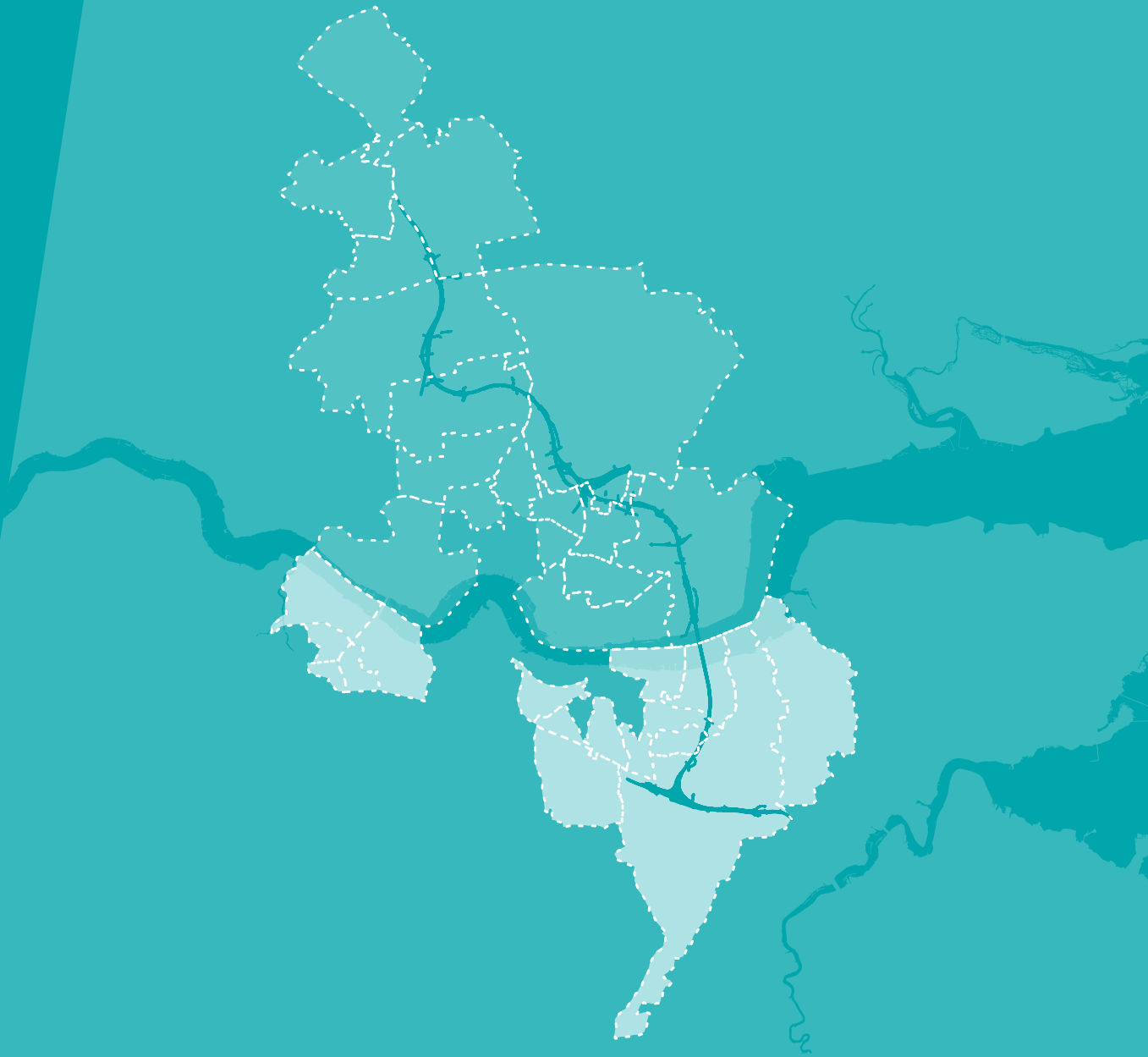


Lower Thames Crossing

Ward impact summaries

south of the river



July 2021
Community impacts consultation

South of the Thames

To make the Ward impact summaries more user-friendly, we have split the document into three sections. The first covers all wards south of the River Thames. The second and third sections cover the wards impacted by the Lower Thames Crossing north of the Thames. All three sections include the same introductory chapter, which explains more about the document and the assessments that we have carried out.

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Chapter 1: Introduction

1.1 About this consultation

The Ward impact summaries are among the documents produced for our community impacts consultation. The consultation materials also include:

- **Guide to community impacts consultation**

An overview of the information included in our consultation materials and directions on where to find out more detail in the technical documents.

- **Construction update**

An overview of the principles and methods that would be used to build the new road and tunnel, and changes to existing utilities infrastructure. It also details the measures proposed to mitigate potential adverse effects.

- **Operations update**

Information on the new road, junctions, the tunnel, utilities, environmental design and green infrastructure. It also includes changes we've made since the last consultation, some updates to our traffic forecasts and how the new road would impact the environment.

- **You said, we did**

A summary of responses received during our three previous consultations and how these have been used to further refine the project's design.

In addition to the documents listed above, we are also consulting on draft versions of a number of control documents. These are technical documents that set out how our proposed measures would reduce the potential adverse impacts of the construction and operation of the new road. For more information about these documents, see chapter 1 of the Construction update.

To make the Ward impact summaries more user-friendly, we have split the printed document into three sections. The first covers all wards south of the River Thames. The second and third sections cover the wards impacted north of the Thames. All three sections include the same introductory chapter, which explains more about the document and the assessments that we have carried out.

Each chapter within the Ward impact summaries includes numerous ward-specific maps showing information about different topic areas. As well as referring to those maps, we recommend that you also visit the online GIS map-viewer on our consultation website and look at the three A3 map books that are included as part of this consultation (see below). In some instances, the GIS viewer and the map books will provide similar information at a larger scale or additional information about the project that may be of interest to you. We also recommend you refer to the other consultation documents described above, which are referenced through the Ward impact summaries.

Map Book 1: General Arrangements

The General Arrangements show the proposed layout details of the project including: permanent works; new roads, earthworks and roadside features; construction compounds; environmental mitigation; landscaping and tree planting; utilities diversions; Order Limits (previously known as the 'development boundary'); and open space and replacement land.

Map Book 2: Land Use Plans

The land use plans show the areas where we are seeking powers to compulsorily acquire land or permanent rights. They also show the land we require temporary rights to use in order to construct and operate the project. Areas we may need to purchase include the land required for the permanent works, temporary works and compensation land.

Map Book 3: Engineering Plans

The engineering plans show plan and profile drawings which detail the vertical and horizontal road alignment. They also include junction arrangements showing the proposed layout and cross-sections throughout the route showing the lanes and earthworks.

Overview of the Ward impact summaries

These Ward impact summaries provide an overview of the proposals for the project and the associated impacts the project would have in nearby wards, should we be granted development consent. We also explain the measures that we would take to reduce the impacts on local communities. We intend to provide you with information that is relevant to your area, so you can take an informed view of how the project might affect you during construction and operation.

Once appointed, our contractors would further develop our construction plans for the Lower Thames Crossing and, as a result, some of the construction methods and timing may differ from those included in this document. For example, utility diversions are subject to agreement on timing with the relevant companies, which work to ensure supply is maintained to all customers and disruption is minimised across areas far greater than the project footprint. In the event that consent is granted for the project, the contractors would need to confirm that any changes to construction methods or timings would not result in an environmental impact that is materially different from that presented in our application.

To make sure people are aware of any anticipated disruption and can plan ahead, we would share more information during construction. If parts of the project are finished before the main route is open, such as the upgrades to the Gravesend East junction, we would inform local communities and road users so they can make use of the upgrades.

Our target date for the road opening is 2029/30, but for the purposes of construction and traffic modelling the opening date is assumed to be 2029 throughout this consultation.

1.2 Ward selection

For the purposes of describing the impacts of the project, we have divided the project up using the existing local authority electoral wards. The wards included are those that are directly affected by the project, in that part of the Order Limits falls within those wards. The Order Limits (also known as the ‘development boundary’) is the area required to build and operate the new road.

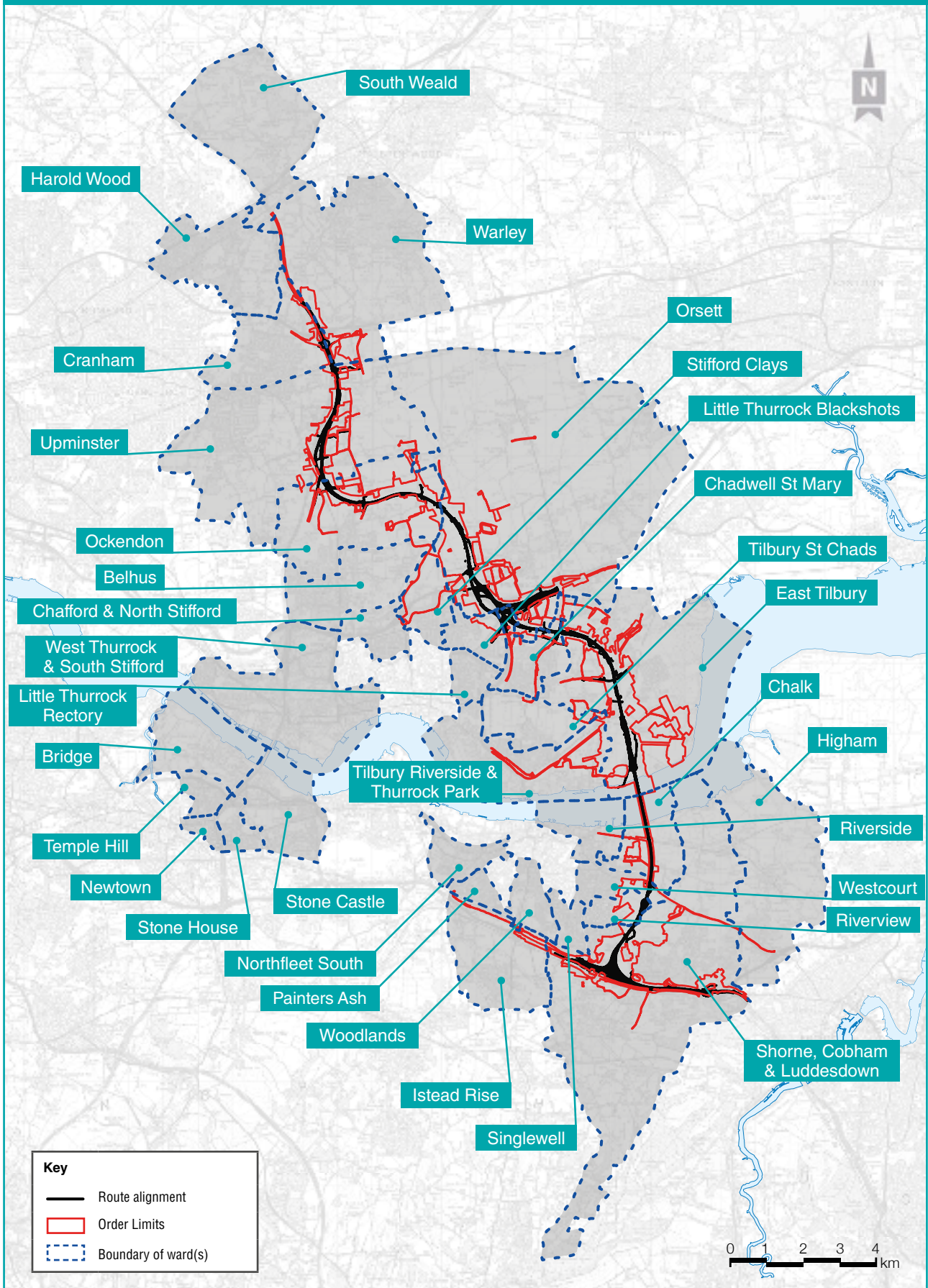
We have also included two chapters covering wards immediately north and south of the Dartford Crossing, even though these are not directly affected by the Order Limits. This is because it is the existing situation at Dartford that underpins the need for the Lower Thames Crossing. Table 1.1 below presents a list of chapters, including the wards in each and the associated local authority, while figure 1.1 maps all the included wards.

The wards in this document are presented from south to the north of the project. In some chapters, two or more wards are presented together because they are impacted in similar ways.

Table 1.1: Ward selection

Chapter	Ward(s) included	Local authority
2	Higham	Gravesham
3	Shorne, Cobham and Luddesdown	Gravesham
4	Chalk	Gravesham
5	Riverside	Gravesham
6	Westcourt	Gravesham
7	Riverview	Gravesham
8	Singlewell	Gravesham
9	Woodlands	Gravesham
10	Northfleet South; Istead Rise; Painters Ash	Gravesham
11	Newtown; Stone Castle; Stone House; Bridge; Temple Hill	Dartford
12	East Tilbury	Thurrock
13	Tilbury Riverside and Thurrock Park	Thurrock
14	Tilbury St Chads	Thurrock
15	Chadwell St Mary	Thurrock
16	Orsett	Thurrock
17	Little Thurrock Blackshots; Little Thurrock Rectory	Thurrock
18	Stifford Clays; Chafford and North Stifford; Belhus	Thurrock
19	West Thurrock and South Stifford	Thurrock
20	Ockendon	Thurrock
21	Upminster	Havering
22	Cranham; Harold Wood	Havering
23	Warley; South Weald	Brentwood

Figure 1.1: Map of the wards featured in this document



1.3 Topics covered in each chapter

We've divided each chapter into 12 sections (listed in table 1.2). In each one, we summarise the existing situation and explain how construction and operation would have effects within the ward(s). We set out what the impacts could be and the measures we would use to reduce them. Where there are no significant impacts, this is highlighted.

Landscape, climate, geology and soils, archaeology and water management are predominantly dealt with at a project-wide level in the Construction and Operations updates, with additional maps and information. Following engagement with local authorities, it was determined that these impacts were more appropriately dealt with on a project-wide level. Traffic impacts are covered both at a ward and project level.

Table 1.2: Topics in each ward impact summary

Section	Topics covered
Overview	Information about the ward, including area, population and significant features, such as population centres and transport links. This section also includes a table summarising the impacts and mitigation expected in this ward.
Project description	The construction activities required to build the project in this ward, including information about traffic management measures associated with construction. It also includes information about the elements of the new road that would be in this ward once the project is open, information about the impacts on open space and recreational land, and changes to the Order Limits since our design refinement consultation in 2020.
Traffic	Descriptions of the impacts of construction on local roads, including HGV and project workforce movements. It also includes information about traffic flows on roads in the ward once the project is open, and information about how the new road would affect journey times and the availability of job opportunities for people within the ward.
Public transport	The impact on bus and rail services during construction, including any closures or diversions required. It also sets out the impacts on bus and rail services once the new road is open, with the latter including information about journey times by car to nearby stations.
Footpaths, bridleways and cycle routes	The impacts of the project on footpaths, bridleways and cycle routes during construction, including any proposed diversions. It also includes information about new and upgraded routes once the new road is operational.
Visual	The visual impacts of the construction and operation of the Lower Thames Crossing, as well as information about how we have sought to reduce these through measures such as landscaping and good design.
Noise and vibration	Daytime noise impacts from construction sites, information about traffic noise for each year of construction, and a summary of areas likely to experience 24-hour/ seven-day working. This section also explains the anticipated noise and vibration impacts of the new road once it is operational. It also includes information about the measures put in place to reduce noise and vibration impacts during construction and operation. More information about the noise and vibration assessments carried out can be found below.

Section	Topics covered
Air quality	Air quality impacts during construction of the new road, including the impact of construction traffic. It also explains the controls that would be in place during construction to reduce the impacts of dust, while providing information about the impact on air quality once the new road is open. More information about the air quality impact assessments carried out can be found below.
Health	The potential positive and negative impacts of the project on people's health and wellbeing, including from increased access to job opportunities and from changes to noise or air quality. Demographic data presented in the Health sections is derived from independent sources such as the UK Census and the Office for National Statistics.
Biodiversity	The impact of the new road on local flora and fauna during construction and operation. Where relevant, this section includes information about designated sites. It also describes our work to create new habitats, build green bridges and introduce landscaping measures.
Built heritage	The impact of construction and operation on conservation areas, listed buildings, scheduled monuments and other buildings of local importance. This section includes information about how we have sought to preserve the integrity of local built heritage where possible.
Contamination	How we would manage existing sites of potential contamination, such as landfill and petrol stations, to prevent harm to local land or water supplies. It also sets out procedures to manage contamination from incidents, such as collisions, once the road is open.

1.4 Transport

1.4.1 Construction traffic

There would be more traffic on the roads in the vicinity of the project due to people travelling to the construction sites and the delivery of materials. The location of the construction activities and traffic management measures within each ward are discussed in the Project description section of each chapter, along with information about the expected daily number of construction vehicles travelling to and from each site.

Traffic management measures would be required on the road network at different locations and for varying lengths of time during construction to maintain safety for all road users and the project workforce. A list of all currently proposed measures is presented in the Outline Traffic Management Plan for Construction (OTMPfC), which is one of the technical documents included in this consultation.

Local diversions during construction may be required for some bus routes and these are reported in the relevant ward chapters. Information is also provided about likely disruptions to rail services that serve each ward.

Information about closures and realignments of existing footpaths, bridleways and cycle routes is presented for each ward.

1.4.2 Operational traffic

We have used traffic modelling to forecast what the conditions on the road network are predicted to be in the project's opening year, 2029, both with and without the project. Maps showing data for current and predicted traffic flows and road capacity for the wider area can be found in the Operations update, which also includes information about how we carried out our modelling.

For this consultation, local adjustments were made to our modelling to update the geographic information, such as the location of new housing, retail and leisure sites, and the trips associated with them. We have included the main future development areas that are either under construction or already within the planning process, based on local authority information made available at the end of June 2020. More information about how we carried out our operational traffic modelling can be found in chapter 4 of the Operations update.

In each chapter of this document, we also explain the predicted change in conditions on the road network within each ward for three different time periods: the morning peak hour (7-8am), the interpeak period (a typical hour between 9am-3pm) and the evening peak hour (5-6pm). For each time period, we provide a map showing the changes in traffic flows measured in Passenger Car Units (PCUs), where one PCU is equivalent to a car and 2.5 PCUs is equivalent to an HGV. For each time period, we also show the changes in traffic flow as a percentage of the existing traffic flow on that road. On each set of maps, we have not highlighted roads where the change in flow on that road is predicted to be between -49 PCUs and +50 PCUs in each of the modelled time periods.

We have also included maps that show predicted changes in the distance that people within each ward would be able to travel within either a 30 to 60-minute drive once the new road is open.

Information is also provided on any changes to local bus routes and journey times (greater than one minute) within each ward, as well as information about impacts on rail services, including journey times to stations within or near each ward.

1.5 Environmental Impact Assessment

The type and scale of the project means that it automatically requires an Environmental Impact Assessment (EIA) to meet the requirements of legislation and policy. The results of the EIA process is being documented in an Environmental Statement (ES), which will be submitted with our application for development consent.

The EIA follows industry-standard methods as set out in Highways England's Design Manual for Roads and Bridges, along with other topic-specific methods and guidance. Each topic chapter of the ES will be completed by competent experts.

Within the ES, all effects will be reported according to their significance (very large, large, moderate, slight or neutral). These categories are determined by understanding how sensitive a 'receptor' might be (where a receptor is something that can experience an impact, such as a person, property or animal), as well as the size of an impact, which could be classed as major, moderate, minor, negligible or no change. These are understood using a matrix to determine the overall significance of an impact. See table 1.3

Table 1.3: How the size of an impact and the sensitivity of a receptor combine to establish the significance of an effect

		Size of impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
Environmental value (sensitivity)	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

For example, if a major impact affects a 'sensitive receptor' (such as a local community), then the level of environmental effect would be 'very large'. The matrix shows the magnitude of effects possible with different degrees of sensitivity and sizes of impacts. It is shown here to provide the context of the assessment presented in the ward summaries.

The typical methodology used for producing an EIA is not designed to be reported at ward level, so in some cases it can be hard to interpret at that scale. However, the effects have been presented for visual, noise, air quality, health, biodiversity (ecology) and built heritage to help show how communities would be affected by the project. The typical language used in an EIA as shown in table 1.3 has not been used in the ward summaries. However, this is how effects will be presented in the Environmental Statement.

Other topics such as climate, road drainage and the water environment, and geology and soils are presented in chapter 7 of the Construction update and chapter 5 of the Operations update. These chapters also include information about noise and vibration and air quality impacts, presented from a project-wide perspective.

The EIA process follows a series of key steps:

1. Identification of the study area and the receptors to be assessed. Receptors can include people, properties, flora and fauna, and the surrounding environment and its resources.
2. Information on the existing environment is collected through surveys, desk-based studies, and consultation with environmental groups and the public.
3. A Scoping Report was produced to request a Scoping Opinion from the Planning Inspectorate (the government body that oversees our application for development consent). The scoping process identifies the key environmental issues relevant to the project and determines which environmental topics and elements of these topics are to be assessed. This step was completed in 2017.
4. A Scoping Opinion was received from the Planning Inspectorate on 13 December 2017.
5. Environmental assessment of the project to identify any potential significant effects on what is a reasonable worst-case scenario for both construction and operation of the project.

6. Mitigation measures are set out that seek to avoid, reduce or offset potential adverse impacts.
7. Likely significant environmental effects are identified, considering whether effects would be beneficial or adverse, permanent or temporary, while taking proposed mitigation measures into account.

Measures to reduce impacts

To avoid or reduce potentially significant effects on the environment we would use the following:

- Embedded mitigation: Such as the use of cuttings to hide roads or green bridges to link footpaths, bridleways and ecological habitats.
- Good practice: These are standard approaches and actions, for example, suppressing dust to reduce air quality impacts during construction and measures to reduce the risk of pollution.
- Essential mitigation: These are specific measures to avoid or reduce localised environmental effects. They include monitoring protected ecological species during construction or building earth walls (bunds) alongside construction compounds to reduce noise.

More information can be found in the following control documents:

- Design principles: Embedded mitigation would be committed to within this document.
- Register of Environmental Actions and Commitments (REAC): Presents good practice measures and essential mitigation to be carried out during construction and operation of the project.
- Code of Construction Practice (CoCP): Provides a framework to manage construction activities and will accompany the ES when we submit our application for development consent. It aims to make sure environmental mitigation commitments are met and that any necessary consents and licences are obtained.

Throughout this document we have signposted to the above where relevant, while also referring to the Construction update and Operations update.

A Habitat Regulations Assessment is also being prepared and will be submitted with the application for development consent. This is required due to the proximity of the project to internationally designated sites including Thames Estuary and Marshes Special Protection Area and Ramsar site.

1.6 Air quality and noise assessments

The effects reported in the ward summaries are representative of a reasonable worst-case scenario, which is the basis for carrying out environmental assessments. This is assessed for the construction and operation of the project and takes account of mitigation which we have proposed to avoid, reduce or offset the effects. As a reasonable worst-case scenario has been considered, the actual impact of the project on air quality once constructed may well be less than we have assessed.

Although the impacts set out in the ward summaries provide a reasonable representation of the likely effects from our proposals in this consultation, the air quality and noise assessments are based on earlier versions of the project. The information provided about air quality and noise when the road opens is based on traffic data from an earlier opening year than is now planned for and the construction traffic air quality and noise information does not include all of the traffic management measures that we have developed subsequently.

The chapters in this document present an indicative summary of the likely effects of the project for each ward or group of wards, although further modelling will be required. For consultation, more information is described in relation to construction compounds and activities than has been included within air and noise predictions that are presented.

Air quality assessment

When a project leads to traffic changes, an air quality assessment is carried out. Roads that are modelled as part of the traffic assessment are included within the air quality assessment. These roads are collectively called the 'affected road network'.

Nitrogen dioxide (NO₂) is one of a group of gases called nitrogen oxides, which are generated by road traffic (among other things). There is evidence that high levels are harmful to health, causing symptoms such as shortness of breath and coughing. The health effects are likely to be more pronounced in people with pre-existing conditions like asthma. PM₁₀ is a type of particulate matter (fine particles of dust) that is also generated by road traffic and high levels can cause similar health issues.

Before an air quality assessment can be made, it is important we understand what the current air quality is like in the area. We have sourced air quality data from local authorities and the Department for Transport, used existing Highways England data, and collected our own project data. Background air quality is measured by placing diffusion tubes (a type of monitoring equipment) at the roadside, for example, attached to a lamp post for weeks at a time. These tubes are changed intermittently and sent to a laboratory, where they are analysed and the results collated. There are also automatic monitoring stations that continuously measure both NO₂ and PM₁₀ concentrations and collect annual averages. Collectively, these results provide us with a good picture of existing levels of NO₂.

Next, the area is analysed for 'sensitive receptors'. These can be human or natural, so residential properties are included, as well as locations that have an ecological interest, such as Sites of Special Scientific Interest (SSSIs). In line with standards and guidance, only those receptors that fall within 200 metres of an affected road are included in the analysis because air quality impacts tend to decrease beyond this distance.

Following this, we carry out dispersion modelling, which predicts future NO₂ and PM₁₀ concentrations, for scenarios with the new road and without it.

In some ward impact summaries, we explain that we expect local increases and exceedances in pollutants and in others there would be an improvement in air quality. To derive the significance of the effect of the project on air quality best-practice guidance has been followed (in the Design Manual for Roads and Bridges) to establish if the project overall has a significant effect. The conclusion of this assessment of significance is presented in the construction and operation summary documents. Localised increases and decreases in air quality do not necessarily result in a 'likely significant effect', for air quality for the project overall.

Glossary of air quality terms

Air Quality Standards

The project must comply with UK air quality objectives and the relevant Air Quality Regulations, which apply to the UK following withdrawal from the EU and which reflect the limit and target values contained in the EU Air Quality Directive.

Air Quality Standards (AQS) are concentrations recorded over a given time. They take into account what is known about the effects of pollutants on health and on the environment, and can be used as a benchmark to show whether air quality is getting better or worse. AQS have set objectives for two important air pollutants: NO₂ and PM₁₀.

An exceedance is a period of time (defined for each standard) during which the concentration is higher than that set out in the standard.

The parameters set out in the Air Quality Regulations are legally binding and must not be exceeded.

Air Quality Management Areas

Since December 1997, each local authority in the UK has been carrying out reviews and assessments of air quality within its area. This involves measuring air pollution and trying to predict how it will change over the next few years. The aim of the reviews is to make sure the national air quality objectives will be achieved throughout the UK by the relevant deadlines. These objectives have been put in place to protect people's health and the environment.

In addition to the baseline monitoring that we have carried out, we have established which AQMAs are within the vicinity of the project, which helps us understand what the existing air quality is like and where there are areas already impacted by poor air quality. We have used this knowledge to help predict how air quality may change during both the construction of the project as well as after it is built and open to traffic.¹

¹ (Source: <https://uk-air.defra.gov.uk/aqma>).

Glossary of noise terms

Decibels

Decibels (dB) is the unit used to measure noise. The typical level ranges from 30 dB(A)², which is a quiet night-time level in a bedroom, to 90 dB(A), which would be kerbside by a busy road.

When we report noise levels and thresholds within the ward summaries, we use the label 'LAeq'. The 'A' refers to a standard weighting that is applied to noise to represent the range of noise that people can hear. The 'eq' stands for 'equivalent' and means the average noise over an amount of time. The amount of time would then be written after the label, with the most-used time period presented in the ward summaries being 12 hours, which is expressed as 'LAeq12hour'. L stands for level.

Noise impacts are described as being negligible, minor, moderate, or major. These levels of change are associated with an increase in decibels of less than 1.0 dB(A) to greater than 5.0 dB(A), as shown in table 1.4.

Table 1.4: Terms used to describe noise impacts

Noise increase	In decibels	Meaning
Negligible	Less than 1.0 dB(A)	Change in noise is not noticeable
Minor	Greater than or equal to 1.0 and less than 3.0 dB(A)	Change in noise is barely noticeable
Moderate	Greater than or equal to 3.0 and less than 5.0 dB(A)	Change in noise is noticeable (requires concentration to hear)
Major	Greater or equal to 5.0 dB(A)	Change in noise is apparent (can be heard easily)

² (A) shown after dB refers to weighting applied to sound levels to mimic the human hearing range.

Noise assessment

As the area surrounding the project has the potential to be affected by noise caused by construction or operation of the project, a noise assessment is being carried out for both the construction and operational phases. This would predict the likely noise levels from construction traffic and equipment, as well as changes in road noise once the new road is open.

First, we establish existing background noise levels by surveying locations agreed by the Local Planning Authority. These are recorded using sound level meters over a set timeframe, to provide day and night-time averages in decibels.

Noise hotspots

Noise Important Areas are 'hotspots' where the highest 1% of noise levels at residential locations can be found and are defined by DEFRA. These areas provide a framework for further investigation and are used to produce action plans to manage environmental noise and its effects.

British Standard (BS) 5228

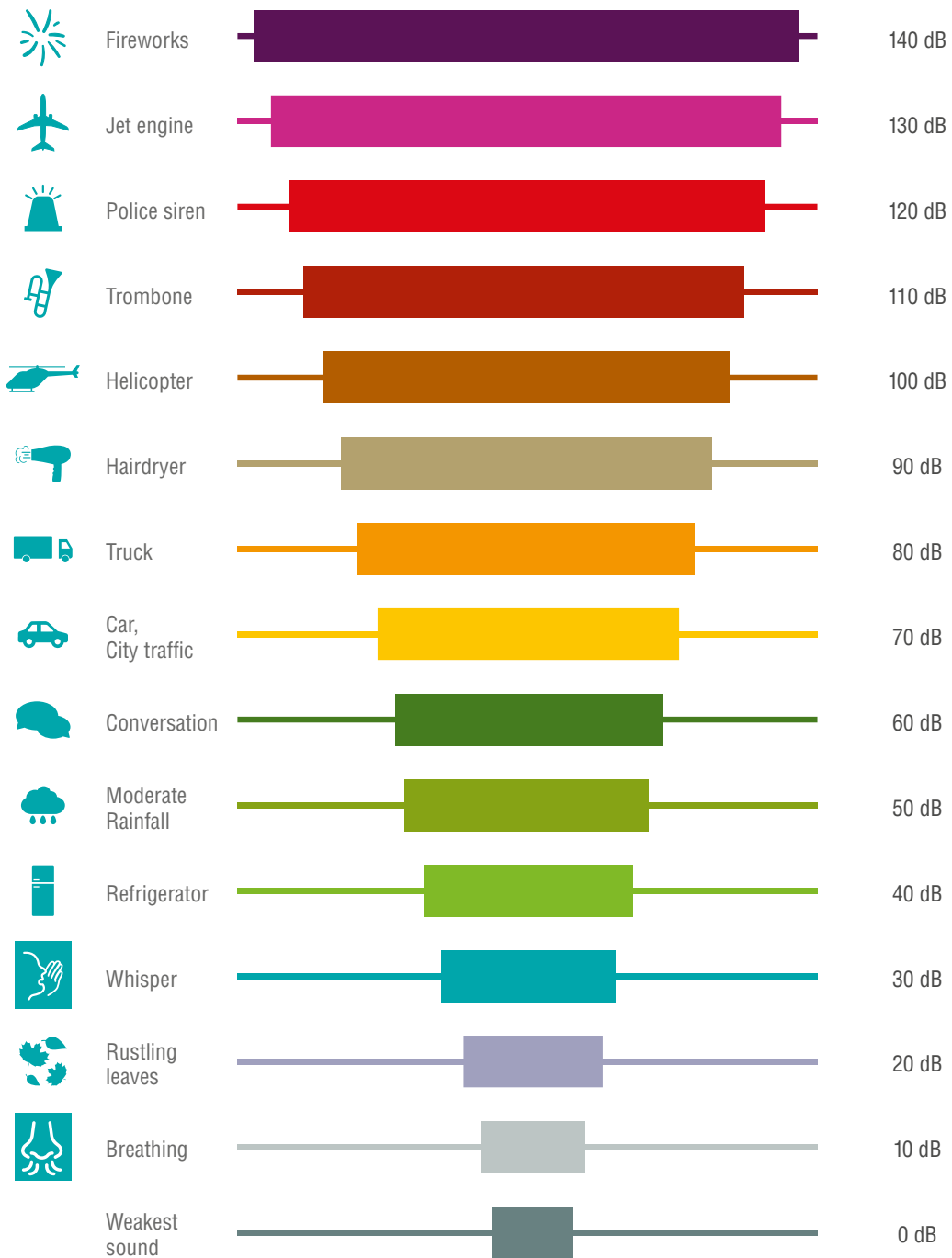
We refer to BS 5228 in the noise sections of the ward summaries. This is a British Standard for conducting noise modelling. It provides the methodology for assessing changes in noise and tells us how we determine the significance of a change. The guidance provides threshold levels for noise during the day, the evening, at weekends and at night. If these thresholds are exceeded mitigation is needed.

Where we present a threshold based on BS 5228 this is done over an average time period. Where we predict that noise levels would be below a threshold this is the average noise level rather than the peak noise level. For example, over the course of a day the average noise level may remain well below the baseline noise levels but individual short-term activities might cause noise levels which peak above the threshold.

Figure 1.2: Noise impacts, decibel changes and how these might be perceived

decibel Scale (dB)

An explanation of the decibel scale and related units for measuring sound and loudness. How noise levels measured in decibels might sound.



2

Chapter 2: Higham ward

This chapter summarises the activities in Higham ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and the Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

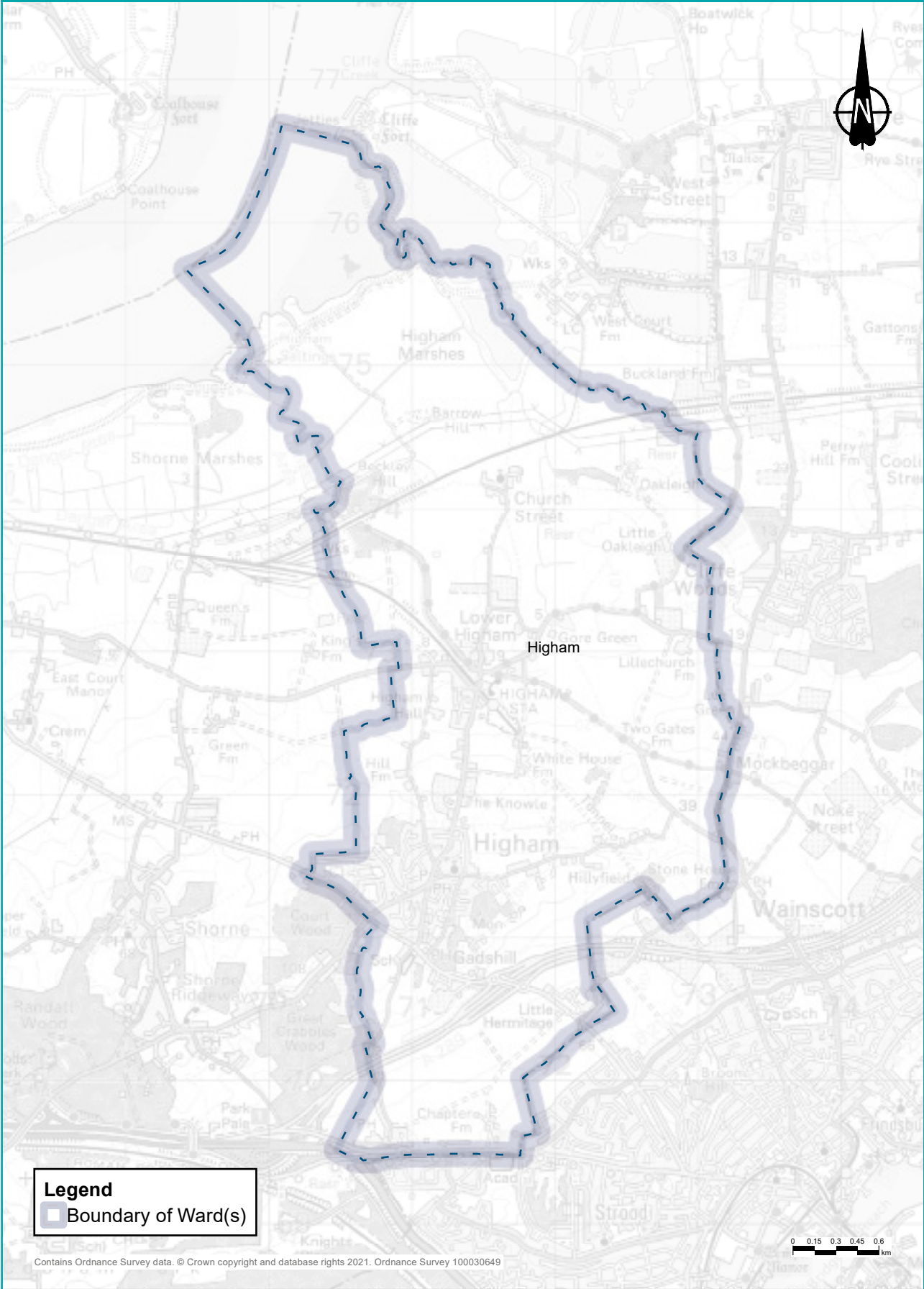
2.1 Overview

2.1.1 About this ward

Higham ward is located south of the River Thames in the borough of Gravesham and to the east of Shorne, Cobham and Luddesdown ward. Higham ward has an area of approximately 13km² and an estimated population of 3,868¹. The ward includes Higham and Lower Higham villages to the north-west of the A226 Gravesend Road, along with areas of farmland and open space to the east and north, which include footpaths and bridleways. Higham station is located within the ward in Lower Higham, served by Southeastern and Thameslink services. The M2, including junction 1, runs along the southern boundary of the ward.

¹ Office for National Statistics, 2018 ward-level population estimate

Figure 2.1: Ward boundary map for Higham ward



2.1.2 Summary of impacts

Table 2.1: Summary of impacts during the project’s construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>Construction traffic accessing the compounds would use the A226, leading to some delays at the junction of the A226 with the A289, and slower journey times along the A226. Traffic management measures on the A2 may result in additional local traffic using the A226.</p> <p>Mitigation</p> <p>Several mitigation measures have been adopted to reduce the impacts during the construction period such as only using one construction route for HGV traffic – the A226 Gravesend Road and the A289 – during the construction process. Additional measures are outlined in the traffic section of this chapter.</p>	<p>Impacts</p> <p>An increase in traffic flows is expected on the A226 Gravesend Road, the A289 and the A2 once the project is operational. There are only small changes in flows predicted on other minor roads within the ward. Analysis on the traffic flow increases and impacts can be found in the traffic section of this chapter.</p> <p>Mitigation</p> <p>A2/M2 widening works would be carried out during the construction of the project to ensure the A2/M2 has capacity for the increased traffic flows, reducing the impact of the project on the local road network.</p>
<p>Public transport</p>	<p>Buses</p> <p>Due to the impacts on journey times along the A226 and at the junction with the A289, bus services along the A226 Higham Road may experience delays.</p> <p>Rail</p> <p>There would be no impact on train services in Higham ward and access to Higham station would not be affected during construction.</p>	<p>Buses</p> <p>There would be no discernible impact on bus services once the project is operational.</p> <p>Rail</p> <p>There would be no discernible impact on rail services once the project is operational, nor on journey times the Higham station.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>The cycle route along the A226 Gravesend Road would be affected during the construction period due to lane closures and traffic signals in place while accesses to construction compounds are built.</p> <p>Mitigation</p> <p>This cycle route would remain open, with impacts only during the first year of construction while works on the A226 take place.</p>	<p>None of the footpaths, bridleways or cycle routes in Higham ward would change once the project is operational.</p>
<p>Visual</p>	<p>Impacts</p> <p>Views of the construction of the project would be limited, but there would be some from residential areas including western end of Old Watling Street, Strood and along the A226 Gravesend Road.</p> <p>New landscaping as well as the Northern Tunnel Entrance Compound would be visible in the distance from Saxon Shore Way long-distance footpath.</p> <p>Mitigation</p> <p>No specific measures to reduce visual impacts are required given the distance and limited views of construction activities.</p>	<p>Impacts</p> <p>There would be minimal views of the project once the new road is open to traffic. There may be greater visibility of the M2 corridor from Higham until new planting establishes.</p> <p>Mitigation</p> <p>Planting removed during construction of the project would be reinstated along the M2 corridor.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activities associated with the widening of the M2 is expected to create noise. There would also be 24-hour, 7-day construction working in particular locations. There would be negligible changes in noise from road traffic for a majority of roads within this ward during the construction period, except along Peartree Lane, Lower Road, Lower Rochester Road and slip roads onto Hasted Road off Gravesend Road where minor increases in noise levels have been predicted.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through the mitigation measures presented in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>There may be changes in noise as a result of changes in traffic flow, traffic speed and the proportion of HGVs on existing roads, as well as from physical changes to the A2/M2 in the south of the ward. This is predicted to range from a negligible reduction to a minor increase in noise.</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on all new and affected roads including the A2/M2 as part of the upgrade works.</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>Residents located within 200m of the project (east of the A2/M2 junction and west of the A226/A289 junction off Gravesend Road) may experience dust and emissions from construction equipment and traffic during the construction phase.</p> <p>Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a temporary minor worsening in air quality in the area around Chalk Road and A226 Gravesend Road as a result of traffic resulting from our traffic management and construction vehicles from 2026 to 2027.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures which are presented in the CoCP and REAC to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>As there are no predicted exceedances, no mitigation has been proposed.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There is likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenity as a result of construction traffic using the A226, as well as mental health and wellbeing impacts associated with stress and anxiety relating to the construction of the project.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to dust emissions, working hours and visual screening, traffic management measures and community engagement. This includes the establishment of Community Liaison Groups.</p>	<p>Impacts</p> <p>There would be improvements in the accessibility of local facilities and amenities, better access to jobs and training, and to open spaces, including new recreational areas outside Higham, such as Chalk Park, near Gravesend.</p> <p>The operation of the project may give rise to some stress-related impacts.</p> <p>Mitigation</p> <p>No mitigation measures for health have been included.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>A small area of landscape planting would be removed around junction 1 of the A2/M2 as part of construction.</p> <p>Mitigation</p> <p>The clearance of landscape planting would be carried out in winter, where possible, to avoid impacts on breeding birds. It would be reinstated once construction is complete in this area. New woodland planting is also proposed north of Park Pale bridge – although this is outside of Higham ward, it would provide strong connections between existing woodland in the ward.</p>	<p>Impacts</p> <p>The operation of the new road could cause mortality of species by encountering road traffic, as well as habitat fragmentation, and disturbance from traffic. This risk is not expected to exceed the current level of risk at the A2/M2.</p> <p>Mitigation</p> <p>Appropriate fencing would keep some animals away from the new road. Newly created habitat would be designed to reduce fragmentation. Good practice measures, as set out in the CoCP and REAC, would be implemented.</p>

Topic	Construction	Operations
<p>Built heritage</p>	<p>Impacts Construction activity would have minimal impact on built heritage but may cause minor changes to the settings of some built heritage by introducing additional noise and lighting.</p> <p>Mitigation Mitigation measures have been included in the REAC relating to air quality, noise and vibration.</p>	<p>Impacts No impacts have been identified.</p> <p>Mitigation Although no impacts have been identified, note that road lighting would be minimised where it is safe and practicable to do so (Design Principle LST.02 and LST.03).</p>
<p>Contamination</p>	<p>There are no known sources of contamination that could be at risk of being disturbed during construction or operation of the project within the Higham ward.</p>	

2.2 Project description

2.2.1 Construction

Construction activities

As shown in figure 2.1, very little of Higham ward falls within our proposed Order Limits (the area of land required to construct and operate the project). The area of the Order Limits along the A226 Gravesend Road shows provision for road-widening to accommodate construction traffic using this road to access construction compounds and Utility Logistics Hub to the west. A small area of Higham ward within the Order Limits in the south-west of the ward would be needed to construct the revised A289-M2 southbound slip-road that aligns with the widened section of the M2 and complete minor modifications to existing utility networks.

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

Construction compounds and Utility Logistics Hub

There would be no construction compounds or Utility Logistics Hub within Higham ward, but there are three compounds to the west of the ward, the A226 Gravesend Road Compound, the Milton Compound and the Southern Tunnel Entrance Compound, as set out in the Construction update. Much of the traffic going to these compounds would travel through the Higham ward, on either the A226, the A289 or the A2. Construction compounds outside the ward are shown in chapter 3 of the Construction update and the adjacent Ward impact summaries. Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

The average daily weekday number of HGVs and cars expected to go to the compounds close to Higham ward, from all directions, during the 11 representative construction phases are shown in table 2.2 below. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Figure 2.2: Main construction areas in Higham ward

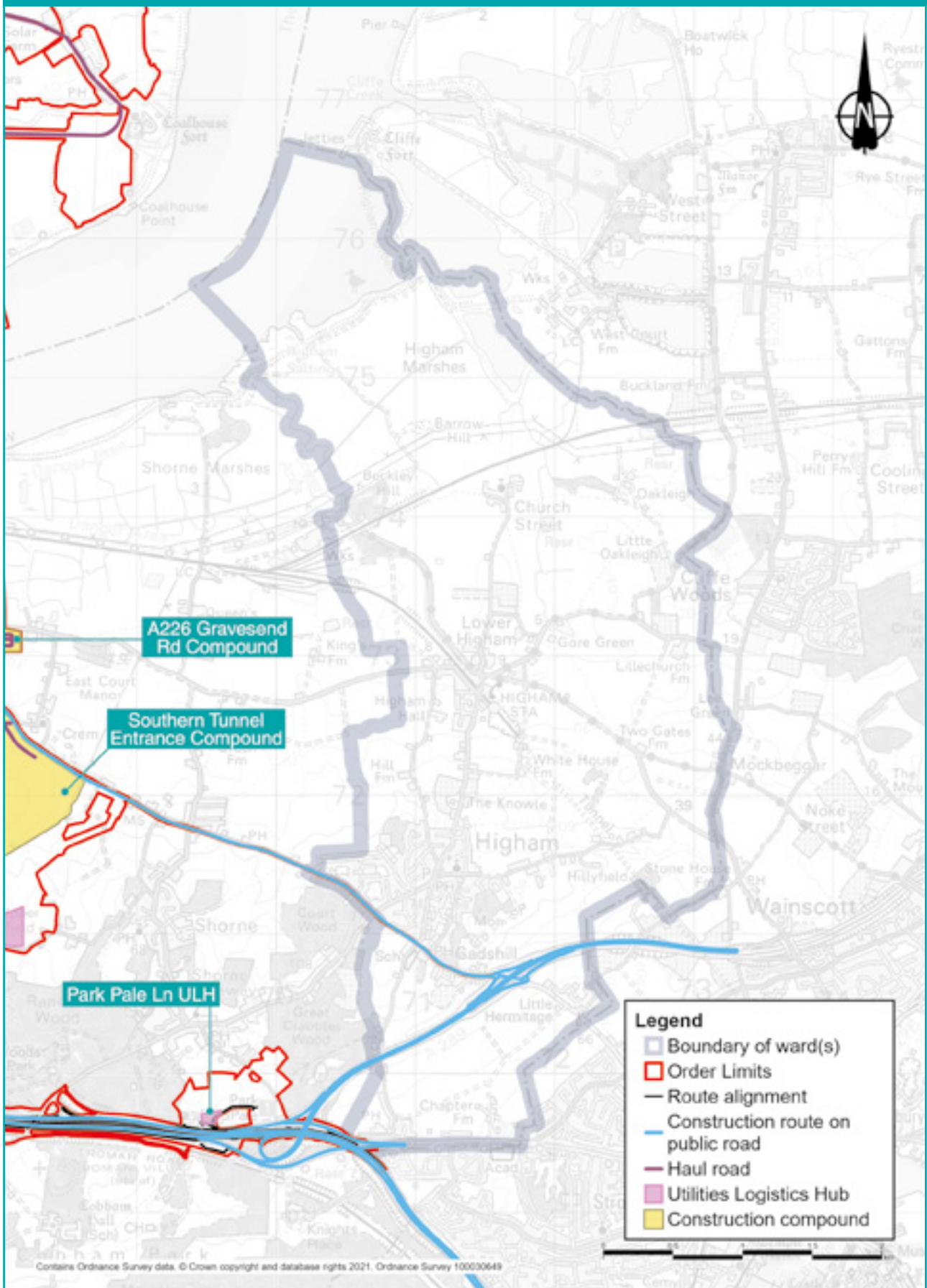


Table 2.2: Average daily vehicle numbers going to compounds near Higham ward

Time period	Southern Tunnel Entrance Compound		A226 Gravesend Road Compound		Milton Compound	
	HGVs	Cars	HGVs	Cars	HGVs	Cars
January to August 2024	30	77	13	21	10	10
September 2024 to February 2025	36	201	13	40	4	9
March to May 2025	39	201	11	40	2	6
June to October 2025	39	281	9	30	2	6
November 2025 to March 2026	39	335	4	14	1	6
April to August 2026	39	317	6	14	5	6
September 2026 to March 2027	39	358	5	20	5	6
April to November 2027	39	378	0	0	0	0
December 2027 to March 2028	39	310	0	0	0	0
April to July 2028	30	209	0	0	0	0
August 2028 to December 2029	8	25	0	0	0	0

The main route into the Southern Tunnel Entrance Compound would be via the A2, the A289 and then the A226 through Higham ward. The shift patterns at this compound would include standard shifts, extended shifts and in some periods shifts across the whole 24 hours.

Access to the A226 Gravesend Compound would be from the A226, so much of the traffic to this compound would travel through Higham ward. The route to the Milton Compound for HGVs would be along the A226 from the A289, so these vehicles and some of the staff cars for this compound would travel through Higham ward.

Construction routes on public roads

The A226 Gravesend Road would be designated as a construction route. This means that HGV and construction workforce traffic would use this road to access the Southern Tunnel Entrance Compound, the A226 Gravesend Road Compound, and the Milton Compound, as well as the Shorne Ifield Road Utility Logistics Hub. Workforce traffic (not HGVs) would also be able to access the Milton Compound via Lower Higham Road. In addition, construction traffic would use the A2, M2 and the A289. These roads would remain open to the public throughout the construction period, with the exception of night and weekend closures for specific works.

Construction schedule

Construction of the whole project is scheduled to last for six years from 2024 to 2029. To complete the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and programmes for the work packages in Kent can be found in chapter 3 of the Construction update.

Construction working hours

Most construction activities in this ward would be carried out during core hours, from 7am to 7pm on weekdays and 7am to 4pm on Saturdays. However, there would be circumstances when our working hours would need to be extended. For example, connecting new roads to existing ones would be carried out when the road is less busy to promote safer conditions for roads users and construction workers. Working outside of the core times can also benefit road users by reducing the need for traffic management measures during peak times. More information about working hours can be found in the CoCP and in the Noise and vibration section.

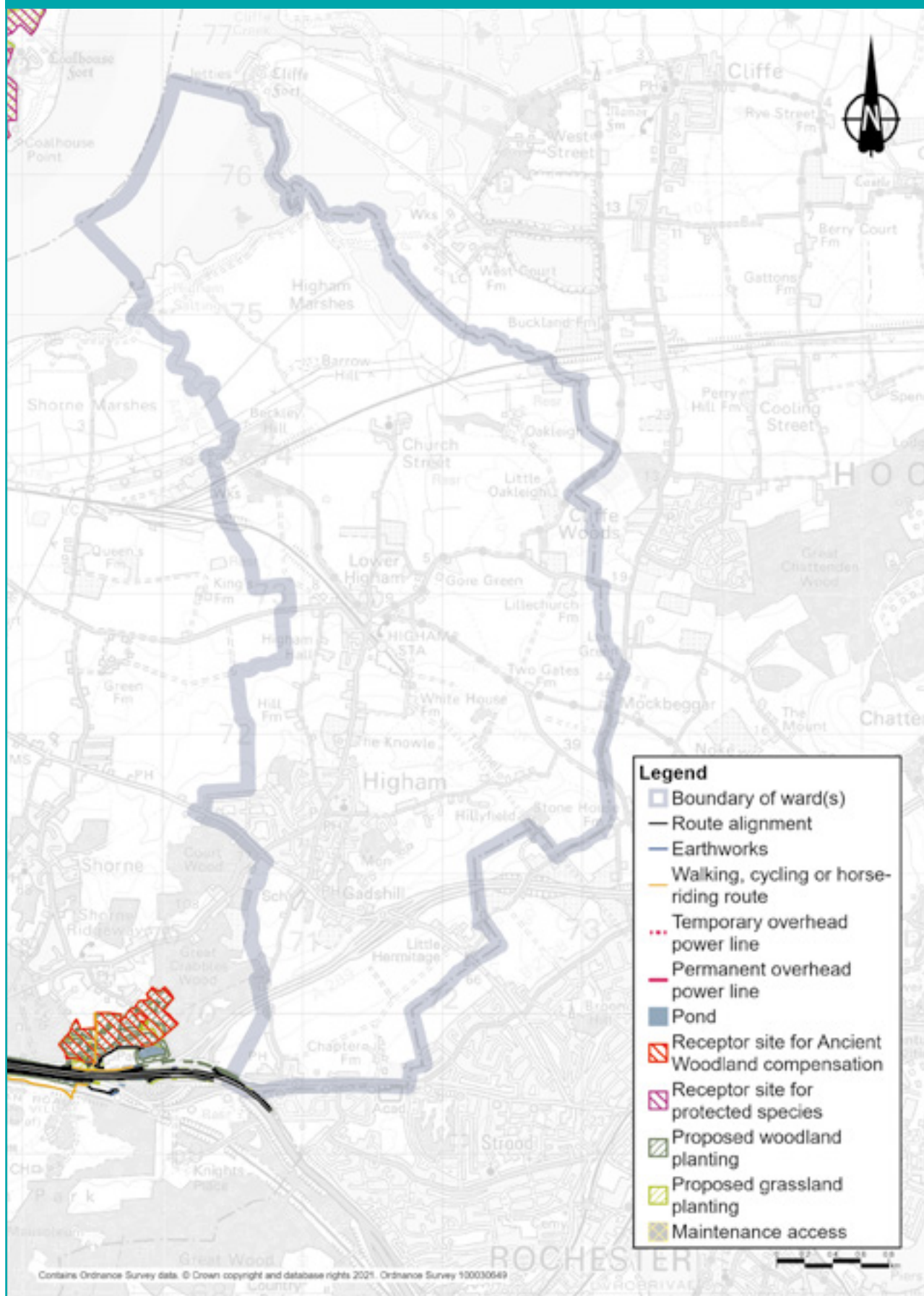
Traffic management

There are no traffic management measures within Higham ward itself. Traffic management across the region is set out in the OTMPfC.

There is a local diversion route that runs along the A2 in Higham ward. A replacement bridge is proposed at Brewers Road bridge and the existing bridge would need to be demolished before the replacement can be built. The eastbound slips on and off the A2 would remain open, other than for specific works which would require night and/or weekend closures, but it would not be possible to pass over the A2 using Brewers Road over the A2 for around 19 months. The diversion route would be via the Gravesend East junction for traffic from the south of Brewers Road bridge that is travelling north, and via the Rochester roundabout for traffic from the north of Brewers Road bridge that is going south. These diversions are shown in figures 3.4 and 3.5 in chapter 3. HGVs would be advised to use the A289 junction rather than the Rochester roundabout on the A2 but the number of HGVs using Brewers Road is very low. There would be a ban on the project's HGVs using Brewers Road north of the A2 throughout the construction period.

There would be traffic management measures outside Higham ward that would impact on traffic on the road network within the ward. We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the OTMPfC. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

Figure 2.3: Main features of the operational project in Higham ward



2.2.2 Operations

The completed project

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements. This section sets out the elements of the project that would feature permanently in Higham ward once construction is complete. Figure 2.3 shows the section of the completed project within Higham ward.

As shown in figure 2.3, only a small part of the completed project would be within Higham ward, with the M2-A289 southbound slip road being realigned to connect to the newly widened M2. The realignment includes environmental mitigation and improvement works.

Changes to the project since our design refinement consultation

As part of our ongoing design development, including discussions with utility companies, we have made several changes to the project and its Order Limits since our design refinement consultation in July 2020. More information about any proposed changes can be found in chapter 3 of the Operations update. However, there are no such changes in Higham ward.

Impacts on open space land

Within Higham ward, there are no changes to our proposals to remove or replace open space or special category land. More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

2.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the project's construction and once it is operational, compared with the situation if the project was not implemented. Information about how we carried out these assessments can be found in chapter 3 of the Operations update.

2.3.1 Construction

Construction traffic impacts

Although there are no traffic management measures within Higham ward, there are traffic management measures outside the ward, on the A2, that would impact on traffic on roads within the ward. The traffic management measures on the A2, which are programmed to occur between June 2026 and April 2028, may result in some local traffic from Gravesend going into the Medway towns choosing to route via the A226 through Higham rather than along Valley Drive and the A2.

The biggest impact on the road network in Higham is likely to come from the extra traffic using the A226 to access the compounds. This additional traffic may lead to some delays at the junction of the A226 with the A289 and slower journey times along the A226.

Measures to reduce construction traffic impacts

Our approach to construction has been continually refined after further investigations, feedback received during consultation and engagement with stakeholders. A summary of the measures introduced to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update and in the OTMPfC.

To reduce construction traffic impacts in Higham ward, we have included the following proposals:

- No local roads other than the A226 Gravesend Road would be used as a construction route within Higham ward. Construction traffic arriving and leaving the area would also use the A2 and the A289.
- The A226 Gravesend Road construction route would be used for works north of Thong Lane, which involve significant excavation works.
- Our proposals allow for re-use of excavated materials, and would substantially reduce the need to dispose of excavated material via the road network, thereby reducing the number of HGV movements on the A226 Gravesend Road. For more information about HGV movements, see the Construction update.
- The A226 Gravesend Road has been included in the Order Limits to allow temporary road-widening if required to maintain the safety of other road users while it is used by construction traffic. Our design changes, including a reduction in the amount of offsite disposal required, has meant we would seek to minimise these works, reducing the impact on local communities.

2.3.2 Operations

Operational impacts

Figures 2.4, 2.6 and 2.8 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 2.5, 2.7 and 2.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

The A2 runs along the southern boundary of the ward from the Three Crutches A2/M2/A289 junction on towards Strood and Rochester. In the morning peak there would be an increase in traffic westbound, towards the project of between 250 and 500 PCUs an hour, which is over a 40% increase in traffic. The road has the capacity for this increased level of traffic. In the evening peak the highest increase in traffic levels is eastbound and is less than 250 PCUs an hour.

The A289 runs through the ward towards Wainscott. We predict that it would experience an increase in traffic levels, with the largest being an increase in flows southbound in the morning peak of between 250 and 500 PCUs.

The A226 Gravesend Road would have an increase in traffic eastbound towards the A226/A289 junction of between 50 and 250 PCUs in the morning, evening and interpeak periods. This is between a 20 and 40% increase. The additional traffic is from people in Chalk and Shorne driving eastbound mainly to join the A249. In the evening peak, there would be some additional traffic from drivers who choose to drive through Shorne Ridgeway and then the Gravesend Road to reach the A289 rather than use the Three Crutches junction. There would be a small increase in traffic of between 50 and 250 PCUs westbound in the evening peak period. This is a 10 to 20% increase.

There would be no discernible change in traffic flows on other local roads in Higham or Lower Higham.

Figure 2.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

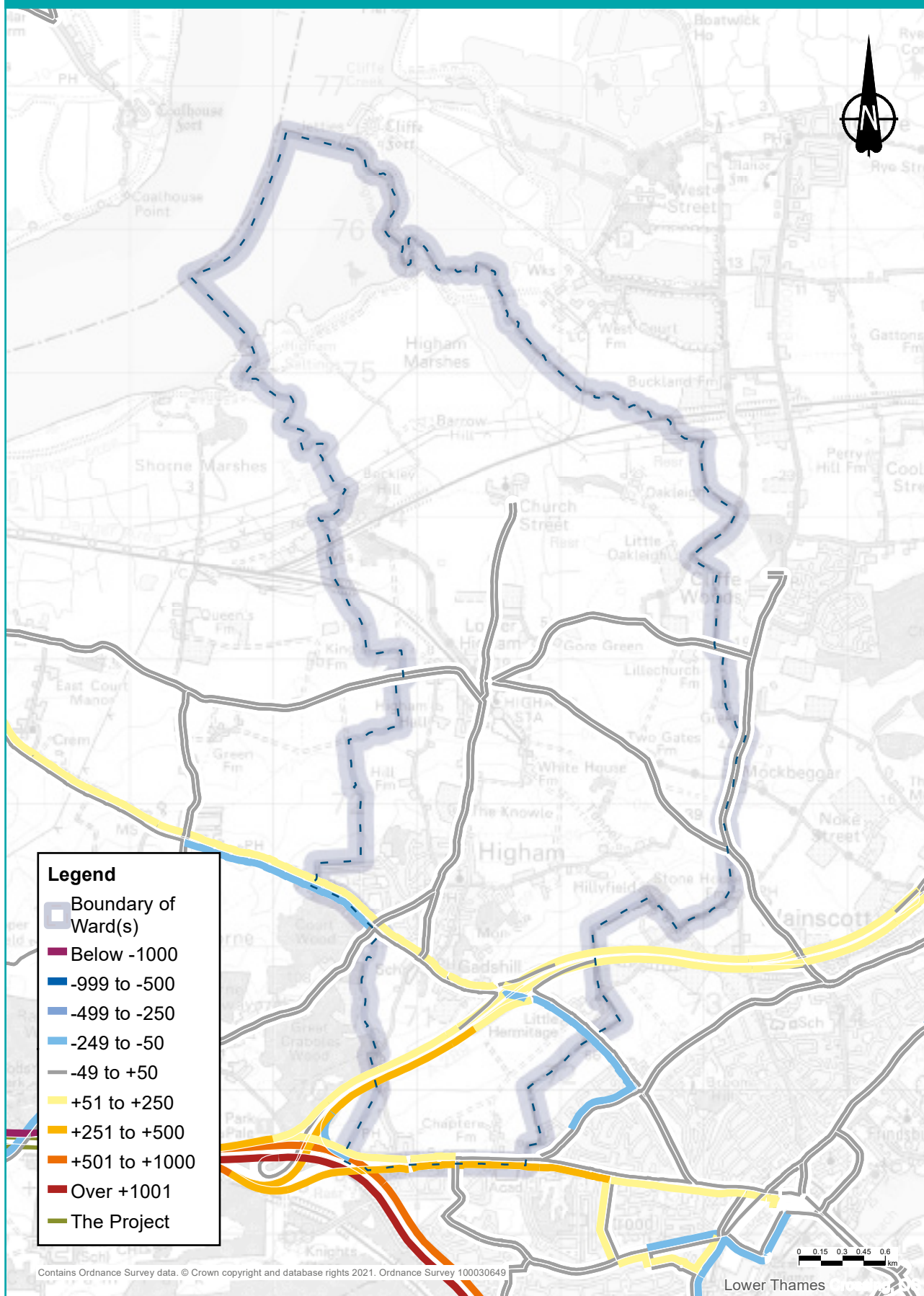


Figure 2.5: Predicted percentage changes to traffic flow during the morning peak in 2029

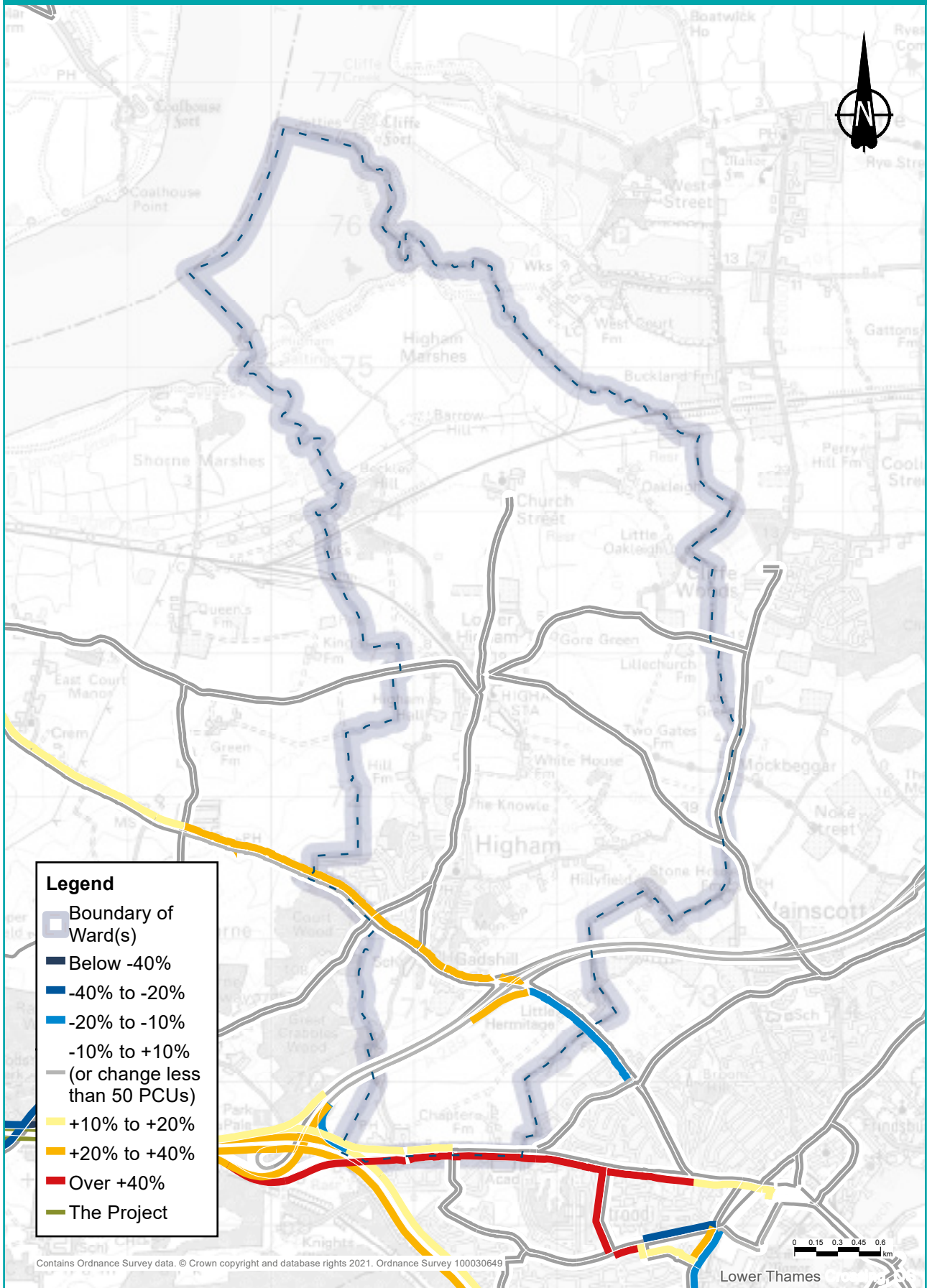


Figure 2.6: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

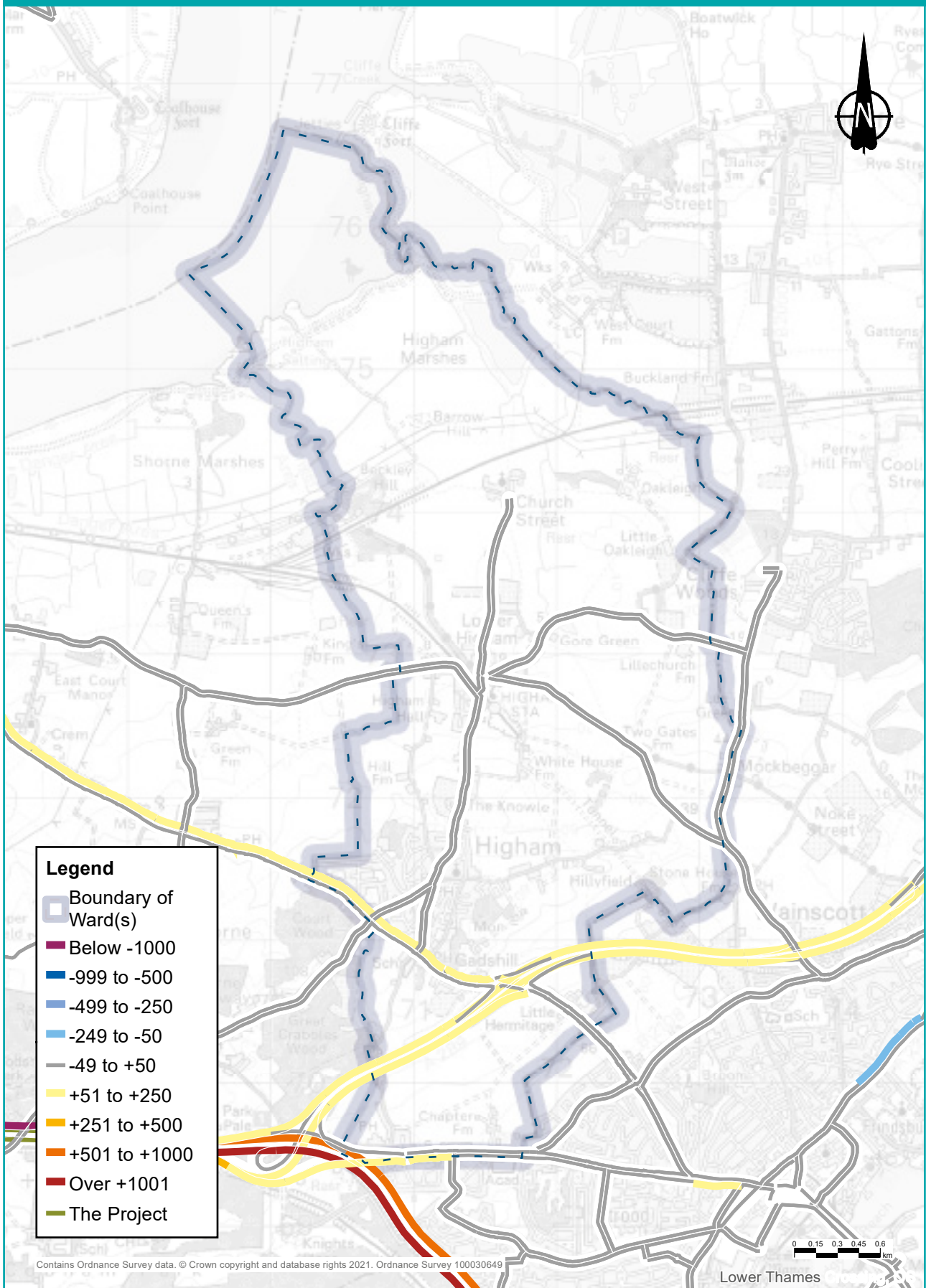


Figure 2.7: Predicted percentage changes to traffic flow during the interpeak in 2029

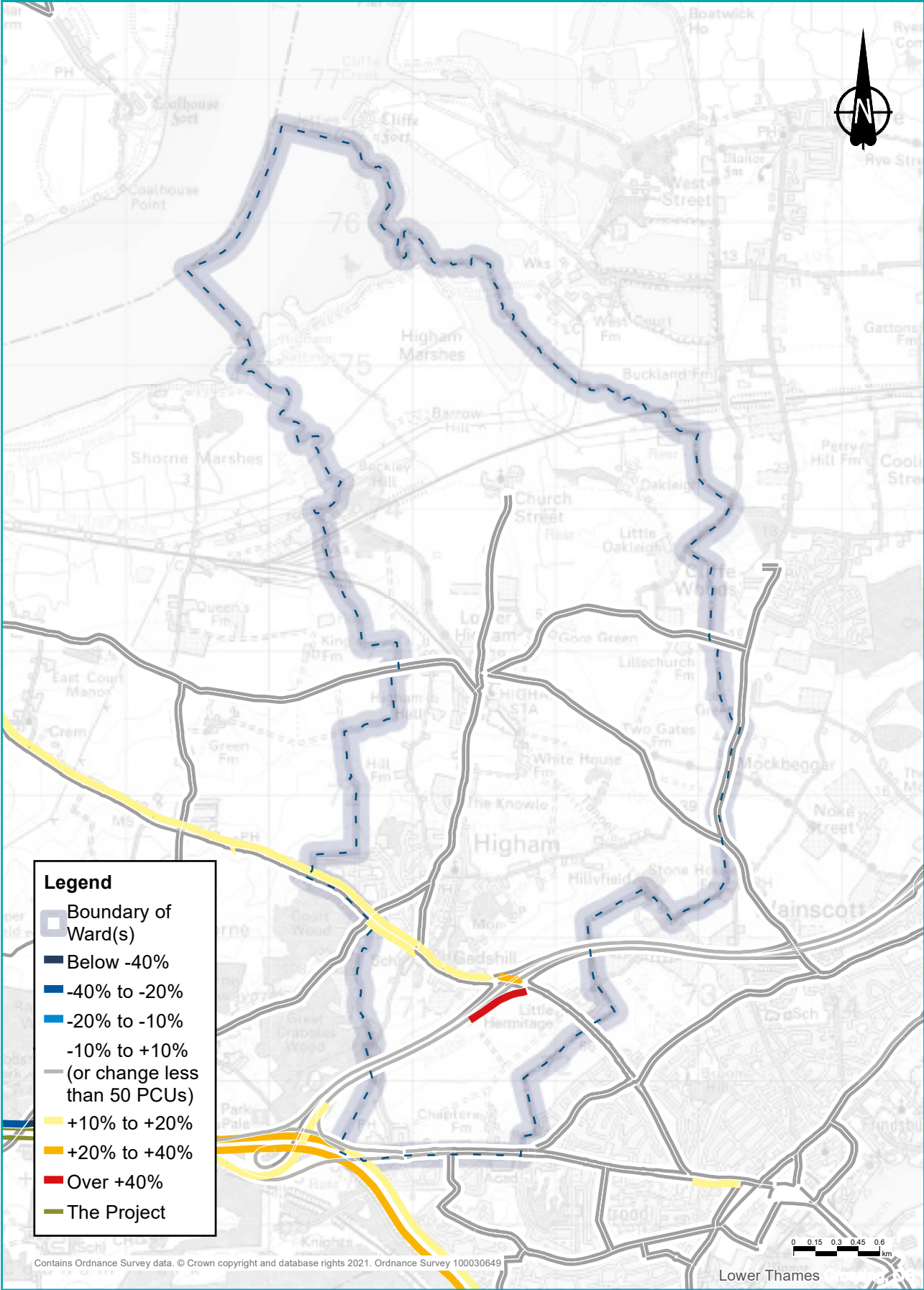


Figure 2.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

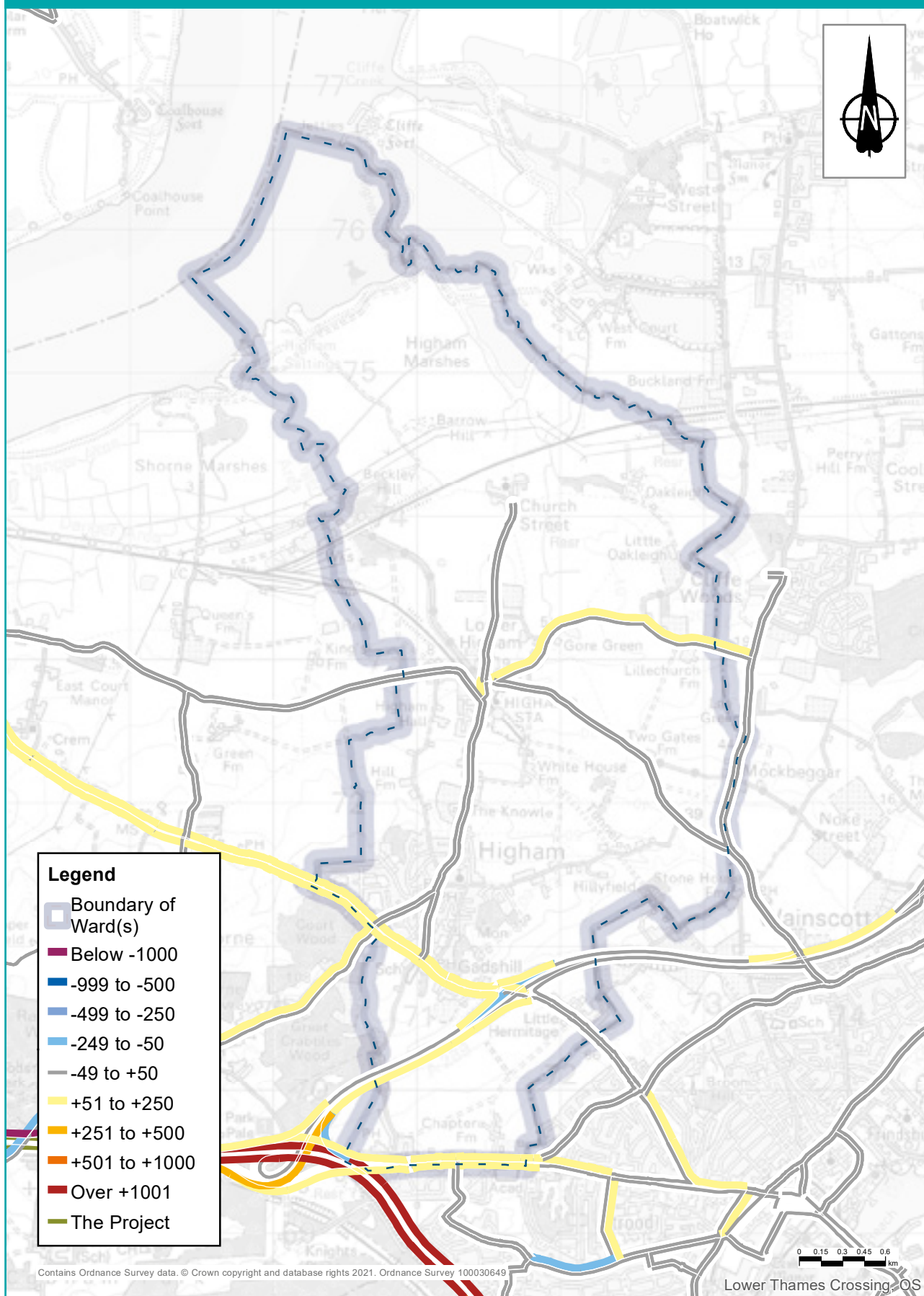
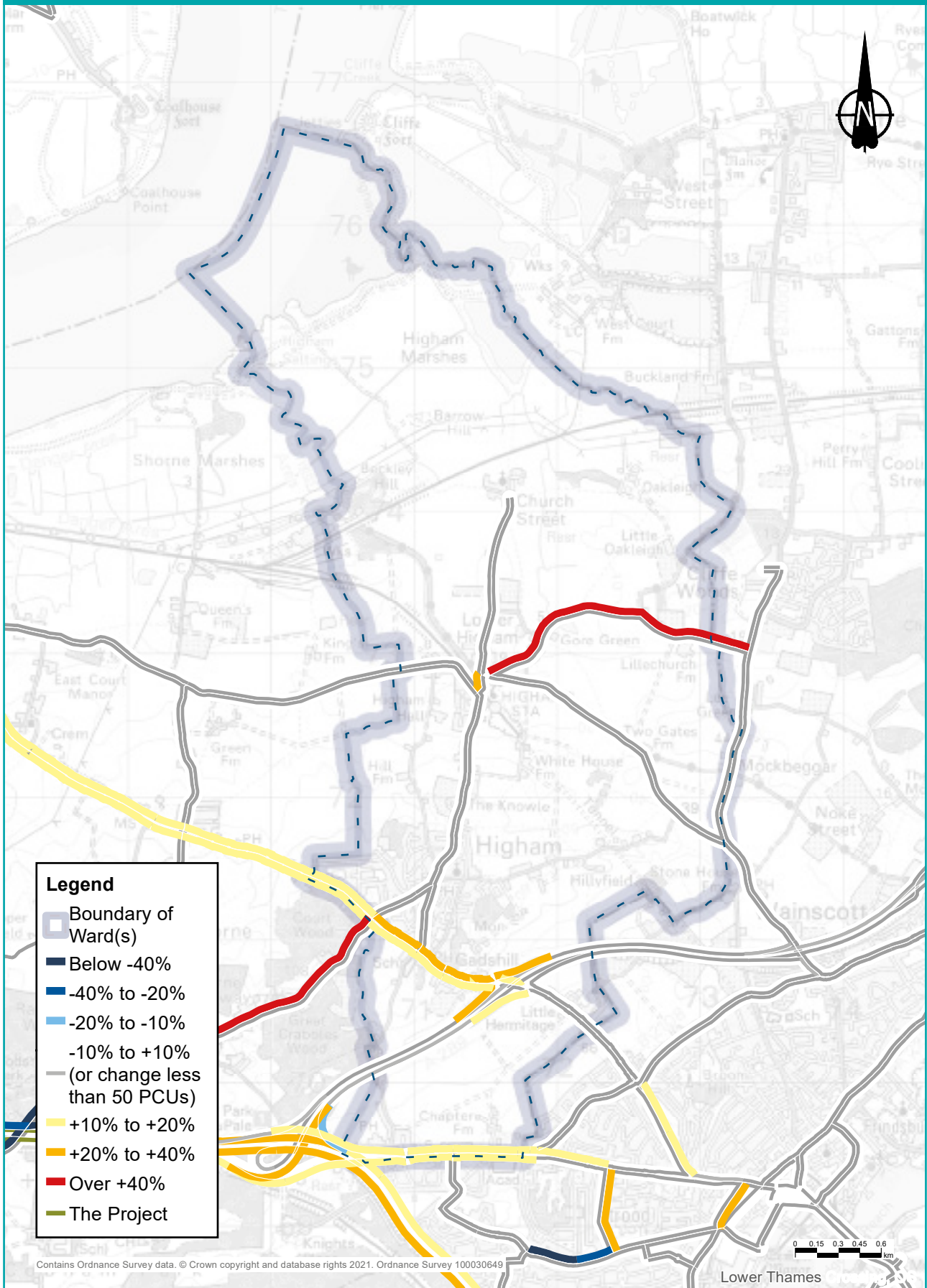


Figure 2.9: Predicted percentage changes to traffic flow during the evening peak in 2029



Changes to journey times

Figure 2.10 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with the project. Figure 2.11 shows the change in areas that can be reached within a 60-minute drive. The areas have been calculated for the morning peak hour (7-8am). The number of jobs within a 30-minute drive increases by 31%, which provides access to an additional 105,900 jobs. The number within a 60-minute drive increases by 33%, which provides access to an extra 685,000 jobs.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.

Figure 2.10: Change in area that motorists could drive to within 30 minutes from Higham ward

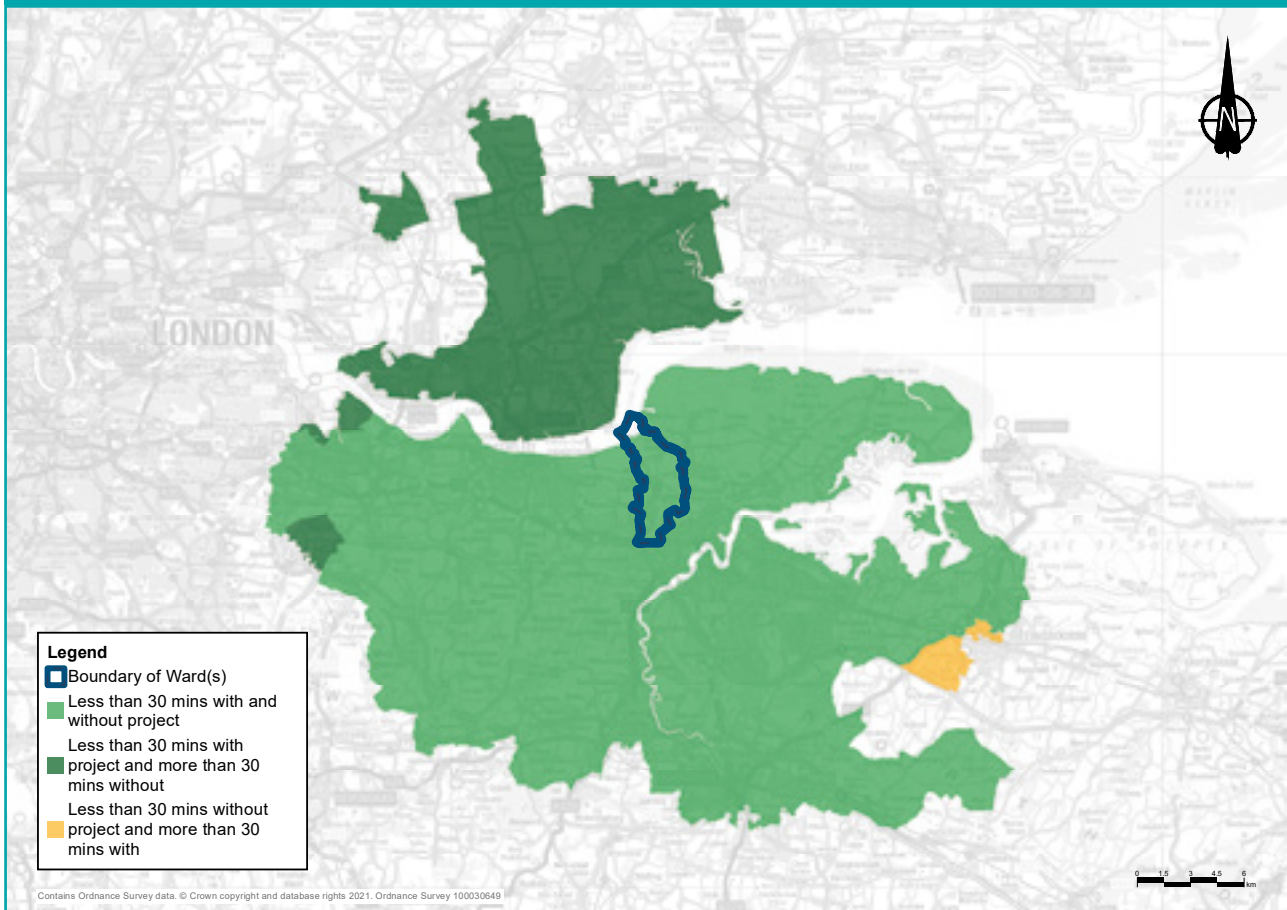
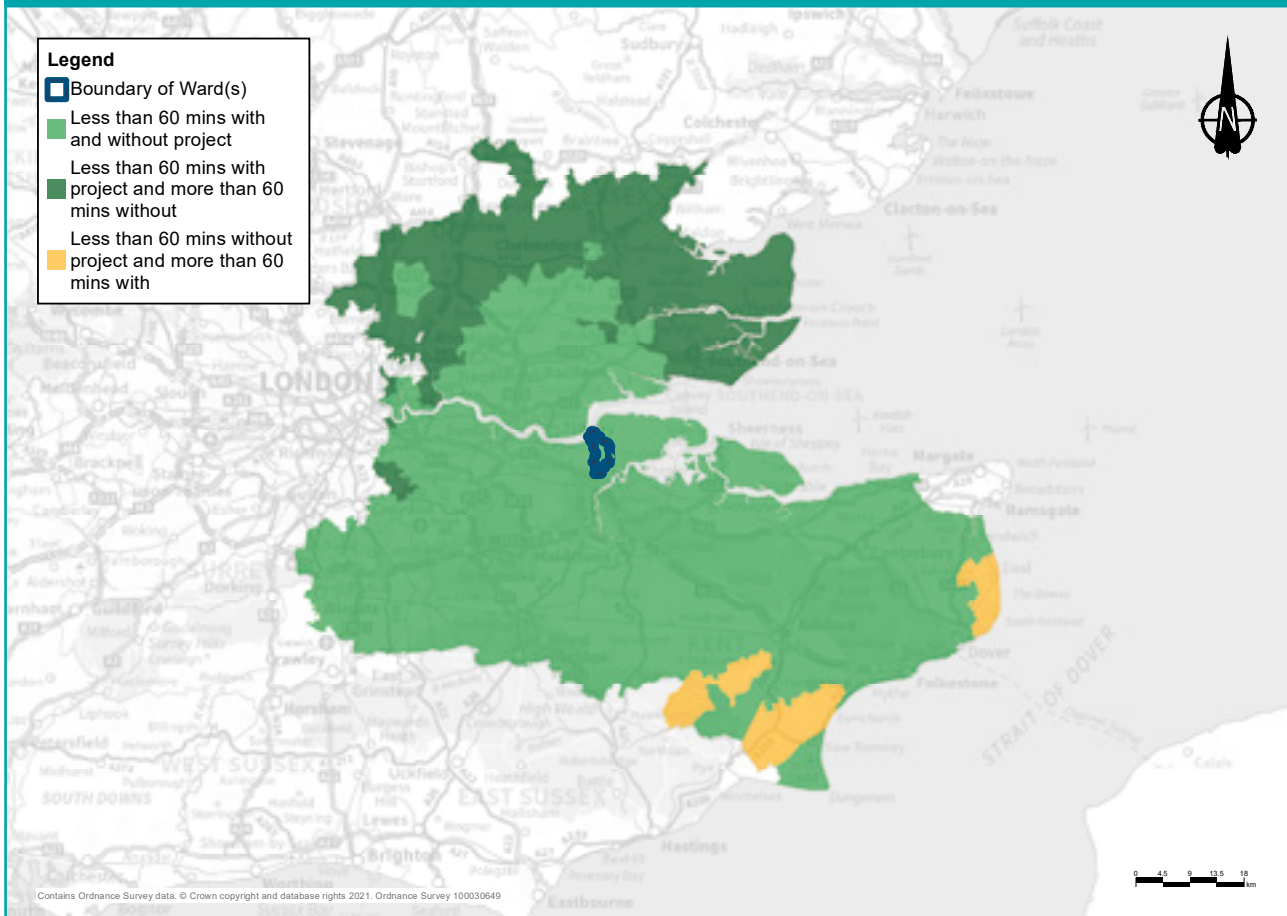


Figure 2.11: Change in area that motorists could drive to within 60 minutes from Higham ward



Operational traffic flows

Widening works on the A2/M2 have been included as part of the project because this section of the Strategic Road Network is expected to see increases in traffic as a result of the new River Thames crossing. In addition, the section of the A2/M2 between the project and M2 junction 1 has been widened through the introduction of parallel link roads, which provide an additional two lanes in each direction, improving safety by reducing the risk of high-speed collisions during lane-changing. Collisions are a significant cause of congestion on the road network.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

2.4 Public transport

Existing situation

Higham ward is served by 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 across London to destinations such as St Albans, Luton and Bedford. There is only one station in Higham ward, which is Higham station located in the hamlet of Lower Higham.

Several bus services pass through this ward, including services along the A226 Higham Road.

2.4.1 Construction

Rail

There would be no impact on train services in Higham ward, and access to Higham Station would not be affected during construction.

Buses

Due to the impacts on journey times along the A226 and at the junction with the A289, bus services along the A226 Higham Road may experience delays. Local bus routes that would be impacted include the 111, 190, 311, 417, 668, 735 and the 736.

2.4.2 Operations

Rail

Once the project is operational, there would be no discernible change in local access times to Higham station and no change to rail services at the station.

Buses

There are no changes to bus routes through the ward required once the project is operational and no discernible change to bus journey times.

2.5 Footpaths, bridleways and cycle routes

Existing situation

Higham is a largely rural ward with a bank along the River Thames in the north and the suburban area of Higham in the south.

2.5.1 Construction

Construction impacts

Due to the construction activities in the neighbouring ward of Shorne, Cobham and Luddesdown, there would be minor disruptions in Higham ward during the first year of the construction period.

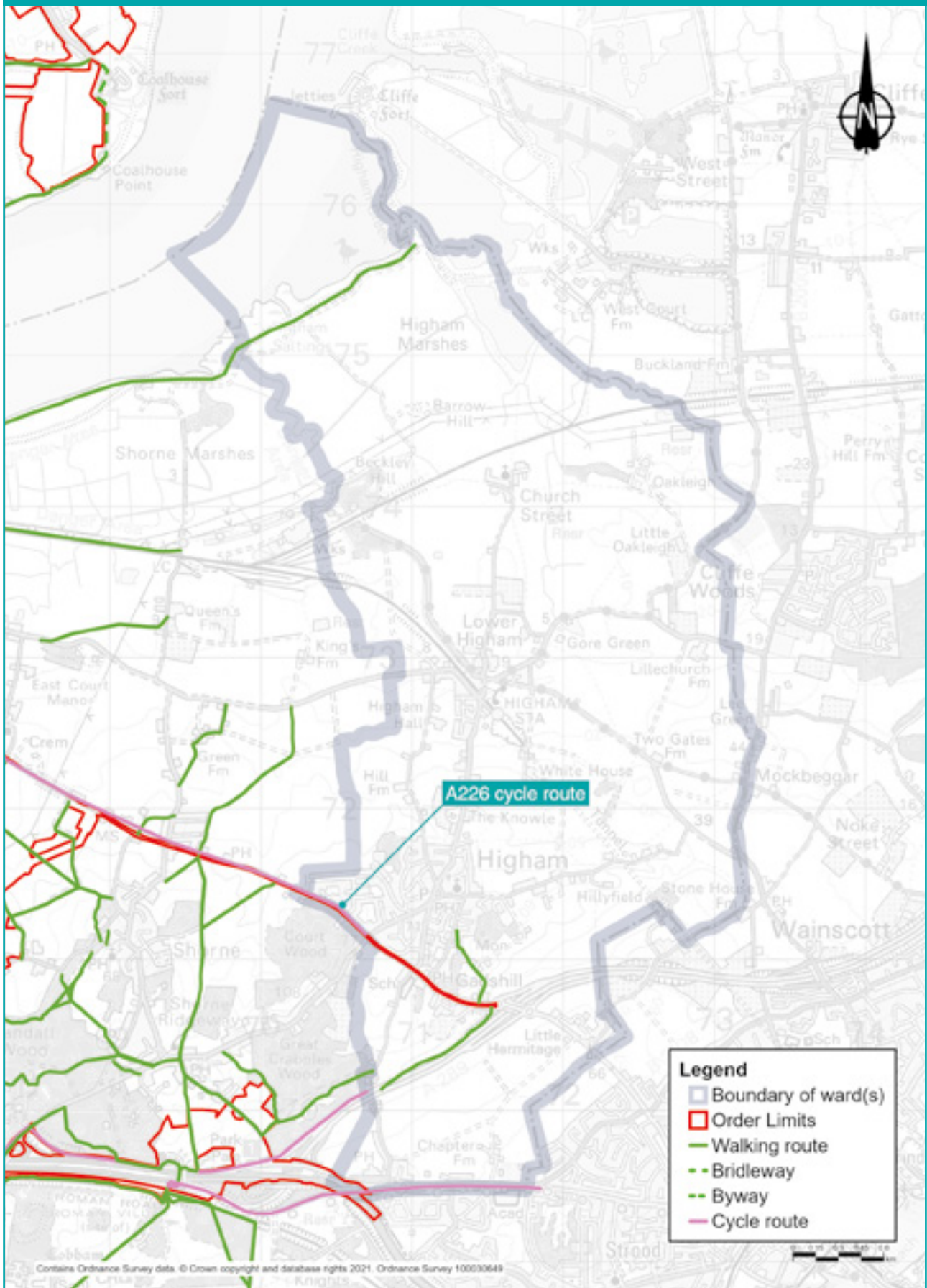
The cycle lanes along the A226 would be impacted during the first year of construction while access to work compounds are constructed. During this period, the A226 would be under a single lane traffic control system.

2.5.2 Operations

Operational impacts

There would be no permanent changes to footpaths, bridleways or cycle routes once the project is operational.

Figure 2.12: Footpaths, bridleways and cycle routes near the project in Higham ward



2.6 Visual

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video-fly-through of the project during construction by visiting our consultation website.

Existing situation

Higham ward would not be materially affected by the visual impact of the project. Views towards the land on which the project would be built from the main residential areas are limited to those from properties at the western end of Old Watling Street, Strood and along the A226 Gravesend Road on the edge of Higham village. To the north of the ward, views towards the land on which the project would be built are limited to those from Saxon Shore Way.

Current views towards the land on which the project would be built from Higham ward on the western tip of Strood are typically screened by vegetation or adjacent buildings. Some residential properties on the south-west edge of the Higham urban area currently have views of the A226 Gravesend Road. From Saxon Shore Way, there are distant westward views over flat low-lying pasture along the Thames Estuary, towards the project north and south of the river.

2.6.1 Construction

Construction impacts

The main activities likely to be seen from this ward during construction are:

- Highway works along the A2/M2 corridor.
- Short-term works for the construction vehicle access route along the A226 Gravesend Road.
- The setting up and operation of the Southern Tunnel Entrance, Milton and Northern Tunnel Entrance Compounds.
- New landscaping near the northern tunnel entrance.
- Vegetation clearance to facilitate main works construction and utilities works.

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

Views of construction activities from the western edge of Strood are likely to be limited to highway works on the existing M2 road corridor, from homes at the end of Old Watling Street, Strood. Residents on the edge of the Higham urban area, that already have views of the A226 Gravesend Road, may notice construction traffic.

From Saxon Shore Way long-distance footpath, earthworks and the northern tunnel entrance compound would be visible in distant views north of the River Thames.

More information about the Southern Tunnel Entrance Compound, Milton Compound and the Northern Tunnel Entrance Compound is provided in chapter 4 of the Construction update.

Measures to reduce visual impacts during construction

Given the distance and limited views of the project from this ward, no specific measures to reduce the visual impacts of construction activity are considered necessary.

The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC. See chapter 5 of the Construction update for more information about this and the project's other control documents.

2.6.2 Operations

Operational impacts

The operational visual impacts of the project would be minimal. During operation, there is the potential for greater visibility of the M2 corridor from Higham, until new planting has established, as well as the new landscaping next to the northern tunnel entrance, north of the Thames Estuary. There would also be potential views of the new landscaping from Saxon Shore Way long-distance path. Further descriptions of the project in operation, including works along the M2 and earthworks around the northern tunnel entrance, can be found in chapter 2 of the Operations update.

Measures to reduce visual impacts during operation

The primary measure to reduce visual impacts of the completed project in Higham ward is the proposed planting of vegetation and trees along the M2 corridor adjacent to Watling Street.

2.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Higham ward is mainly characterised by traffic noise, with a contribution from railway noise. The main sources of road traffic noise within this ward are from the M2, A289, A226 and the A2.

As part of our environmental assessment process, we carried out surveys of existing background noise in close proximity to the A2/M2, in the adjacent ward of Shorne, Cobham and Luddesdown. This is because only a small section of the upgrades to the existing M2 would be implemented at the southern end of Higham ward. The levels monitored at these locations recorded average existing noise levels in the range of 50 to 65dB(A)² during the day and 47 to 60dB(A) during the night.

In order to understand how noise levels would vary with and without the project, we use noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We model this because we cannot assume that noise levels when the project opens would be the same as they are now. For example, our assessment of the opening year noise levels take into account predicted changes in traffic levels.

We also model the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if it were implemented.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about decibel levels.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 77 dB(A) during the day and from 29 to 63 dB(A) during the night-time period at identified locations within this ward. As such, our noise assessments predict that by opening year noise levels would increase compared to the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

2.7.1 Construction

Daytime construction noise impacts

The main construction activities that are expected to give rise to noise and vibration in this ward are those associated with widening the M2. There are no main works compounds or Utility Logistics Hubs currently proposed to be located within the Higham ward, nor are there any haul roads proposed within this ward.

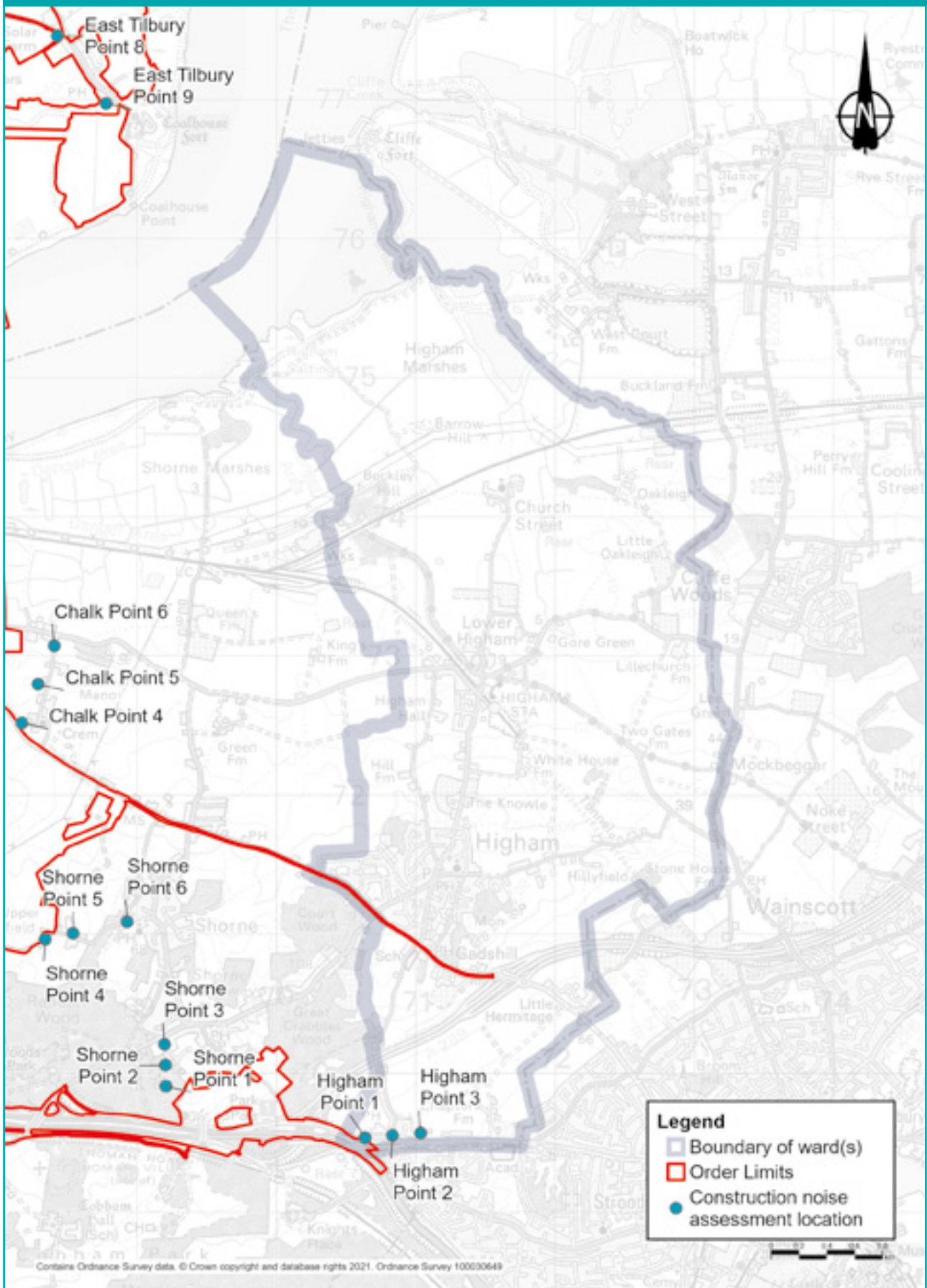
Within the ward there aren't any percussive or vibratory works proposed to be undertaken.

Construction noise levels have been predicted at three locations across this ward, chosen to provide a representation of the level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using the standard units for major projects, dB LAeq(12hour), which represent the average noise level for the assessed 12-hour daytime period.

Figure 2.13 shows the locations at which we have predicted the daytime construction noise during the project's construction phase.

Figure 2.13: Construction noise assessment locations in Higham ward



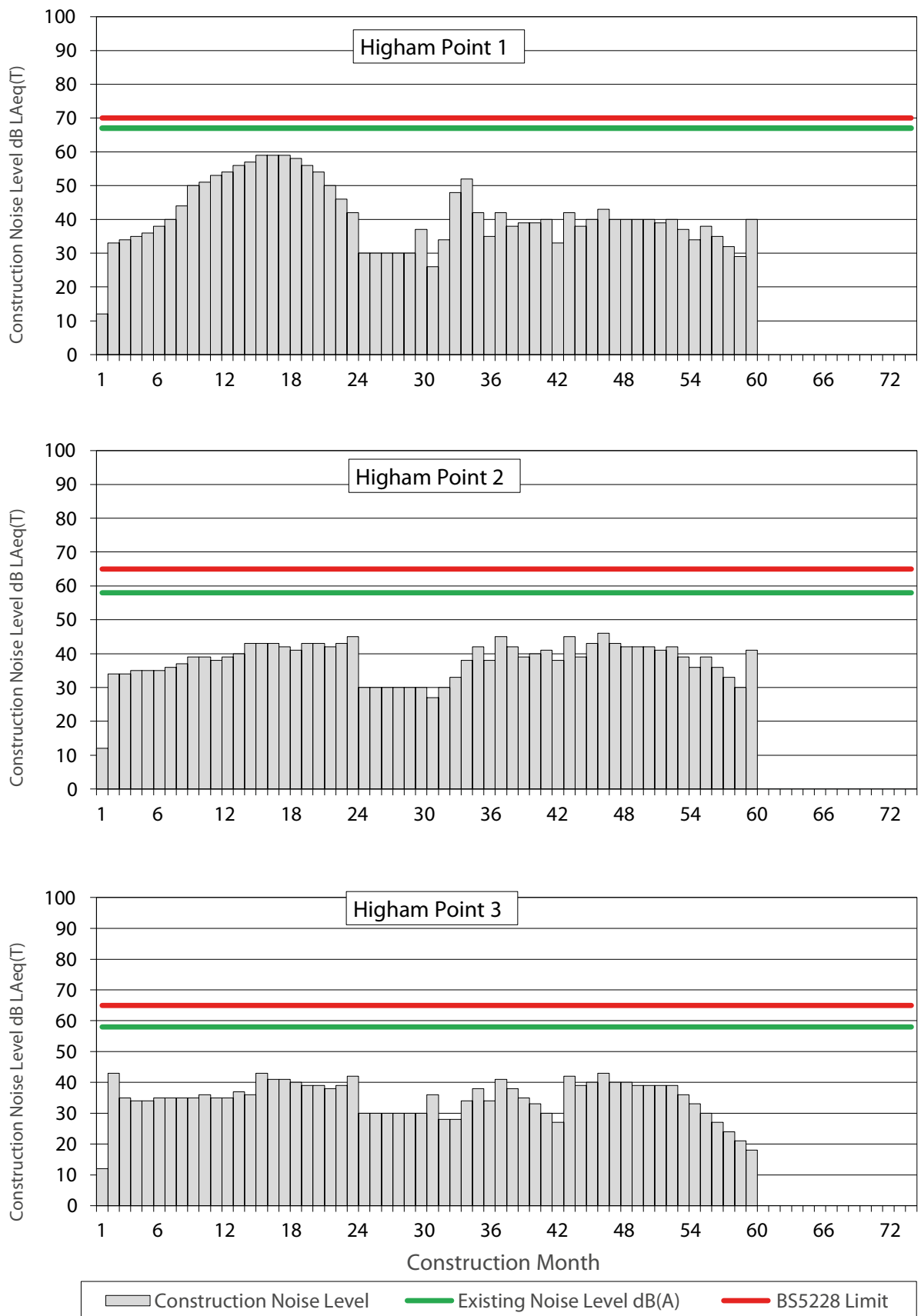
Each vertical bar in figure 2.14 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart shows the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce the noise.

The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance and additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 2.14 the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 12 to 59dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 2, construction noise levels are predicted to range from 12 to 46dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 3, construction noise levels are predicted to range from 12 to 43dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.

Figure 2.14: Construction noise by month for points 1, 2 and 3 in Higham ward



24/7 construction working

In addition to the changes to the daytime noise impacts presented in the section above, 24-hour seven-day construction working is proposed at the locations shown in figure 2.15. The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and remain part of our current proposals.

These locations are where works may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The works in this area are expected to be night-time or weekend highways works. These works could have an impact on local communities, and we would work with the local authority to manage these impacts.

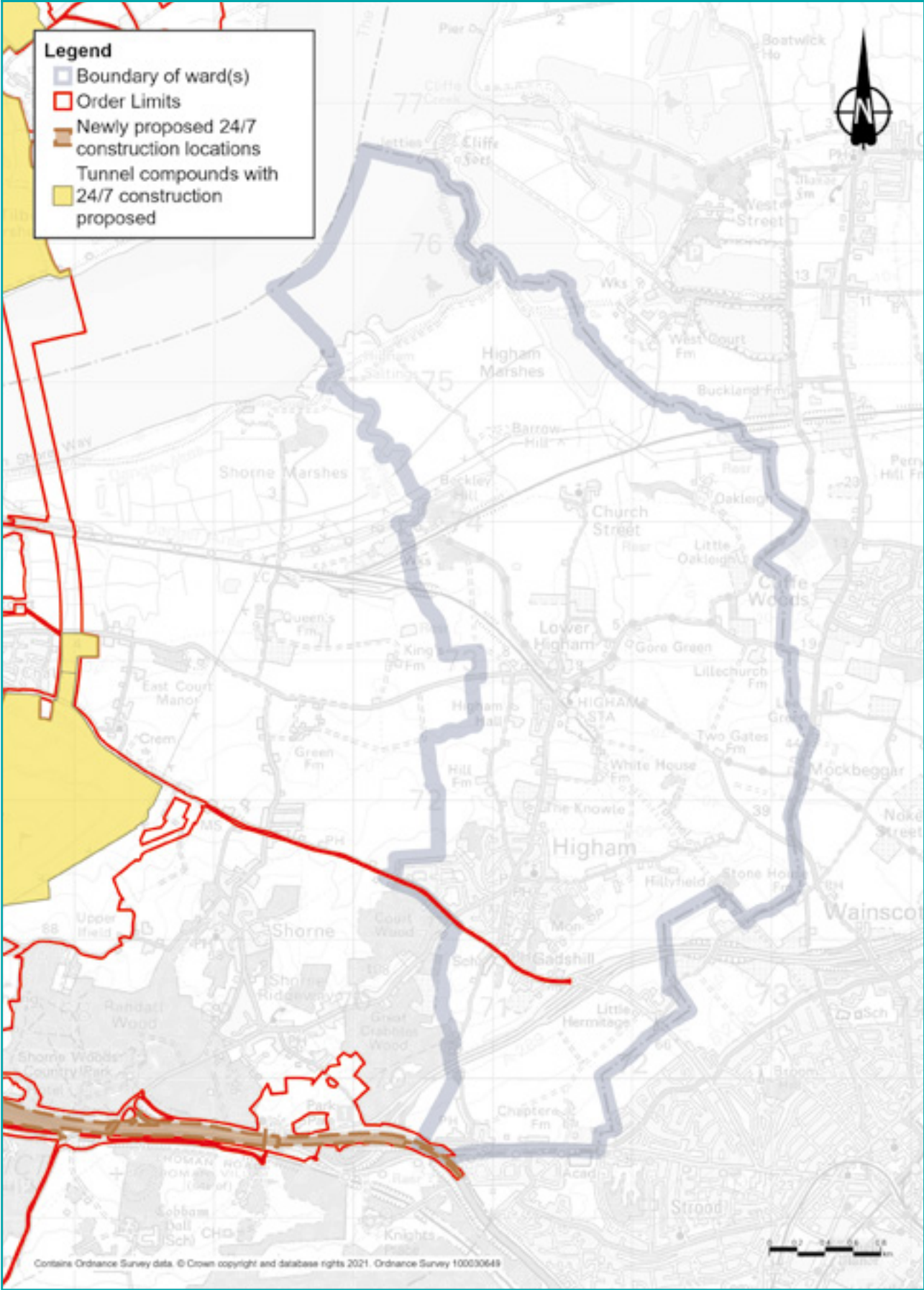
Construction traffic noise impacts

Maps showing the predicted change in road traffic noise on roads within Higham ward during each year of the construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years, except along the roads where increases in noise levels been predicted. For more information about how we define noise impacts i.e. negligible, minor, moderate and major, see chapter 1.

Table 2.3: Construction traffic noise in Higham ward

Affected road(s)	Predicted noise impact	Construction year(s)
Slip roads on to Hasted Road off Gravesend Road	Minor increase in noise levels	1 to 6
Lower Road	Minor increase in noise levels	3 and 4
Lower Rochester Road	Minor increase in noise levels	4
Peartree Lane	Minor increase in noise levels	5

Figure 2.15: Newly proposed and tunnel 24/7 working locations in Higham ward



Measures to reduce construction noise and vibration

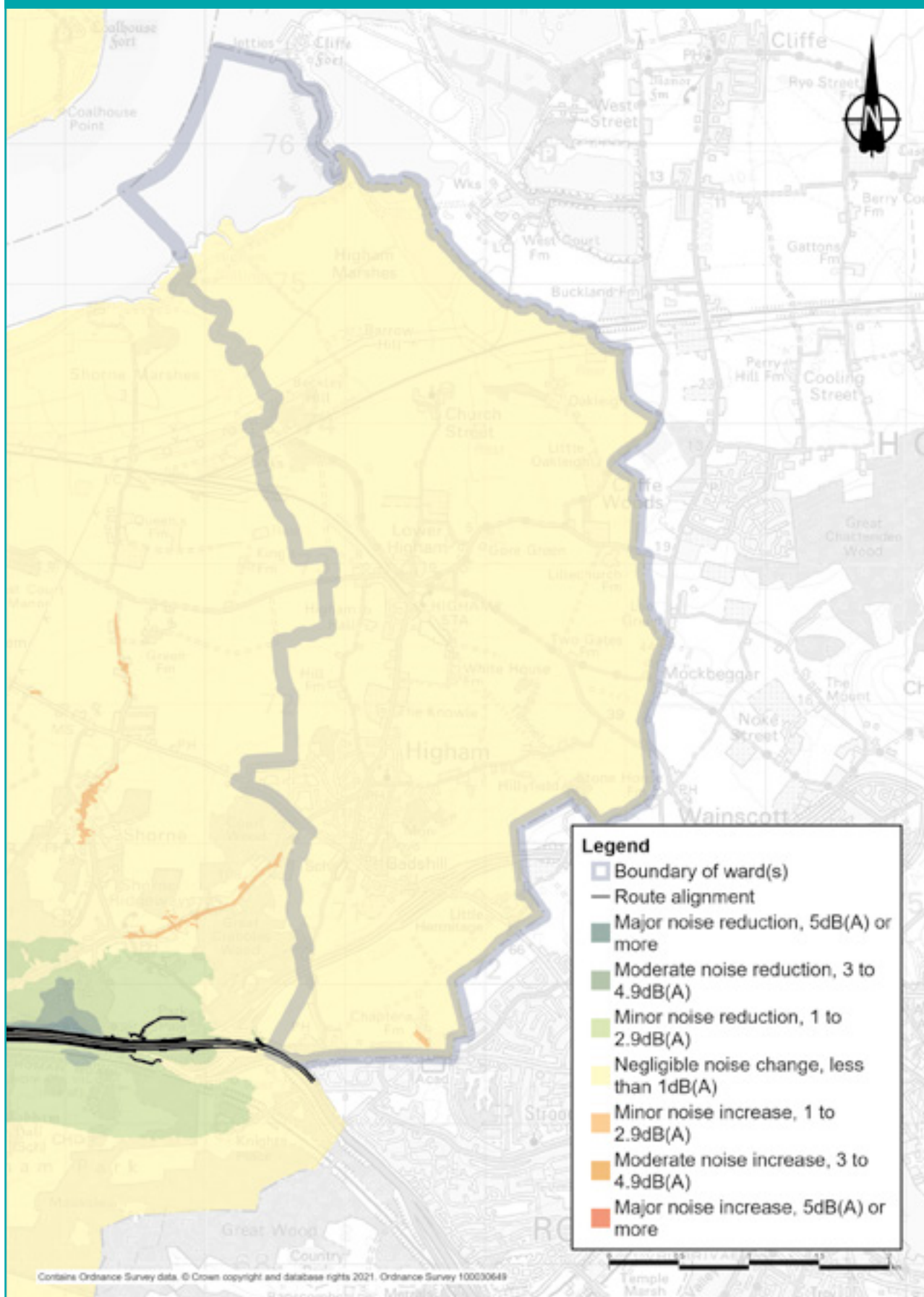
Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- Installing temporary acoustic screening around the construction areas likely to generate noise.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular silenced power generators and pumps.
- No music or radios would be played for entertainment purposes outdoors on-site.
- Minimisation of construction traffic by, where practicable, selection of local suppliers along the project route, using local workforces and minimising material transportation for earthworks construction along the project.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, refer to sections NV001 to NV010 of the REAC, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction period.

Figure 2.16 Noise impacts during operation in Higham ward



2.7.2 Operations

Operational noise impacts

Higham ward is located approximately 2.5km to the east of the main project route and, as such, there would be no direct noise impacts from the project in the ward. Noise impacts within this ward would be as a result of changes in traffic flow, the number of HGVs, and traffic speeds on the existing road network within the ward and because of changes to the A2/M2 in the south of the ward.

Figure 2.16 shows the predicted changes in traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to range from a negligible reduction of up to 1.0dB to a minor increase in noise levels of between 1.0 and 2.9dB. For more information about how we define noise impacts i.e. negligible, minor, moderate and major, see chapter 1.

Measures to reduce traffic noise during operation

The main methods of controlling noise would be, where practicable, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

2.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Higham ward, the A2 has been declared an Air Quality Management Area (AQMA) due to yearly levels of air borne pollution being above acceptable levels. AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the ward have been identified as AQMA.

2.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including some east of the proposed A2/M2 junction and on Gravesend Road west of the A226/A289 junction. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a temporary minor worsening in air quality in the area around Chalk Road and A226 Gravesend Road as a result of traffic resulting from our traffic management and construction vehicles from 2026 to 2027. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions.

The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

2.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200 metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, close to the east of the proposed A2/M2 junction and west of the A226/A289 junction off Gravesend Road that are predicted to experience a minor worsening in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within this ward is 36.0 µg/m³ (close to the M2), which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

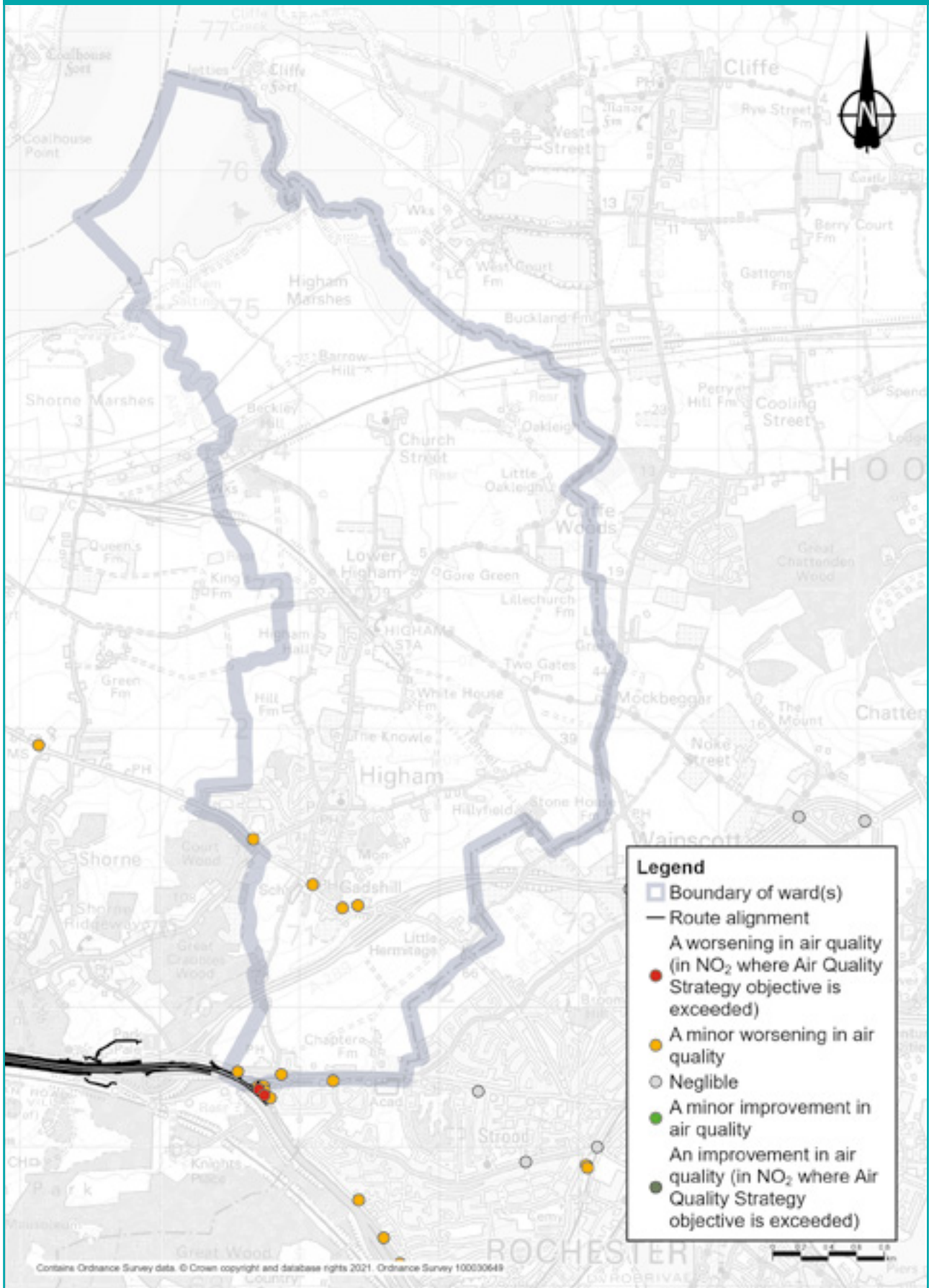
Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area as a result of the project would not trigger the need for additional monitoring or other mitigation measures once the road is open.

Figure 2.17: Predicted changes in NO₂ levels within Higham ward once the new road is open



2.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

Higham ward is characterised by an older population (nearly a third of its residents are aged over 60 – a significantly higher proportion than for Gravesham as a whole and nationally). There are also more older people living alone than the average for Gravesham (15.3% compared to 12.2%). Economic activity is lower than for other Gravesham wards, as would be expected due to more retired people living in the area. Many residents own their own property.

Self-reported health status is generally good, with more than 80% of residents reporting very good or good health. Life expectancy at birth for residents of Higham ward is 80.1 for males and 84.0 for females (slightly above the UK average life expectancy recorded for 2017-19 of 79.4 years for males and 83.1 years for females). Deaths from respiratory disease (all ages) and coronary heart disease (all ages) are slightly higher for Higham ward than is the case for England as a whole.

2.9.1 Construction

Construction impacts

Construction activities affecting Higham ward residents are presented in the Project description section and relate primarily to highways works to the A2/M2 corridor. Construction traffic is limited mostly to the A226 Gravesend Road, which would be used for access to the Southern Tunnel Entrance Compound, A226 Gravesend Road Compound and the Milton Compound, and may affect residents using this route. Elements of each of these activities have the potential to impact health, whether this be the noise associated with construction activities or construction traffic, changes to air quality (dust emissions), potential severance caused by construction traffic, or through impacts on mental health and wellbeing.

There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. Through good communications and engagement, providing people with information about when construction works would take place and its impacts, then negative impacts on people's mental health and well-being would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section). Evidence from The Health Foundation, which is an independent healthcare charity and research body, has demonstrated a link between unemployment and poor mental health.

As highlighted at the outset of this section, different groups of people within the population may be more sensitive to factors which potentially affect their health than others. Some of the changes identified as a result of construction activities may therefore only affect a small proportion of the population. For example, Higham residents may experience changes in accessibility of the A226 owing to construction traffic using the road. This may impact people who are more dependent on public transport and have fewer choices about their route and how they travel, potentially affecting their access to community facilities and services for example (and thereby levels of social interaction, which for some people can have an important impact on their mental health and wellbeing). Impacts on journey times are described further in the Traffic impacts section.

Measures to reduce impacts on health during construction

Proposed measures relating to health and wellbeing (including good practice for dust emissions, hours of working and visual screening) are described in this chapter in the Visual, Noise and vibration, and Air quality sections. Further information relating to mitigation measures for these areas is set out in the CoCP and the REAC and the package of traffic management plans in the Outline Traffic Management Plan for Construction. The commitments in the REAC include items such as adhering to Best Practicable Means (BPM) to reduce noise impacts (see NV007 in the REAC) and dust-management good practice (see AQ005 in the REAC). For more information about these documents, see chapter 1 of the Construction update.

Engagement and effective two-way communication with communities both prior to and during construction by providing information about the programme and impact of works is important in order to reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP sets out proposals for community engagement, including how we would make sure communities, stakeholders and any affected parties are kept informed of the construction works, their progress and associated programme. This includes setting up Community Liaison Groups.

2.9.2 Operations

Operational health impacts

Information about the operational project in this ward is provided in the Project description section.

The assessments undertaken for noise and air quality have shown that no adverse impacts are anticipated as a result of the project for people in Higham ward. However, a proportion of residents may experience anxiety or stress associated with perceptions of environmental change as a result of a major road project. As with the construction stage, different groups in the Higham population may be more susceptible to anxiety and stress than others.

A proportion of residents may also experience positive health benefits through accessibility improvements, better access to jobs and training, and to open spaces, including new recreational areas outside Higham, such as Chalk Park, near Gravesend. A map showing Chalk Park can be found in chapter 3 of the Operations update.

Measures to reduce operational health impacts

As set out in the Noise and Air quality sections, no significant noise or air quality impacts have been identified for Higham ward when the project is operational and so no essential mitigation measures have been proposed. Measures to reduce visual impacts of the project include reinstating planting at temporary construction compounds and along the A2.

2.10 Biodiversity

Existing situation

Only a small area of Higham ward falls within the project's Order Limits, and where it does, the Order Limits are restricted to the boundary of the A226 and the natural habitats around the M2 junction 1. The only habitat affected is a small area of landscape planting around junction 1 of the M2.

Higham ward contains the Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site, the South Thames Estuary and Marshes Site of Special Scientific Interest (SSSI), Great Crabbles Wood SSSI and ancient woodland, and Clifton Hills Wood ancient woodland. The landscape planting has low value for terrestrial biodiversity and due to the lack of suitable habitat within the project Order Limits within Higham ward, no protected species surveys have been carried out. Protected species surveys were carried out within Great Crabbles Wood SSSI, however these were outside of the Higham ward boundary. For information about marine biodiversity, see the Construction update.

2.10.1 Construction

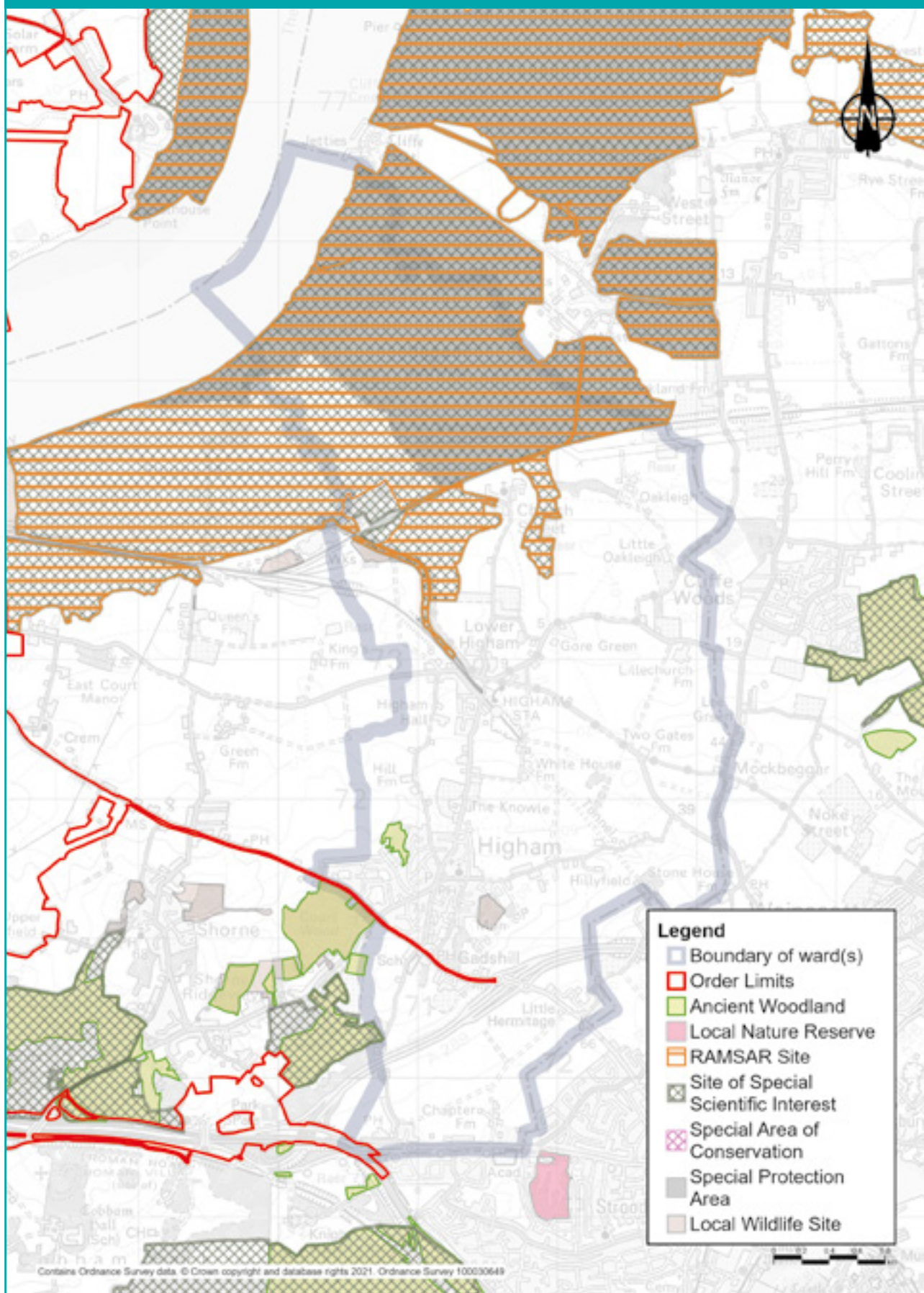
Construction impacts

None of the designated and non-designated sites identified above would be directly impacted by the project within Higham ward. A small area of landscape planting would be removed around junction 1 of the A2/M2 as part of construction.

Measures to reduce biodiversity impacts during construction

Vegetation clearance would be carried out during winter, where possible, to avoid impacts on breeding birds. Where this is not practicable, clearance would be supervised by an Ecological Clerk of Works to ensure no nests are disturbed or destroyed. The landscape planting removed from the A2/M2 junction would be reinstated during the construction process. Great Crabbles Wood SSSI and ancient woodland would be linked to Brewers Wood by an area of newly created woodland planting north of Park Pale bridge. Although this is outside Higham ward, this planting would provide strong connections between existing woodland within the ward, and neighbouring woodland outside the ward. The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

Figure 2.18 Designated and non-designated biodiversity sites in Higham ward



2.10.2 Operations

Operational impacts

Once operational, the project has the potential to cause the mortality of species due to road traffic and habitat fragmentation. It should be noted that the A2/M2 already causes these impacts on terrestrial biodiversity and it is not anticipated that the project would increase these significantly above that caused by the existing road network.

Measures to reduce biodiversity impacts during operation

Reinstated habitat would be managed to ensure that they provide high quality habitat to support a broad range of different plant and animal species. The impact of operation on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

2.11 Built heritage

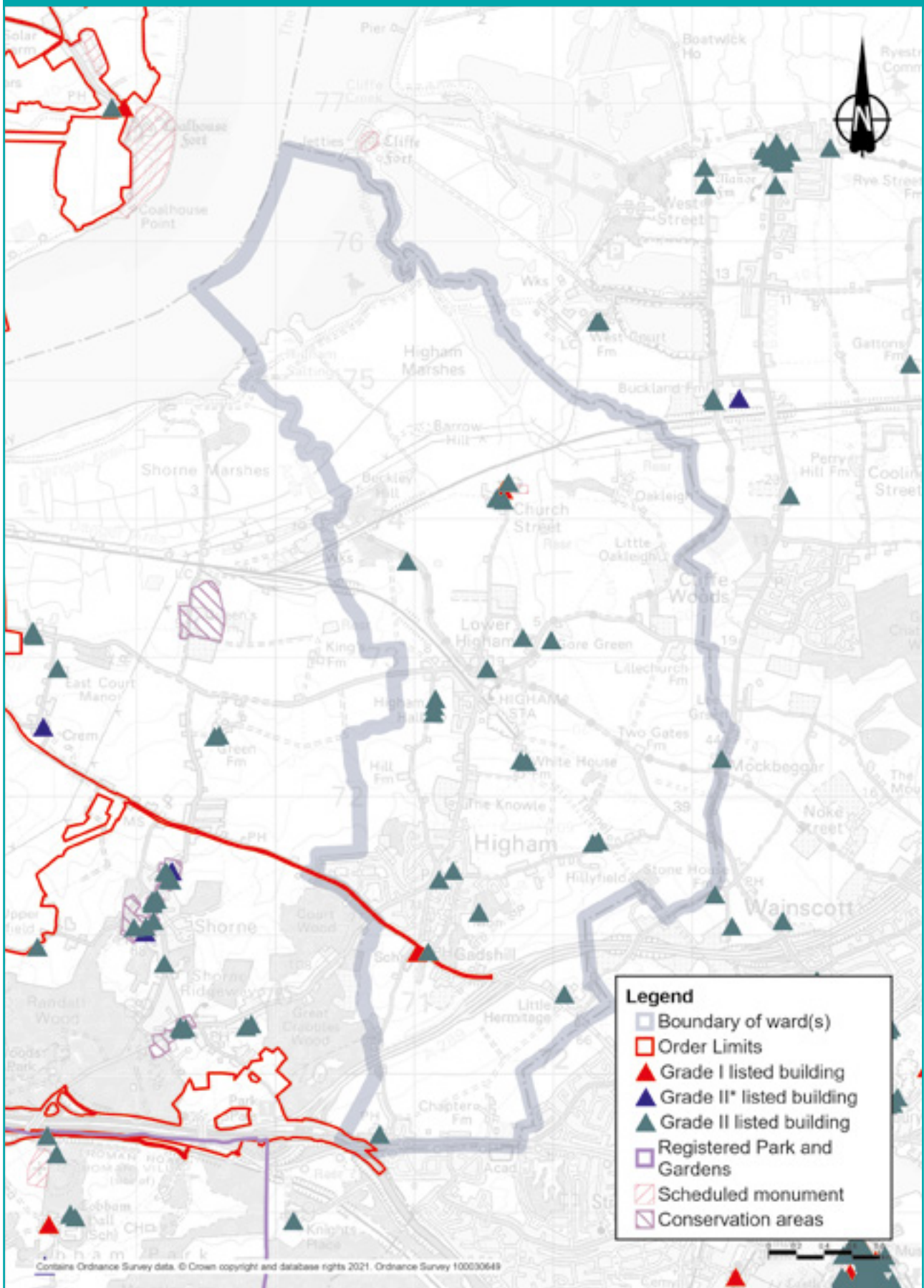
Existing situation

Seven listed buildings of high heritage value and two other structures of historical relevance have been identified within Higham ward that could be affected by the project.

The listed buildings are:

- The Obelisk - Grade II listed. This distinctive boundary marker was erected on the Thames Medway canal in 1820 to mark the jurisdiction of the Cities of London and Rochester for the collection of dues.
- Crutches Gate Cottage and Farmhouse - Grade II listed. The cottage and farmhouse form a single brick building and was constructed in the 18th century. The building has historic interest as an example of a traditional farmstead. It is located 120m north-east of the project, immediately east of junction 1 of the M2.
- The Little Hermitage - Grade II listed. Located on Gravesend Road, 556m east of the project, this house has historic and architectural interest for its surviving fabric, age and attractive Georgian architectural style. It once formed part of a larger house with side wings, which have since been demolished.
- Gadshill Place - Grade I listed. Located on A226 Gravesend Road, 35m south from project. The house was constructed in 1779 by a former Mayor of Rochester. It is built in red brick with string course and a slated Mansard-style roof. It was owned and occupied by the author Charles Dickens from 1857 until his death in 1870. Dickens added a large conservatory to the house and internally, his study is still preserved. The house is set within its own grounds and has been used as a school since the 20th century, with additional school buildings added to the south of the house.
- Sir John Falstaff Public House - Grade II listed. This public house is located on the north side of Gravesend Road in Higham, just 5m from the project. The building dates from the late 18th to early 19th century and its name derives from a fictional character from several of Shakespeare's plays. Sir John Falstaff commits a robbery at 'Gad's Hill' at the beginning of Henry IV Part 1. It has historic value through its connection to several known historic figures including Charles Dickens, who references the pub in his book *The Uncommercial Traveller*.

Figure 2.19 Built heritage in Higham ward



- Monument on Telegraph Hill - Grade II listed. This mid-19th century obelisk is located 450m north of Gravesend Road and the project. It was erected in memory of Charles Larkin, a Rochester auctioneer who promoted parliamentary reform in the 19th century. The structure is built of a rough concrete pebble-dash mixture and was originally faced with Roman cement, which has partially peeled off, and the plaque has been replaced. Although the monument is located on top of Telegraph Hill, it is surrounded by woodland and is semi-isolated.
- Firtrees - Grade II listed. This timber framed house is located on Hermitage Road, 475m north-east of the project. It most likely dates to the 17th century, has been refaced with weatherboarding and has a hipped slate roof. The style and construction of the building is typical of Kent and for its age. The house is surrounded by modern residential housing.

Buildings and structures of local historical relevance within Higham ward include:

- Farmstead, south-west of Crutches Farm, is of low heritage value. It is located 70m northeast of the project. The farm has lost more than 50% of its historic form and is therefore of limited historical significance.
- Thames and Medway Canal (now disused) is of medium heritage value. The line of the canal lies further than 1km from the project in Higham ward. It links the River Thames at Gravesend with the River Medway at Strood. The canal was first proposed in 1778 as a short-cut for military craft from Deptford and Woolwich Dockyards on the River Thames to Chatham Dockyard on the River Medway, avoiding the 74km journey around the peninsula and through the Thames Estuary. The construction of the canal was begun in 1799 but various challenges meant it was not fully open for traffic until 1824 and was over budget.

2.11.1 Construction

Construction impacts

The A226 (Gravesend Road) would be used by construction traffic. Construction activity is likely to cause temporary minor changes to setting of affected known heritage assets by introducing additional noise and lighting. The introduction of additional noise and lighting would cause a temporary impact to Grade II listed Crutches Gate Cottage and Farmhouse, resulting in a slight negative effect.

Measures to reduce construction impacts on built heritage

The impacts on built heritage during construction are negligible and non-physical. Measures applied to the project to reduce the impacts on built heritage can be found in the Design principles, which helps set out the controls that would constrain how the project would be built.

Dust and noise reduction measures are relevant in reducing the effects on heritage buildings. For more information about the proposed measures for noise and dust during construction, see the Noise and vibration section 2.7 and the Air quality section 2.8.

2.11.2 Operations

Operational impacts

There would be no operational impacts on built heritage in Higham ward.

Measures to reduce the operational impacts

The engineering and landscape design for the project has sought to avoid or reduce negative impacts on non-designated heritage buildings and structures because change within their surroundings would harm their significance. For example, to preserve the rural and historic character of the landscape, road lighting would be minimised where safe and practicable but would remain in accordance with relevant standards (Design principle LST.02 and LST.03). As such, once the project is operational, there are no expected impacts on heritage assets within the ward.

2.12 Contamination

From the review of desk-based sources (historical maps and environmental data), there are no known medium or high-risk sources of contamination that could be at risk of being disturbed during construction or operation of the project within the Higham ward.

2.12.1 Construction

By following a construction management plan and ensuring that, where potential sources of contamination are used (for example, oils, lubricants, mechanical plant), that appropriate spill containment and emergency response procedures are in place to prevent adverse environmental impacts from occurring.

2.12.2 Operations

During the operation of the road, should an incident occur, for example, a traffic accident resulting in localised contamination, significantly affected soils would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

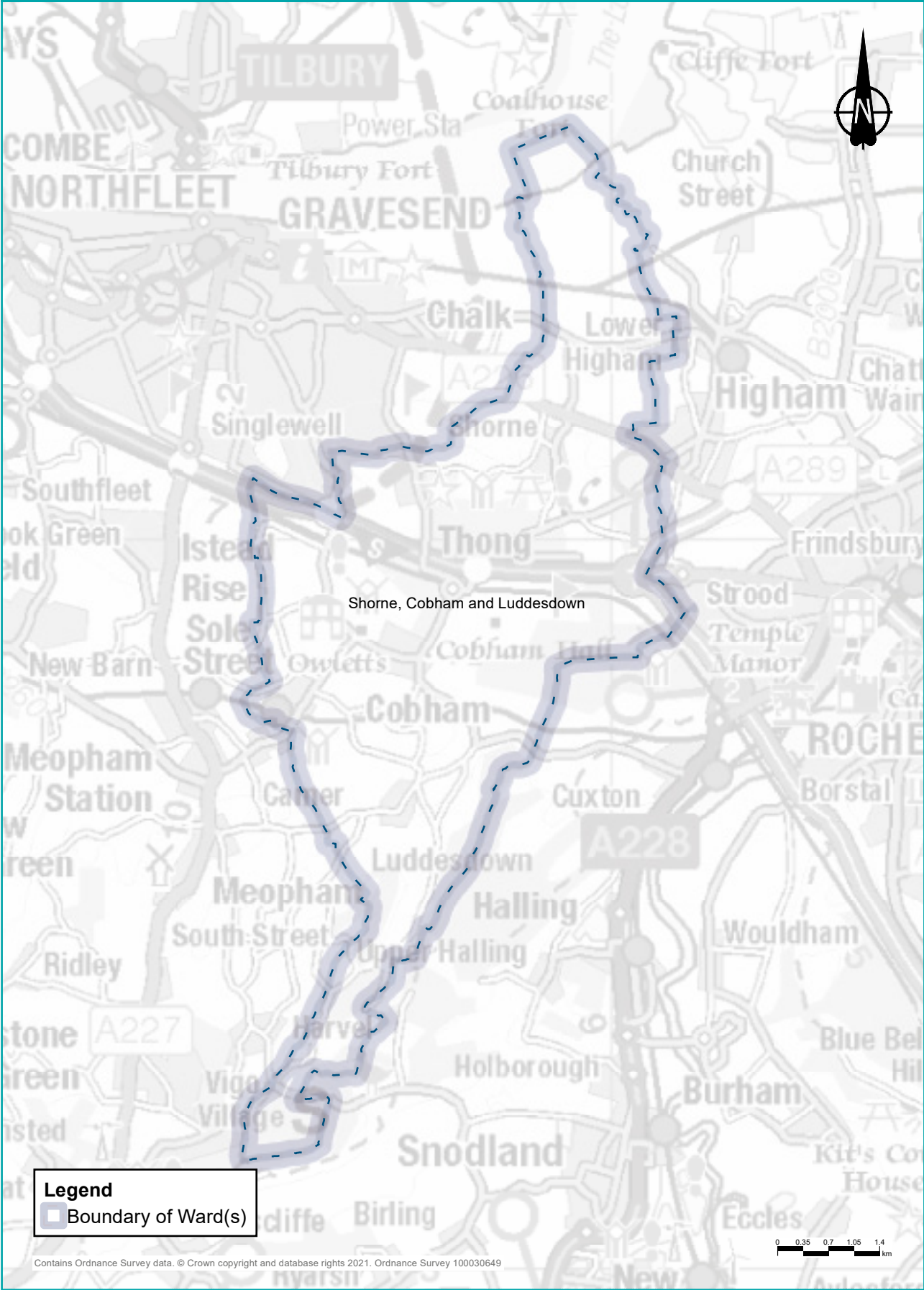
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Chapter 3: Shorne, Cobham and Luddesdown ward

This chapter summarises the activities in Shorne, Cobham and Luddesdown ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 3.1: Ward boundary map for Shorne, Cobham and Luddesdown ward



3.1 Overview

3.1.1 About this ward

Shorne, Cobham and Luddesdown ward is located south of the River Thames in the borough of Gravesham. The ward is approximately 34km² in size and has an estimated population of 4,272¹. It includes a substantial portion of the Order Limits (the area of land required to construct and operate the project, also known as the development boundary) south of the river. Higham ward is located to the east, with Chalk, Westcourt, Riverview, Singlewell, Woodlands and Istead Rise wards to the west. The main population centres in the vicinity of the project are the eastern edge of Gravesend, along with the villages of Thong, Shorne, Shorne Ridgeway and Cobham.

The North Kent railway line runs east-west following part of the alignment of the Thames and Medway Canal. The High Speed 1 (HS1) railway line runs east-west through the ward immediately south of the A2/M2, with the Chatham main railway line south of Cobham.

The land between the villages of Thong and Shorne, and to the south of the A2 including Cobham and Luddesdown, forms part of the Kent Downs Area of Outstanding Natural Beauty (AONB). Within the ward, located around Thong and the A2/M2 are multiple utility networks impacted by the project. These include local distribution networks and nationally important transmission networks such as electricity overhead lines and gas pipelines.

¹ Office for National Statistics, 2018 ward-level population estimate

3.1.2 Summary of impacts

Table 3.1: Summary of impacts during the project’s construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>Traffic management works would result in increased journey times on a number of routes, and some temporary closures would require longer journeys for extended periods of time. Increased traffic along the A226 associated with construction would also increase journey times along this road.</p> <p>Mitigation</p> <p>There are several ways – including minimising the use of local roads for construction purposes – that we would reduce the impact of the construction process of Shorne, Cobham and Luddesdown ward. These are outlined in more detail in the Traffic section of this chapter.</p>	<p>Impacts</p> <p>In the north of the ward, there is predicted to be a small increase in traffic flows along Brewers Road, Pear Tree Lane and the A226.</p> <p>In the south of the ward, there would be a predicted decrease in traffic on Halfpence Lane, The Street and Sole Street. An increase is predicted on Jeskyns Road and Henhurst Road. In addition, there are predicted increases along the A2 where the project lies within the ward.</p> <p>Further details about the changes to traffic and the predicted impacts can be found in the Traffic section of this chapter.</p> <p>Mitigation</p> <p>To mitigate the impacts of the project on Shorne, Cobham and Luddesdown during the operational phase, mitigation such as additional connector roads to the project have been included</p>

Topic	Construction	Operations
<p>Public transport</p>	<p>Buses</p> <p>Local bus services using the A226 and regional coach services using the A2 would have increased journey times during construction.</p> <p>Rail</p> <p>There would be no impacts on rail services during construction, nor on access time to Higham station</p>	<p>Buses</p> <p>There would be no changes to bus routes through the ward required once the new road opens and no discernible change to most bus journey times. One bus route, the 695, would experience a two-minute increase in journey time.</p> <p>Rail</p> <p>There would be no discernible change in access times to Higham station or changes to rail services from that station once the project is open.</p>
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>Due to the extensive construction works in this ward, there would be impacts on numerous footpaths, bridleways and cycle routes.</p> <p>Mitigation</p> <p>Temporary and permanent diversions would be provided for some routes to maintain connectivity during construction, while those that are unable to be diverted would be closed for as short a time as possible to reduce the impact on the local public right of way network.</p>	<p>Impacts</p> <p>Some footpaths, bridleways and cycle routes would be permanently rerouted. Walking, cycling and horse riding facilities would be included as part of the the new green bridges at Thong Lane over the project and Brewers Road.</p> <p>Mitigation</p> <p>We are proposing to upgrade several footpaths to make them suitable for walking, cycling and horse riding, while also providing additional links to connect existing routes.</p>

Topic	Construction	Operations
<p>Visual</p>	<p>Impacts</p> <p>Construction activities would be visible from residential properties, community amenities and footpaths, including utility diversions and compounds.</p> <p>Mitigation</p> <p>Views of earthwork stockpiles would be softened by using grass-seeded slopes. Fencing would be installed around compounds.</p>	<p>Impacts</p> <p>Once the new road is open, the main changes in views from residential properties, community amenities and footpaths would be of the proposed A2/M2 junction (landscaping and false cutting) and the new Chalk Park.</p> <p>Mitigation</p> <p>There would be new planting which would soften the views from residential properties, community amenities and footpaths as it becomes established.</p>
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction of the widening of the A2/M2, the new A2/M2 junction the southern tunnel entrance and the new road are expected to create noise. There would also be 24-hour, seven-day construction working in some locations. There would be negligible changes in noise from road traffic for a majority of roads within this ward during the construction period, except along a number of roads where increases in noise levels have been predicted (see the Noise and vibration section below).</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through mitigation measures presented in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>There would be increased levels of noise on the south western side of the ward, coming from the new road including the proposed A2/M2 junction and upgrades to the existing A2/M2 carriageway. Noise levels would also increase from existing roads due to the changes in traffic flow, speed and vehicle type.</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on all new and affected roads. Acoustic screening (noise barriers) has been incorporated into the design where necessary. The design of the new road and tunnel entrance/exit has been kept low in the environment (this controls the noise).</p>

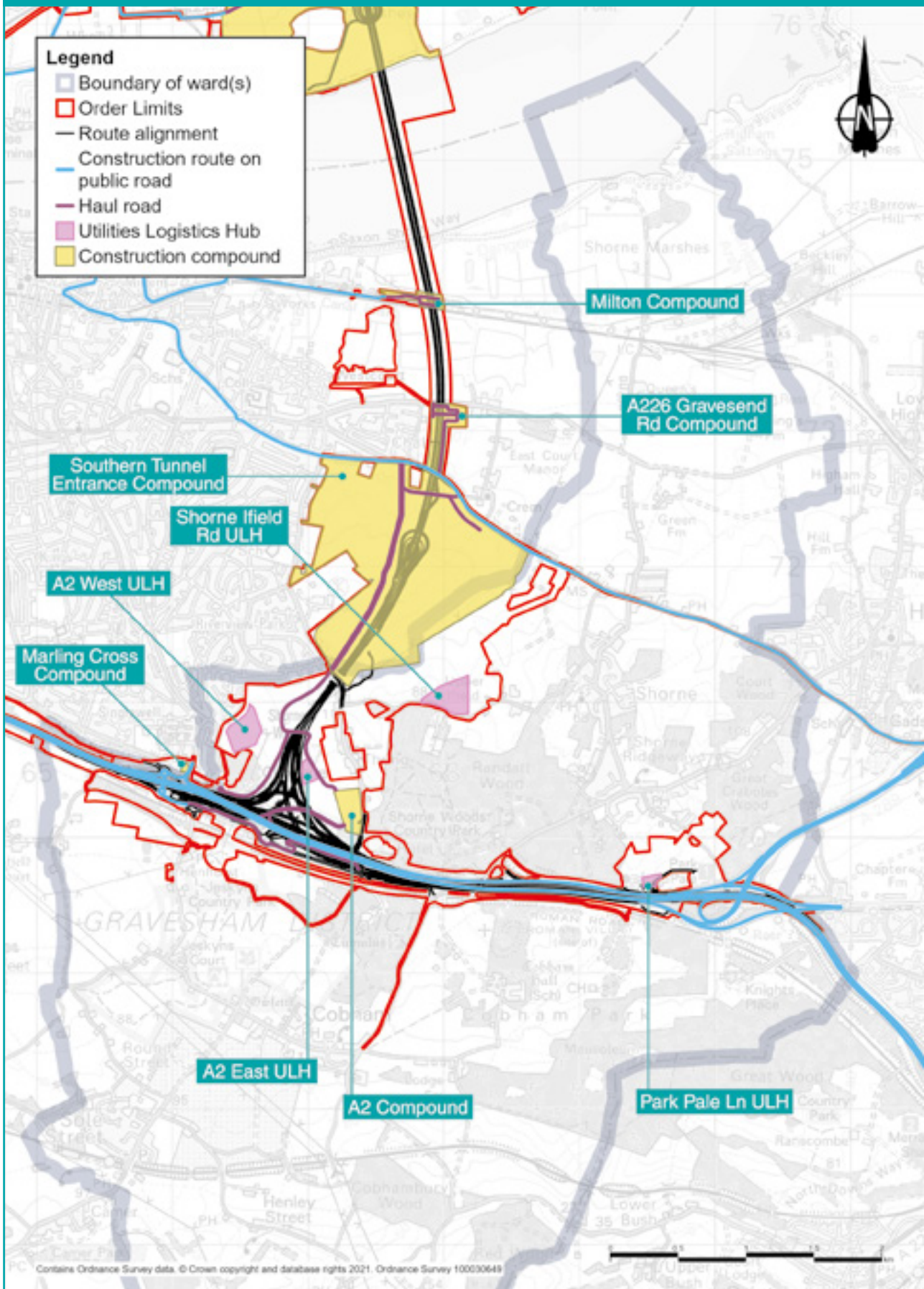
Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>Analysis of traffic data along the A2 corridor shows that likely decreases in traffic between 2026-2028 would lead to a small temporary improvement in air quality. The A226 Gravesend Road is expected to experience an increase in traffic flows from 2026-2027, with the potential for temporary minor worsening in air quality during this period.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures to minimise the dust, which are presented in the CoCP and REAC. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are controlling dust and exhaust emissions effectively.</p>	<p>Impacts</p> <p>There are properties close to M2 junction 1 that are predicted to exceed the air quality thresholds for the key traffic related pollutants NO₂ of 40µg/m³.</p> <p>Mitigation</p> <p>The assessed air quality impacts in this location are worst case and future air quality improvements at this location are likely, due to an increase in the use of electric vehicles. As a result, we do not propose carrying out monitoring or other mitigation measures once the road is open.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenities as a result of road closures, temporary noise increases from construction traffic locations and short-term disruption to Shorne Woods Country Park car park.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to dust emissions, working hours and visual screening, traffic management measures and community engagement. This includes the establishment of Community Liaison Groups.</p>	<p>Impacts</p> <p>The project would bring new and improved walking, cycling and horse riding routes to the ward, improve connectivity in and around Jeskyns Community Woodland and improve road traffic noise levels at the northern parts of Riverview Park.</p> <p>There may be impacts on mental health and wellbeing as a result of the project (for example anxiety around perceived changes to air quality or as a result of changes to the noise environment).</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on all new and affected roads.</p> <p>Acoustic screening (noise barriers) has been incorporated into the design where necessary.</p> <p>The design of the new road and tunnel entrance/exit has been kept low in the environment (this controls the noise).</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project would involve the removal of areas of habitat, both temporarily and permanently and cause the habitat to become fragmented. Some areas of Shorne and Ashenbank SSSI and Claylane Wood Ancient Woodland would be removed.</p> <p>Mitigation</p> <p>The impacts would be mitigated through the creation of new habitat, including woodland planting, to offset the loss. Protected species would be relocated, carried out under a Natural England licence.</p>	<p>Impacts</p> <p>The operation of the new road could cause mortality of species by encountering road traffic, habitat fragmentation, and disturbance from traffic.</p> <p>Mitigation</p> <p>The landscape planting has been designed specifically for animals such as green bridges. New habitats would also be created.</p>
<p>Built heritage</p>	<p>Impacts</p> <p>There would be visible construction activity with noise and lighting in the vicinity of built heritage assets.</p> <p>Mitigation</p> <p>The design and layout of Southern Tunnel Entrance Compound and A2 Compound would take into account the setting of heritage assets (the surroundings in which a heritage asset is 'experienced'), and avoid light glare, light spill and light pollution during night-time construction (Design Principle S326).</p>	<p>Impacts</p> <p>The built project is unlikely to change the setting of any heritage assets in this ward.</p> <p>Mitigation</p> <p>Tree planting would screen heritage assets, improving views as it establishes. Road lighting would be minimised where it is safe and practical to do so (Design Principle LST.02 and LST.03).</p>

Topic	Construction	Operations
<p>Contamination</p>	<p>Impacts</p> <p>There are potential sources of contamination in this ward, based on land uses. Construction activities could mobilise these contaminations. Part of a construction compound falls within this ward where stockpiling may occur as well as storage of materials and chemicals, meaning there is a potential risk of accidental spills.</p> <p>Mitigation</p> <p>To reduce this risk, the contractor would follow good practice construction measures. Work near to the former Esso petrol station would be discussed with the Environment Agency.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>If during operation any incident were to occur that resulted in localised contamination, soils which had become significantly affected would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters.</p>

Figure 3.2: Main construction areas in Shorne, Cobham and Luddesdown ward



3.2 Project description

3.2.1 Construction

Construction activities

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

You can also view a video fly-through of the project during construction by visiting our consultation website.

There would be a large amount of construction activity required in Shorne, Cobham and Luddesdown ward to build the main highways, tunnels, junctions and connecting roads. Most of the ward is outside the proposed Order Limits but there would be significant construction activity within the ward within the Order Limits shown in figure 3.2. Most construction work in this ward would take place along and around the A2/M2, and along the route of the proposed new road between the A2/M2 and the southern tunnel entrance. There would be additional activity for required utility installation, protection and diversion works, and to implement proposals such as tree-planting and building new public rights of way.

Throughout the development of the project, we have aimed to reduce the Order Limits wherever possible while still being able to deliver the project safely and efficiently. For example, we have reduced the area of land needed to carry out utility works by working closely with the utility companies. Much of the land used would only be required temporarily during our construction phase. Afterwards, it would be reinstated to the reasonable satisfaction of the owner of the land, or repurposed as new woodland or other habitats to offset the environmental impacts of the project elsewhere.

Constructing the new road in this ward would include significant elements of landscaping. For example, building sections of the road in a deep cutting, and extensive tree-planting around the proposed A2/M2 junction to reduce the visual impacts on local communities. Reusing spoil excavated from cuttings for nearby embankments and landscaped recreational areas would reduce the HGV traffic on roads close to the project because less materials would need to be moved in and out of the project's construction area. At statutory consultation, the proposed figure was an average of 17,500 HGV journeys a month across the project, whereas at supplementary consultation, this figure had been reduced to an average of 13,300 HGV movements per month. Now, the average number of HGVs per month is expected to be 10,350 per month. For more information about HGV movements, see the Construction update.

Building the new road in this ward would also involve the construction of major structures, such as those needed for the proposed junction with the A2/M2, two green bridges along Thong Lane, and the Brewers Road green bridge over the A2/M2. Each green bridge would carry vehicle traffic while also having safe provision for walking, cycling and horse riding. Planting and vegetation along the Thong Lane bridge would help maintain links between nearby habitats, while the green bridges at Thong Lane and Brewers Road over the A2 would create habitats links where there are none currently.

Across the ward, construction activities would be coordinated to reduce effects on local communities. Dedicated haul roads within the worksites would help to lessen the amount of construction traffic on local roads. Where practical, the construction compounds are being proposed in locations that reduce their impact on local communities. Utility Logistics Hubs and compounds would be laid out in ways that keep noise and light-generating activities as far as possible from nearby communities. At many compounds, earth bunds (walls) would be constructed on the boundary to further reduce impacts on local communities. Machinery and vehicles entering compounds and using public roads would be subject to strict emissions controls and dust-suppression measures to reduce air quality impacts.

Construction compounds

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for the project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not increase dirt on local roads.

Many construction workers would be recruited from local communities, while others would travel from other parts of the UK and be accommodated locally. In each case, the project would help boost the local economy.

There would be two construction compounds in this ward. The smaller A2 Compound would be wholly within the ward and would serve the works south of, and including, the proposed Thong Lane bridge over the new road. The Southern Tunnel Entrance Compound would be partly within this ward, and would facilitate construction of the tunnel and the deep cutting on its approach, as well as being used for utility works and the stockpiling of materials. Both compounds would be in place throughout the construction period, which is expected to last from 2024 to 2029.

Most HGV traffic would access the A2 Compound via a dedicated haul road linked to the A2/M2. The A2 East Utility Logistics Hub (ULH) and the A2 West ULH would be accessed in the same way. There would also be a secondary access to this compound from Thong Lane, mostly for use by smaller construction vehicles such as workers visiting the site. Some HGVs would also use Thong Lane, but HGVs making deliveries and moving earth for the project would not be allowed to drive along the section of the road between the A2 Compound and the A226 (see the Traffic section for HGVs bans agreed with key stakeholders, including sections of Thong Lane).

The Southern Tunnel Entrance Compound would be accessed mainly via the A226 Gravesend Road, although some vehicles may use the haul road from the south. The Shorne Ifield ULH would be accessed in the same way. There is provision to widen the A226 between Gravesend and the A289 if this helps construction and local traffic to use the road more safely. More information about building the tunnel can be found in chapter 4 of the Construction update. Chapter 2 of that document also sets out the reasons for locating compounds and access roads where they are.

The average daily weekday number of HGVs and cars expected to use the A2 and Southern Tunnel Entrance Compounds, during the 11 representative construction phases are shown in table 3.2. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 3.2: Average daily vehicle numbers going to compounds and ULHs in Shorne, Cobham and Luddesdown ward

Time period	A2 Compound, A2 East ULH and A2 West ULH		Southern Tunnel Entrance Compound and Shorne Ifield ULH	
	HGVs	Cars	HGVs	Cars
January to August 2024	66	102	30	77
September 2024 to February 2025	75	198	36	201
March to May 2025	95	205	39	201
June to October 2025	102	215	39	281
November 2025 to March 2026	90	201	39	335
April to August 2026	105	186	39	317
September 2026 to March 2027	85	186	39	358
April to November 2027	56	142	39	378
December 2027 to March 2028	26	74	39	310
April to July 2028	19	70	30	209
August 2028 to December 2029	12	65	8	25

Utility Logistics Hubs

There would be four Utility Logistics Hubs (ULHs) within this ward. These would be required to deliver specific utility works, including those listed. For more information about proposed utility works, see chapters 3 and 4 of the Construction update.

- medium-pressure gas pipeline diversion, around 5km in length, between Park Pale and Gravesend East
- three high-pressure gas pipeline diversions:
 - around 0.1km in length, in Claylane Wood
 - around 1.6km in length, east of Singlewell
 - around 2.7km in length, east of Riverview Park

- 400kV overhead power line diversions, around 1.8km in length, requiring the relocation of four pylons
- construction of a new primary substation and switchgear equipment near the A226
- removal of around 3km of existing 33kV power lines and wooden poles between the A226 and A2

A2 West ULH, near Singlewell (labelled in figure 3.2), would be used to deliver gas pipeline diversions and connect to haul roads within the worksite north of the A2/M2. A2 West ULH would be operational from January 2024 to December 2025.

A2 East ULH, south-west of Thong village, would be used to deliver overhead power line diversions from September 2025 to December 2026. Vehicle access would be via the A2 Compound or other haul roads within the worksite.

Shorne Ifield Road ULH (labelled in figure 3.2), near Shorne village, would be used for gas pipeline diversions from January 2024 to November 2025, and then would be landscaped on completion of the project. Construction traffic would access the ULH from the A226 at two locations, the primary of which is a shared access with the Southern Tunnel Entrance Compound.

Park Pale ULH (labelled in figure 3.2), west of junction 1 of the M2, would be used to divert the medium-pressure gas pipeline and would be in place from June 2024 to September 2026.

There would be HGVs going to these ULHs, the highest daily number of HGVs going to a hub is expected to be less than 20 vehicles.

There would be restrictions on parking along Park Pale while the works were completed (due to temporary construction for utility diversions), with access to Shorne Woods and Great Crabbles Wood reduced due to temporary footpath closures.

Chapter 2 of the Construction update provides an overview of how existing utilities would be affected by the project, with further detail including maps in chapters 3 and 4. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be relocated to accommodate the new roads.

Other activities within the Order Limits

Away from the main route, other areas within the Order Limits would also be used to help construct the project:

- North of the A2/M2 near Park Pale, we would plant an area of new woodland and provide a new access road for a local logistics company.
- Junction 1 of the M2, we would widen the southbound slip road to provide additional capacity.
- Within Jeskyns Community Woodland, we would restring an existing section of overhead power line to facilitate modifications to pylons north of the A2/M2. Impact on existing woodlands would be minimised as far as possible during the overhead line diversion works.
- East of Jeskyns Community Woodland, we would introduce a new public right of way.
- South of the Gravesend East junction southern roundabout and west of Henhurst Road, we would create a new area of tree-planting and a new east-west public right of way. The planting would help to offset the impact of works in Jeskyns Community Woodland.

Construction routes on public roads

The primary access route to the A2 Compound will be from the Gravesend East junction. Vehicles would use the eastbound slip road at this junction to reach a temporary road that would provide access to the compound for staff and HGVs. There will be a secondary access point for HGVs only from the A2 via Thong Lane.

The A226 Gravesend Road would be designated as a construction route. This means that HGV and construction workforce traffic would use this road to access the Southern Tunnel Entrance Compound, the A226 Gravesend Road Compound, and the Milton Compound, as well as the Shorne Ifield Road ULH. In addition, construction traffic would use the A2/M2 (including the Gravesend East junction) and the A289. These roads would remain open to the public throughout the construction period. More information about the impacts on these road can be found in the Traffic section.

Construction schedule

Construction of the whole project is scheduled to last for six years from 2024 to 2029. To complete the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and programmes for the work packages in Kent and the tunnels can be found in chapters 3 and 4 of the Construction update.

Construction working hours

Most construction work would take place during the core construction hours, 7am to 7pm on weekdays, and 7am to 4pm on Saturdays. Additional repair and maintenance periods (if required) would be 8am to 5pm on Sundays. Tunnelling work would take place 24/7 to maintain safety and efficiency. Noise-generating work would not be carried out outside core hours wherever practical.

In addition to the extended hours to support tunnelling works, there would be other circumstances when hours may be extended. Typically, this would be to reduce inconvenience to road users by working at night or at weekends when there is less traffic. Activities that would involve works outside core hours within this ward include implementing traffic management measures, joining new roads to existing ones, resurfacing existing carriageways, demolition of structures, and removal or restringing of overhead power lines over roads. For safety reasons it would be necessary to carry out work close to railway lines outside core hours when trains are not in service. There may be extended working hours for earth works when days are longer (spring to autumn) and during periods of fine weather. More information about working hours is set out in the Noise and vibration section and in the CoCP.

Traffic management

The main traffic management measures proposed for Shorne, Cobham and Luddesdown ward are listed below.

Table 3.3: Main traffic management measures in Shorne, Cobham and Luddesdown ward

Road(s) affected	Proposed traffic management	Purpose	Duration
A2	Narrow lanes, hard shoulder closures and reduced speed limits to 50mph	To facilitate the construction of the new junction and widening works	22 months between June 2026 and April 2028
A2	Weekend and overnight closures	To carry out construction activities in the vicinity of the A2/M2, such as demolishing and building bridges and connecting the project to existing roads	Weekend and overnight intermittently during construction (dates to be confirmed)
A2 westbound on and offslip	Realignment to new layout	Permanent feature of the project	The existing slip roads would stay open until a date between December 2027 and March 2028, when the road would switch to the new layout
A2 eastbound on and off slips	Closure	To carry out nearby works	Nights and weekends over short periods associated with specific works activities
A2 eastbound	Hard shoulder closure	For construction access, works and local utilities modifications	2 weeks
A2 eastbound	Closure	To switch to permanent alignment	1 weekend
A2 westbound	Closure	To switch to permanent alignment	1 weekend

Road(s) affected	Proposed traffic management	Purpose	Duration
Brewers Road	Closure	Switchover to permanent alignment	1 weekend
Brewers Road bridge	Closed	To allow construction of a new green bridge on the same route that connects to the existing green bridge over HS1. A diversion would be put in place after discussions with the local authority	19 months from May 2026 to November 2027
Park Pale Lane & Brewers Road junction	Lane closures and traffic lights and infrequent short-term closures (if required) between the Brewers Road A2 bridge and Park Pale bridge	Modifications to local utility networks	6 months between September 2024 and May 2025
Park Pale	Lane closures and traffic lights	To carry out nearby works and modifications to local utilities	Nights and weekends over short periods associated with specific works activities
Park Pale	Closure	To carry out nearby works and modifications to local utilities	Nights and weekends over short periods associated with specific works activities

Road(s) affected	Proposed traffic management	Purpose	Duration
Thong Lane	Traffic lights	To allow vehicle access to A2 Compound	11 months
Thong Lane	Traffic lights and lane closures	To facilitate modifications to local utilities	1 month between January and August 2024
Thong Lane	Crossing point	To allow construction vehicles to cross	Until access under overbridge (expected between April and November 2027)
Thong Lane	Closure	For bridge works and modifications to local utilities networks	Nights and weekends over short periods associated with specific works activities
Thong Lane (over the A2 and the project)	Switchover	To temporary and then permanent alignment	3 weekends, (between June to October 2025; September 2026 to March 2027; and December 2027 to March 2028)
Gravesend East junction (north)	Reduced junction capacity with some lane closures	To allow improvement works to local utility networks	9 months between January and August 2024
Gravesend East junction (south)	Lane closures	To carry out works on the new connector roads south of the A2	14 months between January 2024 and February 2025
Gravesend East junction (bridge)	Lane restrictions	To carry out bridge widening works and modifications to local utilities	4 months between January and August 2023

Road(s) affected	Proposed traffic management	Purpose	Duration
A226 Gravesend Road	Lane closure and traffic lights in 300-metre sections	To facilitate the construction of access to construction Compound CA03 and utility works	9 months between September 2024 and May 2025
Halfpence Lane	Lane closure, traffic lights and short-term closures	If required would be put in place in phases along the road to allow Halfpence Lane to remain open throughout utility diversion works	6 months between January and August 2024
Henhurst Road	Lane closures and restrictions	To carry out nearby works and utility modifications	Nights and weekends over short periods associated with specific works activities
Hever Court Road	Lane closure and lane restrictions	To carry out nearby works and modifications to utilities	Short duration (2 weeks) early in the construction period (2024)

A ban on HGVs delivering materials and moving excavated material for the project would be in place on the following roads:

- Brewers Road from Park Pale to the A226 Gravesend Road
- The Ridgeway
- Peartree Lane
- Thong Lane between the A2 Compound and the A226
- only the small number of HGVs needed for the utility works on Halfpence Lane will be allowed to use Halfpence Lane

This would not affect other HGVs using these roads.

We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the OTMPfC. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

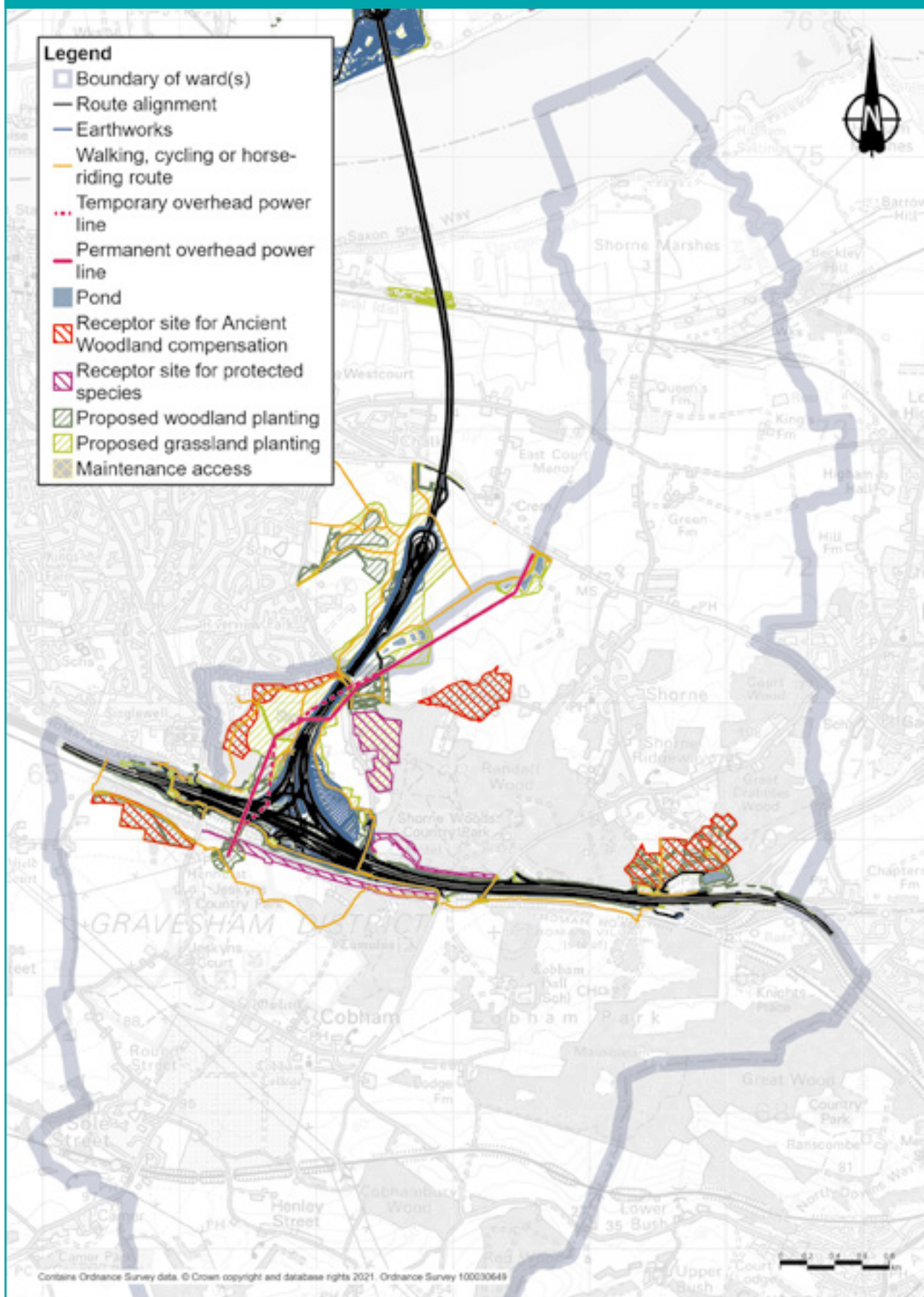
3.2.2 Operations

The completed project

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements. We set out the main features of the project that would be within Shorne, Cobham and Luddesdown ward once it is operational:

- There would be a new junction on the A2/M2, providing free-flowing links from the strategic road network to the project northbound, providing local people with improved and faster Thames crossings. The proposed A2/M2 junction would be landscaped with grassland and woodland, as set out in section S2.03 of the Design principles.
- The A2/M2 would be widened to accommodate predicted increased traffic, reducing the likelihood of congestion for local residents and the associated issues with air quality that can be caused by idling engines.

Figure 3.3: The main features of the completed project in Shorne, Cobham and Luddesdown ward



- New connector roads south of the A2/M2 would link existing local roads to the project via the Gravesend East junction and the A2/M2 via Gravesend East and the Brewers Road slip road, increasing accessibility for local communities to the strategic road network.
- The M2-A289 southbound slip road would be realigned to connect to the newly widened M2.
- New areas of woodland and grassland would be planted in areas around the A2/M2, and east of the project near Shorne Woods Country Park to offset the impacts on Ancient Woodland, while also retaining existing trees and hedges where practical. Sections S1.01 and S1.02 of the Design principles are commitments to screening the project from users of Shorne Woods Country Park (including Park Pale) and Cobham Hall. A flood mitigation pond would be built, landscaped with marsh and wet grassland. There would be further woodland planting south of Singlewell and the A2, parallel with Church Road to offset the environmental impacts elsewhere.
- The lake and woodland area by the Inn on the Lake would be a new habitat site for relocated species, including the installation of dormouse boxes and bat boxes.
- At Park Pale, a noise barrier would be built along the southern edge of the lane between Park Pale bridge and the Inn on the Lake. This barrier would reduce road noise for those travelling along Park Pale and recreational users on the southern edge of Shorne Woods Country Park. To the east, new hedgerow and tree planting would be planted along the northern edge of the A2 to provide visual screening for residents of Old Watling Street. More information about these can be found in sections S1.09 and S1.10 of the Design principles.
- Three green bridges would be built south of the River Thames. Two on Thong Lane, with one crossing the A2/M2 and another crossing the project north of Thong village. A third green bridge would carry Brewers Road over the A2/M2 and link to the existing green bridge over HS1. These green bridges would ensure that local people and wildlife are still able to cross the route safely, reducing the impact on the ward's biodiversity and connectivity to the surrounding area. Design principle section S1.04 details requirements for these bridges.

- Some footpaths and bridleways would be rerouted permanently as part of our proposals for over 46km of upgraded or entirely new footpaths, cycle paths and bridleways that would benefit communities along the route. For example, NCR177 would be permanently realigned to maintain east-west connectivity and avoid crossings through the proposed A2/M2 junction. The existing route of NCR177 would subsequently be planted (where the path is not required to link into other routes) to maintain its rural ambience. This would be secured through sections S1.05 and S1.13 of the Design principles. For more information, see the Footpaths, bridleways and cycle routes section.
- The junction and connecting road that would link the A2/M2 to the southern tunnel entrance would be mostly landscaped with woodland, species rich grassland and scrub around the edges of the roads. Covering 37 hectares, a new landscaped recreational area east of Gravesend, Chalk Park, would feature areas of wildflowers, woodland and grassland planting, with views to the Kent Downs Area of Outstanding Natural Beauty and the River Thames. A map showing Chalk Park can be found in chapter 3 of the Operations update. Noise barriers would also be constructed along sections of the proposed new road to reduce noise impacts on nearby properties and recreational spaces.
- Three drainage ponds would be built near the A226 Gravesend Road and would operate permanently. Flood mitigation would be provided north of the M2-A289 junction to reduce the likelihood of congestion caused by flooding. Further drainage ponds would be located to the south and centre of the junction in areas that would see a mix of landscaping, with woodland, species rich grassland and marsh and wet grassland, and just west of the northbound carriageway of the connecting road.
- Four pylons would be removed and four new pylons would be installed, including one new 75 metre-high pylon north of the A2 (25 metres taller than the existing pylon). Around 1.8km of 400kV overhead power lines would be diverted in the vicinity of the proposed A2/M2 junction, with the new alignment taking the overhead power lines closer to Thong village.
- Significant areas of woodland planting would be carried out to offset woodland habitat being lost. This would increase the overall extent of woodland within the area and provide strong connections between existing habitats such as Claylane Wood and Shorne Woods. Brewers Wood and Great Crabbles Wood would also be connected via an area of woodland habitat creation north of Park Pale bridge, forming part of a larger compensatory package for Ancient Woodland.

- A new area of tree-planting and a new east-west public right of way would be created south of the Gravesend East junction southern roundabout and west of Henhurst Road. The planting would help to offset the impact of works in Jeskyns Community Woodland.

Any commitments made within the Design principles would be included within the project's Development Consent Order application, meaning we would be legally bound to deliver these measures. The Design principles set out further measures that would reduce the impact of the project. Many of these measures are typical for major infrastructure projects and would be implemented based on our understanding of impacts and through best-practice initiatives. Other measures committed to are bespoke and reflect the context and complexity of the local conditions.

Further specific mitigation measures within the ward, as set out in the Design principles, would include:

- Section S2.06 commits to minimise any loss of Ancient Woodland at Claylane Woods, requiring that earthworks are kept to a minimum and no false cutting is provided. It requires that woodland planting shall be provided on earthwork slopes to provide visual mitigation and landscape integration.
- Section S2.01 commits to retaining the open rural setting around Thong village through use of species-rich grassland and wildflower meadow planting. It also requires that the open aspect of the village be enhanced by the contrast created by increased woodland planting along the eastern edge of Gravesend.
- Section S2.10 requires that retaining structures at locations in the vicinity of the AONB would either be green walls (earth banks) or use local materials such as flint or ragstone to integrate with the existing landscape.

References to the Design principles and REAC are included to provide an indication of how our proposed mitigation is secured by our control documents ensuring delivery on site. For more information, see chapter 1 of the Construction update.

Changes to the project since our design refinement consultation

As part of our ongoing design development and discussions with utility companies, we have made several changes to the project and its Order Limits within Shorne, Cobham and Luddesdown ward since our design refinement consultation in July 2020. More information about these proposed changes, including maps showing changes to the Order Limits, can be found in chapter 3 of the Operations update.

We have removed the following areas of land from the Order Limits because they are no longer required for utility diversions:

- An area south of the A226 Gravesend Road, between the existing overhead power lines and Crown Lane.
- An area north of the junction of Thong Lane and Vigilant Way on land currently part of Southern Valley Golf Course.
- Land in the vicinity of the proposed A2/M2 junction.
- An area south of the A2/M2 near Brewers Road and Halfpence Lane.
- An area around the body of water near the Inn on the Lake and the Thong Lane bridge over the A2/M2.
- An area west of Henhurst Road and south of HS1.
- Relocation of the Shorne Woods switching station from the western side of Thong Lane to the same location as the proposed A226 primary substation, reducing visual impacts in the wooded area.
- Land parallel to the A226 Gravesend Road opposite Thameside View Crematorium has been removed from the Order Limits.

In addition, there would be minor changes to works within the highway boundary on Park Pale, and nearby land to the east of Harlex Haulage would no longer be required for temporary works.

Impacts on open space land

Within Shorne, Cobham and Luddesdown ward there are a number of works which impact on open space land. This includes permanently acquiring land from Shorne Woods Country Park for the realignment of Thong Lane. A small area of permanent rights would also be required along the north of the A2 for ecological mitigation and proposed utilities. The replacement land for these works would be located to the east of Brewers Wood and would be larger in area than the land that is proposed to be acquired or be subject to rights.

We are proposing to upgrade a footpath within Shorne Woods Country Park and Ashenbank Wood, to connect with other footpaths and offer improved access to the wider walking, cycling and horse riding network. The land would be retained as open space public land and part of Shorne Woods Country Park and Ashenbank Woods. Once the works are completed, the land would be returned.

We are also proposing to use an area within Jeskyns Community Woodland for restringing existing overhead electricity cables. The use of this site is temporary and the land would be reinstated once the works are complete. Following these works, the use of the land for outdoor recreation would be unaffected.

Additionally, we are proposing to upgrade a footpath running through the Michael Gardens play area to connect with other footpaths across the project area. The upgrade works would offer improved access to the wider walking, cycling and horse riding network. Once the upgrade works are complete, the path and play area would be accessible to the public.

Within the ward, the only change from previous consultations is that the amount of land designated as replacement land has reduced. This land is within the proposed woodland between Brewers Wood and Great Crabbles Wood, and would still be for dual use, as previously consulted. The reduction in the replacement land is due to the reduced impact on Shorne Wood Country Park and the amount of land to be acquired has also reduced as a result of design refinement.

More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

3.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the project's construction and once it is operational, compared with the situation if the project was not implemented. Information about how we carried out these assessments can be found in chapter 3 of the Operations update.

3.3.1 Construction

Construction impacts – Gravesend East junction

There would be a reduction of capacity at the Gravesend East junction and occasional closures for particular traffic movements through the junction. The works around Gravesend East junction (particularly north of the A2) are scheduled to be conducted early in the programme. There would be some overnight closures of the A2 slip roads, the northern roundabout and Valley Drive. There will be lane restrictions on the bridge over the A2 for around four months.

Work at the southern roundabout at the junction is planned to start early in the programme, then there would be a period of inactivity and the traffic restrictions will be eased, until the final works to complete the junction are carried out at the end of the construction period.

The works at Gravesend East may mean that some traffic diverts to using the Wrotham Road junction to access the A2. This would result in higher traffic flows and lower speeds on the A227 north of Istead Rise and on the Wrotham Road north of the A2.

Construction impacts – A2

The narrow lanes and lower speed limit on the A2 would reduce the speed at which vehicles travel along the A2. Some vehicles on longer distance journeys may choose to travel on alternate routes. For example, using the M20 rather than the A2 to reach the M25 and the Dartford Crossing. There may be some traffic from the A228 at Cuxton that chooses to travel along Bush Road and Cobhambury Road, and then through Cobham to avoid the narrow lanes on the A2, but the attractiveness of this route would be reduced by the low capacity of Bush Road and when there are road works on Henhurst Road and the Gravesend East junction. Some traffic that currently travels from the A227 at Meopham, through Sole Street and Cobham and along Halfpence Lane to the A2 eastbound would not take this route when Brewers Road overbridge is shut.

Measures would be needed to ensure the timely removal of any vehicles that break down on the A2 when there are narrow lanes in place to avoid the build-up of traffic and the diversion of vehicles onto the local road network.

Construction impacts – Brewers Road

The closure of Brewers Road where it goes over the A2 would be required as the alignment of the new bridge is on the same as the existing bridge. The access to Cobham Hall School and Nook Pet Hotel would not be closed. The diversion route would be via the Rochester roundabout, or the A289, as shown in figure 3.4, or or figure 3.5 depending on the direction of travel. The closure of Brewers Road over the A2 is expected to last for 19 months. Traffic may choose to re-route their journey rather than use Brewers Road, for instance by using the A226, A289 and A2 north of the A2. South of the A2 vehicles from Luddesdown and Cobham would likely divert to using the Gravesend East junction.

Figure 3.4: Brewers Road closure diversion (south to north)

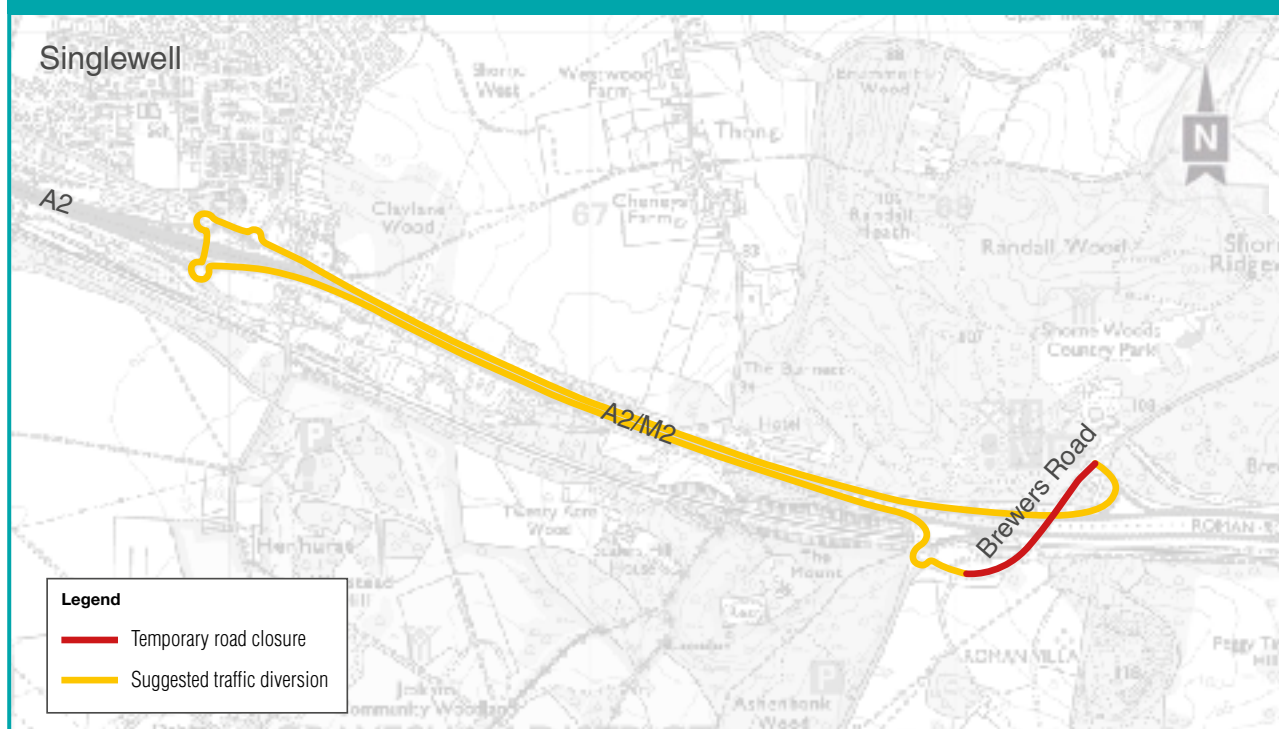
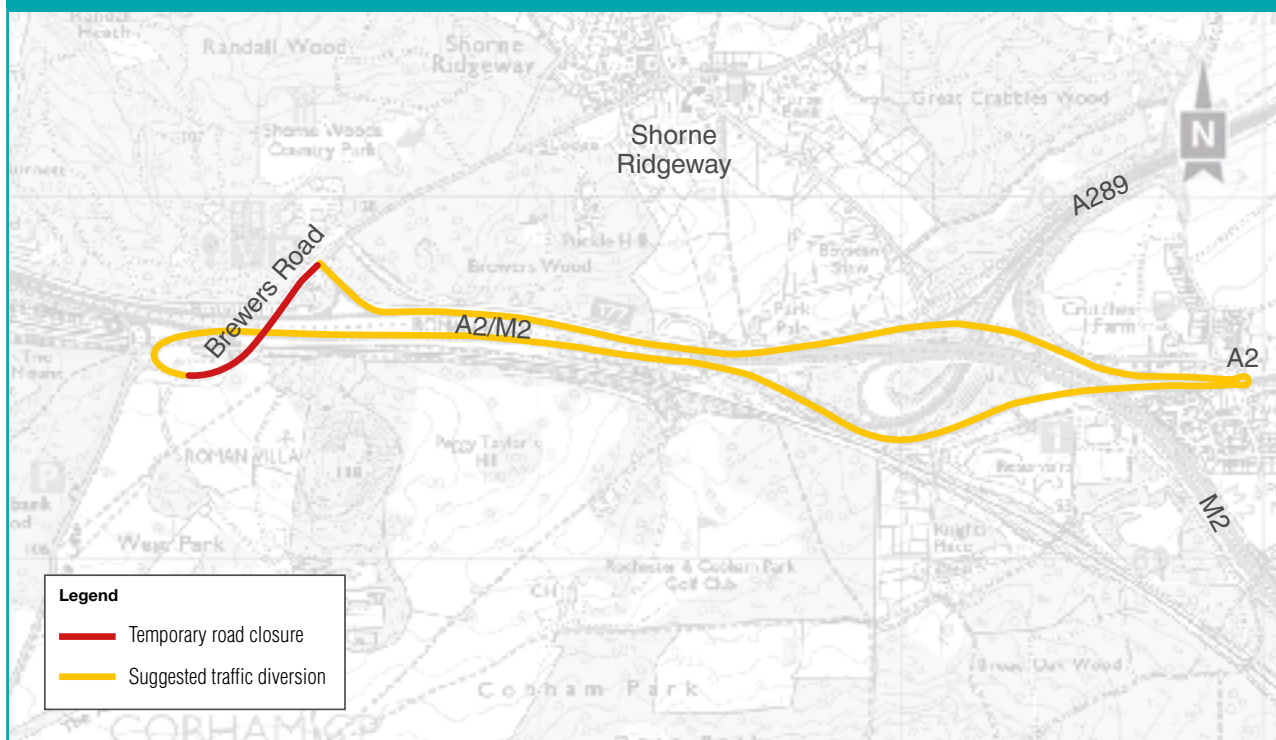


Figure 3.5: Brewers Road closure diversion (north to south)



Construction impacts – Halfpence Lane

Work is needed on 1.1km of Halfpence Lane, from the A2 running south. There would be a contraflow in place for around six months and occasional overnight or weekend closures. These works would not be expected to cause significant re-routing of local traffic but would increase journey times for vehicles that are required to stop at the traffic signals controlling the contraflow.

Construction impacts – Henhurst Road between HS1 railway line and Gravesend East junction.

Works are required to Henhurst Road between the point it goes over HS1 and southern roundabout of Gravesend East junction. Henhurst Road would stay open other than for a few specific works which may require weekend or similar short-term closures. Traffic restrictions would be in place and temporary alignments would be required to construct the various elements in phases. These works would not be expected to cause significant re-routing of local traffic, except when the road is closed, but would increase journey times for vehicles that are required to stop at the traffic signals controlling the contraflow.

Measures to reduce construction traffic impacts

During the design and development of the project, our approach to construction has been refined continually with the aim of reducing construction traffic impacts. A summary of measures proposed to reduce the volume of construction materials transported in and out by road during the construction period can be found in chapter 2 of the Construction update.

To reduce the construction traffic impacts in Shorne, Cobham and Luddesdown ward, we would carry out the following measures:

- Minimise use of the local road network as far as practical through construction of temporary offline haul roads directly from the strategic road network, including directly from the A2 eastbound.
- Our proposals allow for re-use of excavated materials, and would substantially reduce the need to dispose of excavated material via the road network, thereby reducing the number of HGV movements on the A226 Gravesend Road.
- Ban HGVs from some local roads, after discussions with key stakeholders. Proposed HGV road bans for construction vehicles (with the exception of very specific works, which include limited utility and road-connection works) include:
 - Thong Lane between the A2 Compound access on Thong Lane and the A226. This would mean HGVs could only take a left turn into the compound and a right turn out.
 - Brewers Road between Park Pale and the A226, including The Ridgeway and Peartree Lane.
 - The Street, Cobham.
- Implement offline haul roads between the works around the southern tunnel entrance and the A2 to allow on-site movements instead of HGVs using public roads.
- Designing the A2/M2 widening elements of the project in such a way as to allow a larger proportion to be constructed without traffic management measures.
- Implement the Gravesend East junction northern roundabout works as early as possible during construction.
- Stockpile material within the Order Limits to allow material to be managed on-site rather than offsite, reducing the number of HGV journeys needed.

3.3.2 Operations

Operational impacts

Figures 3.6, 3.8 and 3.10 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 3.7, 3.9 and 3.11 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

In the north of the ward, north of the A2, in the morning peak hour there would be increases in traffic flows of between 50 and 250 PCUs on the A226 eastbound. This is an increase of between 10% and 20%. In the evening peak hour, there would be a predicted increase in traffic of between 50 and 250 PCUs northbound along Brewers Road and Pear Tree Lane, and also a similar increase of traffic along the A226 in both directions.

The project would lead to a predicted increase in traffic along the A2 east of the junction between the project and the A2.

There would also be a predicted increase in traffic at the Three Crutches A2/A289/M2 junction which lies within Higham ward. There would be a predicted adverse impact on travel times on the link between the A2 eastbound and A289 northbound where the volume of traffic is over 95% of the capacity in the morning peak and would exceed its capacity in the evening peak. This link would be under severe strain in the future without the new road but there would be additional traffic predicted to use the A289 as a result of the project, which worsens the performance of this link.

Figure 3.6: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

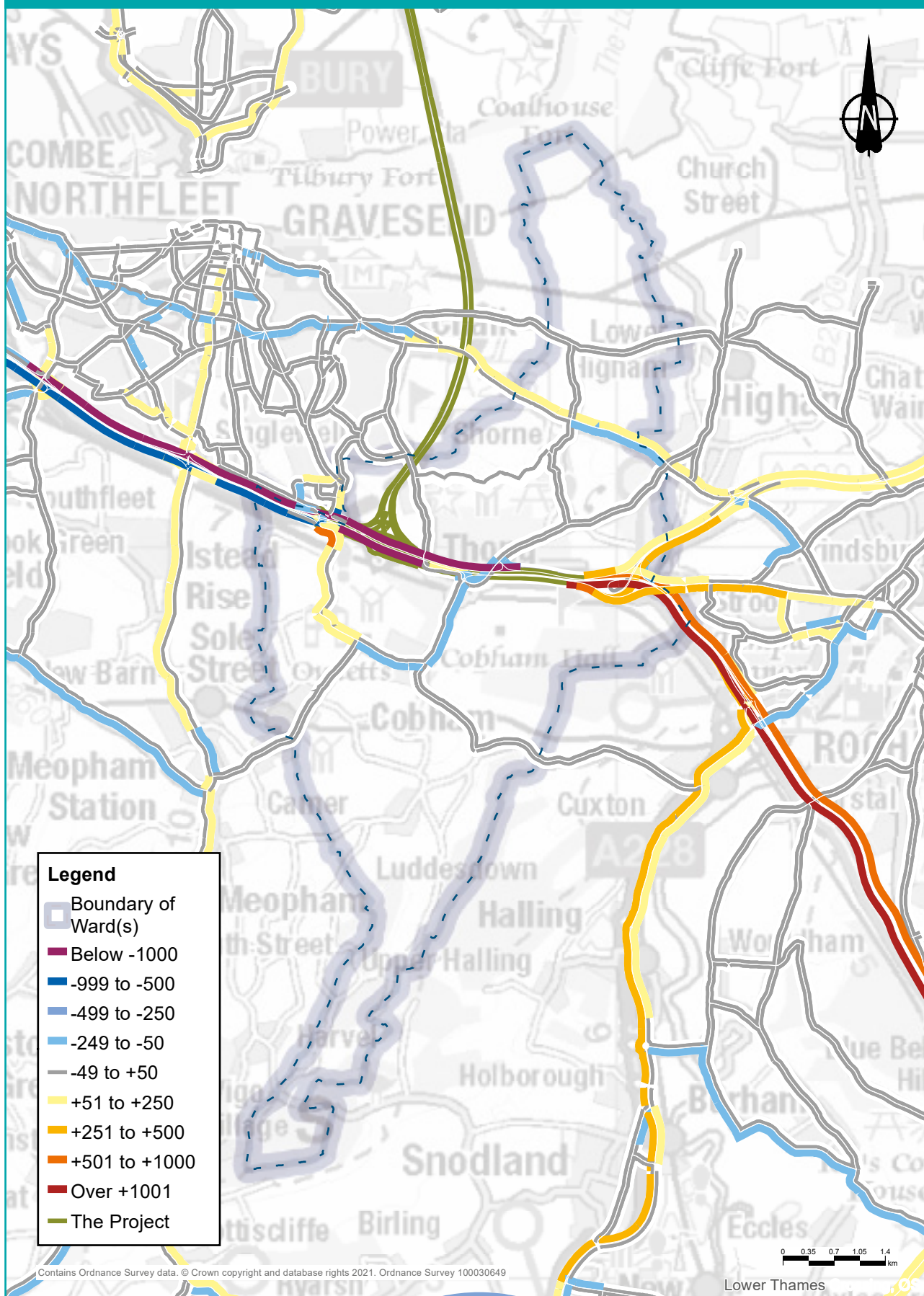


Figure 3.7: Predicted percentage changes to traffic flow in the morning peak in 2029

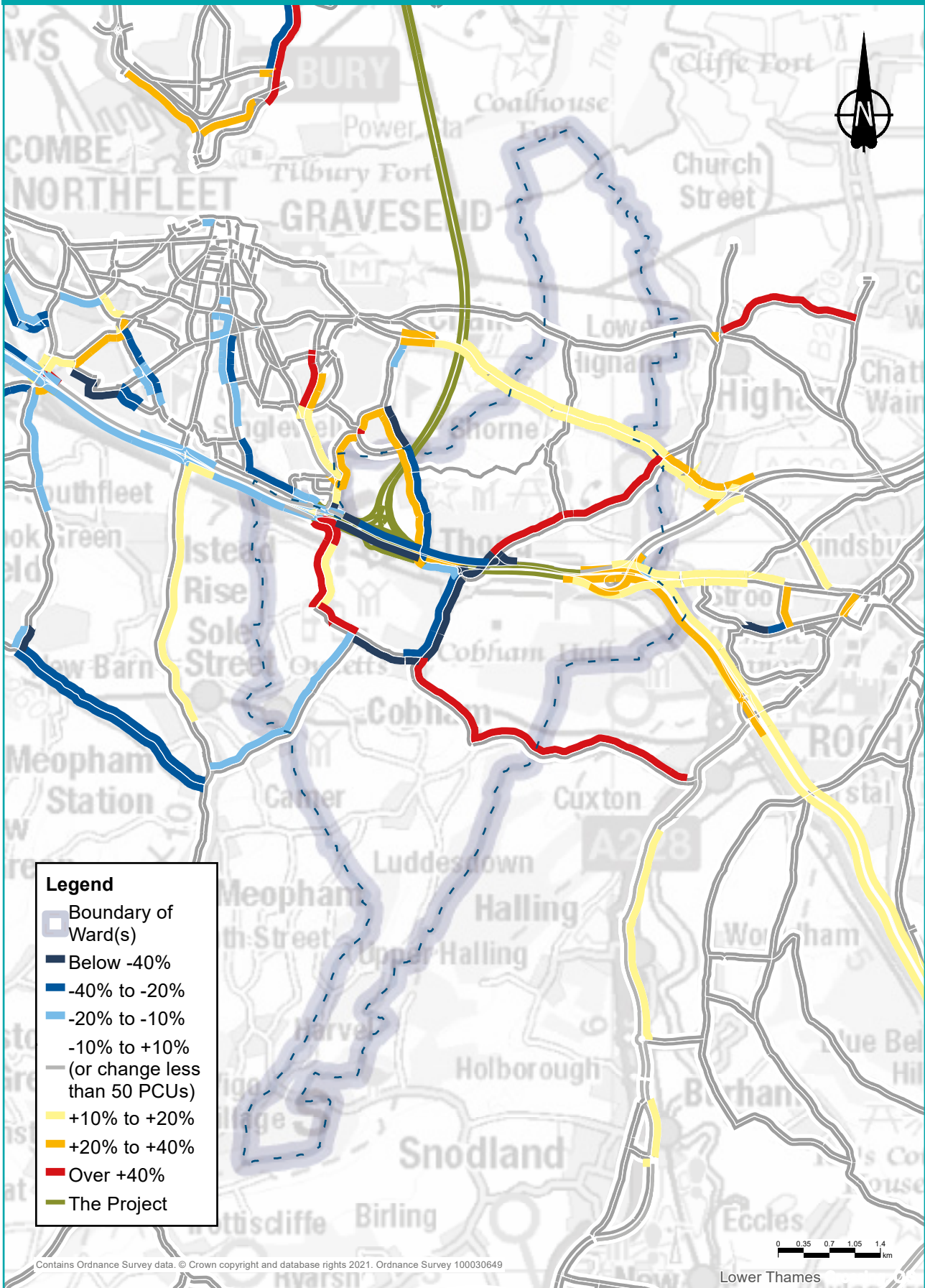


Figure 3.8: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

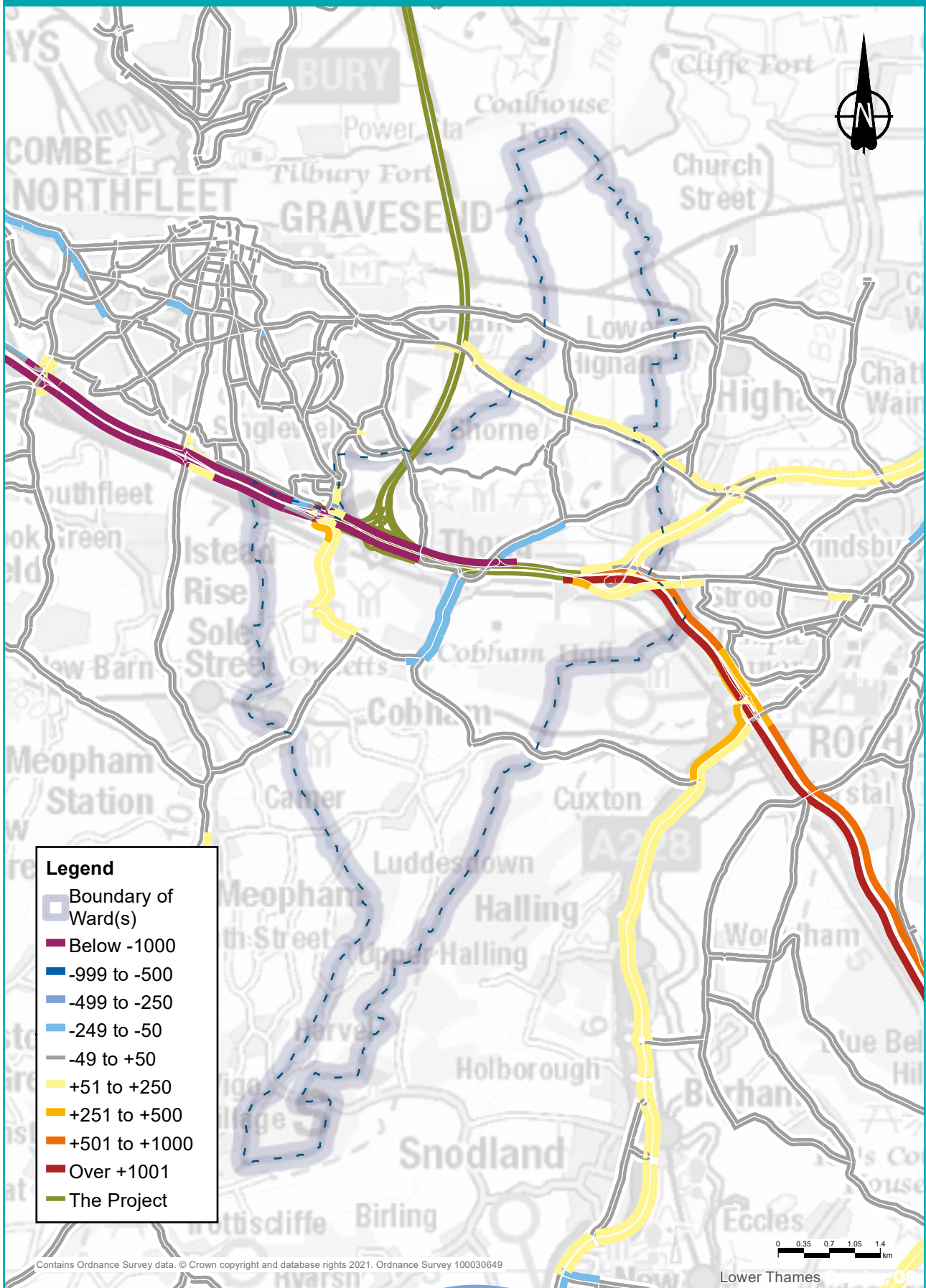


Figure 3.9: Predicted percentage changes to traffic flow in the interpeak in 2029

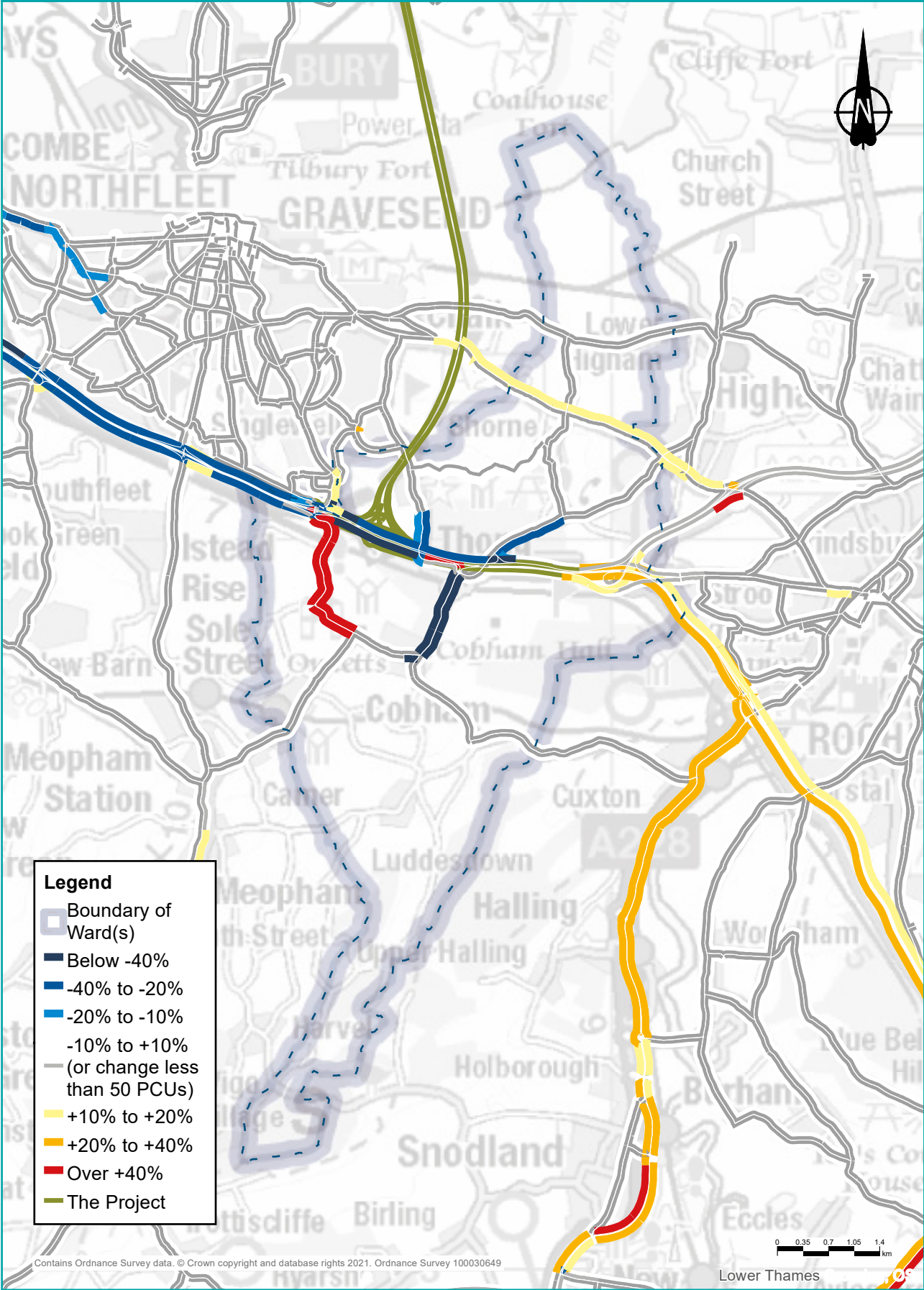


Figure 3.10: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

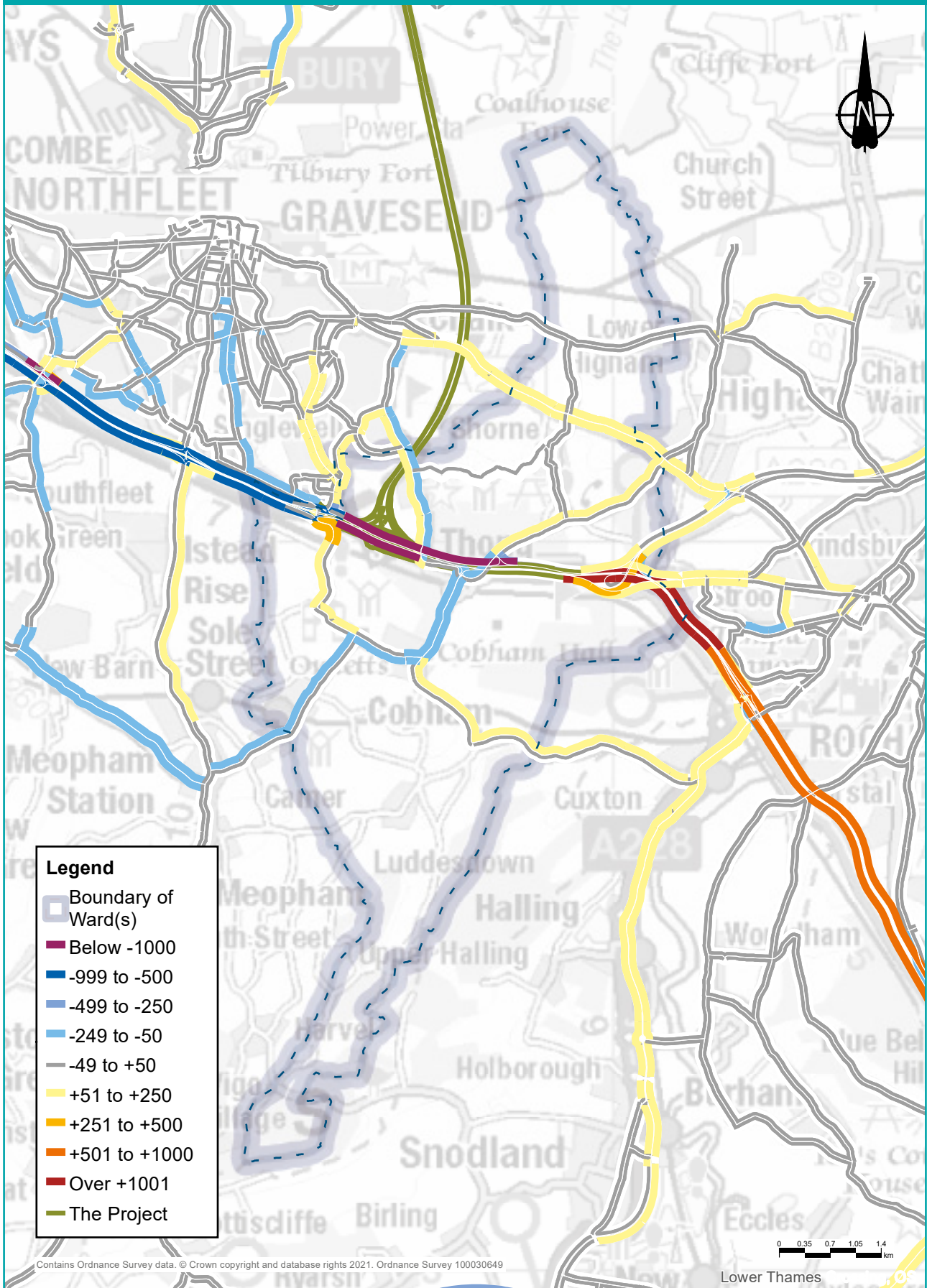
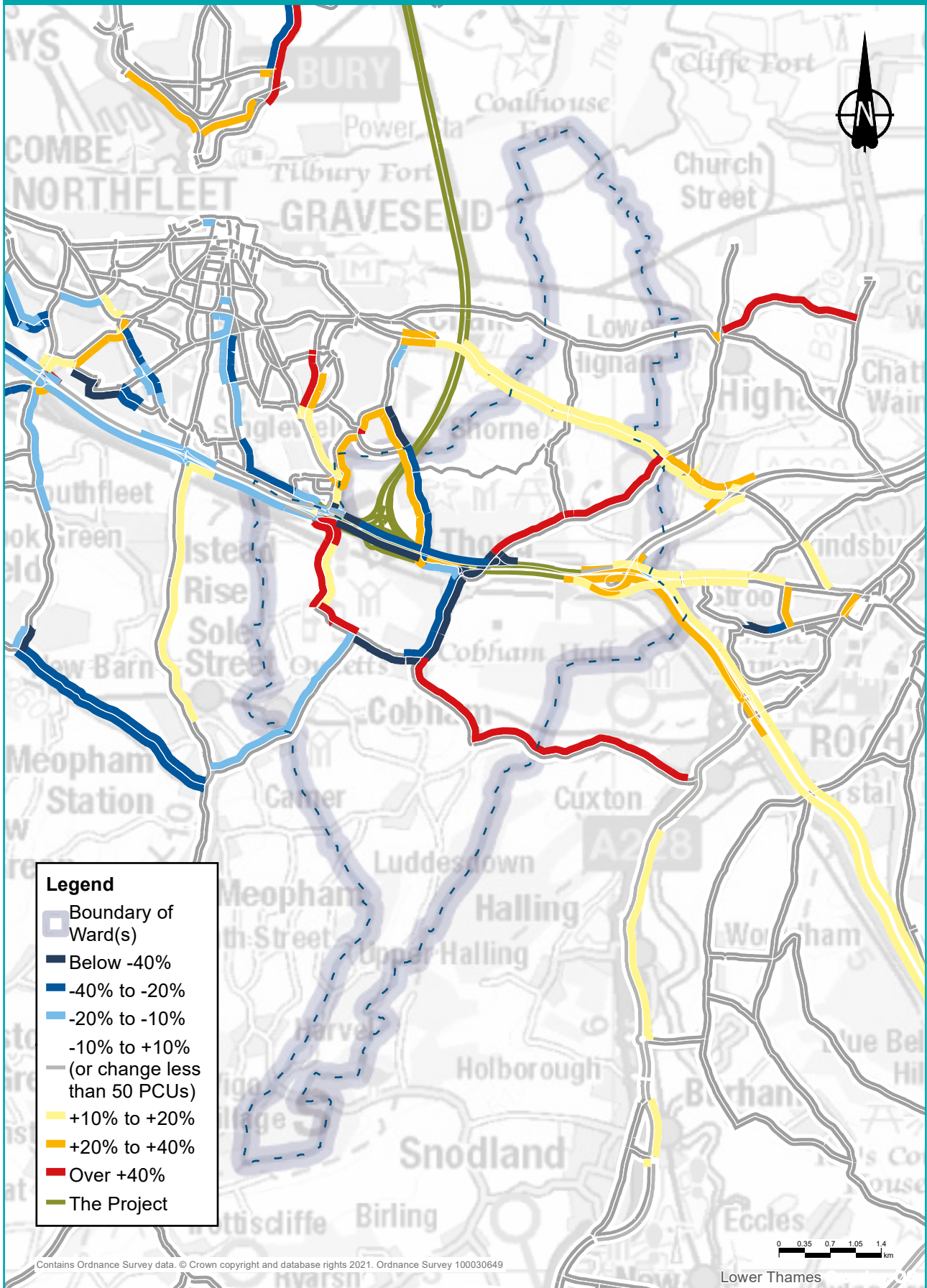


Figure 3.11: Predicted percentage change to traffic flow during the evening peak in 2029



South of the A2, there would be a predicted decrease in traffic on Halfpence Lane and on The Street, which runs through the village of Cobham, in all time periods modelled. The greatest predicted decrease would be southbound on Halfpence Lane in the morning peak (50-250 PCUs) and northbound in the evening peak (again, 50-250 PCUs an hour).

There would be a predicted decrease in traffic flows on Sole Street of 50 to 250 PCUs northbound in the evening peak hour.

Along Jeskyns Road, there would be an increase in traffic flows of between 50 and 250 PCUs per hour in both directions in the morning and interpeak hour, and in the southbound direction in the evening peak hour.

Along Henhurst Road, which leads to the new Gravesend East junction, there would be a predicted increase of between 50 and 250 PCUs northbound in all modelled hours and southbound during the interpeak hour.

Changes to journey times

Figure 3.12 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with the project. Figure 3.13 shows the change in areas within a 60-minute drive. The areas have been calculated for the morning peak hour (7am to 8am). The number of jobs within a 30-minute drive increases by 23%, which provides access to an additional 82,900. Within a 60-minute drive, the number increases by 20%, which provides access to an additional 485,000 jobs.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.

Figure 3.12: Change in area that motorists could drive to within 30 minutes from Shorne, Cobham and Luddesdown ward

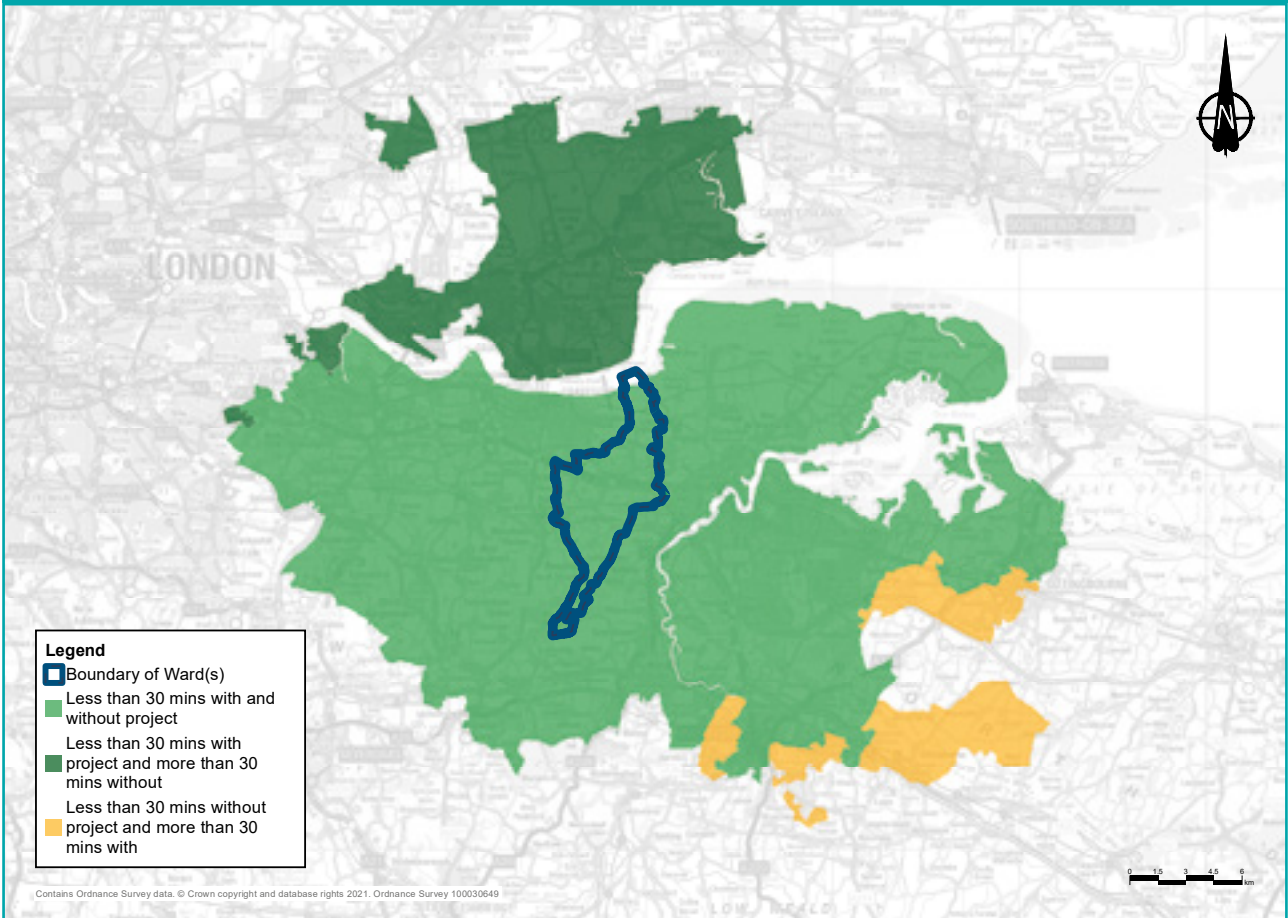
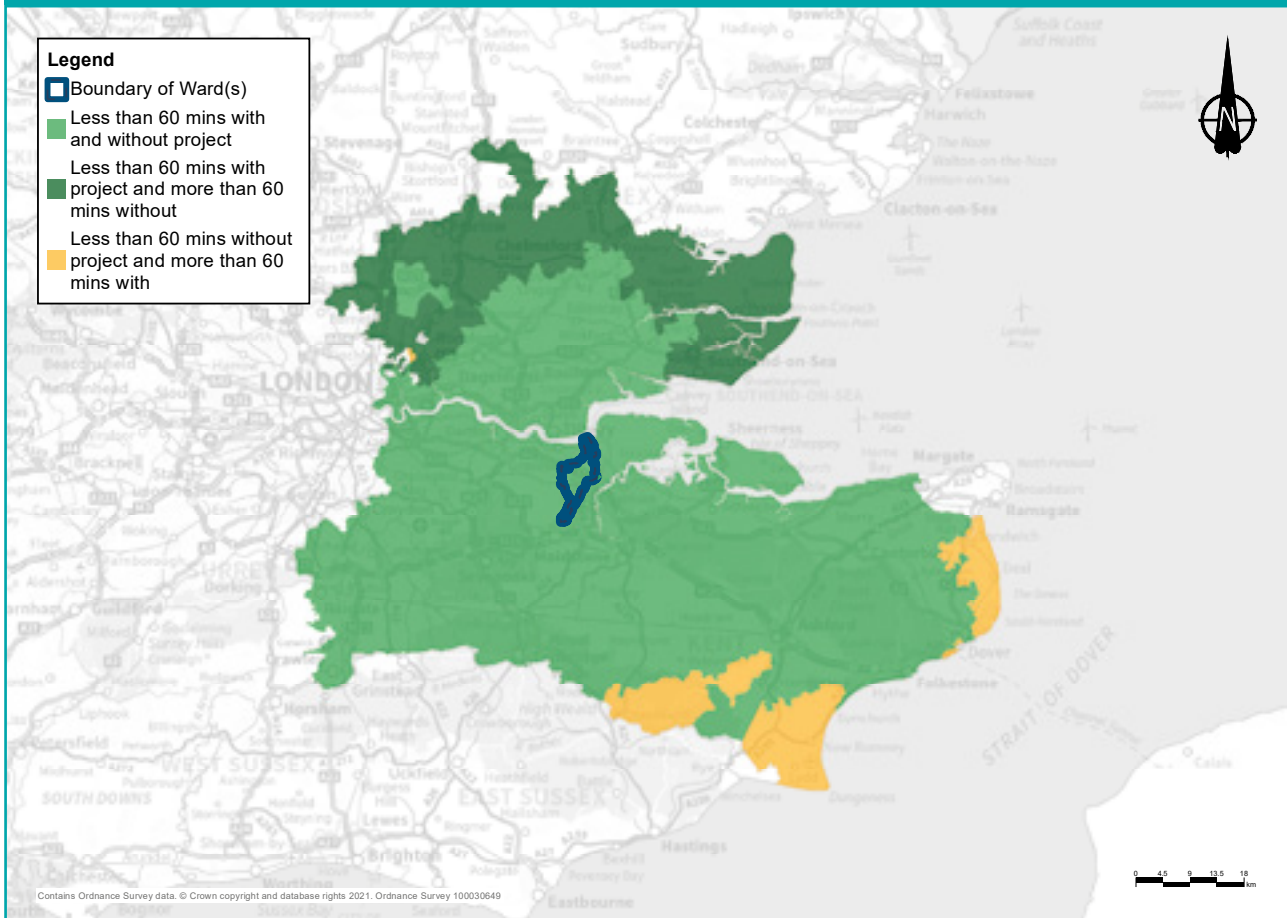


Figure 3.13: Change in area that motorists could drive to within 60 minutes from Shorne, Cobham and Luddesdown ward



Operational traffic flows

Measures designed into the project to improve traffic flow once it is operational include the provision of additional local connector roads south of the A2/M2, which would improve connectivity between local roads and the strategic road network. The junction between the project and the A226 Gravesend Road, which featured in an earlier iteration of the project, was removed following further discussions with stakeholders and feedback during consultation. Removing this junction reduced the forecast impact on local roads east of Gravesend.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

3.4 Public transport

Existing situation

Shorne, Cobham and Luddesdown ward is served in the north by the North Kent railway line from London Charing Cross to Strood. This is used by Southeastern services from Kent into London, and Thameslink Services, which run from Kent across Greater London to destinations including St Albans, Luton and Bedford. In the very south of the ward, Sole Street station is on the Chatham line, also used by Southeastern services between London and Dover.

High Speed 1 (HS1), which runs from London St Pancras to destinations in Kent and Europe, also passes through the ward.

Numerous local buses run through the ward, including along the A226, and regional coach services use the A2.

3.4.1 Construction

Trains

No impacts from construction are expected on rail lines in the ward.

Buses

Increases in journey times along the A2 and the A226 would impact on buses and coach services using these routes. Local buses that would be impacted include the 111, 190, 311, 417, 668, 735 and the 736.

3.4.2 Operations

Operational impacts

Rail

There would be no discernible change in local access times to Higham or Gravesend stations and no change to the rail services at these stations.

Buses

There would be no changes to bus routes through the ward required once the new road opens and no discernible change to most bus journey times. The only bus route that would experience a slight predicted increase in its journey time, of around two minutes over the entire route, is the 695 school bus which runs westbound from the Rochester Grammar School, through Cobham and Sole Street to Meopham School and then onto Istead Rise.

3.5 Footpaths, bridleways and cycle routes

Existing situation

Shorne, Cobham and Luddesdown ward includes many existing footpaths, bridleways and cycle routes. The following sections set out how these would be affected by the construction of the project and which routes would be in place once construction was complete. For other potential impacts, see the other topic areas in this chapter, such as Visual and Noise and vibration.

3.5.1 Construction

Construction impacts

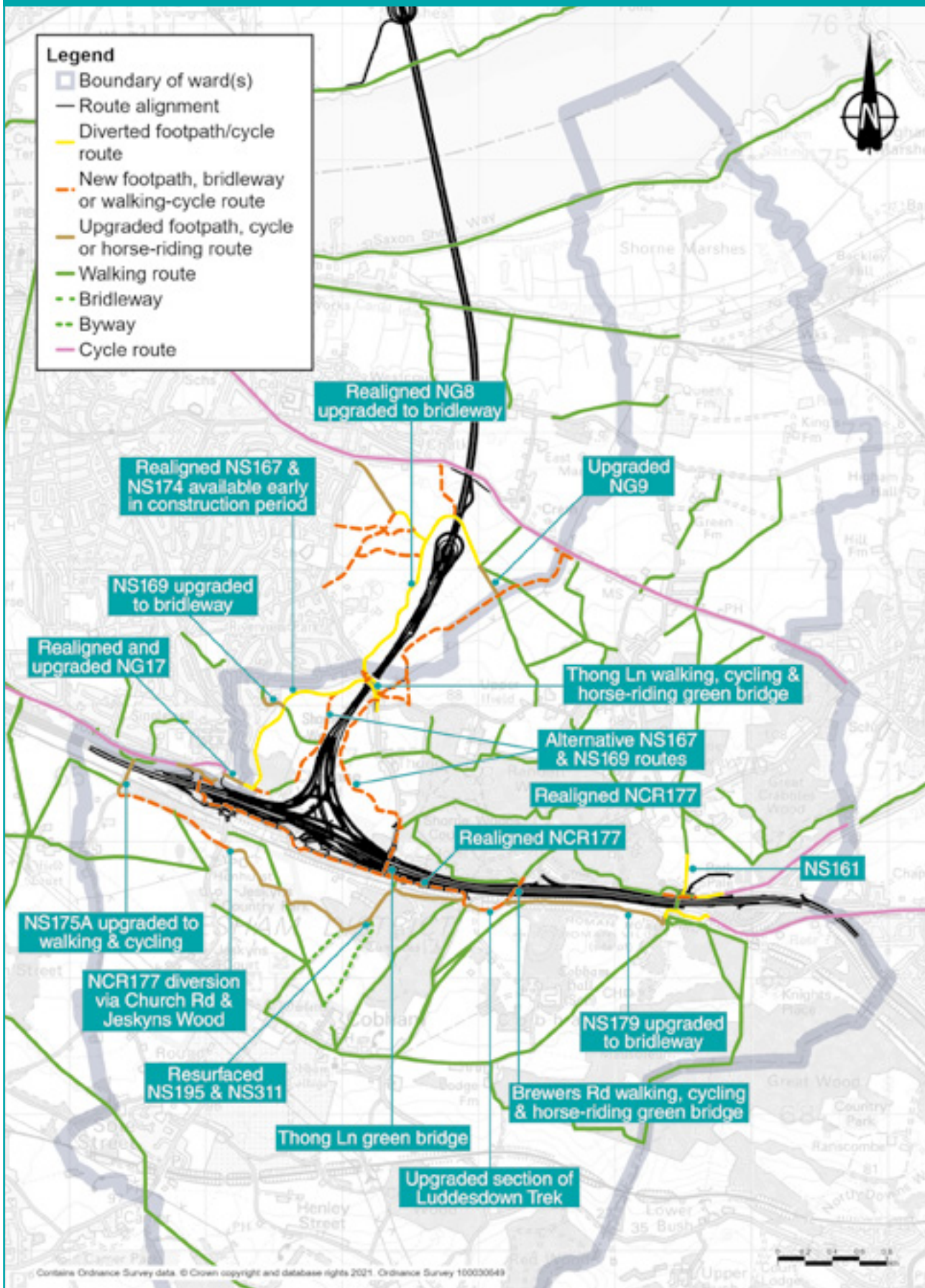
Due to the widespread construction activities in this ward, there would be significant changes to the network of footpaths and bridleways. For more information about the proposed network once the project is complete, see the Operations section.

- NCR177 would need to be closed permanently between Gravesend East junction and the Park Pale bridge. This would accommodate the new road, including the proposed A2/M2 junction. Before closing this section of the existing NCR177, we would ensure an alternative east-west route is available during the construction period, which would run south of the A2/M2. This alternative route would be via the upgraded NS175A bridge over the HS1 railway line, a new walking-cycling route running parallel to Church Road, an upgraded route through Jeskyns Community Woodland, and the resurfaced byway NS311. This alternative route would continue eastwards along upgraded sections of the Luddesdown Trek and footpath NS179, which would be made suitable for walking, cycling and horse riding. The upgraded section of the Luddesdown Trek would also connect to the Brewers Road green bridge over the A2/M2, which would include walking, cycling and horse riding facilities.

- The eastern section of footpath NG17 would be permanently closed due to construction of the new slip-road linking the A2 eastbound to the new road. Early in the construction period, this footpath would be permanently realigned to link to the new footpath heading north through Claylane Wood. It would also be upgraded to be a bridleway.
- Footpath NS161 would be closed for six months to allow for utility works. When it reopens, it would be diverted around the revised access road to Harlex Logistics.
- The sections of footpaths NS164 and NS165 within the Order Limits would be closed for five and a half years while the new road is built.
- The section of footpath NS167 that intersects the new road and junction would be closed permanently. Sections of this footpath within the Order Limits (but not intersecting the new road) would be closed for four years during construction. However, early in the construction period we would open a new route alignment for NS167, NS169 and NS174 that would pass east of Singlewell and would link footpath NG17 to Thong Lane. A temporary walking-cycling crossing would remain open throughout the construction period, maintaining east-west walking-cycling links. When the proposed green bridge carrying Thong Lane over the new road is complete, this would provide east-west walking-cycling connectivity. This crossing would also connect the north and south of Thong Lane along a temporary realignment while works are carried out. The routes would also link to Shorne Ifield Road. The route outlined above may have to close intermittently for utility works, although closures are expected to only be for a few days at a time.

- The most eastern section of footpath NS169 would be closed permanently where it intersects the new road. The rest of the route within the Order Limits would be closed for four years during construction, but with the new alignment open as described above linking NG17 and the Thong Lane green bridge over the new road. The western section of NS169 would close for up to one month for utilities works and would be upgraded to a bridleway.
- Footpath NS174 through Claylane Wood would be closed for four years until works are complete. The alternative route outlined above would provide an alternative link between Singlewell and Thong Lane.
- Footpath NS175A would be closed for one month and upgraded to a shared walking-cycling route, including the section over the bridge over the HS1 railway line.
- Footpath NS179 from Ashenbank Wood to the connection with the Luddesdown Trek would be closed for up to one month and upgraded to a bridleway. It would form part of the east-west alternative to NCR177 during construction (described above).
- Byways NS195 and NS311 would be closed for up to a month for resurfacing.
- Footpath 367 would be closed permanently due to the construction of new roads.

Figure 3.15: Proposed footpaths, bridleways and cycle routes in Shorne, Cobham and Luddesdown wards



3.5.2 Operations

Operational impacts

Overall, the proposals for walking, cycling and horse riding include more than 46km of extended, diverted, upgraded or new footpaths, bridleways and cycle routes. These would provide much improved connectivity across the project. The proposals were developed after consultation and engagement with local communities and stakeholders. For an overview of the proposed improvements to footpaths and bridleways across the project, see chapter 2 of the Operations update.

Shorne, Cobham and Luddesdown ward includes three green bridges: two carrying Thong Lane over the project and the M2/A2, and a third carrying Brewers Road over the M2/A2. All three proposed green bridges accommodate motor vehicles and also have facilities to help walkers, cyclists and horse riders to cross. In addition, we are proposing to create a new car park (with walking, cycling and horse riding access to Shorne Woods Country Park via a Pegasus crossing) located west of Thong Lane and north of Gravel Hill Wood.

As well as the more scenic alternative to NCR177 described in the construction impacts section above, we would also build a new off-road cycle track parallel to the new connector road south of the A2. This would provide a permanent realignment for the section of NCR177 north of the A2 closed as a result of the project.

- Bridleway NS161 would be permanently realigned near Harlex Haulage to allow for a new access road to the business.
- A new bridleway west of Thong village would provide a new route replacing NS167 and NS169.
- The western section of footpath NS169 would be upgraded to a bridleway.
- When the project is complete, footpath NS174 would link to the new realigned NS167 and NS169, which would run parallel either side of the new road, crossing it at the new Thong Lane green bridge.
- Footpath NS175A would be upgraded to a shared walking-cycling route, with new surfacing in the southern section.
- Footpath NS179 would be upgraded to a bridleway.
- Byways NS195 and NS311 would be resurfaced and remain byways.

3.6 Visual

Existing situation

Views towards the land on which the project would be built from the populated areas of Shorne, Cobham and Luddesdown ward are likely to be limited to properties in Thong, and from the southern edge of Riverview Park, Gravesend. Throughout the ward there are likely to be views of the project from parts of the local footpath network, including Saxon Shore Way long-distance footpath.

Views to the west and south-west towards the land on which the project would be built from properties in Thong are largely screened by garden vegetation or other features. The view from homes on the southern edge of Riverview Park is mostly gently rolling arable landscape, featuring a prominent overhead line, and bounded to the north by the urban edge of Gravesend. The A2/M2 corridor is visible in the distance to the south.

From the footpath and bridleway network south of the A2/M2, there are northerly views towards the project, with intervening trees and woodland, and the occasional close-range views of the A2/M2 and High Speed 1 (HS1) corridors.

South of Shorne Ridgeway, elevated views towards the Order Limits encompass more undulating scenery, farmland and woodland, and the A2/M2 and HS1.

From the footpath and bridleway network west of Thong Lane, there are views of rolling farmland, bounded by hedgerows and linear belts of trees. The infrastructure along the A2/M2 and HS1 occasionally features in these views, as well as the urban edge of Gravesend.

Between Thong Lane and the A226, west of Shorne, views from the local footpaths and bridleways are mostly of sloping arable landscape, crossed by the north-easterly overhead powerlines. The urban edge of Gravesend is evident in some views.

North of the A226, there are expansive views from the local footpaths and bridleways over the Order Limits, of large-scale flat marshland pasture with the Thames Estuary beyond to the north. From Saxon Shore Way, there are distant views towards the Order Limits north of the river.

Recreational users of Rochester and Cobham Park Golf Club and Jeskyns Community Woodland have views towards the Order Limits of woodland and a gently undulating landscape of mixed farmland. Views also include glimpses of the HS1 and A2/M2 corridors, Brewers Road (including the bridge), parkland surrounding Cobham Hall School, and Rochester and Cobham Park Golf Club.

3.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

The main construction activities likely to be seen in this ward are:

- Highway works along the A2/M2 corridor, including structures and retaining walls
- The new road's proposed A2/M2 junction
- The new highway within deep cutting leading to the southern tunnel entrance
- Utilities works, including diversion of overhead lines
- Two green bridges on Thong Lane and another on Brewers Road
- Chalk Park recreational area
- Drainage ponds
- Construction and operation of the Marling Cross and A2 Compounds for main works
- Construction and operation of the Shorne Ilfield Road, A2 West, A2 East and Park Pale Utility Logistics Hubs
- Vegetation clearance to facilitate main works construction and utilities works

Views of construction activities from properties on the western edge of Thong and the southern edge of Riverview Park are likely to include highway construction, including the Thong Lane green bridge over the new road. There would also be views of works associated with the diversion of the overhead line and the construction of a new pylon at Claylane Woods, including the A2 West Utility Logistics Hub. In addition, works to remove a section of overhead lines south of Thong would also be visible.

Users of Rochester and Cobham Park Golf Club and Jeskyns Community Woodland are likely to be able to see highway works and associated utility diversions alongside the A2/M2 corridor, but these would be partially screened by intervening trees and woodland, including retained roadside planting.

There are likely to be views of construction from the footpath network throughout the ward. South of the A2/M2 would be exposed to intermittent views of highway construction, including the proposed A2/M2 junction. South of Shorne Ridgeway, there would also be views of highways construction and utilities diversions along the A2/M2 corridor. West of Thong Lane, construction of the proposed A2/M2 junction and Chalk Park recreational area would feature prominently in views from footpaths and bridleways remaining open during construction, with diversion of the existing overhead line also evident. A map showing Chalk Park can be found in chapter 3 of the Operations update.

Between Thong Lane and the A226 there would be views towards the Southern Tunnel Entrance Compound. Alongside the deep cutting works for the new highway there would also be views of landscaping associated with Chalk Park and diversion of the overhead line crossing Thong Lane.

From the footpath and bridleway network north of the A226, views of the smaller A226 Gravesend Road Compound and Milton Compound, and views south of Southern Tunnel Entrance Compound along with landscaping associated with Chalk Park may be discernible.

From Saxon Shore Way long distance footpath, landscaping around – and construction of the Northern Tunnel Entrance Compound – would be visible in distant views north of the River Thames.

Measures to reduce visual impacts during construction

Construction of a project of this scale would be visible to residents and users of local amenities such as local footpaths and bridleways. The CoCP and REAC include measures to reduce how intrusive the project is on these views. Proposed measures would include softening the appearance of temporary earthwork stockpiles adjacent to the Kent Downs AONB by seeding south-east facing slopes with grass.

The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

3.6.2 Operations

Operational impacts

Once open, the main project features in this ward would comprise the new highway alignment located in cutting, the A2/M2 junction and nearby open space such as the land north of Claylane Wood and Chalk Park. The replacement pylon in Claylane Wood would be notably taller than the existing one. Additionally, moving a section of wooden electricity poles underground would remove a local feature that detracts from current views. More information about the completed project can be found in the Project description section.

The main visual impacts from the western edge of Thong during operation are likely to comprise views of the landscaped A2/M2 junction embankment and false cutting and diversion of the existing overhead line, closer to the north-west edge of Thong. From the southern edge of Riverview Park, there would be views over the newly created Chalk Park, towards the new road in cutting.

The undergrounding of a section of overhead power line north-east of Thong would remove a prominent feature that detracts from current views in the surrounding landscape.

From public rights of way south of the A2/M2 and from Rochester and Cobham Park Golf Club and Jeskyns Community Woodland, views of the new road would be gradually softened by proposed planting, as would views from footpaths and bridleways south of Shorne Ridgeway.

From the footpath and bridleway network west of Thong Lane, the new A2/M2 junction would feature prominently in views from local footpaths and bridleways. The replacement tower for the modified overhead line, notably taller than the existing tower, would also be visible softened by proposed planting mitigation. North of the A226, there would be views south from the footpath and bridleway network over restored agricultural land, with more distant views of the project including Chalk Park.

From Saxon Shore Way long distance footpath, there would be distant broad views of the proposed landscaping in front of the northern tunnel entrance, which would form a new backdrop to the River Thames to the east of Tilbury Fort.

Measures to reduce visual impacts during operation

Mitigation measures within this ward include using embankments and cuttings west of Thong, screen planting, and the restoration of land used during construction to create areas of open space and for agricultural use.

Location and feature specific design measures, controls, landscape and habitat creation have been developed to enhance the appearance of the project. Details of these can be found in the Design principles and outline Landscape and Ecology Masterplan which accompany this consultation.

3.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Shorne, Cobham and Luddesdown is mainly a result of noise in the centre of the ward where the A2/M2 and HS1 run across from east to west. There is also noise from other roads such as the A226 Gravesend Road, railways, farming and other human activity.

As part of our environmental assessment process, we carried out surveys of existing background noise at five locations in the ward, which were agreed with the local authority. The levels monitored at these locations recorded average existing noise levels in the range of 50 to 65dB(A)² during the day and 47 to 60dB(A) during the night.

In order to understand how noise levels would vary with and without the project, we use noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We model this because we cannot assume that noise levels in future will be the same as they are now. For example, our assessment of the opening year noise levels accounts for predicted changes in traffic levels.

We also model the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if it were implemented.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 78dB(A) during the day and from 29 to 63 dB(A) during the night at the identified locations within the ward. As such, our noise assessments predict that by opening year noise levels will increase compared with the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

3.7.1 Construction

Daytime construction noise impacts

The main construction activities that are expected to give rise to noise and vibration impacts in this ward are those associated with constructing the widened A2/M2, the proposed A2/M2 junction, the southern tunnel entrance, the tunnel approach and the main road, as well as utilities works.

Within the ward of Shorne, Cobham and Luddesdown two main works compounds and four ULHs would be located within the ward boundary. These are described in the Project description section above.

Although not located within the ward, the Marling Cross Compound (see chapter 9) may contribute to the noise impacts experienced within this ward due to how close it is to the ward boundary.

There would also be haul roads built and used during the construction period, these are shown in the Project description.

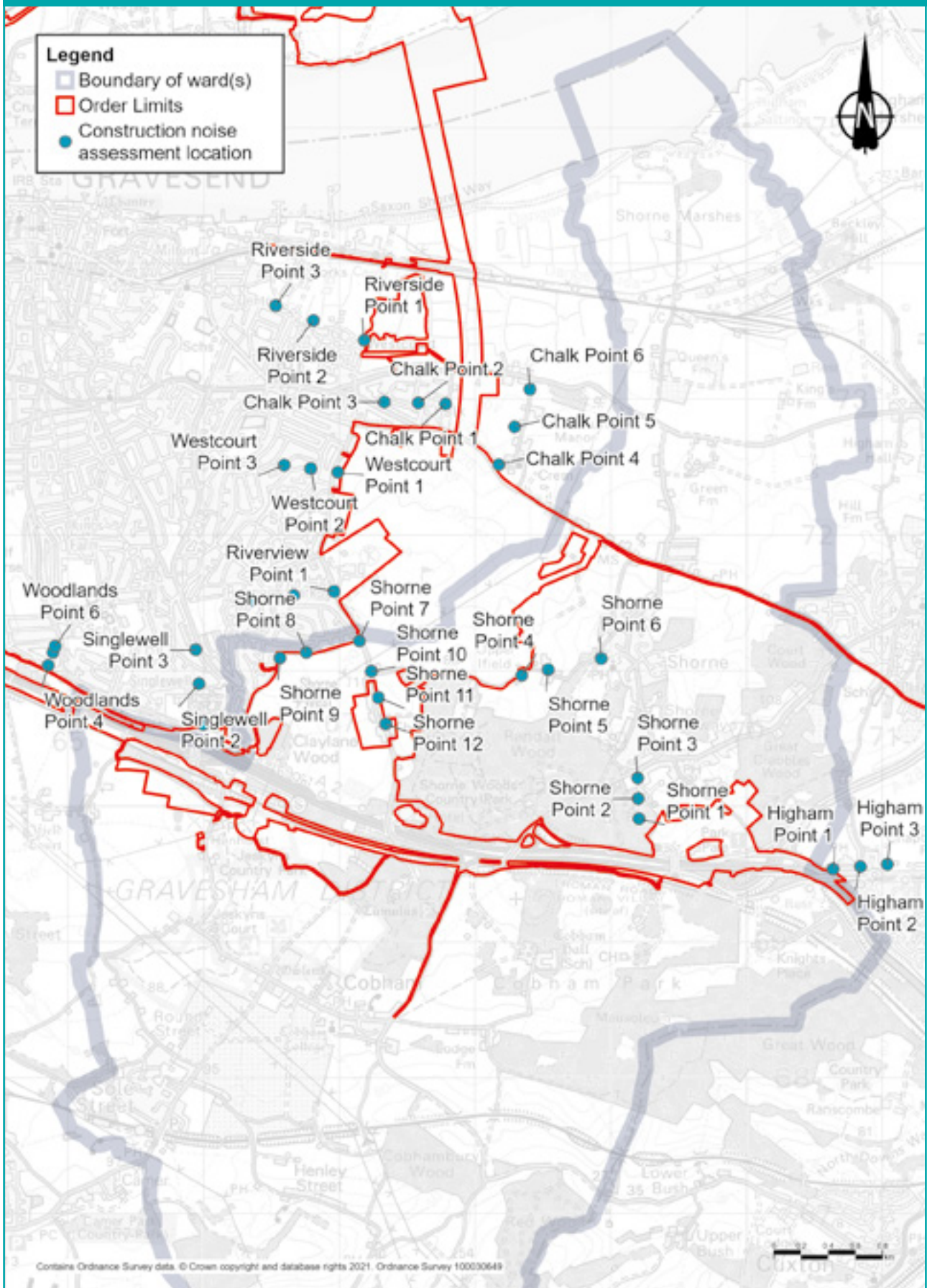
Within the ward there are four proposed structures expected to be constructed using vibratory or percussive piling, but these works would not be within 100 metres of any sensitive receptor and as such no vibration impacts during the construction works are predicted to occur.

Construction noise levels have been predicted at 12 locations across this ward, chosen to provide a representation of the level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using standard units for road projects, dB LAeq (12-hour), which represents the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder noises than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

Figure 3.16 shows the locations at which we have predicted the daytime construction noise during the project's construction period.

Figure 3.16: Construction noise assessment locations in Shorne, Cobham and Luddesdown ward



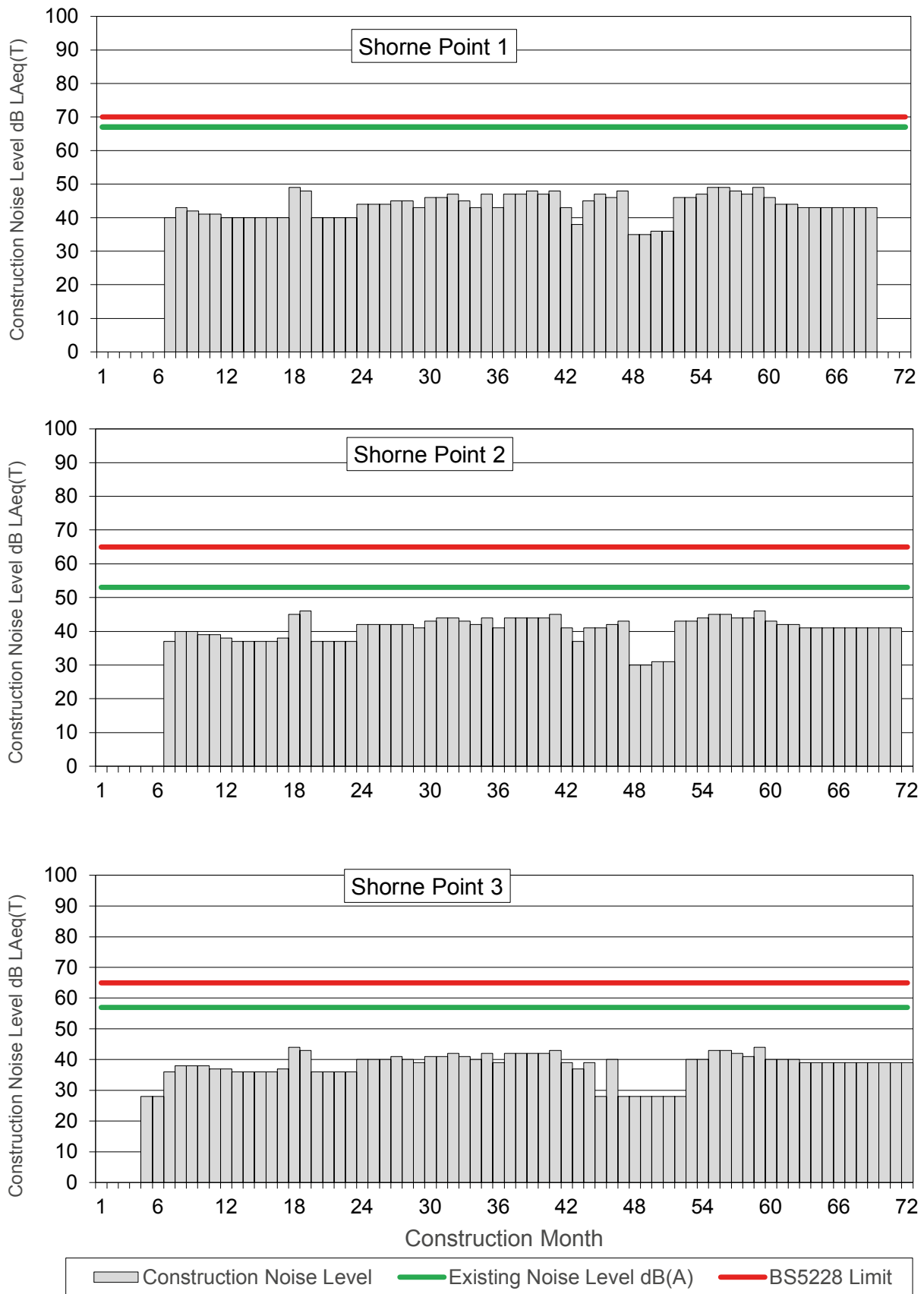
Each vertical bar in figure 3.17, 3.18, 3.19 and 3.20 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart shows the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific mitigation measures would be implemented to reduce the noise.

The predicted noise levels show that higher construction noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance and additional buildings and other features screening the noise from more distant residential areas.

With reference to Figure 3.17, the following summarises the noise level changes over the construction period for points 1 to 3:

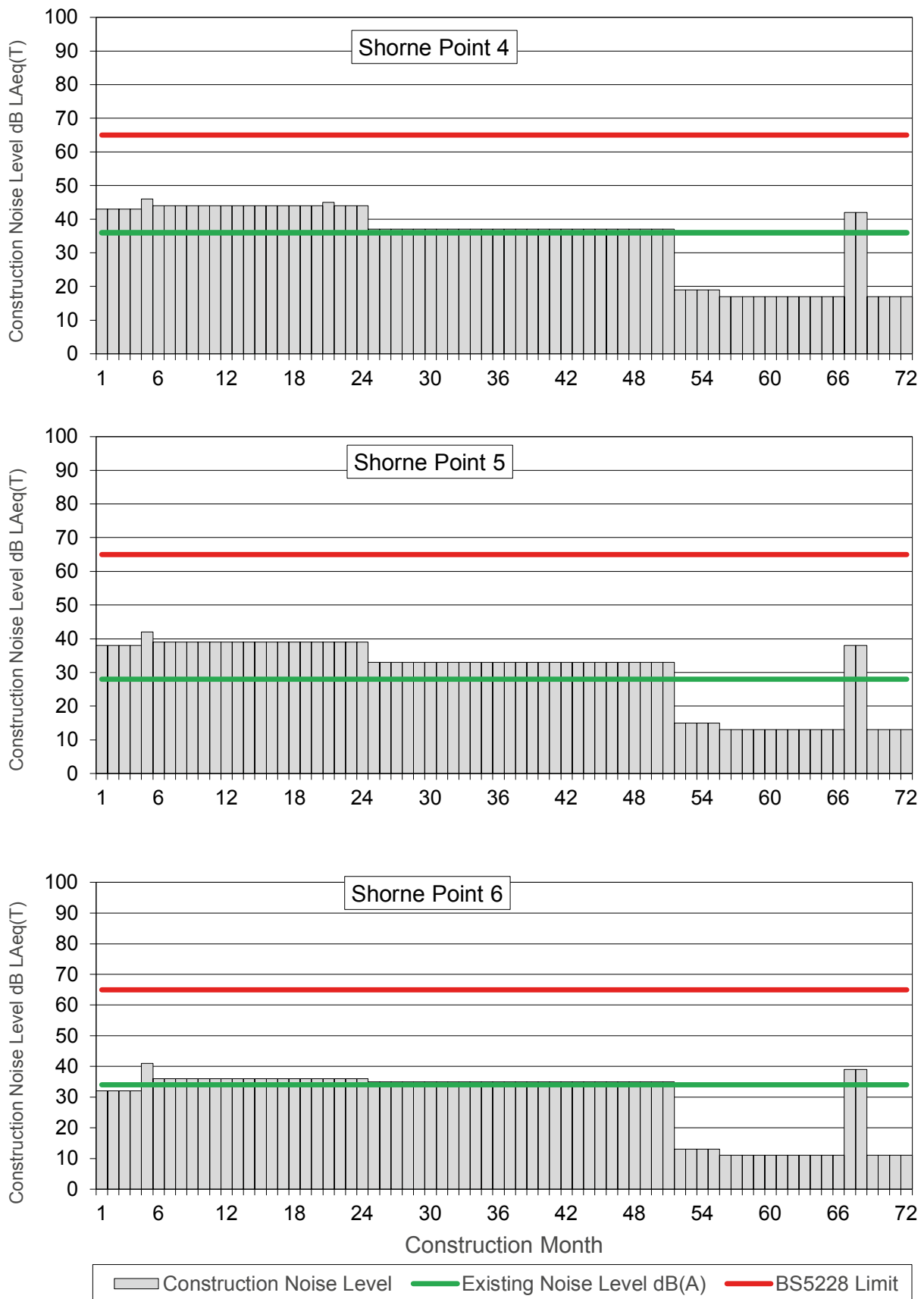
- At point 1, construction noise levels are predicted to range from 35 to 49dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 2, construction noise levels are predicted to range from 30 to 46dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 3, construction noise levels are predicted to range from 28 to 44dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.

Figure 3.17: Construction noise by month for points 1, 2 and 3 in Shorne, Cobham and Luddesdown



- With reference to figure 3.18, the following summarises the noise level changes over the construction period for points 4 to 6:
- At point 4, construction noise levels are predicted to range from 17 to 46dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 53 months. However, they would not breach the defined threshold.
- At point 5, construction noise levels are predicted to range from 13 to 42dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 53 months. However, they would not breach the defined threshold.
- At point 6, construction noise levels are predicted to range from 11 to 41dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 49 months. However, they would not breach the defined threshold.

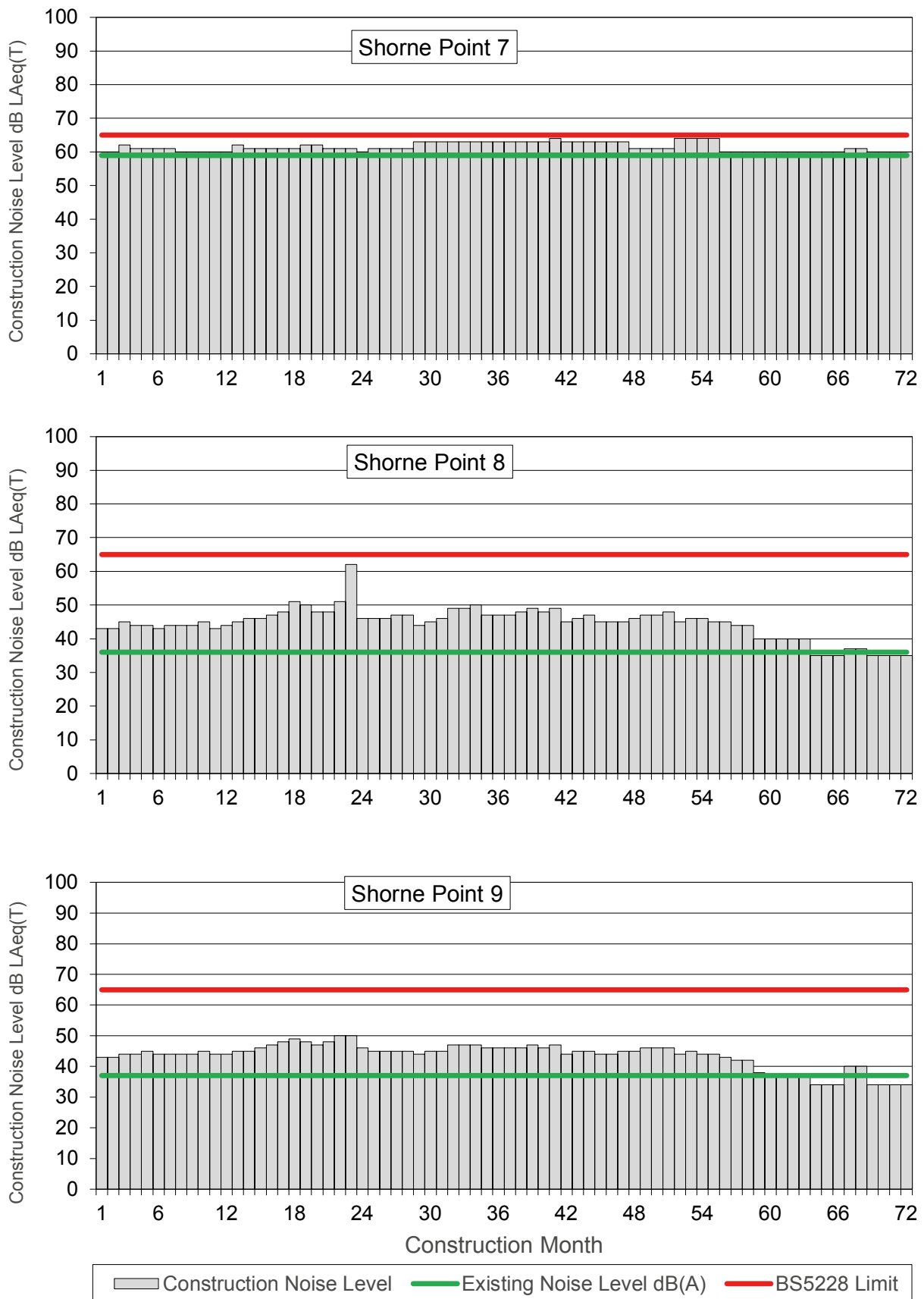
Figure 3.18: Construction noise by month for points 4, 5 and 6 in Shorne, Cobham and Luddesdown



With reference to figure 3.19, the following summarises the noise level changes over the construction period for points 7 to 9:

- At point 7, construction noise levels are predicted to range from 60 to 64dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 72 months. However, they would not breach the defined threshold.
- At point 8, construction noise levels are predicted to range from 35 to 62dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 65 months. However, they would not breach the defined threshold.
- At point 9, construction noise levels are predicted to range from 34 to 50dB LAeq (12-hour), during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 61 months. However, they would not breach the defined threshold.

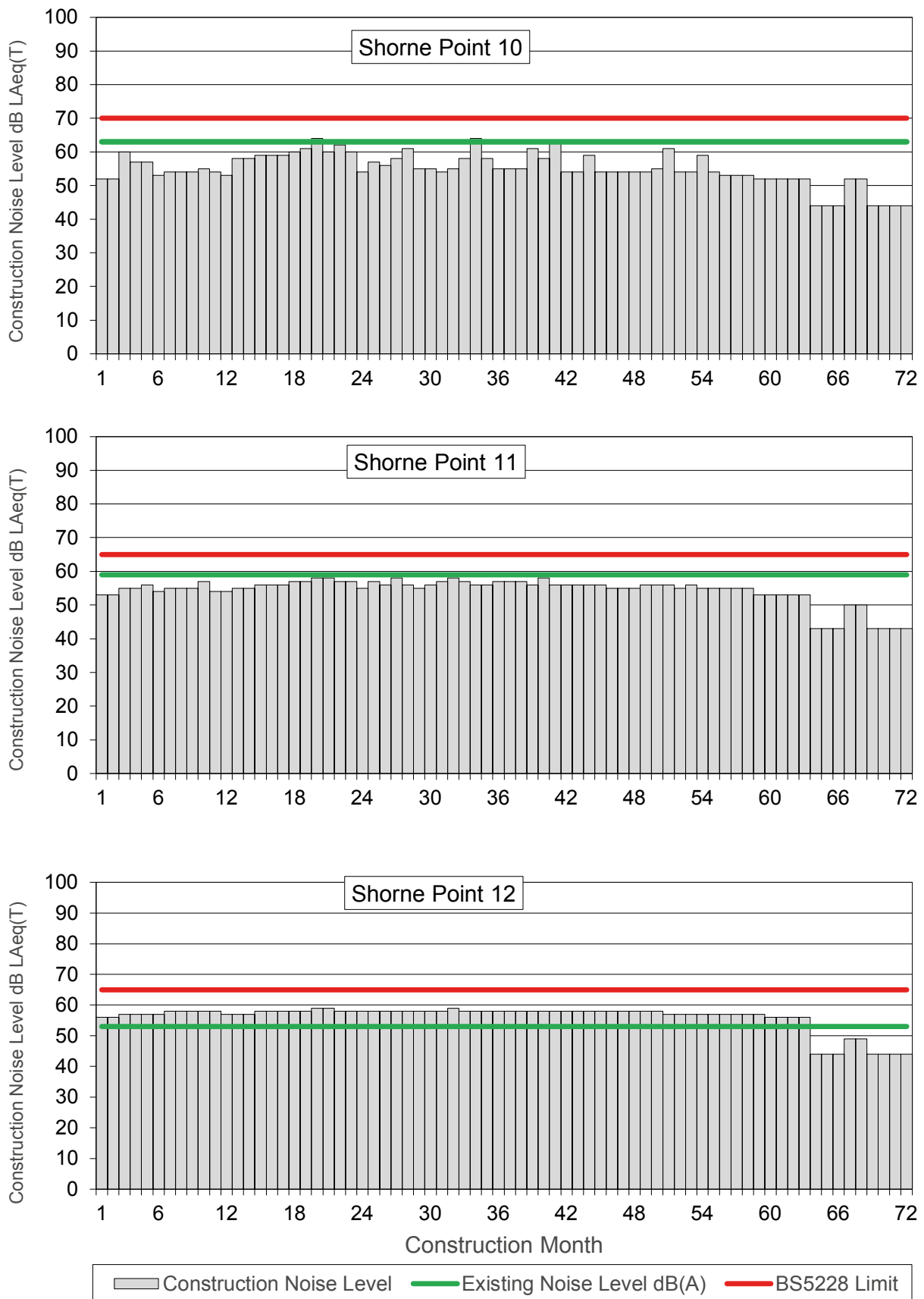
Figure 3.19: Construction noise by month for points 7, 8 and 9 in Shorne, Cobham and Luddesdown



With reference to figure 3.20, the following summarises the noise level changes over the construction period for points 10 to 12:

- At point 10, construction noise levels are predicted to range from 44 to 64dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately two months. However, they would not breach the defined threshold.
- At point 11, construction noise levels are predicted to range from 43 to 58dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 12, construction noise levels are predicted to range from 44 to 59dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 63 months. However, they would not breach the defined threshold.

Figure 3.20: Construction noise by month for points 10, 11 and 12 in Shorne, Cobham and Luddesdown



24/7 construction working

In addition to the changes to the daytime noise impacts reported in the section above, 24-hour seven-day construction working is proposed at the locations shown in figure 3.21. The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and remain part of our current proposals.

These locations are where works may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The duration of utility works in this area could be for several months of continuous working, as well as occasional night-time or weekend works for other highways and utilities works. These works could have an impact on local communities, and we would work with the local authority to manage these impacts.

Construction traffic noise impacts

Maps showing the predicted change in road traffic noise within this ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years, except along the roads where increases in noise levels have been predicted. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Figure 3.21: Newly proposed and tunnel 24/7 working locations in Shorne, Cobham and Luddesdown ward

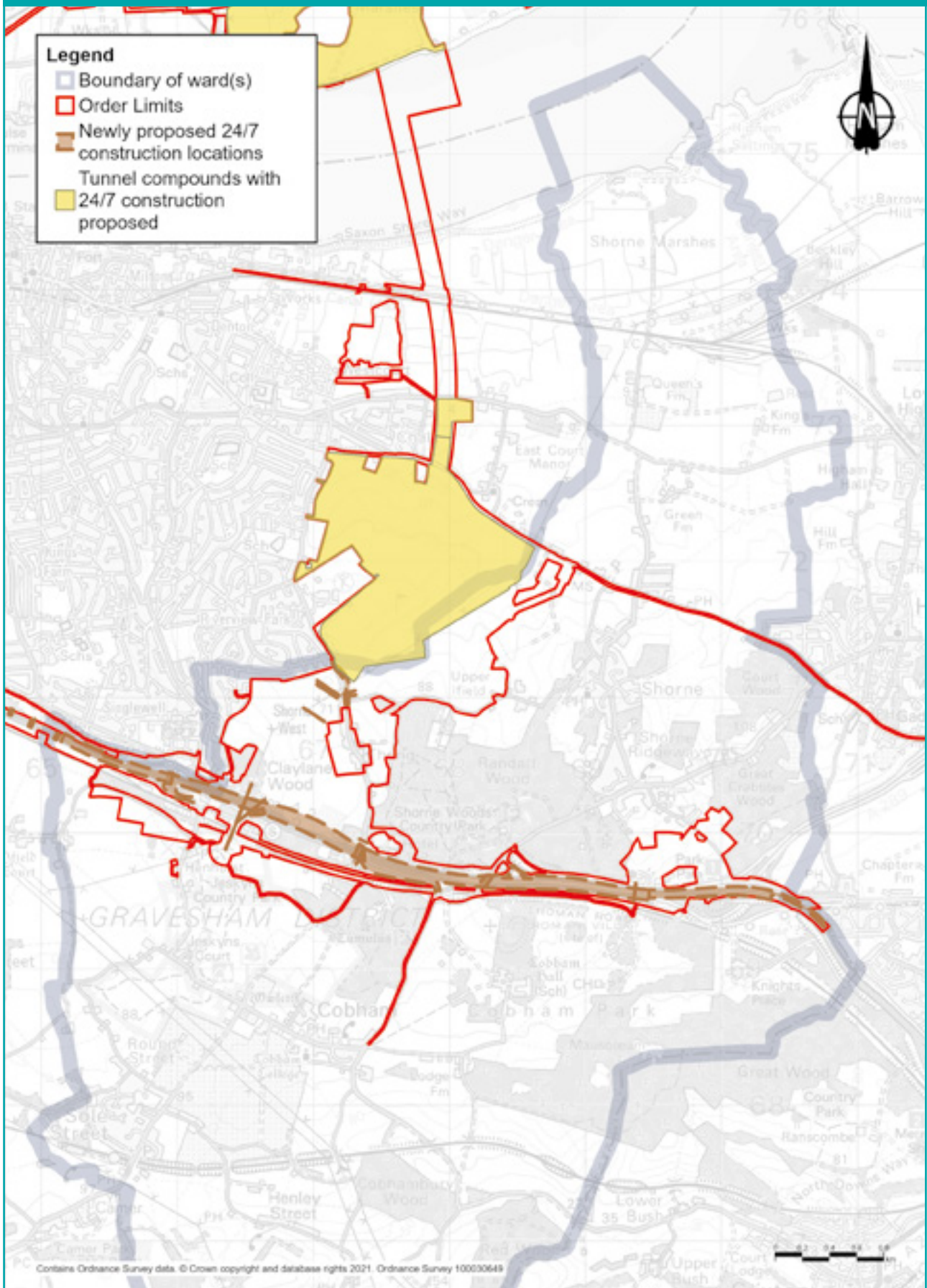


Table 3.4: Construction traffic noise in Shorne, Cobham and Luddesdown ward

Affected road(s)	Predicted noise impact	Construction year(s)
Shorne Ifield Road	Major increase in noise levels	3 and 4
Crown Lane	Moderate increase in noise levels	3 and 4
Jeskyns Road Henhurst Road Lower Road	Minor increase in noise levels	3 and 4
Cobhambury Road Warren Road Pear Tree Lane	Minor increase in noise levels	5
Cobhambury Road Warren Road	Moderate increase in noise levels	3 and 4
Green Farm Lane	Minor increase in noise levels	4
A2 Slips on to Brewers Road	Minor increase in noise levels	1

Measures to reduce construction noise and vibration

Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- Installing and maintaining hoarding around the construction compounds.
- Installing temporary acoustic screening around the construction areas likely to generate noise.
- Keeping site access routes in good condition with condition assessments onsite to inspect for defects such as potholes.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular power generators and pumps.
- No music or radios would be played for entertainment purposes outdoors onsite.

- Site layout would be planned to ensure that reversing is kept to a practical minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings.
- Non-percussive demolition techniques would be adopted where reasonably practical to reduce noise and vibration impact.
- Careful consideration of the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity as opposed to generators, where possible.
- Minimisation of construction vehicle traffic by, where practical, selection of local suppliers along the project route, using local workforces and by minimising material transportation for earthworks construction along the project.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction period.

3.7.2 Operations

Operational noise impacts

Within this ward, the main project route (see the Project description) runs through the western part of the ward, with traffic joining the new road at its proposed junction with the A2/M2 and flowing to the southern tunnel entrance east of Gravesend. There would also be changes to the existing A2/M2 to accommodate the predicted changes in traffic flow.

Direct noise impacts from the new road, the proposed A2/M2 junction and widening of the existing A2/M2 would be experienced in the south-western section of the ward, close to the southern tunnel entrance and the main project alignment. There would also be indirect noise impacts as a result of changes in traffic flow, the number of HGVs, and traffic speeds on the existing road network within the ward.

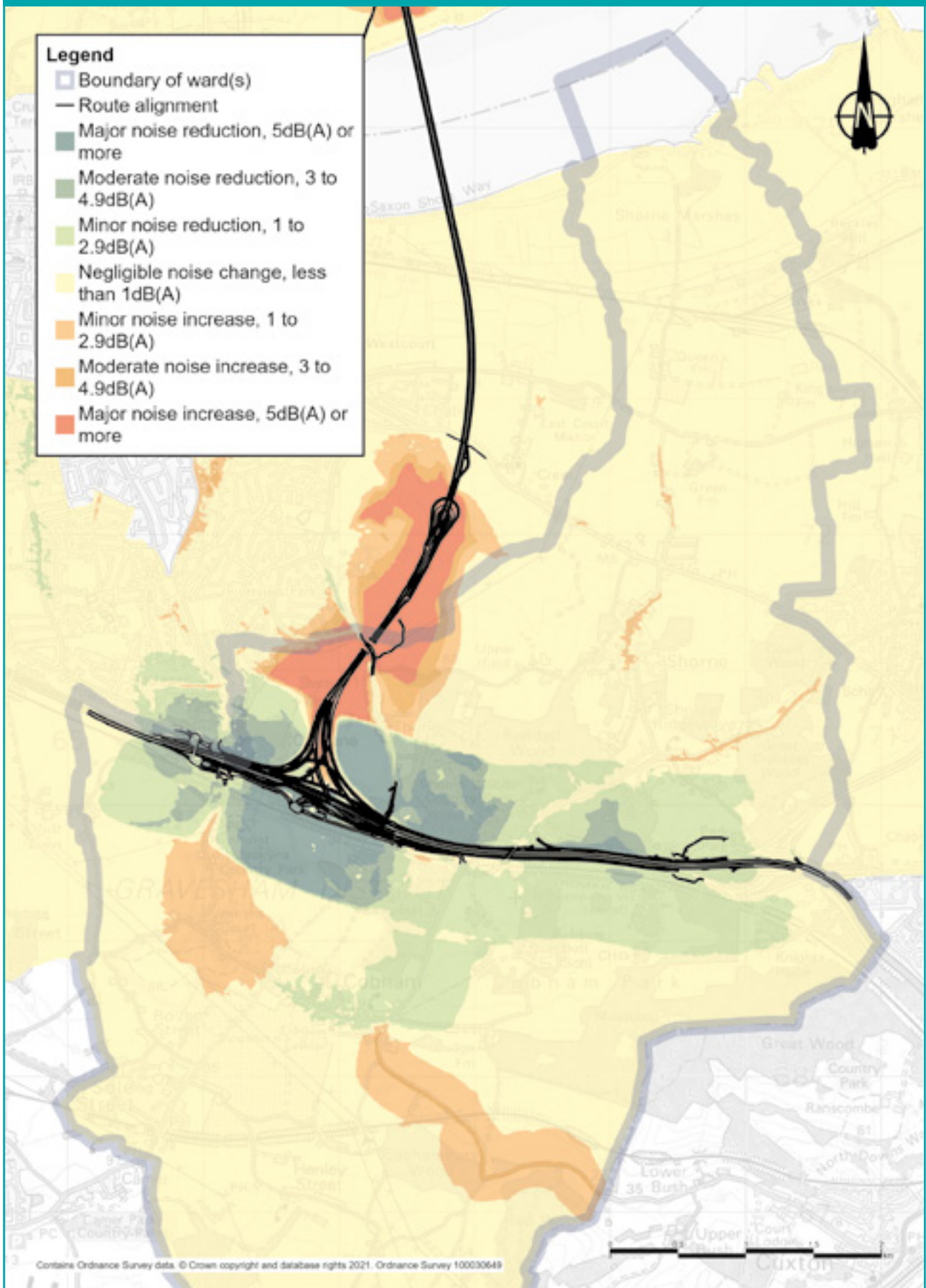
Figure 3.22 shows the predicted changes in operational road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise-sensitive receptors (such as nearby properties) are predicted to range from major reductions in noise levels of greater than 5dB to major increases in noise levels of greater than 5dB. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce traffic noise and vibration during operation

The main methods of controlling noise would be, where practical, to design the road within landscaped features such as cuttings and bunds (walls of earth). However, where noise impacts are greatest, we would install noise barriers (typically, wooden fences) in addition to these earthworks features. Noise barriers have been incorporated into the design along the A2 and along the new road north of the proposed A2/M2 junction. Proposed noise barriers are shown in chapter 5 of the Operations update. The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

Figure 3.22 Noise impacts during operation in Shorne, Cobham and Luddesdown ward



3.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Shorne, Cobham and Luddesdown ward, the M2/A2 has been declared an Air Quality Management Area (AQMA) due to yearly levels of airborne pollution being above accepted standards. AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the ward have been identified as AQMA.

3.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

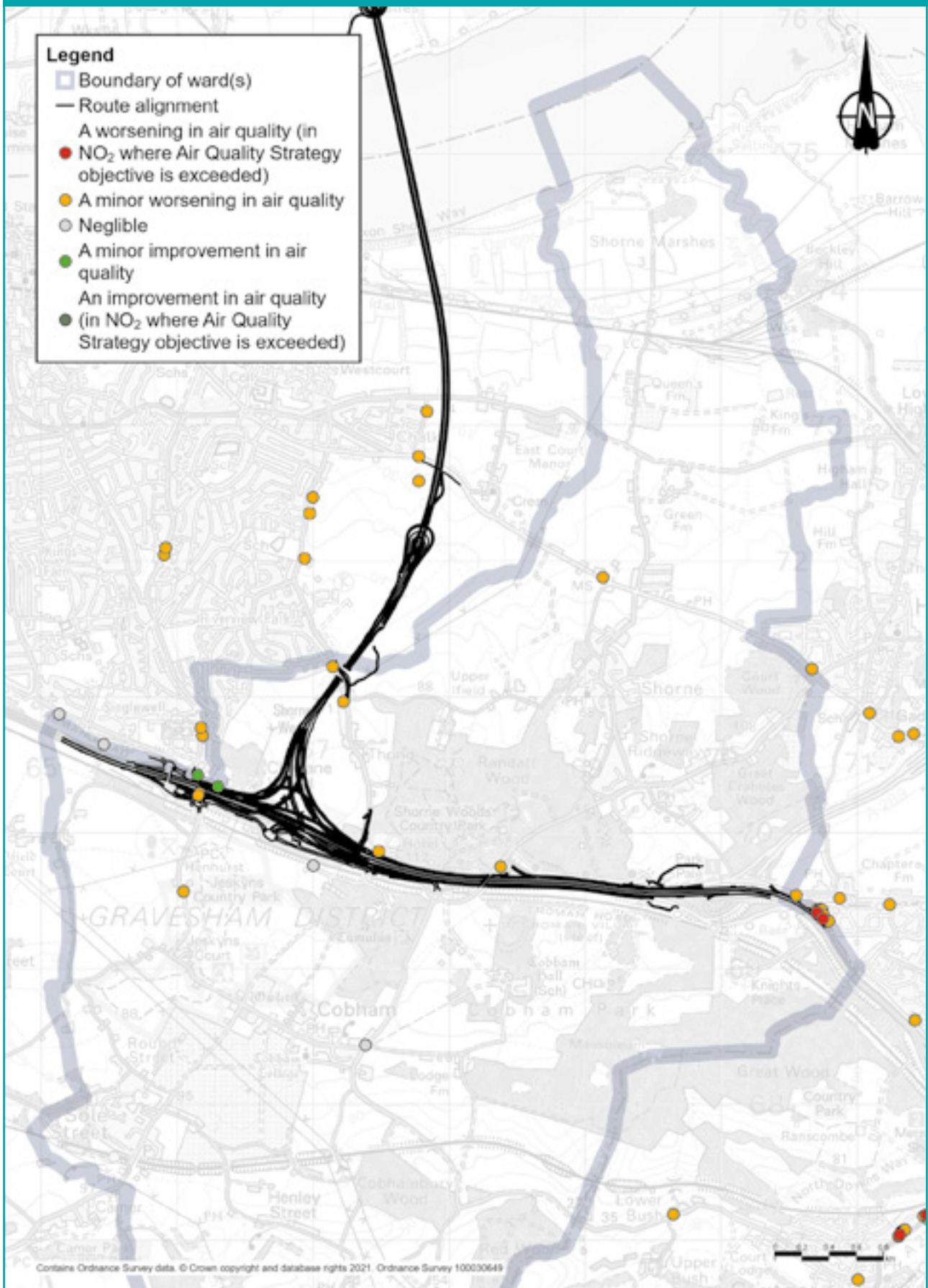
Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including some east of the proposed A2/M2 junction and the new road. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts. The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Analysis of traffic data along the A2 Corridor shows that likely decreases in traffic between 2026-2028 would lead to a small temporary improvement in air quality. The A226 Gravesend Road runs north of the A2 and is expected to experience an increase in traffic flows during 2026 and 2027. During these periods there is the potential for temporary minor worsening in air quality in the area. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

Figure 3.23: Predicted changes in NO₂ levels within Shorne, Cobham and Luddesdown ward once the new road is open



3.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward close to junction 1 of the M2 that are predicted to exceed the air quality thresholds for nitrogen dioxide (NO₂), the main traffic-related pollutant³.

The highest modelled yearly average NO₂ concentration within this ward is 42.1 µg/m³ (close to the M2 on Squires Close), exceeding the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation

The overall impact of the Lower Thames Crossing project is determined as not being significant and therefore mitigation is not required.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

3.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

In line with other more rural wards in the area, Shorne, Cobham and Luddesdown ward has a higher proportion of residents aged over 60 (34.8% compared with 22.6% for Gravesham and 23.6% for England as a whole). Economic activity rates and unemployment rates within the ward are correspondingly low due to a higher proportion of retired people. There is a very high degree of home ownership within the ward (over 80%).

Self-reported health status data shows that a high proportion of residents consider themselves to be in good or very good health (83.4% of residents compared with 81.5% for Gravesham as a whole). Life expectancy at birth for residents of Shorne, Cobham and Luddesdown ward is 79.9 for males and 88.0 for females (above the UK average life expectancy recorded for 2017-2019 of 79.4 years for males and 83.1 years for females).

3.9.1 Construction

Construction impacts

The main construction activities that could potentially impact health in this ward are related to highway works to the A2/M2 corridor, construction of the proposed A2/M2 junction, utilities works (including diversion of overhead lines), and the construction of the two Thong Lane green bridges and the Brewers Road green bridge, together with road closures associated with these activities. Each of these activities has the potential to impact on human health, whether this be through noise associated with construction activities or traffic, changes to air quality (as a result of dust emissions), changes to accessibility caused by road or footpath closures, potential severance caused by construction traffic, or through impacts on mental health and wellbeing.

Further information about construction activities affecting Shorne, Cobham and Luddesdown ward are provided in the Project description section.

There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. With good communication and engagement, mental health and wellbeing impacts associated with stress and anxiety related to the construction of the project would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section).

Negative health outcomes may be experienced by residents within Shorne, Cobham and Luddesdown ward as a result of:

- Changes in accessibility as a result of road closures. This may be the case for people who are more dependent on public transport and have less choice about method and route travelled. Thong Lane would be affected by various construction activities which would likely require traffic management measures. The A226 Gravesend Road, which crosses the northern section of the ward, would be used by construction traffic. Various construction activities connected with Brewers Road are likely to require long-term closures (approximately 18 months for the demolition of existing bridge and construction of replacement structure). Impacts on journey times are described further in the Traffic management section.

- Access to open space. There would be some short-term disruption to the car park at Shorne Woods Country Park (due to temporary construction for utility diversions), with access to open spaces such as Shorne Woods and Great Crabbles Wood reduced due to temporary footpath closures. These changes may particularly affect people without access to private transport for whom there may be less choice in finding alternative destinations and may affect people's ability to carry out physical activity.
- Noise and vibration. Adverse construction impacts in relation to noise from construction traffic have been identified at properties including to the north of Shorne and adjacent to Thong Lane (including along Shorne Ifield Road and Vigilant Way). Different groups of people within the population may be more sensitive to factors which potentially affect their health than others and adverse effects may therefore affect a small proportion of the population.

Measures to reduce construction health impacts

Mitigation measures relevant to health and wellbeing (including good practice measures relating to dust emissions, hours of working and visual screening) are described in relation to air quality, noise and vibration, and visual impacts respectively. Further detail relating to mitigation (for example in relation to footpath closures) is set out in our CoCP, the REAC, and the package of traffic management plans detailed in the traffic management section. For example, the commitments in the REAC include items such as adhering to Best Practical Means (BPM) to reduce noise impacts (see NV007 in the REAC), dust-management good practice (see AQ005 in the REAC) and planning construction works to reduce durations that footpaths are closed for (see PH001 in the REAC).

Engagement and effective two-way communication with communities both prior to and during construction is important in order to reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP describes proposals for community engagement, setting out how we would continue to liaise with local communities, stakeholders and affected parties to make sure they are kept informed of our construction works, their progress and associated timescales. This includes establishing Community Liaison Groups.

3.9.2 Operations

Operational impacts

Some residents within Shorne, Cobham and Luddesdown ward may experience negative health impacts in relation to mental health and wellbeing as a result of the project (for example relating to anxiety around perceived air quality changes or as a result of noise).

Jeskyns Road (a short section of rural road linking The Street and Henhurst Road to the west of the village of Cobham) may be affected by an increase in severance as a result of forecast changes in traffic flow, potentially impacting how people may travel and access facilities in this area. However, there are no footpaths along Jeskyns Road and therefore existing pedestrian activity is likely to be low and no adverse health effects have been identified.

Positive health outcomes may be experienced in relation to access to open space. The project includes new and improved walking, cycling, and horse riding routes within Shorne, Cobham and Luddesdown ward. These improve connectivity in and around Jeskyns Community Woodland and include a cycle route across the A2 into Shorne Woods.

In relation to noise, operational impacts across the A2 and the proposed A2/M2 junction include both adverse and beneficial changes in road traffic noise levels at the northern parts of Riverview Park, Thong Lane, and Shorne Ifield Road. Noise barriers are proposed along sections of the A2 and the new road north of the proposed A2/M2 junction. As noted earlier, different groups of people within the population may be more sensitive to factors which potentially affect their health than others and adverse effects may therefore affect a small proportion of the population.

Measures to reduce operational health impacts

Mitigation measures to address noise and visual impacts have been described above. No further impacts relating to health have been identified for this ward and consequently no specific additional measures are required.

3.10 Biodiversity

Existing situation

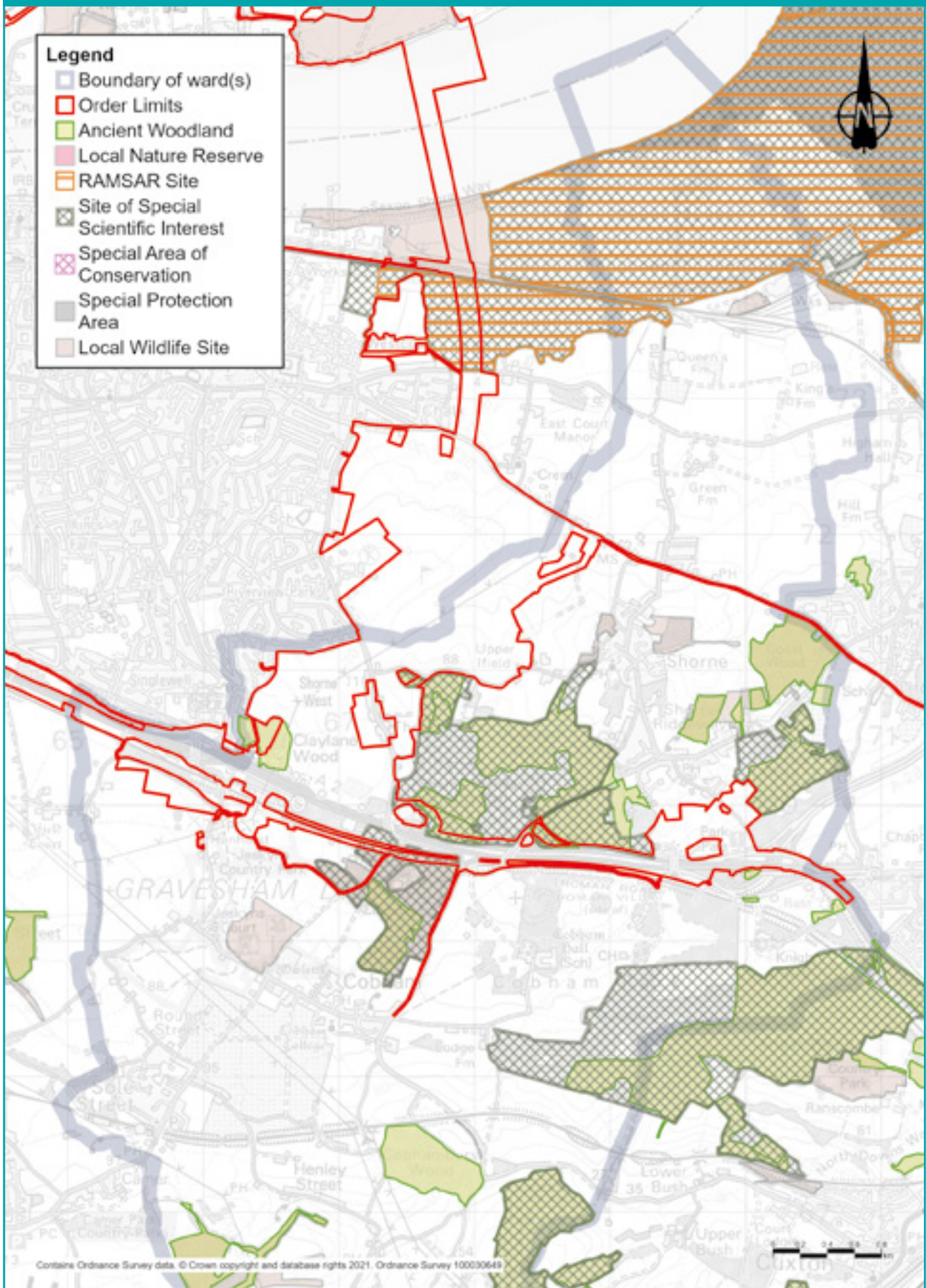
The main habitats within the Order Limits in the Shorne, Cobham and Luddesdown ward are areas of arable and pasture, rough grassland, plus large areas of woodland. Much of this woodland is either designated ancient or protected.

Within 2km of the Order Limits this ward contains the designated sites of the Thames Estuary and Marshes Special Protected Area (SPA) and Ramsar, the South Thames Estuary and Marshes SSSI, Shorne and Ashenbank Woods Site of Special Scientific Interest (SSSI) and Ancient Woodland, Great Crabbles Wood SSSI and Ancient Woodland, Cobham Woods SSSI, and Halling to Trottiscliffe Escarpment SSSI.

Within 500 metres of the Order Limits, the non-designated sites are Shorne Country Park Local Wildlife Site (LWS), Court Wood LWS, Shorne Pastures LWS, Jeskyns LWS, Canal and Grazing Marsh LWS, Claylane Wood Ancient Woodland, Cole Wood Ancient Woodland, Peartree Wood Ancient Woodland and areas of Ancient Woodland around the proposed A2/M2 junction. For information about marine biodiversity, refer to the Construction update.

We carried out surveys across the project to set a baseline for assessment, and these identified the presence of a range of protected and notable species. Species within the woodland in the A2/M2 corridor include bats, badgers, and dormice, as well as a range of woodland bird and invertebrate species. A number of ponds supporting great crested newts were identified in Shorne and Ashenbank Woods SSSI. In the areas of rough grassland both the common lizard and slow worm were recorded, as well as invertebrate species.

Figure 3.24: Designated and non-designated biodiversity sites in Shorne, Cobham and Luddesdown ward



3.10.1 Construction

Construction impacts

Construction of the project would require the removal of areas of habitat, both temporarily and permanently from the route. This habitat consists of areas of arable fields, landscape planting, scrub, rough grassland and woodland. Some areas of Ancient Woodland would be removed including areas of Shorne and Ashenbank SSSI and Claylane Wood Ancient Woodland. This currently supports a range of species, some protected, that would be impacted by construction in terms of direct habitat loss (the loss of badger setts, bat roosts, dormouse, reptile and invertebrate habitat); fragmentation of habitat (loss of hedgerows linking woodland); and disturbance to retained habitat.

Measures to reduce biodiversity impacts during construction

Where possible, vegetation clearance would be carried out during winter to avoid impacting on breeding birds. Where this isn't practical, clearance would be supervised by an Ecological Clerk of Works to make sure no nests are disturbed or destroyed. Where protected species are present, these would be moved away from the site prior to any construction activities either through habitat manipulation (for example strimming to reduce the height of vegetation to displace reptiles), or translocation. Where required, works affecting protected species would be carried out under a Natural England licence. Mitigation would include the creation of an artificial badger sett as a replacement for a main sett that would be lost. Boxes to support bats, dormice and birds would be set up within retained habitat.

Significant areas of woodland planting would be carried out to offset woodland habitat being lost. This would increase the overall extent of woodland within the area and provide strong connections between existing habitats such as Claylane Wood and Shorne Woods. Brewers Wood and Great Crabbles Wood would also be connected via an area of woodland habitat creation north of Park Pale bridge and forms part of a larger compensatory package for Ancient Woodland. These are shown in a map in the general arrangement drawings and within the oLEMP.

Areas consisting of grassland, scrub and bare earth, as well as larger areas of species-rich grassland would be created to provide good quality habitat for a number of species, particularly invertebrates, reptiles and amphibians including great crested newts. Ponds would be included in these areas to further diversify the habitats.

To provide habitat connectivity within this area, three green bridges would be created. Two of these would be over the existing A2/M2 at Brewers Road and Thong Lane and would connect Shorne Woods with Ashenbank Wood and Cobham Hall parkland. Another green bridge would be created over the new road north of Thong, which would connect Shorne Woods with the new woodland planting north of Claylane Wood.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

3.10.2 Operations

Operational impacts

Road traffic, habitat fragmentation and noise disturbance from traffic has the potential to cause mortality of species.

Measures to reduce biodiversity impacts during operation

Landscape planting has been designed to provide strong links for animals to move and forage along, guiding them to safe crossing points over the new road such as the green bridges mentioned above. To reduce noise and visual impacts, the new road would be in a cutting north of the A2/M2.

Newly created habitat, including that to support animals moved from the construction area, would be managed to ensure that they provide high quality habitat to support a broad range of different plant and animal species.

3.11 Built heritage

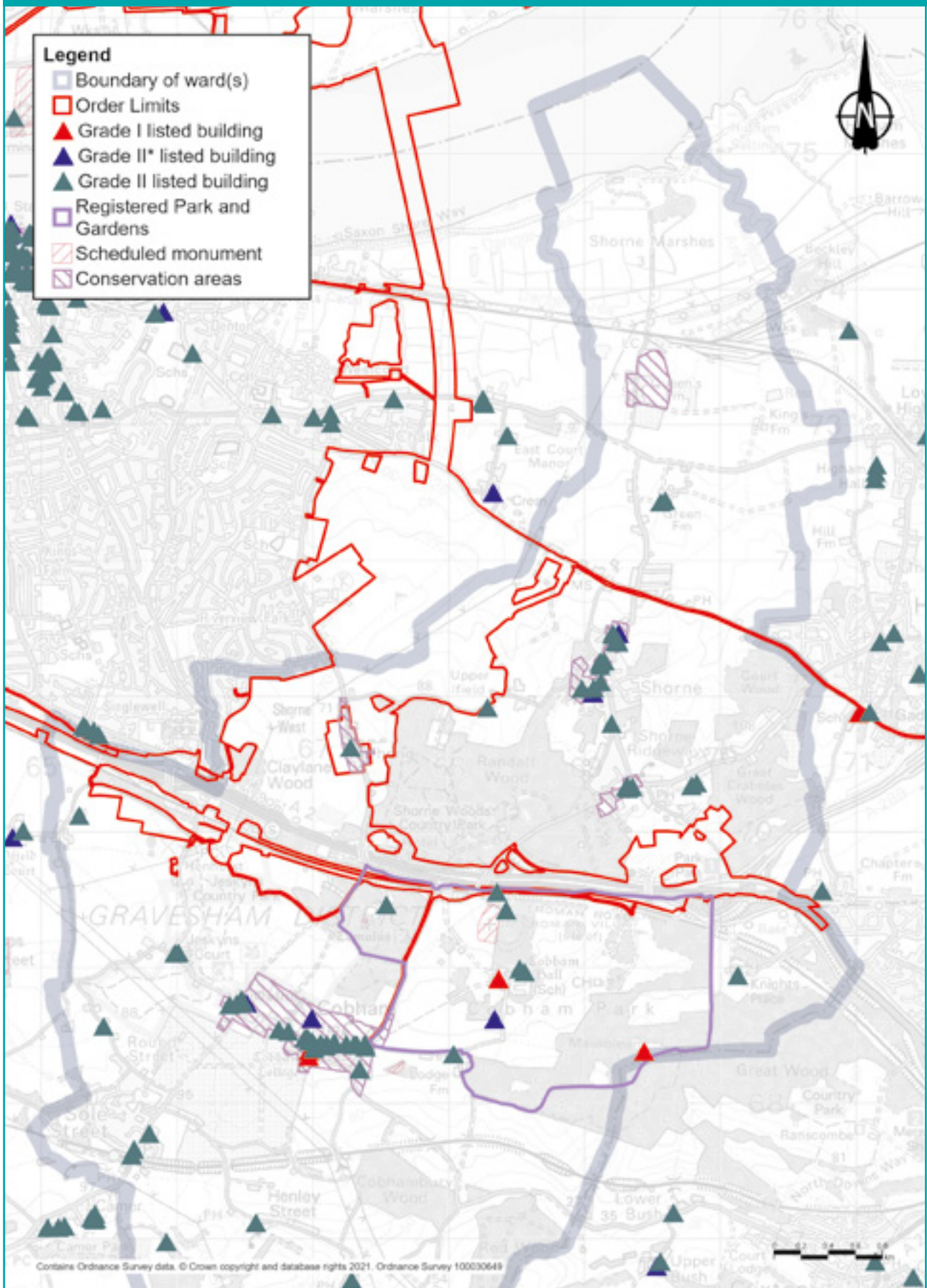
Existing situation

Three scheduled monuments, one registered park and garden, five conservation areas, 66 listed buildings and 39 other buildings or structures of historical relevance have been identified within the ward of Shorne, Cobham and Luddesdown in relation to the project.

Scheduled monuments:

- Bowl Barrow in Ashenbank Wood is a scheduled monument of high heritage value. It is located to the south of Cobham Park and 185 metres south of the project. Bowl barrows, the most numerous form of round barrow, are Prehistoric funerary monuments dating from the Late Neolithic period to the Late Bronze Age, with most examples belonging to the period 2400-1500 BC. The Bowl Barrow in Ashenbank Wood is formed by an earth mound and is surrounded by a quarry ditch. Some damage was caused to the monument by its partial excavation in 1895 which revealed fragments of prehistoric pottery and charcoal but left the main burial site undisturbed. Therefore, most of the mound and any burials within are likely to still remain. The monument stands on the highest ridge of Ashenbank Wood and was probably once very visible in the landscape. However, it is now enclosed by the surrounding woodland.
- The site of a Romano-British villa and 19th century reservoir is a scheduled monument of high heritage value. It is located within Cobham Park some 80 metres south of the project. The villa is located to the south of a Roman Road called 'Watling Street'. Excavations in 1959-1960 revealed a small villa that had likely been built on an earlier settlement. Parts of the villa had been destroyed by redevelopment of the park in the 17th and 18th century. The remains of an outbuilding and well were also discovered to the northeast and appeared to be associated with the villa site. Unrelated to the villa is a 19th century reservoir located within the wider Roman archaeological site, which partly accounts for the reservoir's inclusion in the scheduling. The reservoir was created to collect spring water to be transferred via culverts to the grounds and kitchens of the grade I listed Cobham Hall.

Figure 3.25 Built heritage in Shorne, Cobham and Luddesdown ward



- World War 2 Heavy Anti-aircraft Gunsite is a scheduled monument of high heritage value which is located 245m southeast of the project and to the east of Cobhambury Farm. The monument is known as Thames South 15 (TS15) and formed part of a chain of anti-aircraft batteries positioned to defend military and industrial targets in the Thames and Medway Gun Defended Areas. Documents indicate the battery was established in February 1940 and was armed with four 4.5-inch guns. Many archaeological features of the gun site still survive and illustrate Britain's defence against strategic aerial bombing during World War 2. Several domestic army camps were located within the area, one of which was located 100 metres away from the entrance to the gun site.

Registered park and gardens:

- Cobham Hall

Conservation areas

- Cobham Village
- Shorne
- Thong
- Chestnut Green
- Queens Farm

Listed buildings:

- Green Farm Granary (Grade II)
- Green Farm House (Grade II)
- Knights Place Farmhouse (Grade II)
- Church of St Margaret (Grade II)
- Owletts (Grade II*)
- Owletts' Cottage (Grade II)
- Leather Bottle Inn (Grade II)
- Cottage belonging to the Leather Bottle Inn (Grade II)
- 36 and 38 The Street (Grade II)
- 26-30 The Street (Grade II)
- Cobham Hall including Kitchen and Stable Court (Grade I)
- The Temple, Cobham Hall (Grade II)
- The Aviary, Cobham Hall (Grade II)
- The Dairy, Cobham Hall (Grade II*)
- Cobhambury House (Grade II)
- Rose Cottage (Grade II)

- Rookery Farm Thatched Barn (Grade II)
- Rookery Farm Granary (Grade II)
- Jeskyns Court (Grade II)
- Jeskyns Court Granary (Grade II)
- Cadman's Dillywood Cottage, Murrels Old Post Cottage, White Cottage (Grade II)
- The Old Post Office (Grade II)
- 63 The Street (Grade II)
- Cobham College (Grade I)
- The Terrace (Grade II)
- The Ship Inn (Grade II)
- Forge Cottages (Grade II)
- The Village School (Grade II)
- Crockers Place (Grade II)
- Meadow Cottages (Grade II)
- The Mount (Grade II)
- The Engine House, Cobham Hall (Grade II)
- Parish Boundary Stone (Grade II)
- The Village Pump (Grade II)
- Owletts Well House (Grade II)
- The Stone House (Grade II)
- Parish Church of St Mary Magdalene (Grade I)
- Mill Farmhouse (Grade II)
- Dovecote at Lodge Farm (Grade II)
- Meadow House (Grade II*)
- Cobham War Memorial (Grade II)
- Chapel of St Katherine (Grade II)
- 10, 11, and 12, Homewood Cottages (Grade II)
- Harmony Hill and the Post Office (Grade II)
- The Tanyard (Grade II)
- Church of St Peter and St Paul (Grade II*)
- The Old Parsonage (Grade II)
- Pipes Place (Grade II)
- Front Garden Wall and Gate Piers to Pipes Place (Grade II)
- Little St Katherine's (Grade II*)
- St Katherine's House (Grade II)
- 8 and 10 The Street (Grade II)
- Prospect Cottage (Grade II)
- 6 Homewood Cottages (Grade II)
- 7 Homewood Cottages (Grade II)
- 8 and 9 Homewood Cottages (Grade II)

- K6 Telephone Kiosk (Grade II)
- Baynards Cottage (Grade II)
- Bushylees (Grade II)
- The Old Vicarage (Grade II)
- Parish Boundary Stone (Grade II)
- Well Cottage (Grade II)
- Shorne War Memorial (Grade II)
- White Horse Cottage (Grade II)

Buildings/structures of historical relevance:

- Thames and Medway Canal
- North Kent Railway
- Hoo Junction and Port Victoria Railway
- Bridge No. 7
- Lifting Bridge over Thames and Medway Canal
- British Uralite Factory
- Green Farm
- Thong (1132)
- Cheneys Farm
- White Horse Cottage
- Shorne Hill WWII Spigot Mortar Emplacement, Shorne
- Milestone on Gravesend Road, Shorne
- Park Pale Farm
- Ifield Farm (Ifield Place)
- Outfarm in Upper Ifield
- Smith Street Farm
- Court Lodge Farm
- Hillside Farm
- Spigot Mortar Emplacement, Shorne
- Primitive Methodist Chapel, The Street, Shorne
- 18th century icehouse, Cobham Hall
- Meadow Rooms Second World War First Aid Post,
The Street Cobham
- Gardner's Cottage, Cobham Hall

- Jeskyns Court
- Dabbs Place Farm
- Parsonage Farm
- Rookery Farm
- Cobhambury Farm
- Farmstead at Battle Street
- Mill Farm (Manor House)
- Lodge Farm
- Oast in Cobham
- Stable at Rookery Farm
- Cartshed at Rookery Farm
- Shelter shed at Rookery Farm
- Cobham Hall
- Lady Darnley's Garden, Cobham Hall
- Early 19th century Wash House, Rose Cottage, Cobham
- WWI Homes for Heroes

3.11.1 Construction

Construction impacts

The main construction activities are related to highway works to the M2/A2 corridor, construction of the proposed A2/M2 junction, utilities works (including diversion of overhead lines) and the construction of the two Thong Lane green bridges and the Brewers Road green bridge, together with road closures associated with these activities. The A226 Gravesend Road would be used as a construction access route for the works.

The overall impact on known built heritage assets listed above, would be barely perceivable as they would not be directly affected by the project. However, there would be an indirect effect through the change to the surroundings of some built heritage assets as a result of the construction of the project. This includes temporary additional noise, lighting and visible construction activity and machinery.

Measures to reduce impacts during construction

The design and layout of Southern Tunnel Entrance Compound and A2 Compound would take in to account the setting of heritage assets (the surroundings in which a heritage asset is 'located'), and avoid light glare, light spill and light pollution during night-time construction. Southern Tunnel Entrance Compound and A2 Compound would also be appropriately screened as set out in Section 5.7 of the CoCP. Dust and noise reduction measures are also relevant in mitigating the setting of heritage assets. Please refer to Air quality, noise and vibration and heritage asset section of the REAC measures. More information can be found in the Design principles (section S326).

3.11.2 Operations

Operational impacts

The operational phase would widen the size of the A2. This would not be noticeable in the setting of built heritage assets located close to its existing route so, they would experience no change.

Measures to reduce the impacts during operation

Once the new road is operational and planting has matured, tree planting would screen the road from heritage assets. To preserve the rural and historic character of the landscape, road lighting would be minimised where it is safe and practical to do so, in accordance with relevant standards.

3.12 Contamination

Existing situation

Potential sources of contamination have been identified based on land uses, from the review of sources (historical maps and environmental data). Within this ward, the following have been identified:

- Henhurst Road contractor's depot, a civil engineering contractors' yard and aggregate processing site (post-1993).
- Site at A2 possible compound, south of A2 (between 2003 and 2013).
- Esso A2 westbound petrol filling station. Vehicle garage and petrol filling station (1972-present).
- Former A2 eastbound petrol filling station. Former vehicle garage and petrol filling station (approximately 1972 to 2008).
- To the west of Thong, former Gravesend Airport (a former civilian and military airfield). Former land uses are known or suspected to include aviation fuel storage and dispensing, firefighting, blast pens, aircraft service/manufacture/breaking, deep made ground, and an aluminium smelter.

The overall impact from these contamination sources is considered to be low, given the mitigation proposed.

3.12.1 Construction

Construction impacts

Construction activities in this ward could include topsoil stripping, earthworks/movements and excavations that could cause the mobilisation of contamination (if present). This area is part of a construction compound where stockpiling of soils may occur, as well as storage of materials and chemicals.

During construction, there is the possibility for existing contamination within the ground to become mobilised. There is also a potential risk of accidental oil, cement and fuel spills from construction traffic and the storage of materials.

Measures to reduce contamination

To reduce the impact to an acceptable level, good practice measures include appropriate storing of equipment and clear soil handling. Storage of chemicals and re-use guidance would be used during construction to reduce the risk of spreading contamination and spillage or pollution. To reduce the risk of accidental spillages, procedures would be in place including designating areas to re-fuel plant and tank bunding. Spill kits would be available and incidents would be recorded and managed. Impacted soils would be assessed and removed if necessary.

Essential mitigation such as the development of site-specific remediation, where contamination has been identified during ground investigation work, would be carried out following consultation with the local authority. During the earthworks, workers would remain vigilant and any suspected contamination would be recorded and assessed accordingly via a watching brief protocol.

Work near to the former Esso petrol station, where contamination is known to be present, would be discussed with the Environment Agency to make sure that the disturbance of residual contamination is avoided and ongoing remediation works in this area not disturbed.

Contamination would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

3.12.2 Operations

Operational impacts

Verification reports would be prepared of the remediation that is carried out in site specific areas and this would be provided to the local authority. Once the road opens, should an incident, for instance a traffic accident, result in localised contamination, any significantly affected soils would be assessed and if necessary removed to reduce the risk of contamination moving across a wider area or entering controlled waters. For more information on these controls, see the REAC.

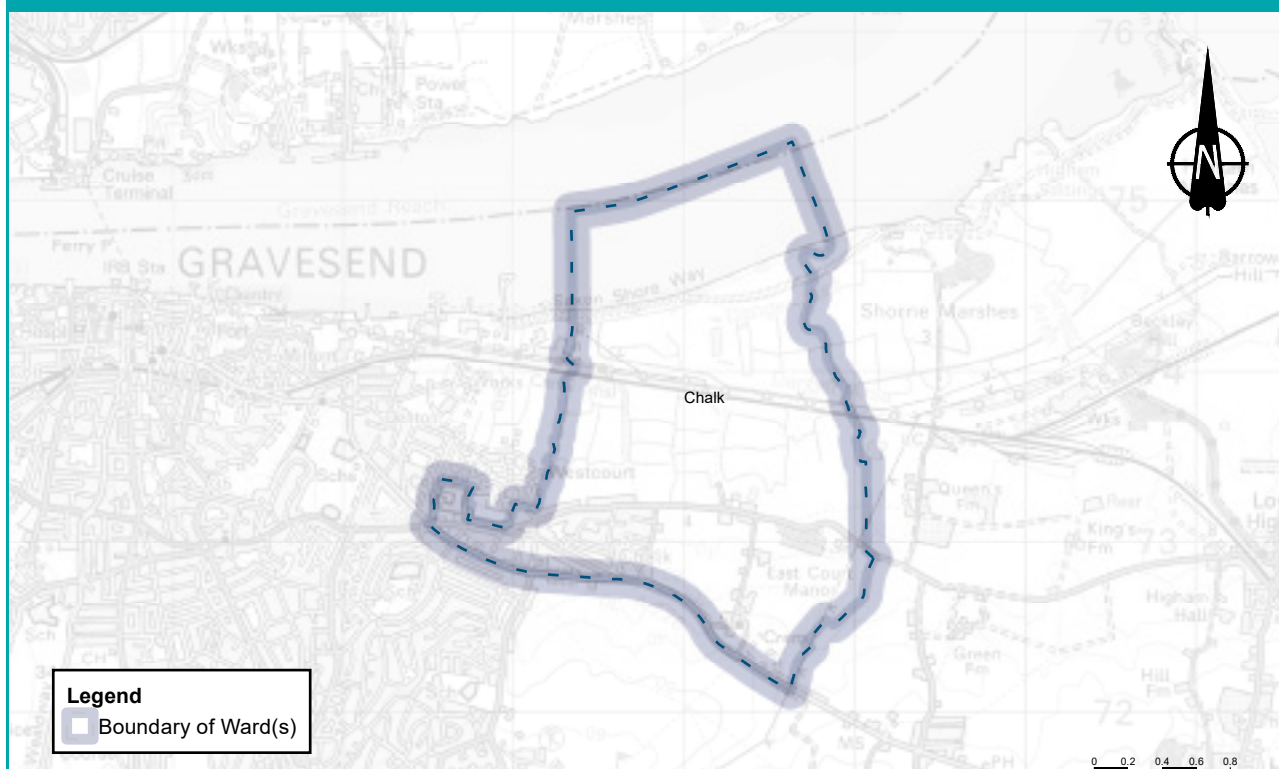
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Chapter 4: Chalk ward

This chapter summarises the activities in Chalk ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and the Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 4.1: Ward boundary map for Chalk ward



4.1 Overview

4.1.1. About this ward

Chalk ward is located to the south of the River Thames in the borough of Gravesham, to the west of Shorne, Cobham and Luddesdown ward, north of Westcourt ward and east of Riverside ward. It has an area of approximately 3.5km² and an estimated population of 2,176¹. Chalk ward includes a residential area between the Lower Higham Road and Rochester Road. Train services run through the ward to Higham station. St Mary's Church lies to the south-east of the ward with North Kent College to the north-west. There are footpaths, bridleways and farmland to the south.

¹ Office for National Statistics, 2018 ward-level population estimate

4.1.2 Summary of impacts

Table 4.1: Summary of impacts during the project’s construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>Construction traffic accessing the compounds would use the A226 (Higham Road), leading to slower journey times along the A226. Temporary lane closures would also lead to slower journey times along the A226 and Lower Higham Road for short periods.</p> <p>Mitigation</p> <p>Several mitigation decisions have been taken to reduce the impacts during the construction period such as only using one construction route for HGV traffic to arrive from the strategic road network – the A226 Gravesend Road via the A289 – during the construction process. Additional measures are outlined in the traffic section of this chapter.</p>	<p>Impacts</p> <p>An increase in traffic flows is expected on the A226 Gravesend Road once the project is operational. There are only small changes in flows predicted on other minor roads within the ward. Analysis on the traffic flow increases and impacts can be found in the traffic section of this chapter.</p> <p>Mitigation</p> <p>A previously proposed junction between the project and the A226 Gravesend Road was removed after consultation because it had a negative impact on traffic levels east of Gravesend, including roads in Chalk ward.</p>

Topic	Construction	Operations
<p>Public transport</p>	<p>Buses</p> <p>Due to the impacts on journey times along the A226, bus services along the A226 Higham Road may experience delays. Local buses that would be impacted include the 111, 190, 311, 417, 668, 735 and the 736.</p> <p>Rail</p> <p>There would be no impact on train services passing through Chalk ward, and access to Gravesend Station for the residents of Chalk ward would not be affected during construction.</p>	<p>Buses</p> <p>There would be no changes to bus routes through the ward required once the project opens and no discernible change to bus journey times.</p> <p>Rail</p> <p>There would be no discernible change in local access times to Gravesend and Higham train stations and no change to the rail services at these stations when the project is operational.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>One footpath and one cycle route would be impacted during the construction period, to allow for utilities works and the construction of access to construction compounds.</p> <p>Mitigation</p> <p>Closure of the footpath would be kept as short as possible to reduce the impact on the local public right of way network. The cycle route would remain open, with impacts only during the first year of construction.</p>	<p>Impacts</p> <p>The footpath from Albion Parade along the Thames and Medway Canal would be widened.</p> <p>Mitigation</p> <p>No mitigation would be required.</p>
<p>Visual</p>	<p>Impacts</p> <p>Construction activities would be visible from edges of Chalk’s residential area and some properties along Church Lane, as well as from local footpaths, National Cycle Network Route 1, east of Chalk and from Saxon Shore Way long distance footpath.</p> <p>Mitigation</p> <p>Taller structures within A226 Gravesend Road Compound would be located as far away as possible from homes in Chalk and materials excavated on site would be used to create earth bunds to provide visual screening for Castle Lane. The contractor would also follow good practice construction measures as set out in the CoCP and REAC.</p>	<p>Impacts</p> <p>When the new road opens, it would be underground in this ward. The most noticeable change would be the new landscaping on the north bank of the River Thames, forming a new landmark feature in views across the river from Saxon Shore Way.</p> <p>Mitigation</p> <p>The land used temporarily for construction would be reinstated to its former use and the operational project would not be visible as it would be underground.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with the advanced tunnel grouting works and utilities works are expected to create noise and vibration impacts in this ward. There would also be 24-hour, seven-day construction working. There would be negligible changes in noise from road traffic.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled by implementing Best Available Techniques (BAT) such as installing acoustic screening around the construction areas likely to generate noise and turning off plant and machinery when not in use.</p>	<p>Impacts</p> <p>The changes in road traffic noise as result of the new road are predicted to range from minor reductions in noise to minor increases in noise levels. Direct noise impacts from the new road would be confined within the tunnel structure. The majority of noise impacts within this ward would be as a result of changes in traffic flow, traffic composition, traffic speed or physical alterations on the existing road network within the ward itself.</p> <p>Mitigation</p> <p>The new road would be confined within the tunnel structure when it opens. Low-noise road surfaces would be installed on new and resurfaced roads.</p>

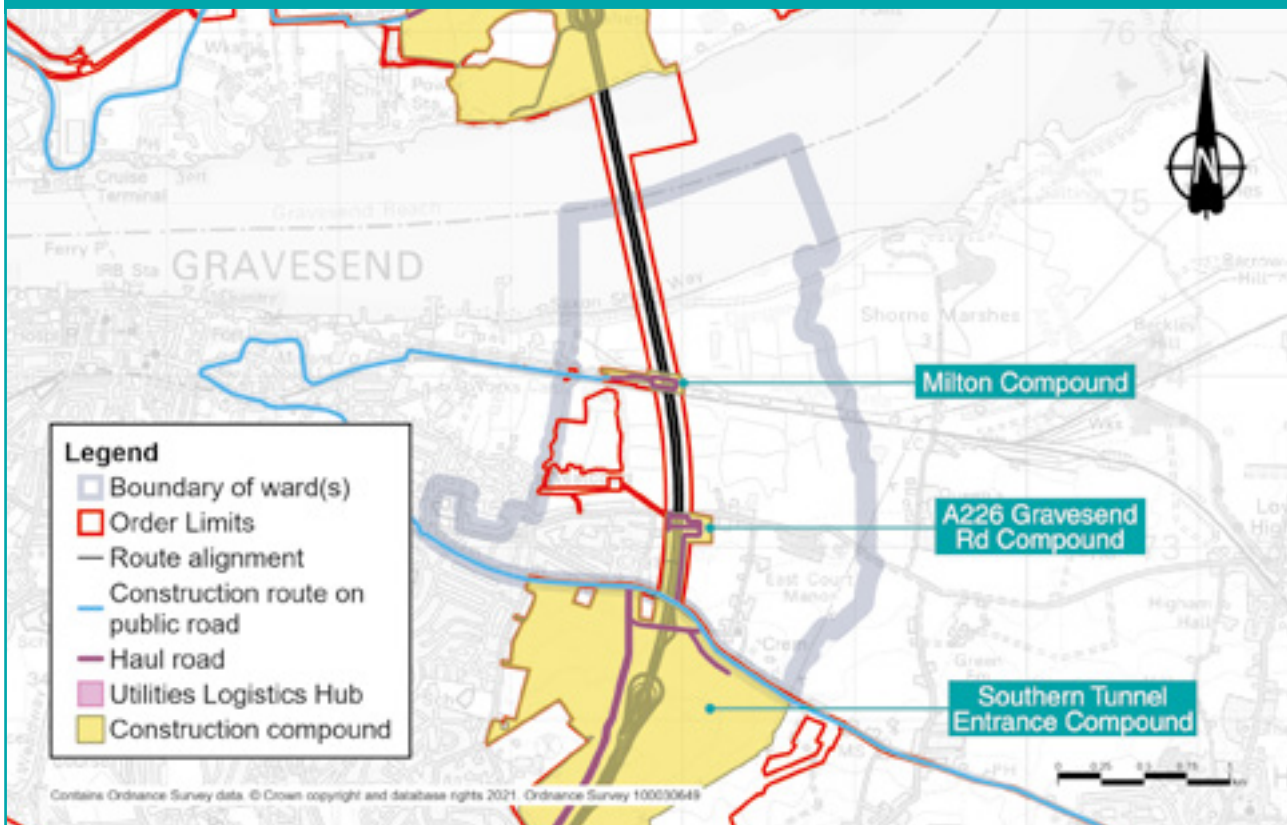
Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>There is likely to be dust and emissions from construction equipment and traffic during the construction phase.</p> <p>Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a temporary minor worsening in air quality in the area around the A226 Gravesend Road that runs through Chalk from 2026 to 2027, as well as an area around Higham Road from 2025 to 2027. In both, instances these areas would see a temporary minor worsening in air quality due to a predicted increase in traffic.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures which are presented in the CoCP and REAC to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀ in this ward.</p> <p>Mitigation</p> <p>As there are no predicted exceedances, no mitigation has been proposed.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenity as a result of construction traffic using the A226. Noise would increase as a result of construction traffic and from construction traffic locations. Access to open spaces, like Claylane Woods, Michael Gardens Play Area and various footpaths, could be impeded during construction.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to dust emissions, working hours and visual screening, traffic management measures and community engagement. This includes the establishment of Community Liaison Groups.</p>	<p>Impacts</p> <p>There would be improvements to accessibility of open space, such as the new Chalk Park.</p> <p>There would be increases in road traffic noise at Riverview Park and Thong Lane to the north of the A2. Some residents within the ward may experience anxiety around perceived change to air quality and noise.</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on all new and affected roads.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project, including two compounds, would involve the removal of areas of habitat, both temporarily and permanently. These habitats are home to protected and notable species including water vole, reptile, great crested newt, birds and invertebrates. Habitats would also be fragmented.</p> <p>Mitigation</p> <p>Vegetation clearance would be undertaken during the winter where possible. Protected species would be moved away outside of the construction working area under a Natural England licence. An area of farmland to the south of the Thames and Medway Canal would be managed to encourage use by birds particularly for wintering wetland birds.</p>	<p>Impacts</p> <p>No significant impacts are expected; there may be negligible disturbance to species of habitats.</p> <p>Mitigation</p> <p>The land used to accommodate the compounds would be returned to the reasonable satisfaction of its owner on completion of construction. New wetland features would also be created to enhance the area.</p>

Topic	Construction	Operations
<p>Built heritage</p>	<p>Impacts</p> <p>Construction activity would impact on the setting of some heritage assets through an increase (although minor) in noise, and lighting during night-time working.</p> <p>Mitigation</p> <p>The design and layout of Southern Tunnel Entrance Compound would take in to account the setting of heritage assets and avoid light glare, light spill, and light pollution during night-time construction.</p>	<p>Impacts</p> <p>There would be a negligible impact on built heritage in this ward once the project construction is finished.</p> <p>Mitigation</p> <p>Southern Tunnel Entrance Compound would be reinstated after construction to reflect existing field patterns and the surrounding landscape character as outlined under Design principle S3.05.</p>
<p>Contamination</p>	<p>There are no identified sources of contamination that could be at risk of being disturbed during construction or operation of the project within Chalk ward.</p>	

Figure 4.2: Order Limits and construction areas in Chalk ward



4.2 Project description

4.2.1 Construction

Construction activities

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

Works within Chalk ward are associated with the construction of the tunnels through which the project road would run. These works include both the construction of the tunnels themselves, and ground preparation works to support the tunnelling. Information on how the tunnels would be constructed is provided in chapter 4 of the Construction update.

Construction compounds

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

There are two construction compounds located within Chalk ward. These are the A226 Gravesend Road Compound and the Milton Compound. The entrance/exit to the Southern Tunnel Entrance Compound is on the A226 in Chalk ward although the compound itself lies south of the ward.

The main tunnel boring machines (TBMs) would be assembled in a compound north of the River Thames and launched towards the south, passing under the River Thames and Chalk ward via the route shown in figure 4.2. The TBMs would emerge into the Southern Tunnel Entrance Compound, which is located just to the south of Chalk ward.

Tunnelling activities would largely take place out of sight under Chalk ward. However, to support the tunnel construction, two smaller construction compounds (A226 Gravesend Road Compound and Milton Compound) would be required in Chalk ward.

The A226 Gravesend Road Compound would be located north of the main Southern Tunnel Entrance Compound, while the Milton Compound would be north of the Thames and Medway Canal and the North Kent Railway line. Any impacts on the canal or the railway would be managed and agreed with asset owners.

As part of the tunnel construction, a smaller TBM would be launched north from the A226 Gravesend Road Compound to the Milton Compound to allow ground improvement work to take place ahead of the arrival of the two TBMs making the main tunnels. More information about tunnel construction can be found in chapter 4 of the Construction update. In figure 4.2, the section of Order Limits, (the area of land required to construct and operate the project, formerly known as the development boundary), running from the west along Norfolk Road into the Milton Compound would allow for road widening should this be necessary for construction vehicles to access to the compound.

On completion of the ground improvement works, the A226 Gravesend Road and Milton Compounds would be removed. The Southern Tunnel Entrance Compound would remain in place until the completion of construction in 2029.

No road construction or tunnelling activity would take place at Great Clane Lane Marshes (the three fields north of the A226 Gravesend Road), although treated water from our compound would be discharged there during construction. This area would temporarily be turned into new habitat for birds as part of our measures to reduce the construction period's environmental impacts on the Thames Estuary and Marshes Special Protection Area and Ramsar. Access to the area would be between houses on Lower Higham Road.

The average daily weekday number of HGVs and cars expected to go to the three compounds either in or close to Chalk ward, during the 11 representative construction phases are shown in table 4.2. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 4.2: Average daily vehicle numbers going to compounds in or near Chalk ward

Time period	Southern Tunnel Entrance Compound		A226 Gravesend Road Compound		Milton Compound	
	HGVs	Cars	HGVs	Cars	HGVs	Cars
January to August 2024	30	77	13	21	10	10
September 2024 to February 2025	36	201	13	40	4	9
March to May 2025	39	201	11	40	2	6
June to October 2025	39	281	9	30	2	6
November 2025 to March 2026	39	335	4	14	1	6
April to August 2026	39	317	6	14	5	6
September 2026 to March 2027	39	358	5	20	5	6
April to November 2027	39	378	0	0	0	0
December 2027 to March 2028	39	310	0	0	0	0
April to July 2028	30	209	0	0	0	0
August 2028 to December 2029	8	25	0	0	0	0

The main route into the Southern Tunnel Entrance Compound would be via the A2, the A289 and then the A226, with the entrance and exit being on the southern side of the A226 in Chalk ward, between Castle Lane and Church Lane. The shift patterns at this compound would include standard shifts, extended shifts and in some periods shifts across whole 24-hour days.

Access to the A226 Gravesend Road Compound for HGVs would be from the A226, just east of Chalk village, between Castle Lane and Chalk Lane. There would be a ban on HGVs along Castle Lane and the Lower Higham Road. Cars would be able to use the Lower Higham Road to access the A226 Gravesend Road Compound from the A226. The route to the Milton Compound for HGVs would be along the A226 Rochester Road and then Ordnance Road and Norfolk Road.

Utilities

There would be no Utility Logistics Hubs within Chalk ward. Utility works within this ward are limited to the temporary provision of utilities to the three compounds, which would be removed during compound demobilisation. Permanent works include the diversion of a water pipeline along the Lower Higham Road and placing an overhead electricity power line underground within the Southern Tunnel Entrance Compound.

Construction routes on public roads

HGV access to the Southern Tunnel Entrance Compound would be from the east via the A226 Gravesend Road. HGV access to the A226 Gravesend Road Compound would be via the A226 Gravesend Road from the east and then north along a haul road built across private land. HGV access to Milton Compound would be via the A226 Gravesend Road/Rochester Road/Milton Road, then east along Prospect Grove, Norfolk Road and the road along the north side of the Thames and Medway Canal. All HGV traffic serving these three compounds would access the A226 via the A289 and A2/M2, while staff traffic (cars) would use any suitable public road.

Construction schedule

Construction of the entire project is scheduled to last for six years from 2024 to 2029. To deliver the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and programmes for

the work to build the tunnel can be found in chapter 4 of the Construction update. New habitats would be created early in the construction programme to provide space for protected species to be moved into. Establishment of the A226 Gravesend Road and the Milton Compounds and works on the ground preparation tunnel would be during the first two years of construction (January 2024 to late 2025) to ensure the main tunnelling works could be carried out safely. It is expected that these two compounds would be decommissioned in 2027.

Construction working hours

Tunnelling would take place 24/7 with some surface activities supporting the underground work. More information about working hours is set out in the Noise and vibration section below and in the CoCP.

Traffic management

The main traffic management measures within Chalk ward are listed below.

Table 4.3: Main traffic management measures in Chalk ward

Road(s) affected	Proposed traffic management	Purpose	Duration
A226 Gravesend Road	Lane closure and traffic lights	To facilitate the construction of access to the Southern Tunnel Entrance and the A226 Gravesend Road Compounds as utility works	9 months between September 2024 and May 2025
A226 Gravesend Road	Lane closure and traffic lights	To facilitate construction access and modifications to local utilities	4 weeks between January 2024 and August 2024
Lower Higham Road	Lane closures and traffic lights	For construction access works and modifications to local utilities	2 occasions, each being 2 weeks duration, between January 2024 and August 2024

Lane closures would be required on the A226 to construct the access to the Southern Tunnel Entrance Compound and the A226 Gravesend Road Compound and for carrying out modifications to the local utility networks. This is expected to take around nine months early in the construction period. The affected stretch of road is 1.3km but the contraflow would operate over much shorter sections at a time. During the lane closures, a short section of road is closed on one side, while the other side remains open. Access to the open side of the road from each direction would be controlled by temporary traffic signals.

There would be two short periods, of around two weeks each, when a lane closure would be required on Lower Higham Road to construct an access to the A226 Gravesend Road Compound and for carrying out modifications to the local utility networks.

While the compounds are in use, the access points to the compounds may require traffic signals to allow public traffic to be managed while construction traffic enters and leaves the compounds.

A ban on HGVs delivering materials and moving excavated material for the project would be in place on Castle Lane and Lower Higham Road. This would not affect other HGVs using these roads.

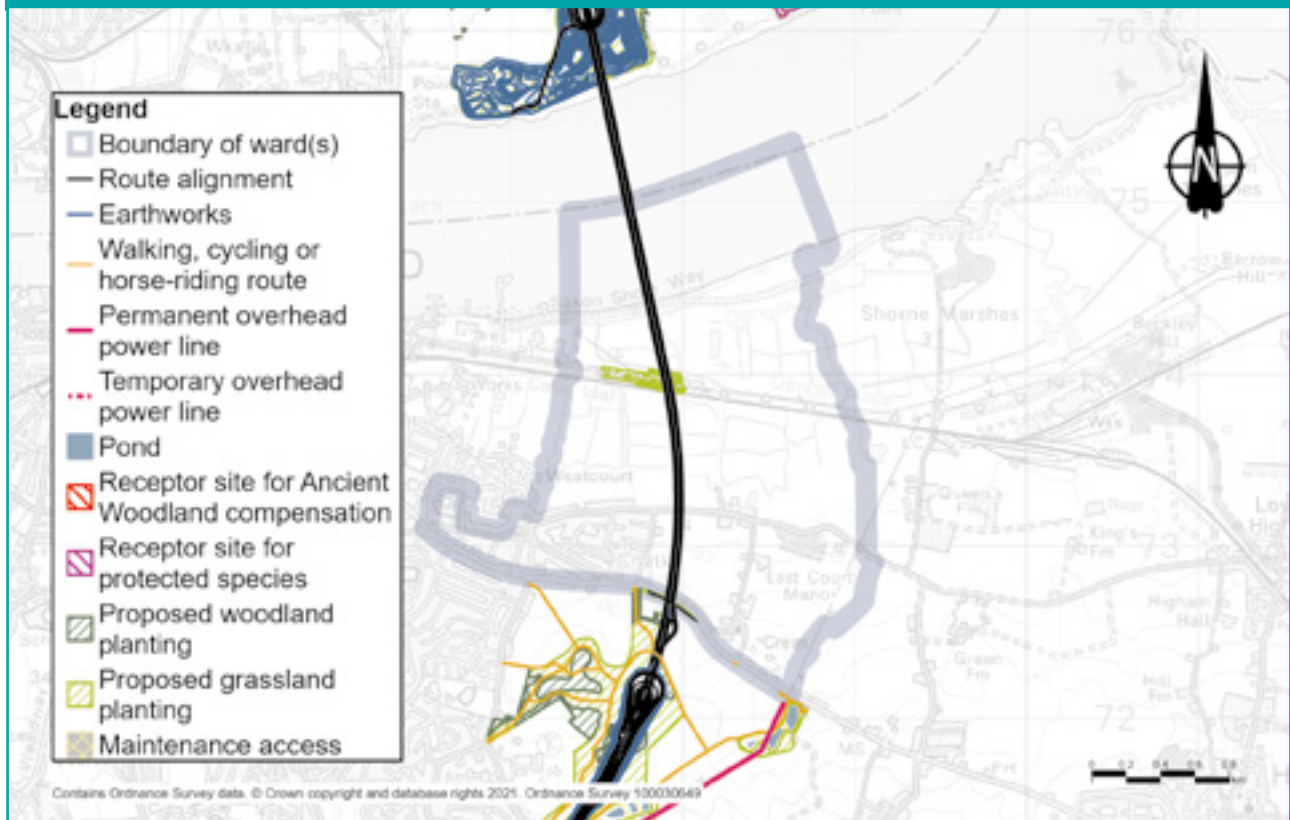
We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

4.2.2 Operations

The completed project

This section sets out the elements of the project that would feature permanently in Chalk ward once construction is complete and the new road is open. For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements.

Figure 4.3: Main features of the completed project in Chalk ward



- The main alignment of the new road would pass through Chalk ward, but would be underground at this point and not visible.
- There would be provision within the Order Limits to widen the section of Norfolk Road running parallel to the Thames and Medway Canal in order to accommodate construction traffic. If the works are required for the project, they would be retained permanently, benefiting road users accessing the industrial sites near the canal.
- Footpaths and bridleways would be rerouted permanently once the project is operational ensuring that communities in Chalk can stay connected with the surrounding area. For more information, see the Footpaths, bridleways and cycle routes section.
- To reduce impacts in Chalk ward, the southern entrance of the tunnel has been moved, in line with community feedback, further south out of the ward. The tunnel was extended 600 metres after our Options Consultation and by an additional 350 metres after Statutory Consultation, lengthening the tunnel by a total of 950 metres and moving it away from Chalk village. By moving the southern tunnel entrance closer to the A2/M2 junction, we reduced the potential environmental impacts on the nearby Ramsar site, reduced the visual and noise impacts locally, and ensured that Chalk village is not divided by the new road.
- Waste generated by the project (for example, spoil from excavation) would be reused where possible on-site to reduce the number of HGV journeys on public roads that would be needed to move materials in or out of the construction site. At Statutory Consultation, the proposed figure was an average of 17,500 HGV journeys a month across the project, whereas at Supplementary Consultation, this figure had been reduced to an average of 13,300 HGV movements per month. Now, the average number of HGVs per month is expected to be 10,350 per month. For more information about HGV movements, see the Construction update.
- One area where spoil would be reused is in a new area of landscaping at Chalk Park, near the southern tunnel entrance, which would provide a new recreational area for local communities and would be accessible on foot from Chalk ward. Covering around 38 hectares, Chalk Park would feature woodland planting and grassland with views to nearby Areas of Outstanding Natural Beauty and the River Thames. Chalk Park would form part of a total of 84 hectares of open space land in the areas north of Claylane Wood and around the southern tunnel entrance. A map showing Chalk Park and other areas of open space can be found in chapter 3 of the Operations update.

Changes to the project since our Design Refinement Consultation

As part of our ongoing design development, including discussions with utility companies, we have made several changes to the project and its Order Limits since our Design Refinement Consultation in July 2020. Within this ward the changes would be as follows.

- A previously proposed water outfall (drain into the River Thames) has been removed from the project so it would not impact the Ramsar site.
- The temporary bird habitat at Great Clane Lane Marshes, the fields north of the A226 Gravesend Road, has been added to the project since our last consultation. See figure 4.3 for the area of land that would be affected.

More information about any proposed changes can be found in chapter 3 of the Operations update.

Impacts on Open Space land

Within Chalk ward, there are no proposals to remove or replace open space land. More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

4.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the project's construction and once it is operational, compared with the situation if the project was not implemented. Information about how we carried out these assessments can be found in chapter 3 of the Operations update.

4.3.1. Construction

Construction traffic impacts

Journey times along the A226 in Chalk would increase during the construction period, both because of the increased number of HGVs using the road, and because of the traffic signals at the compound access points. When the temporary lane closures are in place on the A226 and Lower Higham Road, these would also impact journey times along these sections of road.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigation and feedback. A summary of the measures introduced to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update.

- For Chalk ward, our plans for the location of the southern tunnel entrance have been moved south twice, reducing the construction impact on Chalk village and the surrounding area. More information about the measures to reduce the impact of tunnel construction can be found in chapter 4 of the Construction update.
- Our proposals allow for re-use of excavated materials, and would substantially reduce the need to dispose of excavated material via the road network, thereby reducing the number of HGV movements on the A226 Gravesend Road. For more information about HGV movements, see the Construction update.
- The A226 Gravesend Road has been included in the Order Limits to allow temporary road-widening if required to maintain the safety of other road users while it is used by construction traffic. Our design changes, including a reduction in the amount of offsite disposal required, has meant we would seek to minimise these works, reducing the impact on local communities.
- After discussions with the local authority, we are also proposing an HGV ban during the construction period on Castle Lane. For more information, see the OTMPfC.

4.3.2 Operations

Operational impacts

Figures 4.4, 4.6 and 4.8 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 4.5, 4.7 and 4.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

The project is underground in Chalk ward and there would be very little predicted change in traffic levels on Lower Higham Road in Chalk with no road having a change in traffic levels of more than 100 PCUs as a result of the opening of the project.

Figure 4.4: Predicted change in traffic flows (PCUs) with the project during the morning peak, 2029



Figure 4.5: Predicted changes to the percentage traffic flows during the morning peak in 2029

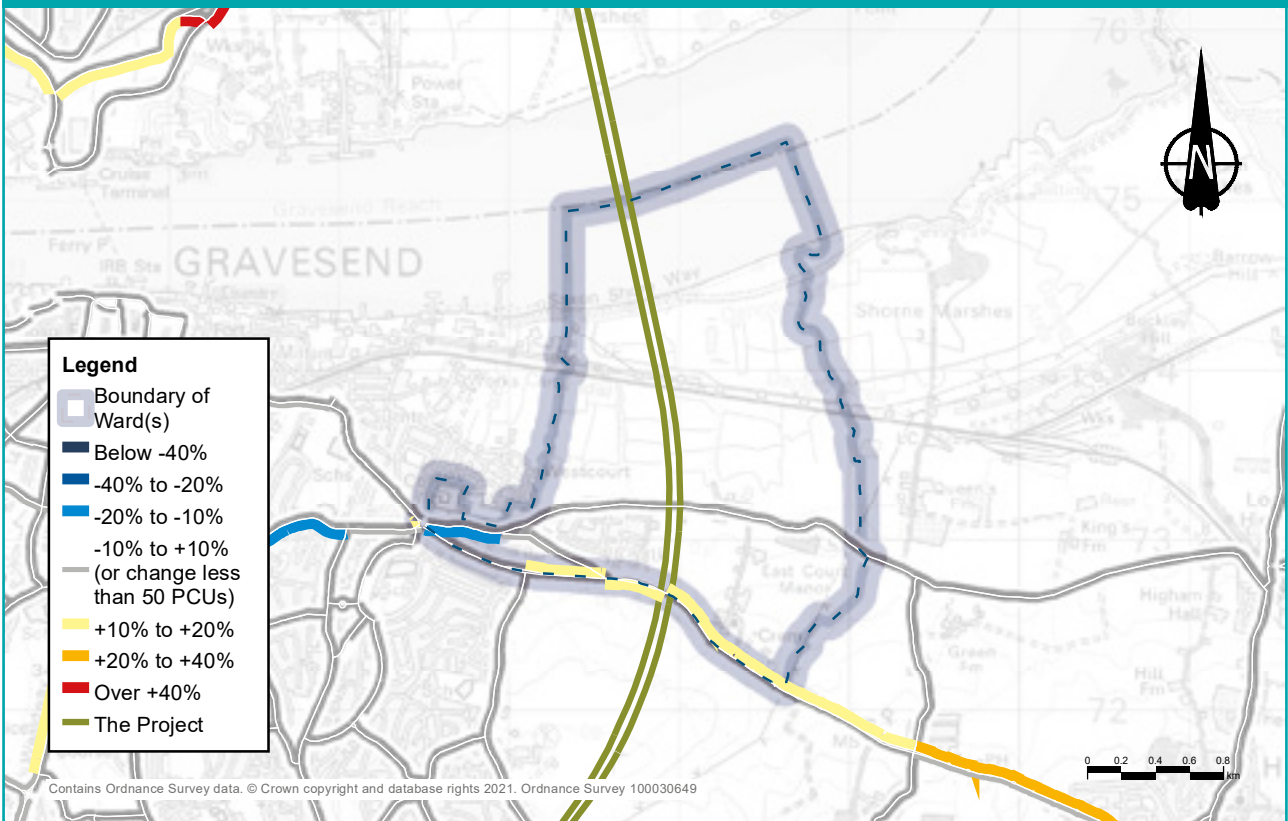


Figure 4.6: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

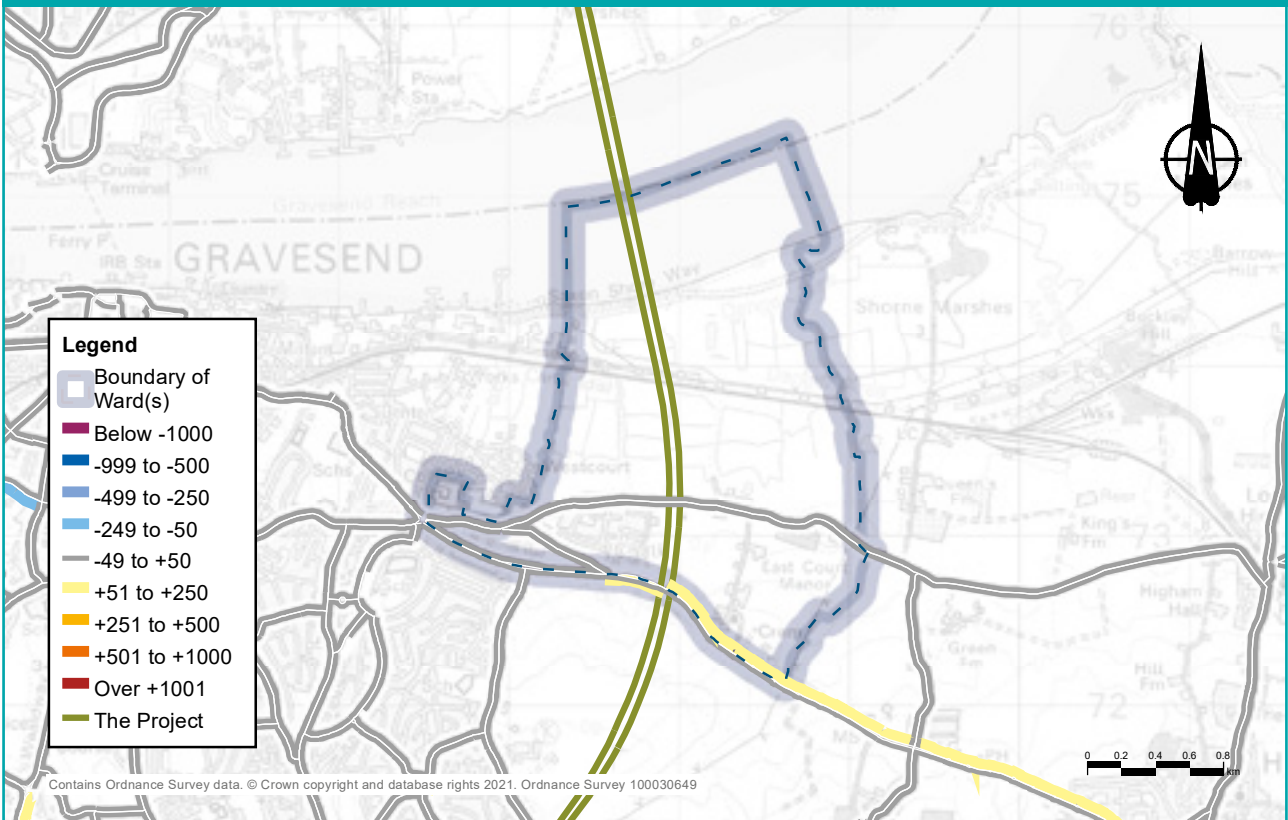


Figure 4.7: Predicted changes to the percentage traffic flows during the interpeak in 2029



Figure 4.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

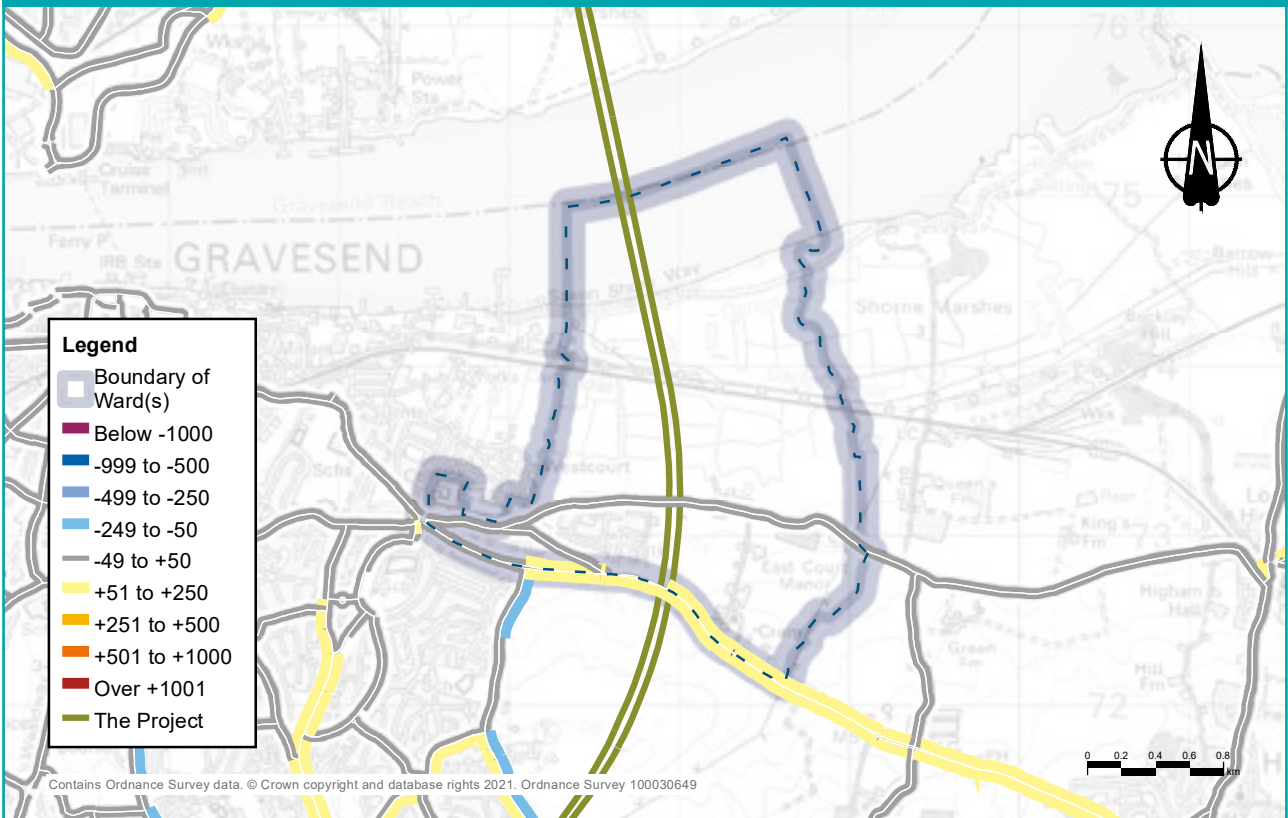
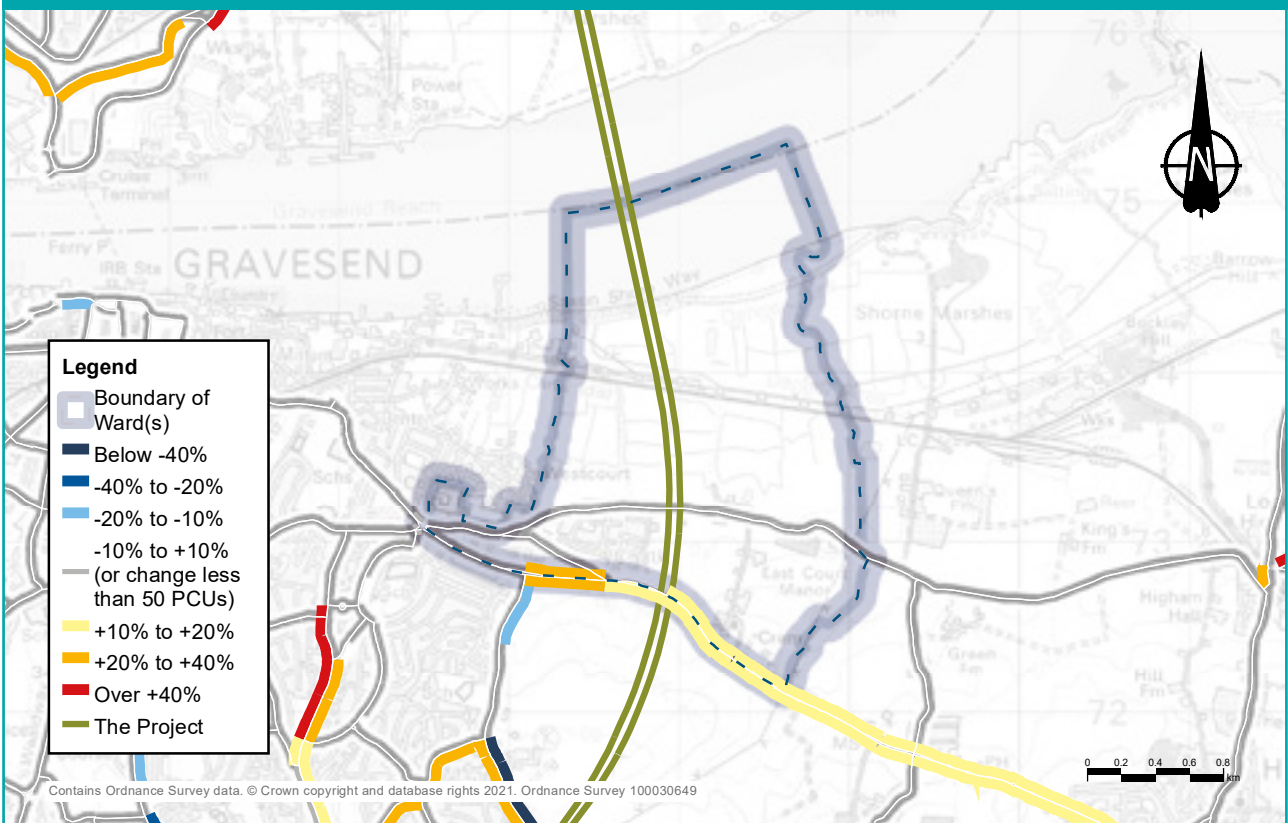


Figure 4.9: Predicted percentage changes to traffic flows during the evening peak in 2029



Changes to journey times

Figure 4.10 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with the project. While figure 4.11 shows the change in areas that can be reached within a 60-minute drive. The drive times have been calculated for the morning peak hour (7am to 8am). With the project, the number of jobs that can be reached within a 30-minute drive increases by 29% which would make an additional 90,200 jobs accessible. Within a 60-minute drive this increases by 42%, which would make an additional 790,000 jobs accessible to people living in Chalk.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.'

Figure 4.10: Change in area that motorists could drive to within 30 minutes from Chalk ward

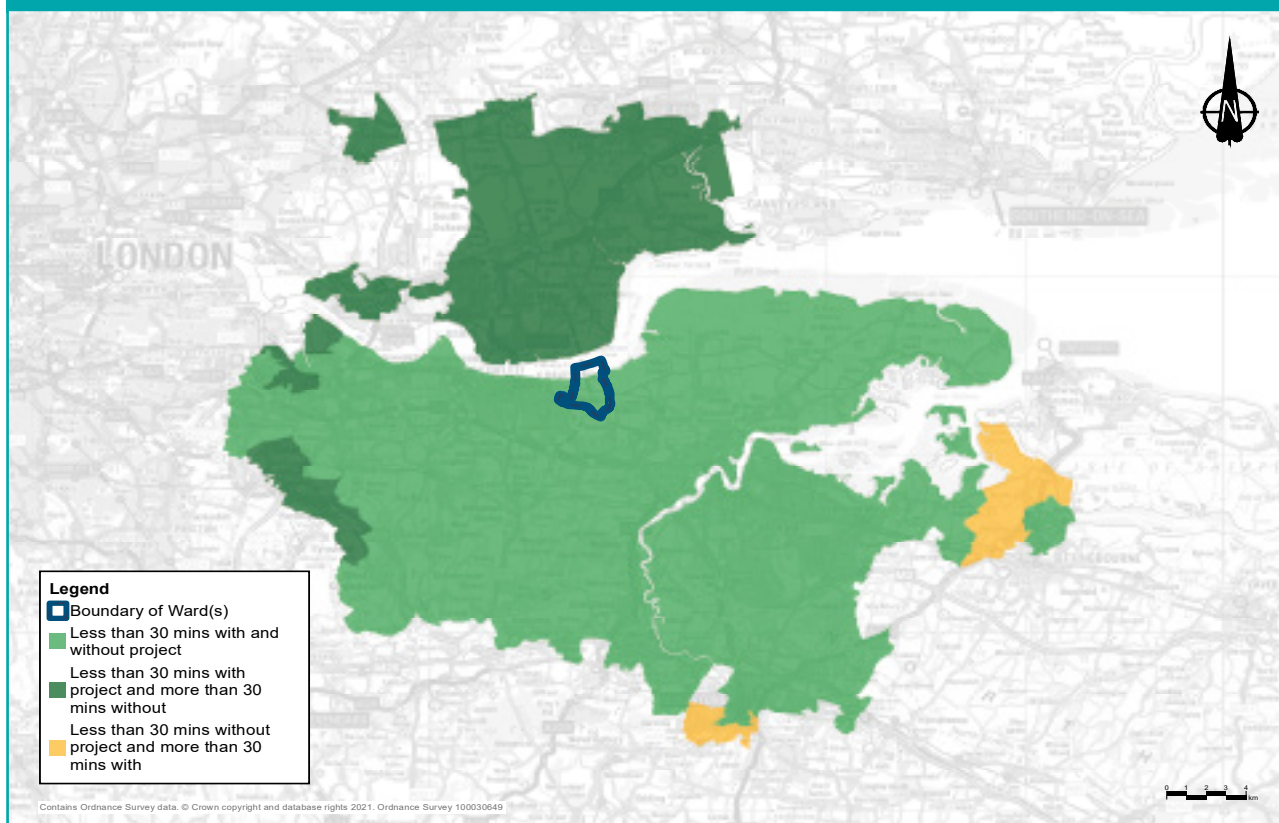
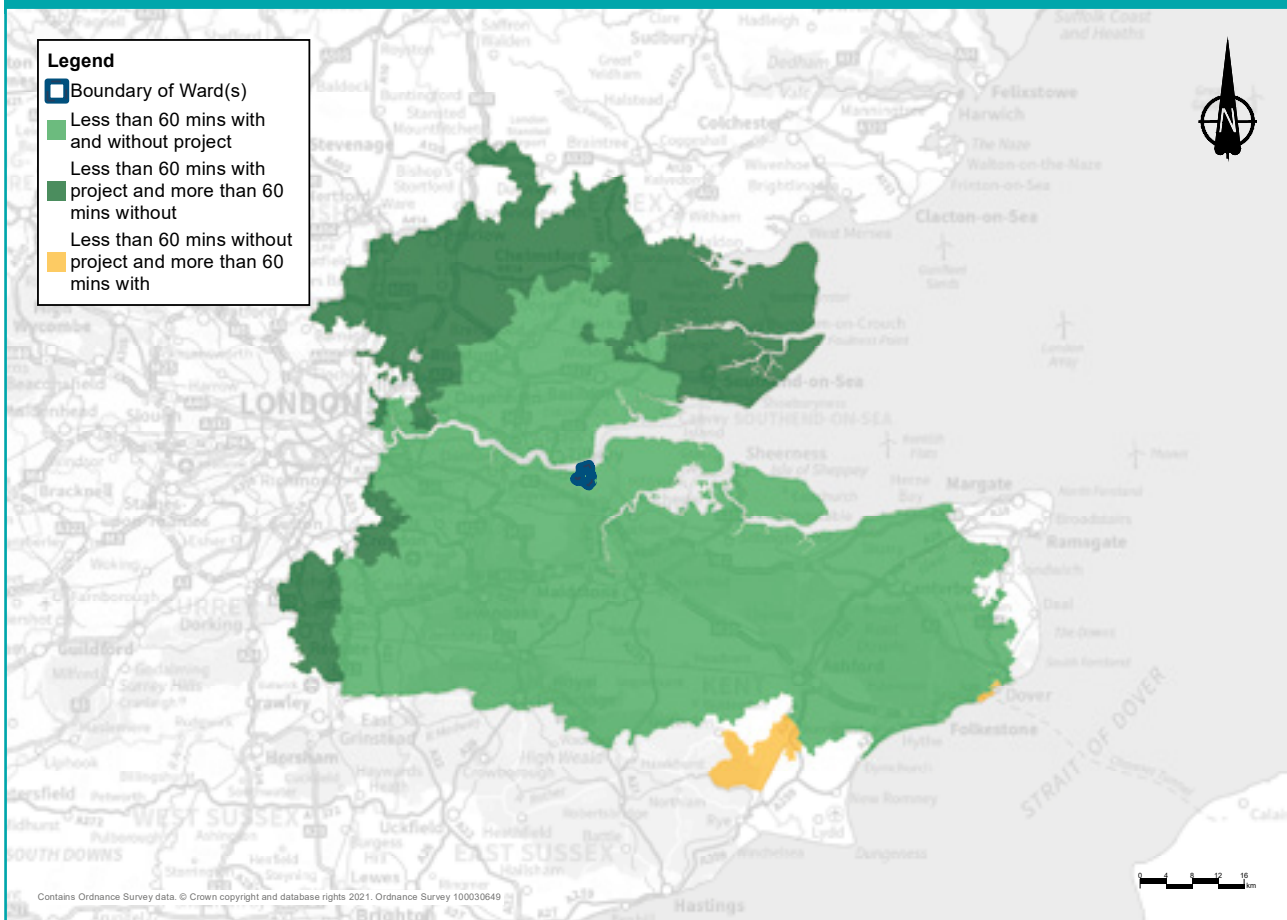


Figure 4.11: Change in area that motorists could drive to within 60 minutes from Chalk ward



Operational traffic flows

An iterative design process including successive stages of traffic modelling and extensive consultation and engagement has ensured that the most appropriate links to the existing road network would be provided. For example, the previously proposed junction between the project and the A226 Gravesend Road was removed after consultation because it had a negative impact on traffic levels east of Gravesend, including roads in Chalk ward. For more information about how the project has developed, see the You said, we did consultation document.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

4.4 Public transport

Existing situation

Chalk ward is served by 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 across London to destinations including St Albans, Luton and Bedford. There are no stations serving this line in the Chalk ward. However, the project crosses the railway in Chalk ward, in a tunnel under the North Kent Railway line.

Several bus services pass through this ward, including services along the A226 Higham Road.

4.4.1 Construction

Trains

There would be no impact on train services passing through Chalk ward, and access to Gravesend station for the residents of Chalk ward would not be affected during construction.

Buses

Due to the impacts on journey times along the A226, bus services along the A226 Higham Road may experience delays. Local buses that would be impacted include the 111, 190, 311, 417, 668, 735 and the 736.

4.4.2 Operations

Trains

There would be no discernible change in local access times to Gravesend and Higham train stations and no change to the rail services at the stations when the project is operational.

Buses

There are no changes to bus routes through the ward required once the project opens and no discernible change to bus journey times.

4.5 Footpaths, bridleways and cycle routes

Existing situation

Figure 4.12 shows the footpaths and cycleways in Chalk ward. Chalk is a relatively small and largely rural ward, which includes five footpaths and one footpath-cycle route (NG2).

4.5.1 Construction

There would be only minor changes to footpaths and bridleways during construction. For more information about the proposed network of footpaths and bridleways in place once the project is complete (including a map), see the Operational impacts section below. For other potential impacts, see the other topic areas in this chapter, such as Visual and Noise and vibration.

- Footpath NG2 runs from Albion Parade along the Thames and Medway Canal and would be affected by utility works. These works would provide power to the Milton Compound which, if required, would cause closure of the path for up to one month.
- Footpath NG3 should be able to remain open throughout construction, but may require very short periods of closure while materials are transported to the Milton Compound.
- The cycle lanes along the A226 Gravesend Road would be impacted during the first year of construction while access to work compounds are constructed. During this period, the A226 would require lane closures and traffic lights.

4.5.2 Operations

The project's proposals include more than 46km of new, extended, diverted or upgraded footpaths, bridleways and cycleways. We developed the proposals after consultation with local communities and stakeholders that included walking, cycling and horse-riding groups. For information about changes to footpaths and bridleways across the project, see chapter 2 of the Operations update.

- Footpath NG2 would be widened to allow construction traffic to access Milton Compound, which would be a permanent widening once the project is operational.

Figure 4.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Chalk ward

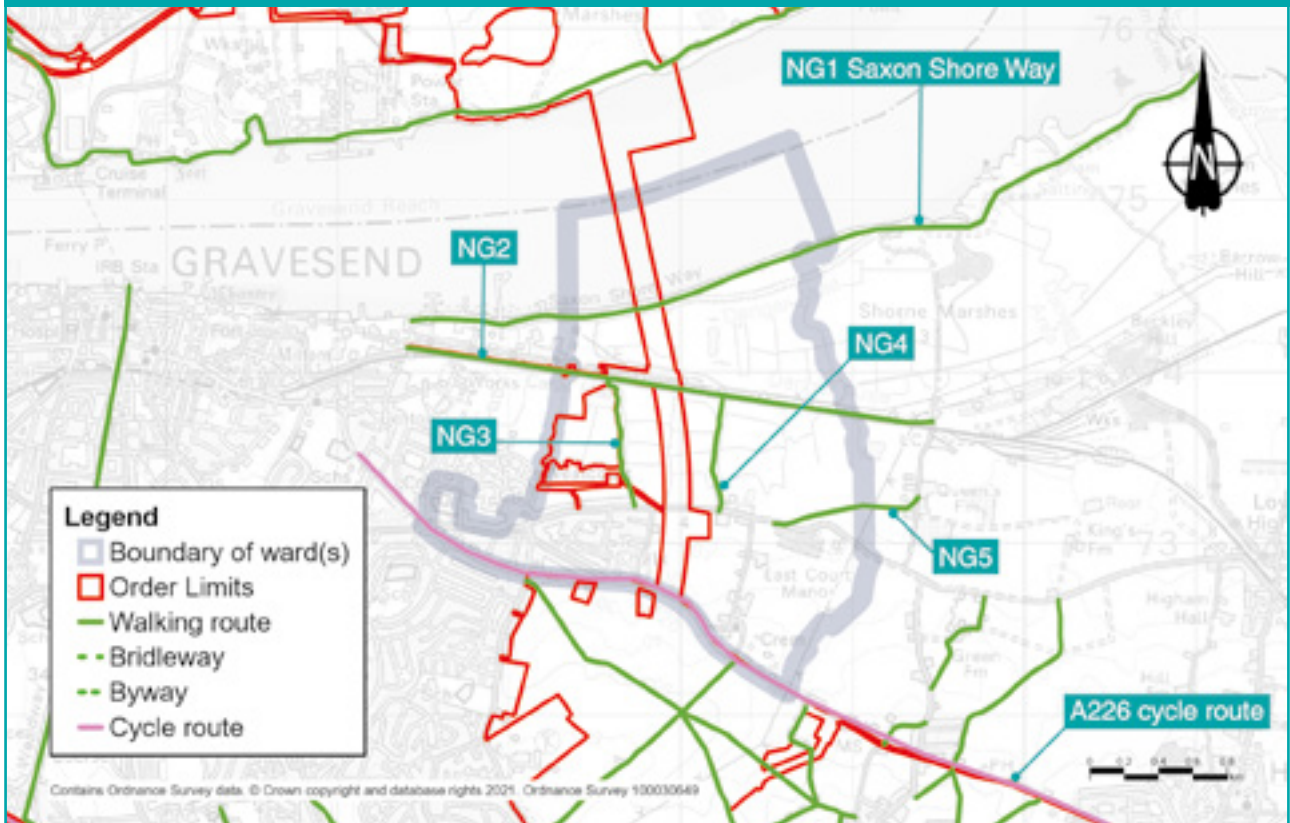
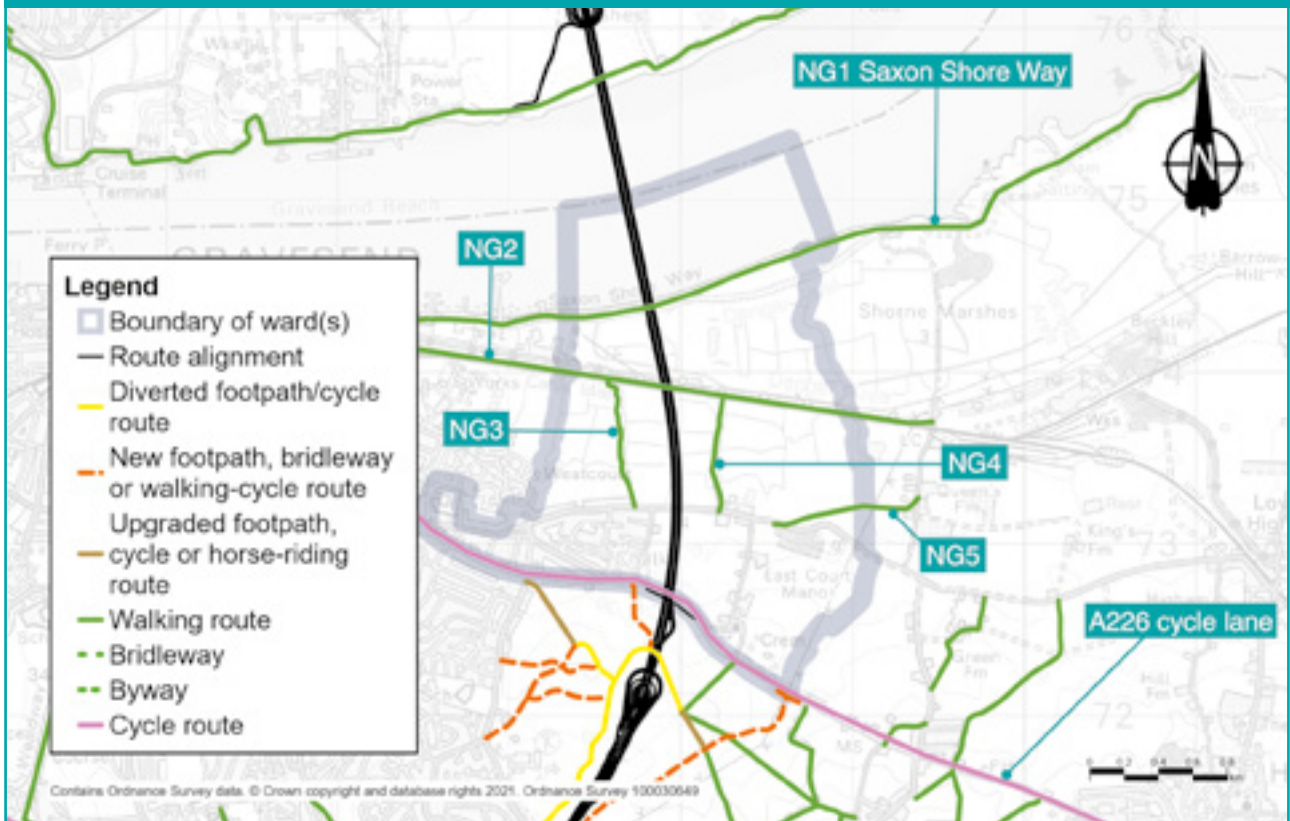


Figure 4.13: Proposed footpaths, bridleways and cycle routes in Chalk ward



4.6 Visual

Existing situation

Views towards the land on which the project would be built from the main populated area are principally limited to the edges of the Chalk residential area and some properties along Church Lane. Other views include those from the local footpath network and National Cycle Network (NCN) Route 1 east of Chalk. There are also views towards the project north of the River Thames from Saxon Shore Way long distance footpath.

Current views towards the land on which the project would be built from the edge of Chalk are in general partially screened by a combination of garden vegetation or hedgerows along the A226 Gravesend Road and Castle Lane. However, more open views over agricultural land are found on the north-east edge of Chalk. From Church Lane, there are intermittent open views over the adjoining farmland.

Views from the local footpath network include large areas of grassland crossed by overhead power lines against a local backdrop of Gravesend town, and the distant backdrop of Shorne Woods Country Park skyline to the south.

From Saxon Shore Way long-distance footpath there are expansive views over the Thames Estuary to Tilbury Docks and Tilbury Marshes on the north bank of the river and gently rising ground beyond.

4.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

The main construction activities that would be seen from this ward are:

- Establishment and operation of the Southern Tunnel Entrance Compound, the A226 Gravesend Road Compound and the Milton Compound.
- Earthworks and landscaping to create Chalk Park and other open space areas.
- Establishment and operation of the Northern Tunnel Entrance Compound north of the River Thames.
- New landscaping near the Northern tunnel entrance.

More information about construction activities can be found in the Project description section above and in chapters 3, 4 and 5 of the Construction update. A map of Chalk Park and other open space areas can be found in chapter 3 of the Operations update.

Construction activity is likely to be partially visible from some homes on the south and east edges of Chalk. There are also likely to be some views of construction activity from homes on Church Lane, the local footpath network, and NCN Route 1.

From Saxon Shore Way long-distance footpath, new landscaping by the northern tunnel entrance and Northern Tunnel Entrance Compound would be clearly visible north of the River Thames.

Measures to reduce visual impacts of construction

Measures would include locating taller facilities in the A226 Gravesend Road Compound as far as possible from homes in Chalk. We also propose to form earth bunds within the A226 Gravesend Road Compound, from material excavated on site, to provide visual screening for homes along Castle Lane on the eastern edge of Chalk.

The visual impacts of the project would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

4.6.2 Operations

Operational impacts

When the new road opens it would run underground in this ward, and the land used temporarily for construction would be reinstated to the reasonable satisfaction of the owner of that land. The former Southern Tunnel Entrance Compound to the south of Chalk ward would be restored to a combination of agricultural use and the proposed open space recreational areas, including Chalk Park. The proposed landscaping in front of the northern tunnel entrance would form a new backdrop feature to the River Thames to the east of Tilbury Fort. Further information about the project during operation is provided in the Project description above.

As the Lower Thames Crossing would be in the tunnel in Chalk ward, the visual impacts from residential areas and the local footpath network would be minimal. The most noticeable change would be the new landscaping on the north bank of the River Thames, forming a new landmark feature in views across the river from Saxon Shore Way.

Measures to reduce visual impacts during operation

Within Chalk, the primary measure to reduce the visual impacts of the project during operation would be the landscape restoration of the temporary working areas.

4.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Chalk ward is mainly characterised by traffic noise in the south of the ward. There is also noise from people and agriculture towards the north. The main sources of road traffic noise within the ward of Chalk are from Lower Higham Road and Gravesend Road.

As part of our environmental assessment process, we carried out surveys of existing background noise at three locations in this ward, which were agreed with the local authority. The levels monitored at these locations recorded average existing noise levels in the range of 49 to 54dB(A) during the daytime and 44 to 52 dB(A)² during the night.

To understand how noise levels would vary with and without the project, we used noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We modelled this because we cannot assume that noise levels in future will be the same as they are now. For example, our assessment of the opening year noise levels take into account predicted changes in traffic levels.

We also modelled the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if it were implemented.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

In the opening year, without the project, existing noise environment is predicted to range between an average of 39 to 73dB(A) during the daytime period and 28 to 59dB(A) during the night-time period at the assessed locations within this ward. As such, our noise assessments predict that without the project there would be noticeable change in noise levels by the opening year of the project due to predicted traffic increases. Our noise assessments predict that by opening year noise levels will increase compared to the existing situation even if the road is not built. Information about how noise levels would change with the project in place, during its construction and operation, are presented below.

4.7.1 Construction

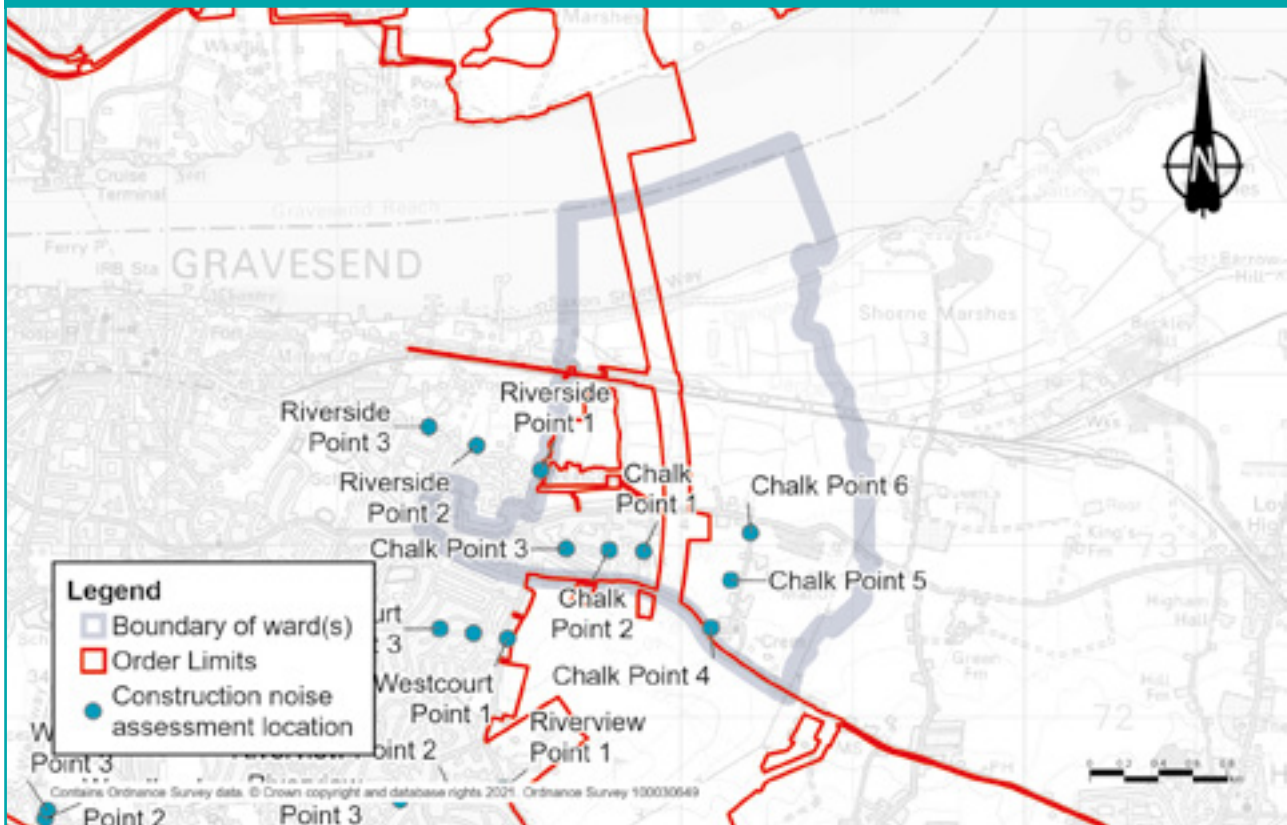
Daytime construction noise impacts

The main construction activities that are expected to create noise and vibration impacts in this ward are those associated with advanced tunnel grouting works and utilities works.

Main works compounds would be located within Chalk ward. There are no Utility Logistics Hubs currently planned within the ward. There would also be haul roads built and used during the construction period. These are shown in the Project description section above.

Construction noise levels have been predicted at six locations across the ward, chosen to provide a representation of the level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Figure 4.14: Construction noise assessment locations in Chalk ward



Noise levels are shown using the standard units for major projects, dB LAeq (12-hour), which represent the average noise level for the assessed 12-hour daytime period.

Figure 4.14 shows the locations at which we have predicted the daytime construction noise during the project's construction phase.

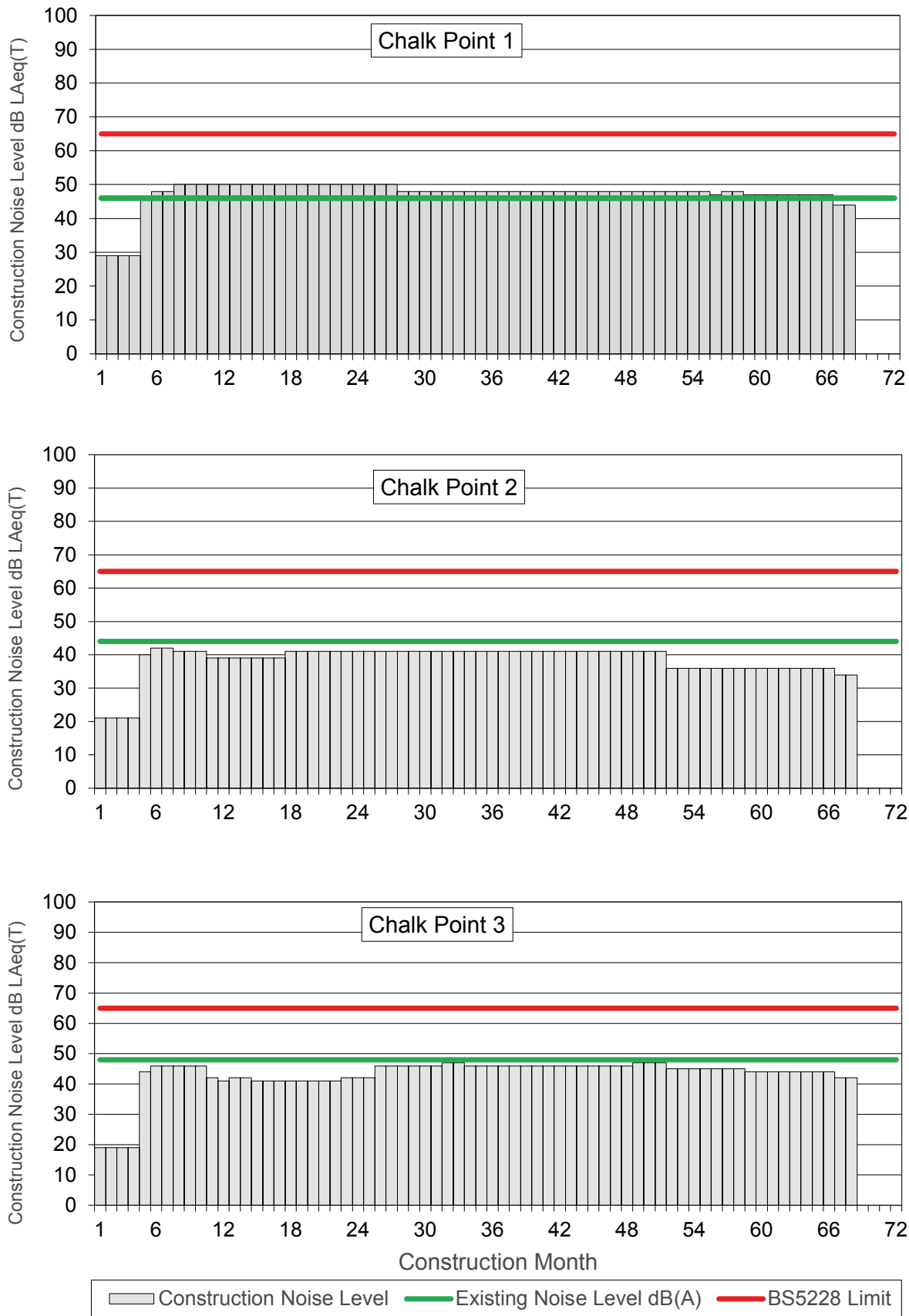
Each vertical bar in figure 4.15 and 4.16 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce the noise.

The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance and additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 4.15, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 29 to 50dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 61 months. However, they would not breach the defined threshold.
- At point 2, construction noise levels are predicted to range from 21 to 42dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 3, construction noise levels are predicted to range from 19 to 47dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location .

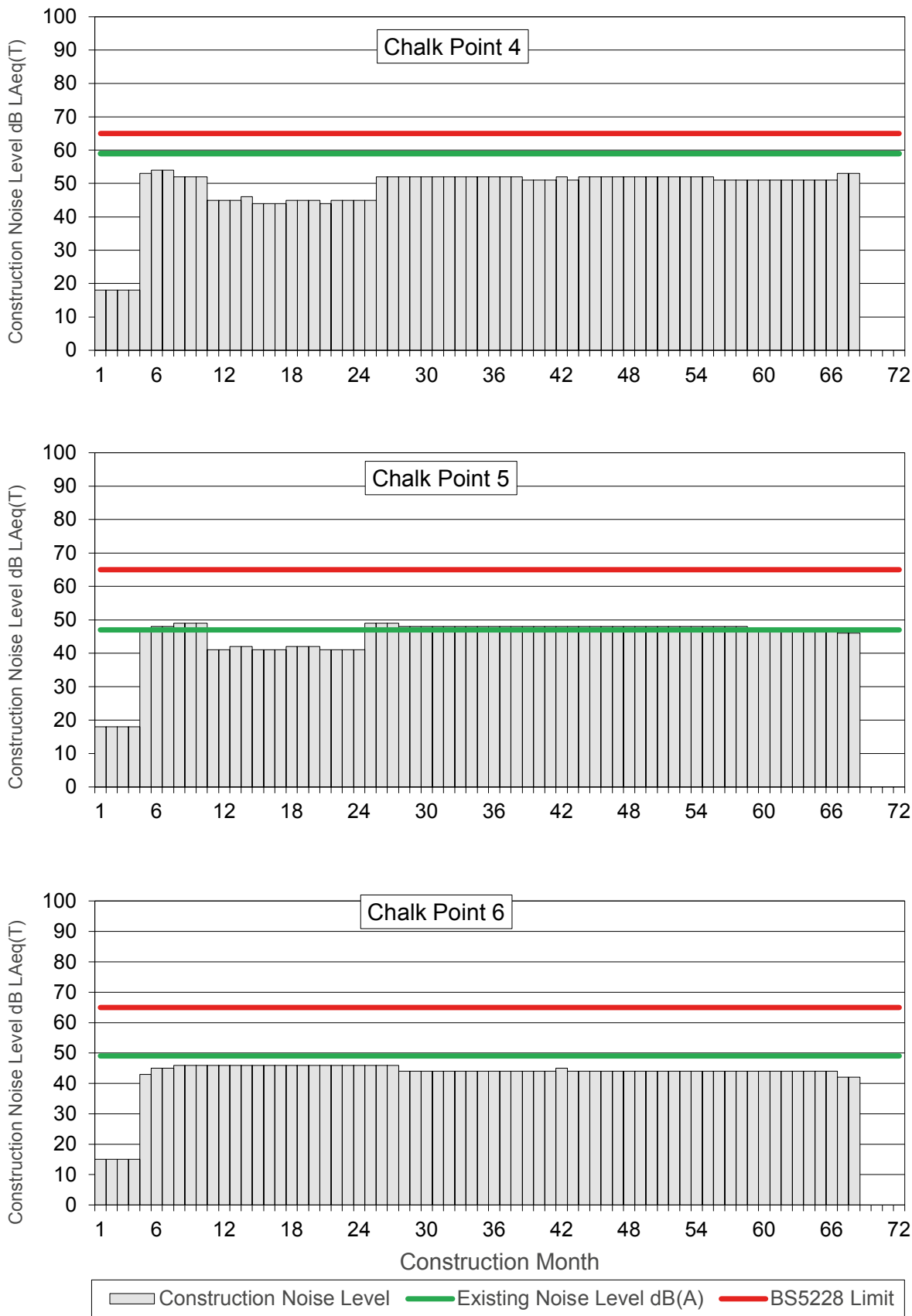
Figure 4.15: Construction noise by month for points 1, 2 and 3 in Chalk ward



With reference to figure 4.16, the following summarises the noise level changes over the construction period for points 4 to 6:

- At point 4, construction noise levels are predicted to range from 18 to 54dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 5, construction noise levels are predicted to range from 18 to 49dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 39 months. However, they would not breach the defined threshold.
- At point 6, construction noise levels are predicted to range from 15 to 46dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.

Figure 4.16: Construction noise by month for points 4, 5 and 6 in Chalk ward



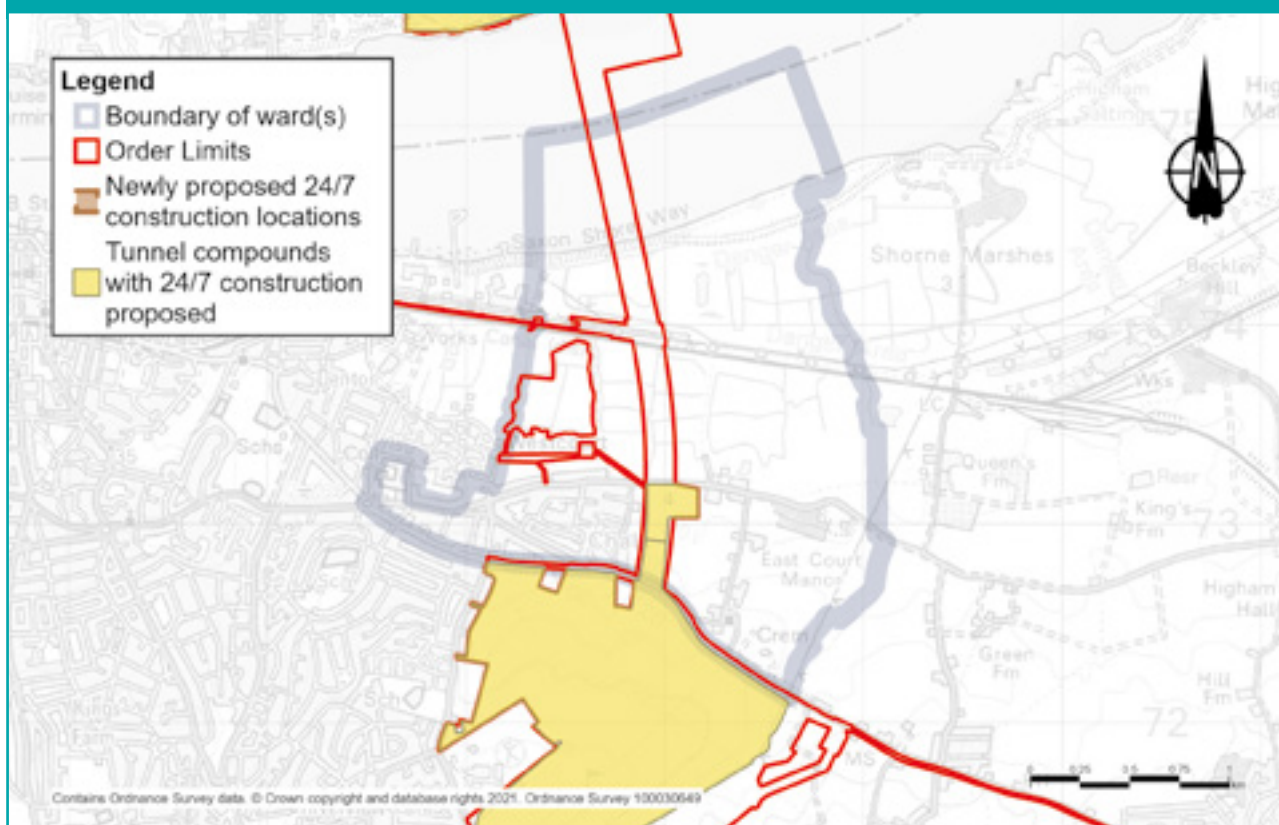
24/7 construction working

In addition to the changes to the daytime noise impacts reported in the section above, night-time, 24-hour, seven-day construction working is proposed at the locations shown in figure 4.17.

The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and remain part of our current proposals.

These locations are where works may need to be undertaken at night to maintain safety and reduce disruption to road and utility networks. Construction activities requiring 24/7 operations would be from the A226 Gravesend Road Compound and the Southern Tunnel Entrance Compound. These works would have an impact on local communities, and we would work with the local authority to manage these impacts.

Figure 4.17: Newly proposed and tunnel 24/7 working locations in Chalk ward



Construction traffic noise impacts

Maps showing the predicted change in road traffic noise within this ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce construction noise and vibration

Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- Installing and maintaining hoarding around the construction compounds.
- Installing temporary acoustic screening around the construction areas likely to generate noise.
- Keeping site access routes in good condition with condition assessments onsite to inspect for defects such as potholes.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant so loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular silenced power generators and pumps.
- No music or radios would be played for entertainment purposes outdoors onsite.
- Site layout would be planned to ensure that reversing is kept to a practicable minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings.
- Non-percussive demolition techniques would be used where possible to reduce noise and vibration impact.
- Carefully considering the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity rather than generators, where possible.
- Minimising construction vehicle traffic by selecting local suppliers along the project, where possible, using local workforces and reducing the material transported for earthworks construction.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction phase.

4.7.2 Operations

Operational impacts

This ward is located approximately 600 metres to the north of the project's southern tunnel entrance and, as such, direct noise impacts from the route of the project would be confined within the tunnel structure, except at the southern edge of the ward where the road emerges from the tunnel, albeit some 20 metres below current ground levels.

The project has been designed to reduce noise and vibration impacts during operation. The majority of noise impacts within this ward would be as a result of changes in traffic flow, the number of HGVs, traffic speed or physical alterations on the existing road network within the ward itself.

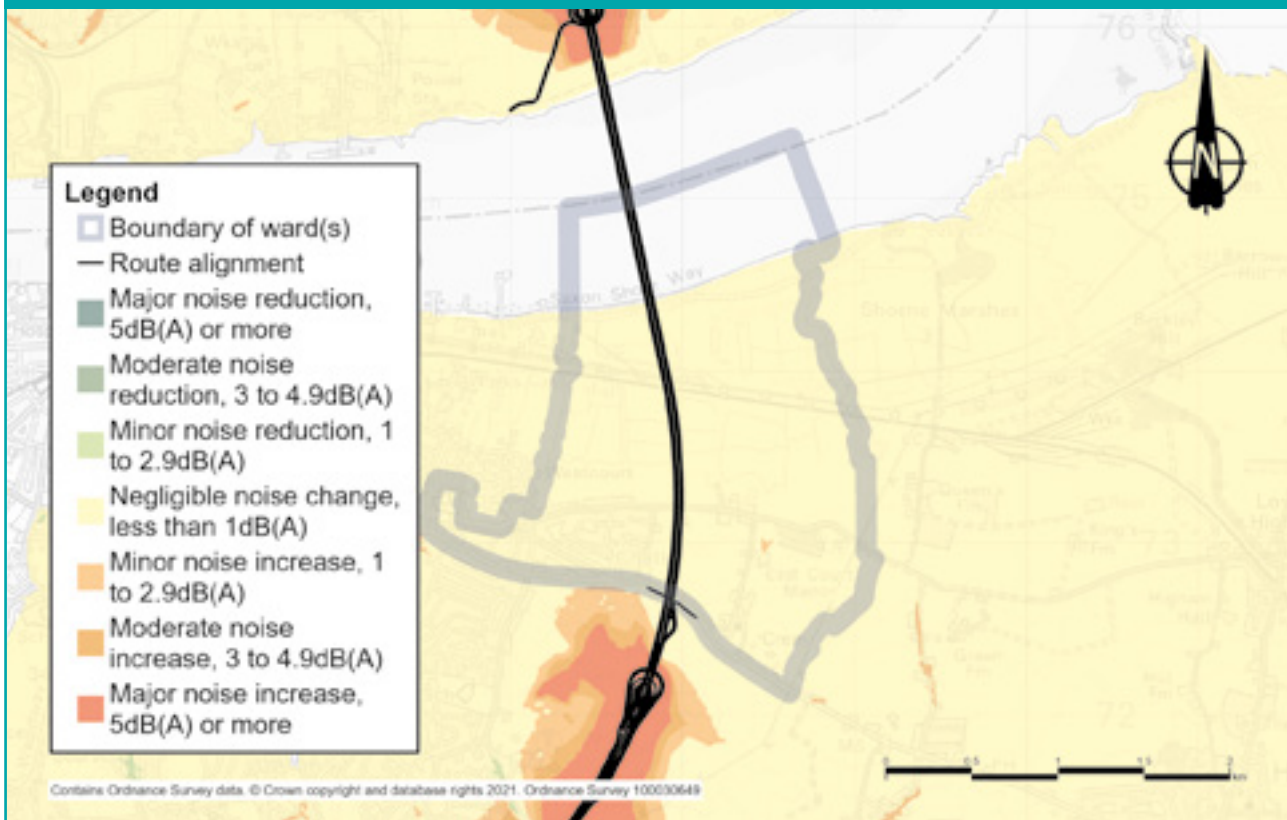
Figure 4.18 shows the predicted changes in operational road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise sensitive receptors (such as nearby properties) are predicted to range from minor reductions in noise levels of between 1.0 and 2.9dB to minor increases in noise levels of between 1.0 and 2.9dB. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce traffic noise during operation

The main methods of controlling noise would be, where practicable, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

Figure 4.18 Noise impacts during operation in Chalk ward



4.8 Air Quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Chalk ward is not located within an Air Quality Management Area (AQMA). AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls.

4.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including the eastern side of Chalk, Lower Higham Road and Church Lane. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a temporary minor worsening in air quality in the area around the A226 Gravesend Road that runs through Chalk from 2026 to 2027, as well as an area around Higham Road from 2025 to 2027. In both instances these areas would see a temporary minor worsening in air quality due to a predicted increase in traffic. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

4.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

Figure 4.19: Predicted changes in NO₂ levels within Chalk ward once the new road is open



There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, for example, the eastern side of Chalk, Lower Higham Road and Church Lane that are predicted to experience a minor worsening in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant. The highest modelled yearly average NO₂ concentration within this ward is 18.7µg/m³, which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time³.

Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce operational impacts on air quality

The assessed air quality impacts in this area as a result of the project would not trigger the need for additional monitoring or other mitigation measures once the road is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

4.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

The Chalk ward is characterised by an older population. The proportion of residents aged over 60 is 34.3% for Chalk compared with 22.6% for Gravesham; and 23.6% for England as a whole. A high proportion of older people live alone within the ward (16.5% in Chalk compared with 12.2% for Gravesham). Given the higher proportion of retired people within the ward, economic activity is correspondingly low, and deprivation levels are low. Home ownership levels are high (nearly 83% of residents own their own home) with the majority of the remainder (13.8%) in private rented accommodation.

Around 80% of residents report their health to be very good or good (roughly in line with figures for Gravesham). A higher proportion of residents report their day-to-day activities to be limited “a little or a lot” as a result of a long-term health problem or disability (18.4% of residents).

Life expectancy at birth for residents of Chalk ward is 83.2 for males and 88.7 for females (above the UK average life expectancy recorded for 2017-19 of 79.4 years for males and 83.1 years for females).

4.9.1 Construction

Construction impacts

Construction activities include the establishment and operation of the Southern Tunnel Entrance Compound, A226 Gravesend Road Compound and Milton Compound, as well as earthworks and landscaping associated with the creation of Chalk Park and other open space. A map showing the proposed open spaces can be found in chapter 3 of the Operations update. Further information about construction activities affecting Chalk ward residents are provided in the Project description section above. Elements of each of these activities have the potential to impact on human health through noise associated with construction activities or construction traffic, changes to air quality (as a result of dust emissions), potential severance caused by construction traffic, or through impacts on mental health and wellbeing.

There would be both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. With good communication and engagement, mental health and wellbeing impacts associated with stress and anxiety related to the construction of the project would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section). Evidence from The Health Foundation has demonstrated a link between unemployment and poor mental health.

As highlighted at the outset of this section, different groups of people within the population may be more sensitive to factors which potentially affect their health than others. Some of the changes identified as a result of construction activities may therefore only affect a small proportion of the population. For example, Chalk residents may experience:

- Access to open space. Temporary closures to the local footpath network, to the south of Chalk, would affect residents' access to open space. This could impact people who do not have access to private cars. However these impacts would be limited, given the short-term nature of impacts on the public rights of way network.
- Noise and vibration. Temporary but significant adverse effects in relation to noise have been identified at receptors located at Lower Higham Road to the north of Chalk. A negative health outcome has been identified for sensitive populations here who may be affected by changes to the noise environment, such as older people or those with pre-existing hearing conditions.

Measures to reduce impacts on health during construction

Proposed measures relating to health and wellbeing (including good practice for dust emissions, hours of working and visual screening) are described in this chapter in the Visual, Noise and vibration and Air quality sections. Further information relating to mitigation measures for these areas is set out in the CoCP, the REAC and the traffic management measures in the Outline Traffic Management Plan for Construction. The commitments in the REAC include items such as adhering to Best Practicable Means (BPM) to reduce noise impacts (see NV007) and dust-management good practice (see AQ005). For more information about these documents, see Chapter 5 of the Guide to consultation.

Engagement and effective two-way communication with communities both prior to and during construction is important in order to reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP sets out proposals for community engagement, including how we would make sure communities, stakeholders and any affected parties are kept informed of the construction works, their progress and associated programme. This includes setting up Community Liaison Groups.

4.9.2 Operations

Operational impacts

The assessments undertaken for noise and air quality have shown that no adverse impacts are anticipated as a result of the project for people in Chalk ward. However, a proportion of residents may experience anxiety or stress associated with perceptions of environmental change as a result of a major road project. As with the construction stage, different groups in the Chalk population may be more susceptible to anxiety and stress than others.

Positive health outcomes may be experienced by residents as a result of improvements to accessibility, access to work and training, and access to open space. The newly created Chalk Park would provide residents with a new recreational resource which could encourage physical activity.

Measures to reduce operational health impacts

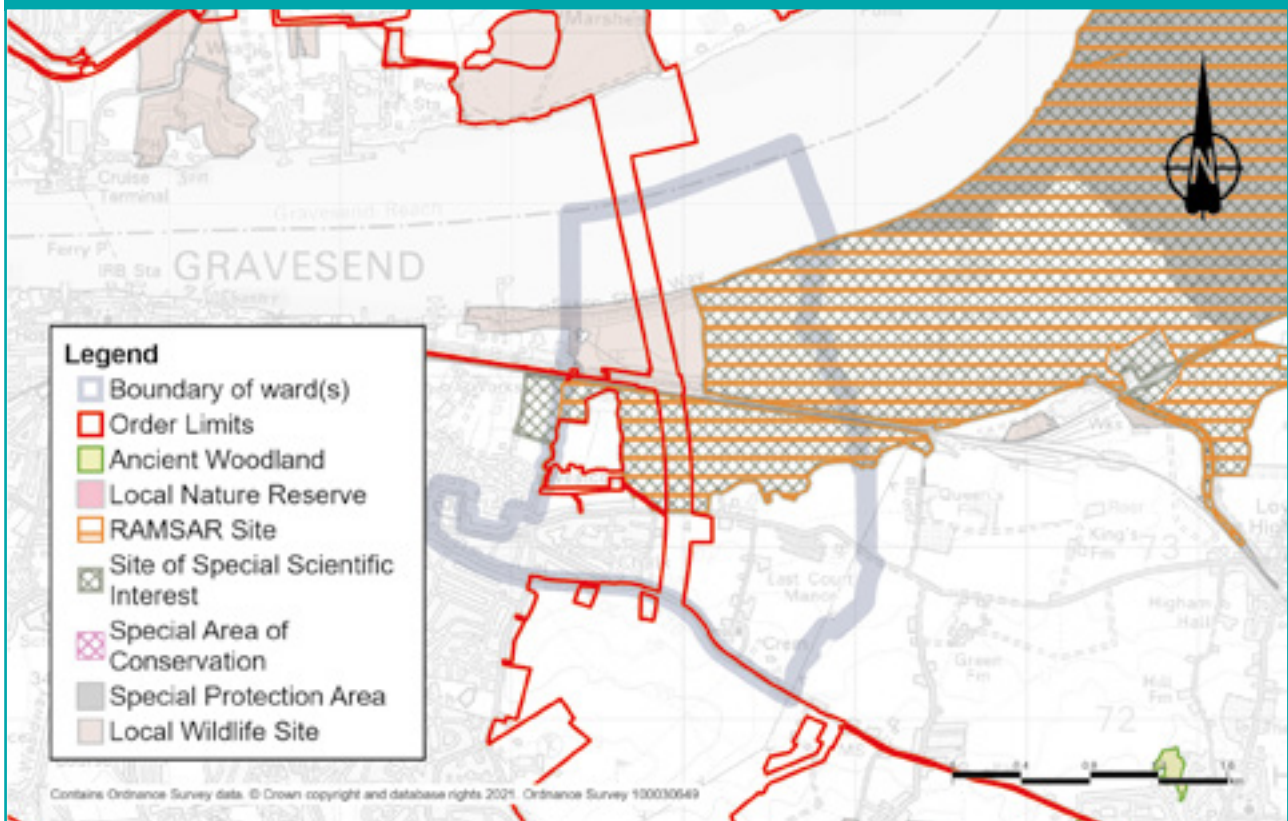
Measures to address health outcomes including those to reduce the risk to noise and visual impacts, are described above.

4.10 Biodiversity

The habitats within the Order Limits in Chalk ward are grazing marsh, reedbed, arable fields, and hedgerows. Chalk ward contains the Thames Estuary and Marshes SPA and Ramsar and the South Thames Estuary and Marshes SSSI. For information about marine biodiversity, please refer to chapter 7 of the Construction update.

We carried out surveys across the project to set a baseline for assessment, and these identified the presence of a range of protected and notable species. Within the grazing marsh habitat species present included water vole, great crested newts, aquatic invertebrates, common reptile species, and otter. These areas are also important for both breeding and wintering wetland birds, particularly the area of the Shorne Marshes RSPB reserve which was found to have notable numbers of breeding waders including lapwing and redshank. The arable fields contained minimal terrestrial biodiversity interest.

Figure 4.20 Designated and non-designated biodiversity sites in Chalk ward



4.10.1 Construction

Construction impacts

There would be impacts from the construction of the two compounds used to construct the ground preparation tunnel. Construction of these compounds would result in the loss of a small area of rough grassland and grazing marsh and would require temporary diversion of a watercourse. This habitat supports protected and notable species which would be impacted by a direct loss of habitat (affecting water vole, reptile, great crested newts, birds and invertebrate environments); fragmentation of habitat (temporary diversion of a watercourse); and disturbance to retained habitat.

Measures to reduce biodiversity impacts of construction

Vegetation clearance would be carried out during the winter where possible to avoid the impact on breeding birds. Where this is not practicable, clearance would be supervised by an ecological clerk of works to ensure that no nests are disturbed or destroyed.

Protected species in situ would be moved away from the site prior to any construction activities – either through habitat manipulation (for example strimming to reduce the height of vegetation and displace reptiles), or translocation. Where required, works affecting protected species would be carried out under a Natural England licence. An area of farmland to the north of the A226 would be sympathetically managed during the construction period to encourage its use by birds, particularly for wintering wetland birds. For more information, see the Project description above.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the CoCP and the REAC. See chapter 5 of the Guide to consultation for more information about this and the project's other control documents.

4.10.2 Operations

Operational impacts

There are not expected to be any significant negative impacts on this ward when the road is open. Underground (tunnel) activity would bring minimal or negligible disturbance to species or habitats.

Measures to reduce biodiversity impacts of the project during operation

Once the works are complete, the land used for the construction compounds would be returned to grazing marsh. In addition, a number of extra wetland features would be created to enhance the area for terrestrial biodiversity, although these would be outside of Chalk ward. Newly created habitat, including that created to support animals moved from the construction area, would be managed to ensure that they provide high-quality environments to support a broad range of different plant and animal species. For maps showing proposed areas of environmental mitigation, see Map Book 1: General Arrangements.

The impact of operation on biodiversity would be controlled through the range of good practice measures set out in the REAC. See chapter 1 of the Construction update for more information about the REAC and the project's other control documents.

4.11 Built heritage

Existing situation

The 10 listed buildings and seven buildings or structures of historical relevance in Chalk are the receptors in the ward.

The listed buildings are:

- 1 Chalk Road is a Grade II listed building of high heritage value. It is located 222 metres north-west of the project and is known locally as Craddock's Cottage. The building is from the early 19th century and is associated with the author Charles Dickens. It is commonly known as the cottage where the author spent his honeymoon in 1836. Above the door is a tablet with a mask of Dickens and an inscription dedicated to the author. The cottage is a typical example of traditional Kentish housing.
- 44 Chalk Road is a Grade II listed farmhouse of high heritage value. It is located 175 metres north-east of the project and dates to the 18th century. The building is an example of an attractive three-storey farmhouse and also claims connections to Charles Dickens as an alternative location (to 1 Chalk Road) of the author's honeymoon.

Figure 4.21 Built heritage in Chalk ward



- 54-58 Vicarage Lane is a Grade II listed building of high heritage value. It is located 242 metres north-west of the project and dates to the 18th century. The range of cottages were originally a single farmhouse with the northern cottage added at a later date. The building is an example of a traditional farmhouse which was altered in the 19th and 20th centuries.
- The Old Forge is a Grade II listed building of high heritage value. It is located 435 metres north-west of the project and dates to the 18th century or earlier. The building is timber-framed and weatherboarded and is a good example of traditional construction and local style. It is famously associated with the author Charles Dickens and is believed to be the original inspiration for 'The Forge' in his novel Great Expectations.
- Readers is a Grade II listed building of high heritage value. It is located 233 metres west of the project on the south side of Lower Higham Road. The house is timber framed and likely dates from the 15th or 16th century. The building has attractive Tudor features which include an arched stone doorcase. It also has a brick extension and a modern extension.
- Filborough Farmhouse is a Grade II listed farmhouse of high heritage value. It is located 174 metres east of the project on the south side of Lower Higham Road. Despite some modern restorations and changes it remains a good example of a late-medieval timber-framed, rural farmhouse. It is the main building of the historic farmstead of Filborough Farm.
- Granary at Little Filborough Farm is a Grade II listed building of high heritage value. It is located 15 metres north of the project on the south side of Lower Higham Road. The building dates to the 18th century and stands on staddle stones which were traditionally used to support timber-framed storage buildings. Although staddle granaries are commonly seen in the South East of England, and are distinctive across the chalklands of the Weald, they are rare in a national context. This detached example is part of the historic farmstead of Filborough Farm.
- Barn to North West of Filborough Farmhouse is a Grade II listed building of high heritage value. It is located five metres west of the project on the south side of Lower Higham Road. The structure dates to the 18th century and is a typical example of a Kentish barn built using local materials. The barn is part of the historic farmstead of Filborough Farm.

- Church of St Mary is a Grade II* listed building of high heritage value. It is located 140 metres north of the project off Church Lane. The church is thought to date back to the late 11th century, with additions from the 12th, 13th and 15th centuries. Original medieval features from the late 11th century and 12th century are still visible in the church. The southern aisle was destroyed in the 18th century but was restored in the 19th century.
- East Court Farmhouse is a Grade II listed farmhouse of high heritage value. It is located 65 metres east of the project on the east side of Church Lane. The 18th century farmhouse is a handsome example of a rural Kentish farmhouse located within a traditional farmstead. The farmhouse is set within attractive gardens located to the north, west and south. Traditional ancillary buildings lie to the east.

Other buildings/structures of historical relevance

- East Court Farm
- East Court Farm World War II road-block buoys
- Filborough Farm
- Mooring post on foreshore by Shorne Marshes
- Thames and Medway Canal
- North Kent Railway
- Milton 19th/20th century Rifle Range

4.11.1 Construction

Construction impacts

Information about construction activities in this ward can be found in the Project description section above. Construction activity along the new route of the A122 Lower Thames Crossing would temporarily introduce barely perceivable noise, lighting and visible construction activity and machinery in the vicinity of known heritage assets.

Measures to reduce construction impacts on built heritage

The design and layout of the Southern Tunnel Entrance Compound would take in to account the setting of heritage assets and avoid light glare, light spill, and light pollution during night-time construction. More information can be found in the Design principles (section S326). The Southern Tunnel Entrance Compound would also be appropriately screened as set out in CoCP. Dust and noise reduction measures are also relevant in mitigating the setting of heritage assets as described in the REAC measure. Please refer to the Air quality, Noise and vibration, and Cultural heritage sections of the REAC. No specific construction mitigation is required for impacted heritage assets as the impacts are non-physical.

4.11.2 Operations

Operational impacts

Information about the operational project in this ward can be found in the Project description section above. Church of St Mary (Grade II*); East Court Farmhouse (Grade II); Filbrough Farmhouse (Grade II); Barn to NW of Filbrough Farmhouse (Grade II); Granary at Little Filbrough Farmhouse (Grade II) are located over 500 metres to the north of the south tunnel entrance. The presence of the project within what is currently a peaceful rural setting would increase the traffic noise and at night the increased lighting would not be directly visible, but would increase the background lighting of the area. The overall impact of this would be negligible.

Measures to reduce operational impacts on built heritage

The engineering and landscape design for the project seeks to avoid or reduce negative impacts on non-designated heritage assets. The Southern Tunnel Entrance Compound would be reinstated after construction to reflect existing field patterns and the surrounding landscape character as outlined under Design principle S3.05.

4.12 Contamination

From the review of desk-based sources (historical maps and environmental data), there are no identified medium or high-risk sources of contamination that could be at risk of being disturbed during construction or operation of the project within Chalk ward.

4.12.1 Construction

By following a construction management plan and ensuring that, where potential sources of contamination are used (for example oils, lubricants, mechanical plant), that appropriate spill containment and emergency response procedures are in place to prevent adverse environmental impacts from occurring.

4.12.2 Operations

During the operation of the road, should an incident occur, for example, a traffic accident resulting in localised contamination, significantly affected soils would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

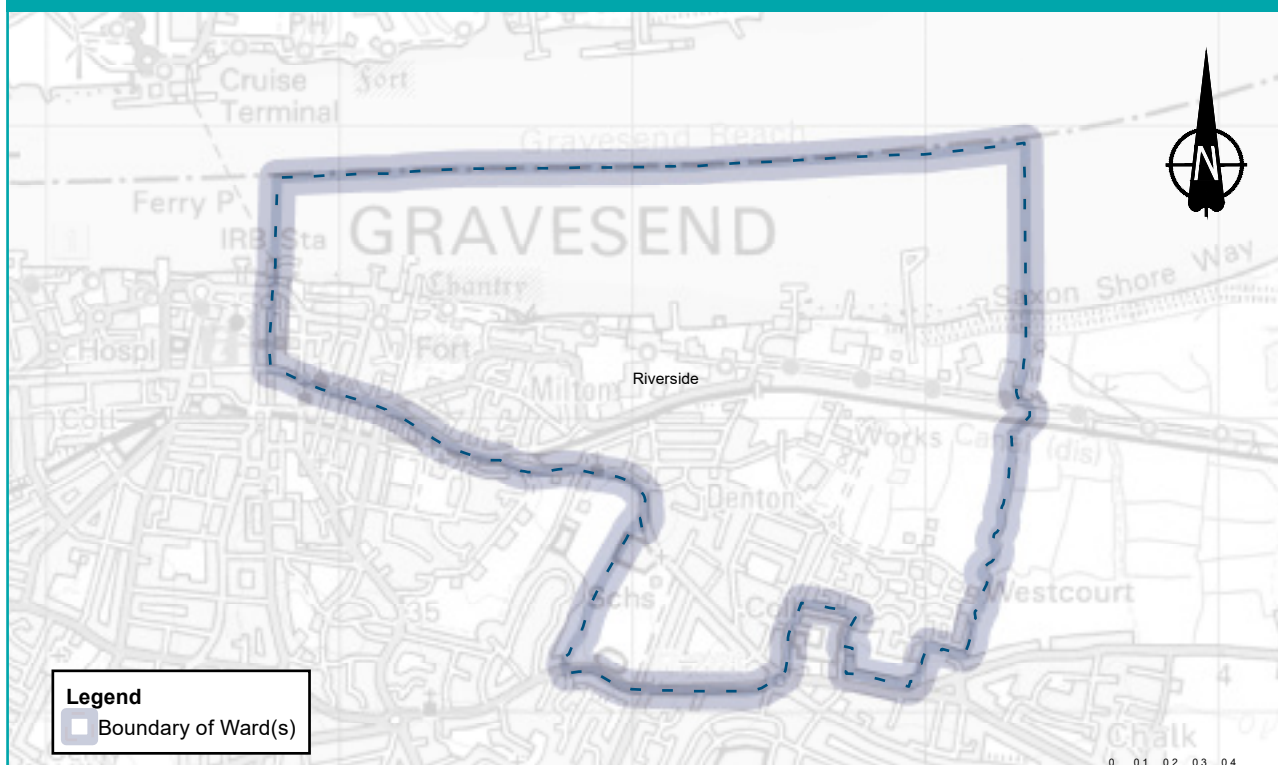
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Chapter 5: Riverside ward

This chapter summarises the activities in Riverside ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 5.1: Ward boundary map for Riverside ward



5.1 Overview

5.1.1 About this ward

Riverside ward is located in the town of Gravesend, on the south bank of the Thames and within the borough of Gravesham. It lies directly to the west of Chalk ward. The ward has an area of around 4.5km² and an estimated population of 5,650¹. The residential areas of Milton and Denton are situated in the west and south of the ward. The A226 runs through part of the ward.

¹ Office for National Statistics, 2018 ward-level population estimate

5.1.2 Summary of impacts

Table 5.1: Summary of impacts during the project's construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impact</p> <p>There should be only a very slight impact on the conditions on the highway network in Riverside as a result of the construction of the project.</p> <p>Mitigation</p> <p>We have moved the location of the southern tunnel entrance to reduce the impact of construction traffic. We have also reduced the number of HGVs by re-using as much excavated material as possible on site, instead of removing it by road.</p>	<p>Impact</p> <p>There would be very little change in traffic on the roads in Riverside as a result of the new road. Further details of changes to traffic flows once the project is operational can be found in the traffic section of this chapter.</p> <p>Mitigation</p> <p>Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads.</p>
<p>Public transport</p>	<p>Buses</p> <p>There would be no changes to bus journey times during construction as a result of activities in Riverside ward. However, there may be some increases to journey times on the 190, 416 and 417 buses due to activities in adjacent wards.</p> <p>Rail</p> <p>There would be no discernible change in local access times to Gravesend station and no change to the rail services there either.</p>	<p>Buses</p> <p>There would be no changes to bus routes through the ward once the new road opens, and no discernible change to bus journey times.</p> <p>Rail</p> <p>There would be no discernible change in local access times to Gravesend station and no change to the rail services there either.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>One footpath would be affected during construction of the project. This footpath would need to be closed for less than a month to allow utility works proposed for providing power to a construction compound.</p> <p>Mitigation</p> <p>Closure of this footpath would be kept as short as possible to reduce the impact on the local public rights of way network.</p>	<p>Impacts</p> <p>There would be no impacts on footpaths, bridleways or cycle routes in this ward once the project is operational.</p> <p>Mitigation</p> <p>No mitigation would be required.</p>
<p>Visual</p>	<p>Impacts</p> <p>There are likely to be limited views of construction activity from a small number of homes on the edge of Denton. Views of Milton Compound would be possible from National Cycle Network (NCR) route 1 and the Thames and Medway Canal towpath. The landscaping in front of the northern tunnel entrance and its compound would be visible north of the Thames.</p> <p>Mitigation</p> <p>The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC.</p>	<p>Impacts</p> <p>Once the project is built, changes in views would be minimal.</p> <p>Mitigation</p> <p>None required.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction works in Milton Compound (in Chalk), specifically vehicle movements, are expected to create noise in this ward. There would be negligible changes in noise from road traffic.</p> <p>There are no percussive and vibratory works proposed in this ward.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through the mitigation measures set out in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>Once the project is built, there would be no direct noise impacts in this ward.</p> <p>There would be negligible noise impacts as a result of changes in traffic flow and speed on the existing road network.</p> <p>Mitigation</p> <p>None required.</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>The properties to the north-eastern side of Denton and near Wharf Road may experience dust and emissions from construction equipment and traffic during the construction phase. Analysis of the construction phase traffic flows associated with the project indicate that there would be a minor worsening in air quality in the area around the B261 Old Road East between 2024 to 2027.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures, which are presented in the CoCP and REAC, to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>No essential mitigation is required.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>There are likely to be health benefits as a result of access to work and training opportunities.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. There is also likely to be temporary air quality, visual and noise impacts from construction works in Milton Compound and from construction traffic.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to: dust emissions, working hours, noise and visual screening, traffic management measures and community engagement.</p>	<p>Impacts</p> <p>There would be positive health benefits associated with improved accessibility to jobs, secondary schools, hospitals and opens spaces.</p> <p>Mitigation</p> <p>None required.</p>
<p>Biodiversity</p>	<p>Impacts</p> <p>There may be some disturbance to species from construction traffic using the road running parallel with the Thames and Medway Canal.</p> <p>Mitigation</p> <p>Traffic on this road would be minimised during the construction period to limit disturbance to the surrounding habitat.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>

Topic	Construction	Operations
<p>Built heritage</p>	<p>Impacts</p> <p>The scheduled New Tavern Fort and associated listed buildings would experience additional noise from construction traffic. The North Kent Line railway and Thames and Medway Canal and Riverside conservation area would experience temporary impacts to their setting from visible and audible construction activity.</p> <p>Mitigation</p> <p>The design of the project has taken into account the setting of heritage assets and seeks to avoid light pollution. The good practice measures associated with air quality, noise and cultural heritage are presented in the REAC.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>
<p>Contamination</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>

5.2 Project description

5.2.1 Construction

Construction activities

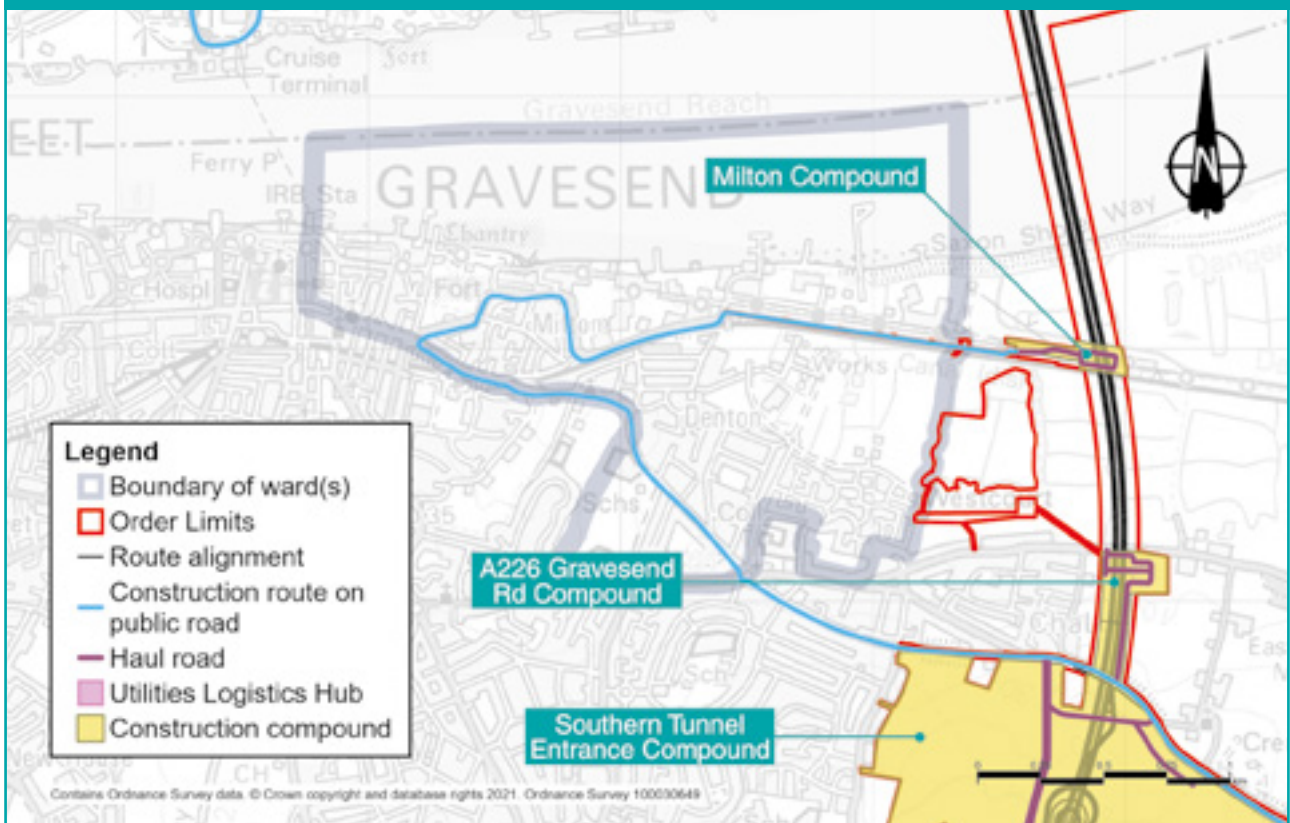
More information about how the area would look during construction, including construction visualisations, can be found in the Construction update. There would be very little construction in Riverside ward as part of the project. Within the Order Limits, (the area of land required to construct and operate the project, formerly known as the development boundary), we have included provision for road-widening along the north side of the Thames and Medway Canal in case construction vehicles need a wider access route to reach the Milton Road Compound in Chalk ward.

Construction compounds and Utility Logistics Hubs

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

There would be no construction compounds or Utility Logistics Hubs (ULHs) in Riverside ward.

Figure 5.2: Main construction areas in Riverside ward



Vehicles going to Milton Compound would go through Riverside. Also, a small proportion of staff cars going to the A226 Gravesend Road Compound and the southern tunnel entrance would use the Milton Road and Rochester Road if they are local traffic coming from near the centre of Gravesend. The number of construction vehicles going to the Milton Compound is shown in table 5.2 below. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 5.2: Average daily vehicle numbers going to Milton Compound and passing through Riverside ward

Time period	Milton Compound	
	HGVs	Cars
January to August 2024	10	10
September 2024 to February 2025	4	9
March to May 2025	2	6
June to October 2025	2	6
November 2025 to March 2026	1	6
April to August 2026	5	6
September 2026 to March 2027	5	6
April to November 2027	0	0
December 2027 to March 2028	0	0
April to July 2028	0	0
August 2028 to December 2029	0	0

Construction routes on public roads

The A226 Gravesend Road would be a designated construction route, which means it would be used by HGVs and other workforce traffic during the construction period, largely to access the A266 Gravesend Road Compound. The Milton Road Compound would also be accessed via the A226 Gravesend Road/Rochester Road, via Milton Road, Prospect Grove, Norfolk Road and Mark Lane, and the road alongside the Thames and Medway Canal. These roads would remain open to the public throughout the construction period. More information about the forecasted impacts on these roads can be found in the Traffic section below.

Construction schedule

Construction of the project is scheduled to last for six years, from 2024 to 2029. To deliver a coordinated and efficient construction programme, we have divided activities into packages of work. Maps and programmes for the work packages south of the river can be found in chapters 3 and 4 of the Construction update.

Construction working hours

Most construction activities in this ward would be carried out during core hours, from 7am to 7pm on weekdays and 7am to 4pm on Saturdays. However, there would be circumstances when our working hours would need to be extended. For example, connecting new roads to existing ones would be carried out when there is less traffic so it is safer for road users and construction workers. Working outside core hours would also benefit road users by reducing the need for traffic management measures during peak times. More information about working hours can be found in the Noise and vibration section below and in the CoCP.

Traffic management

There are no specific traffic management measures proposed in Riverside ward.

The HGV route through Riverside is the A226 Rochester Road (from the east), then Milton Road, Ordnance Road, Canal Road, Norfolk Road and via the road alongside the Thames and Medway Canal.

Traffic management measures required across the project would include narrow lanes, reduced speed limits, lane closures and temporary traffic lights. We have tried to minimise traffic management measures wherever practical. However, they would be necessary in some places to allow construction traffic and local communities to travel safely, while providing construction workers with sufficient space to operate. An overview of the traffic management measures required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by our appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

5.2.2 Operations

The complete project

There would be no roads or features associated with the completed Lower Thames Crossing in Riverside ward.

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements.

Changes to the project since our design refinement consultation

As part of our ongoing design development, including discussions with utility companies, we have made several changes to the project and its Order Limits since our design refinement consultation in July 2020. Within Riverside ward, the changes would be limited to amendments to the Order Limits in Chalk, some of which lie on the boundary with Riverside. A previously proposed water outfall (drain into the Thames) has been removed from the project so it would not affect the Ramsar site.

5.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during its construction and once it is operational, compared with the situation if the new road was not implemented. Information about how we carried out these assessments can be found in chapter 4 of the Operations update.

5.3.1 Construction

Construction impacts

Information about construction activities in this ward, including construction routes on public roads, can be found in the Project description section above.

There should be only a very slight impact on the conditions on the highway network in Riverside as a result of the construction of the new road.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigation and feedback. A summary of the measures to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update.

The proposed location of the southern tunnel entrance has been moved south twice, reducing the construction impact on Chalk village and the surrounding area. More information about our measures to reduce the impact of tunnel construction can be found in chapter 4 of the Construction update.

The A226 Gravesend Road construction route would be used for works north of Thong Lane, which involve significant excavation. Our proposals allow for re-use of excavated materials and would substantially reduce the need to dispose of this material via the public road network, reducing the number of HGV movements on the A226 Gravesend Road. For more information about HGV movements, see the Construction update.

5.3.2 Operations

Operational impacts

We have carried out traffic modelling to forecast the change in traffic flows on roads in the area, including those within or on the boundary with Riverside ward for the first year of operation (2029).

Figures 5.3, 5.5 and 5.7 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 5.4, 5.6 and 5.8 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

As can be seen in figures 5.3 to 5.8, there would be very little change in traffic on the roads in Riverside as a result of the new road. There is predicted to be a decrease of between 50 and 250 PCUs in the morning peak hour westbound on Milton Road. This is a decrease of between 0% and 10% compared with the predicted travel flow without the project.

Figure 5.3: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

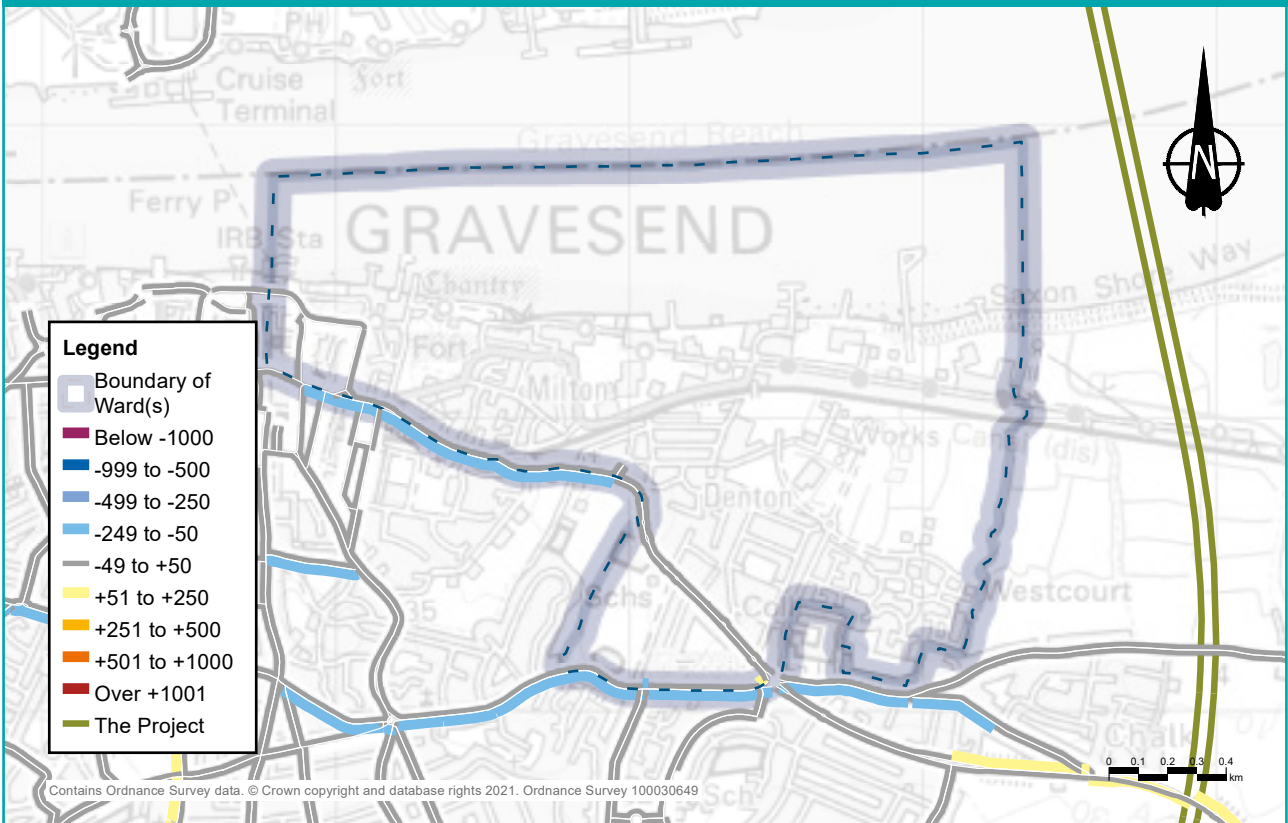


Figure 5.4: Predicted percentage change in traffic flows with the project during the morning peak in 2029

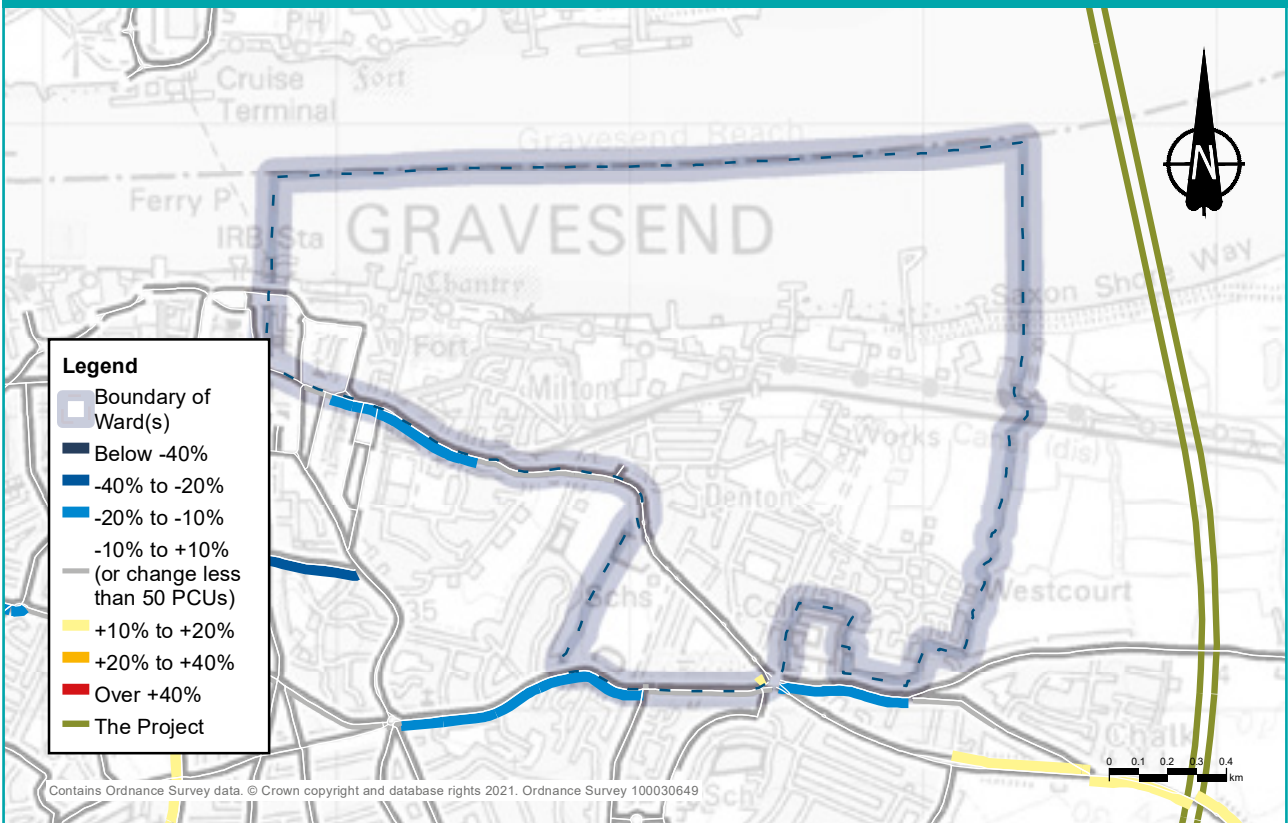


Figure 5.5: Predicted change in traffic flows (PCUs) with the project during the interpeak period in 2029

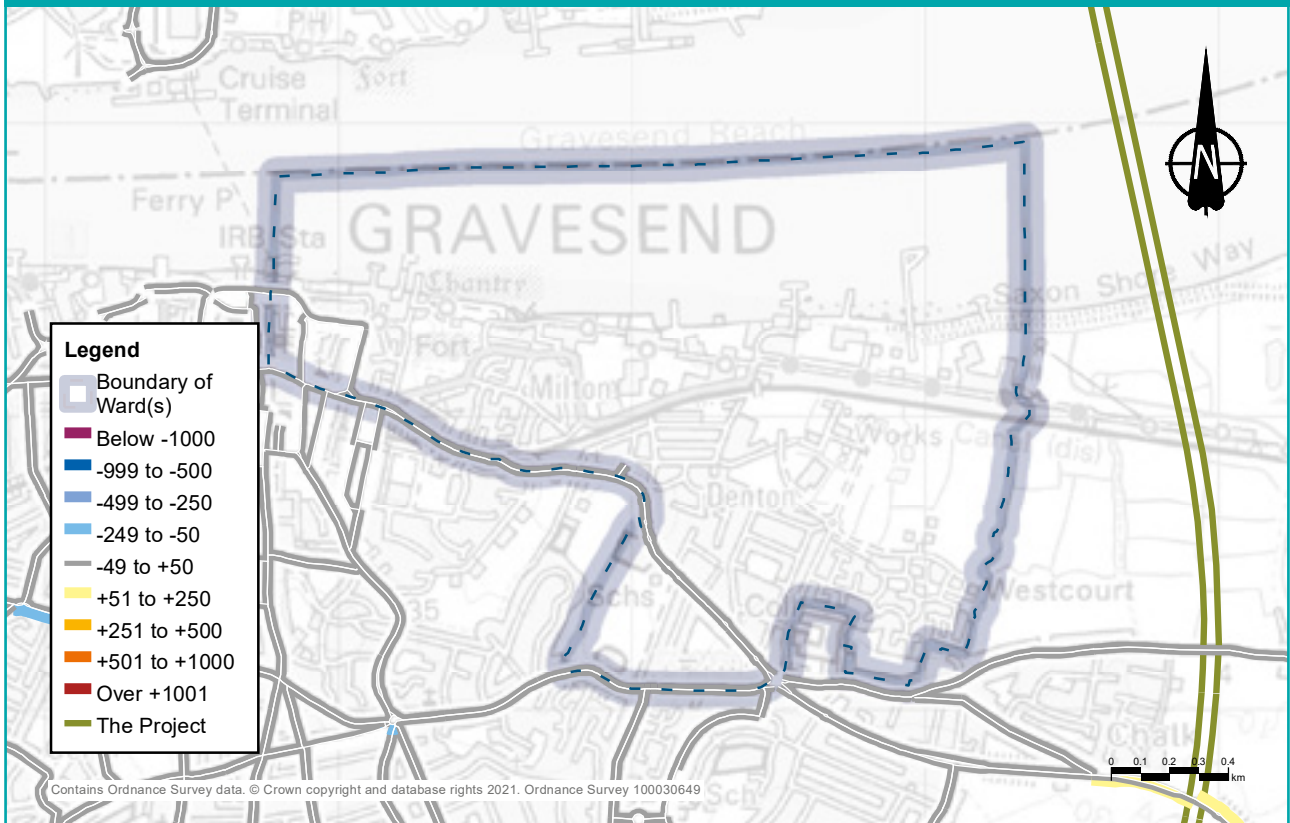


Figure 5.6: Predicted percentage change in traffic flows with the project during the interpeak period in 2029

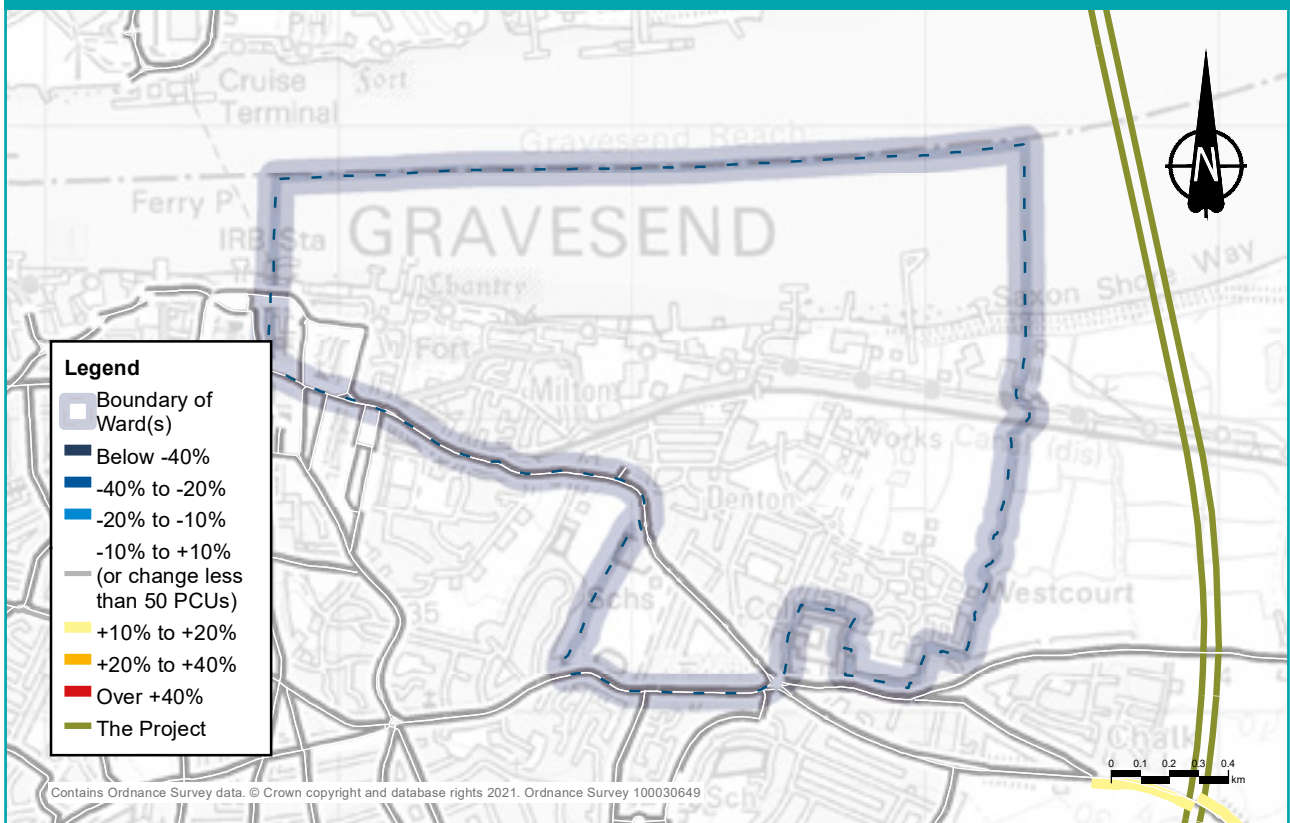


Figure 5.7: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

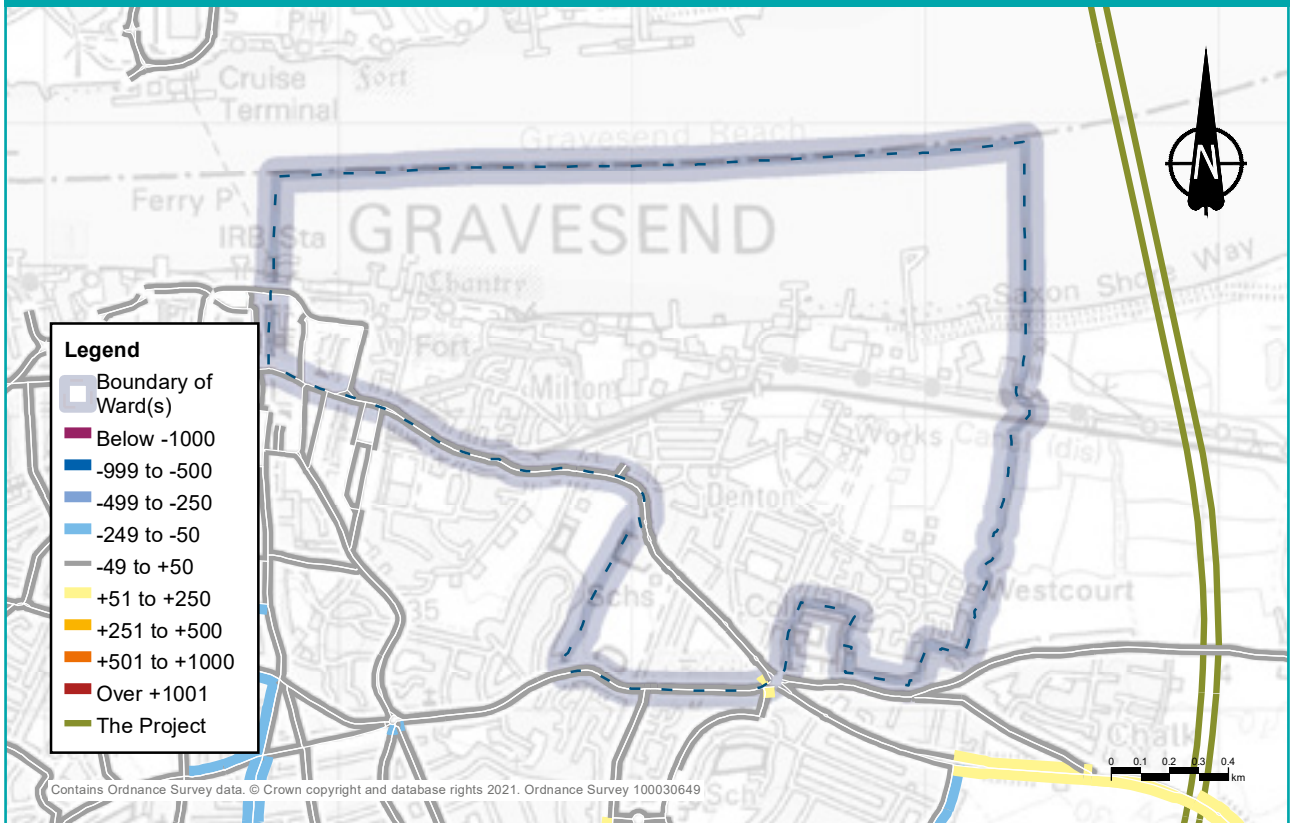
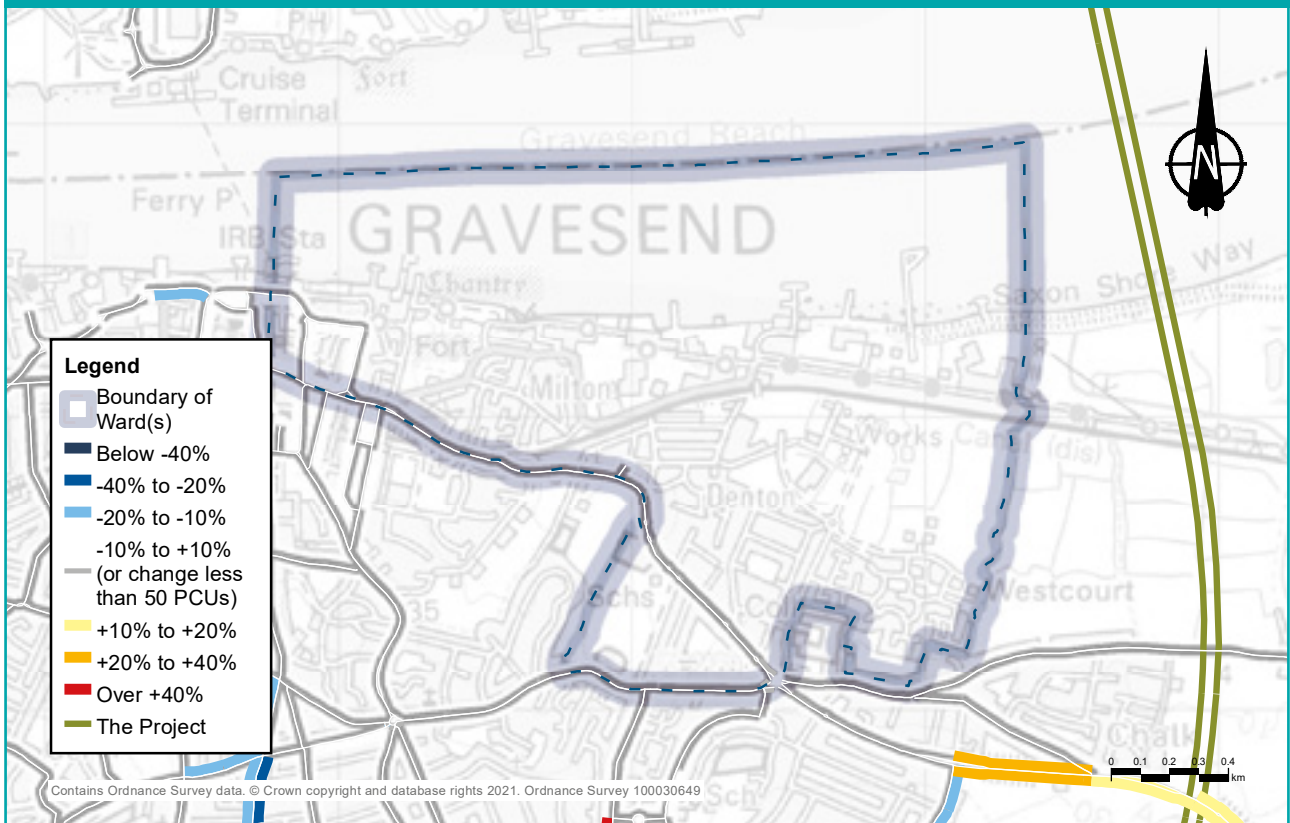


Figure 5.8: Predicted percentage change in traffic flows with the project during the evening period in 2029



Changes to journey times

Figure 5.9 shows the change in the area that could be reached within a 30-minute drive from the centre of the ward without the new road and with it. Figure 5.10 shows the change in areas within a 60-minute drive. These times have been calculated for the morning peak hour (7am-8am). The number of jobs within a 30-minute catchment area would increase by 14%, an additional 39,700 jobs, and within a 60-minute drive this would rise by 32%, creating an additional 605,000 jobs. Despite the project providing a substantial net gain in access for motorists, there is an area (shown in orange in the map below) that would no longer be accessible by car within 30 minutes due to changes in traffic flows on the wider road network.

Figure 5.9: Change in area that motorists could drive to within 30 minutes from Riverside ward

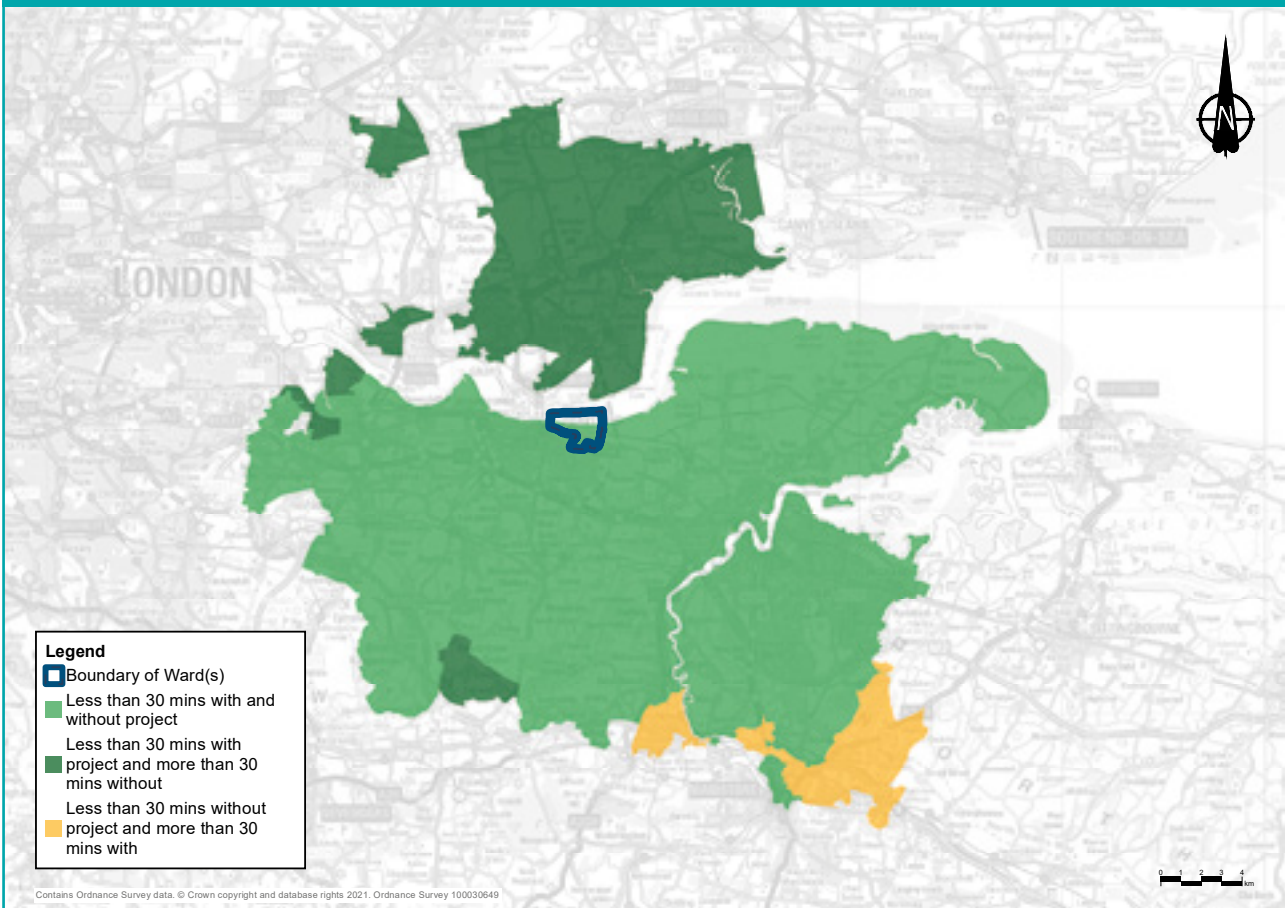
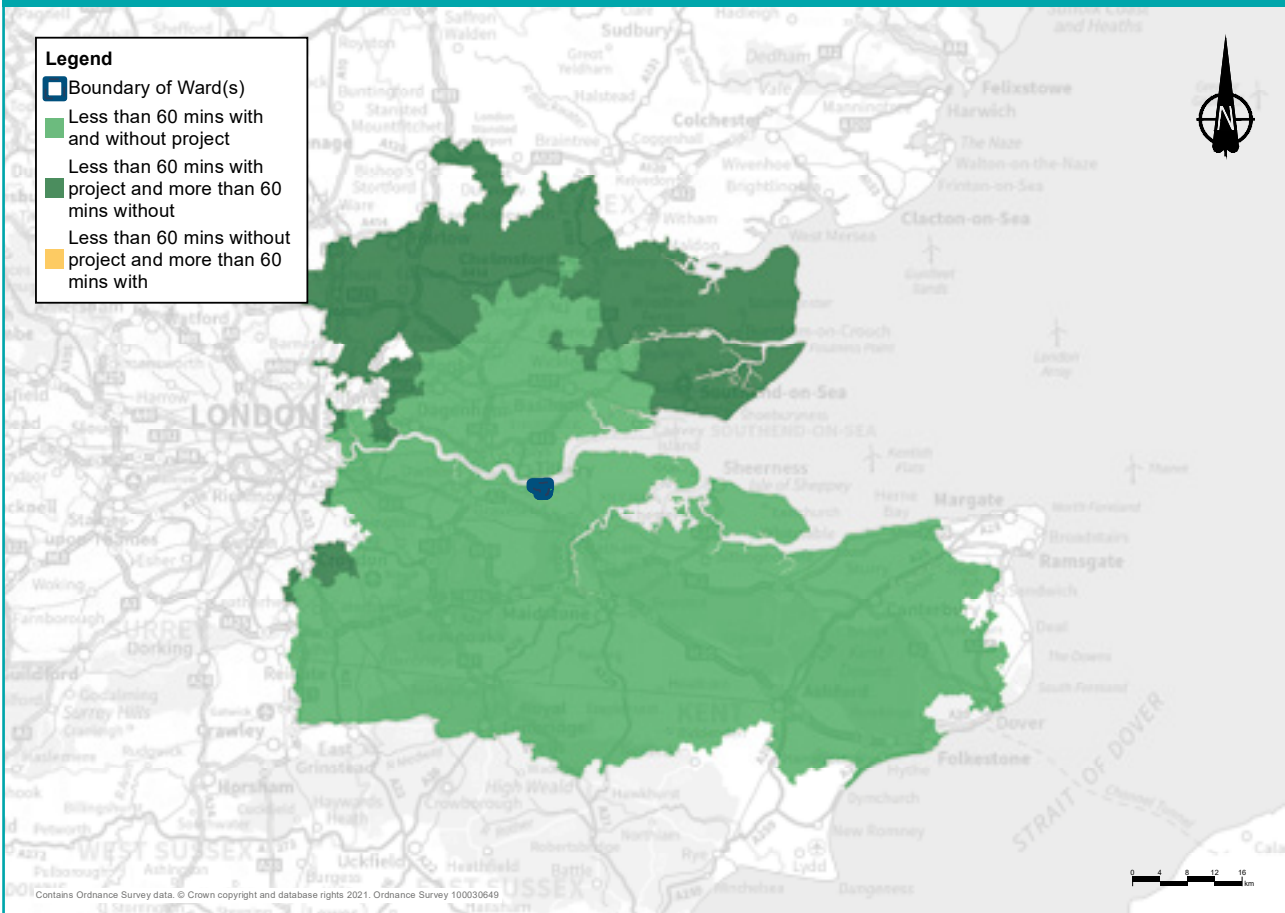


Figure 5.10: Change in area that motorists could drive to within 60 minutes from Riverside ward



Operational traffic flows

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

5.4 Public transport

Existing situation

There are no railway stations in Riverside, but Gravesend station is close to the ward's western boundary.

Riverside ward is serviced by several bus routes, including the 190, 416, 417, 480, 481, 489, 490, Fastrack B, and the school bus routes Meopham1, VIGO1 and NAG1.

5.4.1 Construction impacts

Buses

There would be no changes to bus journey times during construction as a result of activities in Riverside ward. However, there may be some increases to journey times on the 190, 416 and 417 buses due to activities in adjacent wards.

Rail

There would be no discernible change in local access times to Gravesend station and no change to the rail services there either.

5.4.2 Operational impacts

Buses

There would be no changes to bus routes through the ward once the new road opens, and no discernible change to bus journey times.

Rail

There would be no discernible change in local access times to Gravesend station and no change to the rail services there either.

5.5 Footpaths, bridleways and cycle routes

Existing situation

Riverside ward is a largely suburban ward bordering the Thames to the north, with a network of footpaths that connects it to Higham, Shorne and areas south of the A2. For other potential impacts, see the other sections in this chapter, such as Visual and Noise and vibration.

5.5.1 Construction

Construction impacts

Due to the construction activities in this ward, there would be minor disruptions during the construction period:

- Footpath NG2 (which also shares a route with Sustrans NCR 1 cycle route) would be affected for less than a month by utility works in Chalk ward that are necessary to provide power to the Milton Compound (see chapter 4).
- Cycle lanes along the A226 would be affected during the first year of construction while the haul roads to the construction compounds are built in neighbouring wards. During this period, the A226 would be subject to traffic management (see chapters 2, 3 and 4).

5.5.2 Operations

Operational impacts

Overall, the proposals for walking, cycling and horse riding include more than 46km of new, diverted, extended or upgraded footpaths, bridleways and cycle routes. These would provide greatly improved connections across the project. We developed our proposals after consultation and engagement with local communities and stakeholders. For an overview of the proposed improvements to footpaths and bridleways across the Lower Thames Crossing, see chapter 2 of the Operations update.

Within Riverside, there would be no permanent changes to footpaths, bridleways or cycle routes once the project is operational.

Figure 5.11: Footpaths, bridleways and cycle routes in the vicinity of the project in Riverside ward

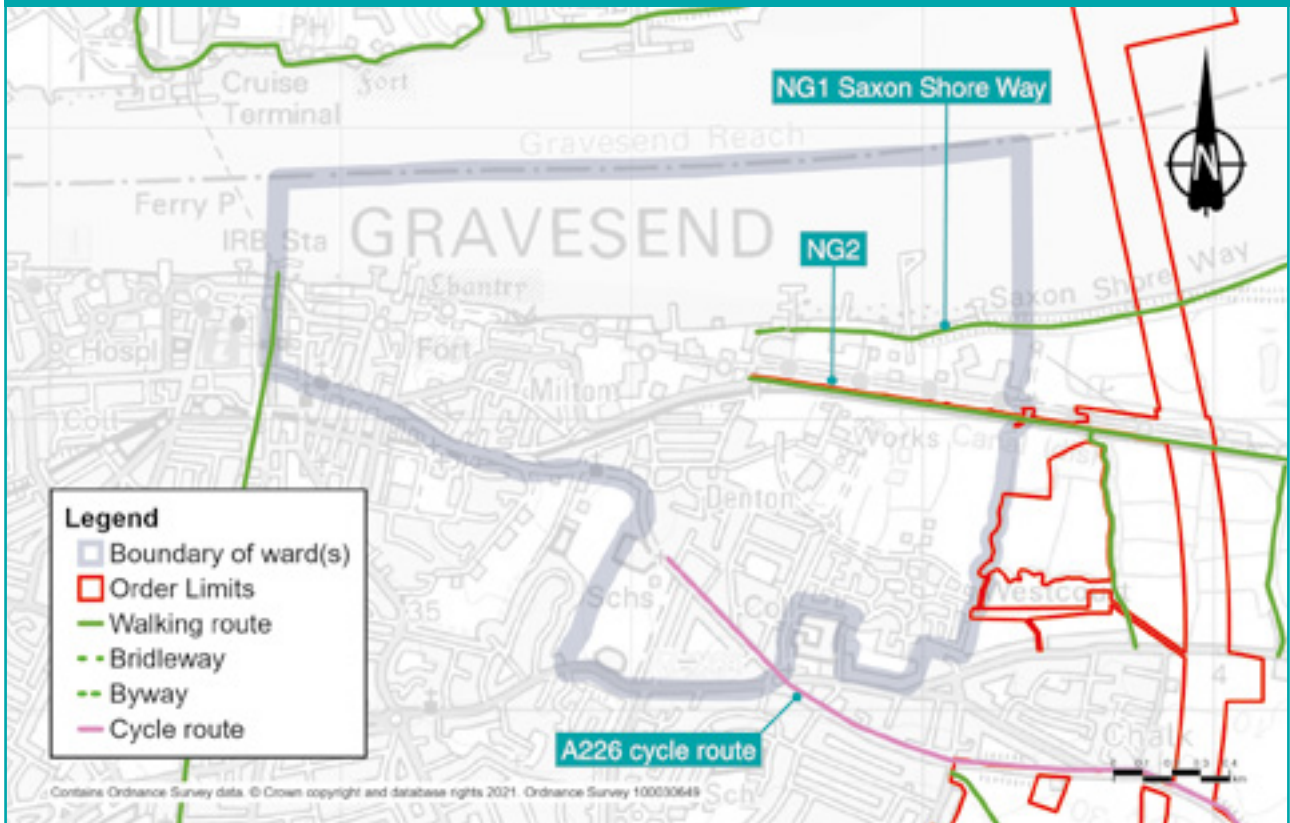
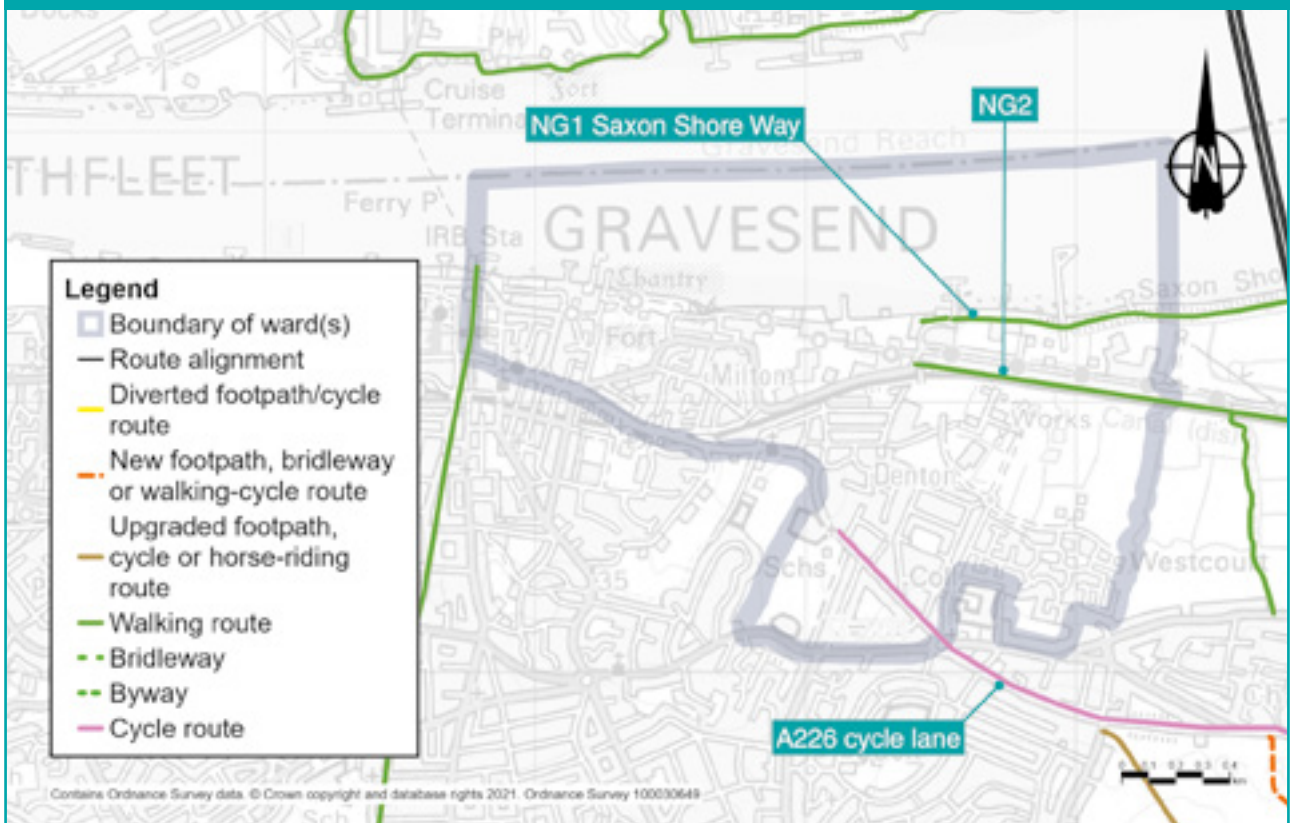


Figure 5.12: Proposed footpaths, bridleways and cycle routes in Riverside ward



5.6 Visual

Existing situation

More information about how the area would look during construction, including construction visualisations, can be found in the Construction update.

Views towards the land on which the project would be built from the main populated area are mostly limited to those experienced from a small number of homes on the eastern edge of the ward, in Denton, Gravesend.

Other views are from National Cycle Route (NCR) 1 and the public footpath along the towpath of the disused Thames and Medway Canal. There are also views towards the project north of the Thames from Saxon Shore Way long-distance footpath.

Current views towards the land on which the project would be built from properties along Cricket Marsh Walk and Malthouse Field look across flat arable land. From NCR 1 and the Thames and Medway Canal towpath, there are intermittent glimpsed views south-east towards the project, beyond the canal and the adjacent railway vegetation, encompassing wasteland, flat pasture and arable fields, seen against a distant backdrop of the Gravesend urban area. Views along the disused canal and neighbouring railway corridor are flanked to the north by industrial development.

From Saxon Shore Way long-distance footpath, there are expansive views over the Thames Estuary to Tilbury Docks and Tilbury Marshes on the north bank of the river and gently rising ground beyond.

5.6.1 Construction

More information about how the area would look during construction can be found in the Construction update, including construction visualisations. The main construction activities likely to give rise to visual effects in this ward are:

- establishing and operating the Milton Compound
- establishing and operating the Southern Tunnel Entrance Compound
- temporary drainage works
- landscaping of Tilbury Fields recreational area on the other side of the Thames near the northern tunnel entrance

More information about construction activities in this ward are provided in the Project description section above and in adjacent ward chapters. Views of construction activities would be mostly seen from a small number of homes on the edge of Denton, comprising temporary drainage works that are visible to the east in Chalk ward.

From NCR 1 and Thames and Medway Canal towpath, there are likely to be views towards the Milton Compound. From Saxon Shore Way long-distance footpath, landscaping in front of the northern tunnel entrance and its compound would be clearly visible north of the Thames.

Measures to reduce visual impact during construction

Given the limited views of the project from this ward, no specific mitigation measures are considered necessary. The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC.

5.6.2 Operations

By the opening year, the new road would be within the tunnel near to this ward and the Milton Compound would have been restored to agricultural use. The proposed landscaping in front of the northern tunnel entrance would form a new backdrop feature to the Thames, east of Tilbury Fort. With the project route in a tunnel, there would be no visual impacts from the edge of the Denton residential area, NCR 1 or the Thames and Medway Canal towpath. The most noticeable change would be the new landscaped recreational area on the north bank of the Thames, forming a new landmark feature in views across the river from Saxon Shore Way.

Measures to reduce the visual impact during operation

Restoring the land used during the construction period once works are completed would be the main mitigation for this ward.

5.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Riverside ward is mainly characterised by traffic noise, with a contribution from railway noise and occasional maritime noise on the Thames and other activity. The main sources of traffic noise in this ward are from the A226 and the B261.

As part of our environmental assessment process, the nearest surveys of background noise have been carried out in the adjacent wards of Westcourt and Chalk because the nearest construction works would be 700 metres away, and the nearest operational impacts would be from the southern tunnel entrance about 1.2km from the ward boundary.

To understand how noise levels would vary with and without the project, we used noise modelling to predict what noise levels would be like in the new road's proposed opening year if it was not built. We modelled this because we cannot assume that noise levels when the project opens would be the same as they are now. For example, our assessment of the opening year noise levels takes into account predicted changes in traffic levels.

We also modelled the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the opening year if it were implemented.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 74 dB(A)² during the day and from 29 to 60dB(A) during the night-time period at identified locations in this ward. As such, our noise assessments predict that by opening year noise levels would increase compared to the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

5.7.1 Construction

Daytime construction noise impacts

The main construction activities that are expected to make noise and vibration in this ward would be those associated with construction works at Milton Compound (in Chalk ward), specifically vehicle movements.

There are no main works compounds or Utility Logistics Hubs currently proposed for Riverside ward, nor any haul roads.

Although not located in the ward, the A2 West Utility Logistics Hub and Shorne Ifield Road Utility Logistics Hub (see chapter 9) may contribute to the noise impacts experienced in Riverside due to how close it is to the ward boundary.

No percussive or vibratory works are proposed in the ward.

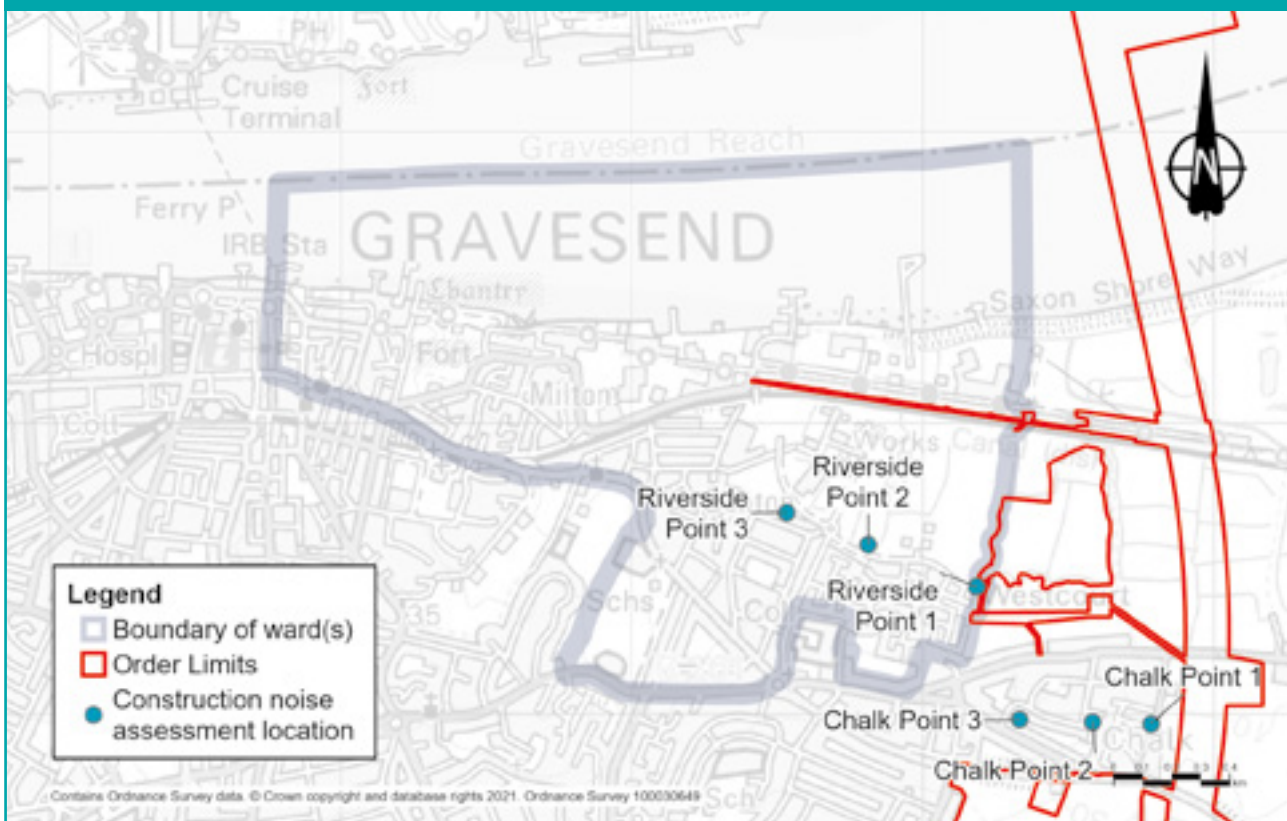
² Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that account for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90dB(A), which is how it would sound by a busy road. See chapter 1 for more information about decibel levels.

Construction noise levels have been predicted at three locations across Riverside, chosen to provide a representative level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using the standard units for major projects, dB LAeq (12-hour), which represent the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

Figure 5.13 below shows the locations at which we have predicted the daytime construction noise during the project's construction period.

Figure 5.13: Construction noise assessment locations in Riverside ward



Each vertical bar in figure 5.14 shows the predicted noise levels for that month of the construction period (from month 1 to 72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce it.

The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance with additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 5.14 the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 26 to 46dB LAeq (12-hour). Levels would exceed current background daytime noise level for about 22 months. However, they would not breach the defined threshold.
- At point 2, construction noise levels are predicted to range from 24 to 40dB LAeq (12-hour). Levels are not predicted to exceed the current background noise levels.
- At point 3, construction noise levels are predicted to range from 21 to 37dB LAeq (12-hour). Levels are not predicted to exceed the existing background noise levels.

Figure 5.14: Construction noise by month for assessment locations 1, 2 and 3 in Riverside ward

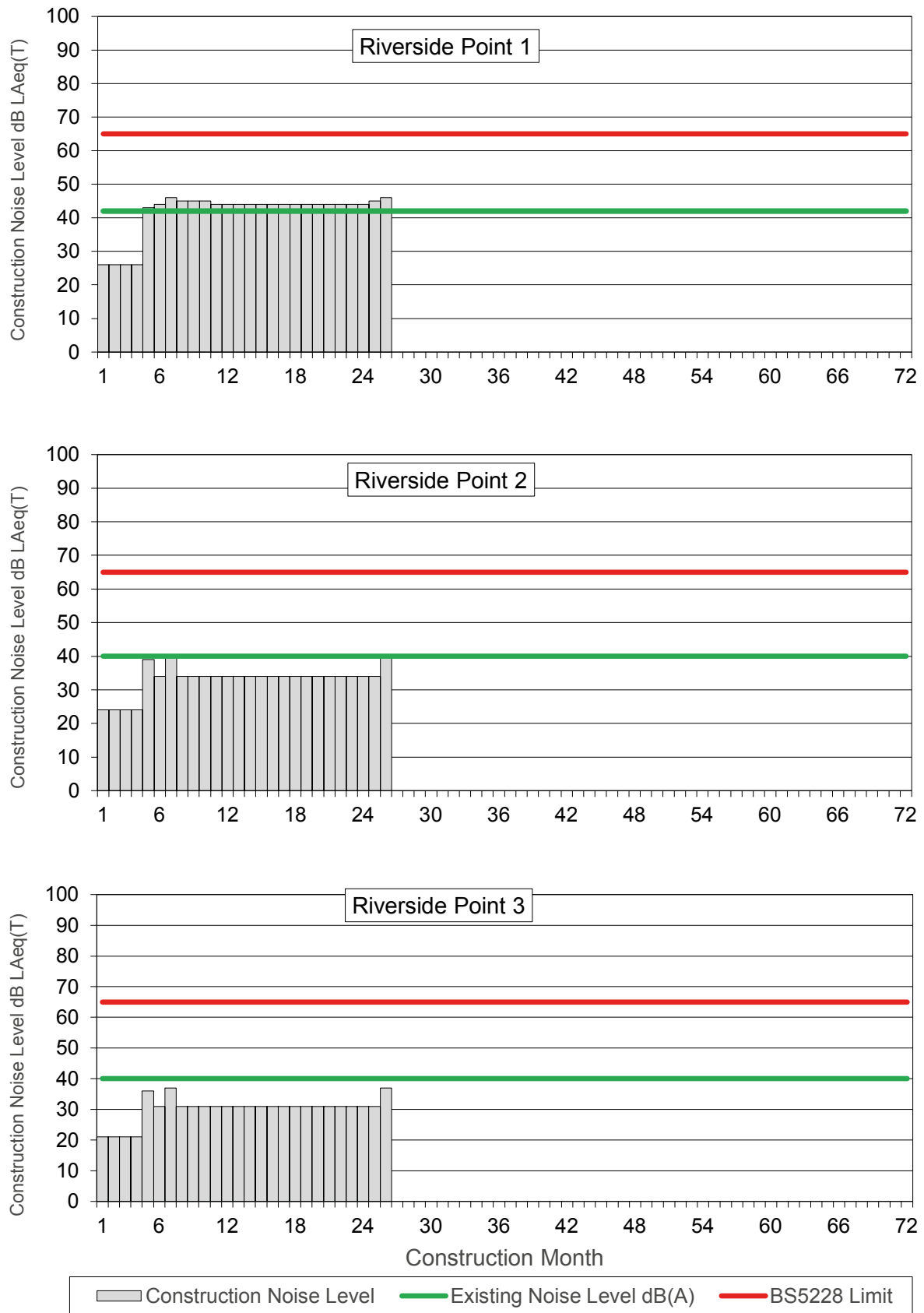
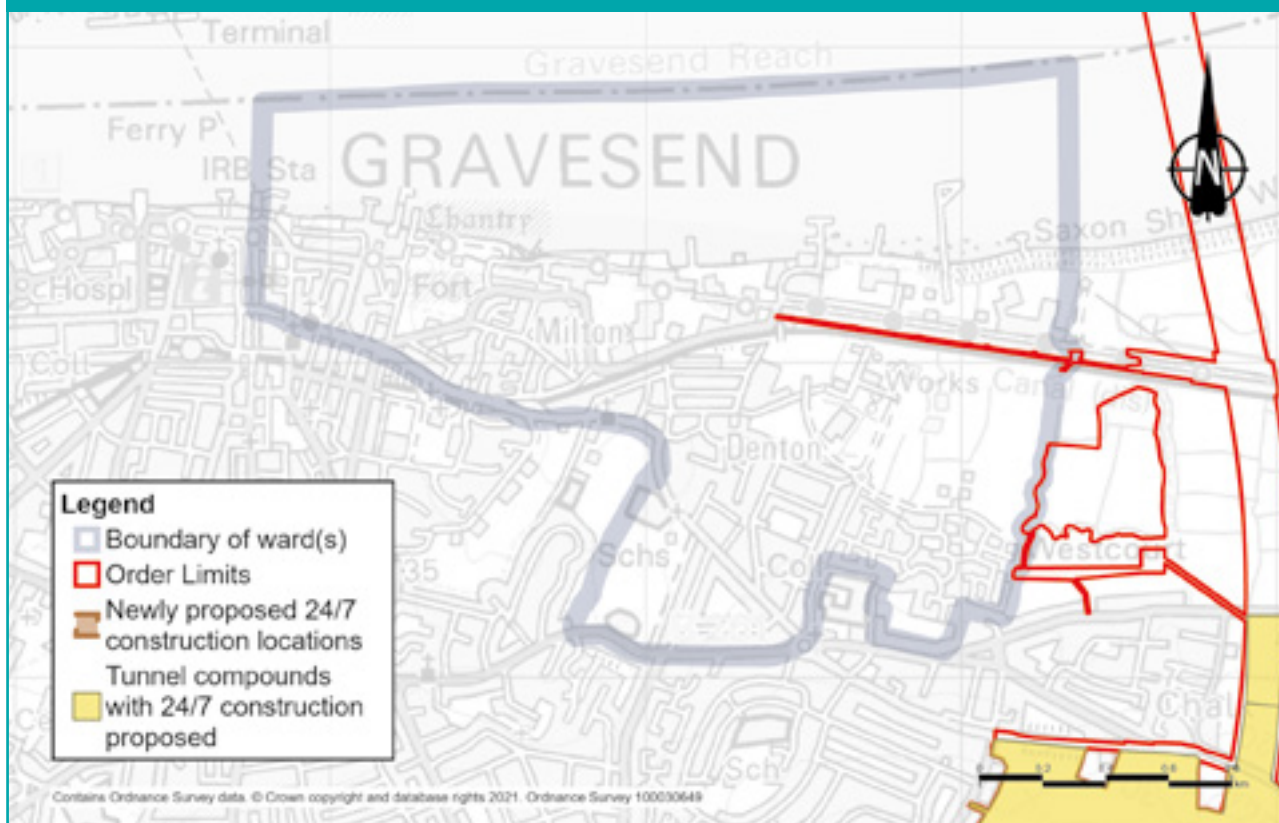


Figure 5.15: Newly proposed and tunnel 24/7 working locations in Riverside ward



24/7 construction working

In addition to the changes to the daytime noise impacts presented in the section above, 24-hour seven-day construction working is proposed at the locations shown in figure 5.15 above.

Construction traffic noise impacts

Maps showing the predicted change in road traffic noise on roads in Riverside ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors in the ward are likely to experience), during the construction period there would be negligible changes in traffic noise (less than 1dB change in noise levels) during all construction years. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce construction noise and vibration

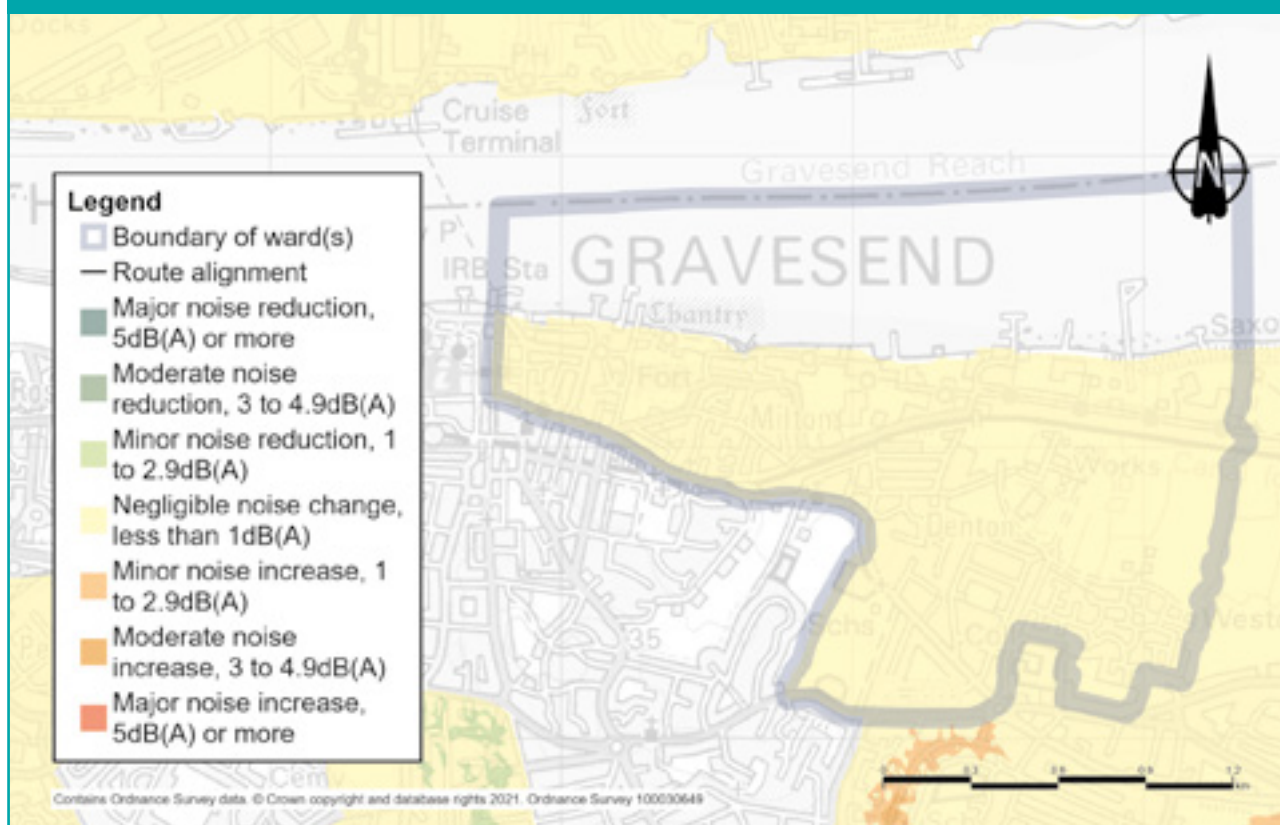
Construction noise levels would be controlled by using Best Available Techniques (BAT), with specific measures at certain locations such as:

- Installing and maintaining hoardings around the construction compounds.
- Installing temporary acoustic screening around construction areas likely to generate noise.
- Keeping site access routes in good condition with onsite condition assessments to inspect for defects such as potholes.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant so loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular power generators and pumps.
- No music or radios would be played for entertainment purposes outdoors onsite.
- Site layout would be planned to make sure reversing is kept to a practicable minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce noise from vehicle reversing warnings.
- Non-percussive demolition techniques would be used where possible to reduce noise and vibration impact.
- Careful consideration of compound location and layout to separate noise-generating equipment from sensitive receptors, and the use of mains electricity rather than generators, where possible.
- Minimisation of construction vehicle traffic, where possible, by selecting local suppliers along the project route, using local workforces and reducing the transport of material for earthworks construction.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where necessary.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction period.

Figure 5.16 Noise impacts during operation in Riverside ward



5.7.2 Operations

Operational noise impacts

Riverside ward is approximately 1.2km to the north-west of the main project route and, as such, there would be no direct noise impacts from the project in the ward.

Figure 5.16 above shows the predicted changes in traffic noise in the opening year of the new road. Within the ward, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to be negligible (less than 1dB). For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce traffic noise and vibration during operation

There would be no mitigation measures needed in this ward.

5.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Riverside, the A226 has been declared an Air Quality Management Area (AQMA) due to yearly levels of airborne pollution being above accepted standards. AQMAs are identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas in the ward have been identified as AQMA.

5.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions. In this ward, there are only a few properties within 200 metres of the worksite, including those to the north-eastern side of Denton and near Wharf Road. Air quality impacts on these properties during construction would be temporary and we would put measures in place to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven effective when used on similar construction projects. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a minor worsening in air quality in the area around the B261 Old Road East as a result of traffic management from 2024 to 2027. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts of construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

5.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

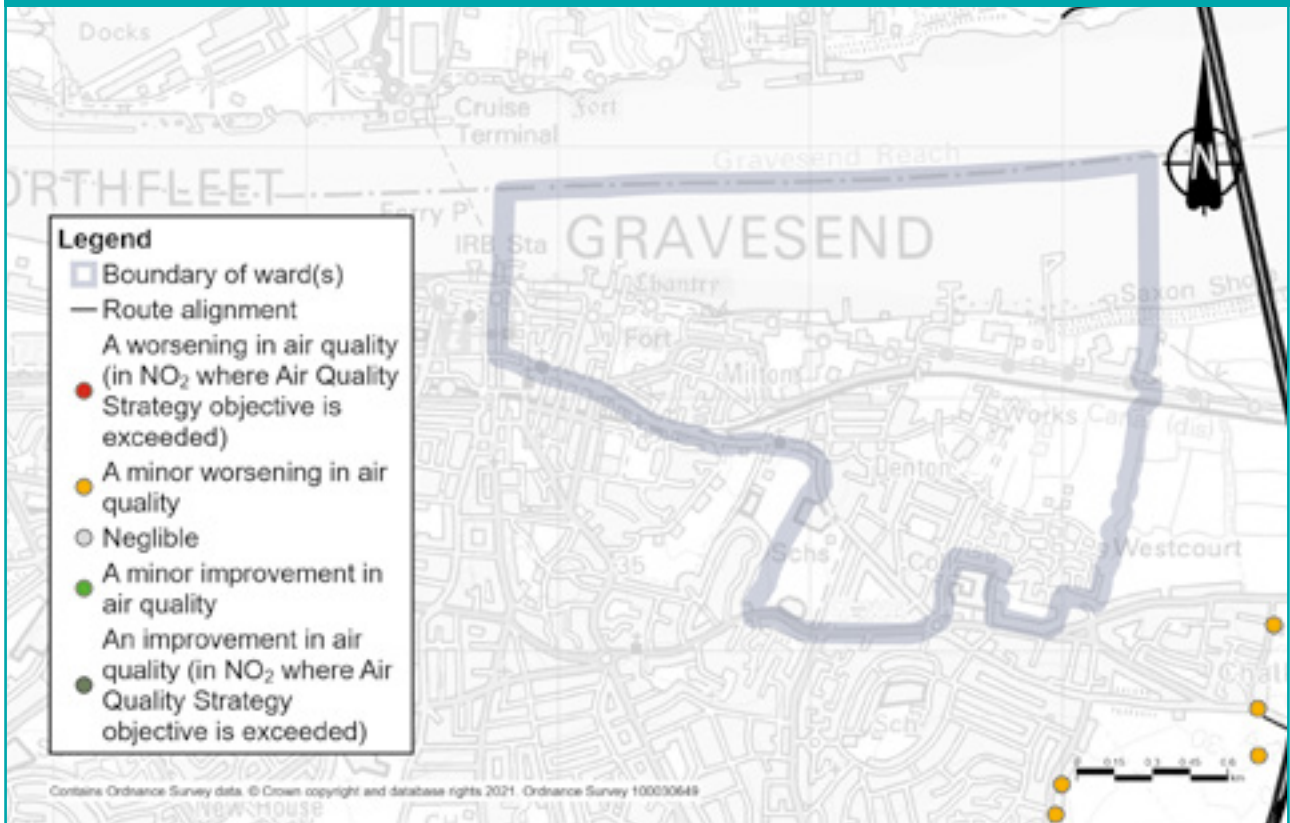
There are no receptors (properties or habitats that are sensitive to changes in air quality) modelled in the Riverside ward. However, there are receptors in Chalk ward close to the eastern side of Chalk, Lower Higham Road and Church Lane. The highest modelled yearly average NO₂ (the main traffic-related pollutant³) concentration in this ward is 18.7µg/m³, which is well below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area as a result of the new road would not trigger the need for monitoring or other mitigation measures once it is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

Figure 5.17: Predicted changes in NO₂ levels within Riverside ward once the new road is open



5.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health and different groups may be more sensitive to these, for example, children, older people or those with pre-existing health conditions.

Riverside ward is characterised by a slightly younger population than Gravesham as a whole and nationally, with a higher proportion of children aged under 16 (25.9% compared with 22.4% for Gravesham and 20.3% for England). The ward also has an ethnically diverse population, with a large proportion of asian and black residents, 17.3% and 6.1% respectively.

Deprivation rates are high in the ward. Two areas are in the top 20% most deprived in the whole of England according to the English Index of Multiple Deprivation. The remaining two areas are in the top 40% most deprived. Economic activity is correspondingly low when compared with Gravesham as a whole. Home ownership levels are also low (44.7% own their own home), with most of the rest (28.8%) in private rented accommodation.

Around 83% of residents report their health to be very good or good (slightly higher than for Gravesham as a whole). A lower proportion of residents say that their day-to-day activities are limited a lot or a little because of a long-term health problem or disability (14.8%). Life expectancy at birth for residents of Riverside is 76.8 for men and 82.7 for women (which are both lower than UK average life expectancy recorded for 2013-2017 of 79.4 years for men and 83.1 for women).

5.9.1 Construction

Construction health impacts

Information about construction works affecting Riverside ward can be found in the Project description section above. Elements of each of these activities have the potential to affect people's health, whether this is through noise associated with construction activities or traffic, changes to air quality (through dust emissions), potential severance caused by construction traffic, or through impacts on mental health and wellbeing.

Riverside ward residents may experience negative effects on health as a result of:

- Temporary closures to the local footpath network to the east of Riverside. This may affect residents' ability to visit open spaces, particularly those without access to private cars and who may not be able to reach alternative venues within a reasonable travel time.
- Increased dust and emissions from nearby construction activities and potential deterioration in air quality. These may affect a small number of properties within a 200-metre buffer (situated in the north-eastern side of Denton and near Wharf Road).
- Stress and anxiety relating to construction.
- Increased traffic noise from construction traffic on public roads and nearby haul roads. However, this would be controlled through the CoCP and the package of traffic management measures.
- Views of construction activities, which would be mainly limited to a small number of homes on the edge of Denton. From NCR 1 and Thames and Medway Canal towpath, there are likely to be views of Milton Compound, and from the Saxon Shore Way long-distance footpath the proposed new landscaping near the northern tunnel entrance would be clearly visible north of the Thames.

Some residents may experience health benefits through access to work and training opportunities presented by construction activities.

5.9.2 Operations

Operational health impacts

Residents in Riverside may experience both positive and negative health outcomes once the new road opens. These could include:

- The project would improve access to jobs and training.
- Improvements in access to open space, with the newly created Chalk Park (see chapters 6 and 7) providing residents with a new landscaped recreational space, including footpaths, which could encourage increased physical activity.

Measures to reduce negative operational health impacts

We have not identified any essential mitigation to address health outcomes over and above the measures relating to noise and visual impacts described elsewhere.

5.10 Biodiversity

Existing situation

Only a small area of Riverside falls within the Order Limits. It is a small road to the north of the Thames and Medway Canal with no habitat. Riverside ward contains one designated site, the South Thames Estuary and Marshes Site of Special Scientific Interest, and one non-designated site, the Canal and Grazing Marsh Local Wildlife Site. For information about marine biodiversity, see chapter 7 of the Construction update.

We carried out surveys across the project to understand the existing situation, and these identified the presence of one protected species in this ward, water vole, within the Thames and Medway Canal.

5.10.1 Construction

Construction impacts

None of the designated and non-designated sites listed above would be directly affected by the project and we would not need to remove any habitat. Disturbance from construction traffic using the road to the north of the canal is possible. However, it already adjoins a busy industrial unit and gravel workings.

Measures to reduce biodiversity impacts during construction

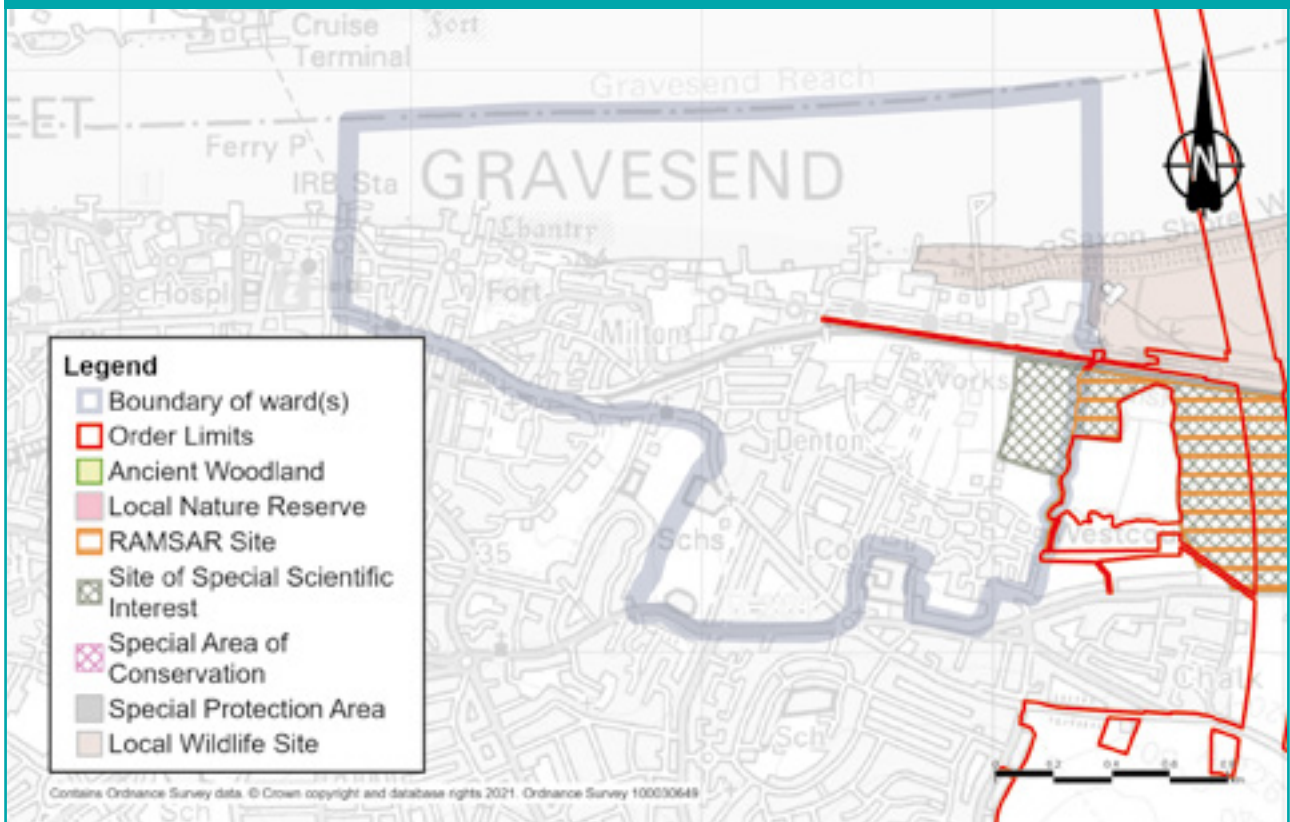
The road would be used to access a small compound, and traffic would be minimised during the construction period to limit disturbance to the surrounding habitat.

5.10.2 Operation

Operational impacts

The new road is unlikely to cause disturbance as the southern tunnel entrance is located more than 1km from Riverside ward. We do not expect any operational impacts.

Figure 5.18: Designated and non-designated biodiversity sites in Riverside ward



5.11 Built heritage

Existing situation

Two scheduled monuments, two conservation areas, 19 listed buildings, and four structures of historical relevance have been identified in Riverside ward in relation to the project. Five of the listed buildings are Grade II* listed and 14 are Grade II listed.

Scheduled monuments

Gravesend Blockhouse, a scheduled monument of high heritage value, is located on Royal Pier Road around 1.4km south and west of the project. This Tudor fortification protected the town for many centuries, although only the partially uncovered foundations of a section remain. The structure forms part of a series of shoreline defences along the Thames which include New Tavern Fort to the east. It also lies within the Riverside conservation area.

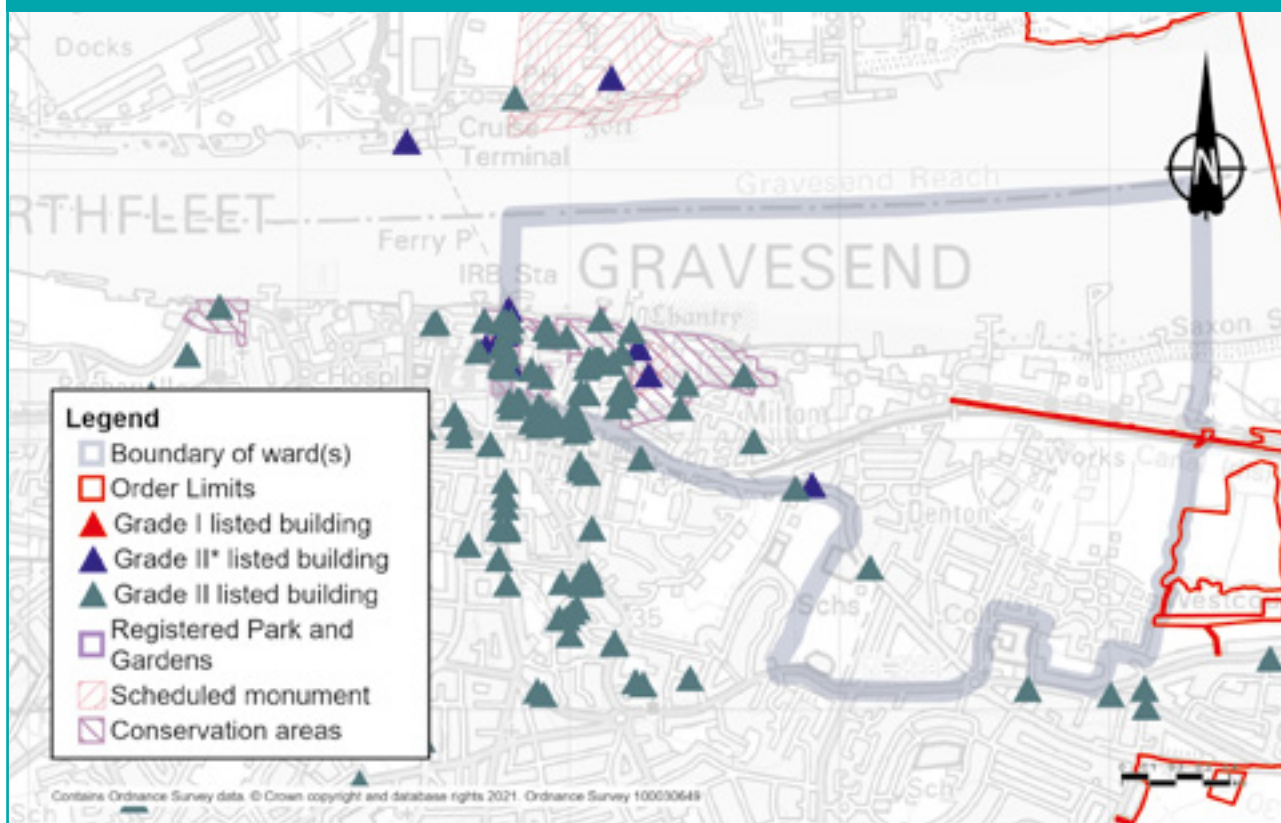
New Tavern Fort, including Milton Chantry, is a scheduled monument of high heritage value. It is situated on the southern bank of the Thames, around 1km west of the project. The structure also forms part of a series of shoreline defences along the Thames. The fort is a Grade II* listed building and is located within the scheduled area, along with the Grade II* listed Milton Chantry. This was used as a 14th century leper hospital, a chapel, public house, Georgian barracks and WWII gas decontamination chamber. It also lies within the Riverside conservation area. New Tavern Fort originally dates to the 1780s but most of the surviving remains date from the 19th and 20th centuries.

Conservation areas

High Street and Queen Street conservation area lies within the historic centre of Gravesend in Kent. It extends to St Andrew's Gardens in the east, Prince Street in the west, the Town Pier in the north and includes the full length of the High Street down to King Street in the south. It includes several listed buildings.

Riverside conservation area includes the Thames south bank riverfront, from the entrance to the Canal Basin in the east to St Andrew's Gardens in the west. It contains several listed buildings along the historic residential streets of Clarendon Road, Royal Pier Road, Commercial Place and the Royal Pier, along with parts of The Terrace and Canal Road. It also includes two scheduled monuments and the Gordon Recreational Ground.

Figure 5.19: Built heritage in Riverside ward



Grade II* listed buildings

- New Tavern Fort (within New Tavern Fort scheduled area)
- Milton Chantry (within New Tavern Fort scheduled area)
- The Town Hall
- The Town Pier
- Church of St Peter and St Paul
- St Mary's Church
- Thames House
- St Andrew's Arts Centre
- 3 and 3A, High Street
- 4 and 5, High Street
- The Mission House
- Three Daws public house
- The Kent Public House
- The Royal Clarendon Hotel and 1-4 Royal Pier Mews
- Two K6 telephone kiosks outside the Old Town Hall
- The Royal Terrace Pier, including the pavilions flanking the entrance
- Statue of General Gordon
- Barrelled Lock Chamber, Sea Walls, Swing Bridge, Locks and Canal Basin
- Milton War Memorial

Buildings/structures of historic relevance

- Wharf, Gravesend
- Two concrete platforms near the National Maritime Training Centre
- Thames and Medway Canal
- North Kent Line railway

5.11.1 Construction

Construction impacts

Our construction activities include setting up and operating the Southern Tunnel Entrance Compounds, A226 Gravesend Road Compound and Milton Compound (the closest to the ward immediately to the east). However, all three would be outside of the ward boundary. Construction traffic along the A226, Ordnance Road/Canal Road/Norfolk Road would result in a temporary increase of noise. Further details of construction activities affecting Riverside ward are provided in the Project description section.

There would be no physical impacts to built heritage. The scheduled New Tavern Fort and its associated listed buildings would experience additional noise from construction traffic on Ordnance Road/Canal Road to the south-east. The North Kent Line railway and Thames and Medway Canal would experience a temporary change to setting (the surroundings in which a heritage asset is 'experienced') with the adjoining Milton Compound. The setting of Riverside conservation area would also experience a slight temporary impact from visual and audible construction activity.

Measures to reduce impacts during construction

The design and layout of A226 Gravesend Road and Milton Compounds would take in to account the setting of heritage assets and seek to avoid or minimise light glare, light spill and light pollution during night-time construction. The A226 Gravesend Road Compound in Chalk ward is one area where 24/7 construction activities would take place and we would put mitigation measures in place above and beyond Best Practice Measures. More information can be found in the Design principles (section S326). Good practice measures, including dust and noise reduction, are also relevant in mitigating the setting of heritage assets. Refer to the Air quality, Noise and vibration, and Cultural heritage sections of the REAC for more information.

5.11.2 Operations

Operational impacts

There would be no anticipated effects on built heritage in Riverside ward once the project is operational.

5.12 Contamination

A review of historical maps and environmental data has shown no known medium or high-risk sources of contamination would be at risk of disturbance during construction or operation of the new road in Riverside ward.

5.12.1 Construction

By following a construction management plan and making sure that where potential sources of contamination are used (for example, oils, lubes, mechanical plant), appropriate spill containment and emergency response procedures are in place to prevent adverse environmental impacts.

5.12.2 Operation

There would be no elements of the completed project in this ward, so no risk of contamination during its operation.

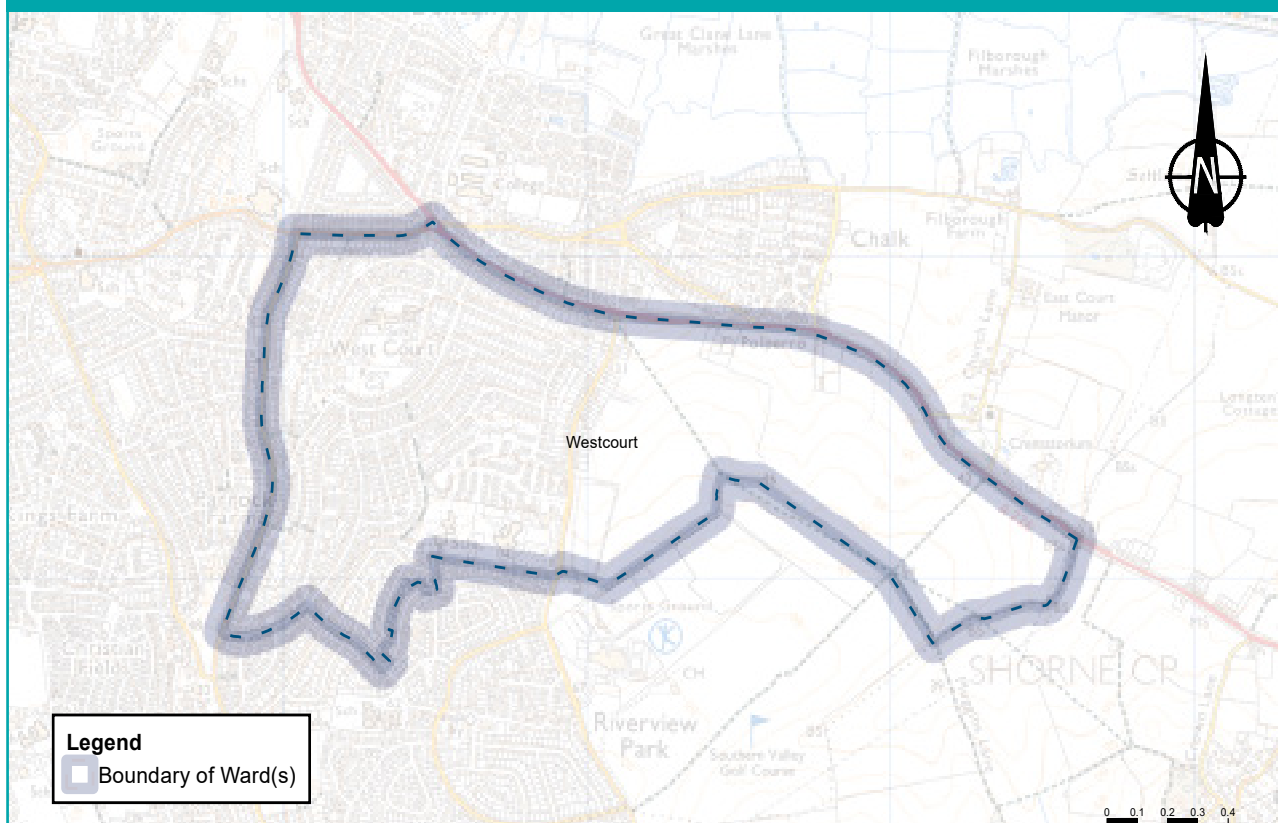
6

Chapter 6: Westcourt ward

This chapter summarises the activities in Westcourt ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on local communities. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and the Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 6.1: Ward boundary map for Westcourt ward



6.1 Overview

6.1.1. About this ward

Westcourt ward is located to the south of the River Thames in the borough of Gravesham. It lies north of Riverview ward, south of Chalk ward, and to the west of Shorne, Cobham and Luddesdown ward. Westcourt ward has an area of around 2km² and an estimated population of 7,039¹. The ward consists of a residential area to the east of Valley Drive, and there is also an area of agricultural land to the east of Thong Lane. There are footpaths that pass through the agricultural land to the east of the ward.

¹ Office for National Statistics, 2018 ward-level population estimate.

6.1.2 Summary of impacts

Table 6.1: Summary of impacts during the project's construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>Construction traffic accessing the compounds would use the A226 (Higham Road), leading to slower journey times along the A226. Temporary lane closures would also lead to slower journey times along the A226 for short periods.</p> <p>Mitigation</p> <p>The impact of the construction process would be mitigated in several ways, including: by reducing the volume of HGV journeys needed for construction; avoiding the long-term closure of the A2/M2; and avoiding the use of local roads for construction vehicles with the exception of the A226 Gravesend Road. For details of all the mitigation measures for Westcourt ward, see the Traffic section of this report.</p>	<p>Impacts</p> <p>There would be only very slight changes predicted in traffic levels on roads within the Westcourt ward following the opening of the project. To see maps showing the changes in traffic flows within the ward, see the Traffic section of this chapter.</p> <p>Mitigation</p> <p>During the design refinement process, a proposed new junction between the A226 and the project was removed due to the negative impact that it would have had on the local area, including Westcourt. Further information on the mitigation to reduce the impacts of the project once it is operational is in the Traffic section of the chapter.</p>
<p>Public transport</p>	<p>Buses</p> <p>Due to the impacts on journey times along the A226, bus services along the A226 Higham Road may experience delays during the construction period.</p> <p>Rail</p> <p>Access to Gravesend station from Westcourt ward would not be affected during construction, nor would rail services from that station.</p>	<p>Bus</p> <p>No route changes are required once the project is operational and no discernible changes to journey times are predicted.</p> <p>Rail</p> <p>There would be no impacts on services at Gravesend station and there are no predicted changes to access times to the station.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>Two footpaths would be affected by construction of the new road and the southern tunnel entrance during construction and would need to be closed for five-and-a-half years.</p> <p>Mitigation</p> <p>Closure of the footpaths would be kept as short as possible to reduce the impact on the local public right of way network. There is no mitigation proposed for the construction phase. New routes would be implemented once the Southern Tunnel Entrance Compound is no longer required.</p>	<p>Impact</p> <p>Existing alignment of two footpaths would be divided by the new connecting road.</p> <p>Mitigation</p> <p>New alignments would connect to the existing public right of way network in the area, including through the new Chalk Park recreational area.</p>
<p>Visual</p>	<p>Impacts</p> <p>Views towards construction activities and the Southern Tunnel Entrance Compound would be limited to the eastern part of the Westcourt ward, from homes and the sports field on Thong Lane, and footpaths in the east.</p> <p>Mitigation</p> <p>A temporary earth bank on the boundary of the Southern Tunnel Entrance Compound would screen views on Thong Lane and Rochester Road. Taller compound facilities would be located as far away as possible from homes within the compound.</p>	<p>Impacts</p> <p>Once the project is complete and in operation, the main changes in views would include the edge of the southern tunnel entrance set within the new Chalk Park and of a new sub-station near Rochester Road.</p> <p>Mitigation</p> <p>Views of the new road and traffic would be hidden by planting and within the tunnel or tunnel approach cutting.</p> <p>There would be new planting and the creation of Chalk Park, which would soften views and integrate the new road into the surrounding landscape.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with the southern tunnel, main alignment and utilities work is expected to create noise and vibration in this ward. There would also be 24-hour, 7-day construction working. There would be negligible changes in noise from road traffic for a majority of roads within this ward during the construction period, except along St Aidan's Way, Hampton Crescent and Brown Road where minor increases in noise levels have been predicted.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through the mitigation measures set out in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>Residents of Westcourt are likely to experience increased levels of noise as a result of the new road near to the southern tunnel entrance in the east of the ward. Noise levels would also increase from existing roads due to the changes in traffic flow, speed and vehicle type.</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on all new and affected roads. Acoustic screening (noise barriers) has been incorporated into the design where necessary.</p> <p>The design of the new road and tunnel entrance/exit has been kept low in the environment (this controls the noise).</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>There is likely to be dust and emissions from construction equipment and traffic during the construction phase. Our analysis of the construction traffic predicts that there would be a minor temporary worsening in air quality on a section of the B261 Old Road East between 2026 and 2027, and a minor temporary improvement in air quality on Valley Drive during 2024 as a result of traffic flow changes.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures to minimise the dust, which are presented in the CoCP and REAC. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>No essential mitigation is required.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenities as a result of road and footpath closures.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to dust emissions, working hours and visual screening, traffic management measures and community engagement. This includes establishing Community Liaison Groups.</p>	<p>Impacts</p> <p>The project would improve access to work and training, and access to open space and accessibility of local resources and amenities. Chalk Park would provide a new recreational resource and encourage physical activity.</p> <p>There may be impacts on mental health and wellbeing as a result of the project, such as anxiety around perceived changes to air quality or as a result of changes to the noise environment.</p> <p>Mitigation</p> <p>No essential mitigation is required for health other than those measures described in the noise mitigation section.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project would involve the removal of areas of habitat, both temporarily and permanently for the new road. It would cause some habitats to become fragmented.</p> <p>Mitigation</p> <p>Vegetation clearance would be carried out in winter to avoid impacting breeding birds. Protected species would be relocated, carried out under a Natural England licence.</p>	<p>Impacts</p> <p>There would be some minor noise disturbance on ecological features from the operation of the project within this ward.</p> <p>Mitigation</p> <p>The land used for the Southern Tunnel Entrance Compound would be returned to agricultural use. Chalk Park would be created which would include areas of woodland and species rich grassland, a more diverse habitat than returning to farmland. The new road would be in a cutting north of the A2/M2, which would reduce the noise impacts.</p>
<p>Built heritage</p>	<p>Impacts</p> <p>There would be visible construction activity with noise and lighting in the vicinity of built heritage assets.</p> <p>Mitigation</p> <p>The design and layout of the Southern Tunnel Entrance Compound would take into account the setting of heritage assets (the surroundings in which a heritage asset is 'experienced'), and avoid light glare, light spill and light pollution during night-time construction (Design Principle S326).</p>	<p>Impacts</p> <p>The built project would change the setting of an undesignated heritage asset known as 'Polperro', which has a low heritage value. The new road is unlikely to change the setting of any heritage assets in this ward.</p> <p>Mitigation</p> <p>The Southern Tunnel Entrance Compound would be reinstated after construction to reflect existing field patterns and the surrounding landscape character as outlined under Design principle S3.05.</p>

Topic	Construction	Operations
<p>Contamination</p>	<p>Impacts</p> <p>There is a risk of accidental spills of oils, cement and fuels from the movement of construction traffic and the storage of materials. There is also the possibility for existing contamination from mobilised ground.</p> <p>Mitigation</p> <p>To reduce risk, the contractor would follow good practice construction measures. Where contamination is identified during ground investigation work, site-specific remediation would be carried out following consultation with the local authority.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>If during operation any incident were to occur which resulted in localised contamination, soils which had become significantly affected would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters.</p>

6.2 Project description

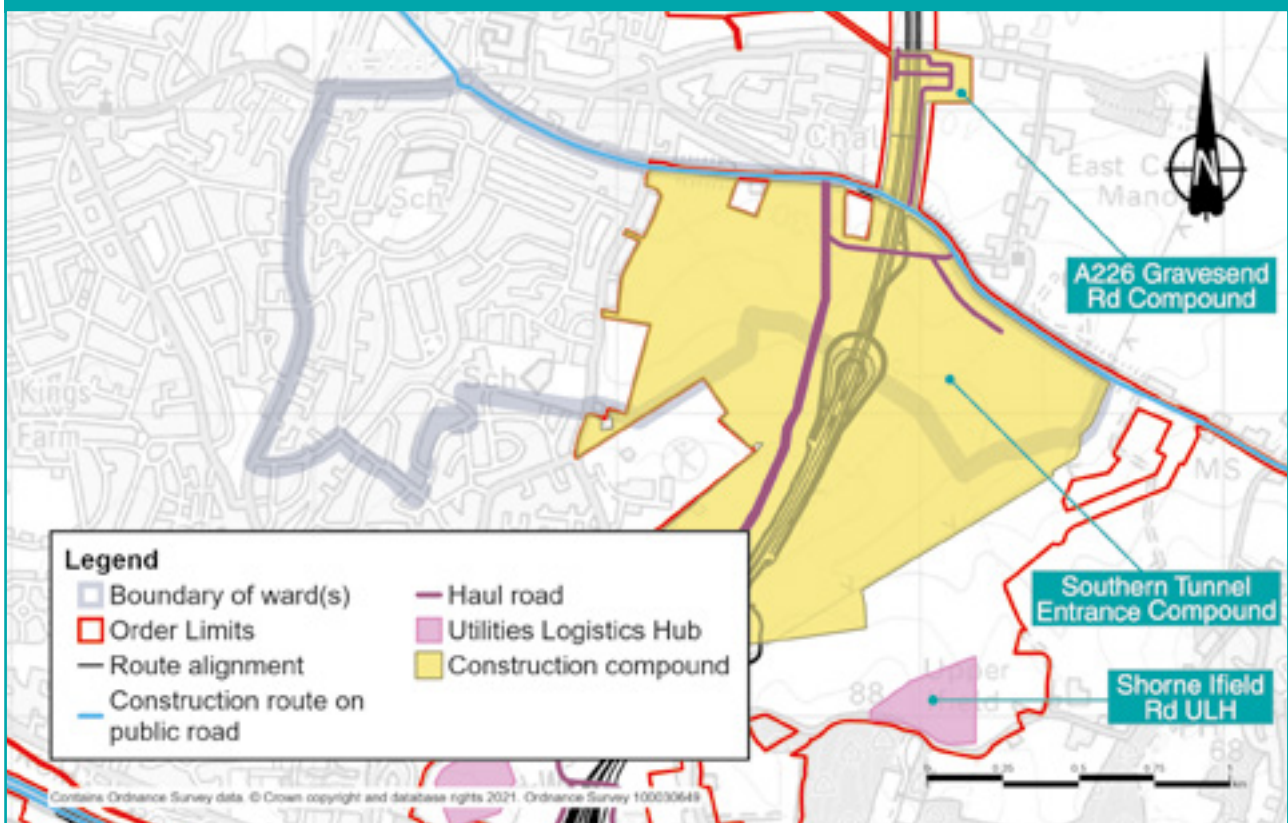
6.2.1 Construction

Construction activities

Works within Westcourt ward would largely relate to the construction of the southern tunnel entrance, as well as receiving the tunnel boring machines at the completion of the tunnel bores.

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

Figure 6.2: Main construction areas in Westcourt ward



Construction compounds

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

Much of the non-residential eastern part of Westcourt ward is within the Order Limits (the area of land required to construct and operate the project, also known as the development boundary) and this area of land would be inaccessible for most of the construction period. The land would be used to accommodate the Southern Tunnel Entrance Compound and a haul road. The entrance/exit to the Southern Tunnel Entrance Compound would be on the A226 on the northern boundary of the Westcourt ward, between Castle Lane and Church Lane. The haul road is a temporary road within the construction site, used for moving machinery and materials. The haul road would allow construction vehicles to travel off the public road network where possible.

The Southern Tunnel Entrance Compound would include offices, parking and areas to store equipment and materials. Building the compound would involve ground works, laying tarmac and the installation of perimeter fencing. The compound would be used to provide worker welfare and site support at the southern tunnel entrance location. This compound would be in place for the duration of the construction to help construct the two main tunnels and their approach. The tunnel entrance and its approach would involve massive earthworks, as well as the construction of major structures. Both this compound and the haul road would be decommissioned once construction is complete.

The vehicles going to the Southern Tunnel Entrance Compound and most of the vehicles going to the A226 Gravesend Road Compound and the Milton Compound would also use the A226 along the northern boundary of the Westcourt ward. Construction compounds outside the ward boundaries are shown in chapter 3 of the Construction update, and in the adjacent Ward impact summaries. The number of vehicles going to these three compounds is shown in table 6.2. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 6.2: Average daily vehicle numbers going to compounds in or near Westcourt ward

Time period	Southern Tunnel Entrance Compound		A226 Gravesend Road Compound		Milton Compound	
	HGVs	Cars	HGVs	Cars	HGVs	Cars
January to August 2024	30	77	13	21	10	10
September 2024 to February 2025	36	201	13	40	4	9
March to May 2025	39	201	11	40	2	6
June to October 2025	39	281	9	30	2	6
November 2025 to March 2026	39	335	4	14	1	6
April to August 2026	39	317	6	14	5	6
September 2026 to March 2027	39	358	5	20	5	6
April to November 2027	39	378	0	0	0	0
December 2027 to March 2028	39	310	0	0	0	0
April to July 2028	30	209	0	0	0	0
August 2028 to December 2029	8	25	0	0	0	0

Access to the A226 Gravesend Road Compound and the Milton Compound for HGVs would also be via the A226. Many of the staff cars to all three compounds would use the A226.

Utilities

There would be no Utility Logistics Hubs within Westcourt ward. Three sets of utility works would take place within the ward's north-east section and these are listed below. For more information about proposed utility works, see chapter 3 of the Construction update. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be repositioned to accommodate the new road.

- Diversion of a high-pressure gas main, around 2.7km in length, with the new alignment running from south of Riverview Park to the A226 Gravesend Road.
- Realignment of 400kV overhead power lines, around 1.8km in length, from south of the A2/M2 to the A226, requiring the removal and replacement of four pylons.
- Construction of a new primary substation and switchgear equipment south of the A226, and associated electricity cable networks. Temporary supplies to the compound would be required, plus permanent diversions and installations around the A226 and the south tunnel entrance.

Construction routes on public roads

The haul road within this ward would be reached via the A226 Gravesend Road, which runs along the northern boundary of Westcourt ward, and via the A2/M2 to the south. This construction route would be in use throughout the construction period from 2024 to 2029. Two compounds in neighbouring Chalk ward would also take deliveries from the A226, with vehicles arriving from the east before travelling along Lower Higham Road or using a proposed haul road through private land north of the A226.

Construction schedule

Construction of the whole project is scheduled to last for six years from 2024 to 2029. To deliver the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and programmes for the work to build the tunnel can be found in chapter 4 of the Construction update. Expected to start in early 2024, the main tunnelling works would continue until 2029. Construction of the tunnels would use two tunnel boring machines (TBMs), and would involve additional tunnel fit-out, earthworks and landscaping. The main road construction works would be carried out between early 2024 and early 2028. The works would also involve construction of the southern tunnel entrance and the deep cutting for the approach road. The busiest period of construction in Westcourt ward is expected to be from mid-to-late 2027 to mid-to-late 2028 for works on the approaches and structures, tunnelling works, tunnel fit-out and earthworks and landscaping.

Construction working hours

Tunnelling activities would be carried out 24/7 to improve safety and speed up the project's completion overall. Within the ward, above-ground tunnelling activities taking place 24/7 would include the breakthrough of the TBM into the southern tunnel entrance and the removal of the TBM. Most of the remaining works at the Southern Tunnel Entrance Compound would be during core hours from 7am to 7pm weekdays and 7am to 4pm on Saturdays, with additional repair and maintenance periods (if needed) from 8am to 5pm on Sundays. There are some circumstances, such as concrete-pouring work, where core construction hours may be extended. More information about working hours is set out in the Noise and vibration section below and in the CoCP.

Traffic management

The main traffic management measures within Westcourt ward are listed below.

Table 6.3: Main traffic management measures in Westcourt ward

Road(s) affected	Proposed traffic management	Purpose	Duration
A226 Gravesend Road	Lane closure and traffic lights	To facilitate the construction of access to the Southern Tunnel Entrance and the A226 Gravesend Road Compounds	9 months between September 2024 and May 2025
A226 Gravesend Road	Lane closure and traffic lights	To facilitate construction access and modifications to local utilities	4 weeks between January 2024 and August 2024

Lane closures would be required on the A226 to construct the access to the Southern Tunnel Entrance Compound and the A226 Gravesend Road Compounds, and for carrying out modifications to the local utility networks. This is expected to take around nine months early in the construction period. The affected stretch of road is 1.3km but the contraflow would operate over much shorter sections at a time. During the lane closures, a short section of road would be closed on one side, while the other side remains open. Access to the open side of the road from each direction would be controlled by temporary traffic signals.

While the compounds are in use, the access points to the compounds may require traffic signals to allow public traffic to be managed while construction traffic enters and leaves the compounds. It is proposed that the access into the Southern Tunnel Entrance Compound for HGVs would be off the A226 from the east via a left turn and only a right turn be allowed out of the site onto the A226 eastbound.

A ban on HGVs delivering materials and moving excavated material for the project would be in place on Thong Lane from the A226 to Vigilant Way. This would not affect other HGVs using these roads.

There would be traffic management measures outside Westcourt ward that would impact on traffic on the road network within the ward. We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

6.2.2 Operations

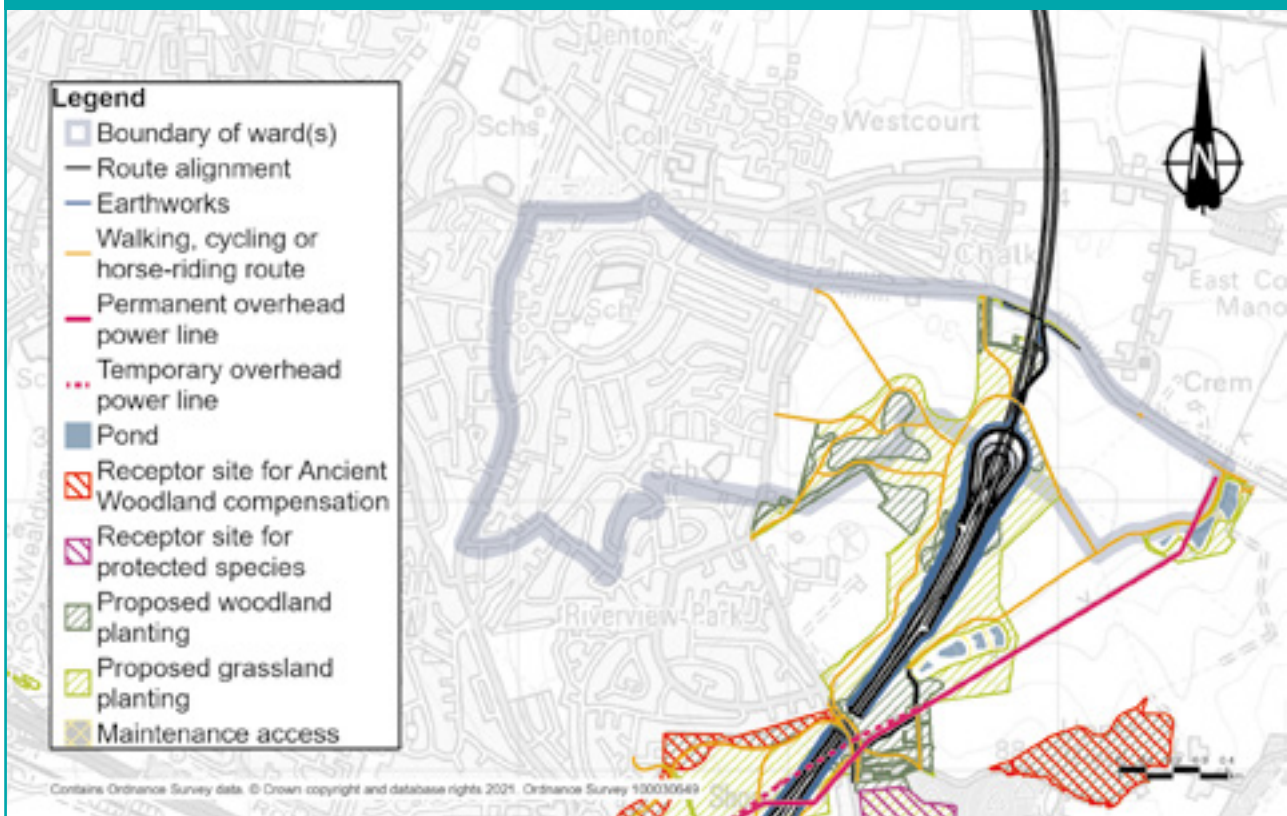
The completed project

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements. These are the elements of the completed project within this ward:

- The southern entrance of the tunnel would be to the north-east of the current site of the Southern Valley Golf Club on land permanently acquired for the project and be served by a road in a deep cutting linking to the A2/M2. All the road north of the tunnel entrance would be underground. The southern entrance of the tunnel has been moved further south in response to stakeholder and community feedback. The tunnel was extended 600 metres southwards before our statutory consultation and by a further 350 metres after supplementary consultation. These changes lengthen the tunnel by 950 metres. This would reduce the visual and noise impact in Westcourt ward, with only part of the tunnel entrance now within the ward boundaries.

- New alignments would connect to the existing public right of way network in the area, including through the new Chalk Park recreational area.
- An access road would link the two carriageways by forming a loop over the tunnel to the north of the southern tunnel entrance. There would also be an operations building near the entrance, screened by new planting. An access road would connect to the A226 to the north. These roads would provide access for emergency services and maintenance vehicles only, allowing for quicker response times and reducing the impact of congestion should there be an incident in or near the tunnel entrance.

Figure 6.3: Main features of the completed project in Westcourt ward



Changes to the project since our design refinement consultation

As part of our ongoing design development, including discussions with utility companies, we have made several changes to the project and its Order Limits since our design refinement consultation in July 2020. However, there are no such changes in Westcourt ward. More information about any proposed changes can be found in chapter 3 of the Operations update.

Impacts on open space land

The nearby Thamesview School playing fields would not be directly affected and would remain in use by the school. While private agricultural land above the proposed tunnel would be permanently acquired for the project, a new recreational area, Chalk Park, would fall partially within Westcourt ward and be accessible to local residents when the project is completed. Covering 37 hectares, Chalk Park would feature woodland planting with views to the Areas of Outstanding Natural Beauty and the River Thames. Additional open space north of Claylane Wood and east of the southern tunnel entrance would also be accessible to local people. There would be a total of around 37.5 ha of open space land south of the river provided as part of the project. A map showing Chalk Park and other open space can be found in chapter 3 of the Operations update

Within Westcourt ward, there are no changes to our proposals to remove or replace open space land. More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

6.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the project construction and once it is operational. Information about how we carried out these assessments can be found in chapter 1.

6.3.1 Construction

Journey times along the A226 would increase during the construction period, partly because of the increased number of HVGs using the road but also due to the lane closures, when these are in place, and the traffic signals at the compound access points.

There would also be some additional car traffic on A226 Rochester Road and at the Lion roundabout junction with Old Road East and Lower Higham Road.

Some night or weekend closures on the southern section of Thong Lane between the A2 and Vigilant Way may cause traffic to re-route to use the northern section of Thong Lane. Similarly, the contraflow traffic management on the southern section of Thong Lane between the A2 and Vigilant Way may cause traffic to re-route to use the northern section of Thong Lane.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigations and feedback received from the public and stakeholders. A summary of the proposed measures to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update. In addition to reducing the volume of HGV journeys needed for the project's construction, we would avoid the long-term closure of the A2/M2 during the construction period to reduce the impacts on local communities and the wider road network. Instead, we would only close the road overnight or at weekends when it is less busy in order to carry out required works on the A2/M2.

Our proposed measures to reduce construction traffic impacts include:

- No local roads within Westcourt ward apart from the A226 Gravesend Road would be used for construction traffic.
- We would minimise use of the local road network as far as reasonably practical through construction of temporary offline haul roads directly off the A2 eastbound.
- The A226 Gravesend Road construction route would be used for works north of Thong Lane, which involve significant excavation works. Our proposals allow for re-use of excavated materials, and would substantially reduce the need to dispose of excavated material via the road network, thereby reducing the number of HGV movements on the A226 Gravesend Road. For more information about HGV movements, see the Construction update.
- After discussion with stakeholders, we are proposing to ban HGV traffic from some local roads. Proposed HGV road bans for construction vehicles (with the exception of very specific works which include limited utility works and connecting to existing roads) include Thong Lane between the A2 Compound access off Thong lane and the A226. For more information, see the Outline Traffic Management Plan for Construction.
- HGV vehicles turning out of the Southern Tunnel Entrance Compound would only be allowed to turn right on to the A226, unless they are going either to the nearby A226 Gravesend Road or Milton Compounds.

6.3.2 Operational traffic impacts

Figures 6.4, 6.6 and 6.8 show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 6.5, 6.7 and 6.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

There would be only very slight changes predicted in traffic levels on roads within the Westcourt ward following the opening of the project.

Figure 6.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

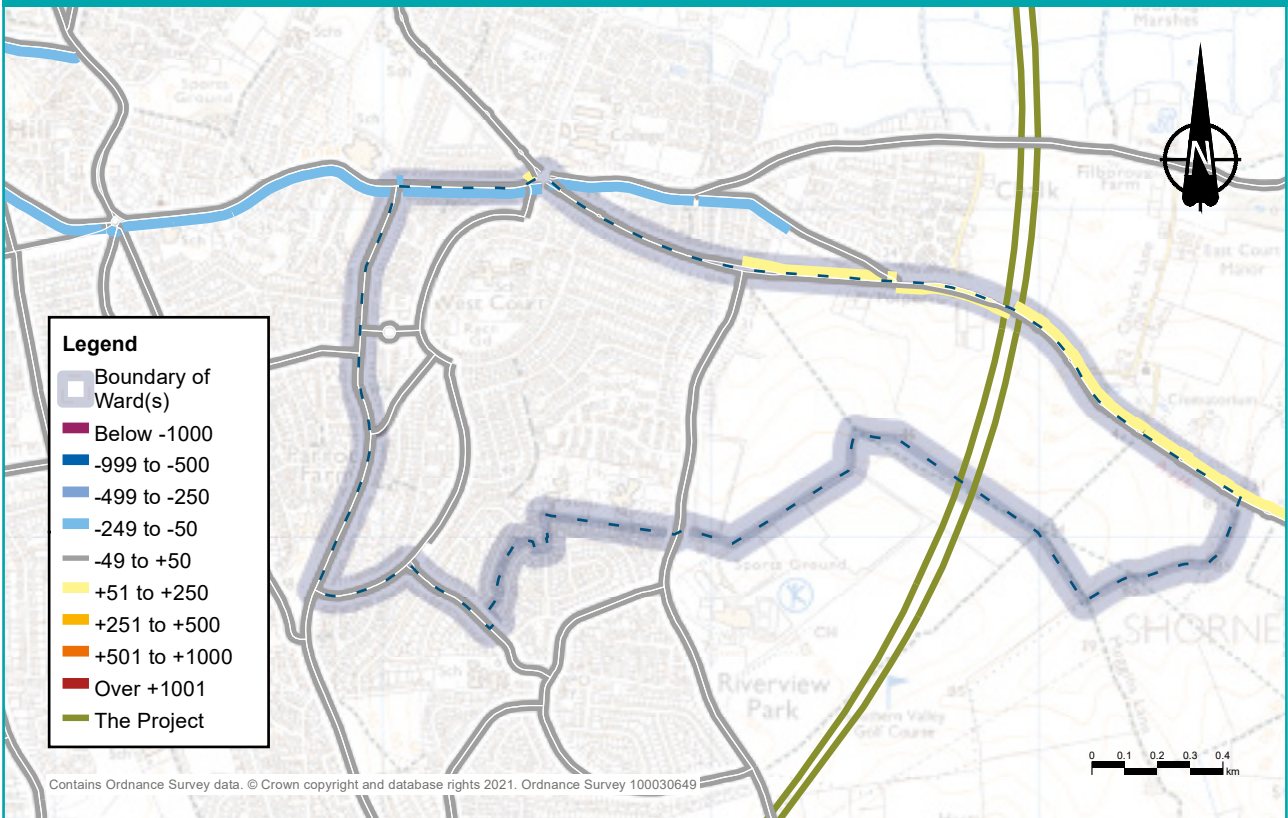


Figure 6.5: Predicted percentage change in traffic flows during the morning peak in 2029

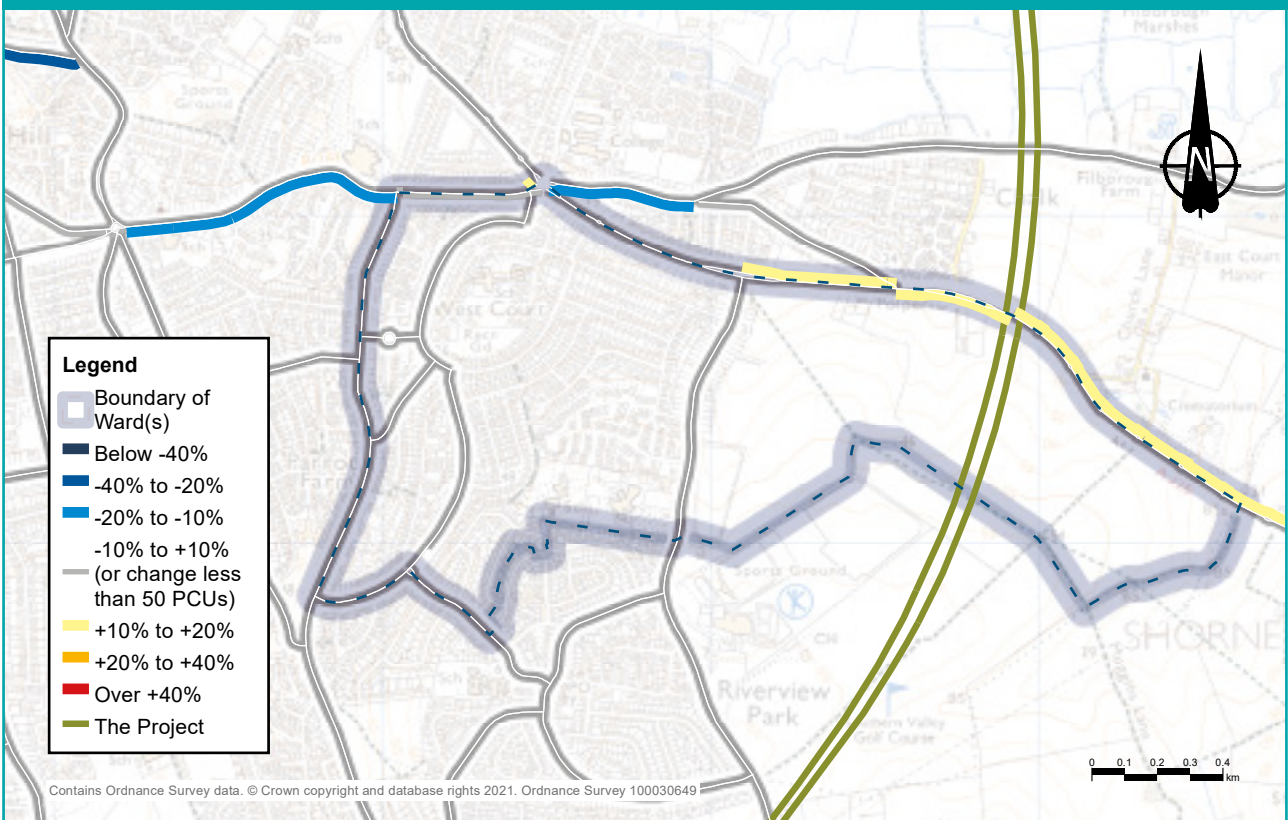


Figure 6.6: Predicted change in traffic flows (PCUs) with the project during the interpeak peak in 2029

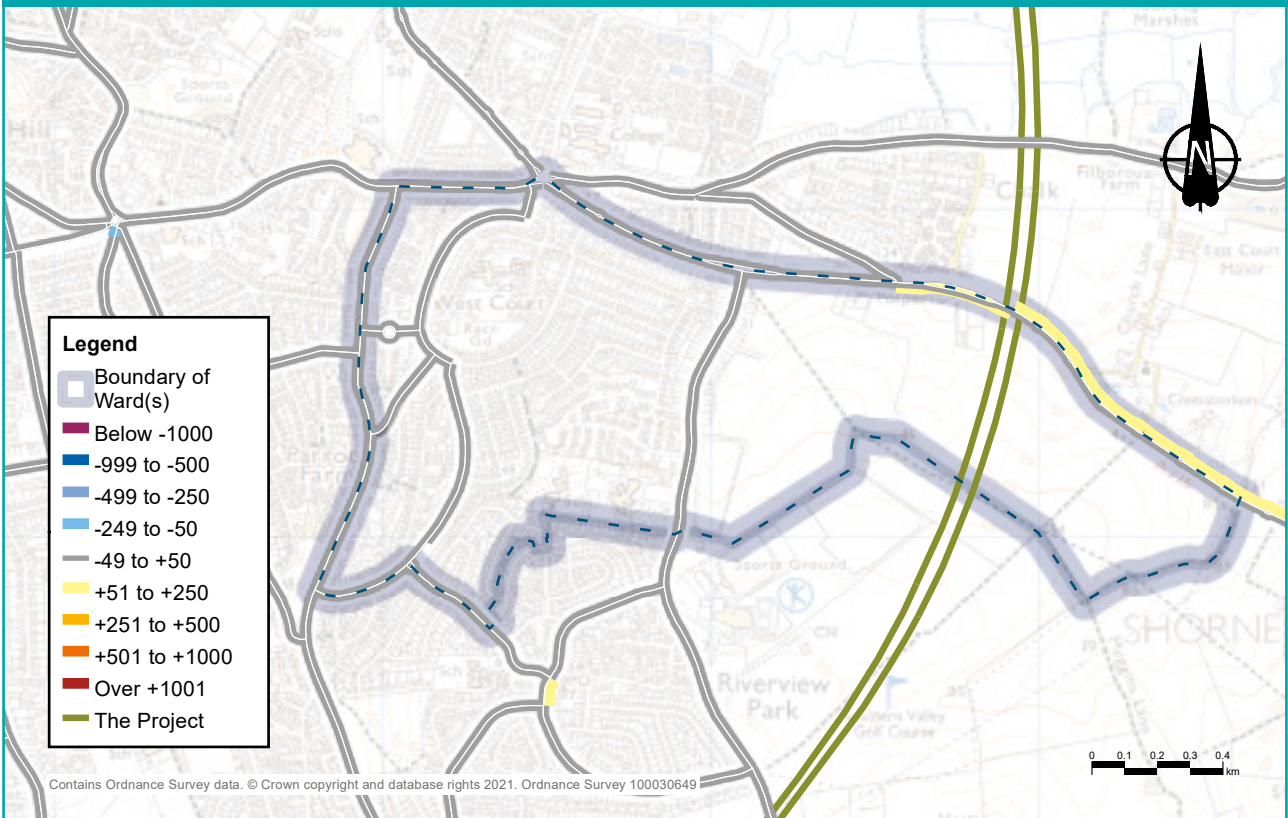


Figure 6.7: Predicted percentage change in traffic flows during the interpeak period in 2029

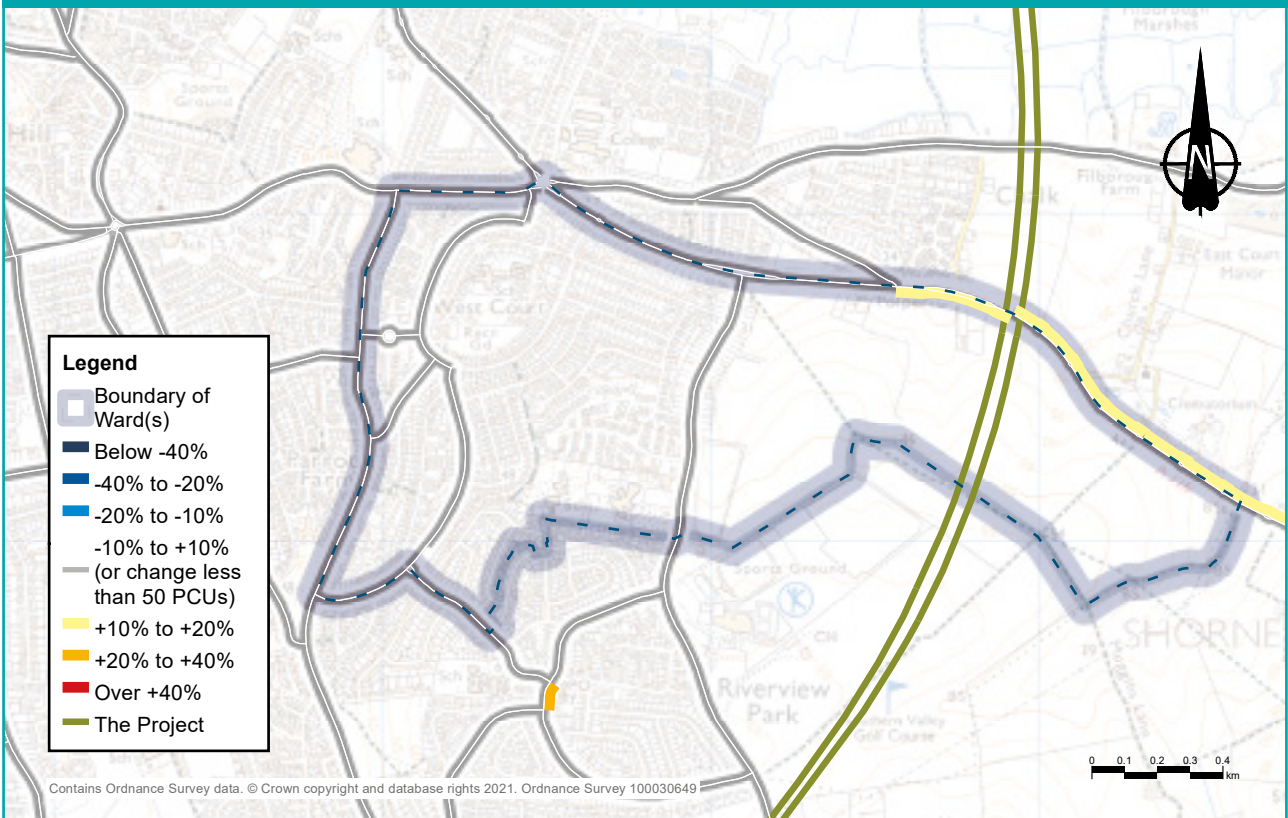


Figure 6.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

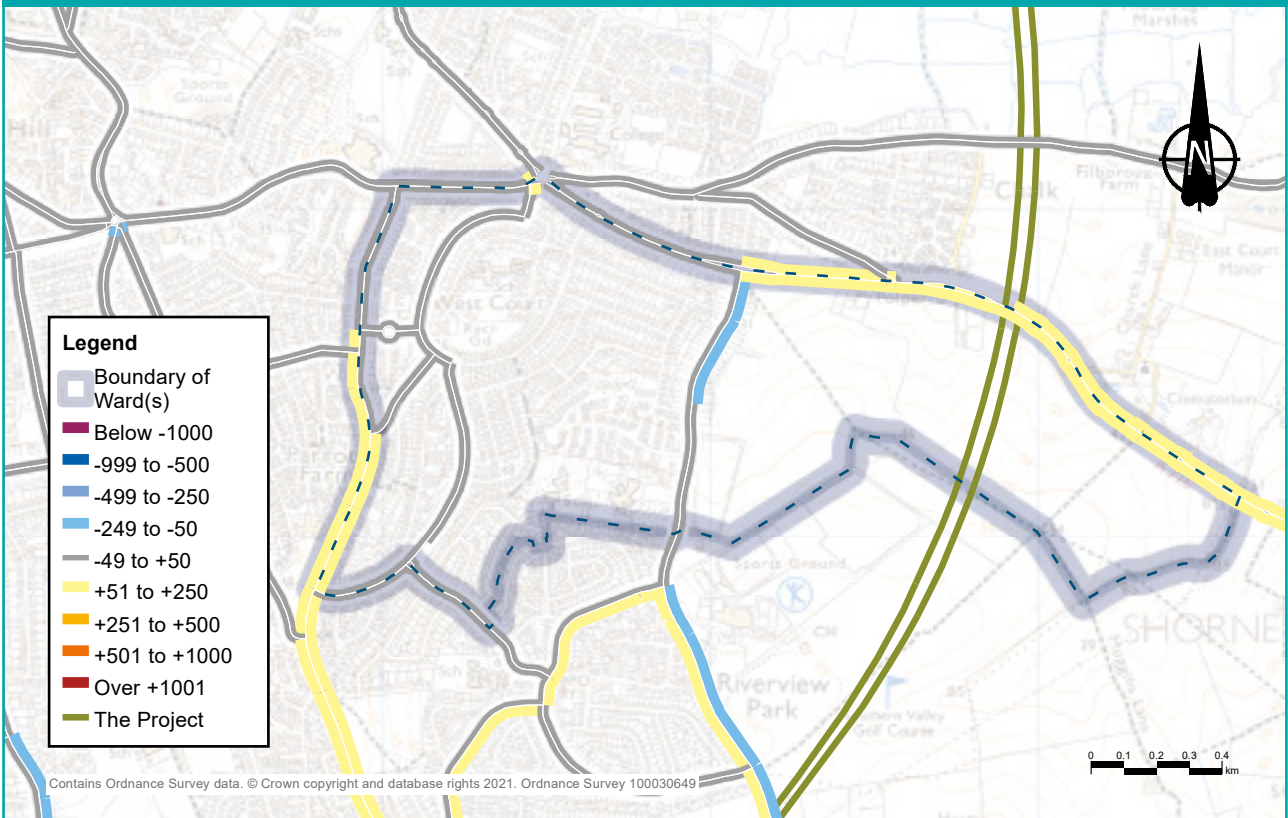
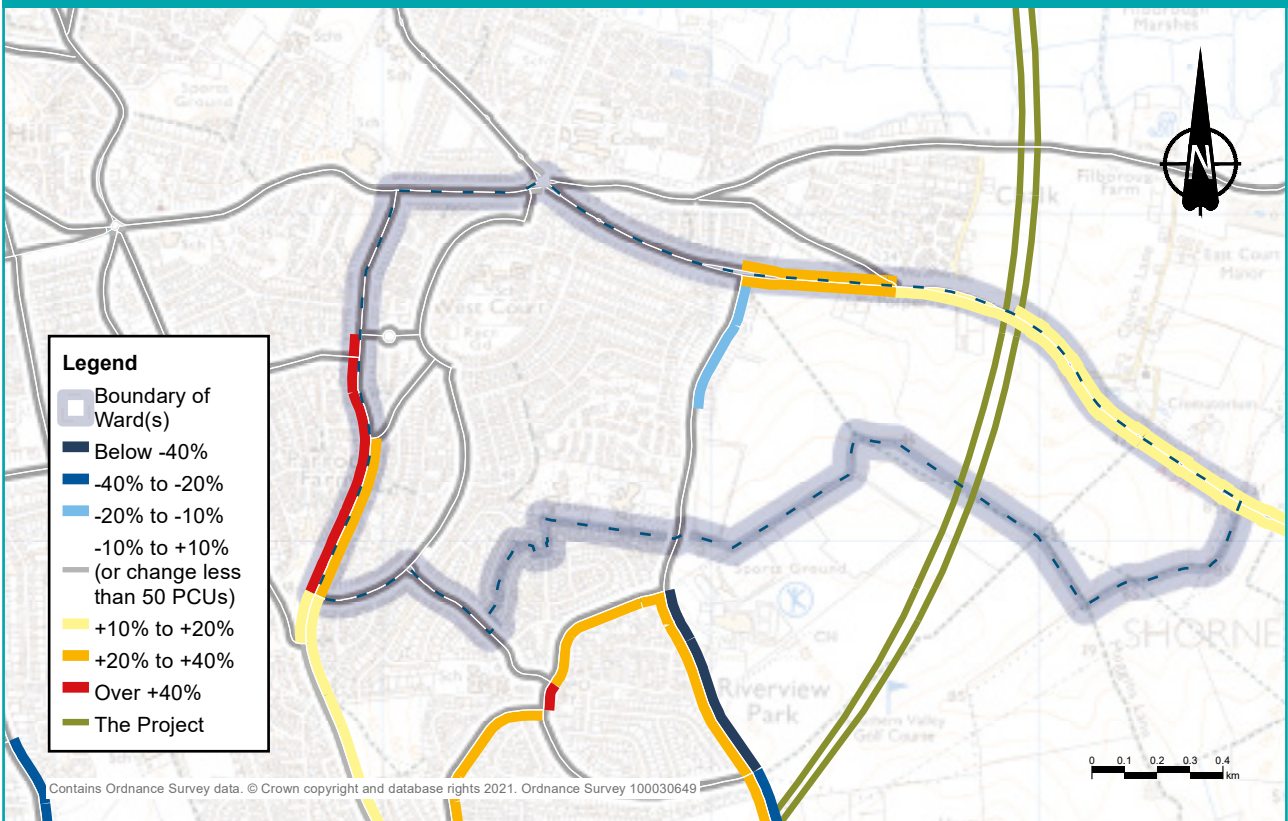


Figure 6.9: Predicted changes to the percentage traffic flows during the evening peak in 2029



Changes to journey times

Figure 6.10 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with the project. Figure 6.11 shows the change in areas that could be reached within a 60-minute drive. The areas have been calculated for the morning peak hour (7am-8am) for journeys. The number of jobs within a 30-minute drive with the project in place increases by 28%, which would mean access to an additional 94,400 jobs. Within a 60-minute drive, the number increases by 35%, which would mean access to an additional 730,000 jobs.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.

Figure 6.10: Change in area that people could drive to within 30 minutes from Westcourt ward

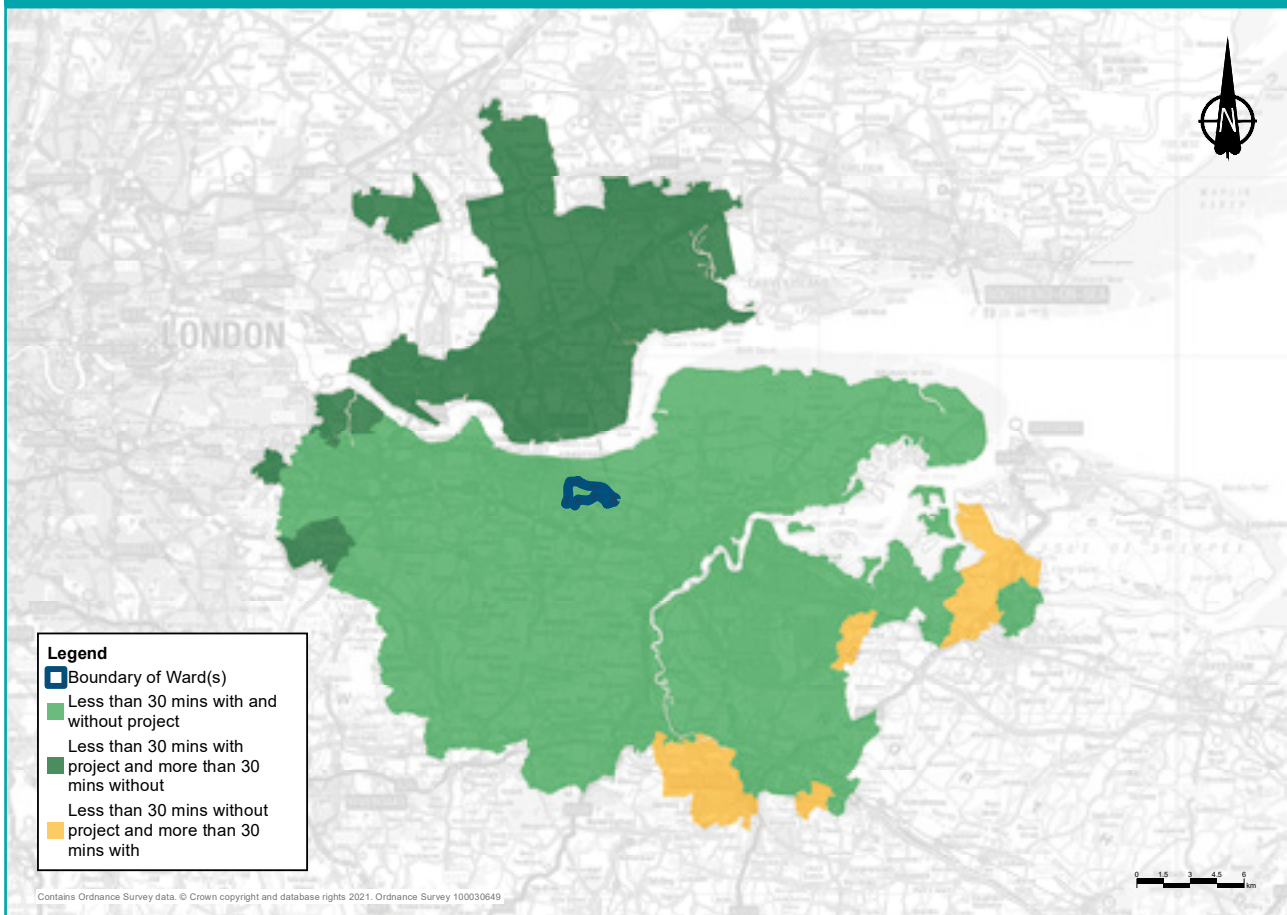
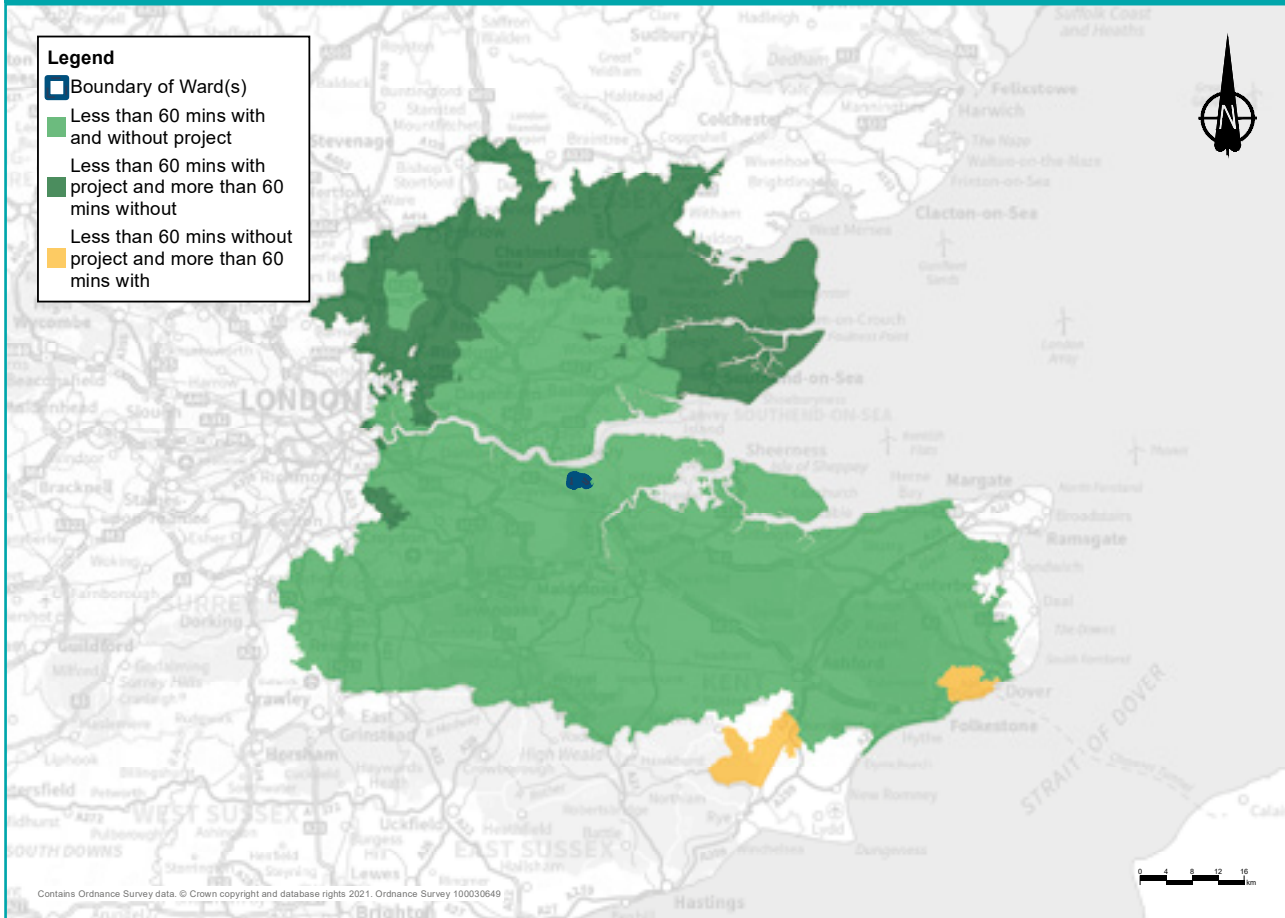


Figure 6.11: Change in area that people could drive to within 60 minutes from Westcourt ward



Measures to improve traffic flow during operation

To reduce the traffic impacts of the project in Westcourt ward, we removed the previously proposed junction with the A226, which could have negatively affected Westcourt by encouraging traffic from Gravesend to short-cut through the ward using local roads. More information about this and other changes we made following feedback from stakeholders and local communities can be found in the You said, we did consultation document.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

6.4 Public transport

Existing situation

There are no railway lines or stations in Westcourt ward but the ward is serviced by Gravesend station which is used by Southeastern and Thameslink Services to run journeys from Kent through to London Charing Cross.

Bus services pass through this ward, including services along the A226 Higham Road.

6.4.1 Construction

Rail

Access to Gravesend station for the residents of Westcourt ward would not be affected during construction.

Buses

Due to the impacts on journey times along the A226, bus services along the A226 Higham Road may experience delays.

6.4.2 Operation

Rail

As there are no railway lines or stations in Westcourt ward there would be no construction or operational impacts on rail services. In addition, there would be no discernible change in local access times to Gravesend station and no change to the rail services at the station.

Buses

There would be no changes required to bus routes through the ward once the project opens and there would be no discernible predicted changes to bus journey times.

6.5 Footpaths, bridleways and cycle routes

Existing situation

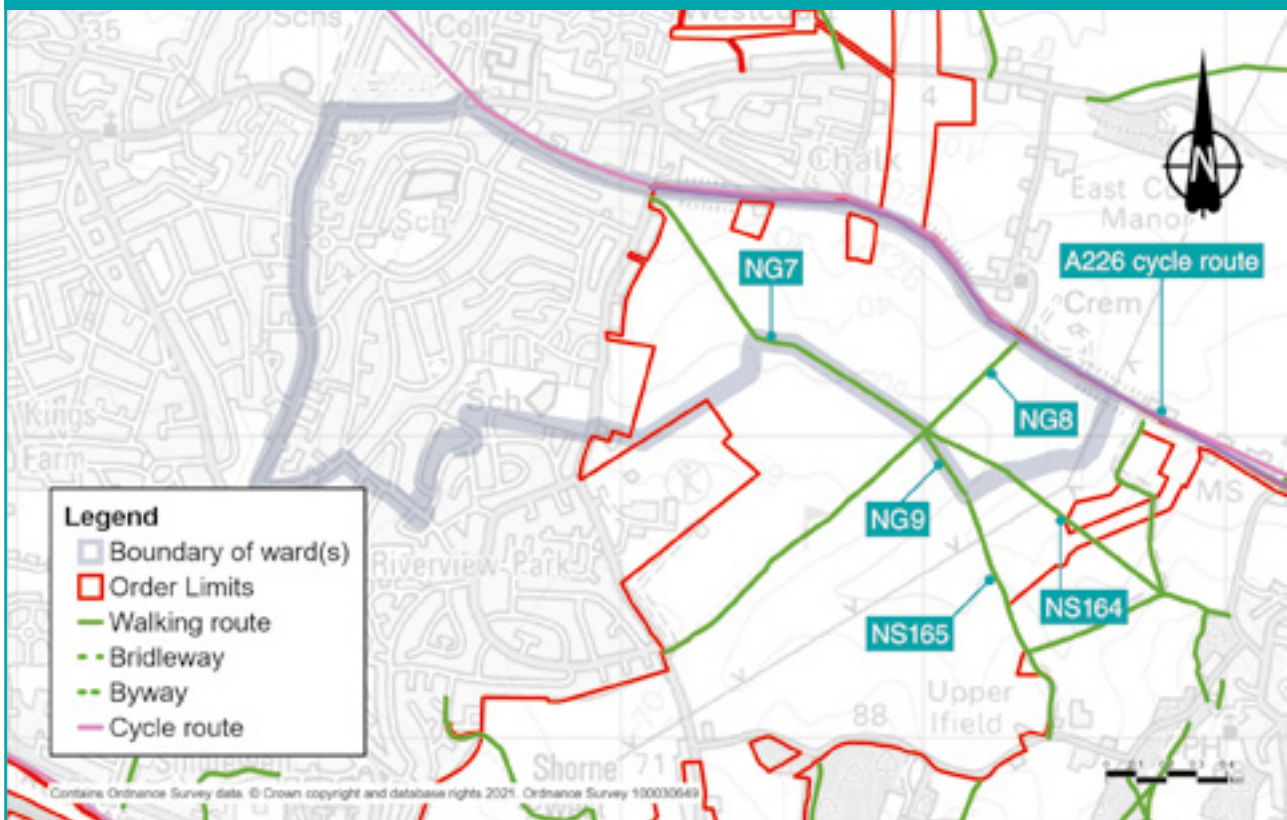
Westcourt ward is made up of a residential area in the west and a rural area to the east. The ward has seven footpaths and one bridleway, although two of these would be closed or diverted during construction. For other potential impacts, see the other sections in this chapter, such as Visual and Noise and vibration.

6.5.1 Construction

Construction impacts

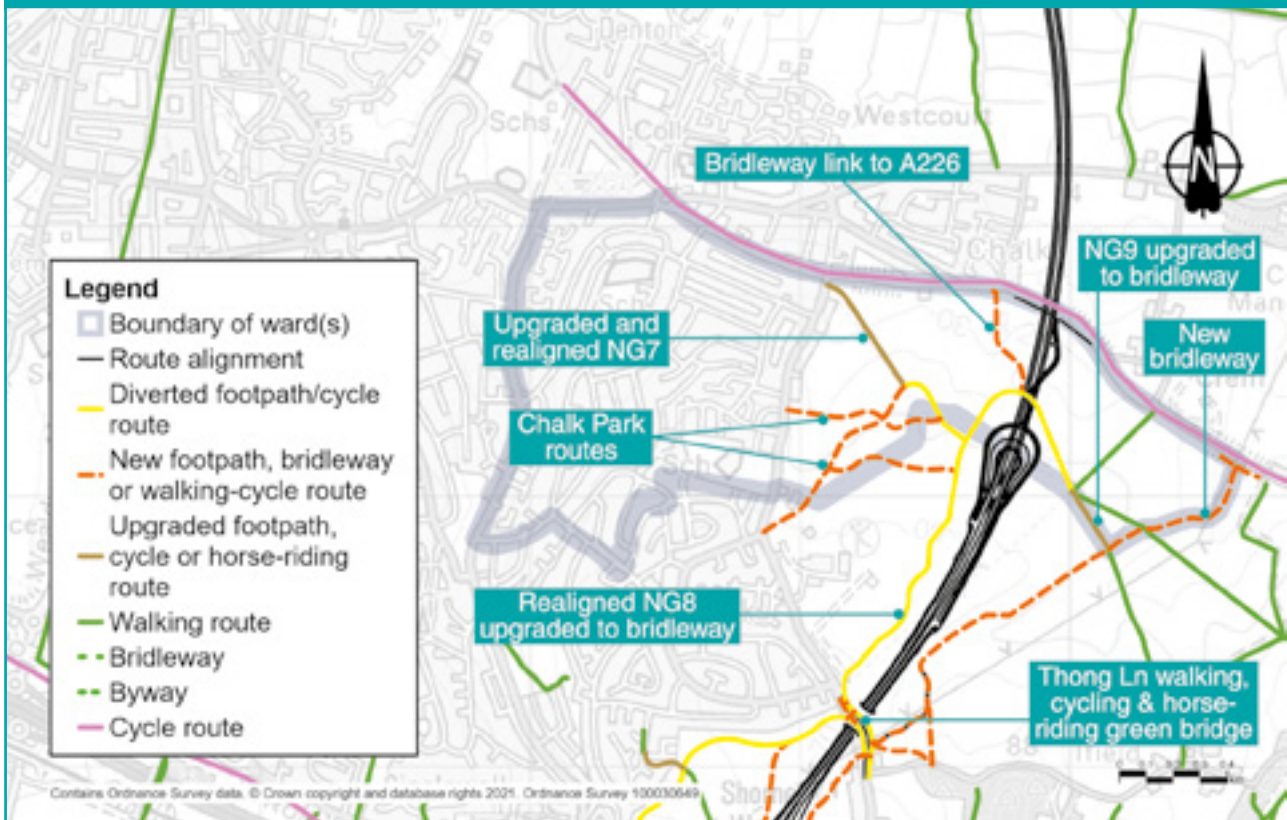
Due to the construction of the southern tunnel entrance, the new road, and construction activities in the neighbouring ward of Shorne, Cobham and Luddesdown, there would be a small number of closures in Westcourt ward during construction.

Figure 6.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Westcourt ward



- Footpath NG7 would be closed for five and a half years, until the realignment through the new Chalk Park recreational area is complete.
- Footpaths NG8 and NG9 would be closed for five and a half years while the new road is built.
- The cycle lanes along the A226 would be impacted during the first year of construction while access to work compounds are constructed. During this period, the A226 would be subject to lane closures and traffic lights.

Figure 6.13: Proposed footpaths, bridleways and cycle routes in Westcourt ward



6.5.2 Operations

The project's proposals include more than 46km of new, extended, diverted or upgraded footpaths, bridleways and cycleways. We developed the proposals after consultation with local communities and stakeholders that included walking, cycling and horse-riding groups. For information about changes to footpaths and bridleways across the project, see chapter 2 of the Operations update.

- NG7 would open with a new alignment through the new Chalk Park recreational area. It would link with the newly aligned and upgraded NG8 bridleway, which links the new Thong Lane green bridge with routes north and east of the Southern Tunnel Entrance.
- Footpath NG8 would reopen as a bridleway with a new alignment from the Thong Lane green bridge to north around the south tunnel entrance, including connections to the new network of Chalk Park routes. There would also be a new bridleway connection from this route to the A226 Gravesend Road.

A map showing Chalk Park and other proposed open space in Westcourt ward can be found in chapter 3 of the Operations update.

6.6 Visual

Existing situation

Views towards the land on which the project would be built from the main populated areas are mostly limited to the eastern part of Westcourt ward, from homes and the sports field on Thong Lane and from the local footpath network to the east. Current views towards the project from Westcourt ward are typically glimpsed views over rural agricultural land or the adjacent sports field, interrupted by garden boundary vegetation, garages or vegetation surrounding the sports field.

At the intersection of footpaths NG7, NG8 and NG9, there are enclosed views to the south and distant views over the Thames Estuary to the north, characterised by arable landscape backed by surrounding landform, vegetation and homes.

6.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

The main construction activities likely to be seen from this ward are:

- construction of the Southern Tunnel Entrance Compound and deep cutting for the main alignment of the project
- establishment and operation of the Southern Tunnel Entrance Compound
- earthworks and landscaping to create Chalk Park and open space east of the southern tunnel entrance
- construction of a new substation
- completion of other utility works

How construction activities may affect views in Westcourt ward can also be found in the Project description section above, with additional information in chapter 3 of the Construction update.

Views of construction would be mainly limited to the eastern part of the ward, where activity is likely to be visible from adjacent homes and the sports field on Thong Lane, partially screened by boundary vegetation or other garden features.

Much of the local footpath network east of the urban area would be temporarily closed during construction. Therefore, views of construction from footpaths are likely to be minimal. Further information on the effects on public rights of way is given above.

Measures to reduce visual impacts during construction

A number of measures would include forming a temporary earth bank on the boundary of Southern Tunnel Entrance Compound, to help screen the homes on Thong Lane and Rochester Road. The taller compound facilities would be located as far as possible away from residential areas adjoining Thong Lane and Thamesview School.

The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC.

6.6.2 Operation

Operational impacts

When the road opens, the main visible features would include the edge of the southern tunnel entrance and the newly created Chalk Park and other nearby open space. More information about the completed project can be found in the Project description section above.

The main visual impacts from the eastern part of the urban area are likely to be views over restored agricultural land, towards the newly created Chalk Park. Views of the new road and associated traffic would be concealed in the tunnel, in the cutting containing the project's main highway as it approaches the tunnel, and by new planting in Chalk Park.

From the newly diverted public rights of way network, the works for the new road would alter the recognised land pattern, which would be slightly visible. However, this would not alter the visual focus of the Thames Estuary to the north.

Measures to reduce visual impacts during operations

Proposed planting, the creation of Chalk Park and the return of the wider landscape to its former agricultural state would help integrate the new route into the surrounding landscape. The planting would screen views of the new substation near Rochester Road.

6.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Westcourt ward is mainly characterised by traffic noise coupled with noise from agriculture and people. The main sources of road traffic noise within the ward are from the A226 and the B261, and other local roads.

As part of our environmental assessment process, we carried out surveys of existing background noise in the ward. The level monitored at this location recorded average existing noise level in the range of 51dB(A)² during the daytime.

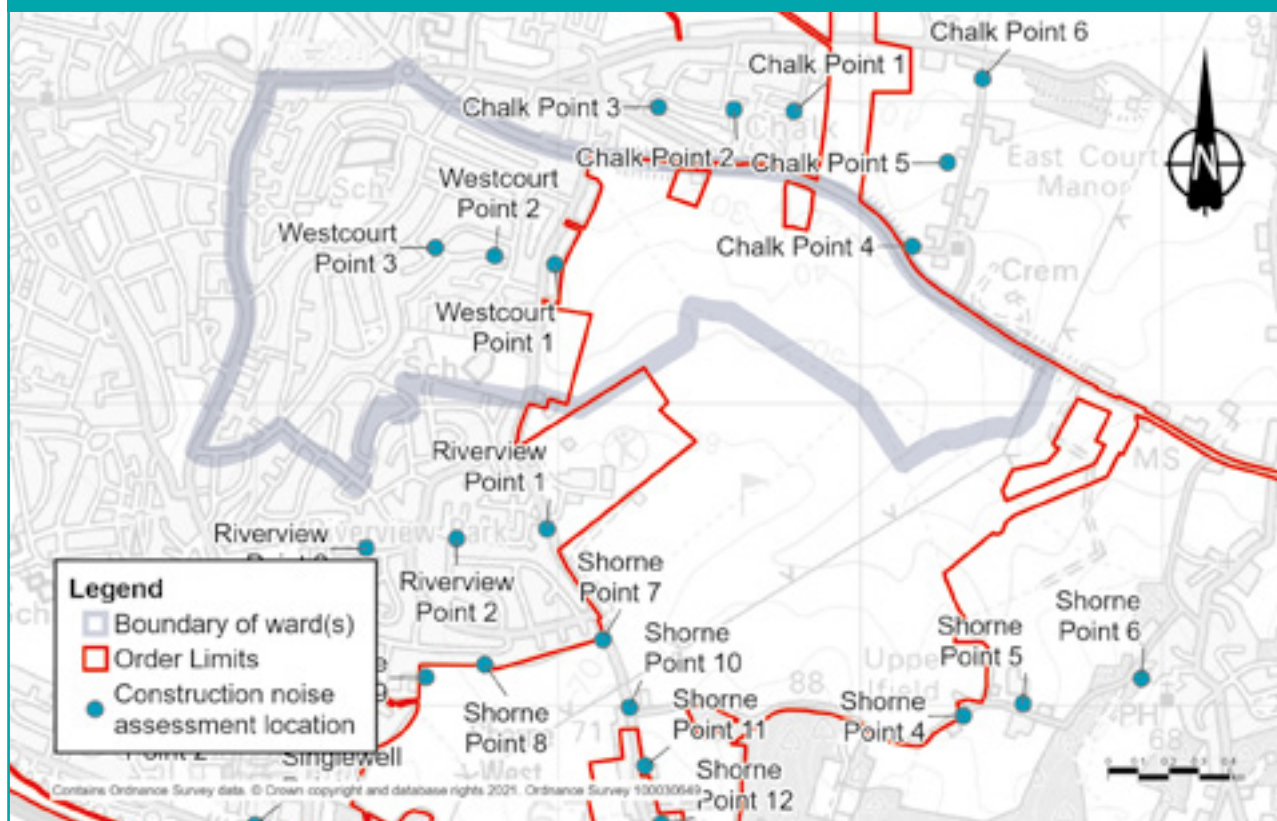
To understand how noise levels would vary with and without the project, we use noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We model this because we cannot assume that noise levels when the project opens would be the same as they are now. For example, our assessment of the opening year noise levels accounts for predicted changes in traffic levels.

We also model the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if it were implemented.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 73 dB(A) during the day and from 29 to 59 dB(A) during the night at identified locations within this ward. As such, our noise assessments predict that by opening year, noise levels will increase compared with the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

Figure 6.14: Construction noise assessment locations in Westcourt ward



6.7.1 Construction

Daytime construction noise impacts

The main daytime construction activities that are expected to give rise to noise and vibration impacts in this ward are those associated with southern tunnel construction, main alignment and utilities works.

Within Westcourt, a main works compound would be located within the ward boundary. There are no Utility Logistics Hubs currently proposed to be located within the ward.

Although not located within the ward, the A226 Gravesend Road Compound (see chapter 9) may contribute to the noise impacts experienced within this ward due to how close it is to the ward boundary.

There would also be project haul roads built and used during the construction period, these are shown in the Project description.

Within the ward, there is one proposed structure expected to be constructed using vibratory or percussive piling, but potential vibration impacts of these structures would be less than 10 days.

Construction noise levels have been predicted at three locations across this ward, chosen to provide a representation of the level of noise communities are expected to experience during construction. For more information about the methodology, see chapter 1.

Noise levels are shown using standard units for road projects, dB LAeq (12-hour), which represents the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder noises than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

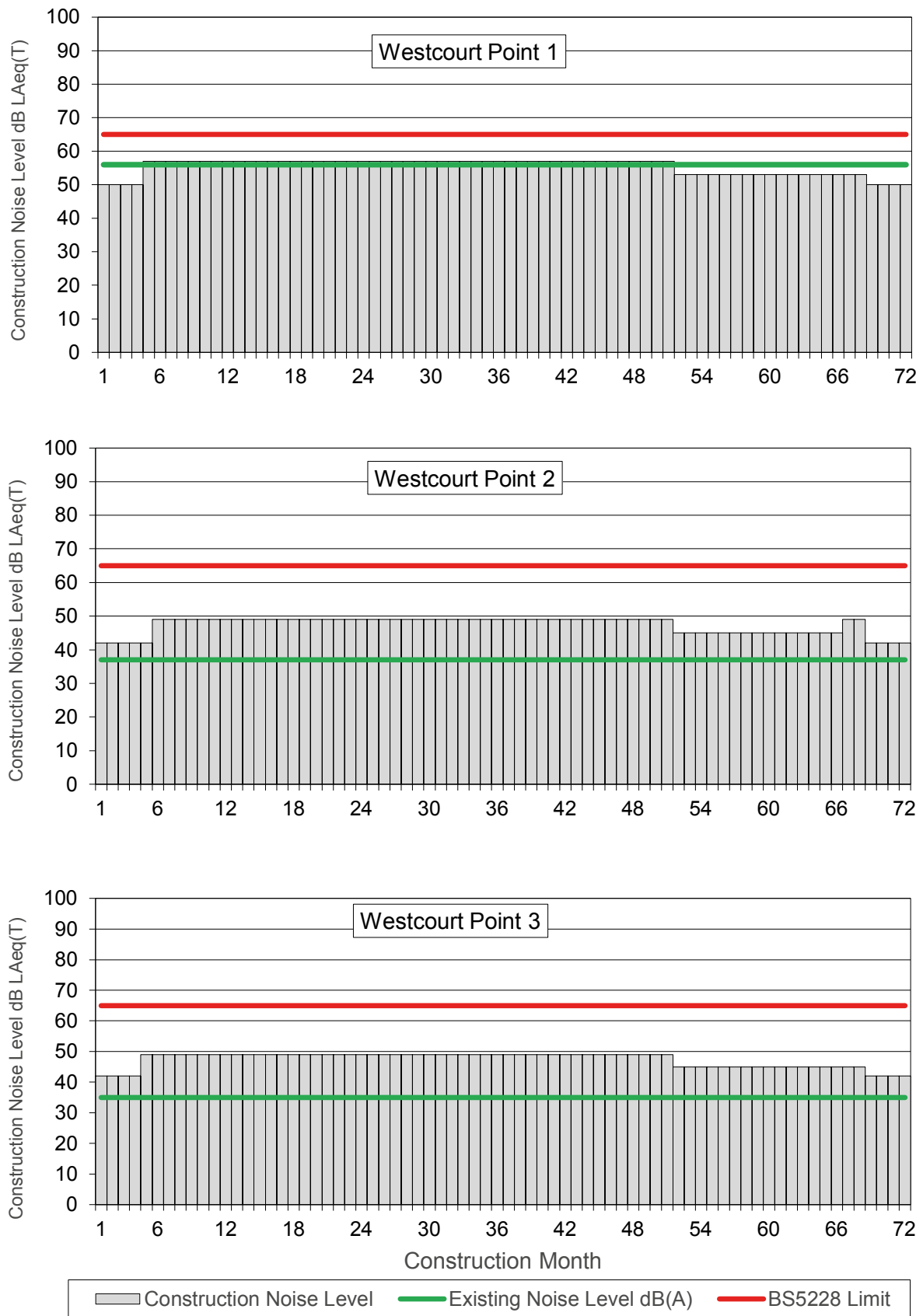
Each vertical bar in figure 6.15 shows the predicted noise levels for that month of the construction period (from months 1-72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific mitigation measures would be implemented to reduce the noise.

The predicted noise levels show that higher construction noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance and additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 6.15, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 50 to 57dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 47 months. However, they would not breach the defined threshold.
- At point 2, construction noise levels are predicted to range from 42 to 49dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 72 months. However, they would not breach the defined threshold.
- At point 3, construction noise levels are predicted to range from 42 to 49dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 72 months. However, they would not breach the defined threshold.

Figure 6.15: Construction noise by month for points 1, 2 and 3 in Westcourt ward



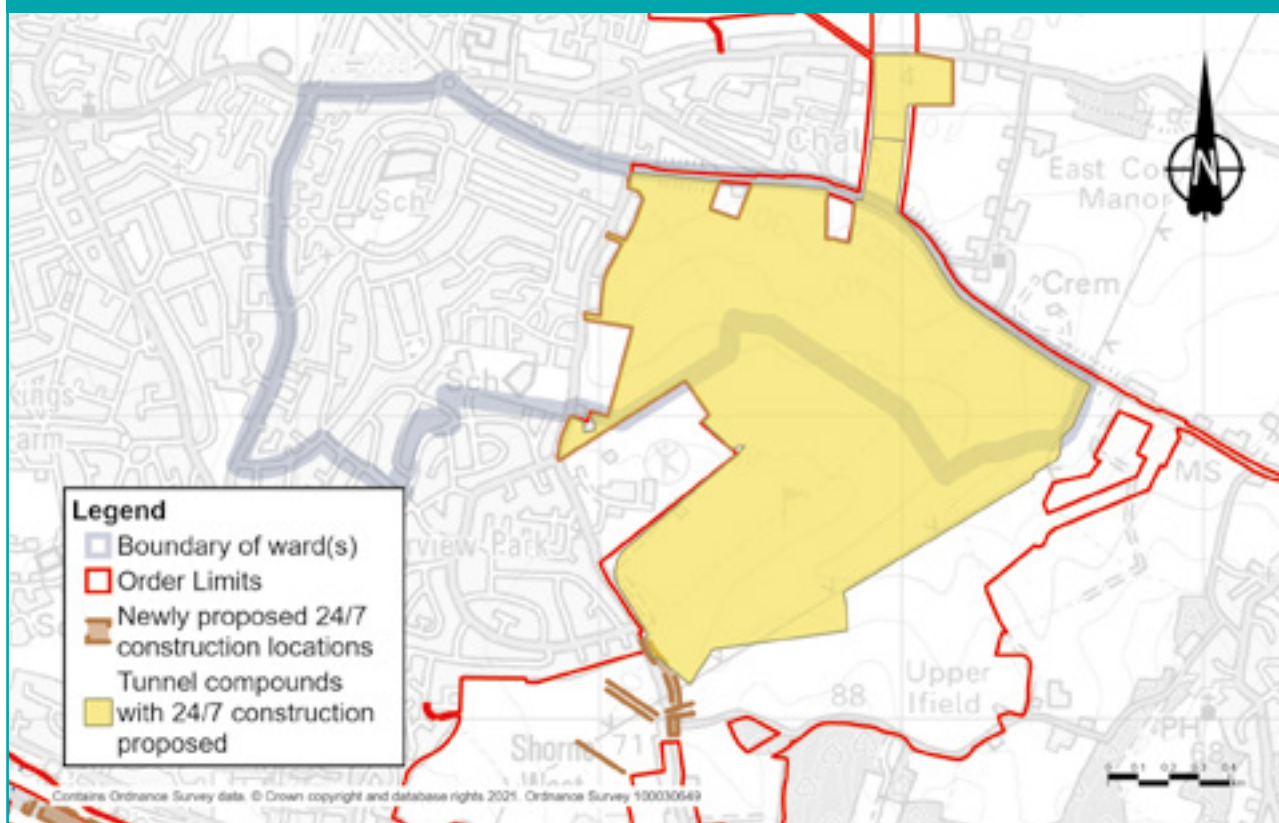
24/7 construction working

In addition to the changes to the daytime noise impacts reported in the section above, 24-hour, seven-day construction working is proposed at the locations shown in figure 6.16 below. The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and that remain part of our current proposals.

These works have been identified as they may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. Construction activities requiring 24/7 operations would be within the Southern Tunnel Entrance Compound.

These works could have an impact on local communities and we would work with the local authority to manage these impacts.

Figure 6.16: Newly proposed and tunnel 24/7 working locations in Westcourt ward



Construction traffic noise impacts

Maps showing the predicted change in road traffic noise within this ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years, except along the following roads where minor increases have been predicted. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Table 6.4: Construction traffic noise in Westcourt ward

Roads affected	Predicted noise impact	Construction years
St Aidan's Way, Hampton Crescent, Brown Road	Minor increase in noise levels	3 and 4

Measures to reduce construction noise levels

Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- installing and maintaining hoarding around the construction compounds
- installing temporary acoustic screening around the construction areas likely to generate noise
- keeping site access routes in good condition with condition assessments onsite to inspect for defects such as potholes
- turning off plant and machinery when not in use
- maintaining all vehicles and mobile plant so loose body fittings or exhausts do not rattle or vibrate
- using silenced equipment where available, in particular silenced power generators and pumps
- no music or radios would be played for entertainment purposes outdoors onsite
- site layout would be planned so that reversing is kept to a practicable minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings
- non-percussive demolition techniques would be adopted where reasonably practicable to reduce noise and vibration impact

- careful consideration of the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity as opposed to generators, where possible
- minimising construction vehicle traffic by, where practicable, selecting local suppliers along the project route, using local workforce and by minimising material transportation for earthworks construction along the project

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see REAC sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction phase.

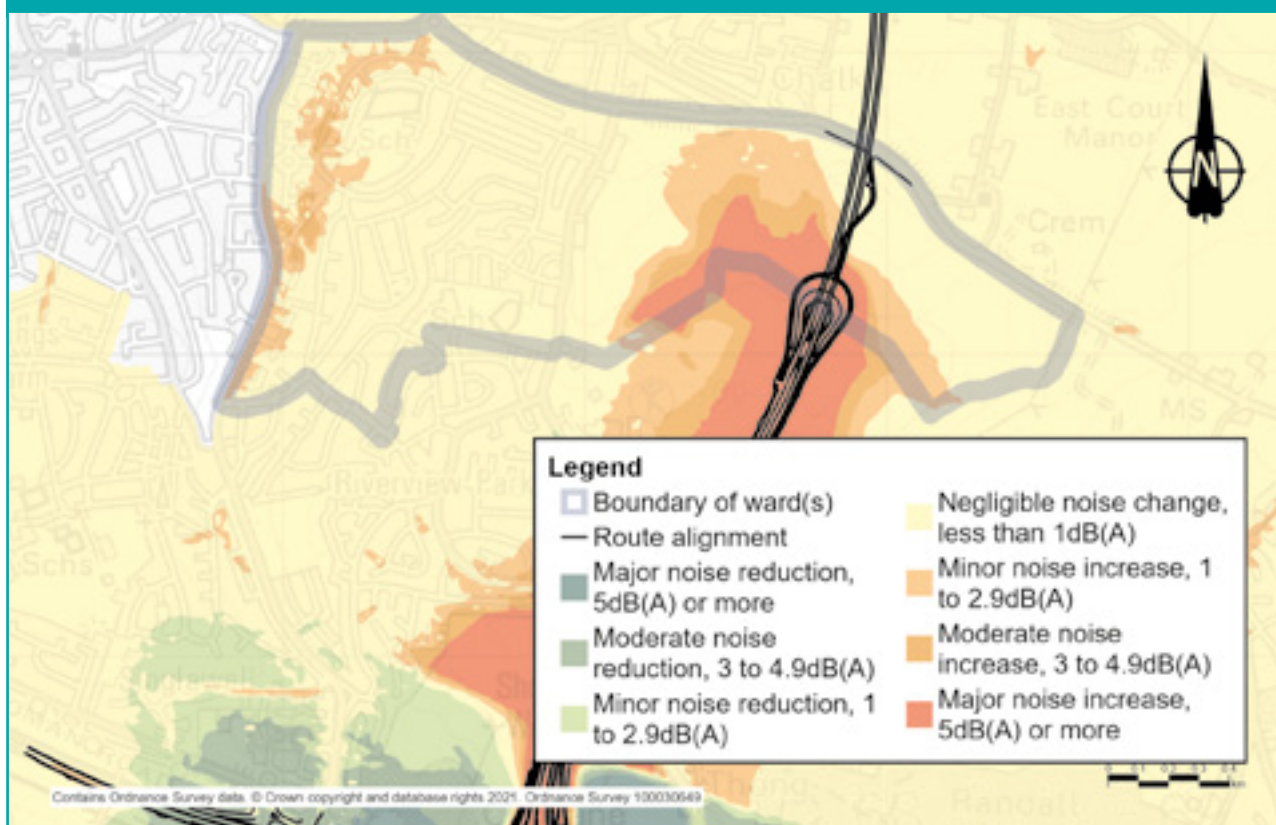
6.7.2 Operations

Operational impacts

The southern tunnel entrance is located towards the east of Westcourt ward. There would also be indirect noise impact as a result of changes in traffic flow, the number of HGVs, and traffic speed on the existing road network within the ward.

Figure 6.17 shows the predicted changes in operational road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise-sensitive receptors (such as nearby properties) are predicted to range from negligible reductions in noise levels of less than 1dB to a moderate increase in noise levels of between 3.0 and 4.9dB. For more information about how we define noise impacts, for example negligible, minor, moderate and major, see chapter 1.

Figure 6.17 Noise impacts during operation in Westcourt ward



Measures to reduce noise and vibration impacts of operations

The main method of controlling noise would be, where practicable, to design the road within landscaped features such as cuttings and bunds (walls of earth). However, where noise impacts are greatest, we would install noise barriers (typically, wooden fences) in addition to these earthworks features. While no noise barriers are proposed within Westcourt ward, there are noise barriers proposed that would mitigate impacts in the ward, which are shown in chapter 5 of the Operations update. The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

6.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Westcourt ward is not located within an Air Quality Management Area (AQMA). AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls.

6.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including along Gravesend Road. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of the construction traffic predicts that a short section of the B261 Old Road East between Lion roundabout and St John's Catholic Comprehensive School is expected to experience small increases in traffic between 2026 and 2027, this would lead to a minor temporary worsening in air quality. Also, there is expected to be a decrease in traffic flows on Valley Drive during 2024, which may result in a minor temporary improvement in air quality. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

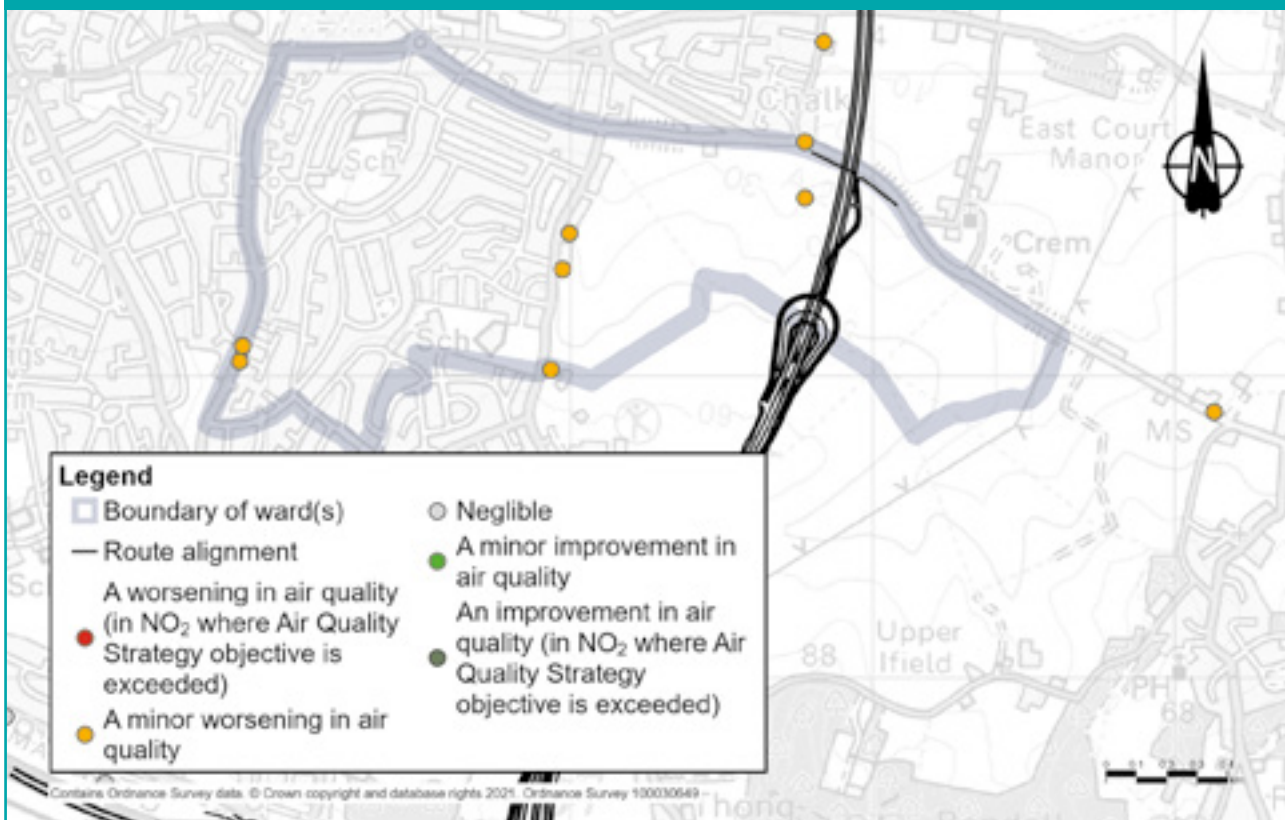
Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

6.8.2 Operations Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

Figure 6.18: Predicted changes in NO₂ levels within Westcourt ward once the new road is open



There are no predicted exceedances of air quality thresholds within Westcourt ward. There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward along the eastern edges of Thong Lane and Rochester Road that are predicted to experience a minor worsening in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within this ward is 22.9µg/m³ (along the eastern edges of Thong Lane), which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area as a result of the project would not trigger the need for additional monitoring or other mitigation measures once the road is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

6.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

Westcourt is characterised by a younger population profile than is the case for Gravesham as a whole and nationally, with a higher proportion of children aged under 16 (27.3% compared with 22.4% for Gravesham and 20.3% for England). Parts of Westcourt ward are within the top 10% deprived areas in England. Economic activity is lower and the number of people claiming benefits is higher than for other Gravesham wards and nationally.

The Westcourt population exhibits high rates of long-term health problems including high rates of self-reported bad or very bad health, and lower life expectancies. There are high rates of emergency hospital admissions for chronic obstructive pulmonary disease (COPD).

6.9.1 Construction

Construction impacts

Construction activities affecting Westcourt ward residents are presented in the Project description section above and relate to construction of the southern tunnel entrance and its approach, establishment and operation of the Southern Tunnel Entrance and A226 Gravesend Road Compounds, earthworks and landscaping to create Chalk Park, and the construction of a new substation. Elements of all these activities have the potential to impact on human health through noise associated with construction activities or construction traffic, air quality (as a result of dust emissions), severance caused by construction traffic, road or footpath closures, or through impacts on mental health and wellbeing.

There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. With good communication and engagement, mental health and wellbeing impacts associated with stress and anxiety related to the construction of the project would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section).

As highlighted at the start of this section, different groups of people within the population may be more sensitive to factors which potentially affect their health than others. Some of the changes identified as a result of construction activities may therefore only affect a small proportion of the population. For example:

- Changes in accessibility. Those who are more dependent on public transport and have less choice about method and route travelled may be negatively affected (see the Public transport section above).
- Severance. Road and footpath closures may affect some people's ability to access services or facilities.
- Changes in access to open space. Much of the local footpath network to the east of the urban area would be temporarily closed during construction. People without access to private cars may not be able to access alternatives within a reasonable travel time.

Measures to reduce construction health impacts

Proposed measures relating to health and wellbeing (including good practice for dust emissions, hours of working and visual screening) are described in this chapter in section 6.6 (Visual impacts), section 6.7 (Noise and vibration impacts) and section 6.8 (Air quality impacts). Further information relating to mitigation measures for these areas is set out in the Code of Construction Practice (CoCP), the Register of Environmental Actions and Commitments (REAC) and the package of traffic management plans. The commitments in the REAC include items such as adhering to Best Practicable Means (BPM) to reduce noise impacts (see NV007 in the REAC) and dust-management good practice (see AQ005 in the REAC). For more information about these documents, see chapter 1 of the Construction update.

Engagement and effective two-way communication with communities both before and during construction is important in order to reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP sets out proposals for community engagement, including how we would make sure communities, stakeholders and any affected parties are kept informed of the construction works, their progress and associated programme. This includes setting up Community Liaison Groups.

6.9.2 Operations

Operational impacts

Information about the ward once the new road is open is provided in the Project description section above. The assessments carried out for noise and air quality have shown that no adverse impacts are anticipated as a result of the project for people in Westcourt ward. However, a proportion of residents may experience anxiety or stress associated with perceptions of environmental change as a result of a major road project. As with the construction stage, different groups in the Westcourt population may be more susceptible to anxiety and stress than others.

A proportion of residents may also experience positive health benefits through accessibility improvements, better access to jobs and training, and to open spaces, including new recreational areas outside Westcourt, such as Chalk Park, near Gravesend. A map showing Chalk Park and other open space proposed as part of the project can be found in chapter 3 of the Operations update.

Measures to reduce health impacts during operation

No essential measures to address health outcomes have been identified within this ward other than those described in the sections on noise and vibration impacts and impacts on air quality. In addition, with mitigation measures implemented, potential impacts on mental health are likely to be minimal.

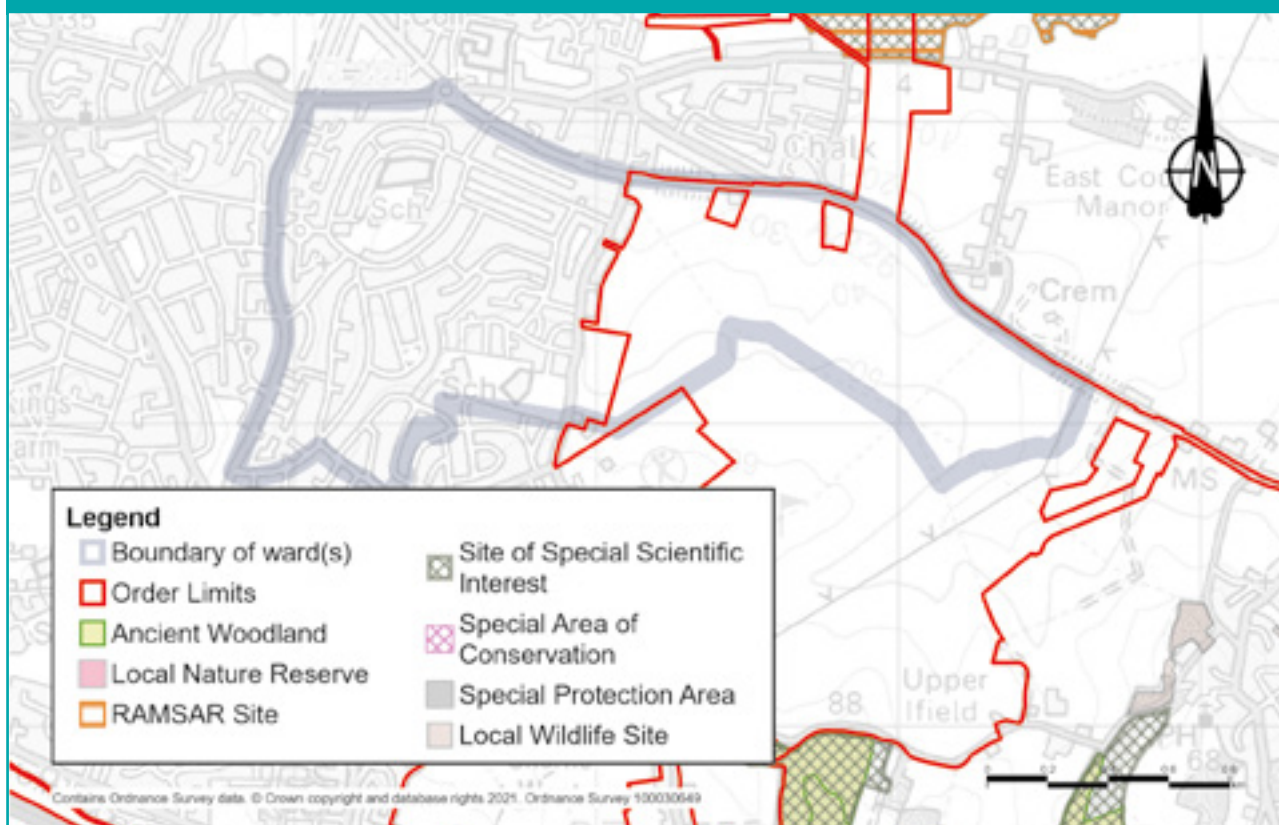
6.10 Biodiversity

Existing situation

The main habitat within the Order Limits in the Westcourt ward is arable fields, with some scattered trees, scrub and defunct hedgerow. Consistent with this habitat, there are few notable or protected species within the Order Limits. The ward does not contain any designated sites such as Sites of Special Scientific Interest (SSSI), locally designated sites such as Local Wildlife Sites (LWS), or Ancient Woodland.

We carried out surveys across the project to set a baseline for assessment, and these identified the presence of a range of protected and notable species. Badger outlier setts were identified within the hedgerow habitats, as well as common reptile and amphibian species.

Figure 6.19: Biodiversity designated and non-designated sites in Westcourt ward



6.10.1 Construction

Construction impacts

Construction activities within this ward are summarised in the Project description section above. Construction would require the removal of areas of habitat, both temporarily and permanently from the route alignment. This habitat consists of areas of arable fields and hedgerows. It supports protected and notable species that would be impacted by construction in terms of direct habitat loss (the loss of badger setts, reptile and amphibian habitat); fragmentation of habitat (loss of hedgerows, particularly a minor bat commuting route); and disturbance to retained habitat.

Measures to reduce biodiversity impacts of construction

Vegetation clearance would be carried out during the winter where possible to avoid the impact on breeding birds. Where this is not possible, clearance would be supervised by an ecological clerk of works to ensure that no nests are disturbed or destroyed. Any protected species would be moved away from the site prior to any construction activities either through habitat manipulation (for example, strimming to reduce the height of vegetation and displace reptiles), or translocation. Where required, works affecting protected species would be carried out under a Natural England licence.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

6.10.2 Operations

Operational impacts

There would be some minor noise disturbance on ecological features from the operation of the project within Westcourt ward, but otherwise the project would have minimal operational impacts on flora and fauna. It is anticipated that with the creation of Chalk Park, which includes areas of woodland and species-rich grassland, a more diverse habitat would be provided than the existing arable farmland. A map showing Chalk Park and other nearby open space can be found in chapter 3 of the Operations update.

Measures to reduce biodiversity impacts of the project during operation

The land used to accommodate the Southern Tunnel Entrance Compound and a haul road would be returned to agricultural use on completion of the construction works. The only exception would be Chalk Park, a recreational area to the west of the southern tunnel entrance, part of which falls within the Westcourt ward. This area would include a mix of grassland, woodland planting, hedges and hedgerows with trees, providing habitat suitable for a number of species and increasing the value for terrestrial biodiversity in this area. Newly created habitat would be managed to ensure that they provide high quality habitat to support a broad range of different plant and animal species. To mitigate disturbance from traffic, the new road would be in a cutting north of the A2/M2, reducing noise impacts.

The impact of the project on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

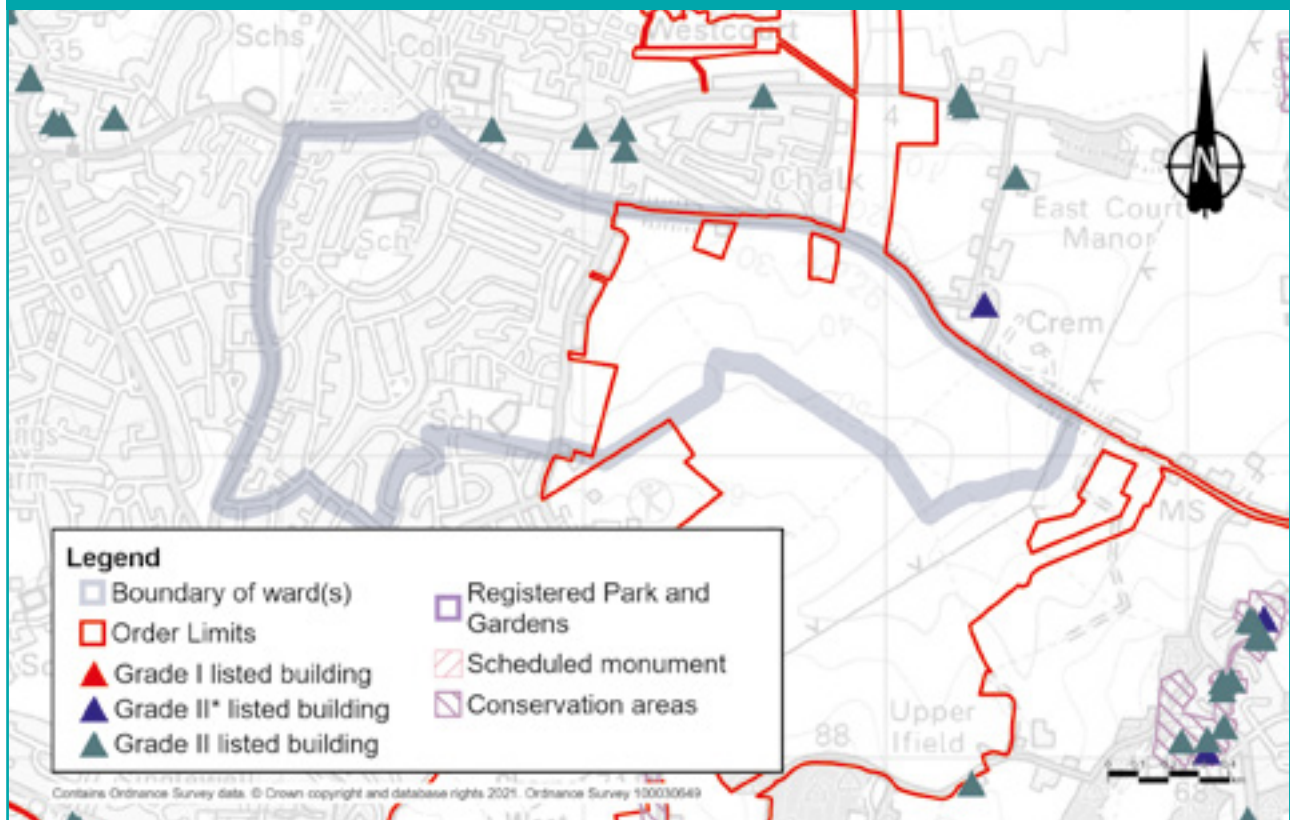
6.11 Built heritage

Existing situation

There is one building of historical relevance (not a listed building) that has been identified within Westcourt ward:

- Polperro World War II anti-aircraft headquarters is a historical building of low heritage value. It is situated south of the A226 Rochester Road, 25 metres from the project and has historical value due to the role it played during the war and its association with several former anti-aircraft defence locations in the landscape. The building is a private property.

Figure 6.20: Built heritage locations in Westcourt ward



6.11.1 Construction

Construction impacts

The design and layout of the Southern Tunnel Entrance Compound would take in to account the setting of heritage assets (the surroundings in which a heritage asset is 'set'), and avoid light glare, light spill and light pollution during night-time construction. More information can be found in the Design principles (section S326). The Southern Tunnel Entrance Compound would be appropriately screened as set out in section 5.7 of the CoCP. Dust and noise reduction measures are also relevant in mitigating the impact to areas of heritage assets. Please refer to Air quality, Noise and vibration and Cultural heritage sections of the REAC.

Construction activity along the new route of the A122 Lower Thames Crossing would temporarily introduce additional noise, lighting and visible construction activity and machinery to the setting of Polperro, resulting in a negligible adverse impact.

Measures to reduce construction impacts

No specific construction mitigation is required for Polperro because impacts are non-physical. There would, however, be an indirect effect to the setting of the building as a result of the construction and operation of the project.

6.11.2 Operations

Operational impact

Polperro would experience a negligible adverse impact due to change in setting caused by the project. The engineering and landscape design for the project seeks to avoid or reduce negative impacts on non-designated heritage assets resulting from changes to surroundings that would negatively affect the site's significance.

Measures to reduce operational impacts

To preserve the rural and historic character of the landscape, road lighting would be minimised where it is safe and practical to do so, but remain in accordance with relevant standards (Design principles LST.02 and LST.03).

6.12 Contamination

Existing situation

From the review of desk-based sources (historical maps and environmental data), potential sources of contamination have been identified based on land uses. Within this ward, the following have been identified:

- Former Gravesend Airport (a former civilian and military airfield). Former land uses are known or suspected to include aviation fuel storage and dispensing; firefighting; blast pens; aircraft service, manufacture and breaking; deep made ground; and an aluminium smelter.

The overall impact from these contamination sources is considered to be low, given the mitigation proposed.

6.12.1 Construction

Construction impacts

Construction activities in this ward would include topsoil stripping, earthworks movements and excavations, which could cause the mobilisation of contamination (if present). The area is part of the main construction compound, where stockpiling of soils would occur as well as the storage of materials and chemicals.

During construction, there is the possibility for existing contamination within the ground to become mobilised. There is also a potential risk of accidental oil, cement and fuel spills from construction traffic and the storage of materials.

Measures to reduce contamination risk

To reduce the impact to an acceptable level, good practice measures include appropriate storing of equipment and clear soil handling. Storage of chemicals and reuse guidance would be used during construction to reduce the risk of spreading contamination and spillage or pollution.

To reduce the risk of accidental spillages, procedures would be in place such as designated areas to re-fuel plant, tanks would be bunded, spill kits would be available and incidents would be recorded and managed, with impacted soils being assessed and removed if necessary.

Essential mitigation, such as the development of site-specific remediation, where contamination has been identified during ground investigation work, would be carried out following consultation with the local authority. During the earthworks, workers would remain vigilant and any suspected contamination would be recorded and assessed accordingly via a watching brief protocol.

Contamination would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

6.12.2 Operations

Verification reports would be prepared for the remediation that is carried out in site-specific areas and this would be provided to the local authority. During the operation of the road, should an incident occur, a traffic accident resulting in localised contamination, significantly affected soils would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

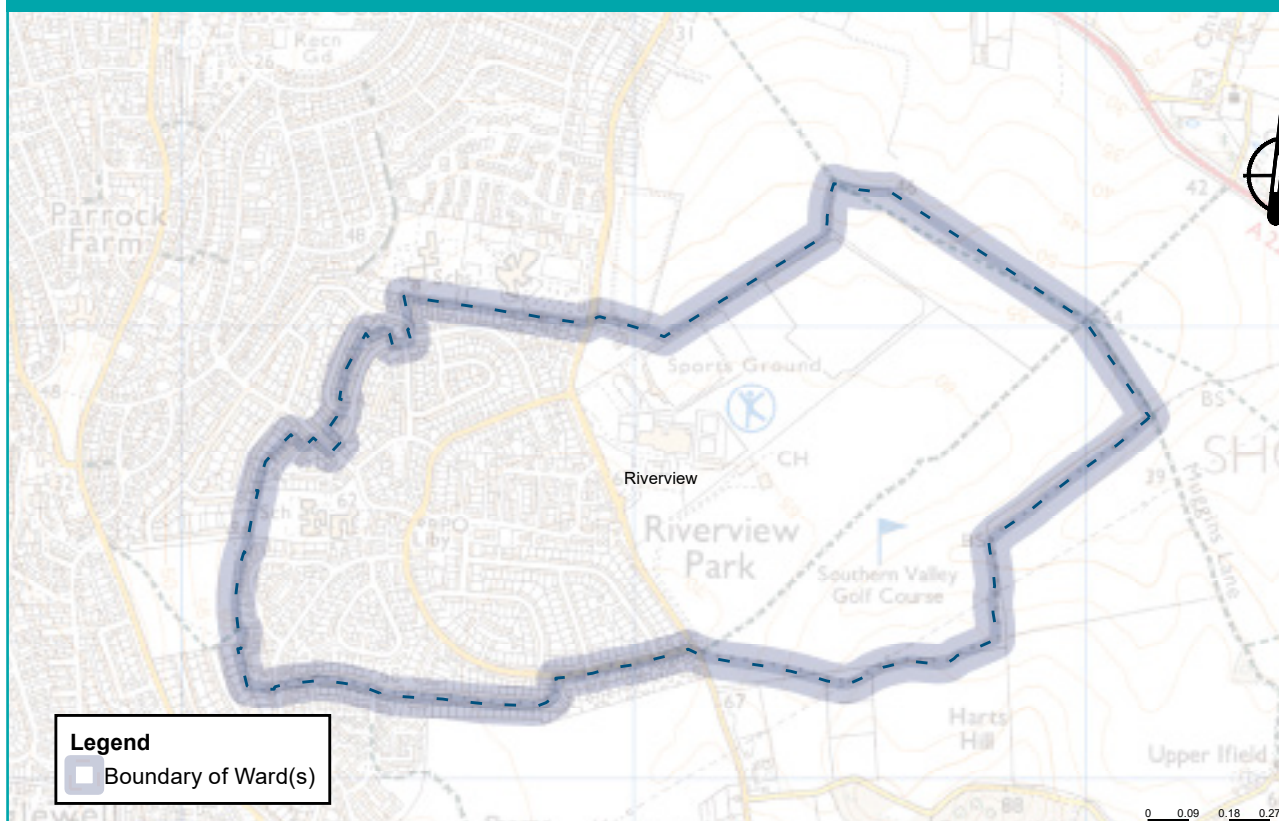
7

Chapter 7: Riverview ward

This chapter summarises the activities in Riverview ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC), and the Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 7.1: Ward boundary map for Riverview ward



7.1 Overview

7.1.1. About this ward

Riverview ward is located south of the River Thames in the borough of Gravesham. It lies to the south of Westcourt ward, east of Singlewell ward, and west of Shorne, Cobham and Luddesdown ward. This ward is approximately 1.5km² in size with an estimated population of 4,322¹. It is predominantly residential and includes Cascades Leisure Centre to the east, and Southern Valley Golf Club, Gravesend Golf Centre and Thames Valley Golf Centre driving range immediately adjacent.

1 Office for National Statistics, 2018 ward-level population estimate

7.1.2 Summary of impacts

Table 7.1: Summary of impacts during the project's construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>There may be some short-term rerouting of traffic through Riverview Park to Valley Drive while temporary traffic-management measures are in place on Thong Lane.</p>	<p>Impacts</p> <p>There would be only very slight changes predicted in traffic levels on roads within the Riverview ward following the opening of the project. To see maps showing the changes in traffic flows within the ward, see section 7.3 Traffic in this chapter.</p>
<p>Public transport</p>	<p>Buses</p> <p>There would be no changes to journey times predicted resulting from construction activities.</p> <p>Rail</p> <p>There would be no changes in journey times to Gravesend station resulting from construction activities.</p>	<p>Buses</p> <p>There would be no required changes to bus routes once the project is operational and no changes to journey times are predicted.</p> <p>Rail</p> <p>There would be no operational impacts on rail services in the ward once the project is open and no changes in journey times to Gravesend station.</p>
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>Five footpaths would be impacted during the construction of the southern tunnel entrance, the Southern Tunnel Entrance Compound and the new road, with each footpath needing to close for five and a half years.</p> <p>Mitigation</p> <p>Due to the proximity of these footpaths to the works, diversions would not be possible during construction.</p>	<p>Impacts</p> <p>Works on the southern tunnel entrance and the road in this ward would mean footpaths and bridleways would be diverted during construction, with some being permanently realigned.</p> <p>Mitigation</p> <p>Realigned footpaths and cycle routes would link up to the existing local network, including new routes through the proposed Chalk Park recreation area.</p>

Topic	Construction	Operations
<p>Visual</p>	<p>Impacts</p> <p>Construction activities would be visible from the eastern edge of the Riverview Park residential area adjoining Thong Lane, the playing fields and golf course north-east of Cascades Leisure Centre and local footpaths.</p> <p>Due to local footpath closures during most of the construction period, the view of the Southern Tunnel Entrance Compound would be limited.</p> <p>Mitigation</p> <p>Taller structures within the Southern Tunnel Entrance Compound would be located as far away as possible from residential properties.</p>	<p>Impacts</p> <p>Once the project is complete and in operation, the views from most residential properties would be limited, as the new road would be located low in the landscape, in a cutting, beyond the new Chalk Park.</p> <p>Views from the diverted footpath, new flood compensation ponds, the new green bridge on Thong Lane and new Chalk Park would be visible. The diverted overhead lines would be visible but be similar to the existing.</p> <p>Mitigation</p> <p>The creation of Chalk Park and associated landscaping would soften the views in this ward.</p>
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with the proposed A2/M2 junction, southern tunnel entrance, main alignment and utility works is expected to create noise. There would also be 24-hour, 7-day construction working in some locations. There would be negligible changes in noise from road traffic for a majority of roads within this ward during the construction period, except along Vigilant Way where minor increases in noise levels have been predicted.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled by mitigation measures set out in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>There would be increased levels of noise in the eastern part of Riverview where the new road would be located. Noise levels would also increase from existing roads due to the changes in traffic flow, speed and vehicle type.</p> <p>Mitigation</p> <p>Low noise road surfaces would be installed on all new and resurfaced roads, plus noise barriers would be installed. The design of the new road and tunnel entrance /exit has been kept low in the environment (this controls the noise).</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>There is likely to be dust and emissions from construction equipment and traffic during the construction phase.</p> <p>Our analysis of construction traffic predicts that there are no anticipated changes in traffic between 2024 and 2029 in this ward, there would be a negligible change in air quality as a result of construction traffic.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures which are presented in the CoCP and REAC to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant Local Authorities. The plan would include details of monitoring to ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>As there are no predicted exceedances, no mitigation has been proposed.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenities as a result of road closures. Thong Lane would be especially affected. Noise would increase as a result of construction traffic and from construction traffic locations. Access to open spaces, like Claylane Woods, Michael Gardens Play Area and various footpaths could be impeded during construction.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to dust emissions, working hours, visual screening, traffic management measures and community engagement. This includes the establishment of Community Liaison Groups.</p>	<p>Impacts</p> <p>There would be less road traffic noise at Riverview Park in proximity of the A2.</p> <p>There would be improved accessibility to open spaces, such as the new Chalk Park, green bridges and a network of improved routes for walkers, cyclists and horse riders. There would be increases in road traffic noise at Riverview Park and Thong Lane to the north of the A2. Some residents within the ward may be concerned about perceived changes to air quality and noise.</p> <p>Mitigation</p> <p>Low noise road surfaces would be installed on all new and affected roads. Acoustic screening (noise barriers) has been incorporated into the design where necessary.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project would involve the removal of areas of habitat, both temporarily and permanently. These habitats are home to protected and notable species including dormice and reptiles. Habitats would also be fragmented.</p> <p>Mitigation</p> <p>Vegetation clearance would be carried out during the winter where possible. Protected species would be moved away outside of the construction working area under a Natural England licence. Boxes to support dormice and birds would be put up within the retained habitats.</p>	<p>Impacts</p> <p>The operation of the new road could cause mortality of species by encountering road traffic, habitat fragmentation, and disturbance from traffic.</p> <p>Mitigation</p> <p>The land used to accommodate the Southern Tunnel Entrance Compound would be landscaped to create Chalk Park. This new habitat would be suitable for a number of species. Landscape planting would provide strong links for animals to move and forage along. A green bridge (provided immediately south of the Riverview ward) would also be installed.</p>
<p>Built heritage</p>	<p>There are no buildings of historic relevance identified within Riverview ward in relation to the project.</p>	
<p>Contamination</p>	<p>Impacts</p> <p>There are potential sources of contamination in this ward, based on land uses. Construction activities could mobilise these contaminations. Part of a construction compound falls within this ward where stockpiling may occur as well as storage of materials and chemicals, meaning there is a potential risk of accidental spills.</p> <p>Mitigation</p> <p>To reduce this risk, the contractor would follow good practice construction measures. Work near to the former Esso petrol station would be discussed with the Environment Agency.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>If during operation any incident were to occur which resulted in localised contamination, soils which had become significantly affected would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters (REAC Ref. GS019).</p>

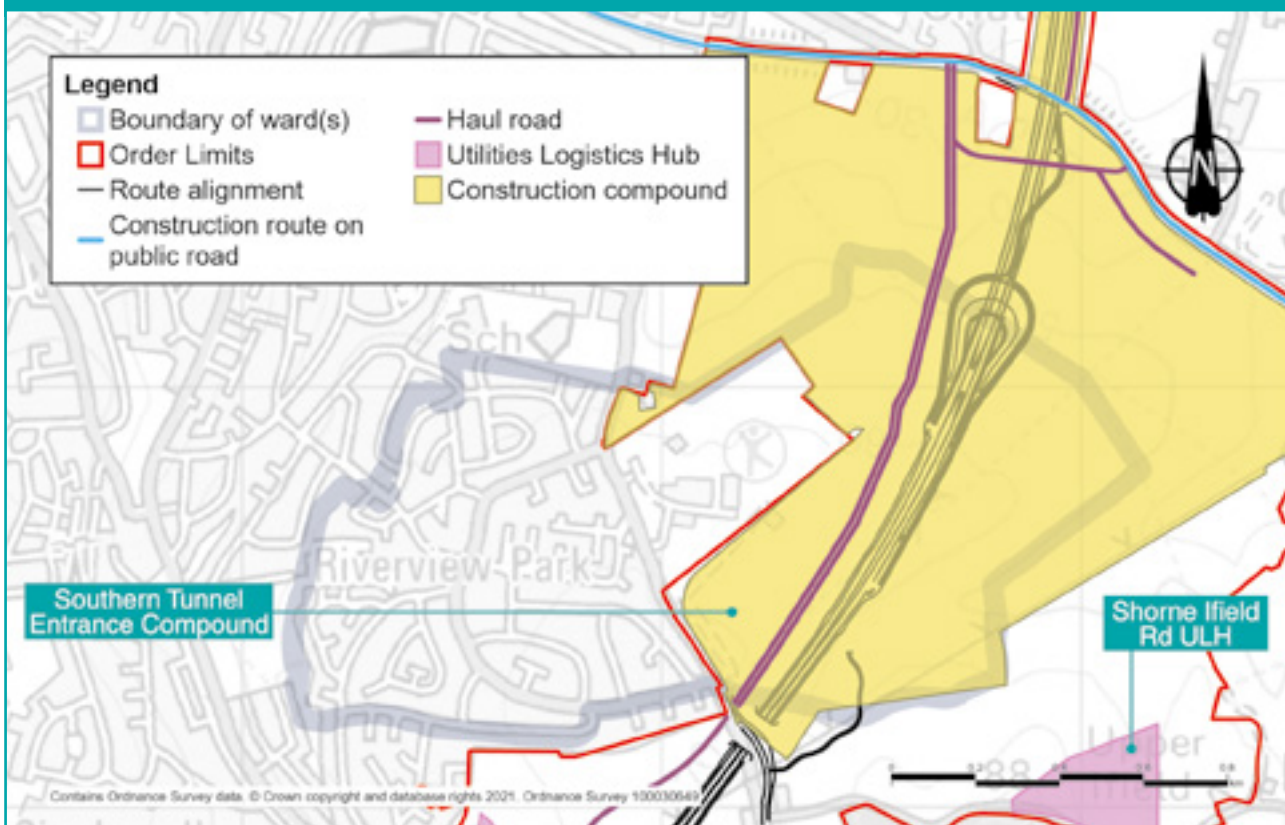
7.2 Project description

7.2.1 Construction

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

Nearly half of Riverview ward would be within the Order Limits (the area of land required to construct and operate the project, formerly known as the development boundary), and this land would be needed for the duration of the construction period. The land that is currently used for recreational purposes would be used for part of construction of the Southern Tunnel Entrance Compound and a haul road, which would be used to construct the southern tunnel entrance and its approach. The haul road would allow the movement of machinery and materials to the compound and around the worksite, reducing the construction traffic using public roads.

Figure 7.2: Key construction areas within Riverview ward



Construction compounds

The Southern Tunnel Entrance Compound is needed for the construction of the main tunnels and the southern tunnel approaches. It would remain in place throughout the construction period to provide facilities including accommodation, vehicle parking accommodation, vehicle parking, and an area for equipment and materials. This would involve ground works, tarmacking, and the installation of perimeter fencing.

Running along the north of the Southern Tunnel Entrance Compound's boundary (but outside Riverview ward), the A226 Gravesend Road would be used by construction traffic to access the compound. The compound could also be accessed from the A2 to the south via other haul roads. However, for much of the construction duration there would not be access across Thong Lane and therefore the A226 would be the primary access route. The reasons we have located in this location are set out in chapter 2 of the Construction update. Both the compound and the haul roads would be decommissioned once construction is complete.

The vehicles going to the Southern Tunnel Entrance Compound are shown in table 7.2. These vehicles would enter the compound from the A226 and would not travel on public roads through Riverview ward. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 7.2: Average daily vehicle numbers going to compounds in Riverview ward

Time period	Southern Tunnel Entrance Compound	
	HGVs	Cars
January to August 2024	30	77
September 2024 to February 2025	36	201
March to May 2025	39	201
June to October 2025	39	281
November 2025 to March 2026	39	335
April to August 2026	39	317
September 2026 to March 2027	39	358
April to November 2027	39	378
December 2027 to March 2028	39	310
April to July 2028	30	209
August 2028 to December 2029	8	25

Utilities

Chapters 3 and 4 of the Construction update provide an overview of how existing utilities would be affected by our plans to build the new road.

Construction schedule

Construction of the whole project is scheduled to last for six years from 2024 to 2029. To help deliver the construction programme as efficiently as possible, construction activities would be divided into packages of work delivered in a coordinated way. Indicative maps and programmes for the tunnels can be found in chapter 4 of the Construction update.

Starting in early 2024, the main tunnelling works would last until 2029. Construction of the tunnels would use two tunnel boring machines (TBMs) operating from north of the river to the south, as well as tunnel fit-out, earthworks and landscaping. The main road alignment works would be carried out between early 2024 and early 2028 and would involve the construction of the project's main highway within a deep cutting. The deep cutting would require substantial excavation and earthmoving activity. The busiest period of construction is expected to be between late 2025 and early 2028 when many of the tunnel and road-building activities would take place at the same time.

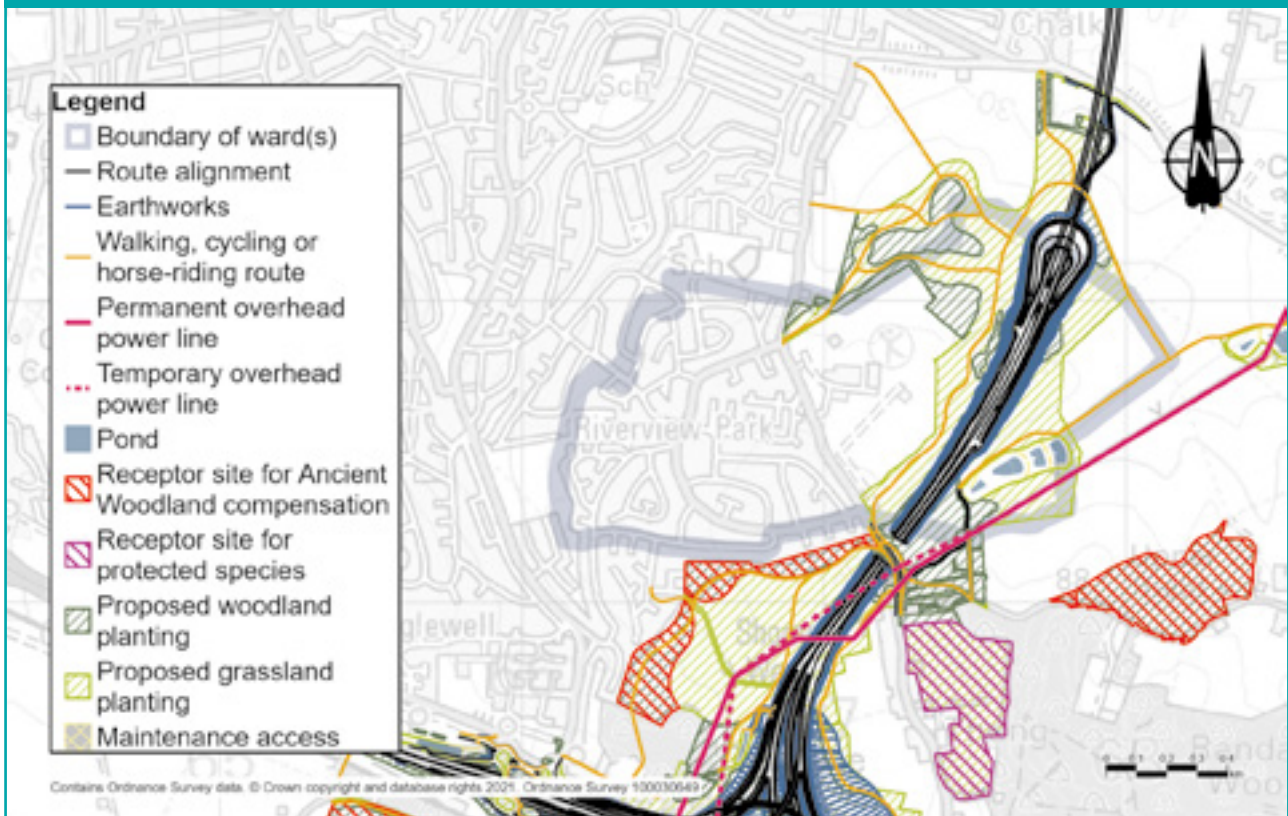
Construction working hours

Tunnelling activities would be carried out 24/7 to improve safety and speed up the project's completion overall. Within the ward, above-ground tunnelling activities taking place 24/7 would include the breakthrough of the TBM into the Southern tunnel entrance and the removal of the TBM. Most of the remaining works at the Southern Tunnel Entrance Compound would be during core hours from 7am to 7pm weekdays and 7am to 4pm on Saturdays, with additional repair and maintenance periods (if needed) from 8am to 5pm on Sundays. There are some circumstances, such as concrete-pouring work, where core construction hours may be extended. More information about working hours is set out in the Noise and vibration section below and in the CoCP.

Traffic management

There are no traffic management measures planned within the Riverview ward. However, there would be traffic management measures outside Riverview ward that would impact traffic on the road network within the ward. We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

Figure 7.3: Main features of the completed project in Riverview ward



7.2.2 Operations

The completed project

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements. The following elements of the project would lie permanently within Riverview ward once the project is complete.

- The southern tunnel entrance would be situated to the north-east of where the Southern Valley Golf Club is currently, on land permanently acquired for the project. It would be linked to the A2/M2 by a major highway in a deep cutting. The southern entrance of the tunnel has been moved further south in line with community feedback. The tunnel was extended by 600 metres after our Options Consultation and by an additional 350 metres after Statutory Consultation, lengthening it by 950 metres. This would reduce the visual and noise impacts in Riverview ward.
- A new area of recreational land would be created partially within Riverview ward, and be accessible to local communities once the new road is complete. Covering 37 hectares, Chalk Park would feature woodland planting with views to nearby Areas of Outstanding Natural Beauty (AONB) and the River Thames. A map showing Chalk Park and other areas of open space land can be found in chapter 3 of the Operations update. Information about new footpaths and bridleways in this area can be found in the Footpaths, bridleways and cycle routes section below.
- Some footpaths and bridleways would be rerouted permanently as part of our proposals for 46km of upgraded, diverted, extended or entirely new walking paths, cycle paths and bridleways to benefit communities along the route. These footpaths and bridleways would link up with the existing network, with some passing through or linking to the proposed Chalk Park area. For more information, please see the Impacts on footpaths and bridleways section below.
- A series of four flood mitigation ponds would be built to the north-east of the Thong Lane green bridge. These would help reduce the risk of flooding as a result of the project, which would reduce the likelihood of flooding causing congestion in the local area.

Impact on open space land

Within Riverview ward, there are no proposals to remove or replace open space land.

Impacts on private recreational facilities

Within Riverview ward we are proposing to permanently acquire the Southern Valley Golf Club for the new road and for landscaping. We are not proposing to replace the golf club. Instead, we propose to create a new public parkland area on part of the site that would be open to the public after construction.

Additionally, we propose to permanently acquire part of the Gravesend Golf Centre facility for the landscaped parkland around the southern tunnel entrances. At the previous consultation we said we were proposing to provide a replacement golf facility to the south-east of the Cascades Leisure Centre, which would enable the Gravesend Golf Centre business to continue. We are, however, engaging with Gravesham Borough Council and the current operator regarding a potential proposal to replace the golf facility on land within the site of the Cascades Leisure Centre, which is currently used as football pitches. That proposal, if agreed, would be delivered separately to the project. If a golf facility is provided on that site instead, we would seek to provide football pitches on the land to the south-east of the Cascades Leisure Centre, rather than provide a golf facility on that land as proposed at the design refinement consultation. If the potential proposal being discussed with Gravesham Borough Council is not implemented, and a golf facility is not provided on that site, we would provide a replacement golf facility as previously proposed.

More information about our proposals for impacts on private recreational facilities, including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

7.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the project's construction and once it is operational. Information about how we carried out these assessments can be found in chapter 1.

7.3.1 Construction

Construction impacts

There would be occasional night or weekend closures on the southern section of Thong Lane between Vigilant Way and the A2, which may cause traffic to reroute through Riverview Park to Valley Drive that would have otherwise used Thong Lane. Similarly, lane closures on the southern section of Thong Lane between Vigilant Way and the A2 are planned for around a month and this may cause traffic to reroute through Riverview Park to Valley Drive.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigations and feedback. A summary of the measures introduced to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update. Within Riverview ward, our proposals allow for re-use of excavated materials, and would substantially reduce the need to dispose of excavated material via the road network, thereby reducing the number of HGV movements on the A226 Gravesend Road. For more information about HGV movements, see the Construction update.

7.3.2 Operations

Operational impacts

Traffic modelling has been carried out to predict the change in traffic flows on roads in the area, including those within or on the boundary with Riverview ward for the first year of operation, 2029.

Figures 7.4, 7.6 and 7.8 show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 7.5, 7.7 and 7.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

The project runs through the east of the ward, through the area currently used by the Southern Valley Golf Course. Within the rest of the ward in the morning and interpeak periods most roads would have a predicted change in traffic levels of more or less than 50 PCUs an hour, with the exception of a very short section of Leander Drive (between St Francis Avenue and Marling Way) which would see an increase of between 51 and 250 PCUs southbound. This would be under a 10% increase in flows in the morning peak and up to a 40% increase in the interpeak period. In the evening peak, Thong Lane (south of Leander Drive) would see a predicted increase in traffic northbound of between 51 and 250 PCUs (between a 20% and 40% increase) and a decrease southbound of between 249 and 50 PCUs (more than a 40% decrease). Southbound on Leander Drive as far as Marling Way, and then on Marling Way itself, predicted flows would increase by between 51 and 250 PCUs, which would be between a 20% and 40% increase, other than a very short section of Leander Drive, which would see an increase of over 40%.

Figure 7.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

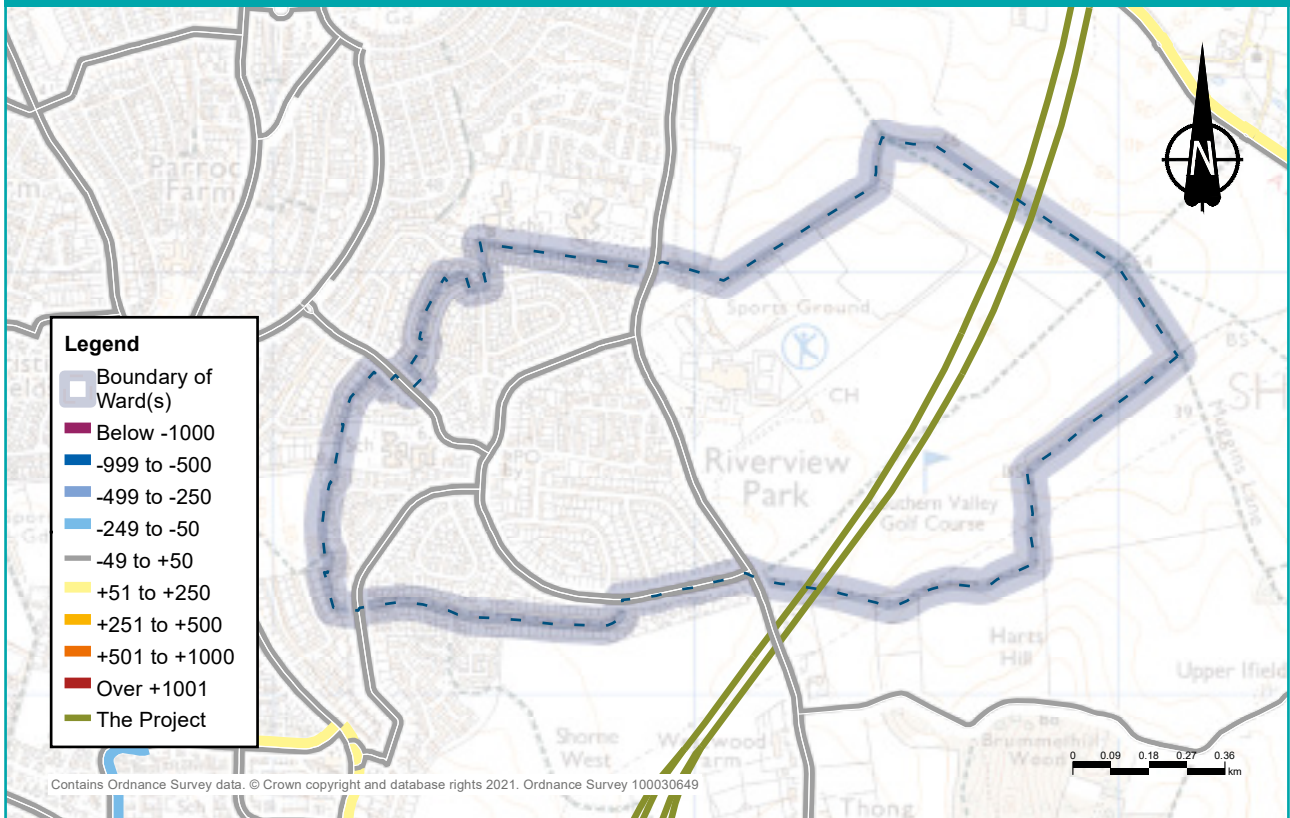


Figure 7.5: Predicted percentage change in traffic flows with the project during the morning peak in 2029

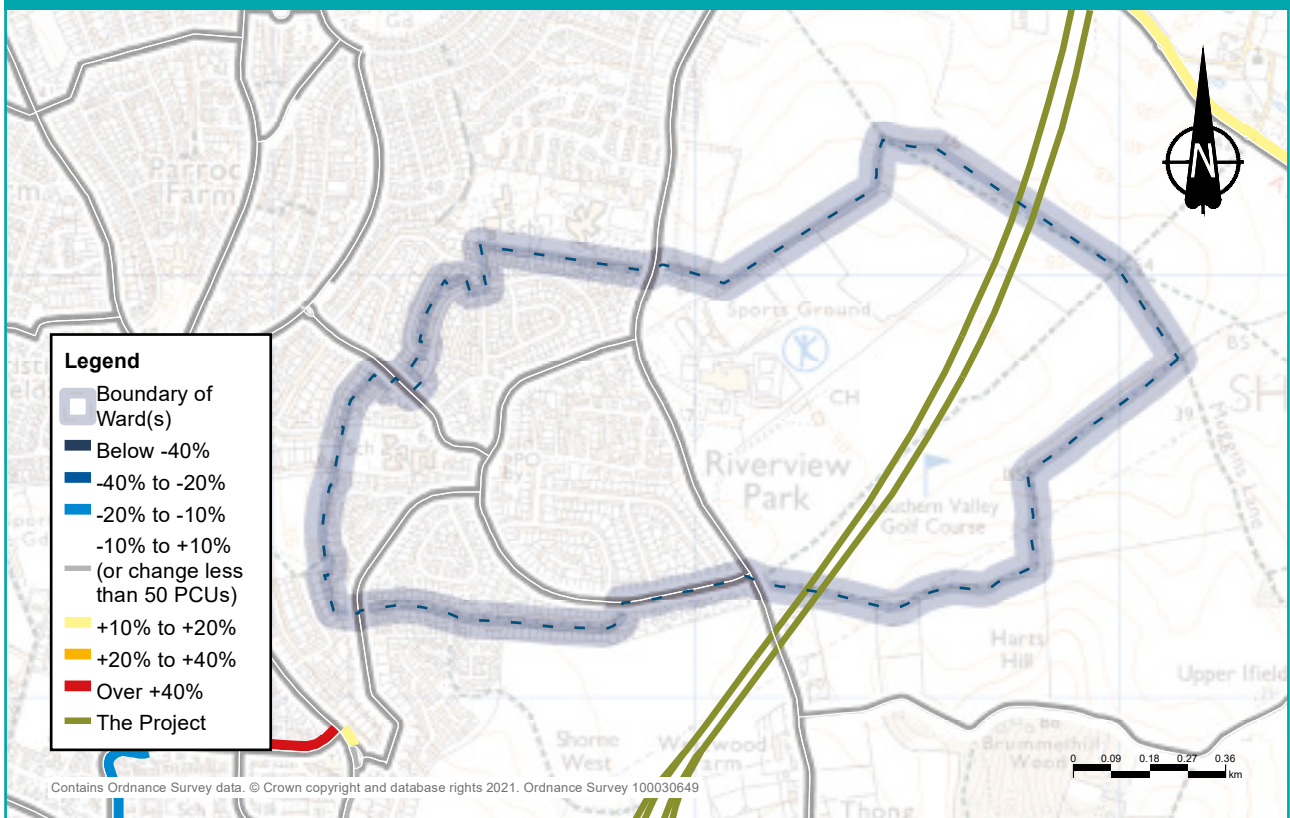


Figure 7.6: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

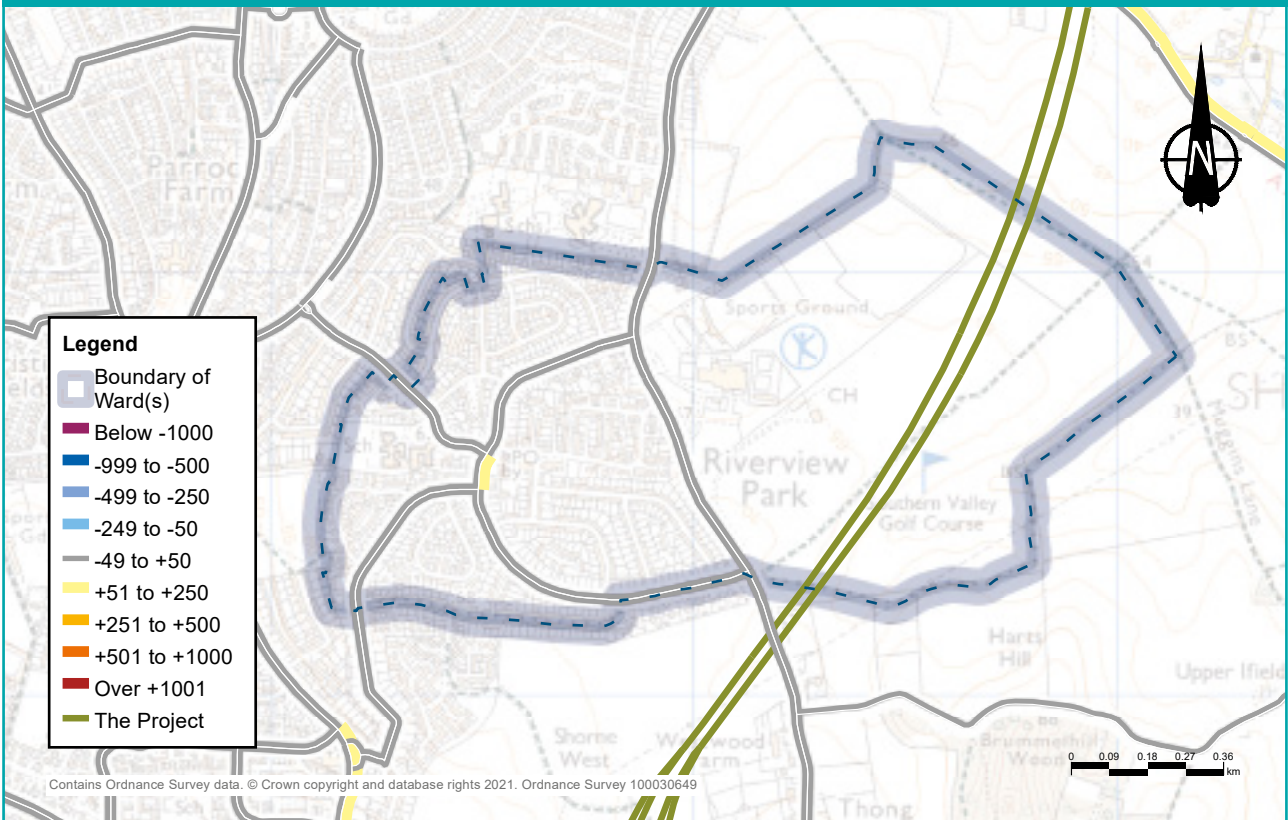


Figure 7.7: Predicted percentage change in traffic flows with the project during the interpeak in 2029

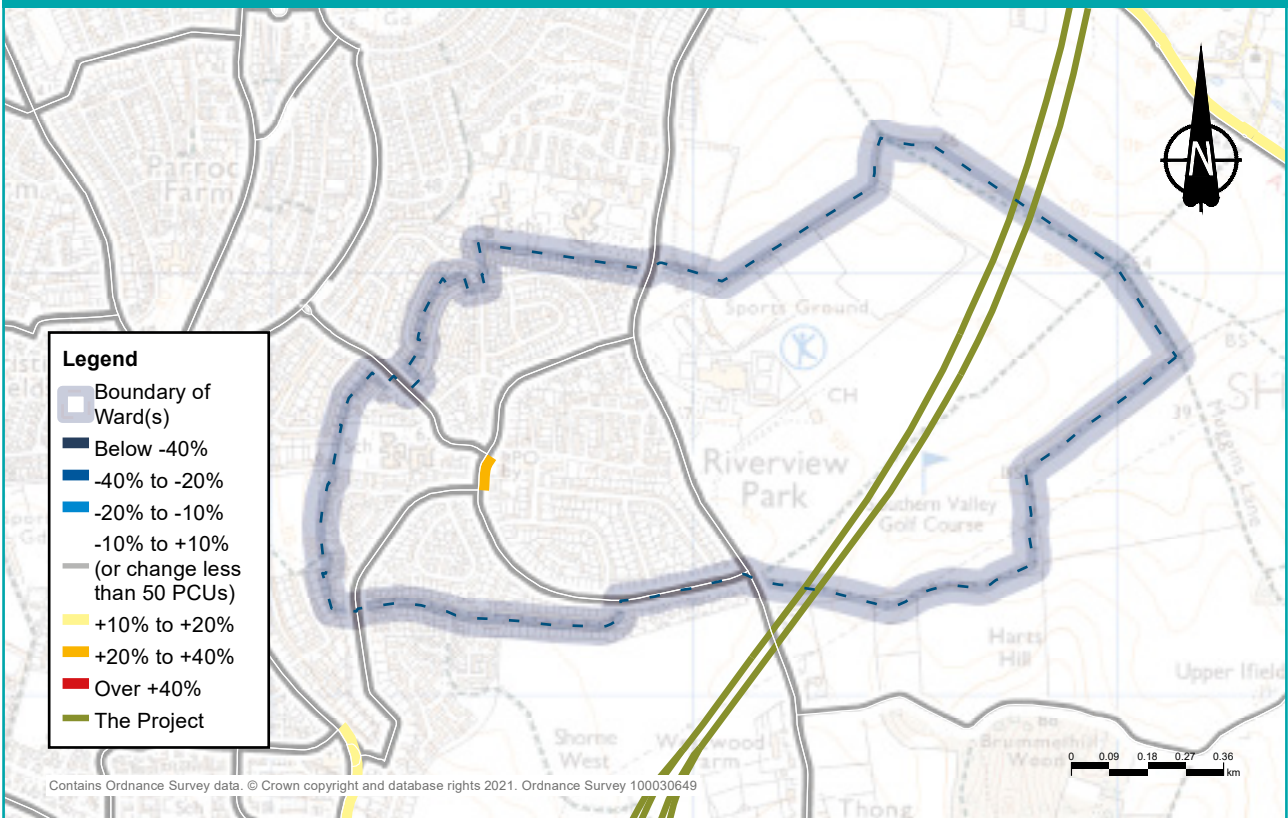


Figure 7.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

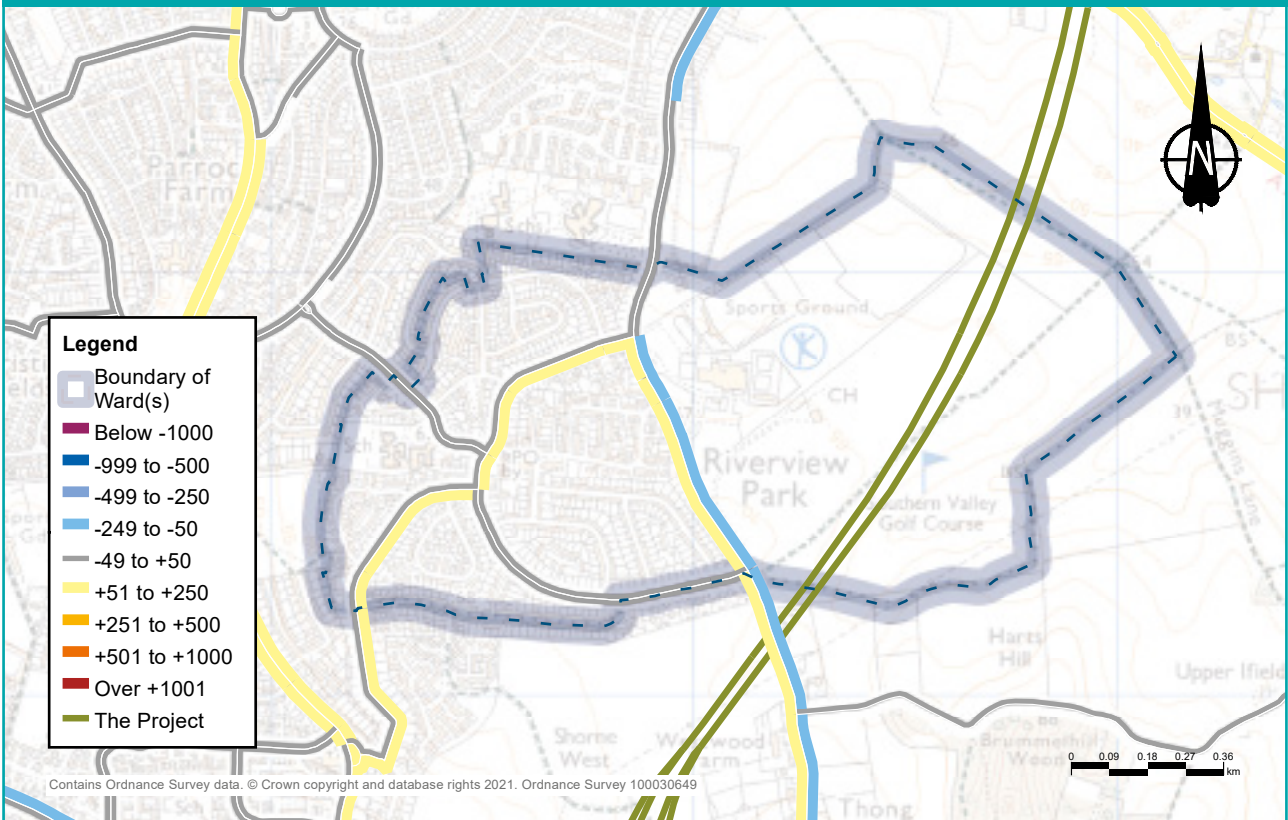
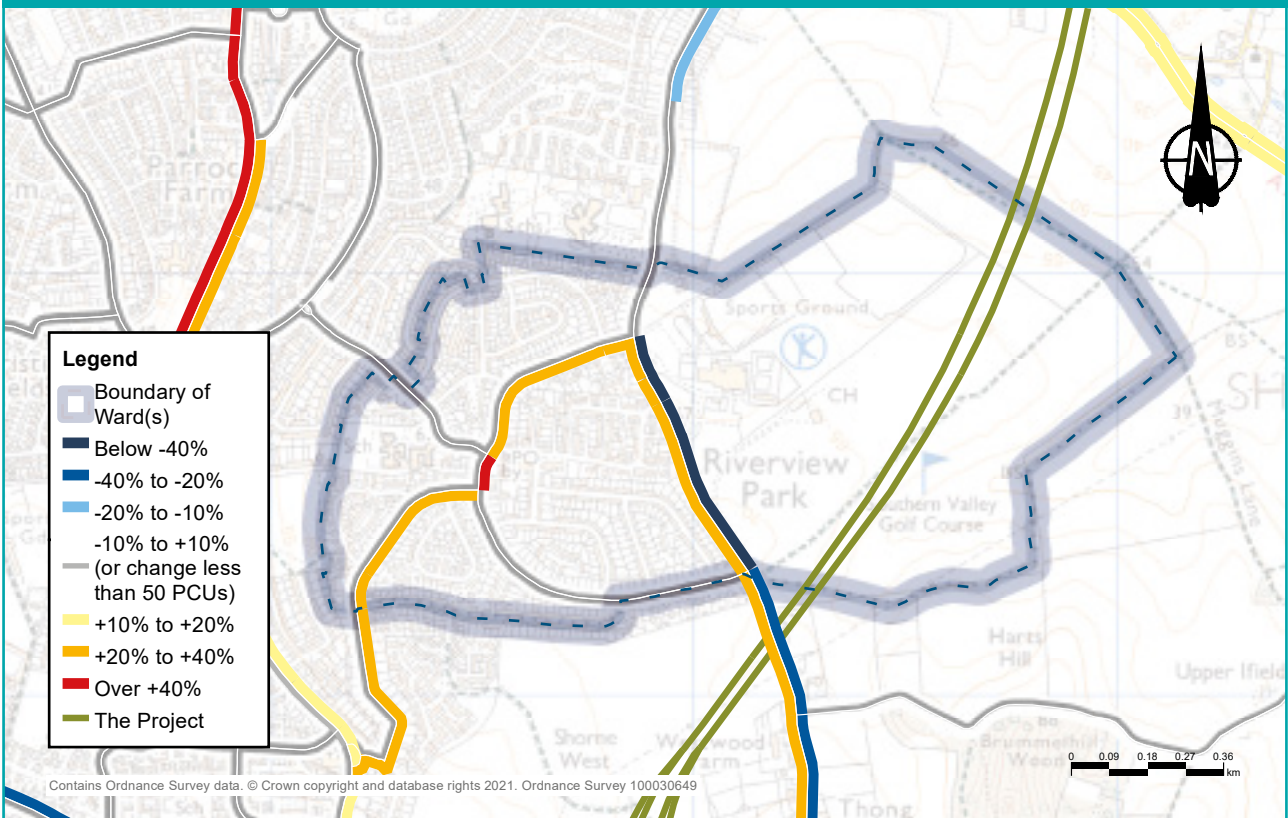


Figure 7.9: Predicted percentage change in traffic flows with the project during the evening peak in 2029



Changes to journey times

Figure 7.10 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with the project. Figure 7.11 shows the change in areas that could be reached within a 60-minute drive. The areas have been calculated for the morning peak hour (7am-8am). The number of jobs within a 30-minute drive with the project in place increases by 28%, which would mean access to an additional 94,400 jobs with the project. Within a 60-minute drive, the number increases by 35%, which would mean access to an additional 730,000 jobs.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.

Figure 7.10: Change in area that motorists could drive to within 30 minutes from Riverview ward

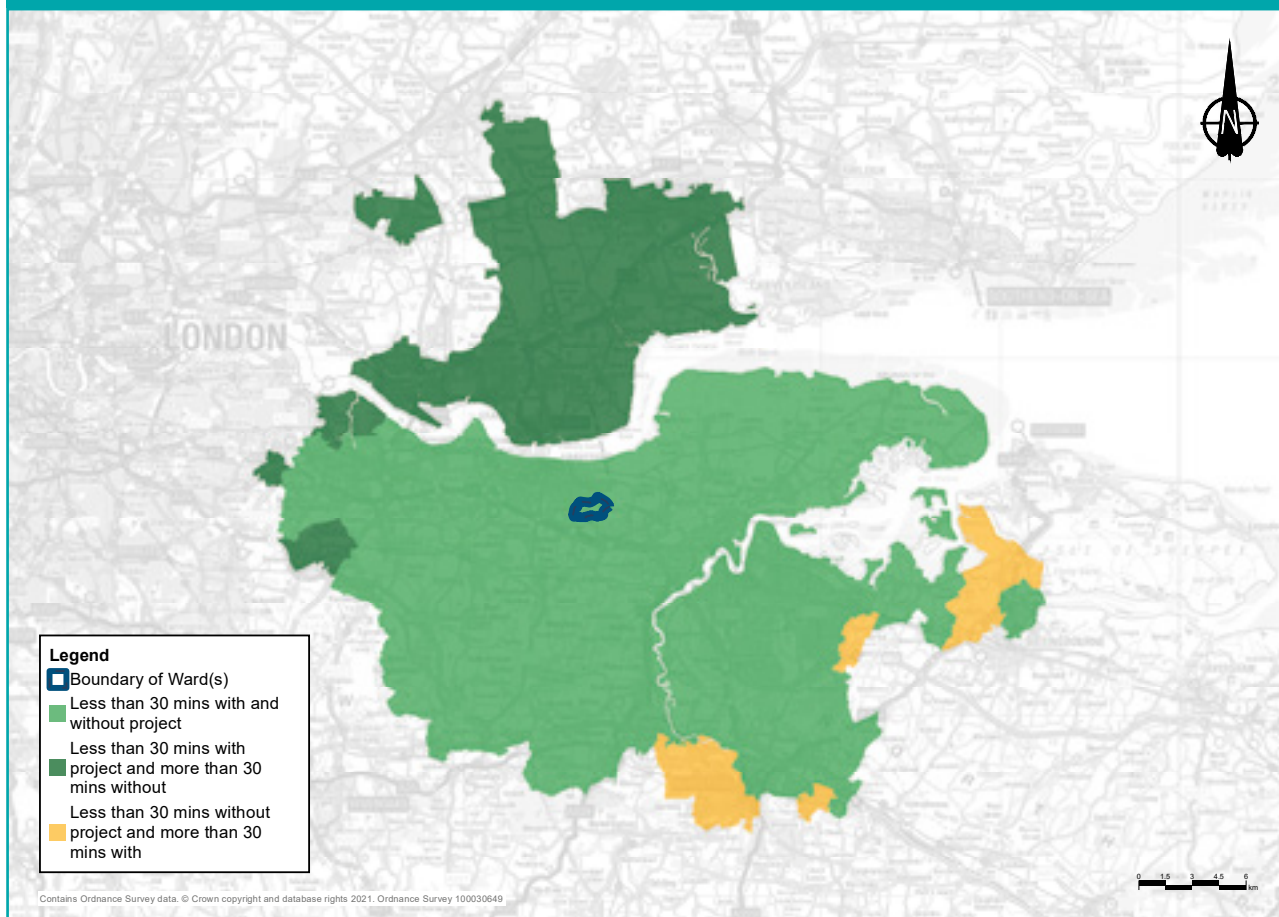
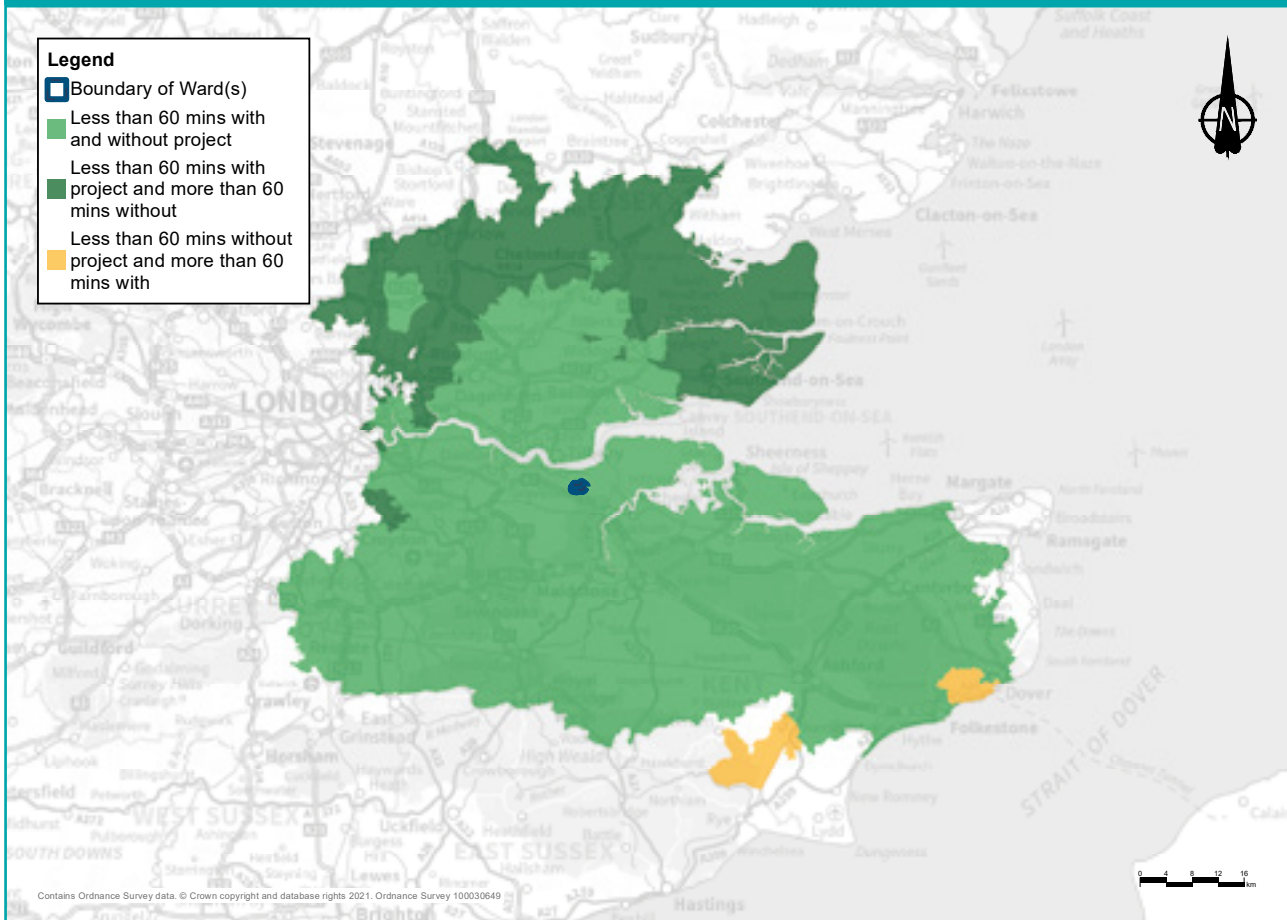


Figure 7.11: Change in area that motorists could drive to within 60 minutes from Riverview ward



Operational traffic flows

There are several ways that the project has been designed that seek to reduce traffic impacts in this ward, including free-flowing connections with the M2/A2 and increased capacity at the Gravesend East junction.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

7.4 Public transport

Existing situation

There are no railway lines or stations in Riverview ward. A number of existing bus routes pass through the ward.

7.4.1 Construction

Rail

Access to Gravesend station for the residents of Riverview ward would not be affected during construction.

Buses

Bus routes within Riverview ward would not be affected during construction.

7.4.2 Operations

Rail

There would be no discernible change in local access times to Gravesend station and no change to the rail services there either.

Buses

There would be no changes required to bus routes through the ward once the project opens and no discernible change to bus journey times.

7.5 Footpaths, bridleways and cycle routes

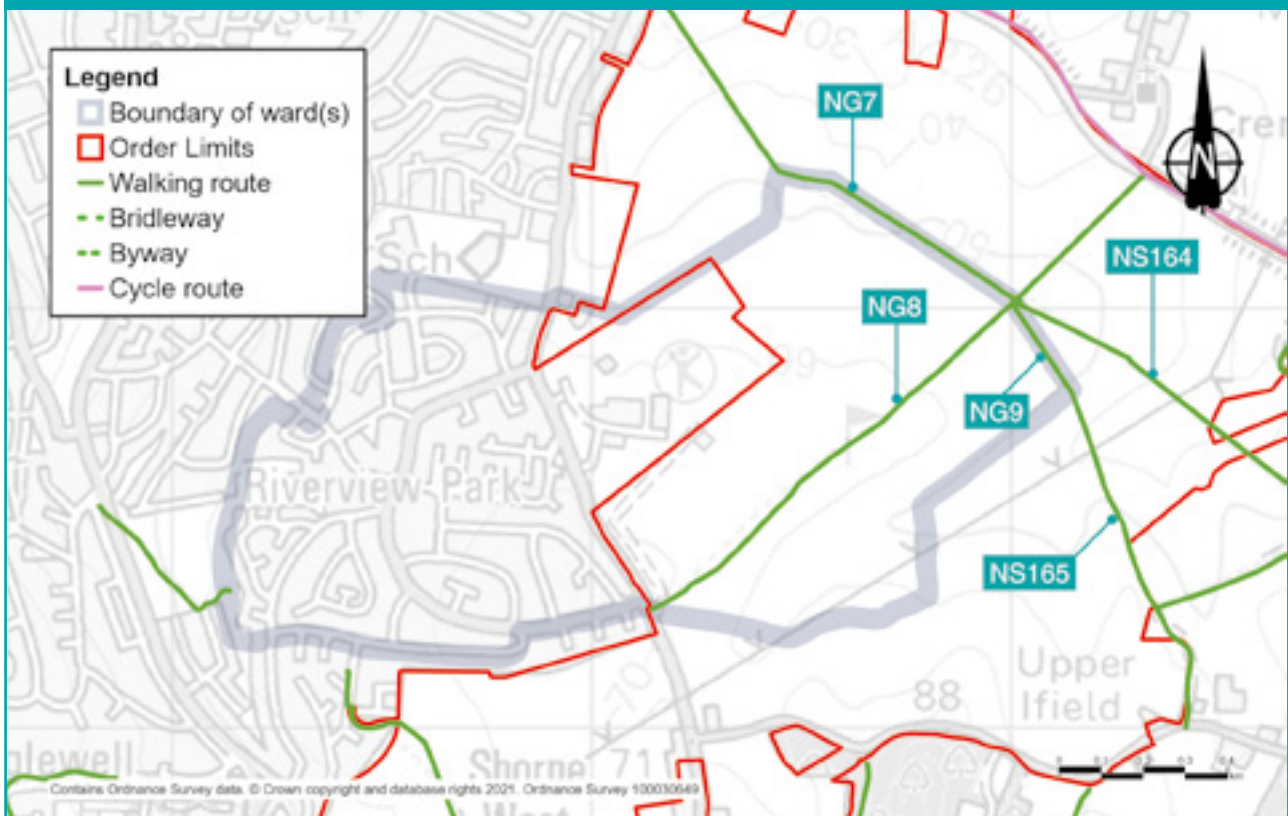
Existing situation

Riverview ward is part-suburban, part-countryside ward with one main footpath that connects the two areas. The following footpaths would be diverted or closed during construction of the project. For other potential impacts, see the other topic areas in this chapter, such as Visual and Noise and vibration.

7.5.1 Construction

Due to the extensive construction activities in this ward, there would be significant changes to the network of footpaths and bridleways during this period. For more information about the proposed network of footpaths and bridleways once the project is complete (including a map), see the Operations section below. For potential additional impacts, see the other topic areas in this chapter, such as Visual and Noise and vibration.

Figure 7.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Riverview ward



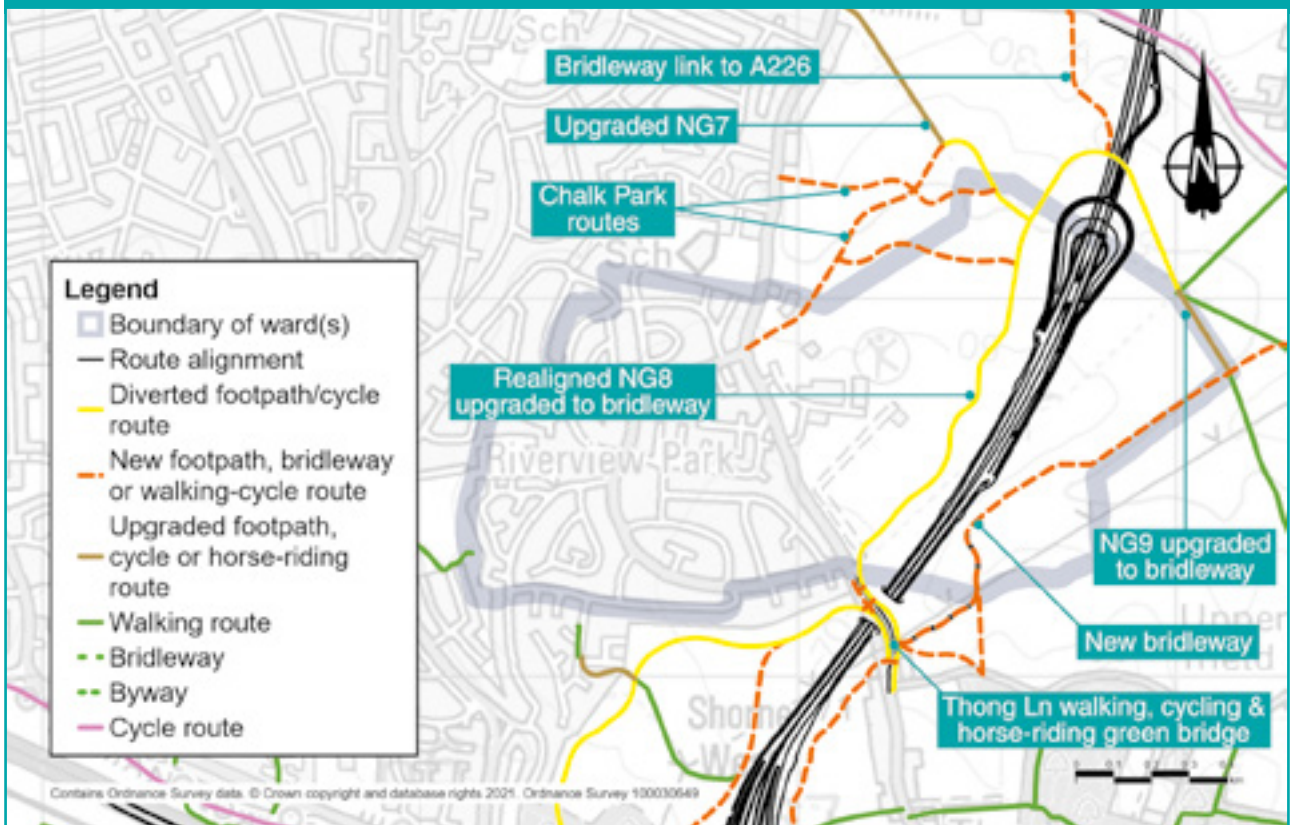
- Footpath NG7 would be closed for five and a half years due to construction of the southern tunnel entrance and approach, until the diversions through the new Chalk Park recreational area are opened.
- Footpath NG8 would be affected by the construction of the southern tunnel entrance and the road linking it to the proposed A2/M2 junction. This footpath would be closed for five and a half years until it is realigned as a bridleway running from the Thong Lane green bridge to the southern tunnel entrance.
- Footpath NG9 would be closed for five and a half years while tunnel and utility works take place.
- The sections of footpaths NS164 and NS165 within the Order Limits would be affected by the Southern Tunnel Entrance Compound, requiring a closure of five and a half years.

7.5.2 Operations

Overall, the project's proposals for walking, cycling and horse-riding include more than 46km of diverted, extended, upgraded or new footpaths and bridleways. The proposals were developed after consultation with local communities and stakeholders. An overview of the proposed improvements to footpaths and bridleways across the project can be found in our Operations update.

- Footpath NG7 would be realigned through the new Chalk Park recreational area, linking to new routes there. It would also link to the realigned and upgraded bridleway NG8 that passes around the north of the southern tunnel entrance. A map showing Chalk Park can be found in chapter 3 of the Operations update.
- Footpath NG8 would be upgraded to a bridleway and realigned from the Thong Lane green bridge around the north of the south tunnel entrance, providing connections to new and existing footpaths, including routes through Chalk Park, a new bridleway to the A226, and the upgraded NG9 bridleway.
- New Public Rights of Way connections would be made from the realigned NG8 through Chalk Park to Thong Lane.
- Footpath NG9 would be upgraded to a bridleway when it reopens. Its western end would link to the realigned NG8, which routes around the southern tunnel entrance. Its eastern end would link to new bridleways heading south to Thong Lane and Shorne Ifield Road and north to the A226, as well as existing footpaths NS164 and NS165.

Figure 7.13: Proposed footpaths, bridleways and cycle routes in Riverview ward



7.6 Visual

Existing situation

Views towards the land on which the project would be built from the main populated area are principally seen from the eastern edge of the Riverview Park residential area adjoining Thong Lane. Other views of the project include those from the playing fields and golf course north-east of Cascades Leisure Centre and the local footpath and bridleway network.

Some views from Riverview ward include open views from some homes across the Southern Valley Golf Club. Other views are limited by vegetation in the grounds of Cascades Leisure Centre. Views towards the Order Limits from the playing fields and golf course north-east of the leisure centre are partially screened by existing vegetation.

Views from the local footpath and bridleway network include arable land on sloping ground backed by surrounding trees and the urban area of Gravesend, as well as extensive distant views northwards towards the Thames Estuary and beyond.

7.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

The main construction activities likely to be seen from this ward are:

- Formation and operation of the Southern Tunnel Entrance Compound.
- Utilities diversions, including the removal of an existing overhead line.
- Construction of the Thong Lane green bridge over the project.
- Excavation of the deep cutting for the southern tunnel entrance and main alignment of the new highway project leading to the tunnel.
- Construction of flood compensation ponds.
- Construction of Chalk Park recreational area and other open space east of the southern tunnel entrance.

Views of construction activities from residential areas would be limited to the eastern edge of Riverview Park. This is where much of the open land, east of the urban area would be used for the Southern Tunnel Entrance Compound and deep excavation for the tunnel entrance. There are likely to be limited views of the Southern Tunnel Entrance Compound from the local footpath and bridleway network due to closures for most of the construction period.

Measures to reduce visual impacts during construction

Proposed measures include locating taller structures within the Southern Tunnel Entrance Compound as far as reasonably practical from homes adjoining Thong Lane and Thamesview School. We would use temporary earth bunding on the compound's boundary to reduce its visibility from properties along Thong Lane.

The visual impacts of the project would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

7.6.2 Operations

Operational impacts

The completed project in this ward would mainly comprise the southern tunnel entrance, its approach road in a deep cutting, flood compensation ponds, and open space land east and west of the southern tunnel entrance. More information about the completed project can be found in the Project description above.

The visual impacts of the project from most homes would be limited, because the highway alignment would be in a deep cutting, beyond the newly created Chalk Park area.

There may be some views from the diverted public footpath network towards the upper sections of the chalk cutting slopes. New flood compensation ponds would feature in views from the diverted footpaths and bridleways east of the project. Thong Lane green bridge would be seen from the south (from the diverted footpaths and bridleways), as would the diverted overhead lines, which would be visible and look similar to the existing ones. The new Chalk Park landscaping would be a notable feature in views from diverted footpaths and bridleways.

Measures to reduce visual impacts during operation

The main mitigation in this ward would be the creation of the Chalk Park recreational area and additional open space east of the new southern tunnel entrance, along with landscaping of the flood mitigation ponds.

7.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment within Riverview ward consists mainly of road traffic noise coupled with natural and human activity noise. The main sources of road traffic noise within Riverview ward are from the M2, A2, Thong Lane, and other local roads.

As part of our environmental assessment process, we carried out surveys of existing background noise at some locations which were agreed with the local authority. The nearest baseline monitoring has been carried out in the adjacent ward of Shorne, Cobham and Luddesdown. The background noise levels monitored in this ward recorded existing noise levels in the range of 50 to 65 dB(A)² during the daytime and 47 to 60 dB(A) during the night-time period.

To understand how noise levels would vary with and without the project, we use noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We model this because we cannot assume that noise levels when the project opens would be the same as they are now. For example, our assessment of the opening year noise levels accounts for predicted changes in traffic levels.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

We also model the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if it were implemented.

In the opening year, noise levels without the project are predicted to range, on average, from 41 to 68 dB(A) during the day and from 30 to 55 dB(A) during the night at the identified locations within the ward. As such, our noise assessments predict that, by opening year, noise levels will increase compared with the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

7.7.1 Construction

Daytime construction noise impacts

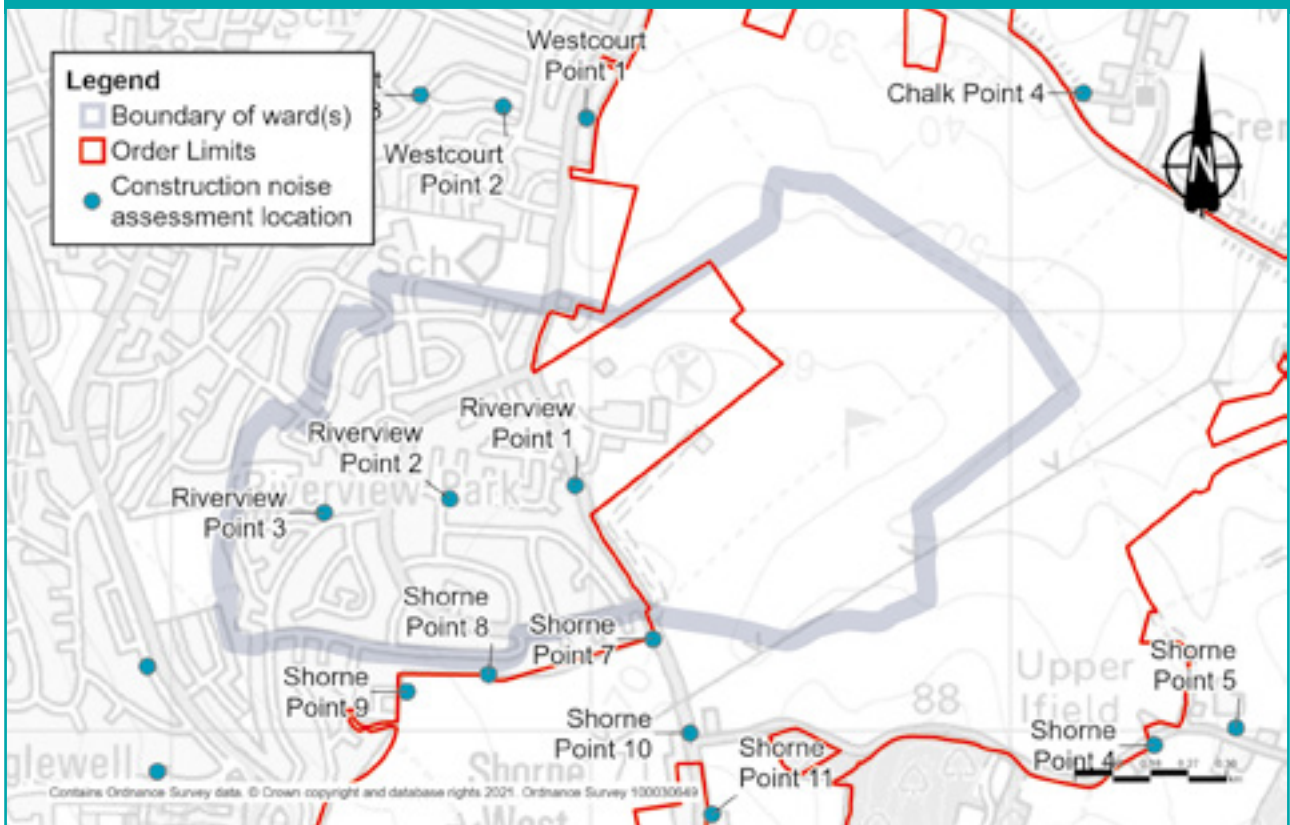
The main daytime construction activities that are expected to give rise to noise and vibration impacts in this ward are those associated with proposed A2/M2 junction, southern tunnel entrance construction and main alignment and utilities works.

Within the Riverview ward, the Southern Tunnel Entrance Compound would be located within the ward boundary. There are no Utility Logistics Hubs currently planned to be located within the ward. There would also be project haul roads built and used during the construction period. Construction activities are summarised in the project description section above.

Construction noise levels have been predicted at three locations across this ward, chosen to provide a representation of the level of noise that communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using the standard units for major projects, dB LAeq (12-hour), which represent the average noise level for the assessed 12-hour daytime period.

Figure 7.14: Construction noise assessment locations in Riverview ward



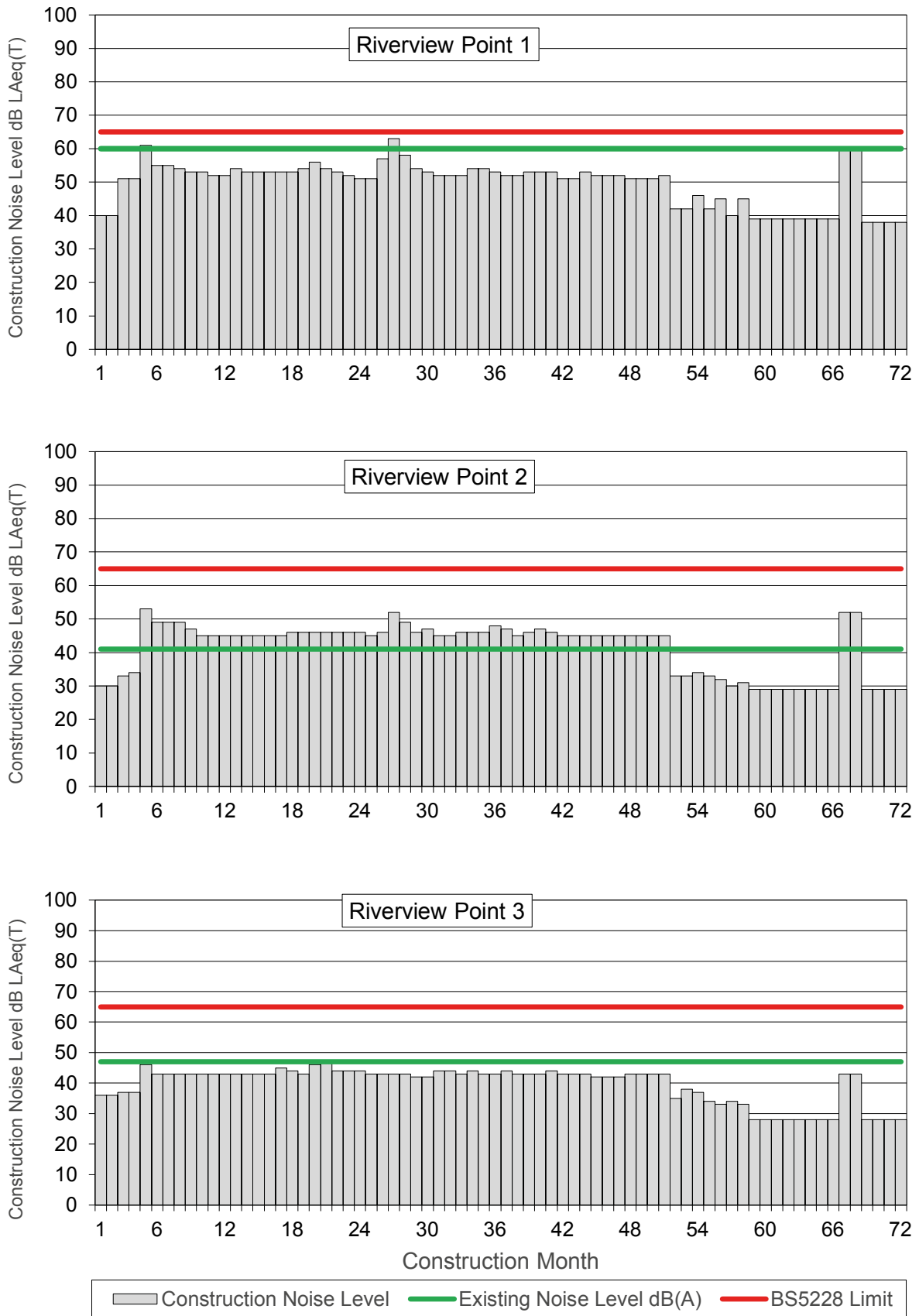
Each vertical bar in Figure 7.15 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart shows the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce the noise.

The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Noise levels would gradually diminish as a result of increased distance, additional buildings and other features screen noise from the more distant residential areas.

With reference to Figure 7.15, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 38 to 63dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately two months. However, they would not breach the defined threshold.
- At point 2, construction noise levels are predicted to range from 29 to 53dB LAeq (12-hour) during the six-year construction programme. Construction noise levels would exceed the existing background daytime noise level for approximately 49 months. However, they would not breach the defined threshold.
- At point 3, construction noise levels are predicted to range from 28 to 47dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.

Figure 7.15: Construction noise by month for points 1, 2 and 3 in Riverview ward



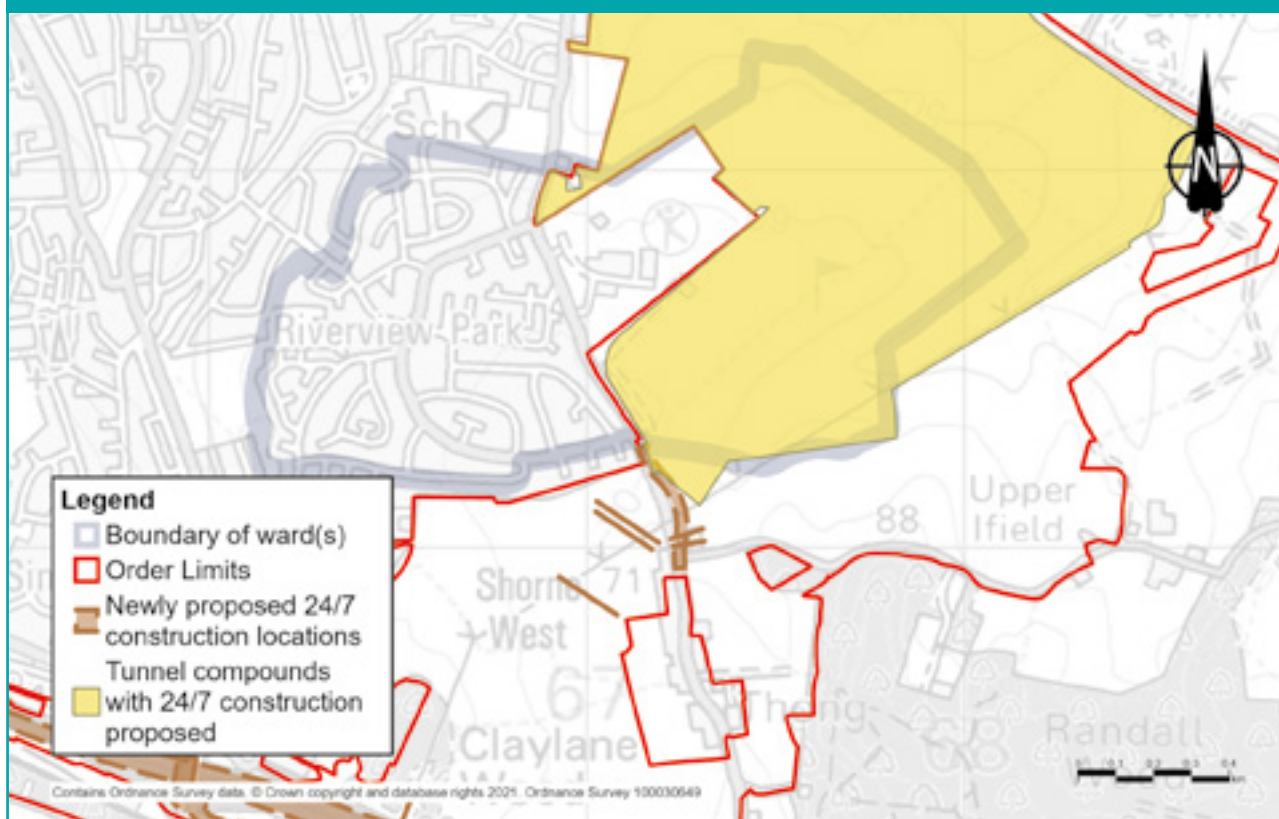
24/7 construction working

In addition to the changes to the daytime noise impacts reported in the section above, 24-hour, seven-day construction working is proposed at the locations shown in figure 7.16. The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and remain part of our current proposals.

These works have been identified as they may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The works in this area are expected to be night-time or weekend highways and utilities works.

These works could have an impact on local communities and we would work with the local authority to manage these impacts.

Figure 7.16: Newly proposed and tunnel 24/7 working locations in Riverview ward



Construction traffic noise impacts

Maps showing the predicted change in road traffic noise within Riverview ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience) during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years, except along the Vigilant Way where minor increases have been predicted to occur of between 1.0 and 2.9dB, as shown in the table below. For more information about how we define noise impacts (negligible, minor, moderate and major) see chapter 1.

Table 7.3: Road where traffic noise impacts are predicted during the construction period

Affected road	Predicted noise impact	Construction years
Vigilant Way	Minor increase in noise levels	3 and 4

Measures to reduce construction noise levels

Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- Installing and maintaining hoarding around the construction compounds.
- Installing temporary acoustic screening around the construction areas likely to generate noise.
- Keeping site access routes in good condition with condition assessments onsite to inspect for defects such as potholes.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant so that loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular power generators and pumps.
- No music or radios would be played for entertainment purposes outdoors onsite.
- Site layout would be planned to ensure that reversing is kept to a practical minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings.

- Non-percussive demolition techniques would be adopted where reasonably practical to reduce noise and vibration impact.
- Careful consideration of the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity as opposed to generators, where possible.
- Minimisation of construction vehicle traffic by, where practical, selection of local suppliers along the project route, using local workforces, thereby minimising material transportation for earthworks construction along the project.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction phase.

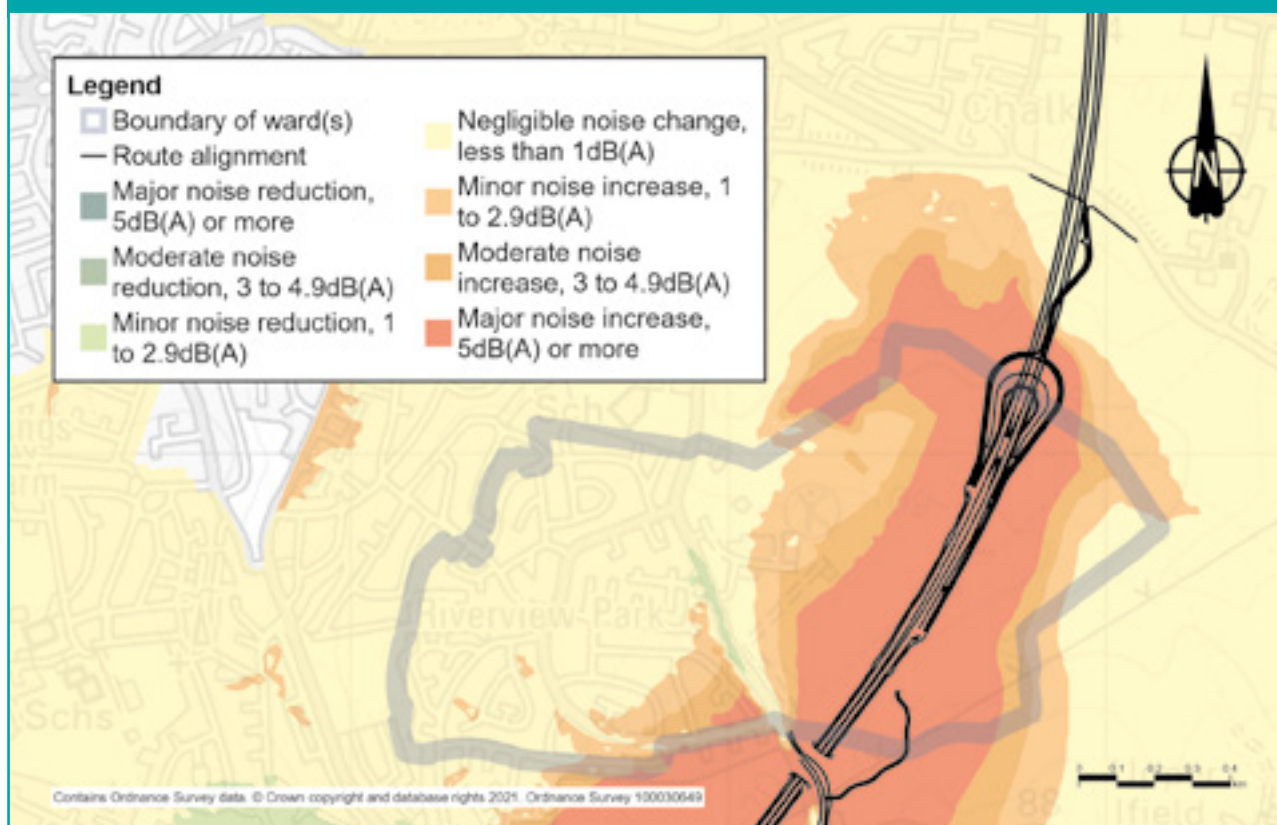
7.7.2 Operations

Operational impacts

Within this ward, the main route runs through the eastern part of the ward as traffic leaves the southern tunnel entrance in a 20-metre deep cutting to the tunnel entrance. There would be direct noise impacts from the new route within the ward. There would also be indirect noise impacts due to changes in traffic flow, number of HGVs, and traffic speed on the existing road network in the ward.

Figure 7.17 on the right shows the predicted changes in operational road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise sensitive receptors are predicted to range from minor reductions in noise levels of between 1.0 and 2.9dB (which is positive) to major increases in noise levels of greater than 5dB (these increases in noise levels would be close to the southern tunnel entrance and the new road).

Figure 7.17 Noise impacts during operation in Riverview ward



Measures to reduce noise and vibration impacts of operations

The main methods of controlling noise would be, where practical, to design the road within landscaped features such as cuttings and bunds (walls of earth). While no noise barriers are proposed within Riverview ward, there are noise barriers proposed that would mitigate impacts in the ward, which are shown in chapter 5 of the Operations update. The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

7.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Riverview ward is not located within an Air Quality Management Area (AQMA). AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls.

7.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties further than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including eastern edges of Riverview Park. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of construction traffic predicts that there are no anticipated changes in traffic between 2024 and 2029, and there would be negligible change in air quality. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

7.8.2 Operation Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

Figure 7.18: Predicted changes in NO₂ levels within Riverview ward once the new road is open



There are no predicted exceedances of air quality thresholds within Riverview ward. There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, along the eastern edges of Riverview Park that are predicted to experience a minor worsening in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within this ward is 20.3µg/m³, which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area, as a result of the project, would not trigger the need for additional monitoring or other mitigation measures once the road is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

7.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

Riverview ward is characterised by an older population (nearly a third of its residents are aged over 60 – a significantly higher proportion than for Gravesham as a whole, and nationally). Deprivation levels are low. More than 90% of residents own their own home.

A high proportion of residents (nearly 85%) report their health status as good or very good (compared with 81.5% of residents of Gravesham as a whole). Life expectancy at birth for residents of Riverview ward is 90.7 years for males and 86.0 years for females (significantly above the UK average life expectancy recorded for 2017-19 of 79.4 years for males and 83.1 years for females).

7.9.1 Construction

Construction impacts

Construction activities affecting Riverview ward residents are presented in the project description section and include the establishment and operation of the Southern Tunnel Entrance Compound; utilities diversions, including the removal of an existing overhead line; construction of Thong Lane green bridge; excavation of the deep cutting for the southern tunnel and approach; construction of infiltration basins; and construction of Chalk Park. Permanent land required during construction works would affect the Gravesend Golf Centre (pitch and putt facility) and the Southern Valley Golf Course. Proposals for the relocation of the Golf Centre are discussed in more detail above. Southern Valley Golf Course would be permanently acquired for the project and therefore no longer in operation as a golf facility.

Thong Lane may be temporarily closed for short periods or times during the construction phase, typically overnight and at weekends. Vehicle access would be maintained from the north off the A226, and vehicle and pedestrian access to Cascades Leisure Centre would be maintained throughout. Further information about construction activities affecting Riverview ward residents is provided in the project description section above. Elements of each of these activities have the potential to impact human health, whether this be through noise associated with construction activities or construction traffic, changes to air quality (as a result of dust emissions), changes to accessibility caused by road or footpath closures, potential severance caused by construction traffic, or through impacts on mental health and wellbeing.

There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. With good communication and engagement, mental health and wellbeing impacts associated with stress and anxiety related to the construction of the project would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section).

As highlighted at the start of this section, different groups of people within the population may be more sensitive to certain factors which potentially affect their health more than others. Some of the changes identified as a result of construction activities may therefore only affect a small proportion of the population. For example:

- Riverview ward residents may experience changes in accessibility as a result of road closures. Thong Lane would be affected by various construction activities, including the diversion of utility services and the construction of Thong Lane green bridge, which would mean traffic management measures might be needed. This may be the case for people who are more dependent on public transport and have less choice about method and route travelled. Impacts on journey times are described further in the Traffic management section.
- Severance. Thong Lane may be temporarily closed for short periods of times during the construction phase, typically overnight and at weekends. Pedestrian access to Cascades Leisure Centre would be maintained.

- Access to open space. Impacts may be experienced by people living on the eastern fringe of Gravesend, who may currently access fields adjacent to Claylane Woods, or the wider countryside via footpaths in the vicinity of Shorne Woods Country Park. The Michael Gardens Play Area is located immediately to the south of Riverview ward and access could be impeded for a short period of time during construction works to upgrade the footpath here. There are several footpaths within the ward (footpaths NG7, NG8 and NG9) which would either be closed or permanently diverted during the construction works. People without access to private vehicles (such as non-car-owning households, children, people with certain disabilities, or people in older age groups) may experience a greater impact, due to fewer alternatives being available to them within an appropriate journey time. People may experience less choice in finding alternative destinations and this may affect the ability of people to undertake physical activity.
- Noise and vibration. Temporary significant adverse effects in relation to noise caused by construction traffic have been identified at receptors in locations including those adjacent to Thong Lane (including Vigilant Way). A negative health outcome has been identified for those who may be affected by changes to the noise environment (for example older people, or people with pre-existing hearing conditions).
- Conversely, local residents may benefit from access to work and training opportunities associated with the project.

Measures to reduce health impacts of construction

Proposed measures relating to health and wellbeing (including good practice for dust emissions, hours of working and visual screening) are described in Riverview chapter in the Visual, Noise and vibration, and Air quality sections. Further information relating to mitigation measures for these areas is set out in the CoCP, the REAC and the package of traffic management plans. The commitments in the CoCP and the REAC include items such as adhering to Best Practicable Means (BPM) to reduce noise impacts (see NV007 in the REAC) and dust-management good practice (see AQ005 in the REAC). More information about these documents can be found in the Consultation guide.

Engagement and effective two-way communication with communities both before and during construction is important in order to reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP sets out proposals for community engagement, including how we would make sure communities, stakeholders and any affected parties are kept informed of the construction works, their progress and associated programme. This includes setting up Community Liaison Groups.

7.9.2 Operations

Operational impacts

Information about the operational project in this ward is provided in the project description section above. Both positive and negative health outcomes may be experienced by residents within Riverview ward. These include:

- Changes to the noise environment. Both adverse and beneficial changes in road traffic noise levels have been identified. Significant adverse noise effects may occur at Riverview Park and Thong Lane to the north of the A2. Significant beneficial effects are predicted at Riverview Park in proximity of the A2. As noted earlier, a negative health outcome has been identified for sensitive populations who may be affected by changes to the noise environment (for example older people, or people with pre-existing hearing conditions).
- Properties within 200 metres (those along the eastern edge of Riverview Park) may experience air quality impacts as a result of changes in traffic flows. Although no significant impacts have been identified in relation to air quality, those that would be more vulnerable to environmental change could include children, older people, and people with respiratory conditions.
- Some residents within Riverview ward may experience negative health outcomes in relation to mental health and wellbeing as a result of the project (for example, relating to anxiety around perceived changes to air quality or actual changes to the noise environment).
- Access to open space. Beneficial health outcomes are associated with improvements to accessing open space, for example through the creation of a publicly accessible country park (Chalk Park), green bridges and a network of improved routes for walkers, cyclists and horse-riders.

Measures to reduce health impacts of operations

No essential mitigation, specifically to address health outcomes, has been identified within Riverview other than mitigation relating to noise and visual impacts described elsewhere.

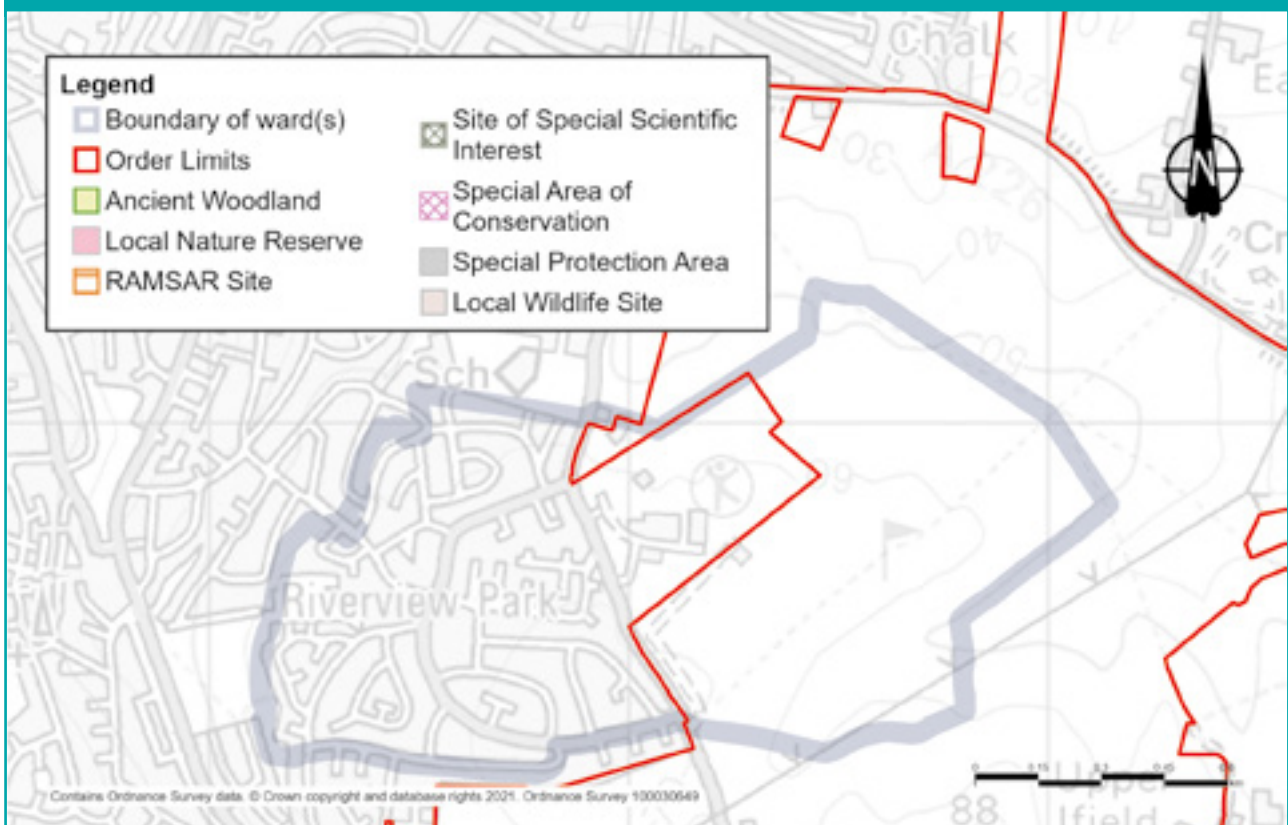
7.10 Biodiversity

Existing situation

Of the habitats present within the Order Limits in Riverview ward, the main area is Southern Valley Golf Course. The golf course habitat consists of short amenity grassland with some areas of rough grassland and scrub. There is a small area of arable field within the Order Limits in Riverview ward. Riverview ward contains no designated or non-designated sites.

We carried out surveys across the project to set a baseline for assessment, and these identified the presence of a range of protected and notable species. Within the habitat present on the golf course, these included reptiles, badgers, and dormice.

Figure 7.19 Designated and non-designated biodiversity sites in Riverview ward



7.10.1 Construction

Construction impacts

The construction activities in this ward are summarised in the project description section above. Construction of the project would require the removal of areas of habitat, both temporarily and permanently, from the route alignment. This habitat consists of areas of arable fields, scrub and rough grassland. This habitat supports protected and notable species which would be impacted by construction in terms of direct habitat loss (the loss of badger setts, dormouse and reptile habitat); fragmentation of habitat (loss of hedgerows); and disturbance to retained habitat.

Measures to reduce construction impacts on biodiversity

Vegetation clearance would be carried out during the winter where possible to avoid the impacts on breeding birds. Where this would not be practical, clearance would be supervised by an Ecological Clerk of Works to ensure that no nests are disturbed or destroyed. Where protected species are present, these would be moved away from the site before any construction activities, either through habitat manipulation (for example strimming to reduce the height of vegetation to displace reptiles), or translocation. Where required, works affecting protected species would be carried out under a Natural England licence. Boxes to support dormice and birds would be erected within retained habitat. To provide habitat connectivity within this area a green bridge would be created over the project immediately to the south of Riverview ward.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

7.10.2 Operations

Operational impacts

The operational activities in this ward are summarised in the project description section above. Operation of the project has the potential to cause mortality of species as a result of them being hit by road traffic, habitat fragmentation, and noise disturbance from traffic.

Measures to reduce operational biodiversity impacts

Once the Southern Tunnel Entrance Compound and nearby haul roads have been removed, the area to the west of the southern tunnel entrance would be landscaped to create Chalk Park, a new recreational area, part of which falls within Riverview ward. Additional open space land would also be implemented east of the southern tunnel entrance. A map showing open space land can be found in chapter 3 of the Operations update. Chalk Park would include a mix of grassland, woodland planting, hedges and hedgerows with trees. This habitat would be suitable for a number of species and would increase the value for terrestrial biodiversity in this area. Landscape planting has been designed to provide strong links for animals to move and forage along, guiding them to safe crossing points over the new road such as the green bridge mentioned above. To mitigate disturbance from traffic, the new road would be in a cutting, north of the A2/M2, reducing noise and visual impacts.

Newly created habitat, including all that created specifically to support animals moved from the construction area, would be managed to ensure that they provide high-quality habitat to support a broad range of different plant and animal species. More information about habitats can be found in Map Book 1: General Arrangements, which form part of our consultation materials.

The impact of operation on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC.

7.11 Built heritage

Existing situation

There are no buildings of historic relevance identified within Riverview ward in relation to the project. The site of a former 19th century farm and World War 2 infrastructure are known to have existed in the area, but these have been demolished in recent times.

7.12 Contamination

From the review of desk-based sources (historical maps and environmental data), potential sources of contamination have been identified based on land uses. Within Riverview ward, the following have been identified:

- Former Gravesend Airport, which covers the majority of Riverview ward. It is a former civilian and military airfield. Former land uses of this site are known or suspected to include aviation fuel storage and dispensing, firefighting, blast pens, aircraft service/manufacture/ breaking, deep Made Ground, and an aluminium smelter.
- Southern Valley Golf Course, which is located to the north-east of the ward. This has been a golf course since 1998 and covers the north-east of the former Gravesend Airport. It is understood that material from Bluewater Shopping Centre was imported for landscaping fill during its construction.

The overall impact from these contamination sources is considered to be low, given the mitigation proposed.

7.12.1 Construction

Construction impacts

Construction activities in this ward would include topsoil stripping, earthworks movements and excavations, which could cause the mobilisation of contamination if present. The area is part of the main construction compound, where stockpiling of soils would occur as well as the storage of materials and chemicals. In addition, verification reports would be prepared of remediation carried out in site specific areas.

During construction, there is a risk of accidental spillages of oils, cement and fuels from the movement of construction traffic and the storage of materials. There is also the possibility for existing contamination from mobilised ground.

Measures to reduce the risk during construction

To reduce the impact to an acceptable level, good practice measures including appropriate storing of equipment and clear soil handling, storage of chemicals and re-use guidance, would be used during construction to reduce the risk of spreading contamination and spillage or pollution.

To reduce the risk of accidental spillages, procedures would be in place such as designated areas to re-fuel plant, tanks would be bunded, spill kits would be available and incidents would be recorded and managed, with impacted soils being assessed and removed if necessary.

Essential mitigation such as the development of site-specific remediation, where contamination has been identified during ground investigation work, would be carried out following consultation with the local authority. During the earthworks, workers would remain vigilant and any suspected contamination would be recorded and assessed accordingly via a watching brief protocol.

Contamination would be controlled through the range of good practice measures set out in the project's CoCP and the REAC.

7.12.2 Operations

During the operation of the road, should an incident occur, such as a traffic collision resulting in localised contamination, significantly affected soils would be assessed and if necessary removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

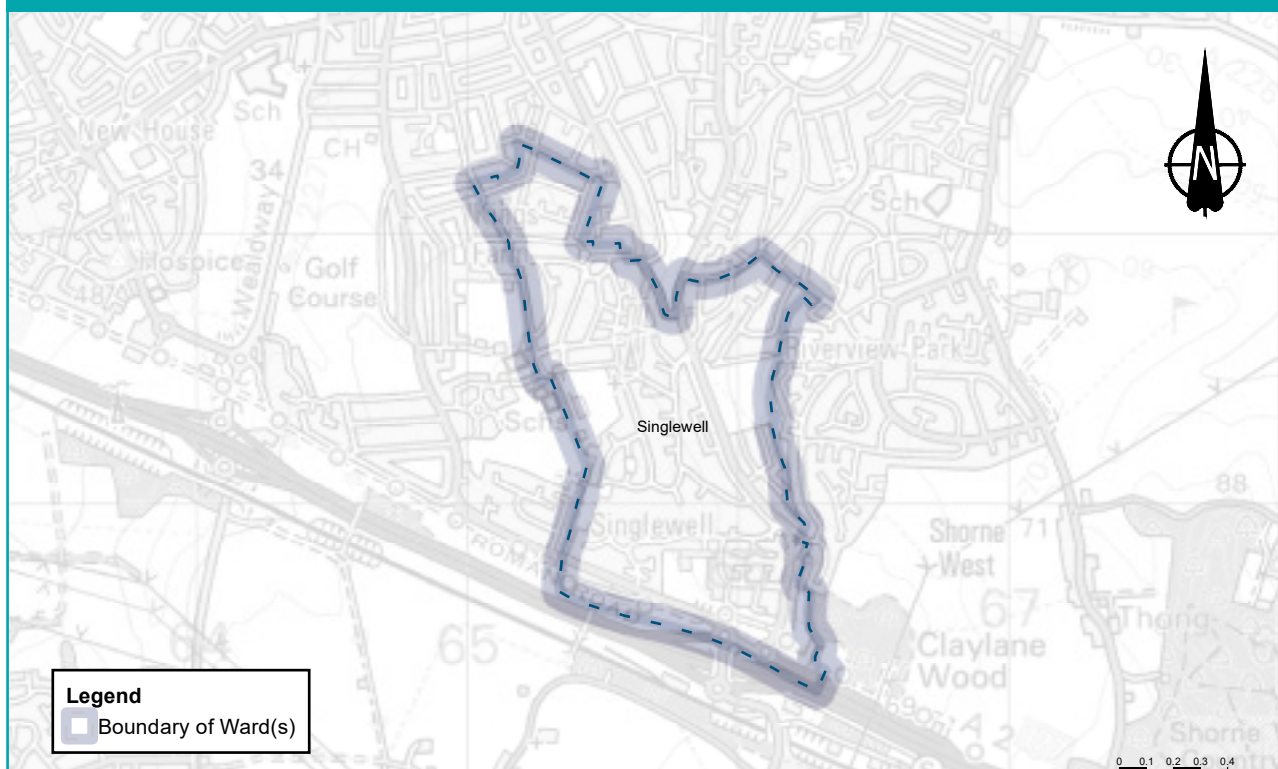
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Chapter 8: Singlewell ward

This chapter summarises the activities in Singlewell ward relating to the project's construction and its operational phase (when the new road is open). It also explains the proposed measures to reduce the project's impact on the local area. For more information about the assessments and other consultation information, see chapter 1 of this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC), and the Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 8.1: Ward boundary map for Singlewell ward



8.1 Overview

8.1.1 About this ward

Singlewell ward is located to the south of the River Thames in the borough of Gravesham. It lies to the west of Riverview ward and Shorne, Cobham and Luddesdown ward. It has an area of around 1.3km² and an estimated population of 8,350¹. The ward is predominantly residential, but also includes part of the Gravesend East junction, which connects to the A2. The ward includes Mackenzie Way Open Space to the south, Hever Farm Recreational Area to the west of the ward and the Warren Play Space in the east off Franklin Road.

¹ Office for National Statistics, 2018 ward-level population estimate

8.1.2 Summary of impacts

Table 8.1: Summary of impacts during the project’s construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>There would be delays to vehicles using Gravesend East junction, due to traffic management measures and additional vehicles using the junction. Journey times along Valley Drive may increase slightly due to additional traffic.</p> <p>Mitigation</p> <p>While the works on Gravesend East junction would be disruptive, they would take place early in the programme to allow safe access to the main construction sites and reduce impacts through the rest of the programme.</p>	<p>Impacts</p> <p>There are no predicted changes to traffic flows in the morning throughout the ward. There are, however, changes predicted to the southbound end of Valley Drive during the evening peak. Further information about changes to traffic flows and their impacts can be found in the Traffic section of this chapter.</p> <p>Mitigation</p> <p>Following a refinement of the design, in response to consultation feedback, several mitigation measures were introduced to the design including a direct link between Gravesend and the M2 eastbound. Further information about design mitigations to reduce the impact of the project once operational can be found in the Traffic section of this chapter.</p>
<p>Public transport</p>	<p>Buses</p> <p>Bus routes using Valley Drive, may have slightly longer journey times.</p> <p>Rail</p> <p>There would be no substantial changes in journey times to Gravesend station resulting from construction activities.</p>	<p>Buses</p> <p>There are no route changes proposed following the opening of the project and there are no predicted discernible changes to bus journey times.</p> <p>Rail</p> <p>There are no predicted delays to services at Gravesend station following the opening of the project.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>There would be a number of short-term and permanent closures in this ward during the construction period.</p> <p>Mitigation</p> <p>Where practicable, diversions would be opened up where footpaths and cycle routes are affected before the existing ones close to allow construction works.</p>	<p>Impact</p> <p>Footpaths and cycle paths would be permanently rerouted into the existing local network and upgraded by the time the project is operational, while two would be returned to their original condition.</p> <p>Mitigation</p> <p>Realigned or rerouted paths would link up to the existing network of footpaths and cycle paths.</p>
<p>Visual</p>	<p>Impacts</p> <p>Views towards construction activities are limited to the residential area on the southern edge of the ward and from National Cycle Network Route (NCR) 177 on the south-east edge of the ward. The Marling Cross Construction Compound would be visible from some properties on Valley Drive. For some residents on Watling Street, the removal of existing vegetation would open up views of the A2/M2 corridor.</p> <p>Mitigation</p> <p>Taller facilities within the compound would be located as far away as possible from surrounding homes. Visual impacts would also be controlled through good practice measures, these can be found in the CoCP and REAC.</p>	<p>Impacts</p> <p>Once the project is complete and in operation, the visual impacts from most residential properties would be minimal. Residential properties adjoining Watling Street would have the most noticeable change in views due to the limited space available for planting mitigation.</p> <p>Mitigation</p> <p>New planting would provide screening in views which would improve over time as it established. The land used temporarily for construction would be reinstated to the reasonable satisfaction of the owner of that land.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with A2 upgrade works and utilities works is expected to create noise. There would also be 24-hour, seven-day construction working in some locations. There would be negligible changes in noise from road traffic for a majority of roads within this ward during the construction period, except along Christianfields Avenue, Miskin Way, Ifield Way and Kitchener Avenue, where increases in noise levels have been predicted.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through mitigation measures presented in the REAC. There are also measures set out in the CoCP.</p>	<p>Impacts</p> <p>A major reduction in noise would occur as a result of the new road, proposed A2/M2 junction and widening of the A2/M2 which would be experienced by residents at the southern extent of the ward. Noise levels would also increase on some existing roads due to changes in traffic flow, speed and vehicle type.</p> <p>Mitigation</p> <p>Low noise road surfaces would be installed on all new and affected roads.</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>There is likely to be dust and emissions from construction equipment and traffic during the construction phase.</p> <p>Analysis of the construction phase traffic flows shows there is expected to be a temporary temporary minor improvement in air quality along the A2 corridor between 2026 and 2028.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures which are set out in the CoCP and REAC to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>No essential mitigation is required.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would provide opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenities as a result of traffic management measures, footpath closures and changes in noise.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures set out in the CoCP and REAC relating to dust emissions, working hours, visual screening, traffic management measures and community engagement. This includes the establishment of Community Liaison Groups.</p>	<p>Impacts</p> <p>The project would improve access to work and training, and access to open space and accessibility of local resources and amenities. Chalk Park would provide a new recreational resource and encourage physical activity.</p> <p>There would be changes in noise levels which are both adverse, and beneficial, on the eastern side of Singlewell. Some residents may experience impacts on mental health and wellbeing as a result of the project (such as anxiety around perceived changes to air quality or as a result of changes to the noise environment).</p> <p>Mitigation</p> <p>No essential mitigation is required for health other than those measures described in the Noise mitigation section.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project would involve the removal of areas of habitat, both temporarily and permanently for the new road. This includes the loss of badger setts and removal of trees with potential for roosting bats.</p> <p>Mitigation</p> <p>Vegetation clearance would be undertaken in winter to avoid impacting breeding birds. Protected species would be relocated, carried out under a Natural England licence. Boxes to support bats, dormice and birds would be erected.</p>	<p>Impacts</p> <p>There is the potential to cause mortality of species by encountering road traffic as well as habitat fragmentation and disturbance from traffic.</p> <p>Mitigation</p> <p>New habitat would be created to support animals moved away from the construction area. Impacts would also be managed through the range of good practice measures set out in the CoCP and REAC.</p>

Topic	Construction	Operations
<p>Built heritage</p>	<p>Impacts</p> <p>There would be visible construction activity with noise and lighting in the vicinity of built heritage assets. The Grade II listed George Inn and Chapel Farmhouse would experience temporary changes in their setting.</p> <p>Mitigation</p> <p>General measures used across the project to reduce impacts on built heritage can be found under Design principle S326, while dust and noise reduction measures would also be implemented in accordance with the REAC.</p>	<p>Impacts</p> <p>The A2/M2 widening would not impact on heritage assets in this ward.</p> <p>Mitigation</p> <p>To preserve the rural and historic character of the landscape, road lighting would be minimised where it is safe and practicable to do so, but remain in accordance with relevant standards (Design principles LST.02 and LST.03).</p>

Topic	Construction	Operations
<p>Contamination</p>	<p>Impacts</p> <p>There is a risk of accidental spillages of oils, cement and fuels from the movement of construction traffic and the storage of materials. There is also the possibility for existing contamination from mobilised ground.</p> <p>Mitigation</p> <p>To reduce risk, the contractor would follow good practice construction measures as detailed in the REAC. Where contamination is identified during ground investigation work, site-specific remediation would be carried out following consultation with the local authority.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>If during operation any incident were to occur which resulted in localised contamination, soils which had become significantly affected would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters.</p>

8.2 Project description

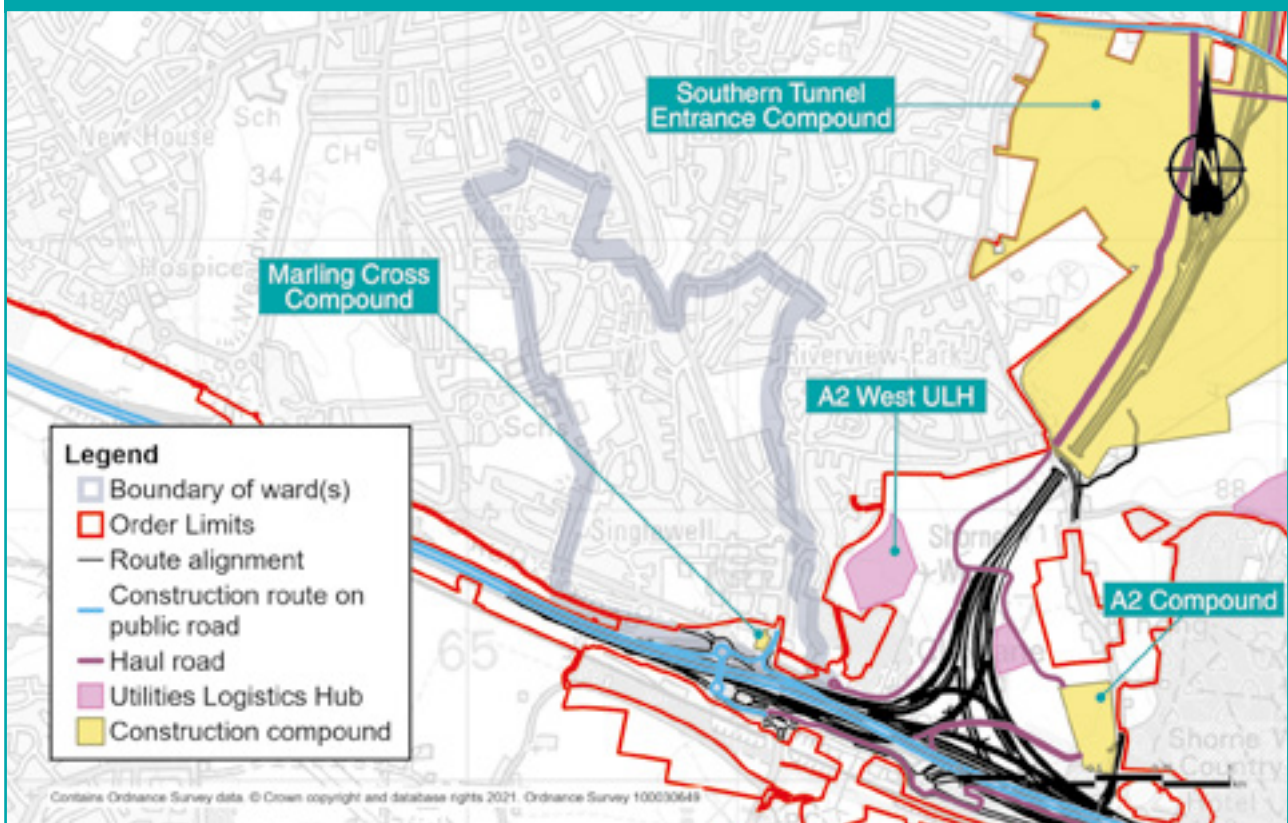
8.2.1 Construction

Construction activities

There would be only a small section of the project constructed within Singlewell ward, a part of the Gravesend East northern roundabout, which is being upgraded to increase capacity. This would be carried out early on in the construction programme to allow the benefits to be made available as soon as possible.

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

Figure 8.2: Main construction areas in Singlewell ward



Construction compounds

As shown in figure 8.2, construction of the project within Singlewell ward would be limited to the southern edge of the ward. A temporary construction compound (the Marling Cross Compound) would be used to deliver the Gravesend East junction works, which lie partially in this ward. The Marling Cross Compound already exists and has been used as a base for the workforce carrying out pre-construction investigations for the project, such as archaeological and environmental surveys. The compound's facilities would be upgraded during the initial works to allow for a larger workforce and to account for the compound being used for the Gravesend East junction works. The existing utility connections from Valley Drive, which include a small substation on the edge of the compound, would be sufficient for the upgraded compound. The main traffic route into the compound is via the Valley Drive to A2 eastbound onslip so all cars and many of the HGVs going to this compound would travel through the ward.

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel washing facilities to make sure vehicles leaving the compound do not dirty local roads.

This compound would have a tarmac surface throughout, used mainly for car parking, offices and welfare facilities, with a smaller area for storing equipment and materials. There would be no spoil or soil from excavations stored in this compound. This compound would be visually screened from nearby properties by existing vegetation. Noisy activities are not expected to take place at this compound so no additional noise-reduction features, such as bunds (walls of earth), are proposed.

The main access point to Marling Cross Compound, the A2 Compound and the A2 West Utility Logistics Hub would be via the Gravesend East junction. Access to the A2 Compound, and the A2 West Utility Logistics Hub would be via the Gravesend East junction, along the eastern section of Hever Court Road, then there would be a new haul road connecting off the onslip to the A2 eastbound. The exit from the compound would be via a new onslip off the A2 eastbound on slip. The traffic for Marling Cross Compound would use the entrance from the very southern section of Valley Drive. Most of the staff cars would arrive between 7am and 8am and leave between 6pm and 7pm.

The average daily weekday number of HGVs and cars expected to go to these compounds, during the 11 representative construction phases are shown in table 8.2 below. These are the number of vehicles going to each compound and there would be the same number of vehicles, on an average weekday, leaving each compound.

Table 8.2: Average daily vehicle numbers going to compounds in Singlewell ward

Time period	Marling Cross Compound		A2 Compound	
	HGVs	Cars	HGVs	Cars
January to August 2024	12	45	66	102
September 2024 to February 2025	5	50	75	198
March to May 2025	1	22	95	205
June to October 2025	0	0	102	215
November 2025 to March 2026	0	0	90	201
April to August 2026	3	0	105	186
September 2026 to March 2027	5	0	85	186
April to November 2027	0	0	56	142
December 2027 to March 2028	0	0	26	74
April to July 2028	0	0	19	70
August 2028 to December 2029	0	0	12	65

Utilities

There would be no Utility Logistics Hub within Singlewell ward. Upgrading Gravesend East junction would require utility diversions to be carried out along Valley Drive and Hever Court Road. Gas, water, electricity and communications services would be moved to accommodate the new road layout.

Chapter 2 of the Construction update provides an overview of how existing utilities would be affected by our plans to build the new road, with further detail including maps in chapter 3. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be repositioned to accommodate the new road.

Construction routes on public roads

The majority of construction traffic serving the works in this ward, particularly HGVs, would arrive directly on the A2. The Marling Cross Compound would be accessed via the eastern extremity of Hever Court Road and southern extremity of Valley Drive, which connects to the A2 via the Gravesend East junction.

Construction schedule

Construction of the whole project is scheduled to last for six years from 2024 to 2029. To deliver the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and assumed programmes for the work packages in Kent, including for the Gravesend East junction, can be found in chapter 3 of the Construction update.

Works to upgrade the Gravesend East junction would start and finish early in the overall construction programme. This would mean that the resulting traffic capacity benefits of the junction upgrade would be available to local people as soon as possible. The works to upgrade the northern section of the Gravesend East junction are expected to last for nine months.

Upgrade works would be carried out on footpath NG17, which links Singlewell to Claylane Woods and other footpaths to the east. For more information, see the section on Footpaths, bridleways and cycle routes below.

Construction working hours

The works would be mostly carried out during the core hours from 7am to 7pm weekdays and 7am to 4pm on Saturdays, with additional repair and maintenance periods (if required) 8am to 5pm on Sundays. However, out of core hours working may be needed for some utility works, such as the connection of gas pipelines or delivery of oversized loads. More information about working hours is set out in the Noise and vibration section and in the CoCP.

Traffic management

Within Singlewell ward there would be a lane closure on the southern section of Valley Drive close to Gravesend East junction for around six months at the start of the construction programme in 2024. This is needed for the work to move some of the utilities in the area. During the lane closures, a short section of road would be closed on one side, while the other side remains open. Access to the open side of the road from each direction would be controlled by temporary traffic signals.

On a few nights there would need to be an overnight lane closure on Valley Drive, again at the start of the construction period.

There would be lane restrictions on the section of the Gravesend East junction in Singlewell ward for nine months at the start of the construction period. There would also be some lane restrictions on the bridge over the A2 at this junction for four months during the start of the construction period for the project.

There would be an occasional closure of the A2 eastbound onslip at night or weekends.

On the right are the main traffic management measures proposed in Singlewell ward.

Table 8.3: Main traffic management in Singlewell ward

Road(s) affected	Proposed traffic management	Purpose	Duration
Gravesend East junction (north)	Lane closures	To facilitate improvement works to local utility networks	9 months between January and August 2024
Gravesend East junction (south)	Lane closures	To carry out nearby works	14 months between January 2024 and February 2025
Gravesend East junction (bridge)	Lane closures	To carry out bridge widening and utility works	4 months between January and August 2024
Gravesend East junction (north)	Closures and lane restrictions	Switch to permanent alignment	1 weekend between January and August 2024
Hever Court Road	Closures and lane restrictions	To carry out nearby works and modifications to local utilities	2 weeks between January and August 2024
Hever Court Road	Closure	To carry out nearby works and modifications to local utilities	Occasional closures at nights or weekends to carry out specific works
Valley Drive	Traffic lights and lane closures	To carry out nearby works and modifications to local utilities	6 months between January and August 2024
Valley Drive	Lane closure	To carry out nearby works and modifications to local utilities	Occasional closures at nights or weekends to carry out specific works
A2 Eastbound	Onslip permanently closed	To facilitate new alignment and modifications to local utilities	Occasional closures at nights or weekends to carry out specific works

There would be traffic management measures outside Singlewell ward that would impact on traffic on the road network within the ward. We have sought to minimise traffic management measures wherever practical, but these would be necessary in some locations to allow construction traffic and local communities to move around safely while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

8.2.2 Operations

The completed project

For more information about the completed project, see the Operations update, as well as the figures in Map Book 1: General Arrangements. Once construction is complete, the following elements of the project would be in Singlewell ward:

- The Gravesend East junction northern roundabout, along with its slip roads and southern roundabout, would have its capacity increased, maintaining traffic flow for the predicted larger volumes of traffic. This would help increase accessibility to the new road for residents of Singlewell ward and reduce the time it takes to join or leave the A2 in either direction.
- Some footpaths and bridleways would be rerouted permanently as part of our proposals for 46km of upgraded, diverted, extended or entirely new routes for walking, cycling and horse riding that would benefit communities along the route. For more information, see the Footpaths, bridleways and cycle routes section in this document.

Changes to the project since our design refinement consultation

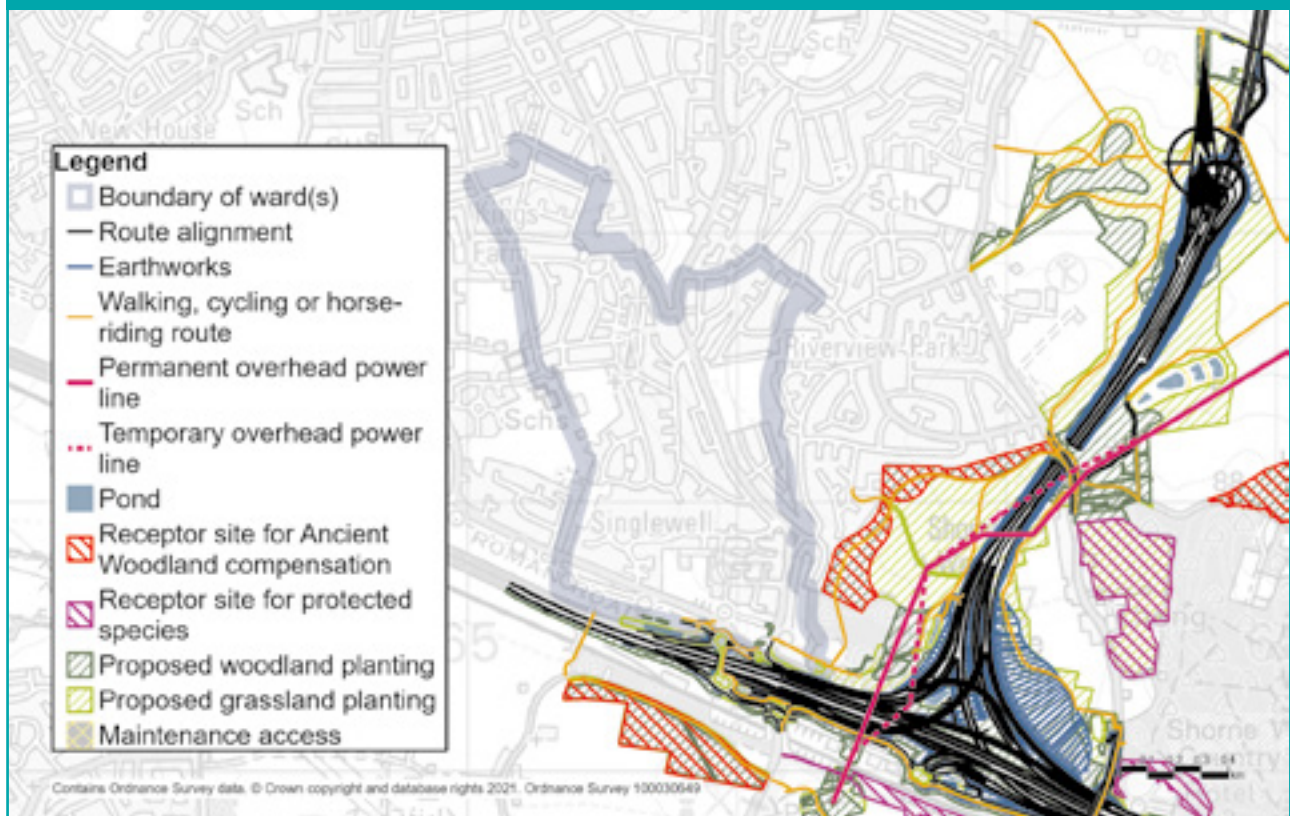
As part of our ongoing design development, including discussions with utility companies, we have made several changes to the project and its Order Limits (the area of land required to construct and operate the project, formerly known as the development boundary), since our design refinement consultation in July 2020. Within Singlewell ward, we have made a minor change to the Order Limits at the A2 Roman Road, where the permanent utility diversion is proposed.

More information about any proposed changes in other wards can be found in chapter 3 of the Operations update.

Impacts on open space land

Within Singlewell ward, there are no changes to our proposals to remove or replace open space land. More information about compensating the impacts on open space land (which includes special category and recreational land) can be found in chapter 3 of our Operations update.

Figure 8.3: Main features of the operational project in Singlewell ward



8.3 Traffic

We carried out traffic assessments to understand how roads in the vicinity of the project would be affected during the new road's construction and once it is operational. Information about how we carried out these assessments can be found in chapter 1.

8.3.1. Construction

There would be additional cars and HGVs using the Gravesend East junction and on the southern section of Valley Drive to access these two compounds. Some workers who live in the Gravesend area may drive along the length of Valley Drive or Hever Court Road to access the compound where they work.

This additional traffic along Valley Drive is likely to result in slightly longer journey times along the road and delays at some of the junctions along the road for turning traffic. There would also be some delays to vehicles using the Gravesend East junction due to the traffic management measures and the additional number of vehicles using the junction.

Traffic speeds on the A2 just south of Singlewell ward would be lower due to traffic slowing down as it approaches the A2 narrow lanes traffic management measures that are programmed to occur between June 2026 and April 2028. The speed limit through the narrow lanes would be 50mph.

There would be temporary disturbance to the users of the Cyclopark to the south of Singlewell, for one-month during construction, as a result of utility diversions.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigations and feedback received from the public and stakeholders. A summary of the proposed measures to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update. In addition to reducing the volume of HGV journeys needed for the project's construction, we would avoid the long-term closure of the A2/M2 during the construction period to reduce the impacts on local communities and the wider road network. Instead, we would only close the road overnight or at weekends when it is less busy in order to carry out required works on the A2/M2.

- No local roads, other than a small section of Valley Drive used to access the Marling Cross Compound, would be used as a construction route within Singlewell ward.
- We would implement the Gravesend East junction northern roundabout works as early as possible during construction so local traffic could benefit from the changes as soon as possible.
- We would minimise the use of the local road network as far as practicable through the construction of temporary offline haul routes that link the strategic road network directly to the construction areas, including directly from the A2 eastbound.

8.3.2. Operations

Traffic impacts

Figures 8.4, 8.6 and 8.8 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 8.5, 8.7 and 8.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

The northern end of the new Gravesend East junction lies within the Singlewell ward. There would be no changes of traffic flows on the roads in Singlewell above 50 PCUs an hour in the morning peak hour, but there would be an increase in traffic on the southern end of Valley Drive of between 50 and 250 PCUs southbound in the evening peak hour. This represents between a 10% and 20% increase in predicted traffic levels, which would have an impact on the performance of the junction with Marling Way.

Figure 8.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

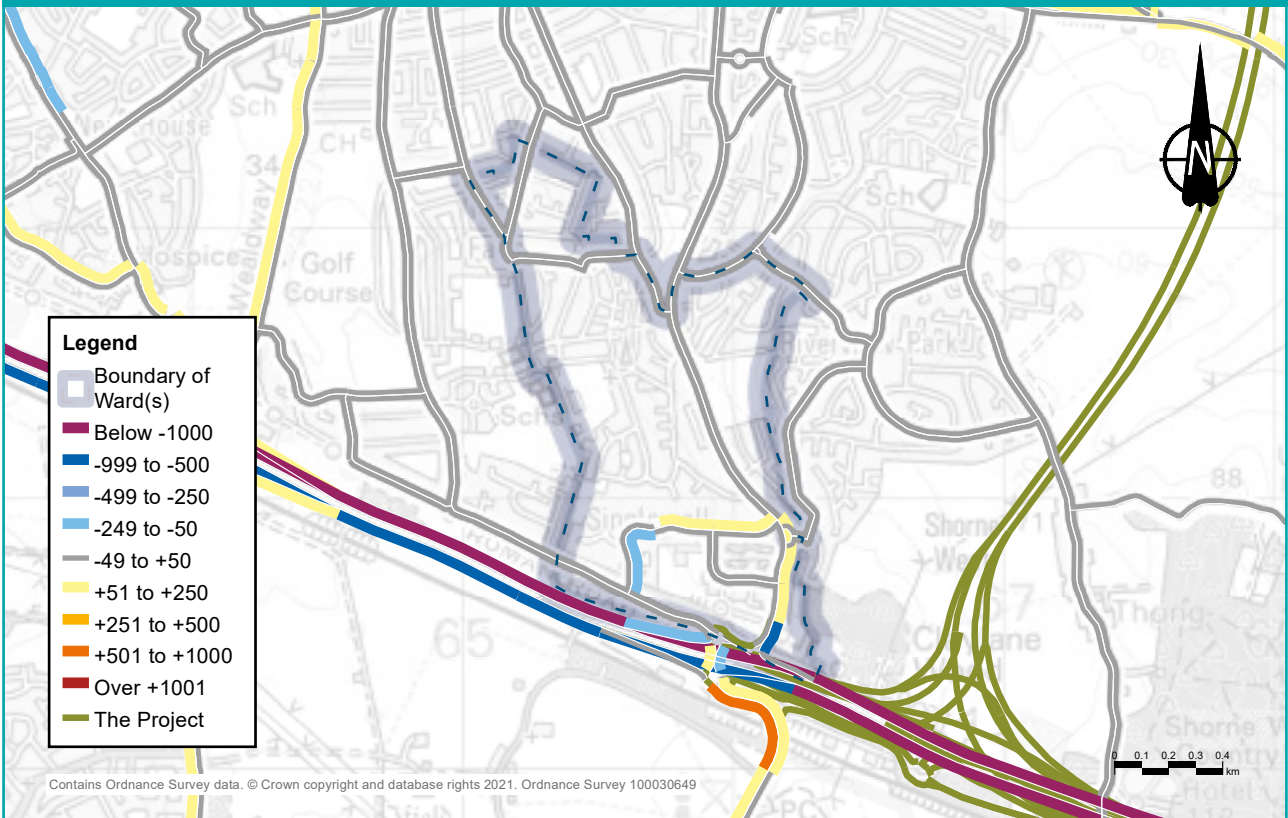


Figure 8.5: Predicted percentage change in traffic flows with the project during the morning peak in 2029

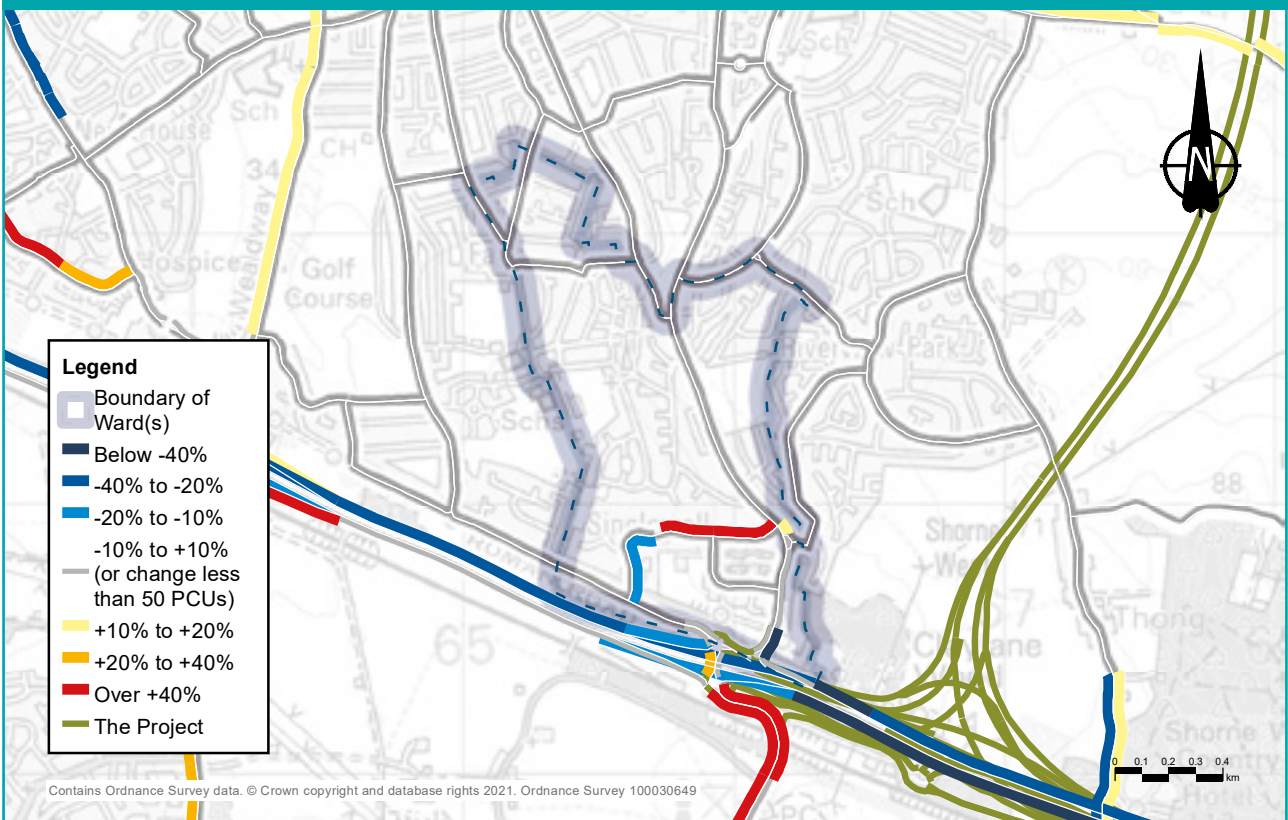


Figure 8.6: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

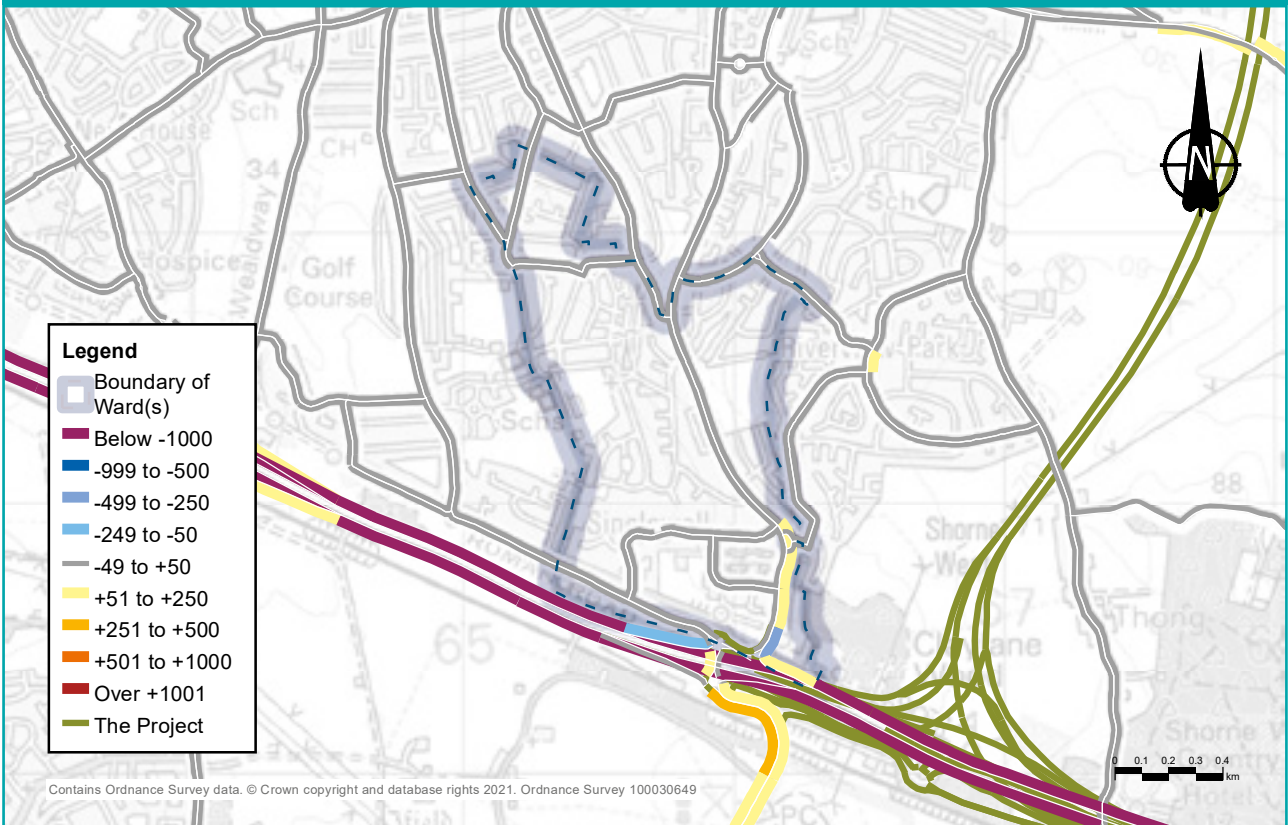


Figure 8.7: Predicted percentage change in traffic flows with the project during the interpeak in 2029

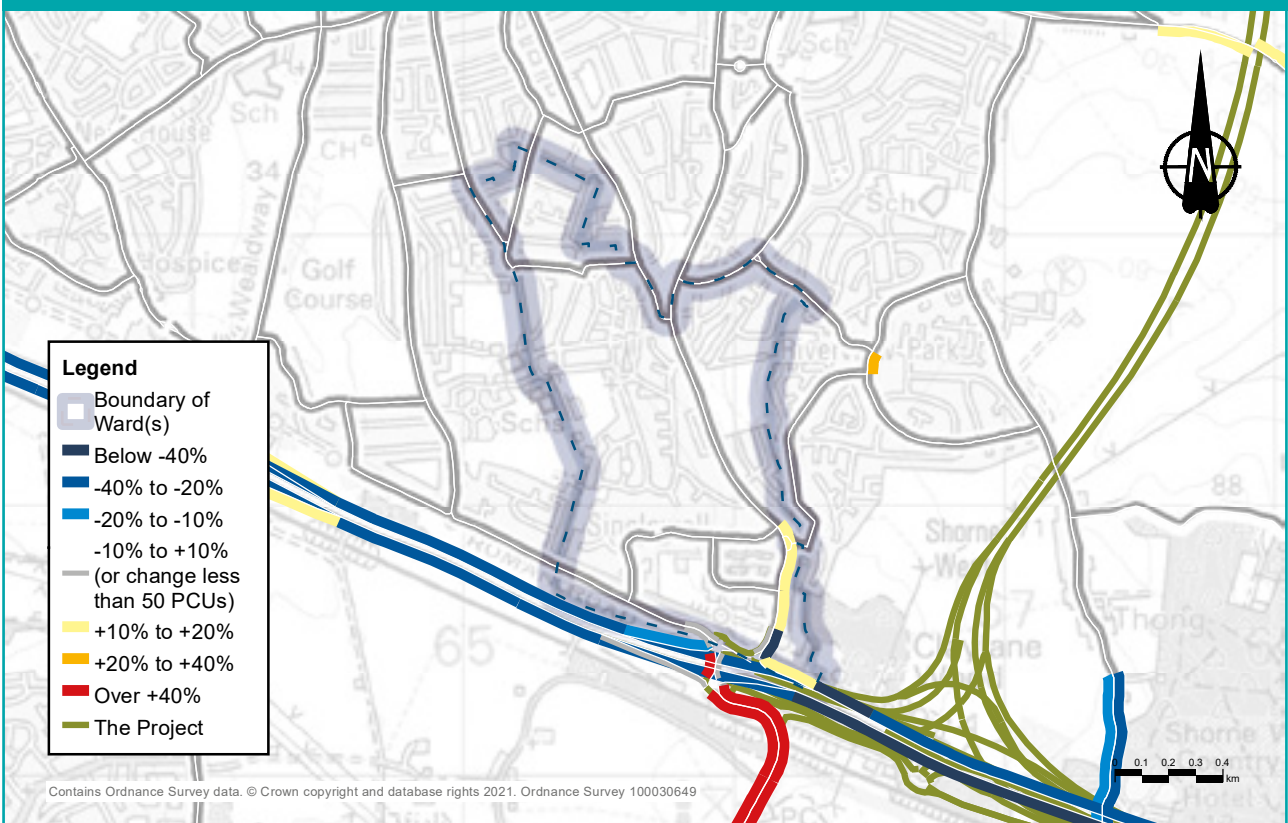


Figure 8.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

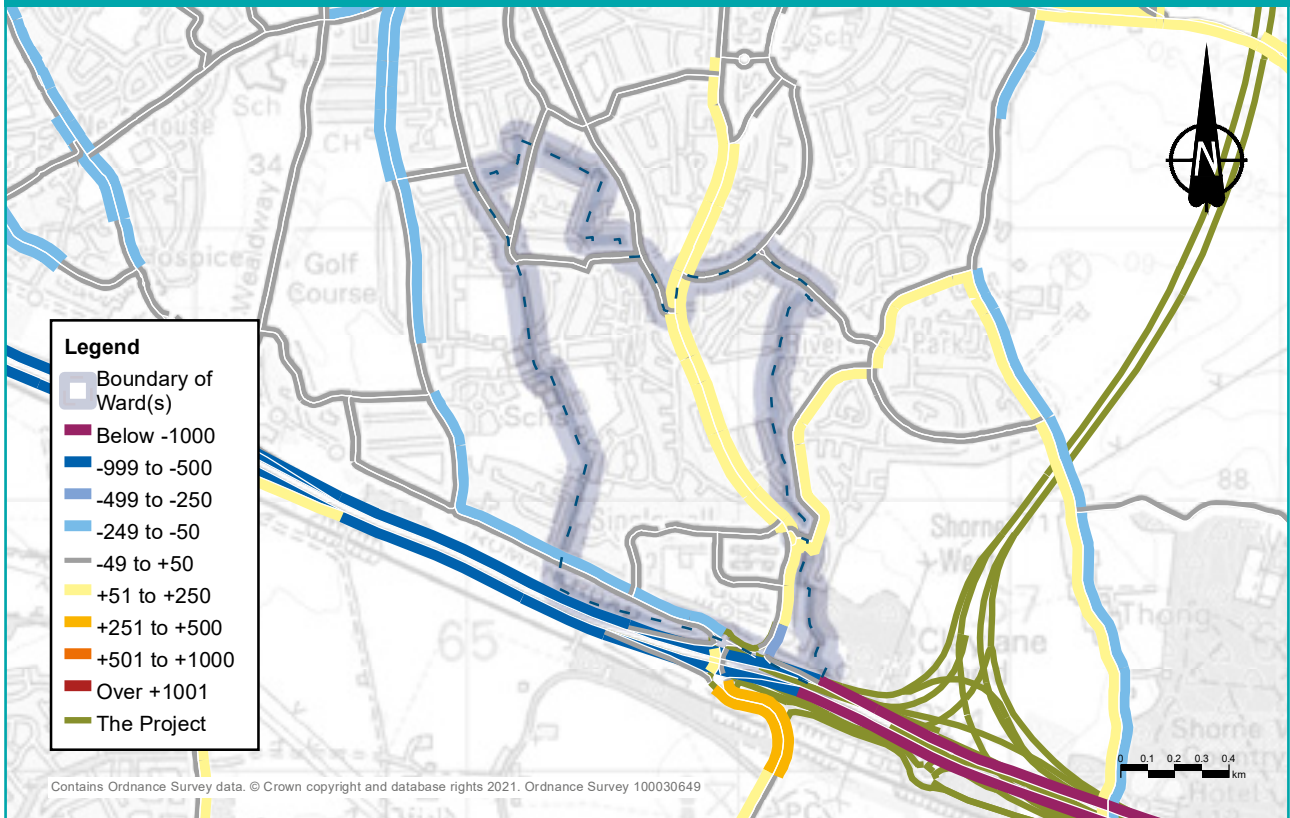
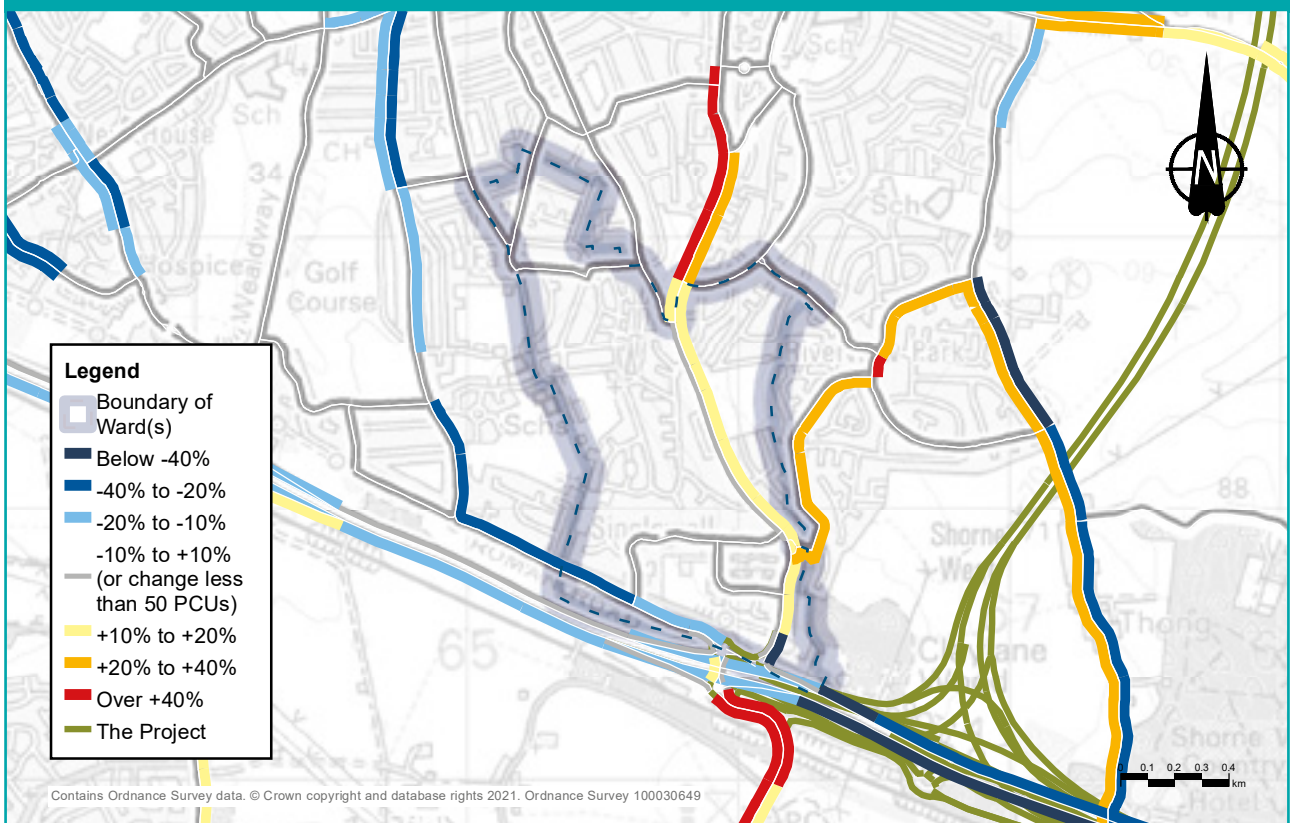


Figure 8.9: Predicted percentage change in traffic flows with the project during the evening peak in 2029



Changes to journey times

Figure 8.10 shows the change in the area that can be reached within a 30-minute drive from the centre of the ward both without the project and with. Figure 8.11 shows the change in areas that can be reached within a 60-minute drive. The areas have been calculated for the morning peak hour (7am to 8am). The number of jobs within a 30-minute drive increases by 54%, which provides access to an additional 200,700 jobs. The number within a 60-minute drive increases by 22%, which provides access to an additional 550,000 jobs.

Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the accompanying maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.'

Figure 8.10: Change in area that motorists could drive to within 30 minutes from Singlewell ward

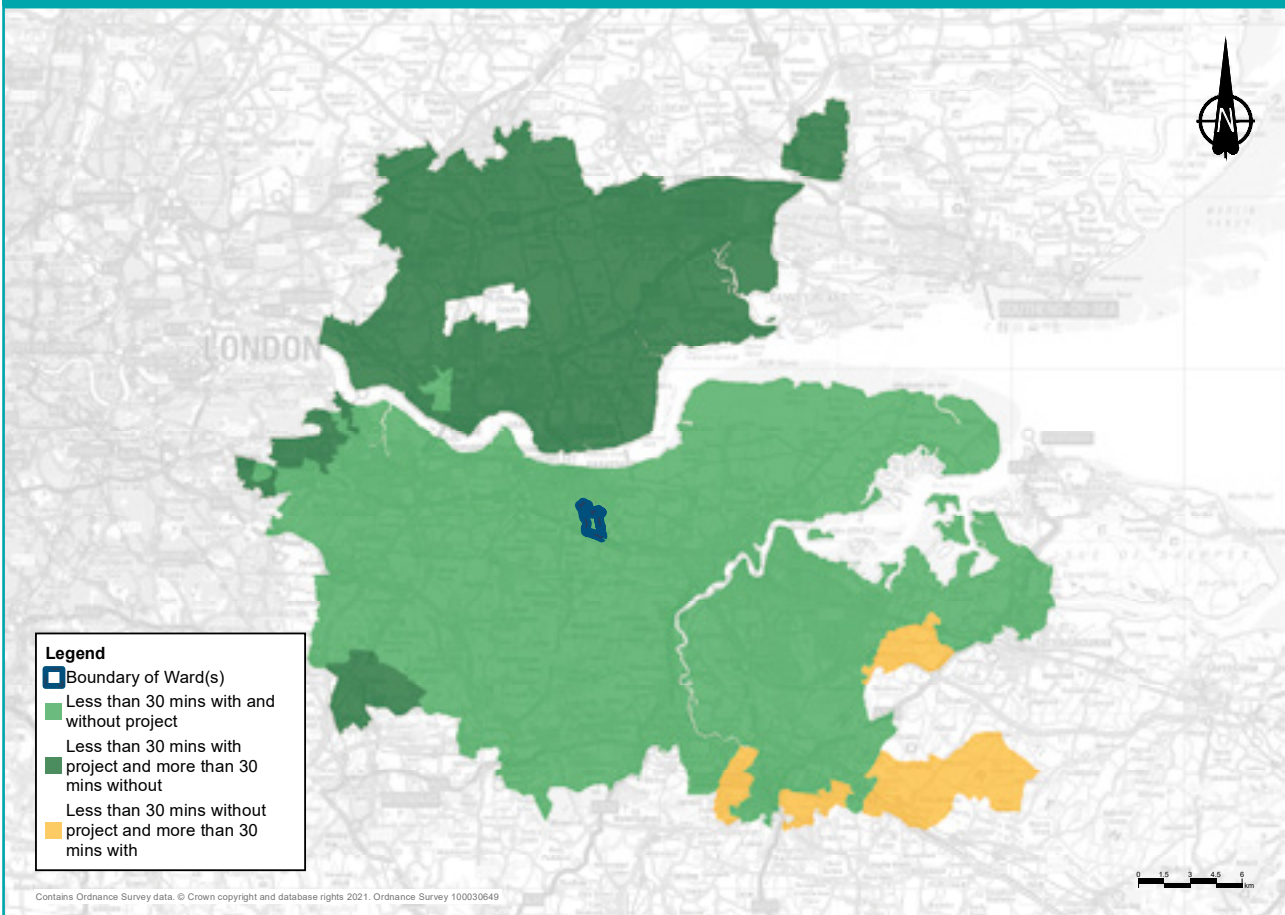
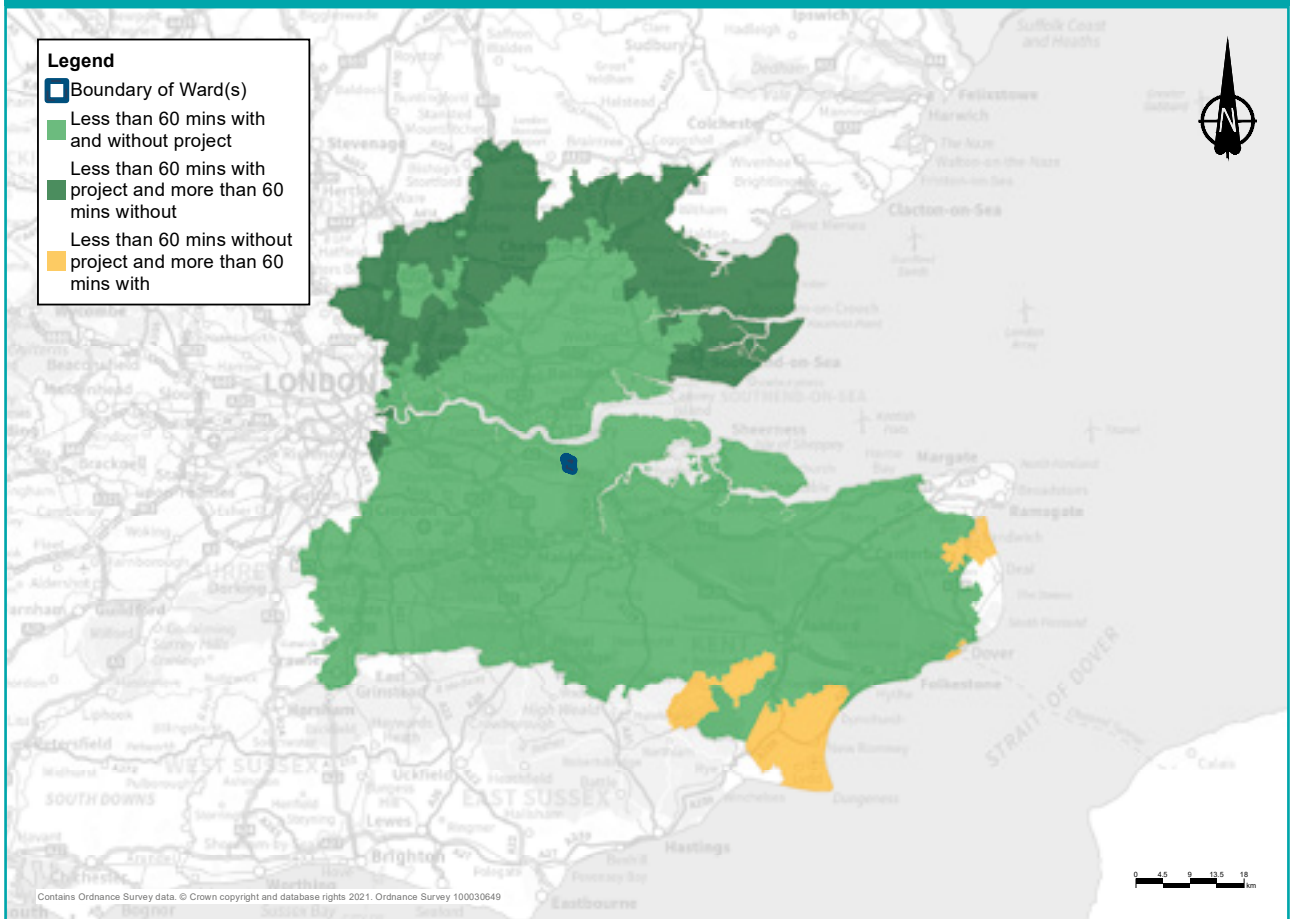


Figure 8.11: Change in area that motorists could drive to within 60 minutes from Singlewell ward



Operational traffic flows

In Singlewell ward, there are several ways in which the project has been designed to mitigate its impacts. For example, the main route has no traffic lights or roundabouts to ensure continuous traffic flow. The main junctions, including the project's proposed junction with the A2/M2 (just outside Singlewell ward), have been designed to be free-flowing, with links chosen to provide a balance between maintaining traffic flow, improving local connectivity and reducing environmental impacts. In response to feedback received during Statutory Consultation, we revised the design of the A2/M2 junction to allow traffic from Gravesend to connect directly with the M2 eastbound, which was not possible in the earlier design. More information about this and other changes we made following feedback from stakeholders and local communities can be found in the You said, we did consultation document.

Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

8.4 Public transport

Existing situation

There are no railway lines or stations in Singlewell ward but Gravesend station is nearby. The station is serviced by Thameslink and Southeastern trains between Kent and London Charing Cross. A number of existing bus routes pass through Singlewell ward, including the 490, which passes along Valley Drive, and the 455, which terminates at Davy's Place, just off Valley Drive.

8.4.1 Construction

Rail

Access to Gravesend station for the residents of Singlewell ward would not be affected during construction.

Buses

Due to slightly extended journey times along Valley Drive, the 490 and 455 may have slightly longer journey times.

8.4.2 Operational

Rail

There would be no discernible change in local access times to Gravesend station and no change to the rail services at the station.

Buses

There would be no changes required to bus routes through the ward once the project opens and no discernible change to bus journey times are predicted.

8.5 Footpaths, bridleways and cycle routes

Singlewell is a suburban ward bordered by the A2 to the south and has one cycle route and 10 footpaths within its boundaries. For other potential impacts, see other section areas in this chapter, such as Visual and Noise and vibration.

8.5.1 Construction

Due to construction activities associated with the proposed A2/M2 junction and utilities diversions, there would be direct impacts on four footpaths and one cycle route:

- Footpath NG13 would be affected by utility works where it crosses the Order Limits, requiring closure for six months.
- Footpath NG14 would be affected by utility works where it crosses the Order Limits, requiring closure for six months.
- The short eastern section of footpath NG17 would be permanently closed due to construction of the new slip road linking the A2/M2 eastbound to the project northbound. Early on in the construction period, the footpath would be permanently diverted north to the Thong Lane bridge over the project.
- Footpath NS175A, which runs from the bend of Church Road over HS1 and the A2/M2 to Hever Court Road, would be affected by works to upgrade the footpath and would be closed for up to one month.
- NCR177 would need to be closed permanently between Gravesend East junction and Park Pale bridge. This would be to accommodate the new road, including the proposed A2/M2 junction. Before closing this section of the existing NCR177, we would ensure an alternative east-west route is available during the construction period, which would run south of the A2/M2. This alternative route would include the upgraded NS175A bridge over the HS1 railway line, a new walking-cycling route running parallel to Church Road and an upgraded route through Jeskyns Community Woodland. For more information, see the Footpaths, bridleways and cycle routes section in chapter 3.

Figure 8.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Singlewell ward

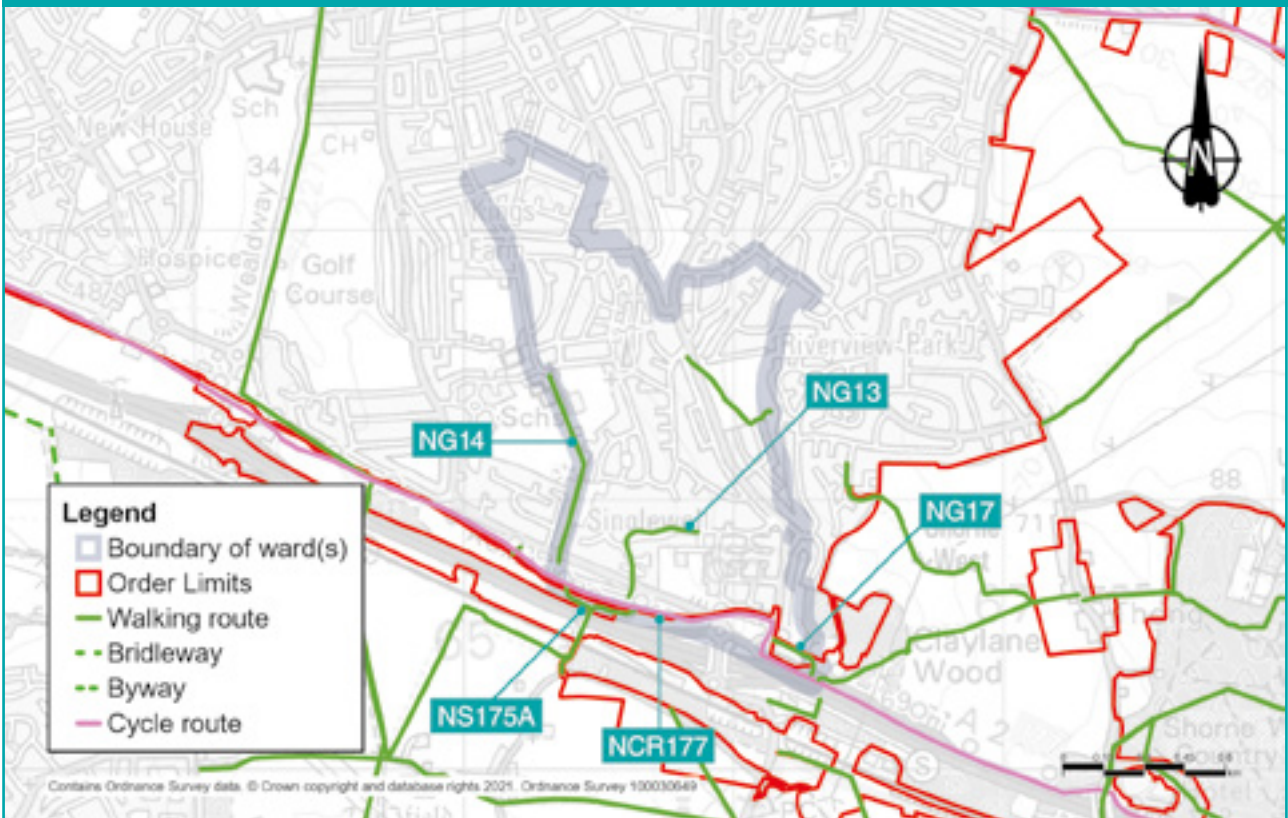
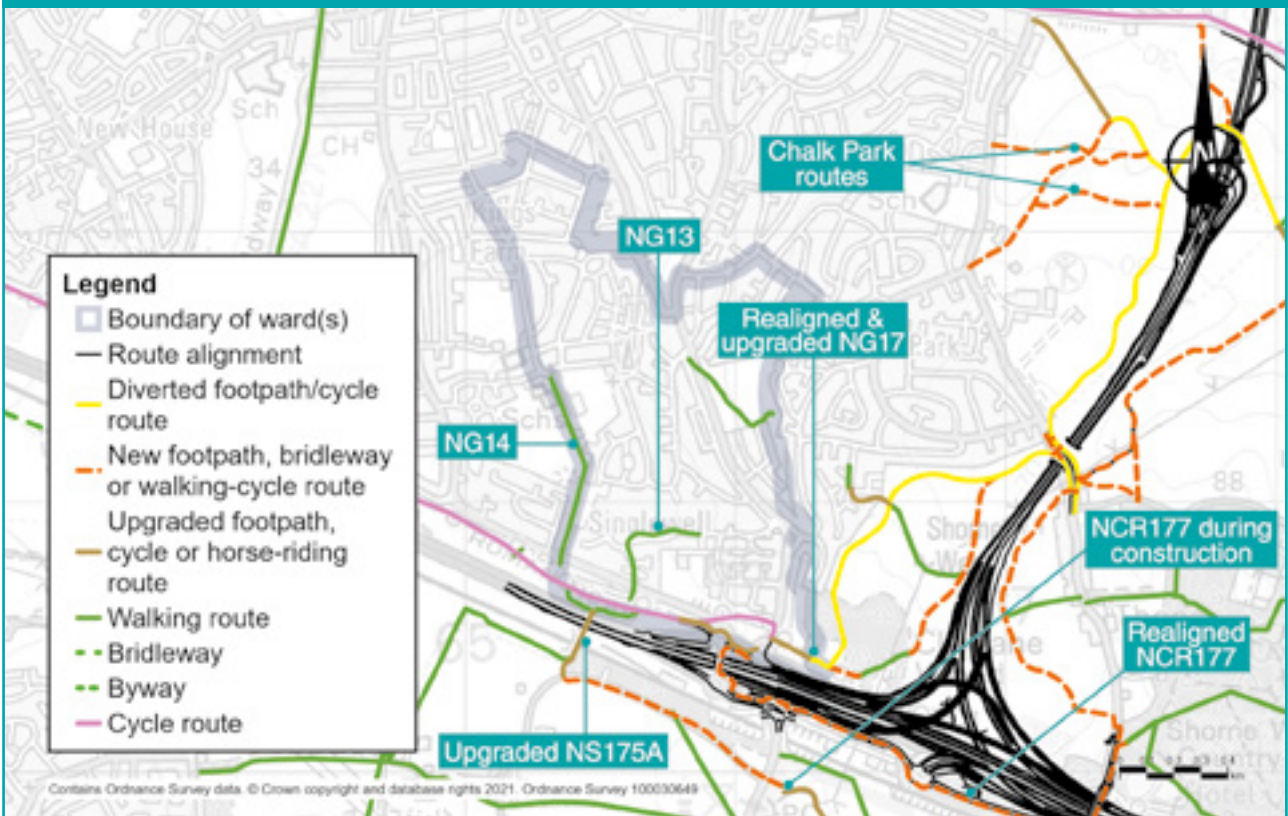


Figure 8.13: Proposed footpaths, bridleways and cycle routes in Singlewell ward



8.5.2 Operations

Overall, the project's proposals for walking, cycling and horse riding include more than 46km of upgraded, extended, diverted and entirely new footpaths, bridleways and cycle routes.

The proposals were developed after consultation with local communities and stakeholders. For an overview of the proposed improvements to footpaths, bridleways and cycle routes across the project, see chapter 2 of the Operations update.

- Footpaths NG13 and NG14 would be unaffected once the road is open.
- Footpath NG17 would be upgraded to a bridleway and realigned to connect with routes through Claylane Wood.
- Footpath NS175A would be upgraded to become a shared walking-cycling route.
- NCR177 would be closed permanently between Gravesend East junction and Park Pale bridge. See the construction section above for information about an alternative route available during the construction period. The alternative route would remain open once the project is complete, and there would also be a more-direct realigned NCR177 running from Gravesend East junction alongside the new parallel connector road south of the A2. For more information, see the Footpaths, bridleways and cycle routes section of chapter 3.

8.6 Visual

Existing situation

Views towards the land on which the project would be built from the main populated area are largely constrained by the urban area of Gravesend and principally limited to the residential area on the southern edge of the ward. Other views include those from National Cycle Network (NCN) Route 177 on the south-east edge of the ward.

Current views from properties in Singlewell towards the land on which the project would be built are largely screened by a combination of garden and roadside vegetation, or by commercial buildings along Hever Court Road. The existing A2/M2 corridor dominates views from NCN Route 177 on the edge of Singlewell.

8.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update. You can also view a video fly-through of the project during construction by visiting our consultation website.

The main construction activities likely to be seen from this ward are:

- The operation of the Marling Cross Compound adjoining Valley Drive.
- Utilities diversions.
- Construction of slip roads for the proposed A2/M2 junction and associated works to the existing A2/M2 corridor.

How construction activities may affect views in Singlewell ward can also be found in the Land use section above, and in chapter 3 of the Construction update.

Views of construction activities would be limited to the southern edge of Singlewell, where construction activity is likely to be partially visible from residential properties and potentially from Singlewell Primary School. The Marling Cross Compound would be visible from some adjacent residential properties on Valley Drive, and to a lesser extent from Mackenzie Way. For some residents adjoining Watling Street, removal of existing vegetation for construction would open up views of the A2/M2 corridor and associated construction activities.

NCR177 would be permanently realigned as a result of the project, and routed outside of this ward.

Measures to reduce visual impacts of construction

Measures would include locating the taller facilities in the Marling Cross Compound to maximise the distance from homes, as far as reasonably practical. The visual impacts of the project would be controlled through the range of good practice measures set out in the CoCP and the REAC.

8.6.2 Operations

Operational impacts

When the road opens, the A2 slip roads to the new Gravesend East junction would be completed, together with associated landscape restoration and planting mitigation. The site of the Marling Cross Compound would be restored to its current condition. Further information about the completed project is provided in the Project description section above.

The visual impacts from most residential properties would be minimal, given the restricted nature of existing views and relatively limited nature of the proposed works in the area. The most noticeable change would be seen from homes adjoining the A2 due to the limited space available for planting mitigation. There would be no perceptible change to views from NCR Route 177.

Measures to reduce visual impacts of the operational project

The main measures to reduce visual impacts during the project's operation in the Singlewell ward are landscape restoration and screen planting.

8.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment within Singlewell ward mainly comes from traffic noise from the A2 and Valley Drive, along with other local roads in the area. As part of our environmental assessment process, we carried out surveys of existing background noise at five locations in the ward, which were agreed with the local authority. The levels monitored at these locations recorded average existing noise level of 64 dB(A)² during the day and 60 dB(A) during the night.

To understand how noise levels would vary with and without the project, we used noise modelling to predict what noise levels would be like in the project's proposed opening year if the road was not built. We modelled this because we cannot assume that noise levels when the road opens would be the same as they are now. For example, our assessment of the opening year noise levels accounts for predicted changes in traffic levels.

We also modelled the predicted noise levels for the opening year with the new road in place. This provides a useful comparison with how the road would change the noise levels in its opening year if it were built.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 82dB(A) during the day and from 29 to 67dB(A) during the night at identified locations within the ward. As such, our noise assessments predict that by opening year, noise levels will increase compared with the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are below.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

8.7.1 Construction

Daytime construction noise impacts

The main construction activities that are expected to cause noise and vibration impacts in this ward are those associated with A2 widening and utilities diversions. Marling Cross Compound would be located within the Singlewell ward. There would be no Utility Logistics Hubs located within the ward. Although not within the ward, the A2 West Utilities Logistics Hub may contribute to the noise impacts experienced within this ward due to how close it is to the ward boundary. There would be no haul roads in this ward during the construction period.

Within the ward there are two proposed structures expected to be constructed using vibratory or percussive piling, but potential vibration impacts of these structures would be less than 10 days.

Construction noise levels have been predicted at three locations across this ward, chosen to provide a representation of the level of noise communities would expect to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using standard units for road projects, dB LAeq (12-hour), which represents the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

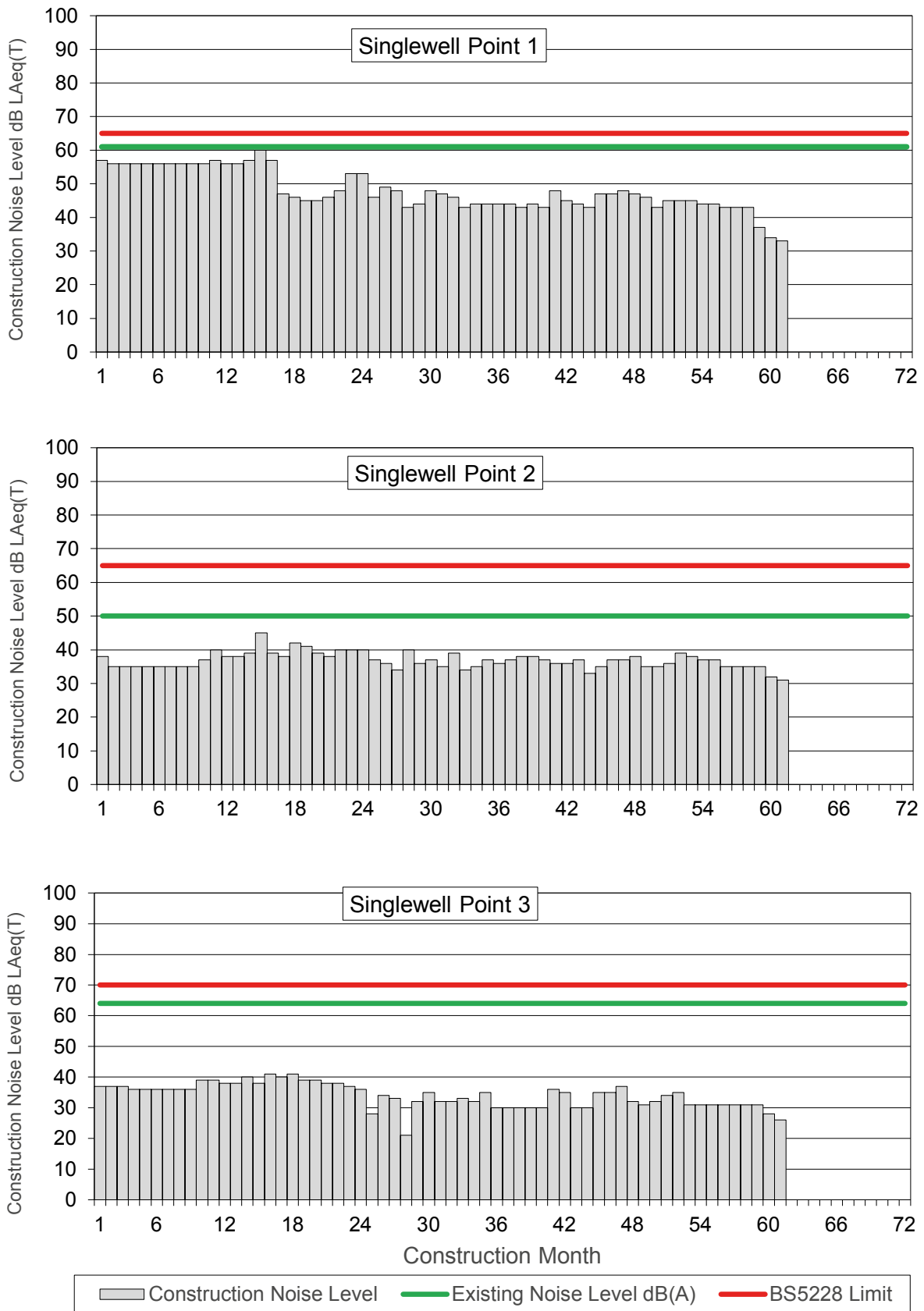
Figure 8.14: Construction noise assessment locations in Singlewell ward



Each vertical bar in figure 8.15 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific mitigation measures would be implemented to reduce the noise.

The predicted noise levels show that higher construction noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance and additional buildings and other features screening the noise from more distant residential areas.

Figure 8.15: Construction noise by month for points 1, 2 and 3 in Singlwell ward



With reference to figure 8.15, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 33 to 60dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 2, construction noise levels are predicted to range from 33 to 45dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 3, construction noise levels are predicted to range from 21 to 41dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.

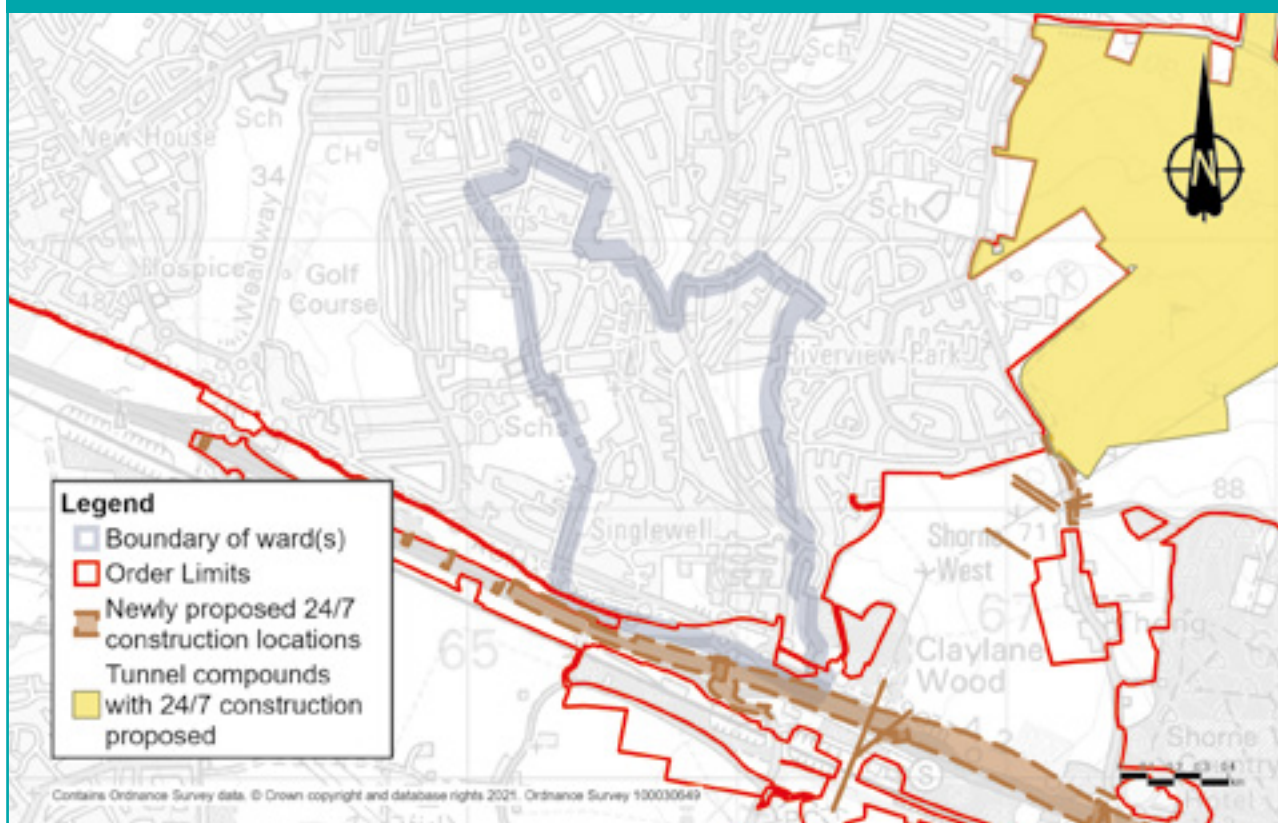
24/7 Construction working

In addition to the changes to the daytime noise impacts reported in the section above, 24-hour, seven-day construction working is proposed at the locations shown in figure 8.16. The previously proposed 24/7 construction locations referred to in the figure are those 24-hour tunnelling activities that we have outlined during previous consultations and remain part of our current proposals.

These works have been identified as they may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The duration for the works within this area is anticipated to be night-time or weekend closures for highways works.

These works could have an impact on local communities, and we would work with the local authority to manage these impacts.

Figure 8.16: Newly proposed and tunnel 24/7 working locations in Singlewell ward



Construction traffic noise impacts

Maps showing the predicted change in road traffic noise within the ward during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within the ward likely to experience) during the construction period, there would be negligible changes in road traffic noise (less than 1 dB change in noise levels) during all construction years, except along the following roads where increases have been predicted.

Table 8.4: Construction traffic noise in Singlewell ward

Road	Predicted noise impact	Construction year
Christianfields Avenue, Miskin Way, Ifield Way	Minor increase in noise levels	1
Kitchener Avenue	Moderate increase in noise levels	1

Measures to reduce construction noise levels

Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

- Installing and maintaining hoarding around the construction compounds.
- Installing temporary acoustic screening around the construction areas likely to generate noise.
- Keeping site access routes in good condition with assessments on-site to inspect for defects such as potholes.
- Turning off plant and machinery when not in use.
- Maintaining all vehicles and mobile plant so that loose body fittings or exhausts do not rattle or vibrate.
- Using silenced equipment where available, in particular power generators and pumps
- No music or radios would be played for entertainment purposes outdoors onsite
- Site layout would be planned to ensure that reversing is kept to a practicable minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings.
- Non-percussive demolition techniques would be adopted where reasonably possible to reduce noise and vibration impact.

- Careful consideration of the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity rather than generators, where possible.
- Minimising construction vehicle traffic by, where practical, selection of local suppliers along the project route, using local workforces and by minimising material transportation for earthworks construction along the project route.

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction phase.

8.7.2 Operations

Operational noise impacts

Within Singlewell, the main project route runs approximately 450 metres to the east of the ward.

Direct noise impacts from the route, the proposed A2/M2 junction and widening of the A2/M2 would be experienced in the southern extents of the ward along with indirect noise impacts due to changes in traffic flow, the number of HGVs, and traffic speed on the existing road network in the ward.

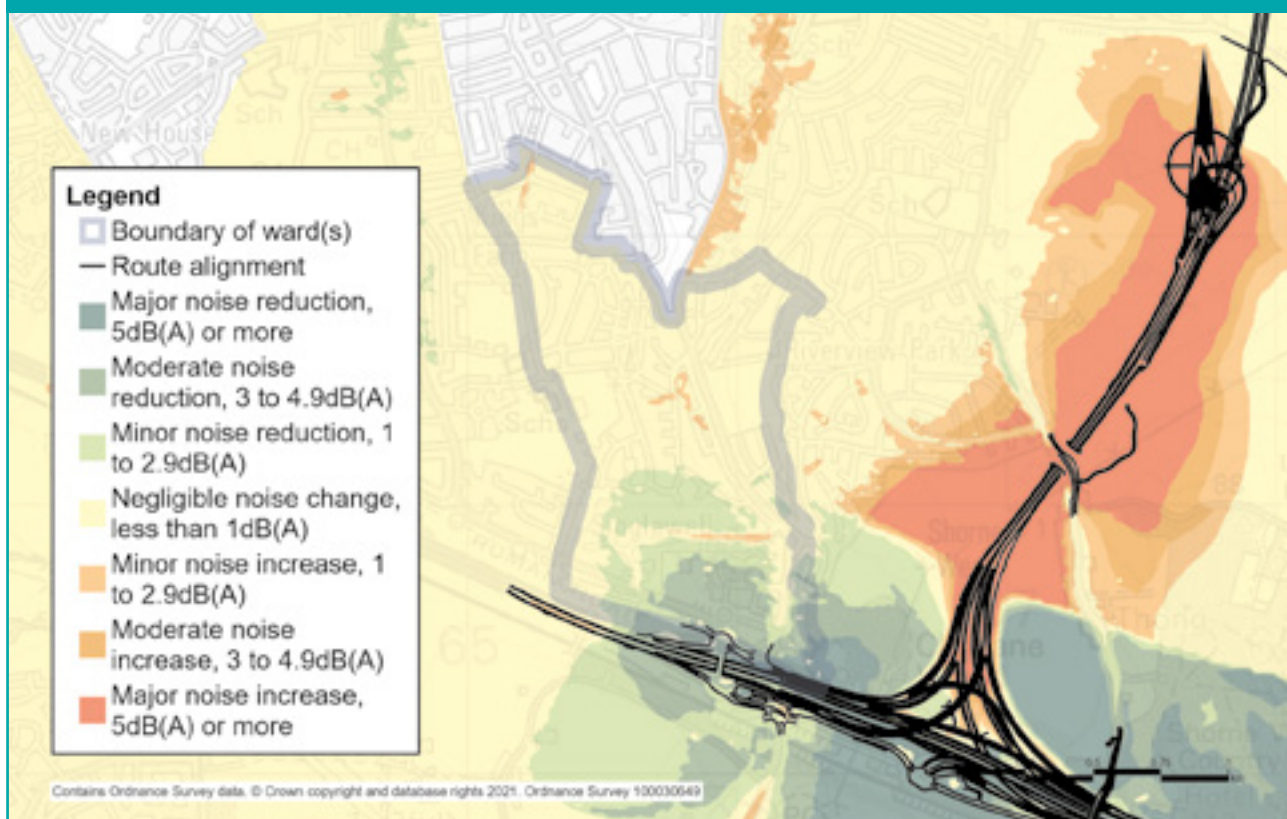
Figure 8.17 below shows the predicted changes in road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise-sensitive receptors (such as nearby properties) are predicted to range from major reductions in noise levels of greater than 5 dB to minor increases in noise levels of between 1.0 and 2.9 dB. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce noise and vibration when the road is open

The main methods of controlling noise would be, where practical, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

Figure 8.17 Noise impacts during operation in Singlewell ward



8.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Singlewell ward, the A2/M2 has been declared an Air Quality Management Area (AQMA) due to yearly levels of airborne pollution being above accepted standards. AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the ward have been identified as AQMA.

8.8.1 Construction

Construction impacts

Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including along the southern edge of Singlewell, close to the A2. Air quality impacts on these properties during construction would be temporary and we would put measures in place to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of the construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a minor improvement in air quality in the area around the A2 corridor as a result of the traffic management in place from 2026 to 2028. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction and changes in traffic on local air quality would be controlled and minimised through the range of good practice measures set out in the project's CoCP and the REAC. For example, measures to suppress dust and the use of low emission vehicles.

In addition, we would develop an air quality management plan to make sure the measures set out in the CoCP and REAC would effectively monitor and control dust and exhaust emissions. In this case, the location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

8.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, close to the existing A2 that are predicted to experience a minor increase in nitrogen dioxide (NO₂) in the air quality, the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within this ward is 28.3 µg/m³ (close to the A2), which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

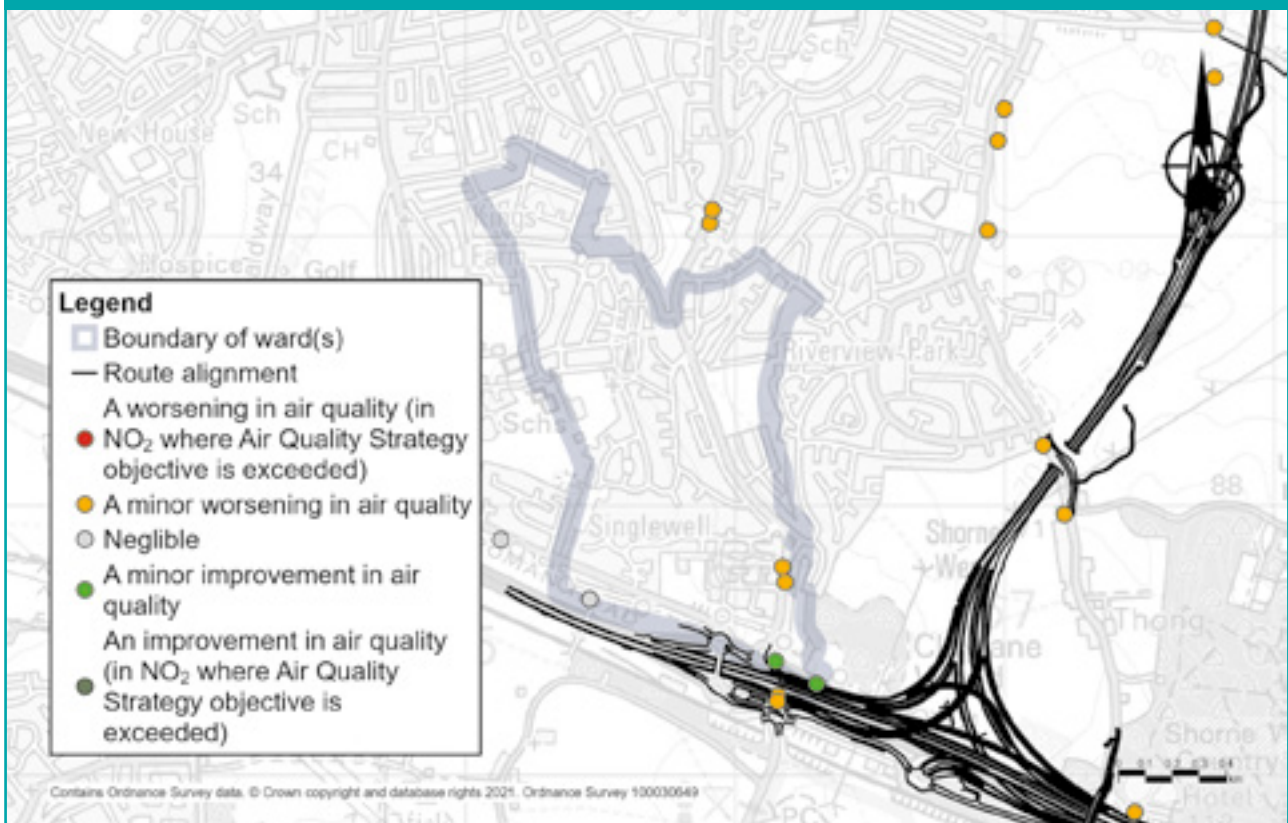
Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, we predict that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce operational impacts on air quality

The assessed air quality impacts in this area as a result of the project would not trigger the need for additional monitoring or other mitigation measures once the road is open.

Figure 8.18: Predicted changes in NO₂ levels within Singlewell ward once the new road is open



8.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

Singlewell ward is characterised by a younger population than that of Gravesham overall, with a higher proportion of residents in both the under 16s and 17-25 categories. The proportion of older people living alone is higher within Singlewell than is the case nationally.

Self-reported health status of residents is slightly worse than overall in Gravesham, with around a fifth of residents reporting fair, bad or very bad health compared with 18.5% for Gravesham. The number of residents who report their day-to-day activities to be limited a lot as a result of a long-term health condition or disability is also slightly higher than for Gravesham as a whole (8.6% compared with 7.7%). Life expectancy at birth for residents of Singlewell ward is 76.9 years for males and 85.3 years for females (male life expectancy recorded as significantly below the UK average life expectancy recorded for 2017-19 of 78.4 years for males and female life expectancy significantly better than the 83.1 years for females).

8.9.1 Construction

Construction impacts

Construction activities affecting the Singlewell ward are presented in the Project description section and relate primarily to construction works to the A2/M2 and the proposed A2/M2 junction. The Marling Cross Compound is located off Valley Drive. Elements of each of these activities have the potential to impact on human health, whether this be through noise associated with construction activities, changes to air quality (as a result of dust emissions), changes to accessibility caused by road or footpath closures, impacts on access to open space, or through impacts on mental health and wellbeing.

There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. With good communication and engagement, mental health and wellbeing impacts associated with stress and anxiety related to the construction of the project would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section).

Different groups of people within the population may be more sensitive to factors that potentially affect their health than others. Some of the changes identified as a result of construction activities would therefore only affect a small proportion of the population.

For example:

- Changes in accessibility as a result of traffic management measures. This may be the case for people who are more dependent on public transport and have less choice about method and route travelled. Relevant traffic management for residents of Singlewell ward include:
 - Gravesend East Junction (north) – Lane closures to carry out improvement works to local utility networks
 - Gravesend East Junction (south) – Lane closures to carry out nearby works
 - Gravesend East Junction (bridge) – Lane closures to carry out bridge widening and utility works

Further information about impacts on journey times can be found in the Traffic section above.

- Access to open space. Access to the rural area immediately to the east of Singlewell, including Claylane Woods, would be disrupted as a result of construction activities. The current NCN Route 177 would be closed as a result of the project and there would be no views of construction activity from the current alignment. Footpath NS367/1 (found immediately to the south of the Singlewell ward) would be temporarily closed for a period of up to 48 months. There would be temporary disturbance to users of the Cyclopark to the south of Singlewell, for one-month during construction. People without access to private cars may not be able to access alternatives within a reasonable travel time.
- To the south of the ward, there would be disruption to access to Shorne Woods Country Park, with access to open spaces such as Shorne Woods and Great Crabbles Wood reduced due to temporary footpath closures.
- The Michael Gardens Play Area, to the south-east of the ward would be affected by works to upgrade the footpath for a very short time during construction.

The above changes may particularly affect people without access to private transport for whom there may be less choice in finding alternative destinations, and may therefore affect the ability of people to undertake physical activity.

- Noise and vibration. Temporary worsening of noise from construction traffic has been identified at receptors on the eastern side of Singlewell. A negative health outcome has been identified for those who may be affected differentially by changes to the noise environment (for example older people, or people with pre-existing hearing conditions). Mitigation measures described below would be employed to minimise the risk of negative health outcomes on sensitive populations.

Measures to reduce construction health impacts

Proposed measures relating to health and wellbeing (including good practice for dust emissions, hours of working and visual screening) are described in this chapter in the Visual, Noise and vibration, and Air quality sections. Further information relating to mitigation measures for these areas is in the CoCP, the REAC and the traffic management plans set out in the Outline Traffic Management Plan for Construction. The commitments in the CoCP and the REAC include items such as adhering to Best Practicable Means (BPM) to reduce noise impacts (see NV007 in the REAC) and dust-management good practice (see AQ005 in the REAC).

Engagement and effective two-way communication with communities both prior to and during construction is important to help reduce mental health and wellbeing impacts associated with uncertainty, stress and anxiety. The CoCP sets out proposals for community engagement, including how we would make sure communities, stakeholders and any affected parties are kept informed of the construction works, their progress and associated programme. This includes setting up Community Liaison Groups.

8.9.2 Operations

Operational impacts

Information about the operational project in this ward is provided in the Project description section above.

Both positive and negative health outcomes may be experienced by residents within Singlewell ward. These include:

- Access to open space. Beneficial health outcomes are associated with improvements to accessing open space – for example, through the provision of open space north of Claylane Woods, at the new recreational area Chalk Park in Riverview and Westcourt wards (see chapters 6 and 7), and east of the southern tunnel entrance. These areas would be made accessible via green bridges and improved routes for walking, cycling and horse riding.
- Changes to the noise environment. Both adverse and beneficial changes in road traffic noise levels have been identified towards the eastern side of Singlewell. As noted earlier, a negative health outcome has been identified for sensitive populations who may be affected differentially by changes to the noise environment (for example older people, or people with pre-existing hearing conditions).
- Properties that are within 200 metres (along the southern edge of Singlewell) may experience minor air quality worsening as a result of changes in traffic flows. These changes are small and represent a worst-case scenario which will improve with an increase in electric vehicles.
- Some residents within Singlewell ward may experience negative health outcomes in relation to mental health and wellbeing as a result of the project (for example, relating to anxiety around perceived changes to air quality or changes to the noise environment).

Measures to reduce operational health impacts

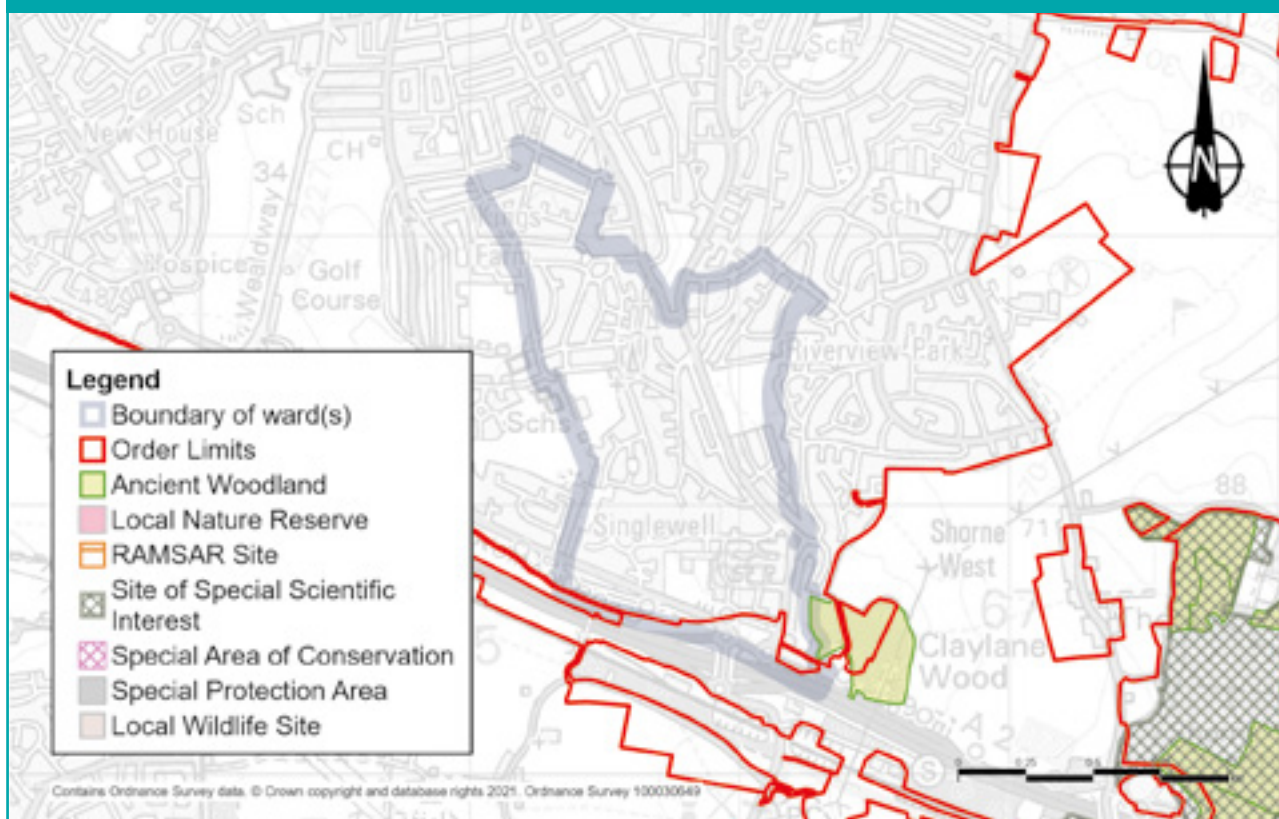
No significant noise or air quality impacts have been identified for Singlewell ward and as such, no essential mitigation measures have been proposed.

8.10 Biodiversity

Only a small area of Singlewell ward falls within the Order Limits and where it does, the Order Limits are restricted to a small area of landscape and woodland planting north of Hever Court Road. Singlewell ward contains no designated or non-designated sites, although Claylane Wood ancient woodland is adjacent to the south-east boundary of the ward.

We carried out surveys across the project to set a baseline for assessment, and these identified the presence of a range of protected and notable species. Only badger outlier setts were identified within the woodland area. No other protected species were identified, although some trees were assessed as having potential for roosting bats.

Figure 8.19 Designated and non-designated biodiversity sites in Singlewell ward



8.10.1 Construction

Construction impacts

Construction of the project would require the removal of areas of habitat, some temporarily and some permanently, as a result of construction of the new road including utility diversions. The removal of woodland would cause the loss of badger setts, disturbance to roosting bats, and disturbance to retained habitats. For more information about the impacts on Claylane Wood, see the Shorne, Cobham and Luddesdown ward chapter.

Measures to reduce biodiversity impacts of construction

Vegetation clearance would be carried out during the winter where possible to avoid the impact on breeding birds. Where this is not practical, clearance would be supervised by an Ecological Clerk of Works to ensure that no nests are disturbed or destroyed.

Any protected species would be moved away from the site prior to any construction activities, either through habitat manipulation (for example strimming to reduce the height of vegetation and displace reptiles), or translocation. Where required, works affecting protected species would be carried out under a Natural England licence. Boxes to support bats, dormice and birds would be erected within retained habitat. Habitat lost for temporary construction works would be reinstated following construction.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

8.10.2 Operations

Operational impacts

Once open, the new road could affect species through habitat fragmentation, noise disturbance from traffic and encountering road traffic. The operational impacts on terrestrial biodiversity from the project are expected to be similar to those of the operation of the existing A2/M2.

Measures to reduce biodiversity impacts of the project during operation

Newly created habitat, including those created to support animals moved from the construction area, would be managed to ensure that they provide high quality environments to support a broad range of different plant and animal species. The General Arrangement plans, which accompany this consultation, show where areas of new habitat would be created.

The impact of operation on biodiversity would be controlled through the range of good practice measures set out in the project's CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

8.11 Built heritage

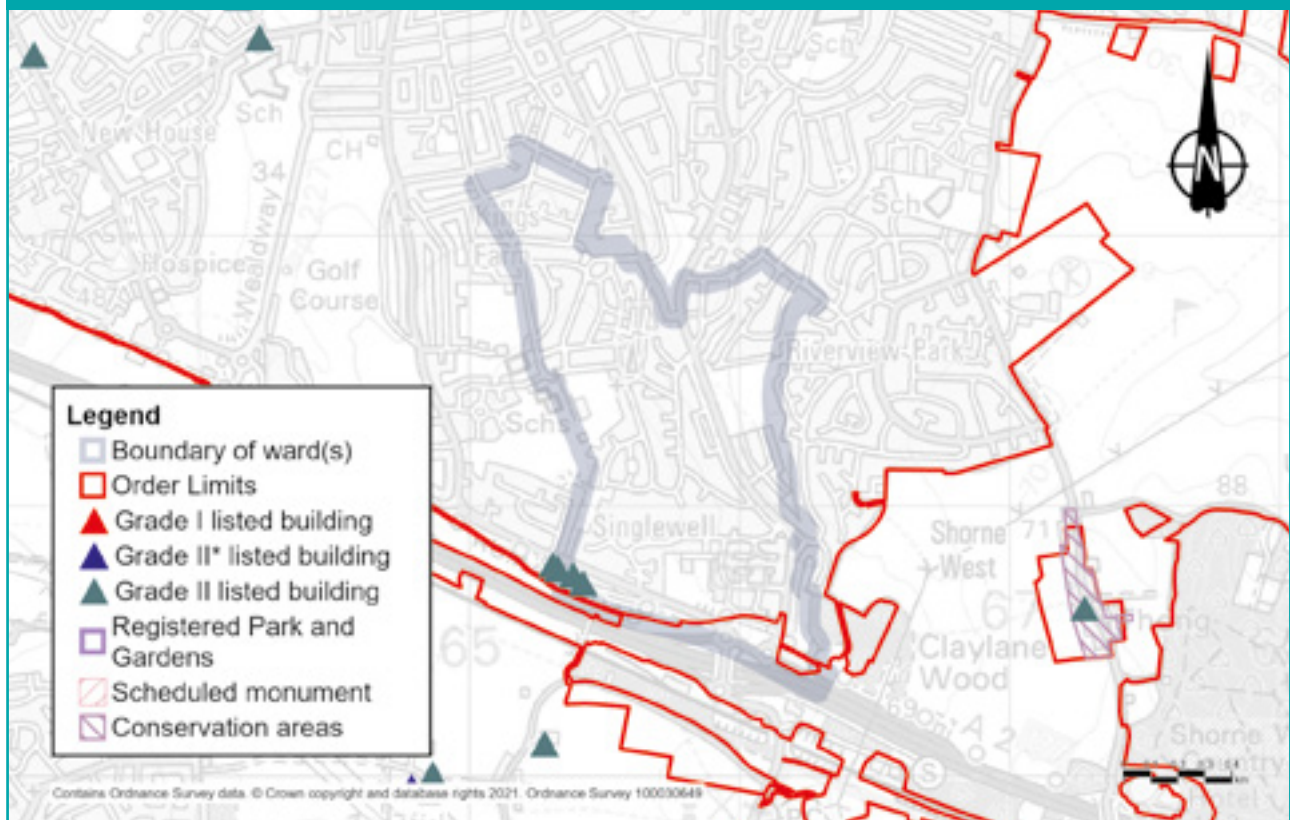
Existing situation

There are two listed buildings and two structures of local historical relevance located in Singlewell ward.

The listed buildings are:

- The George Inn. This is a Grade II listed building of high heritage value. It is located 415 metres east of the project. The inn has a front section that appears to be 18th century and there is a timber-framed portion to the rear that may be older. It is a good example of an old Kentish building constructed in a local style using traditional materials.
- Chapel Farmhouse. This is a Grade II listed building of high heritage value. It is located 70 metres north of the project. The building dates to the 18th century and is the main farmhouse of a historic farmstead, the rest of the farm buildings are poorly preserved.

Figure 8.20 Built heritage in Singlewell ward



Structures of historical relevance:

- Hever Farm was a post-medieval farmstead. It has now been demolished and replaced by modern housing. The site is of low heritage value. As the site has been redeveloped, its historical relevance would not be affected by the project.
- Chapel Farm is a post-medieval farmstead which contains the Grade II listed Chapel Farmhouse (see above). However, apart from the listed farmhouse, the farmstead is poorly preserved and would therefore not be impacted by construction and operation of the Lower Thames Crossing.

8.11.1 Construction

Construction impacts

Activities relate to construction works to the A2 Watling Street and the junction between the A2 and the project. Marling Cross Compound is located off Valley Drive. Known built heritage assets, as shown in the ward map above, would not be directly affected by the project because these buildings would not be physically impacted. However, there would be an indirect effect through the change to the surroundings of some built heritage assets as a result of construction and operation of the project.

Works along the A2 and construction of the proposed A2/M2 junction would temporarily introduce additional noise, lighting and visible activity and machinery in the vicinity of built heritage assets. Being sited just north of the current alignment of A2, the Grade II listed George Inn and Chapel Farmhouse would experience temporary minor changes to their settings (the surroundings in which a heritage asset is located).

Measures to reduce construction impacts on built heritage

No specific measures to reduce construction impacts are required for impacted built heritage assets in this ward because the impacts are non-physical. General measures used across the project to reduce impacts on built heritage can be found under Design principle S326, while dust and noise reduction measures would also be implemented in accordance with the REAC. Please refer to Air quality, Noise and vibration and Heritage asset section of the REAC measures.

8.11.2 Operations

Information about the operational project in this ward can be found in the Project description section above.

Operational impacts

The operational phase would increase the width of the A2/M2. However, this would not be discernible from these assets and consequently they would experience no change.

Measures to reduce operational impacts on built heritage

Tree planting is proposed for the operational phase of the project as screening for heritage assets, which can be seen in the figures in the Project description's Operations section above. The engineering and landscape design for the project seeks to avoid or reduce negative impacts on heritage assets as a result of change to their surroundings that would negatively affect their significance. To preserve the rural and historic character of the landscape, road lighting would be minimised where it is safe and practical to do so but remain in accordance with relevant standards (Design principles LST.02 and LST.03).

8.12 Contamination

From the review of desk-based sources (historical maps and environmental data), potential sources of contamination have been identified based on land uses. Within this ward, the following have been identified.

- Singlewell service station has been a vehicle maintenance garage since 1961.
- The former Gravesend Airport is located to the east of Valley Drive and is a former civilian and military airfield. Former land uses are known or suspected to include aviation fuel storage and dispensing, firefighting, blast pens, aircraft service/ manufacture/ breaking, and an aluminium smelter.

The overall impact from these contamination sources is considered to be low, given the mitigation proposed.

8.12.1 Construction

Construction impacts

The overall impact from these identified sources is considered to be low, given the mitigation proposed. Construction activities such as excavation and earth movements in Singlewell ward would be minimal and given their location, it is unlikely that the potential sources of contamination identified above would be affected.

During construction, there is the possibility for existing contamination within the ground to become mobilised. There is also a potential risk of accidental oil, cement and fuel spills from construction traffic and the storage of materials.

Measures to reduce the risk of contamination

To reduce the impact to an acceptable level, good practice measures including appropriate storing of equipment and clear soil handling, storage of chemicals and re-use guidance would be used during construction to reduce the risk of spreading contamination and spillage or pollution.

To reduce the risk of accidental spillages, procedures would be in place such as designated areas to re-fuel plant, tanks would be bunded, spill kits would be available and incidents would be recorded and managed, with impacted soils being assessed and removed if necessary.

Essential mitigation such as the development of site-specific remediation, where contamination has been identified during ground investigation work, would be undertaken following consultation with the local authority. During the earthworks, workers would remain vigilant and any suspected contamination would be recorded and assessed accordingly via a watching brief protocol.

The impact of construction on contamination would be controlled and minimised through the range of good practice measures set out in the project's CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

8.12.2 Operations

Verification reports would be prepared for the remediation that is undertaken in site-specific areas and this would be provided to the local authority. Once the road is open, should an incident occur, for example, a traffic accident resulting in localised contamination, significantly affected soils would be assessed and, if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

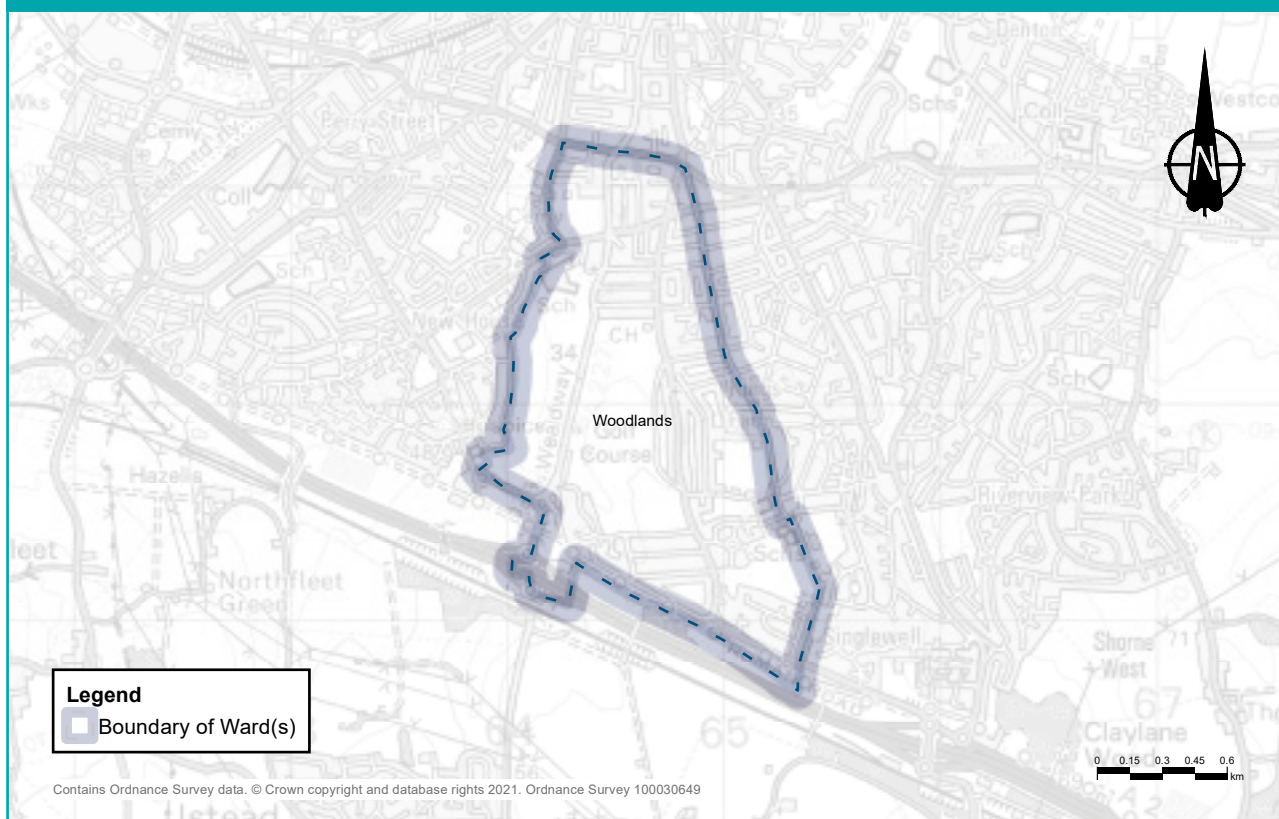
9

Chapter 9: Woodlands ward

This chapter summarises the activities in Woodlands ward relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter, and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 9.1: Ward boundary map for Woodlands ward



9.1 Overview

9.1.1 About this ward

Woodlands is located south of the River Thames and forms part of Gravesend town in the borough of Gravesham. It is situated to the west of Singlewell ward and east of Painters Ash ward. Woodlands ward is approximately 2.2km² in area and has an estimated population of 6,934¹. Woodlands ward is mostly residential and includes the suburbs of Christian Fields and King's Farm, as well as Mid Kent Golf Club. The A2 runs close to the southern boundary of the ward, with Roman Road bridleway on the ward's southern boundary.

1 Office for National Statistics, 2018 ward-level population estimate

9.1.2 Summary of impacts

Table 9.1: Summary of impacts during the project’s construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>There may be some additional local vehicles on the A227 Wrotham Road if traffic is deterred from using the Gravesend East junction. This may lead to some delays at junctions along the Wrotham Road within the ward.</p> <p>Mitigation</p> <p>We have reduced HGV journeys. We propose haul roads off the public highway for construction vehicles, which would reduce their use of local roads. We would reduce A2 closures and limit them to nights and weekends as much as possible.</p>	<p>Impacts</p> <p>There would be very little change in traffic in the Woodlands ward as a result of the new road opening, except along Wrotham Road. Further details of the predicted changes in traffic flow can be found in the Traffic section of this chapter.</p> <p>Mitigation</p> <p>Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads.</p>

Topic	Construction	Operations
<p>Public transport</p>	<p>Buses</p> <p>There may be some increases to journey times on coach services on the A2 due to activities in adjacent wards.</p> <p>Rail</p> <p>During construction, there would be no noticeable changes in local journey times to Gravesend station and no changes to rail services at that station.</p>	<p>Buses</p> <p>There are no discernible changes to bus journeys predicted once the project is operational.</p> <p>Rail</p> <p>There would be no discernible changes to rail services from or access times to Gravesend station once the project is operational.</p>
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>One bridleway and one cycle route would be impacted during the construction period to allow for utilities diversions works.</p> <p>Mitigation</p> <p>Closures of these two routes would be reduced as much as possible to lessen the impact on the local public rights of way network.</p>	<p>Impacts</p> <p>The section of a cycle route that runs through these wards would be unaffected by the road when it opens, but would be affected in other sections of the route in neighbouring wards to the west.</p> <p>Mitigation</p> <p>No mitigation required.</p>

Topic	Construction	Operations
<p>Visual</p>	<p>Impacts</p> <p>Views towards construction activities would be limited. A small number of homes along Epsom Close would be able to see the adjacent utility works along the Roman Road. Some taller elements, such as new tunnel entrance gantries may be visible.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with widening the A2 is expected to create noise in this ward. There would be 24-hour, seven-day working in some locations.</p> <p>There would be no percussive or vibratory works within this ward. There would be negligible changes in road traffic noise apart from Ridgeway Avenue, which is predicted to have a minor increase in noise and Harman Avenue, which is predicted to have a moderate increase in noise during year 1 of construction.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled by mitigation measures set out in the REAC. There are also measures presented in the CoCP.</p>	<p>Impacts</p> <p>Once the new road is built, it is predicted there would be between a minor increase and decrease in noise in different areas of this ward. This is due to changes in traffic flow and the speed on the existing road network.</p> <p>Mitigation</p> <p>Low-noise road surfaces would be installed on new and resurfaced roads.</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>A few properties located along the A2 corridor may experience dust and emissions from construction equipment and traffic during the construction phase.</p> <p>Analysis of the construction phase traffic flows associated with the project indicate there would be a minor worsening in air quality in the area along Singlewell Road during 2024.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures (which are presented in the CoCP and REAC) to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀.</p> <p>Mitigation</p> <p>No essential mitigation is required.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are limited impacts predicted on this ward although there is the potential for changes in the area that may result in negative impacts on health, for example, mental health and wellbeing. These include increased traffic noise, dust and emissions from construction equipment and traffic, and changes in access to open space such as the temporary closures of footpaths.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to noise, working hours and community engagement.</p>	<p>Impacts</p> <p>Once the project is built, there would be a 10% increase in accessibility to open space for local people.</p> <p>Mitigation</p> <p>No essential mitigation is required for health other than those measures described in the noise mitigation section.</p>

Topic	Construction	Operations
<p>Biodiversity</p>	<p>Impacts</p> <p>The construction of the project would involve the removal of areas of habitat, both temporarily and permanently, and disturbance to retained habitat for the new road. These habitats support a number of protected and notable species which would be impacted including reptiles.</p> <p>Mitigation</p> <p>Vegetation clearance would take place in winter to avoid impacting breeding birds. Protected species would be relocated, carried out under a Natural England licence. Impacts would be controlled through the range of good practice measures set out in the CoCP and REAC.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>
<p>Built heritage</p>	<p>Impacts</p> <p>There is likely to be an indirect effect (additional noise, lighting and visible construction activity) on some built heritage assets due to construction work on the A2 Watling Street. Grade II listed Orchard House and Corner Cottage would experience temporary minor change to their setting as they are located just north of the A2.</p> <p>Mitigation</p> <p>Mitigation measures are presented in the REAC, the CoCP and the Design principles.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>
<p>Contamination</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>

9.2 Project description

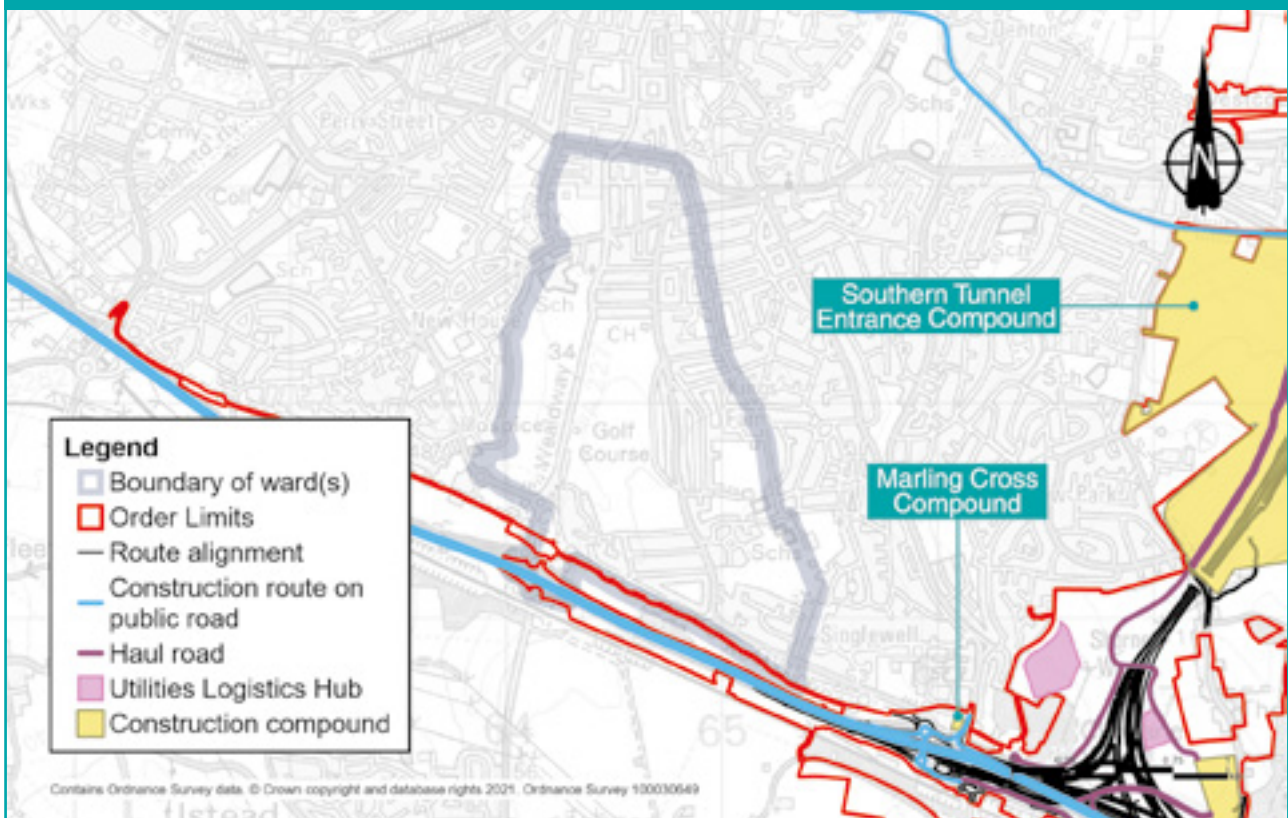
9.2.1 Construction

Construction activities

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

Part of our proposed Order Limits (the area of land required to construct and operate the project, formerly known as the development boundary), extends from an existing compound at Marling Cross in Shorne, Cobham and Luddesdown ward to a National Grid site west of Hall Road. This is to support the proposed installation of four underground power cables from the National Grid site to the new primary substation at the A226. The power cables and associated works would pass through Woodlands ward.

Figure 9.2: Main construction areas in Woodlands ward



The power cables would be installed using trenchless methods under Hall Road and Wrotham Road. The remainder, along the Roman Road bridleway, would be mostly open cut and delivered in sections, with barriers moving as work progressed. Chapter 2 of the Construction update provides an overview of how existing utilities would be affected by our plans to build the new road, with further detail including maps in chapter 3. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be repositioned to accommodate the new road.

Construction compounds and Utility Logistics Hubs

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

No construction compounds or Utility Logistics Hubs are proposed in Woodlands ward.

Construction routes on public roads

The A2 would be used as a construction route.

Construction schedule

Construction of the entire project is scheduled to last for six years from 2024 to 2029. To complete our construction programme efficiently, we would divide activities into packages of work, carried out in a coordinated way. Maps and programmes for the work packages in Kent can be found in chapter 3 of the Construction update. The utility works in this ward are expected to take around 15 months, towards the beginning of the overall construction schedule.

Construction working hours

Most construction activities in this ward would take place during core hours, from 7am to 7pm on weekdays and 7am to 4pm on Saturdays. However, there would be circumstances when our working hours would need to be extended. For example, connecting new roads to existing ones would be carried out when there is less traffic, so it is safer for both construction workers and road users. Working outside the core hours can also benefit road users by reducing the need for traffic management measures during peak times. More information about working hours is set out in the Noise and vibration section below and in the CoCP.

Traffic management

There are no construction traffic management measures planned in the Woodlands ward.

Measures required across the project would include narrow lanes, reduced speed limits, lane closures and temporary traffic lights. We have tried to minimise traffic management measures wherever practical. However, they would be necessary in some places to allow construction traffic and local communities to travel safely, while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction. All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans would be subject to approval by the Secretary of State for Transport, following consultation with the local highways authority.

9.2.2 Operations

The completed project

For more information about the completed project, see the Operations update, as well as the large-scale figures in Map Book 1: General Arrangements.

Changes to the project since our design refinement consultation

There have been changes to the Order Limits in Woodlands ward since our design refinement consultation in July 2020. These are in the area where the works on the underground power cables are proposed. Our ongoing discussions with the local authority and utility company have allowed us to realign the proposed utility works and we have reduced the Order Limits accordingly.

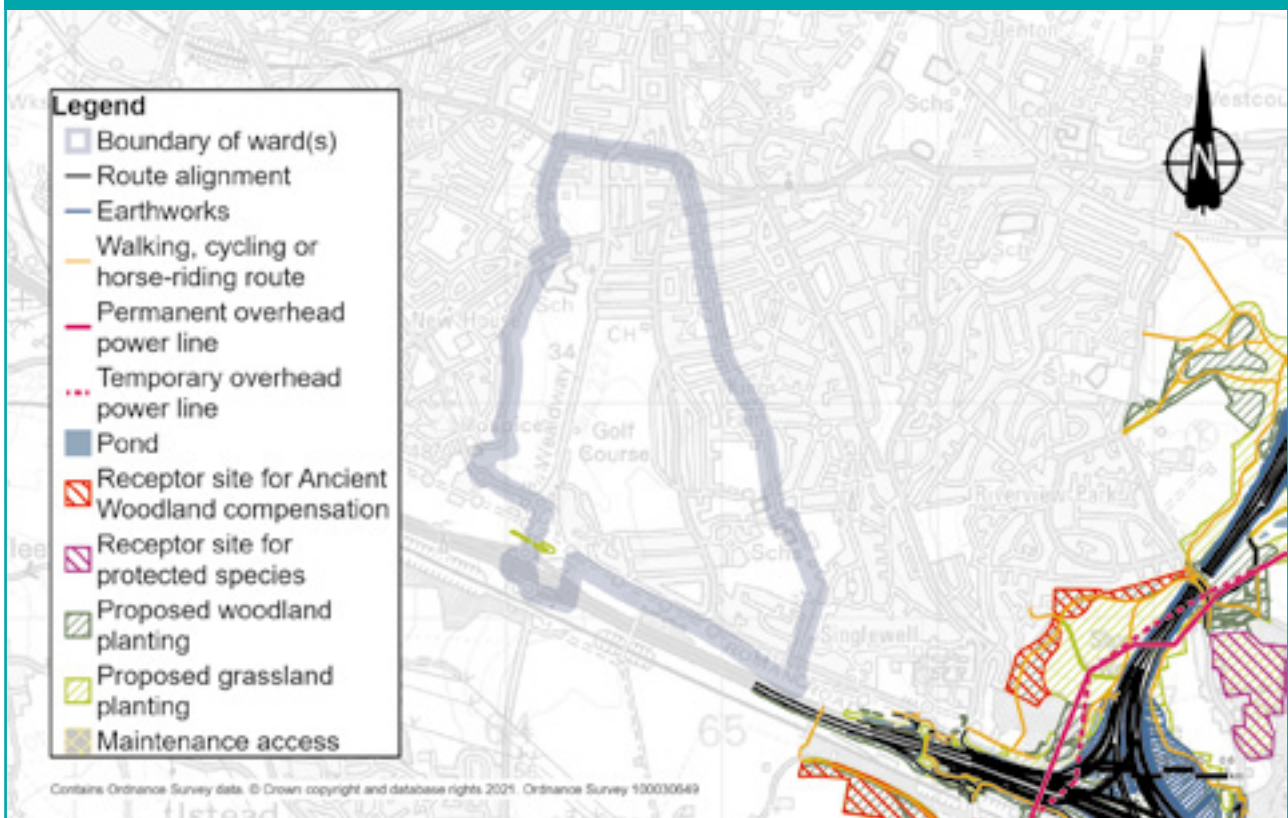
Impacts on open space and common land

In Woodland ward, we propose permanently acquiring rights within the Cyclopark for the purposes of maintaining the newly installed underground power cable along or adjacent to the existing bridleway on Roman Road. The open space affected by these utility works would be reinstated and access to the land would be unaffected once construction is complete.

The amount of land required within the Cyclopark has been reduced since the design refinement consultation, therefore reducing the temporary impact on the open space site.

More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

Figure 9.3: Main features of the completed project



9.3 Traffic

We carried out traffic assessments to understand how roads near the project would be affected during the project's construction and once it is operational, compared with the situation if the project was not built. Information about how we carried out these assessments can be found in chapter 4 of the Operations update.

9.3.1 Construction

Construction impacts

Information about construction activities in this ward, including construction routes on public roads, can be found in the Project description section above.

There may be some additional local vehicles on the A227 Wrotham Road if traffic is deterred from using the Gravesend East junction. This may lead to some delays at the junctions along the Wrotham Road within the ward.

Measures to reduce construction traffic impacts

Our approach to construction has been refined after further investigations and feedback received from the public and stakeholders. A summary of the proposed measures to reduce the volume of construction materials transported in and out by road can be found in chapter 2 of the Construction update. In addition to reducing the volume of HGV journeys needed for the project's construction, we would avoid the long-term closure of the A2/M2 during the construction period to reduce the impacts on local communities and the wider road network. Instead, to carry out the required works on the A2/M2, we would only close the road overnight or at weekends when it is less busy.

- We would implement the Gravesend East junction northern roundabout works as early as possible during construction, so local traffic could benefit from the changes as soon as possible.
- We would minimise the use of the local road network as far as practical by building temporary offline haul routes that link the strategic road network directly to the construction areas, including directly from the A2 eastbound.

9.3.2 Operations

Operational impacts

Traffic modelling has been carried out to predict the change in traffic flows on roads in the area, including those within or on the boundary with this ward for the first year of operation, 2029.

Figures 9.4, 9.6 and 9.8 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV.

Figures 9.5, 9.7 and 9.9 show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

There would be very little change in traffic in the Woodlands ward as a result of the new road opening, except along Wrotham Road and Coldharbour Road. Coldharbour Road would generally not experience any change in traffic greater than 50 PCUs an hour; the exception is eastbound in the morning peak hour where the increase is between 50 and 250 PCUs an hour. Along the Wrotham Road outside the St George's Church of England Academy, the traffic increases by between 50 and 250 PCUs northbound in the morning peak hour. This is an increase of between 10% and 20%. In all other time periods, the change in traffic flows would be less than 50 PCUs. Southbound, the change in traffic flows is less than 50 PCUs in all modelled time periods.

Coldharbour Road would generally not experience any change in traffic greater than 50 PCUs an hour; the exception is eastbound in the morning peak hour where the increase is between 50 and 250 PCUs an hour.

On the Wrotham Road, between the A2 and the junction with Coldharbour Road, northbound the traffic flows increase in the morning peak period by between 50 and 250 PCUs, an increase of less than 10%. Southbound traffic flows would increase by between 50 and 250 PCUs, an increase of less than 10% in the morning peak hour and an average interpeak period. Where the A227 Wrotham Road crosses over the A2, the traffic flows would increase northbound by between 50 and 250 PCUs in all modelled time periods. This is an increase of between 20% and 40% in the morning peak hour and less than 10% in the other time periods. Southbound, the increase in traffic flows would be between 50 and 250 PCUS in the evening peak hour, an increase of between 10% and 20%.

On the offslip westbound from the A2 onto the Wrotham Road junction, the increase in traffic flows would be between 50 and 250 PCUs in each modelled time period. This is an increase of over 40% in the morning peak hour and between 10% and 20% in the interpeak period and the evening peak hour. The eastbound onslip from the Wrotham Road onto the A2 would experience an increase in traffic flows of between 50 and 250 PCUs in the morning peak hour and an average hour in the interpeak period. This is an increase of between 10% and 20%.

Figure 9.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

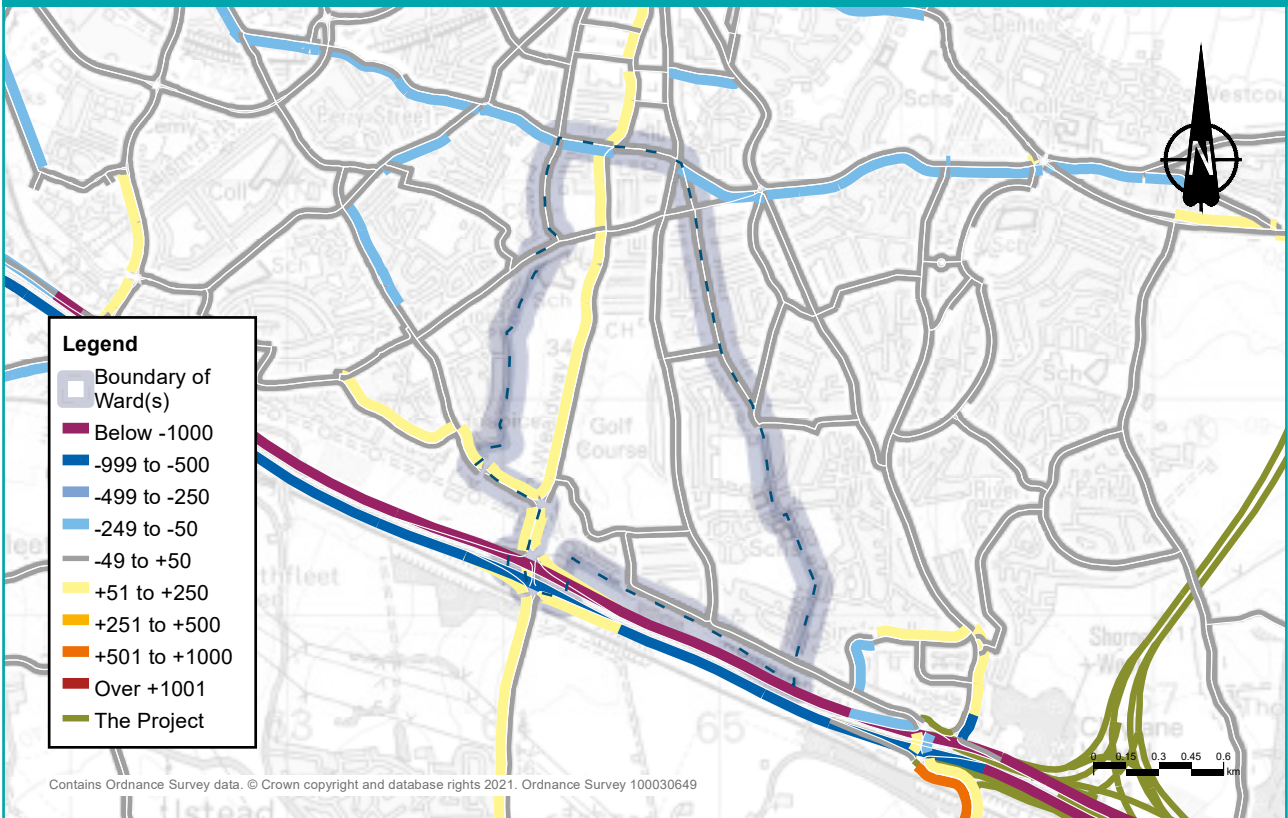


Figure 9.5: Predicted percentage change in traffic flows with the project during the morning peak in 2029

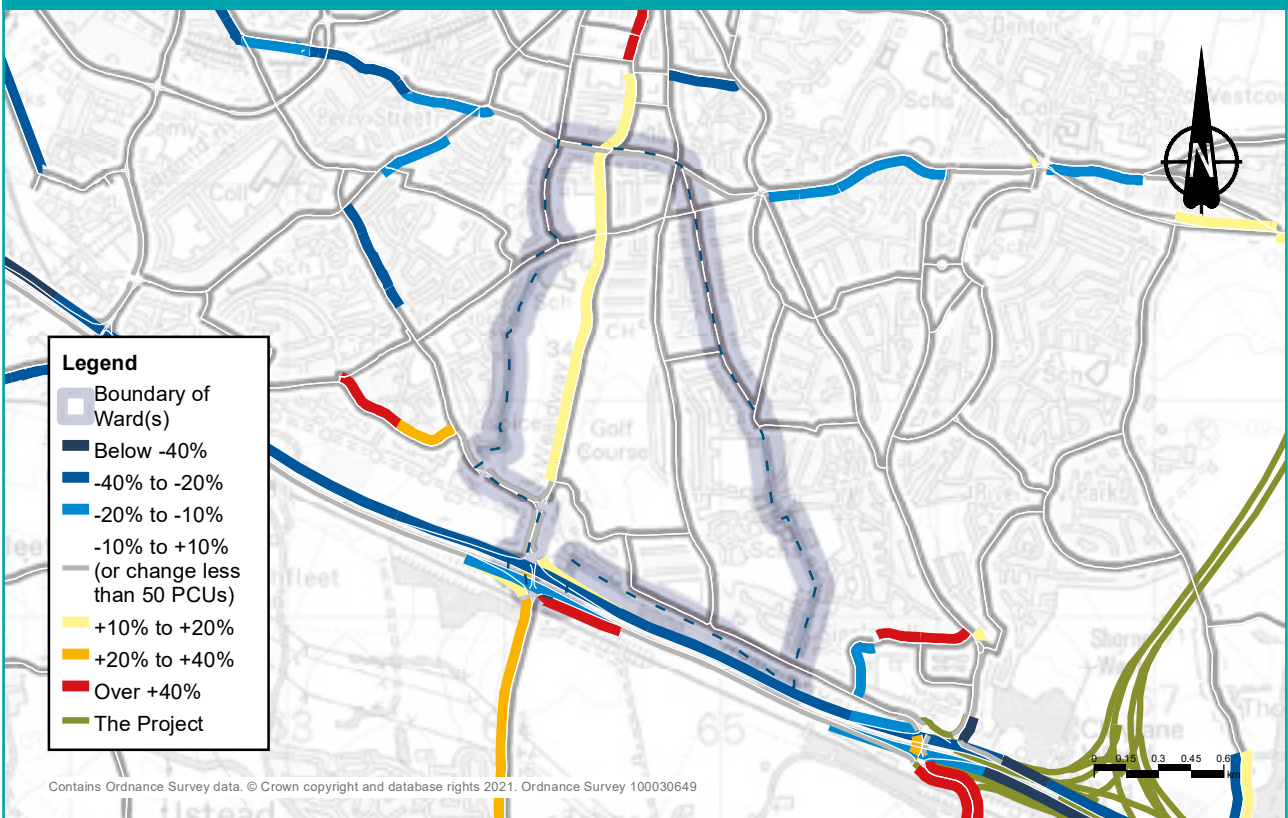


Figure 9.6: Predicted change in traffic flows (PCUs) with the project during the interpeak period in 2029

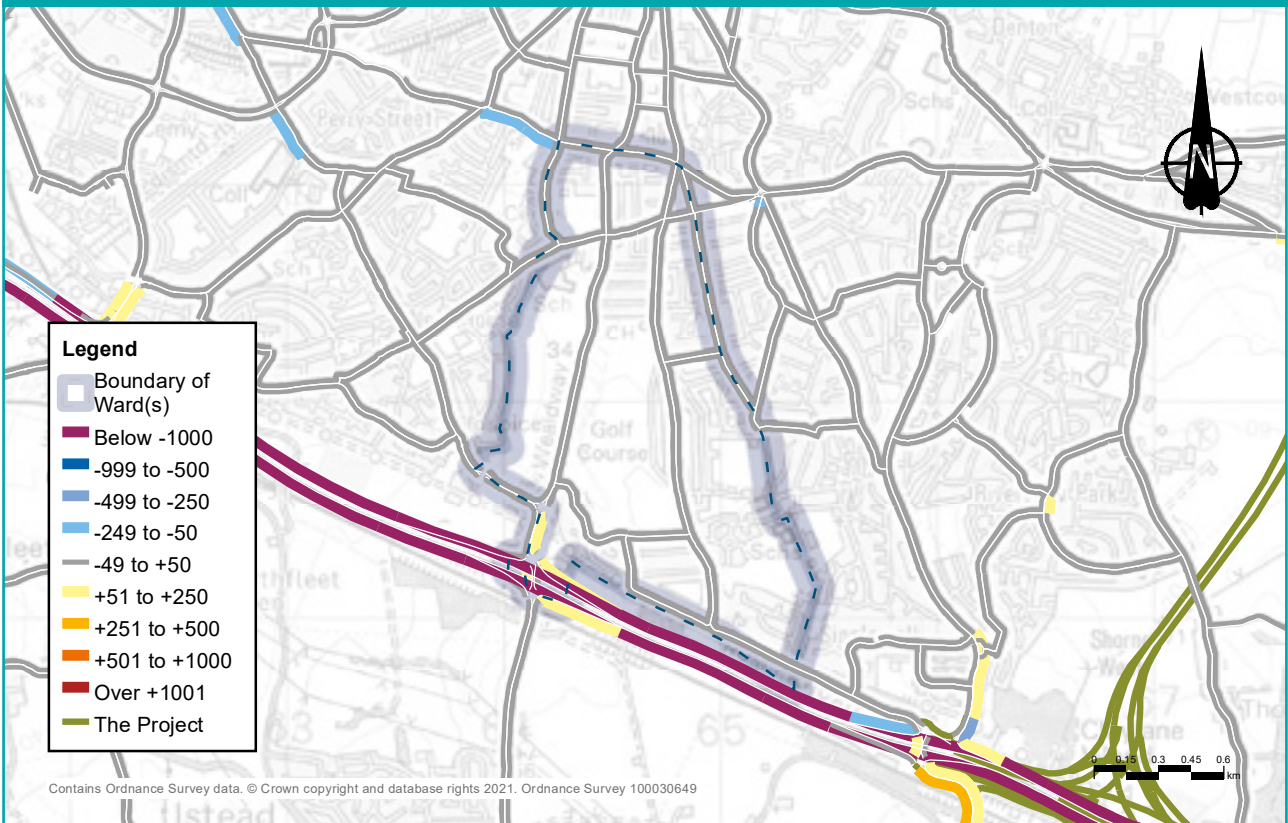


Figure 9.7: Predicted percentage change in traffic flows with the project during the interpeak period in 2029

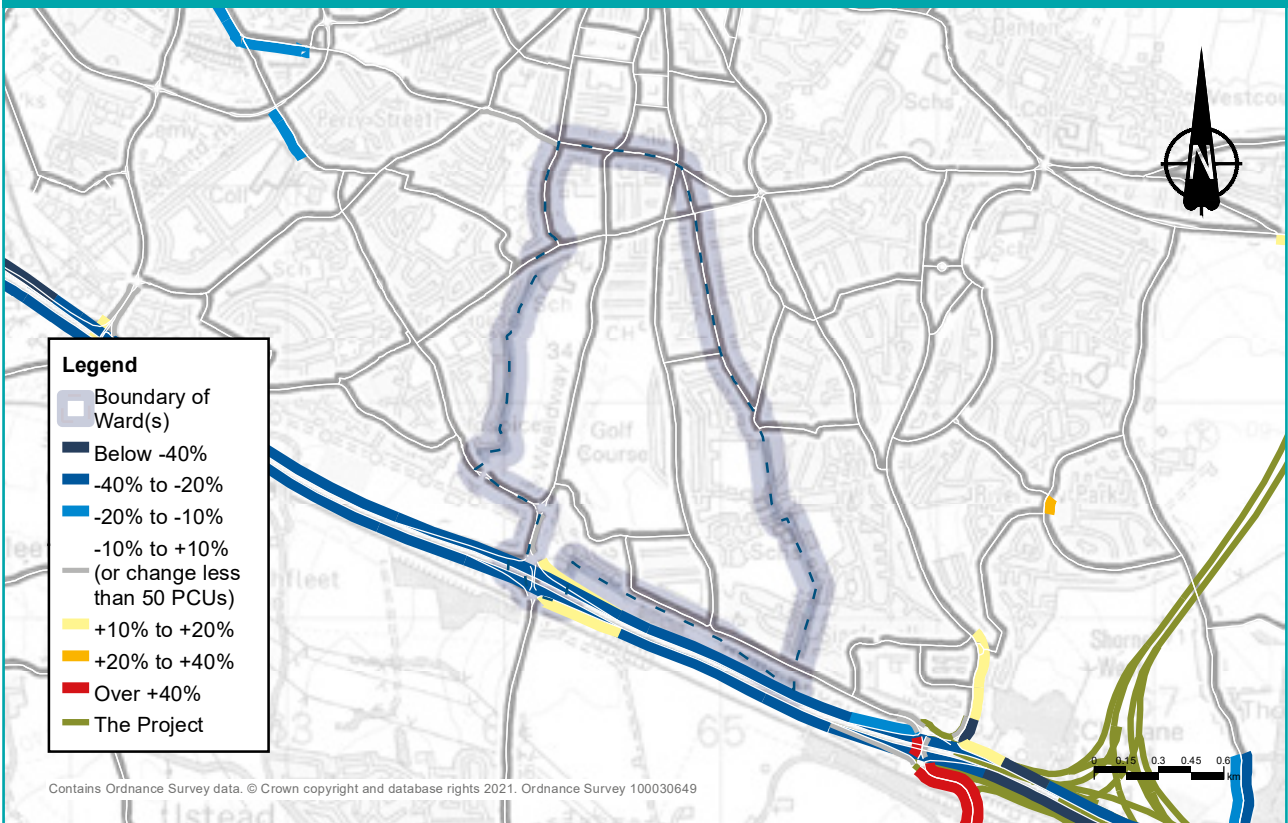


Figure 9.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

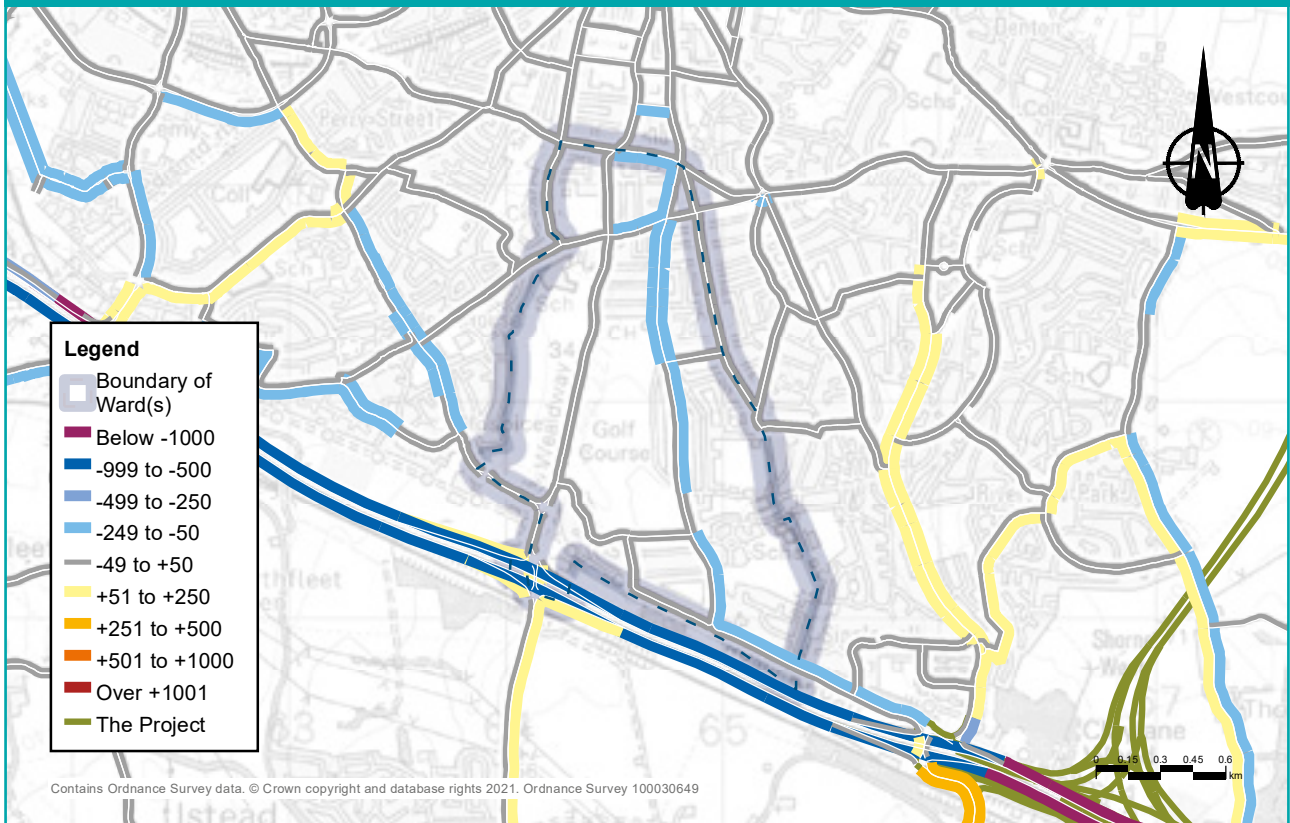
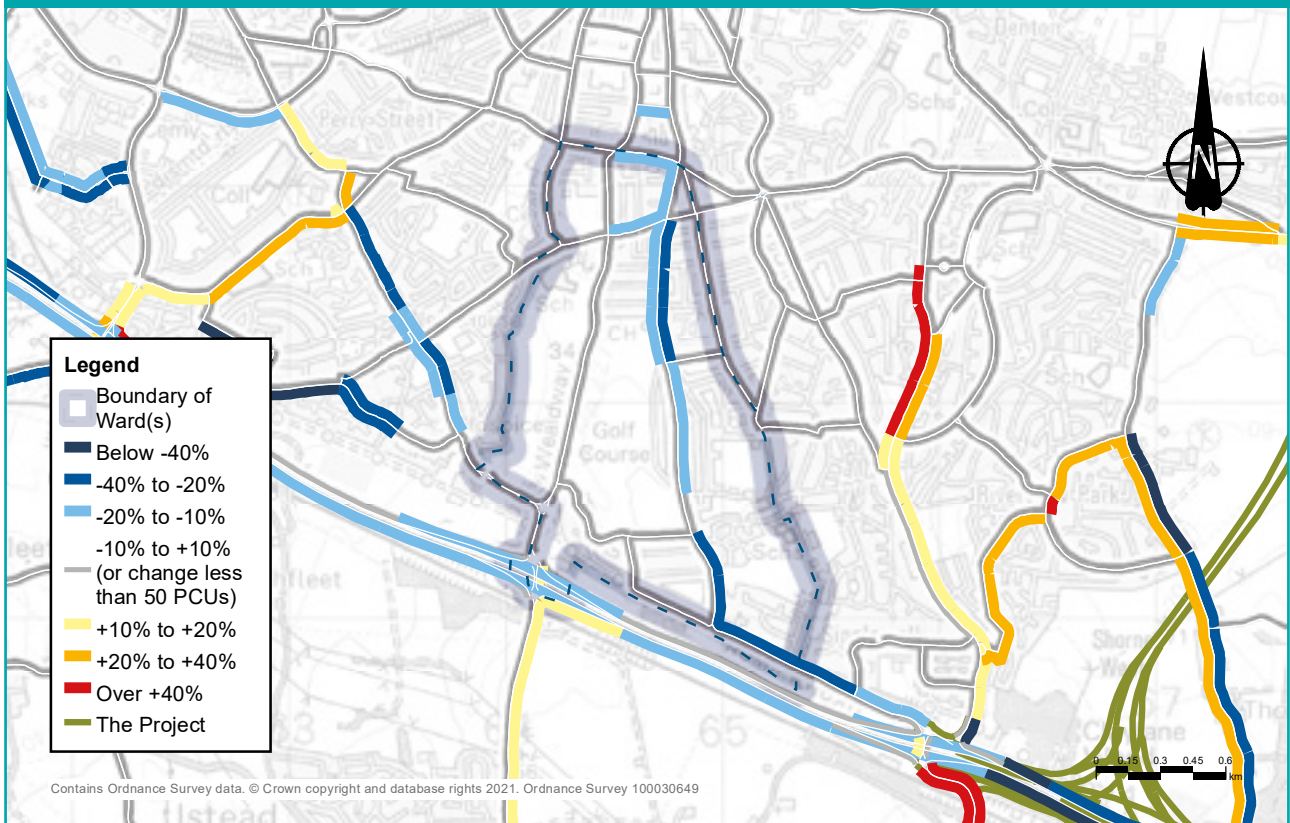


Figure 9.9: Predicted percentage change in traffic flows with the project during the evening peak in 2029



Changes to journey times

Figure 9.10 shows the change in the area that could be reached within a 30-minute drive from the centre of the ward with and without the project. Figure 9.11 shows the change in area that can be reached within a 60-minute drive. The areas have been calculated for the morning peak hour (7am to 8am). The number of jobs within a 30-minute catchment area would increase by 50% with the project, an increase of 187,700 jobs. The number within a 60-minute drive increases by 22%, and would provide access to an additional 555,000 jobs. Despite the project providing a substantial net gain in access for motorists within Woodlands ward, there are areas (shown in orange on the maps below) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network. The area of white space north of the River Thames within the 30-minute map reflects the predicted journey times in that area.

Figure 9.10: Change in the area that motorists could drive to within 30 minutes from Woodlands ward

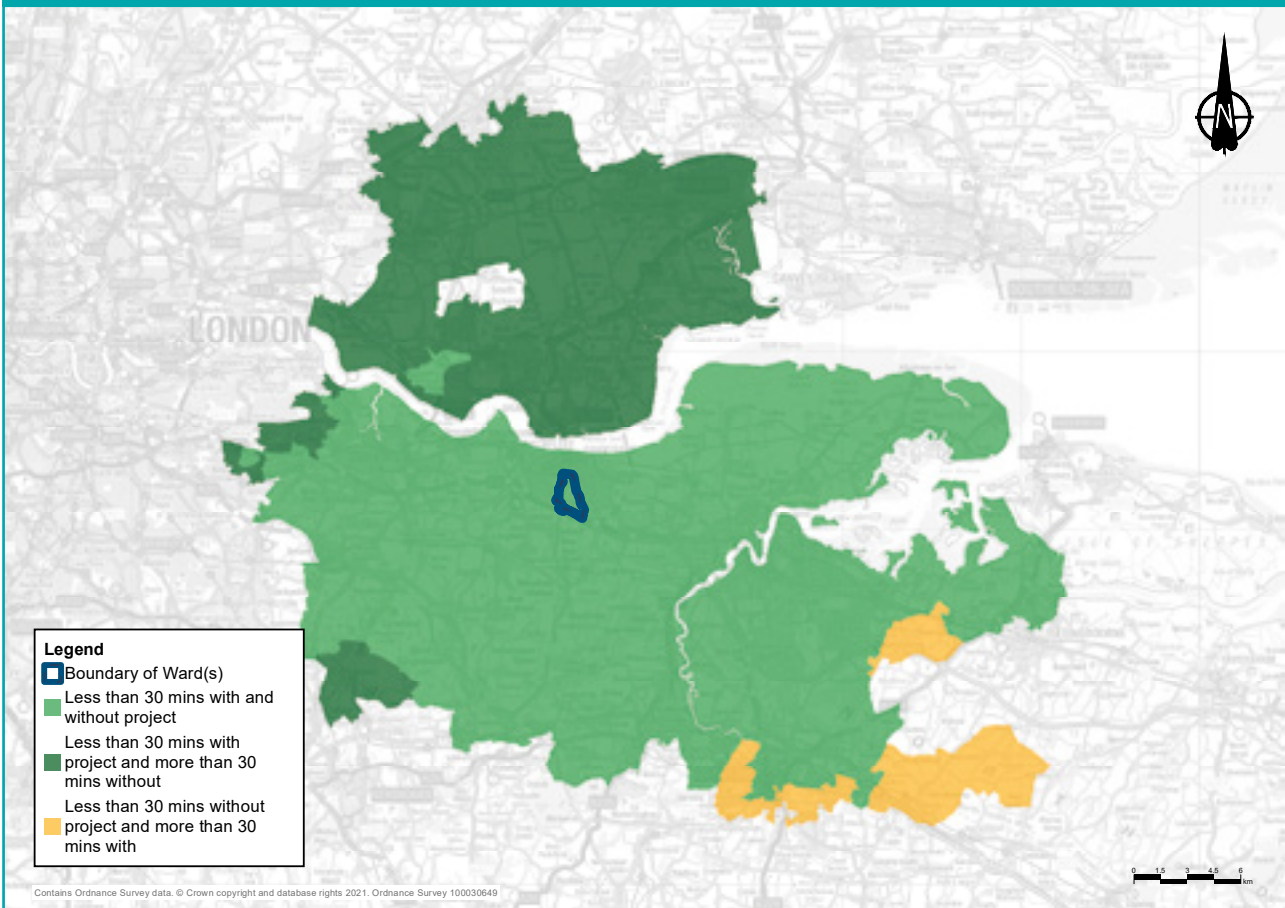
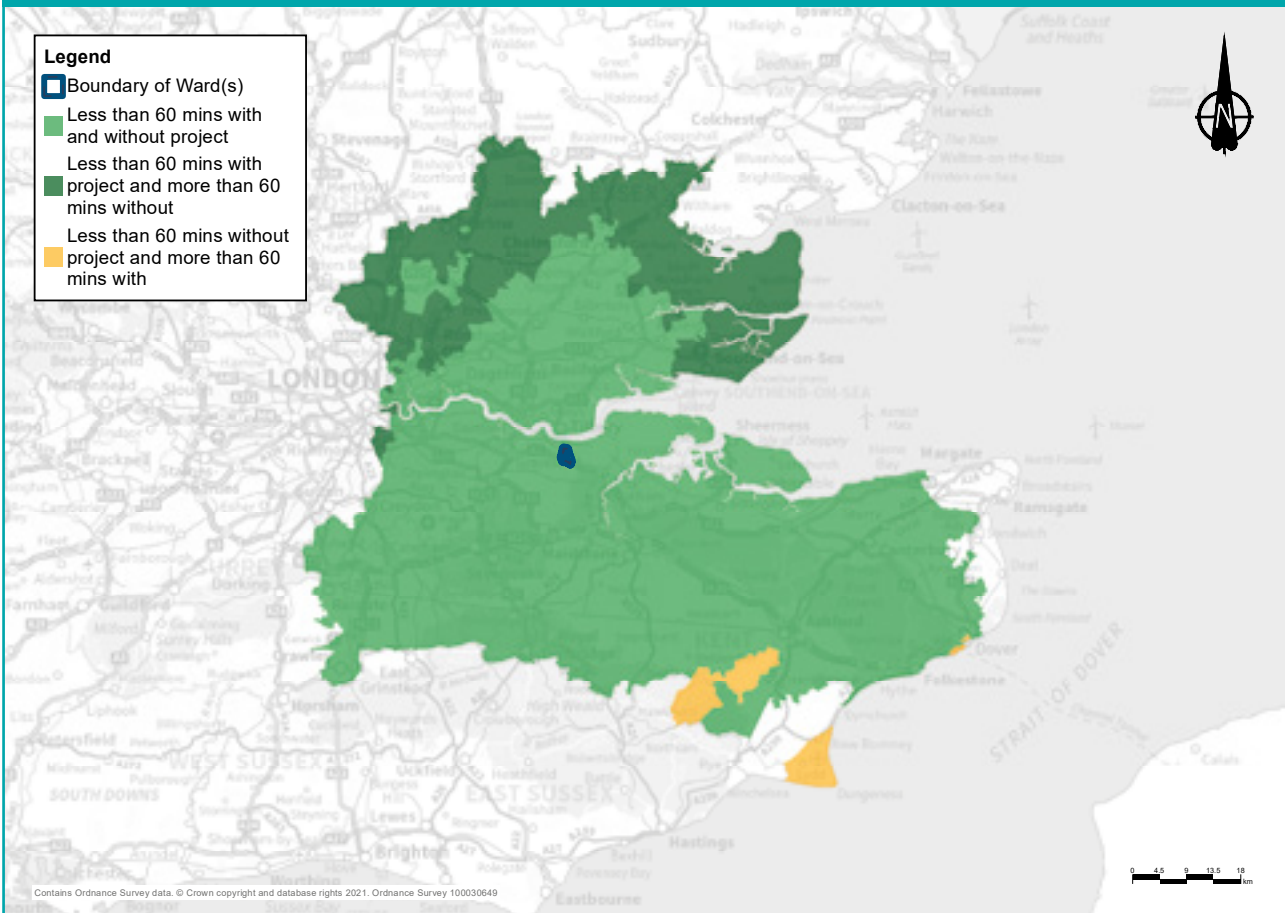


Figure 9.11: Change in the area that motorists could drive to within 60 minutes from Woodlands ward



Operational traffic flows

Once the road is open, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

9.4 Public transport

Current situation

There are no railway stations within the ward but Gravesend station is used by Southeastern and Thameslink services to run journeys from Kent through to London Charing Cross north of the ward. Woodlands ward is served by several bus routes including the 3, 223, 305, 306, 308, 416, 455, 717, 719, 720, 722, 750, 751, 765, 774, the school buses Meopham1, VIGO1, NAG2, and regional coach services using the A2.

9.4.1 Construction

Buses

There would be no changes to bus journey times during construction as a result of activities within Woodlands ward. There may be some increases to journey times for buses and coaches using the A2 due to activities in adjacent wards.

Rail

There would be no noticeable change in local journey times to Gravesend station and no change to rail services at that station.

9.4.2 Operational

Buses

Once the new road opens, there would be no changes to bus routes through the ward and no noticeable change to bus journey times.

Rail

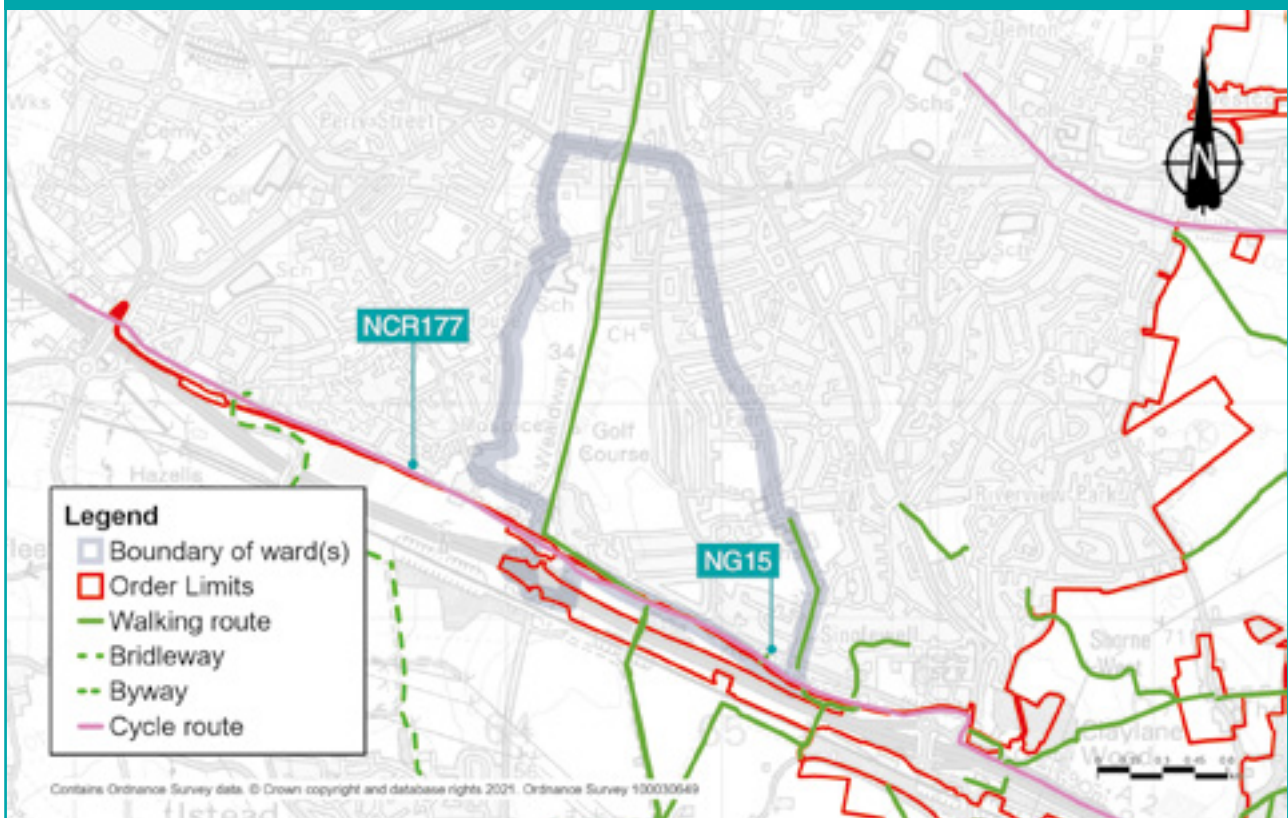
There would be no noticeable change in local journey times to Gravesend station and no change to rail services at that station.

9.5 Footpaths, bridleways and cycle routes

Existing situation

Woodlands is a largely suburban ward, split by the Singlewell Road and the Mid Kent Golf Club. The ward has a small network of local footpaths. For other potential impacts, see the other section areas in this chapter, such as Visual, and Noise and vibration.

Figure 9.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Woodlands ward



9.5.1 Construction

Construction impacts

Due to the construction activities around the A2 in this ward, there would be minor disruptions during the construction period.

- Footpath NG15 would need to be closed for six months to allow utility works where it crosses the Order Limits.
- Cycle route NCR177 within Woodlands ward would remain open during the construction period.

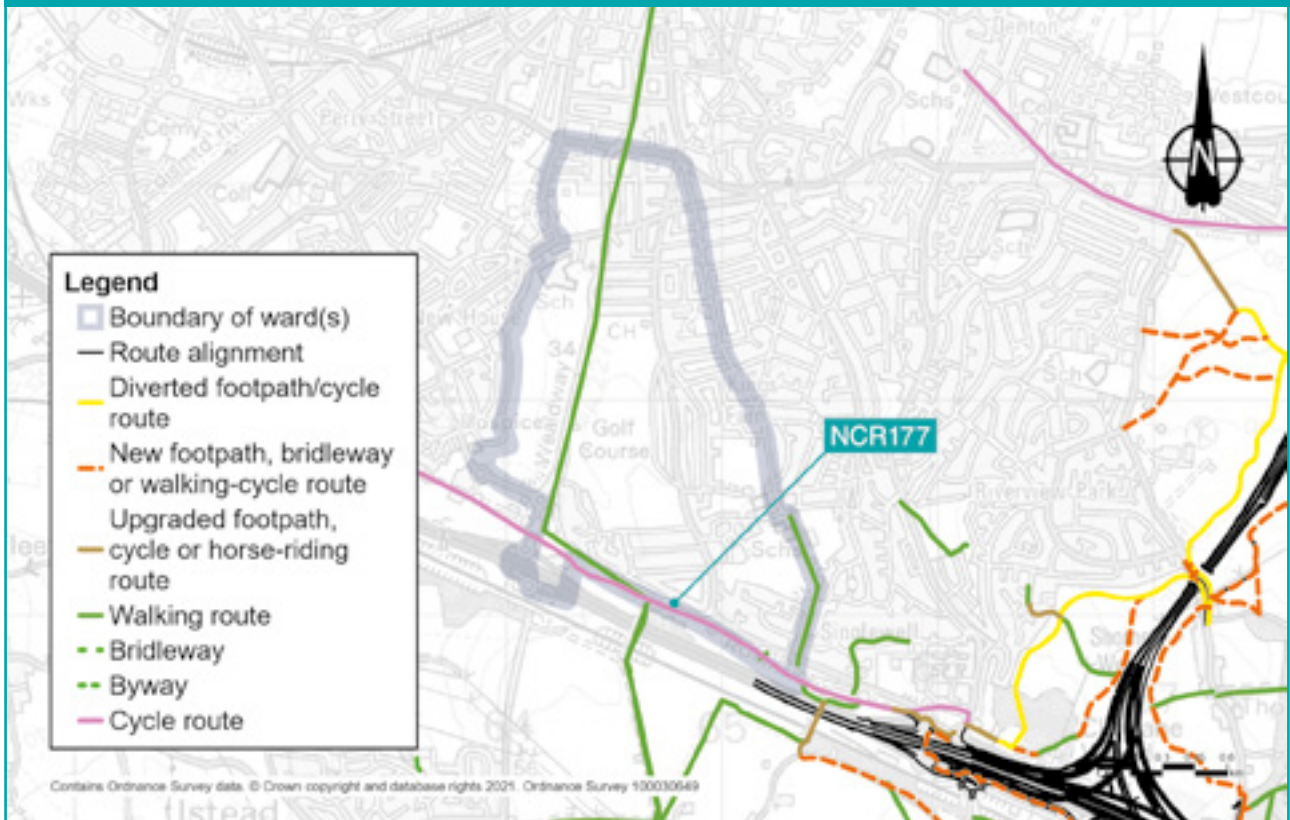
9.5.2 Operations

Operational impacts

Overall, the proposals for walking, cycling, and horse riding include more than 46km of new, diverted, extended or upgraded footpaths, bridleways and cycleways. These would provide greatly improved connections across the project. We developed our proposals after consultation and engagement with local communities and stakeholders. For an overview of the proposed improvements to footpaths and bridleways across the Lower Thames Crossing, see chapter 2 of the Operations update.

- The section of NCR177 within Woodlands ward would not be affected by any permanent changes. However, a section of the route east of Gravesend East junction would close permanently, with two new routes being implemented south of the A2, one more direct route along the new connector road south of the A2 and a more scenic route through Jeskyns Woods. For more information, see the Footpaths, bridleways and cycle routes section in chapter 3.

Figure 9.13: Proposed footpaths, bridleways and cycle routes



9.6 Visual

Existing situation

Of the main populated areas, only those homes on the southern edge of Gravesend have views towards the land on which the project would be built. East of the A227, there are views of the land on which the project would be built from a short section of the Wealdway long-distance footpath along Roman Road, until the route crosses the A2 on a footbridge. Views of the land on which the project would be built are also visible from cycle route NCR177 along Roman Road.

Current views towards the land on which the project would be built from homes along Old Watling Street/Watling Street and Hever Court Road are largely screened or densely filtered by a combination of roadside hedgerows and garden vegetation. From Epsom Close, views towards the project include glimpses of gantries along the A2 corridor, partially screened by garden vegetation.

The Wealdway long-distance footpath along Roman Road lies within the land on which the project would be built. Current views from both the Wealdway and NCR177 include the green corridor between the edge of Gravesend and linear planting parallel with the A2. Views towards the land on which the project would be built, taking in the A2 corridor, are restricted by linear belts of trees and roadside vegetation.

East of the Wealdway footbridge crossing the A2, there are slightly more open views from NCR177 toward the project, including the A2 corridor, of grassland, scrub and intermittent trees, with glimpses of gantries.

9.6.1 Construction

Construction impacts

For more information about how the area would look during construction, refer to the construction visualisations in the Construction update. The main construction activities likely to be seen from this ward are:

- utilities diversions
- widening of the A2 corridor and connection works

Views of construction activities would be limited to a small number of homes along Epsom Close, where adjacent utilities works along Roman Road would be partially visible in filtered views and from NCR177. Beyond these works, construction activities along the A2 would be mostly screened by roadside vegetation, although taller elements such as new tunnel entrance gantries, may be visible.

From a short stretch of the Wealdway long-distance path, which follows Roman Road, there would be views of utility works taking place in or next to Roman Road.

Within this ward the route of NCR177 would remain unchanged, however to the east of this ward NCR177 would be permanently diverted as a result of the project.

Measures to reduce visual impacts during construction

Given the limited views of the project from this ward, no specific mitigation measures are proposed.

9.6.2 Operations

Operational impacts

By 2029, the year of opening, the widening works to the A2 would be complete and the land affected by utilities works along Roman Road would have been restored. More information about the completed project can be found in the Project description section above. There would be no long-lasting visual impacts from the project on Woodlands ward.

Measures to reduce visual impacts during operation

Screen planting would form the primary mitigation in this ward.

9.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals put forward during this consultation.

Existing situation

The existing noise environment in Woodlands ward is mainly characterised by traffic noise, with a contribution from the railway, agriculture and human activity. The main sources of road traffic noise in this ward are from the A2 and B261.

As part of our environmental assessment process, we carried out surveys of existing background noise at one location in the ward, which was agreed with the local authority. The levels monitored at this location recorded an existing noise level of 61dB(A)² during the day.

To understand how noise levels would vary with and without the project, we used modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We modelled this because we cannot assume that noise levels when the project opens would be the same as they are now. For example, our assessment of the opening year noise levels takes into account predicted changes in traffic levels. We also modelled the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if the road was built.

In the opening year, noise levels without the project are predicted to range, on average, from 40 to 81dB(A) during the day and from 29 to 66dB(A) during the night at the identified location in the ward. As such, our noise assessments predict that by opening year noise levels would increase compared to the existing situation even if the road is not built. Information about noise levels with the project, during its construction and operation, are presented below.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that account for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

9.7.1 Construction

Daytime construction impacts

The main construction activities that are expected to give rise to noise and vibration in this ward are those associated with widening the A2. There are no main works compounds or Utility Logistics Hubs currently proposed to be located within the Woodlands ward, nor are there any haul roads proposed within this ward.

There are no percussive or vibratory works proposed in Woodlands.

Construction noise levels have been predicted at six locations across this ward, chosen to provide a representative level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using the standard units for major projects, dB LAeq (12-hour), which represent the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

Figure 9.14: Construction noise assessment locations in Woodlands ward

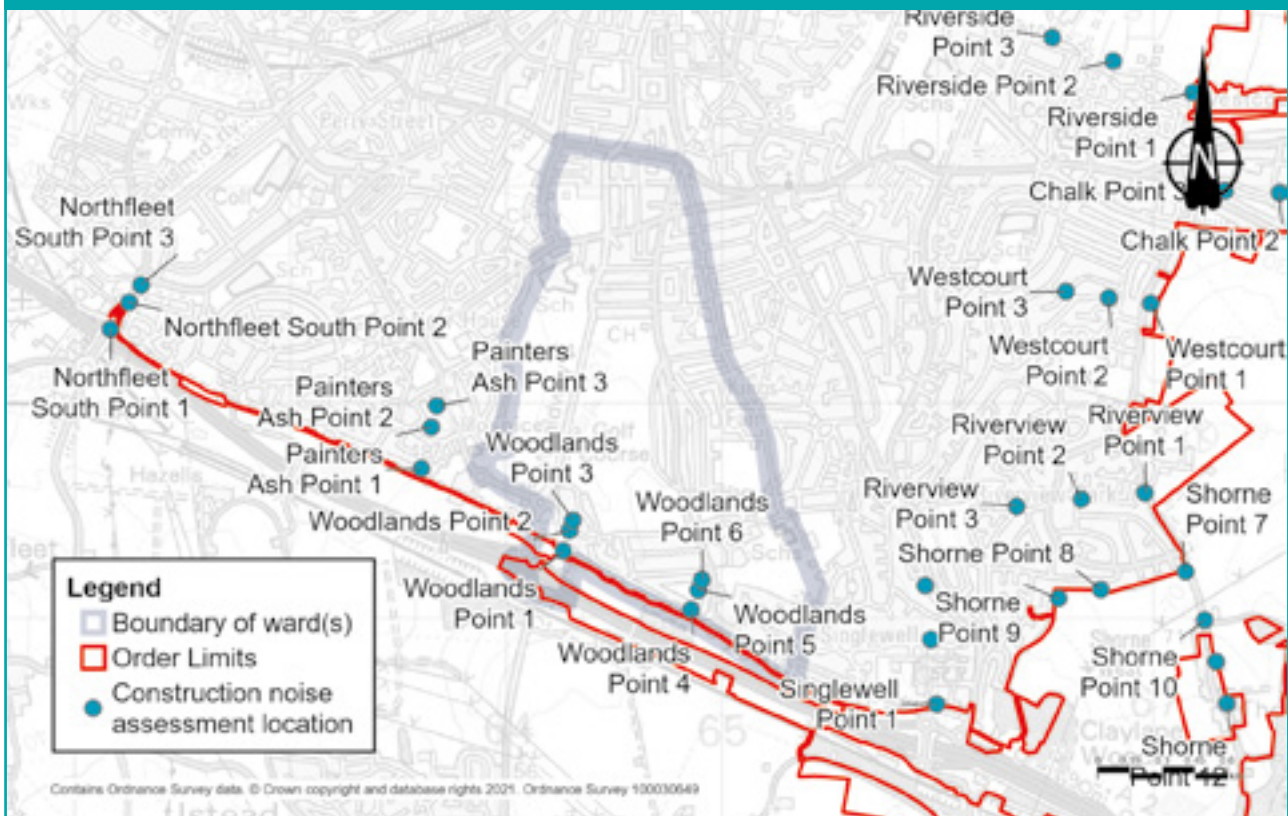


Figure 9.14 shows the locations at which we have predicted the daytime construction noise during the project's construction phase.

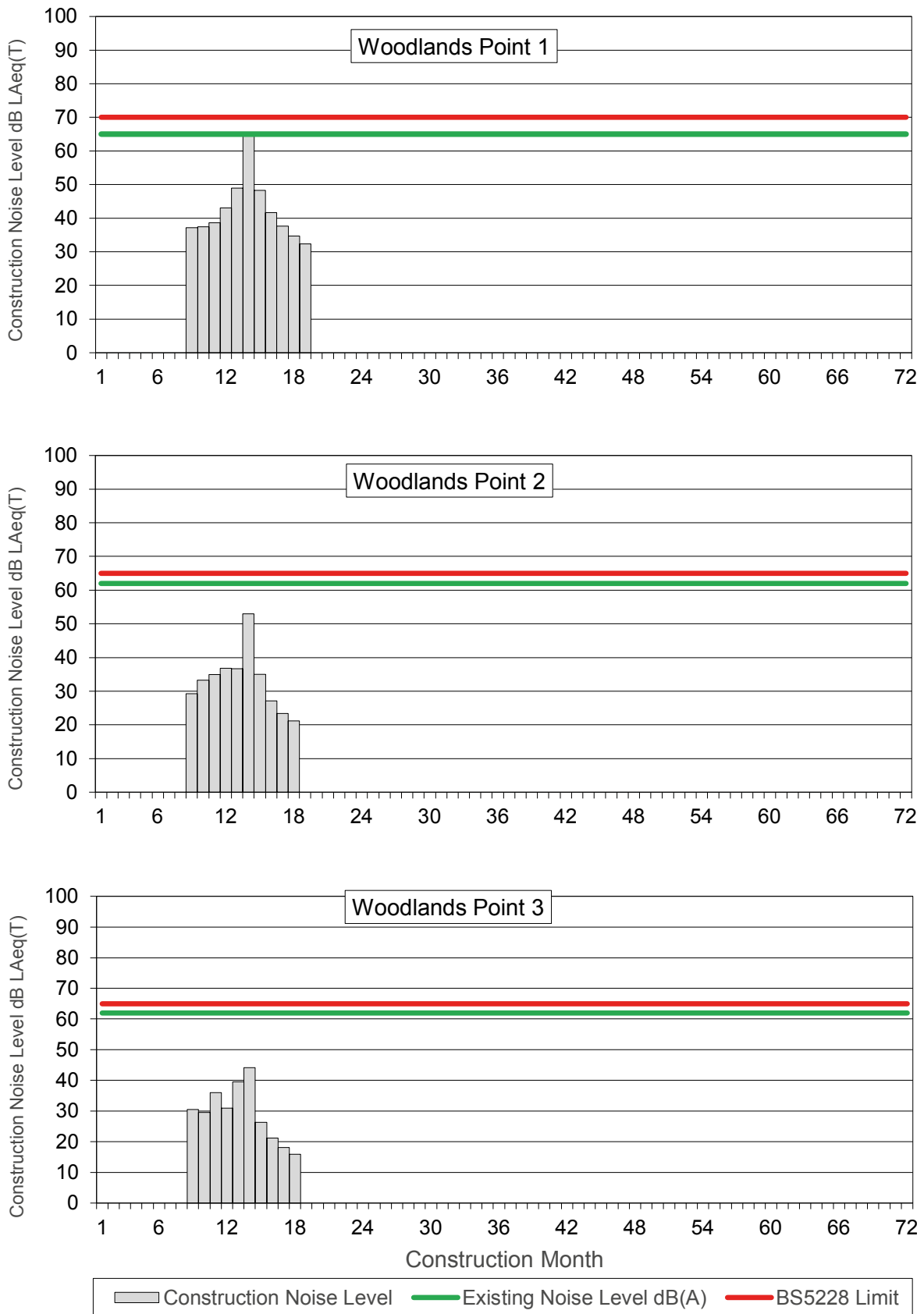
Each vertical bar in figure 9.15 and 9.16 shows the predicted noise levels for that month of the construction period (months 1 to 72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce the noise.

The predicted construction noise levels show that higher levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance with additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 9.15 the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 32 to 65dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 2, construction noise levels are predicted to range from 21 to 53dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 3, construction noise levels are predicted to range from 16 to 44dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.

Figure 9.15: Construction noise by month for points 1, 2 and 3 in Woodlands ward



With reference to figure 9.16 the following summarises the noise level changes over the construction period for points 4 to 6:

- At point 4, construction noise levels are predicted to range from 15 to 58dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 5, construction noise levels are predicted to range from 23 to 41dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 6, construction noise levels are predicted to range from 18 to 39dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.

Figure 9.16: Construction noise by month for points 4, 5 and 6 in Woodlands ward

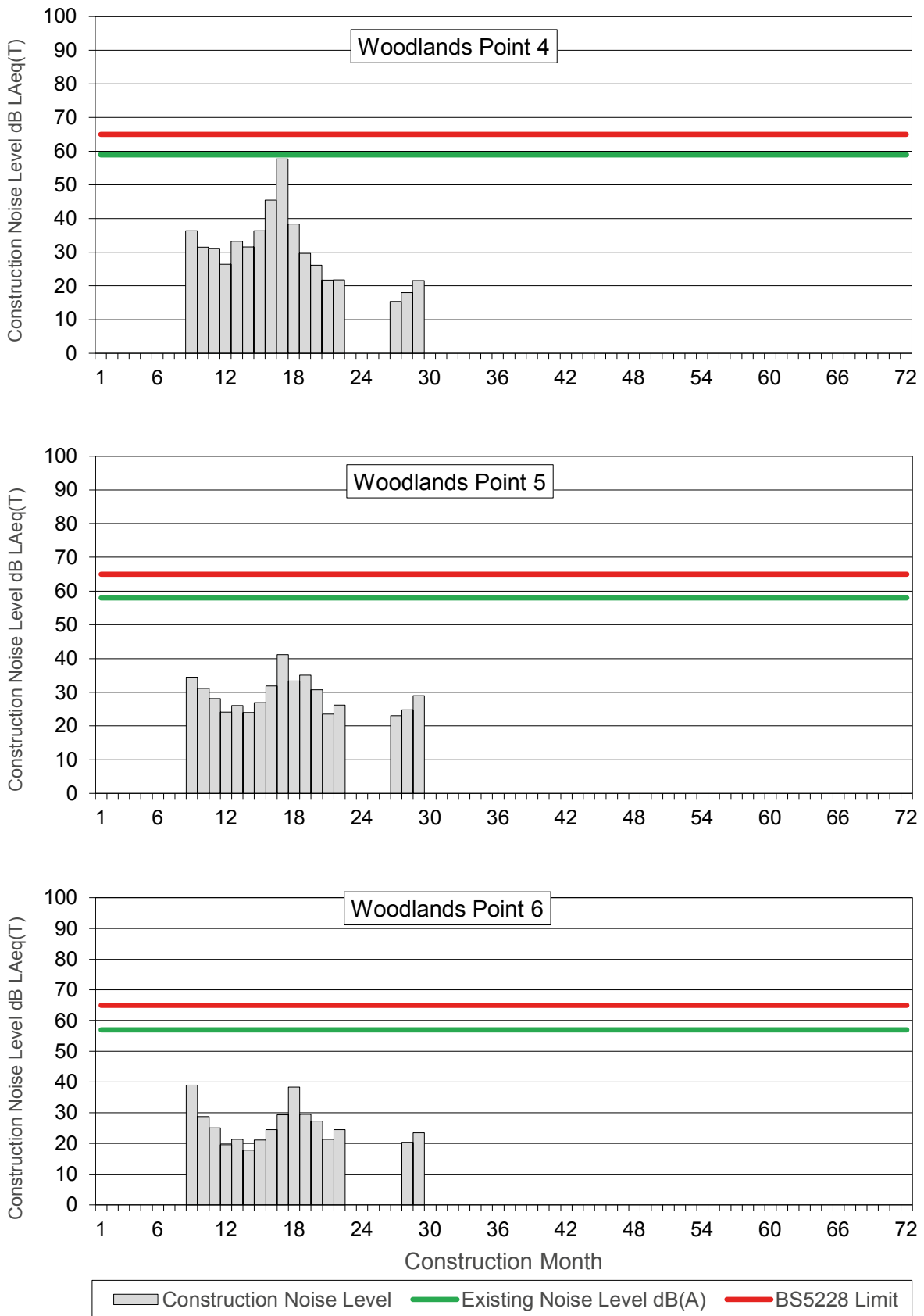
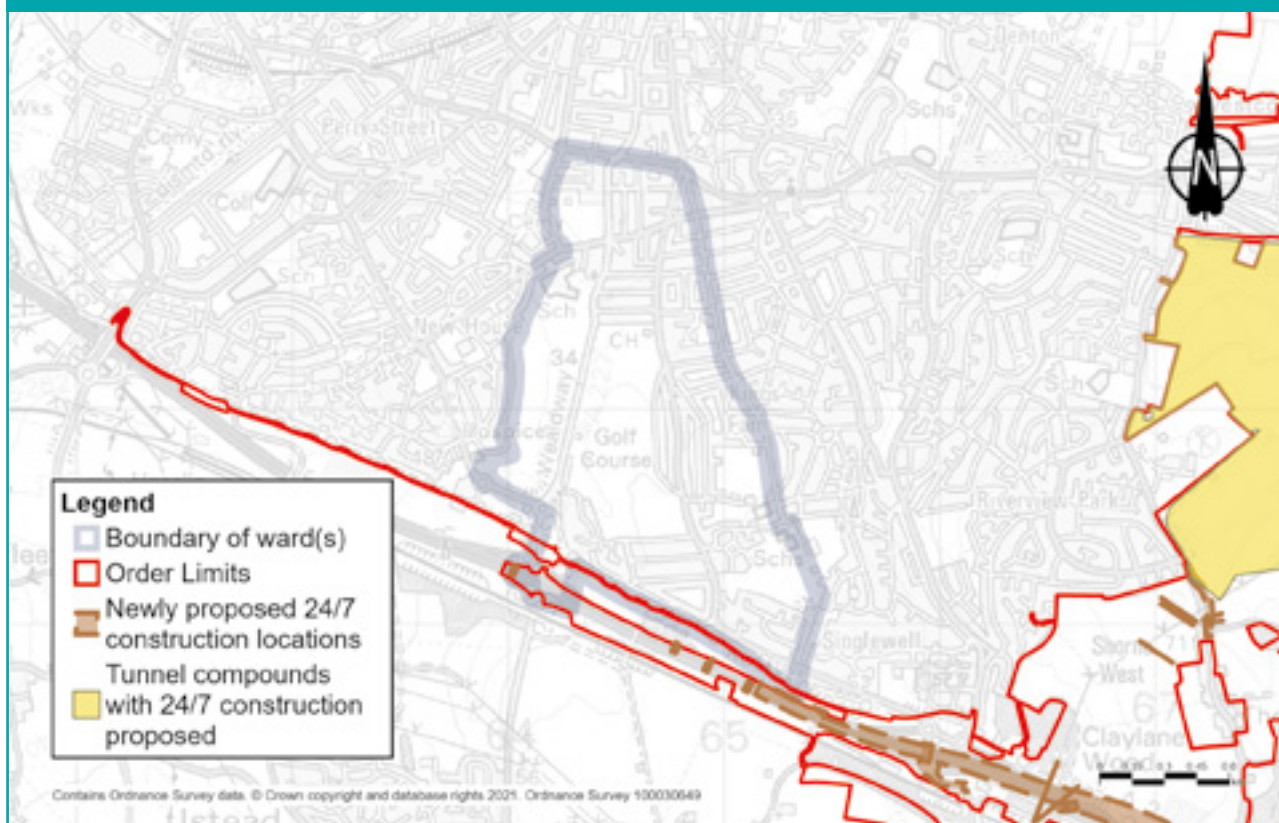


Figure 9.17: Newly proposed and tunnel 24/7 working locations in Woodlands ward



24/7 construction working

In addition to the changes to the daytime noise impacts presented in the section above, 24-hour, seven-day construction working is proposed at the locations shown in figure 9.17 above.

These locations are where works may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The works in this area are expected to be night-time or weekend highways works. These works could have an impact on local communities, and we would work with the local authority to manage them.

Construction traffic noise impacts

Maps showing the predicted change in road traffic noise on roads within Woodlands ward during each year of the construction can be found in chapter 7 of the Construction update.

Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years, except along the following roads where increases in noise levels been predicted. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Table 9.2: Construction traffic noise in Woodlands ward

Affected road(s)	Predicted noise impact	Construction year(s)
Ridgeway Avenue	Minor increase in noise levels	1
Harman Avenue	Moderate increase in noise levels	1

Measures to reduce construction noise levels

Construction noise levels would be controlled by using Best Available Techniques (BAT), with specific measures used at certain locations such as:

- installing and maintaining hoarding around the construction compounds
- installing temporary acoustic screening around the construction areas likely to generate noise
- keeping site access routes in good condition with onsite assessments to inspect for defects such as potholes
- turning off plant and machinery when not in use
- maintaining all vehicles and mobile plant so loose body fittings or exhausts do not rattle or vibrate
- using silenced equipment where available, in particular generators and pumps
- no music or radios would be played outdoors onsite for entertainment purposes

- site layout would be planned to ensure that reversing is kept to a practicable minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly to reduce the noise from vehicle reversing warnings
- non-percussive demolition techniques would be used where reasonably practical to reduce noise and vibration impact
- careful consideration of the location and layout of compounds to separate noise-generating equipment from sensitive receptors, and the use of mains electricity rather than generators, where possible
- minimisation of construction vehicle traffic by selecting local suppliers along the project route, where possible, using local workforces, and by reducing the transport of material for earthworks construction

All control measures, including those above, fall under the principles of BAT and are outlined in the REAC. For more information, see the sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where necessary.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction period

9.7.2 Operations

Operational noise impacts

Woodlands ward is located approximately 1.4km to the west of the main project route and, as such, there would be no direct noise impacts from the project in the ward. Noise impacts within this ward would be as a result of changes in traffic flow, the number of HGVs, and traffic speeds on the existing road network within the ward, and changes to the A2 in the south of the ward.

Figure 9.18 Noise impacts during operation in Woodlands ward

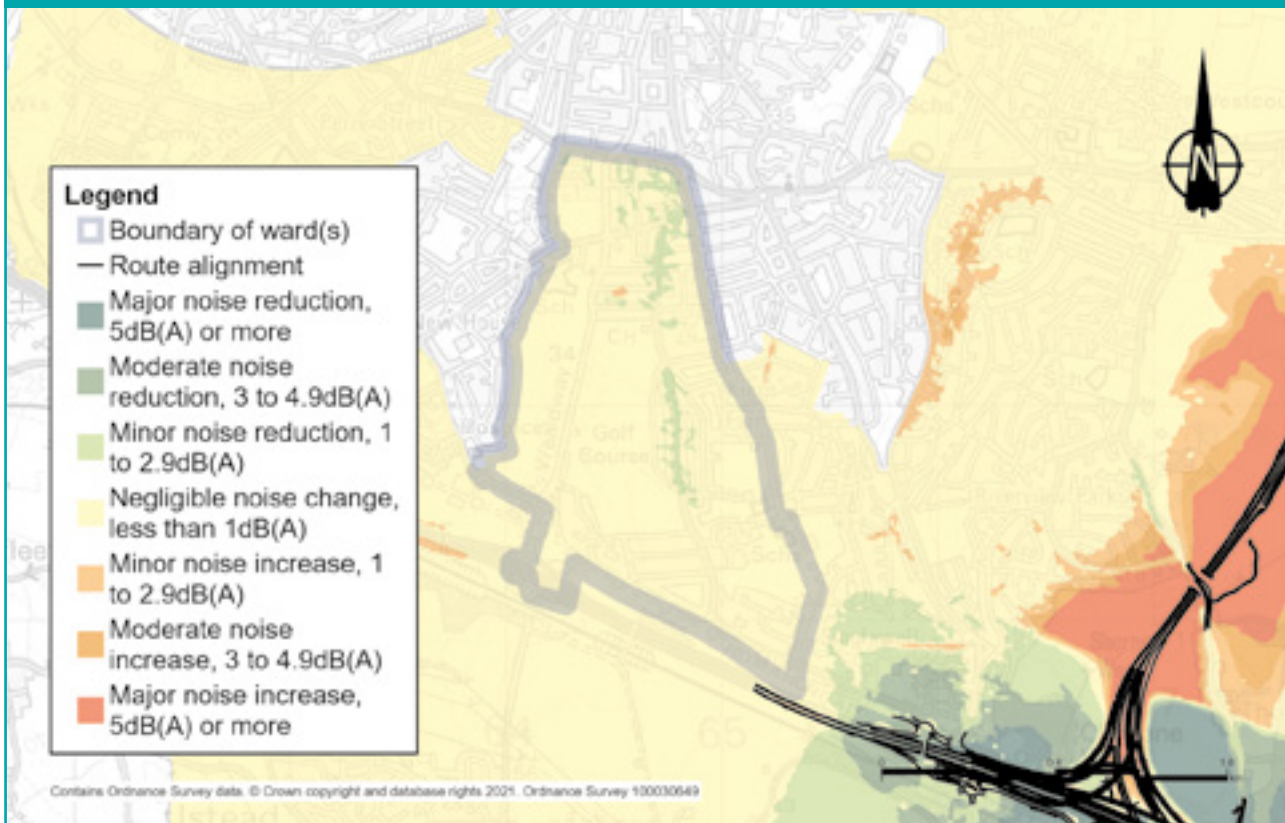


Figure 9.18 above shows the predicted changes in traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to range from a minor decrease in noise levels of between 1.0 and 2.9dB, to a minor increase in noise levels of between 1.0 and 2.9dB. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce traffic noise and vibration during operation

The main methods of controlling noise across the project would be, where practicable, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use. No essential mitigation is required in this ward.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

9.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Woodlands ward, either side of the A2 and M2 have been declared an Air Quality Management Area (AQMA) due to yearly levels of airborne pollution being above accepted standards. AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the ward have been identified as AQMA.

9.8.1 Construction

Construction impacts

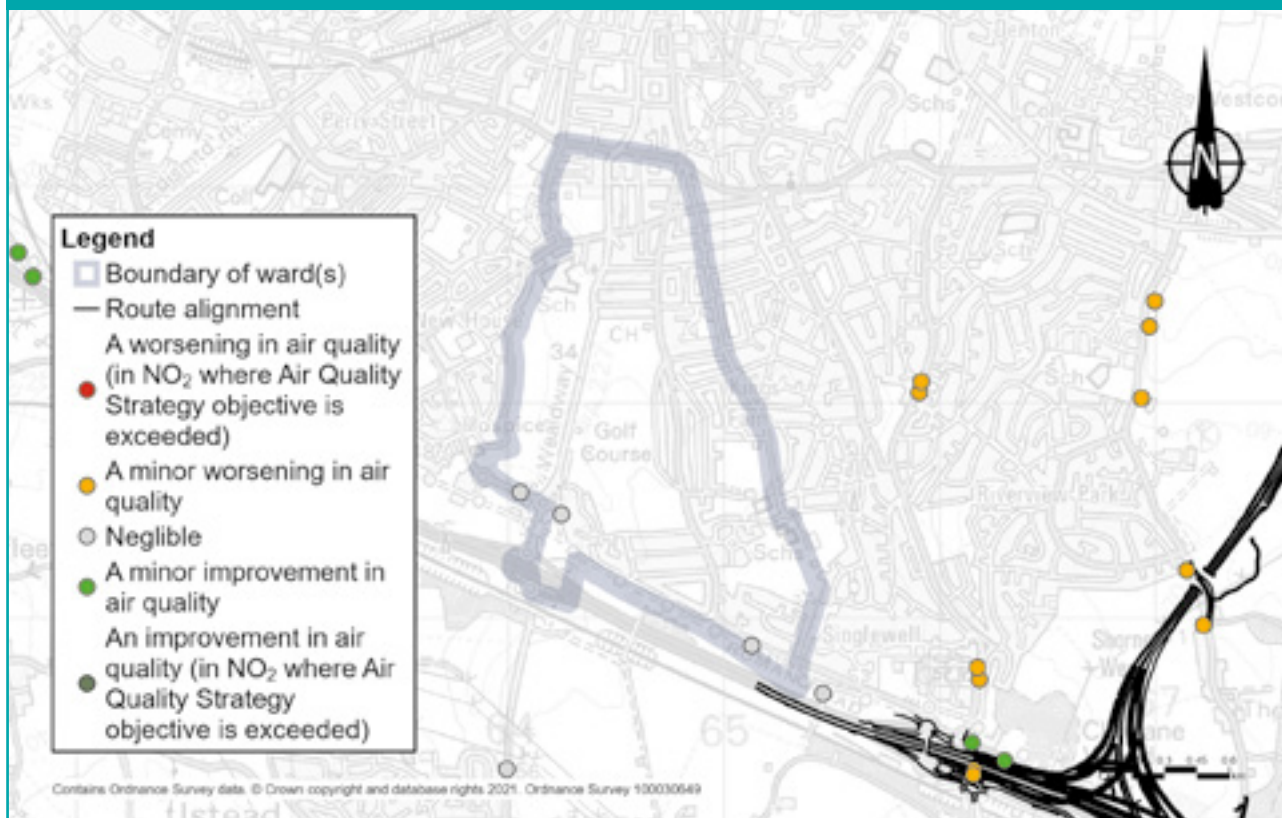
Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas. Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including along the A2 corridor. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below).

The proposed measures to reduce dust and emissions are ones that have been effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health. Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible from 2024 to 2029, although there would be a minor worsening in air quality in the area along the Singlewell Road as a result of the traffic management in place during 2024. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an AQMP to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

Figure 9.19: Predicted changes in NO₂ within Woodlands ward once the new road is open



9.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

At all locations within the ward, there are no predicted exceedances of air quality thresholds. There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, close to the north of the A2 that are predicted to experience a negligible change in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within this ward is 25.2 µg/m³, which is well below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area as a result of the project would be negligible therefore monitoring or other mitigation measures would not be necessary once the new road is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

9.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

Woodlands has a similar proportion of people under the age of 16 and over 60+ as Gravesham as a whole, and a similar proportion of white and people from an Asian background.

According to the English Index of Multiple Deprivation, Woodlands has very low rates of deprivation and economic activity is high compared with Gravesham as a whole. Home ownership levels are also high (76.0%), with the remainder mostly in private rented and social rented property, 12.5% and 10.3% respectively.

Around 84% of residents report their health to be very good or good (slightly higher than Gravesham as a whole). A lower proportion report that their day-to-day activities are limited a lot or a little as a result of a long-term disability (14.9%). Life expectancy at birth for Woodlands residents is 82.7 for males and 82.6 for females. When compared with the UK average, life expectancy rates (2013–2017) are higher in Woodlands for males, but lower for females. For deaths from all causes (these are causes where all or most deaths could potentially be prevented by public health interventions in the broadest sense), respiratory diseases, coronary heart disease and cancer rates are lower in Woodlands than for Gravesham as a whole.

9.9.1 Construction

Construction health impacts

Construction activities in Kent include establishing and operating the Southern Tunnel Compound, as well as earthworks and landscaping to create Chalk Park. More information about the activities affecting Woodlands ward residents is provided in the Project description section above. Elements of each of these activities have the potential to impact human health (including mental health and wellbeing), whether this is through noise associated with construction activities or construction traffic, air quality (as a result of dust emissions), severance caused by construction traffic or road and footpath closures.

Woodland ward residents may experience effects on health as a result of:

- The main construction activities that are expected to give rise to noise and vibration in this ward are those associated with widening the A2. There are no main works compounds or Utility Logistics Hubs currently proposed to be located within the Woodlands ward, nor are there any haul roads proposed within this ward.
- There are no percussive or vibratory works proposed in Woodlands.
- The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance with additional buildings and other features screening the noise from more distant residential areas.
- 24-hour, seven-day construction working is proposed along Watling Street towards the east of the ward. These locations are where works may need to be carried out at night to maintain safety and reduce disruption to road and utility networks. The works in this area are expected to be night-time or weekend highways works and could have an impact on local communities.
- Based on the currently available traffic data (which offers a representative picture of what receptors within the ward are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB) during all construction years, except along Ridgeway Avenue and Harman Avenue.
- Views of construction activities would be limited to a small number of homes along Epsom Close, where adjacent utilities works along the Roman Road would be partially visible in filtered views. Beyond these works, construction activities along the A2 would be mostly screened by roadside vegetation, although taller elements such as new tunnel entrance gantries, may be visible.

- Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including along the A2 corridor. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts.
- There are both positive and negative potential impacts on people's health and wellbeing as a result of the construction stage. Through good communications and engagement, providing people with information about when construction works would take place and its impacts, negative impacts on people's mental health and well-being would be reduced. Equally, some residents would see health and wellbeing benefits from improved access to work and training opportunities presented by construction activities (see the Traffic impacts section). Evidence from The Health Foundation has demonstrated a link between unemployment and poor mental health.

Measures to reduce construction health impacts

Other than measures relating to noise and visual impacts described above, no specific measures relating to health have been identified in this ward.

9.9.2 Operations

Operational health impacts

Both positive and negative health outcomes may be experienced by residents in Woodlands:

- There would be an increase in accessibility to open space for local people.
- By 2029, the opening year, the widening works to the A2 would be complete and the land affected by utilities works along Roman Road would have been restored. There would no long-lasting visual impacts from the project on the ward.
- The ward is located approximately 1.4km to the west of the main project and, as such, there would be no direct noise from the project in the ward. Noise impacts within this ward would be as a result of changes in traffic flow, the number of HGVs and traffic speeds on the existing road network within the ward, and changes to the A2 in the south of the ward.
- Within the ward, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to range from a minor decrease in noise levels of between 1.0 and 2.9dB, to a minor increase in noise levels of between 1.0 and 2.9dB.

Measures to reduce operational health impacts

Other than measures relating to noise and visual impacts described above, no other specific measures relating to health have been identified in this ward.

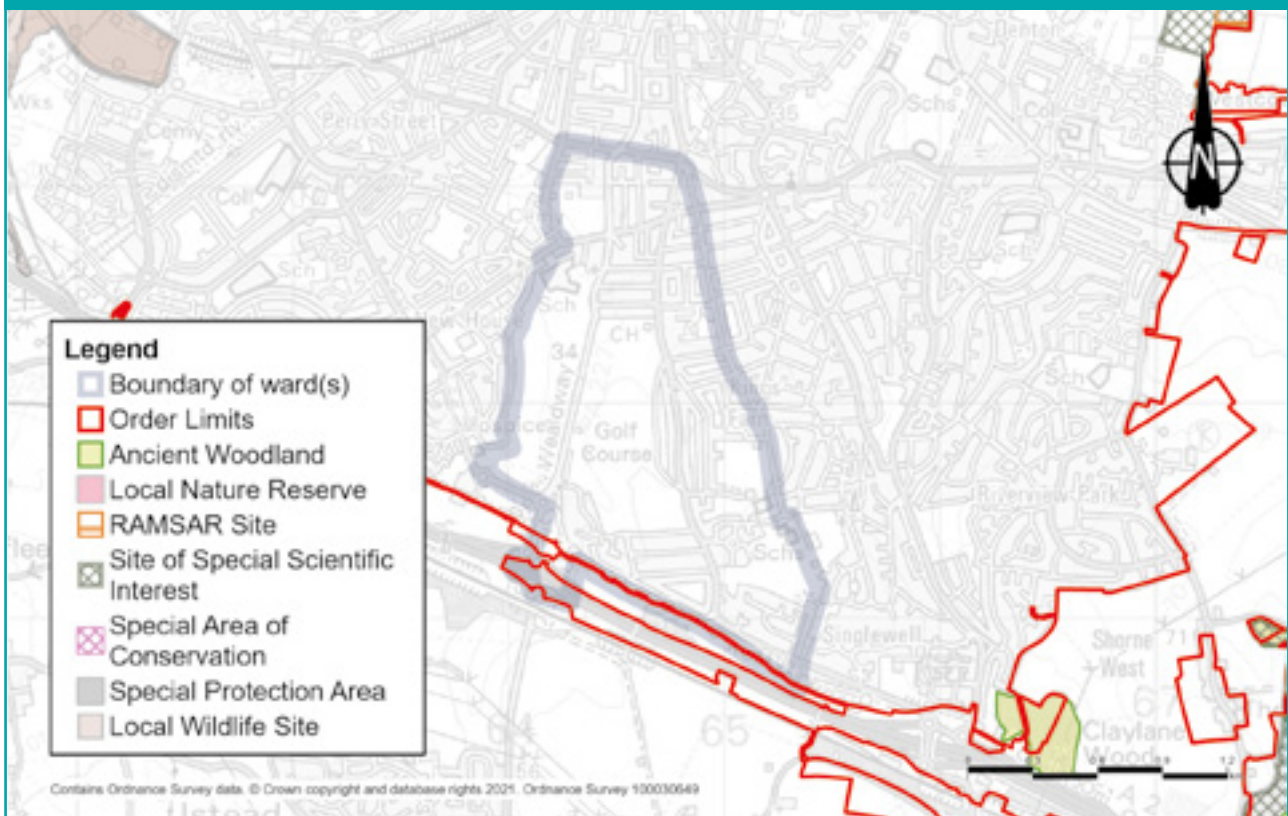
9.10 Biodiversity

Existing situation

Only a small part of Woodlands ward falls within the project Order Limits, forming an area around the A2/M2 and A226 junction and the cycle lane north of the A2/M2. This habitat is limited to some landscape planting and grassland. Woodlands ward contains no designated or non-designated sites.

We carried out surveys across the project to set a baseline for assessment, which identified reptiles in the landscape planting and grassland along the cycle route.

Figure 9.20: Designated and non-designated biodiversity sites in Woodlands ward



9.10.1 Construction

Construction impacts

To build the Lower Thames Crossing, areas of habitat would need to be removed both temporarily and permanently. This landscape planting and grassland habitat supports a range of protected and notable species that would be impacted by construction through direct habitat loss (reptile habitat), and disturbance to retained habitat.

Measures to reduce biodiversity impacts during construction

Vegetation clearance would take place during the winter to avoid any impact on breeding birds. Where this is not practical, clearance would be supervised by an ecological clerk of works to ensure no nests are disturbed or destroyed. Where protected species are present, they would be moved away from the site before any construction activities take place, either through habitat manipulation (for example, strimming to reduce the height of vegetation and displace reptiles), or translocation. Any habitat lost for temporary construction works would be reinstated after construction.

The impact of construction on biodiversity would be controlled through the range of good practice measures set out in the CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

9.10.2 Operations

Operational impacts

The project's operation is unlikely to cause significant additional disturbance within the ward beyond the existing impacts from the operation of the A2/M2.

Measures to reduce biodiversity impacts during operation

Landscape planting has been designed to screen the new road from the surrounding habitats. Newly created habitats would be managed to ensure that they provide a high-quality environment to support a broad range of plant and animal species. The impact of operation on biodiversity would be controlled through good practice measures set out in the CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

9.11 Built heritage

Existing situation

Two listed buildings have been identified in Woodlands ward in relation to the project:

- Orchard House is a Grade II listed building dating from the 18th century. It is L-shaped, timber-framed and has two storeys with attics. The ground floor is rebuilt in red brick with a weather-boarded first floor
- Corner Cottage is a Grade II listed building, dating from the 18th century or earlier and set endwise to the road. This building has two storeys with a ground floor in red brick and weather-boarded first floor. The half-hipped roof is tiled with a later (19th century) casement in the gable end. The weather porch is thought to be a 19th century addition. To the left is a two-storey wing of stock brick with two windows and a half-hipped tiled roof

Figure 9.21: Built heritage in Woodlands ward



9.11.1 Construction

Construction impacts

Construction activities affecting Woodlands relate to the A2 Watling Street works and no built heritage assets would be directly affected by the project. However, there would be an indirect effect through change to the surroundings of some built heritage assets as a result of the project's construction.

Construction works to the A2 Watling Street would introduce temporary additional noise, lighting and visible construction activity close to some built heritage assets. As Grade II listed Orchard House and Corner Cottage are located just north of the A2, they would experience temporary minor changes to their setting (the surroundings in which a heritage asset is 'located').

Measures to reduce impacts during construction

For more information about heritage mitigation measures, refer to the Design principles (section S326), the CoCP, and Air quality, Noise and vibration, and Cultural heritage sections of the REAC.

9.11.2 Operations

Operational impacts

Although the operational phase of the project would increase the size of the A2 and the existing route of the A2/M2 is close to built heritage assets, there would be no discernible effects on these and they would experience no change from the new road construction.

Measures to reduce the impacts during operation

Our engineering and landscape design for the project seeks to avoid or reduce negative impacts on heritage assets. To preserve the rural and historic character of the landscape, we would minimise road lighting where it is safe and practical to do so, in accordance with relevant standards. For more information, see the Design principles (sections LST.02 and LST.03).

9.12 Contamination

From a desk-based review of historical maps and environmental data, there are no known medium or high-risk sources of contamination that could be disturbed during construction or operation of the project in Woodlands ward.

9.12.1 Construction

By following a construction management plan and ensuring that, where potential sources of contamination are used (for example oils, lubes, mechanical plant), appropriate spill containment and emergency response procedures are in place to prevent adverse environmental impacts from occurring.

9.12.2 Operations

When the road opens, should an incident occur, for example, a traffic accident resulting in localised contamination, significantly affected soils would be assessed and if necessary removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

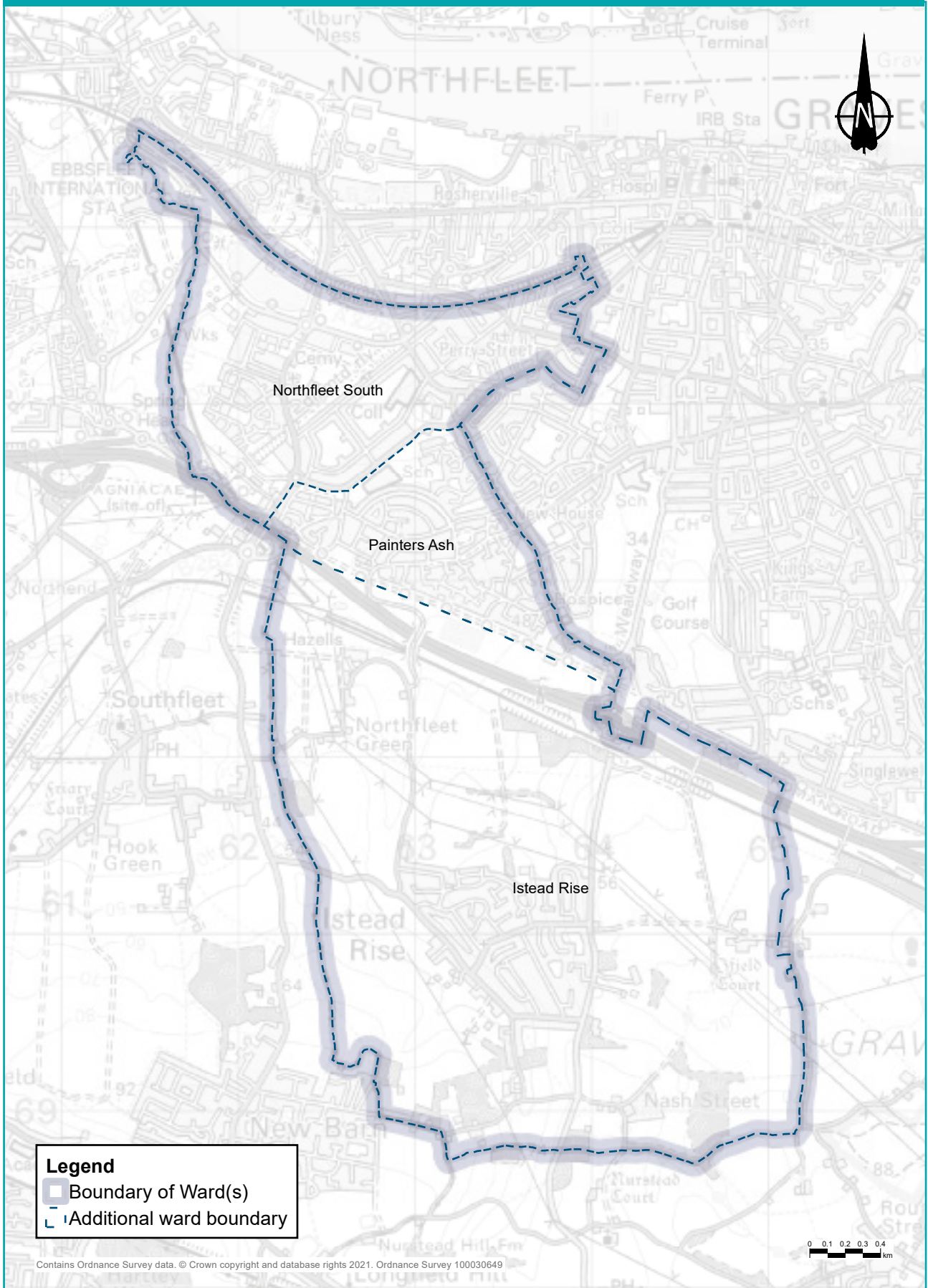
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Chapter 10: Northfleet South, Istead Rise and Painters Ash wards

This chapter summarises the activities in Northfleet South, Istead Rise and Painters Ash wards relating to the project's construction and its operational phase (when the new road is open). It also explains the measures intended to reduce the project's impacts on the local area. For more information about the assessments in this chapter, and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document. The activities and impacts in these wards are presented together in one chapter because they are similar.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 10.1: Ward boundary map for Northfleet South, Istead Rise and Painters Ash wards



10.1 Overview

10.1.1 About these wards

All three wards are located south of the River Thames in the borough of Gravesham.

Northfleet South ward lies to the west of Riverside ward, on the southern edge of Gravesend. It is around 2.3km² in area and has an estimated population of 8,773¹. The central and eastern parts of the ward are residential and include public parks and a golf course. To the west of the ward is Sawyer's Lake, a reservoir. The HS1 railway line and North Kent Line railway pass through the north of the ward. High-voltage overhead power lines run across the centre of the ward from north to south. The A2 runs on part of the southern ward boundary.

Istead Rise ward is to the south of Painters Ash and Woodlands wards. It is approximately 7.4km² in area and has an estimated population of 3,324². The ward is mostly agricultural with the village of Istead Rise at its centre. The A2 runs across the northern part of the ward.

Painters Ash ward is located to the west of Woodlands ward in the borough of Gravesham, forming part of Gravesend town. It is approximately 1.1km² in area and has an estimated population of 5,579³. The ward is mostly residential with some public parks. There is a high-voltage overhead electricity line in the south-west of the ward. The A2 is on part of the western ward boundary.

1 Office for National Statistics, 2018 ward-level population estimate
2 Office for National Statistics, 2018 ward-level population estimate
3 Office for National Statistics, 2018 ward-level population estimate

10.1.2 Summary of impacts

Table 10.1: Summary of impacts during the project's construction and operation

Topic	Construction	Operations
<p>Traffic</p>	<p>Impacts</p> <p>There will be some construction-related traffic (both HGVs and staff vehicles) on the section of the A2 that runs through these wards, going to and from the compounds in Gravesham.</p> <p>Mitigation</p> <p>To reduce the impact of the construction process, construction traffic would be limited to the A2 and local roads would not be used where possible.</p>	<p>Impacts</p> <p>There would be very little change in traffic flows on most roads in Northfleet South, Istead Rise and Painters Ash wards as a result of the new road opening. Changes are predicted, however, on the A2 in both directions. Further details of predicted changes can be found in the Traffic section of this chapter.</p> <p>Mitigation</p> <p>Once the project is operational, traffic impacts on the affected road network would be monitored, including local roads.</p>
<p>Public transport</p>	<p>Buses</p> <p>There may be some increases to journey times on coach services on the A2 due to construction activities in nearby wards.</p> <p>Rail</p> <p>During construction, there would be no noticeable changes in local journey times to Ebbsfleet International or Meopham stations, and no changes to the rail services at these stations.</p>	<p>Buses</p> <p>There would be no noticeable changes in local journey times to Meopham or Ebbsfleet International stations, or changes to rail services, once the road is open.</p> <p>Rail</p> <p>There would be no changes to bus routes through these wards once the road opens, or any noticeable changes to bus journeys. There would be, however, a slight increase in journey times expected on the 695 school bus from Rochester Grammar School via Cobham and Sole Street to Meopham School and on to Istead Rise.</p>

Topic	Construction	Operations
<p>Footpaths, bridleways and cycle routes</p>	<p>Impacts</p> <p>One bridleway and one cycle route would be impacted during the construction period to allow for utilities diversions works.</p> <p>Mitigation</p> <p>Closures of these two routes would be reduced as much as possible to reduce the impact on the local public rights of way network.</p>	<p>Impact</p> <p>The section of a cycle route which runs through these wards would be unaffected by the road when it opens, but would be affected in other sections of the route in neighbouring wards.</p> <p>Mitigation</p> <p>No mitigation would be required.</p>
<p>Visual</p>	<p>Impacts</p> <p>In Istead Rise, the widening of the A2 corridor, utility diversions and the erection of new tunnel entrance gantries would be visible from the Wealdway and nearby footpaths. From the Cyclopark, the utility works along the Roman Road would be visible.</p> <p>Mitigation</p> <p>The visual impacts would be controlled through good practice measures set out in the CoCP and REAC.</p>	<p>Impacts</p> <p>There would be minimal visual impact along the Wealdway, nearby footpaths and from the Cyclopark in Istead Rise.</p> <p>Mitigation</p> <p>Landscape restoration and screen planting would be the primary mitigation in Istead Rise.</p>

Topic	Construction	Operations
<p>Noise and vibration</p>	<p>Impacts</p> <p>The construction activity associated with the A2 upgrade work and utilities work is expected to create noise in these wards. There would be no percussive or vibratory works in these wards. There would also be no 24-hour, seven-day working in any of the wards. There would be negligible changes in noise from road traffic.</p> <p>Mitigation</p> <p>Construction noise levels would be controlled through the mitigation measures set out in the REAC. There are also measures set out in the CoCP.</p>	<p>Impacts</p> <p>There would be no direct noise impacts on any of the wards. There would be indirect noise as a result of changes in traffic flow, the number of HGVs and traffic speed on the existing roads in the wards. In Istead Rise, the indirect noise would also be as a result of physical alterations/upgrade work along the A2 in the north of the ward.</p> <p>Mitigation</p> <p>The use of low-noise surfacing would reduce the traffic noise once the road is open.</p>

Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>There is likely to be dust and emissions from construction equipment and traffic during the construction phase on a few properties within 200 metres of the worksite.</p> <p>Analysis of the construction phase traffic flows show there would be a minor improvement in air quality around the A2 corridor from 2026 to 2028. There would be negligible changes in noise from road traffic.</p> <p>Mitigation</p> <p>The contractor would follow good practice construction measures (which are presented in the CoCP and REAC) to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are effectively controlling dust and exhaust emissions.</p>	<p>Impacts</p> <p>There are no predicted exceedances of NO₂ or PM₁₀. Within Northfleet South and Painters Ash wards, it is predicted there would be a minor improvement in air quality, and within Istead Rise ward there would be a negligible change in air quality for NO₂.</p> <p>Mitigation</p> <p>No essential mitigation is required.</p>

Topic	Construction	Operations
<p>Health</p>	<p>Impacts</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>There are likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. There are also likely to be noticeable changes in the levels of noise from construction traffic. There would also be temporary visual impacts as set out in this table above.</p> <p>Mitigation</p> <p>The negative impacts would be mitigated through the good practice construction measures presented in the CoCP and REAC relating to noise, visual screening and community engagement.</p>	<p>Impacts</p> <p>Positive health outcomes may also be experienced by residents in these wards as a result of improvements to accessibility, access to work and training, and access to open spaces. There is expected to be a minimal visual impact in Istead Rise once the road is built.</p> <p>Mitigation</p> <p>No essential mitigation is required for health other than those measures described in the visual sections.</p>

Topic	Construction	Operations
Biodiversity	<p>Impacts</p> <p>The construction of the utility diversion in Northfleet South would require the removal of woodland and scrub habitat. In Istead Rise and Painters Ash wards, landscape planting and grassland habitat would need to be removed temporarily and some permanently.</p> <p>Mitigation</p> <p>Vegetation clearance would be carried out in winter to avoid impacting breeding birds. Protected species would be relocated, carried out under a Natural England licence. Any habitat lost temporarily would be reinstated after construction. Impacts would be controlled through the good practice measures set out in the CoCP and REAC.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None identified, although newly created habitats would be managed to ensure they provide high-quality habitats to support a wide range of plants and animal species.</p>
Built heritage	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>
Contamination	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impacts</p> <p>None identified.</p> <p>Mitigation</p> <p>None required.</p>

10.2 Project description

10.2.1 Construction

Construction activities

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

Part of our proposed Order Limits (the land we would need to build and operate the project) extends from the Marling Cross Compound in Singlewell ward to a National Grid site west of Hall Road, along Roman Road, which is a bridleway that runs parallel to the A2 to the north of it. This is to allow the proposed installation of four underground power cables from the National Grid site to a new primary substation near the A226. The power cables would pass through Northfleet South, Istead Rise and Painters Ash wards.

The power cables would be installed using trenchless methods under Hall Road and Wrotham Road, which would mean digging underneath the road without damaging the existing road surface. The remainder, along the Roman Road bridleway, would be mostly open cut and delivered in sections, with barriers moving as work progressed. Chapter 2 of the Construction update provides an overview of how existing utilities would be affected by our plans to build the new road, with further detail including maps in chapter 3. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be repositioned to accommodate the new road.

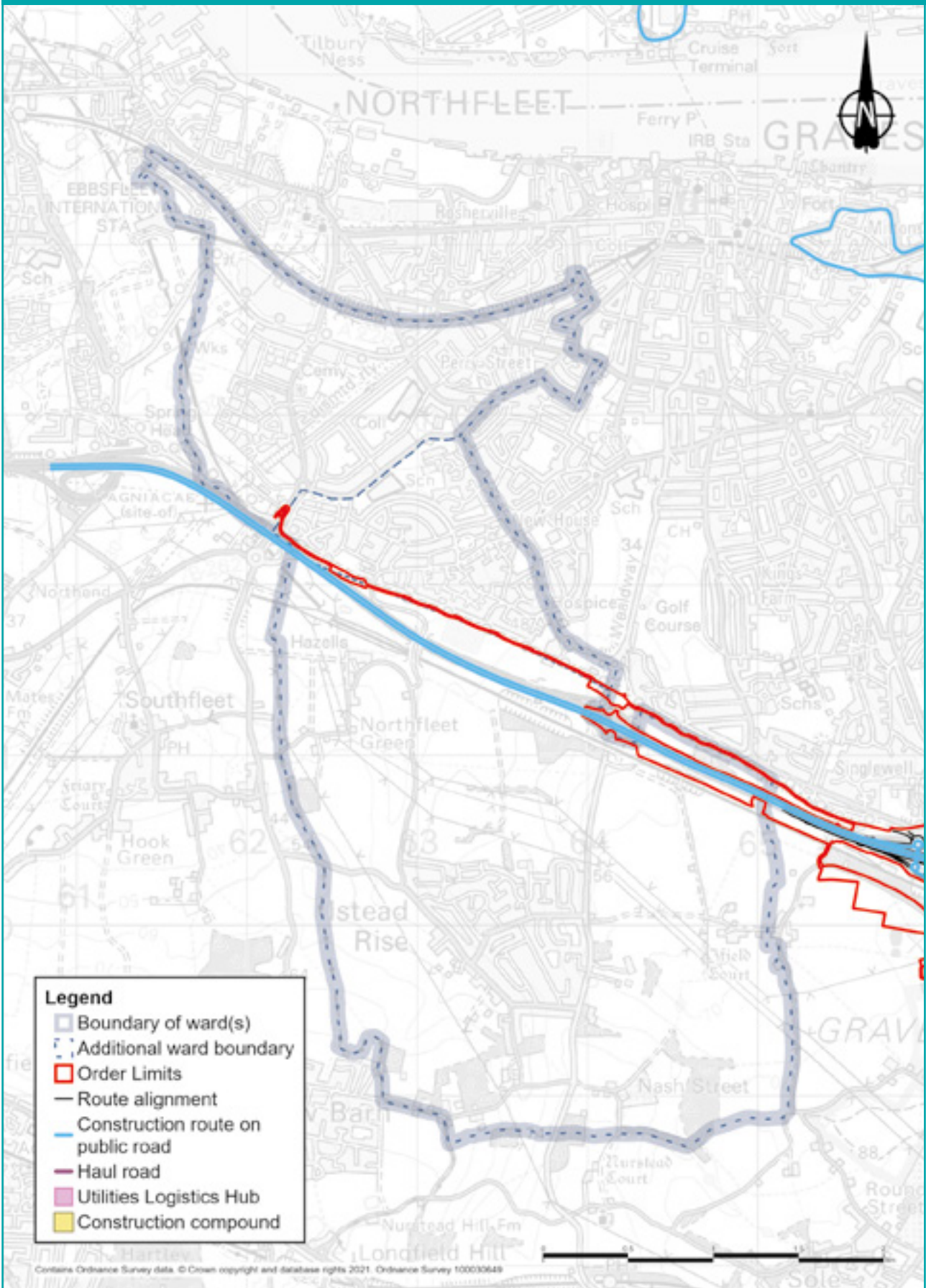
Construction compounds and Utility Logistics Hubs

Chapter 2 of the Construction update provides an overview of how existing utilities would be affected by our plans to build the new road, with further detail including maps in chapter 3. Chapter 2 of the Operations update also describes the project's impacts on utilities, including a map showing the utilities that would be repositioned to accommodate the new road.

Construction compounds are fenced-off areas, accessible to construction traffic, which provide the facilities for our project to be built efficiently. For example, compounds would provide parking, storage for machinery and materials, offices, welfare facilities, refuelling, and vehicle and wheel-washing facilities to make sure vehicles leaving the compound do not dirty local roads.

There are no compounds or Utility Logistics Hubs located in the Northfleet South, Istead Rise and Painters Ash wards.

Figure 10.2: Main construction areas in Northfleet South, Istead Rise and Painters Ash wards



Construction routes on public roads

The A2 would be designated as a construction route.

Construction schedule

Construction of the project is scheduled to last for six years from 2024 to 2029. The works to install the power cables would take around 15 months, which would be carried out early in the construction period. To deliver the construction programme efficiently, activities would be divided into packages of work and delivered in a coordinated way. Maps and programmes of the work packages in Kent can be found in chapter 3 of the Construction update.

Construction working hours

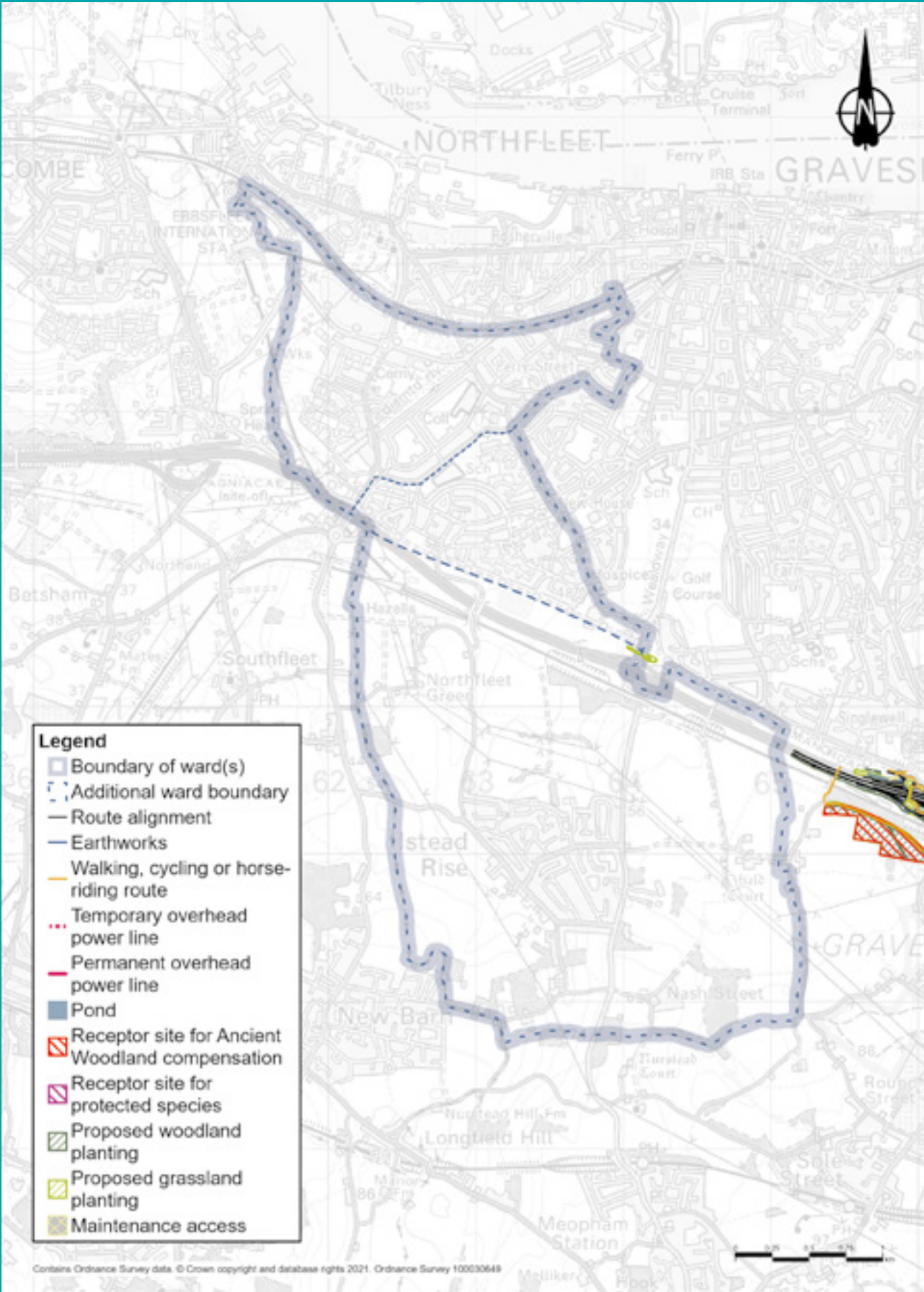
Most construction activities in Northfleet South, Istead Rise and Painters Ash wards would take place during core hours, from 7am to 7pm on weekdays and 7am to 4pm on Saturdays. However, there would be circumstances when our working hours would need to be extended. For example, connecting new roads to existing ones would be carried out when there is less traffic, so it is safer for both construction workers and roads users. Working outside the core hours can also benefit road users by reducing the need for traffic management measures during peak times. More information about working hours is set out in the Noise and vibration section below and in the CoCP.

Traffic management

There are no construction traffic management measures planned in the Northfleet South, Istead Rise and Painters Ash wards.

Measures required across the project would include narrow lanes, reduced speed limits, lane closures and temporary traffic lights. We have sought to minimise traffic management measures wherever practical. However, they would be necessary in some places to allow construction traffic and local communities to travel safely, while providing construction workers with sufficient space to operate. An overview of the traffic management required across the project can be found in the Outline Traffic Management Plan for Construction (OTMPfC). All traffic management measures are based on an indicative construction programme, which would be finalised by the appointed contractor. The contractor's final traffic management plans will be subject to final approval by the Secretary of State for Transport, following consultation with the local highways authority.

Figure 10.3: The main features of the completed project



10.2.2 Operations

The completed project

For more information about the completed project, see chapter 1 of the Construction update and the large-scale figures in Map Book 1: General Arrangements. Below, we outline the main features of the project that would be in Northfleet South, Istead Rise and Painters Ash wards once the road is open.

- We would acquire permanent rights over a strip of land along Roman Road to maintain newly installed underground power cables, although there would be no visible elements of the project.
- Some footpaths, bridleways and cycle routes in Istead Rise would be re-routed permanently. For more information, see the Footpaths, bridleways and cycle routes section below.

Changes to the project since our design refinement consultation

The amount of land within the Order Limits needed for works in the Cyclopark (see below) has been made smaller, reducing the temporary impact on this recreational site.

Impacts on open space and common land

We proposed to permanently install an underground power cable along or adjacent to the existing footpath in the Cyclopark. We would acquire permanent rights over the strip of land to allow the cable to be maintained. The use of the land as open space would be unaffected and the land would be reinstated once works are complete.

More information about our proposals for compensating for impacts on open space land (which includes special category and recreational land), including proposals we have consulted on previously, can be found in chapter 3 of our Operations update.

10.3 Traffic

We carried out traffic assessments to understand how construction and operation would affect nearby roads, compared with the situation if the project was not implemented. For more information, see chapter 4 of the Operations update.

10.3.1 Construction

Construction impacts

Information about construction activities in these wards, including construction routes on public roads, can be found in the Project description section above.

There will be some construction-related traffic (both HGVs and staff vehicles) on the section of the A2 that runs through these wards, going to and from the compounds in Gravesham.

Measures to reduce construction traffic impacts

Within these wards, construction traffic would be limited to the A2. Where possible, we have reduced the volume of construction traffic that would use this road during the construction period. A summary of our proposed measures to reduce the amount of construction material transported in and out of the project by road can be found in chapter 2 of the Construction update.

10.3.2 Operations

Operational impacts

Traffic modelling has been carried out to predict the change in traffic flows on the roads in the area, including those within or on the boundary of these wards for the first year of operation (2029).

Figures 10.4, 10.6 and 10.8 below show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 10.5, 10.7 and 10.9 below show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

There would be very little change in traffic flows on most local roads in Northfleet South, Istead Rise and Painters Ash wards as a result of the new road opening.

South of the A2, there would be an increase in traffic of between 50 and 250 PCUs in the morning peak northbound on Wrotham Road between Istead Rise and the A2. This is an increase of between 20% and 40%. southbound, there would be an increase of between 50 and 250 PCUs in the evening peak period, an increase of between 10% and 20%.

Along the A2 between the Gravesend East and Tollgate (Wrotham Road) junctions – Westbound, there would be a reduction in traffic of between 500 and 1,000 PCUs per hour in the morning (a 0% to 10% decrease). In an average interpeak hour, the decrease in traffic would be over 1,000 PCUs, a decrease of between 20% and 40%. In the evening peak hour, the decrease in flows would be between 500 and 1,000 PCUs, a decrease of between 10% and 20%. Eastbound on the A2, the decrease in flows would be over 1, 000 PCUs in the morning peak hour and an average interpeak hour. This is a decrease of between 20% and 40%. In the evening peak hour, the decrease in traffic flows would be between 500 and 1,000 PCUs, a decrease of between 0% and 10%.

On the A2 between the Tollgate junction and the Pepper Hill junction, there would also be a large decrease in traffic flows. Westbound, the decrease would be between 500 and 1,000 PCUs (0% to 10%) in the morning peak hour, over 1,000 PCUs an hour in an average interpeak hour (a decrease of between 20% and 40%) and in the evening peak hour the change in traffic flows would be a decrease of between 500 and 1,000 PCUs (between 10% and 20%). Eastbound, the decrease would be over 1,000 PCUs, a reduction of between 20% and 40% in the morning peak hour and an average interpeak hour. In the evening peak, the reduction would be between 500 and 1,000 PCUs (between 0% and 10%).

Within Painters Ash ward on the A227 between the A2 and Coldharbour Road, there is predicted to be an increase in traffic westbound of between 50 and 250 PCUs in the morning and evening peak hour. This is an increase of between 10% and 20% in the morning peak hour and between 0% and 10% in the evening peak hour. Eastbound, there would be an increase of between 50 and 250 PCUs in the evening peak hour, which is an increase of between 0% and 10%.

There would be a slight increase in traffic along Mulberry Road eastbound, of between 50 and 250 PCUs, a 40% increase in the morning peak hour, but a decrease of a similar number of vehicles in the evening peak hour. Further west, there would be a small decrease in traffic flows, along Landseer Avenue and Gainsborough Drive. This would be due to some traffic re-routing and using the A2 Tollgate junction rather than the Pepper Hill junction.

There would also be a small decrease in traffic, of between 50 and 250 PCUs southbound on Coldharbour Road near the junction with Hall Road in the morning and evening peak hours. This is a decrease of between 20% and 40%.

On Hall Road, just north of the Pepper Hill junction on the A2, there would be an increase in traffic in both directions. Northbound, there would be an increase of between 50 and 250 PCUs in each modelled time period, which is a 0% to 10% increase in the morning peak hour and an average interpeak hour and a 10% to 20% reduction in the evening peak hour. Southbound, there would be an increase in traffic of between 50 and 250 PCUs in the average peak hour (an increase of between 0% and 10%) and in the evening peak hour (an increase of between 10% and 20%). Further north along Springhead Road, there would be an increase in flows northbound of between 50 and 250 PCUs (an increase of between 0% and 10%) and a decrease in traffic flows southbound in the evening peak hour of between 50 and 250 PCUs (a decrease of between 0% and 10%). On Hall Road, just east of the junction with Springhead Road, there would be an increase in traffic flows in the evening peak hour of between 50 and 250 PCUs, an increase of between 10% and 20%.

Elsewhere in the ward, there would be a decrease of traffic in the evening peak hour westbound, outside Springhead Park primary school on Springfield Parkway, of between 50 and 250 PCUs, a decrease of between 20% and 40%. There would also be a decrease eastbound in the evening peak period as well, of between 50 and 250 PCUS, which is a decrease of between 10% and 20%. On Vale Road between Thames Way and Colyer Road, there would be a decrease in traffic northbound in an average interpeak hour of between 50 and 250 PCUs, a decrease of between 10% and 20%, and an increase in traffic flows of between 50 and 250 PCUs southbound in the evening peak hour, an increase of between 10% and 20% southbound.

Figure 10.4: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

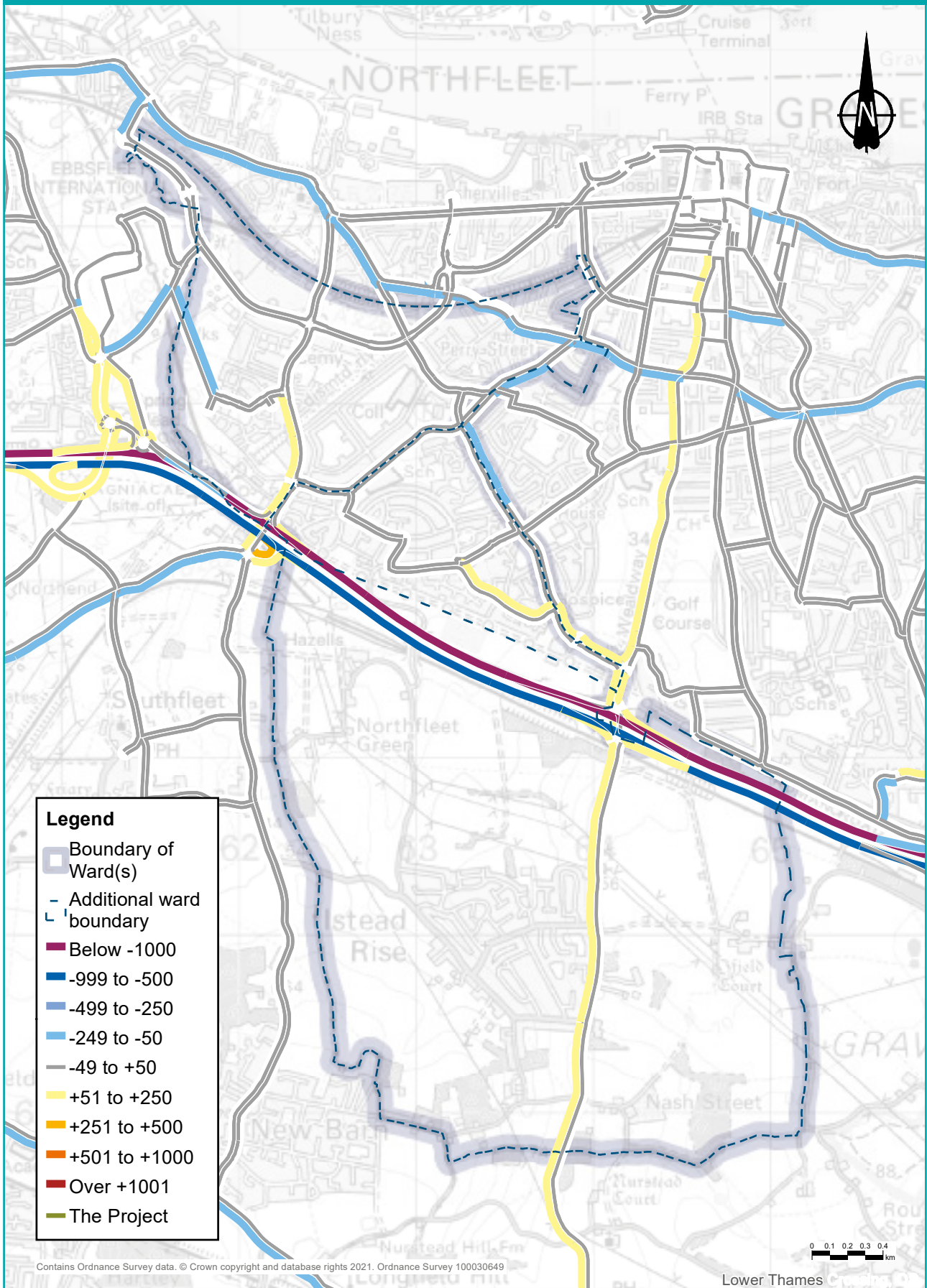
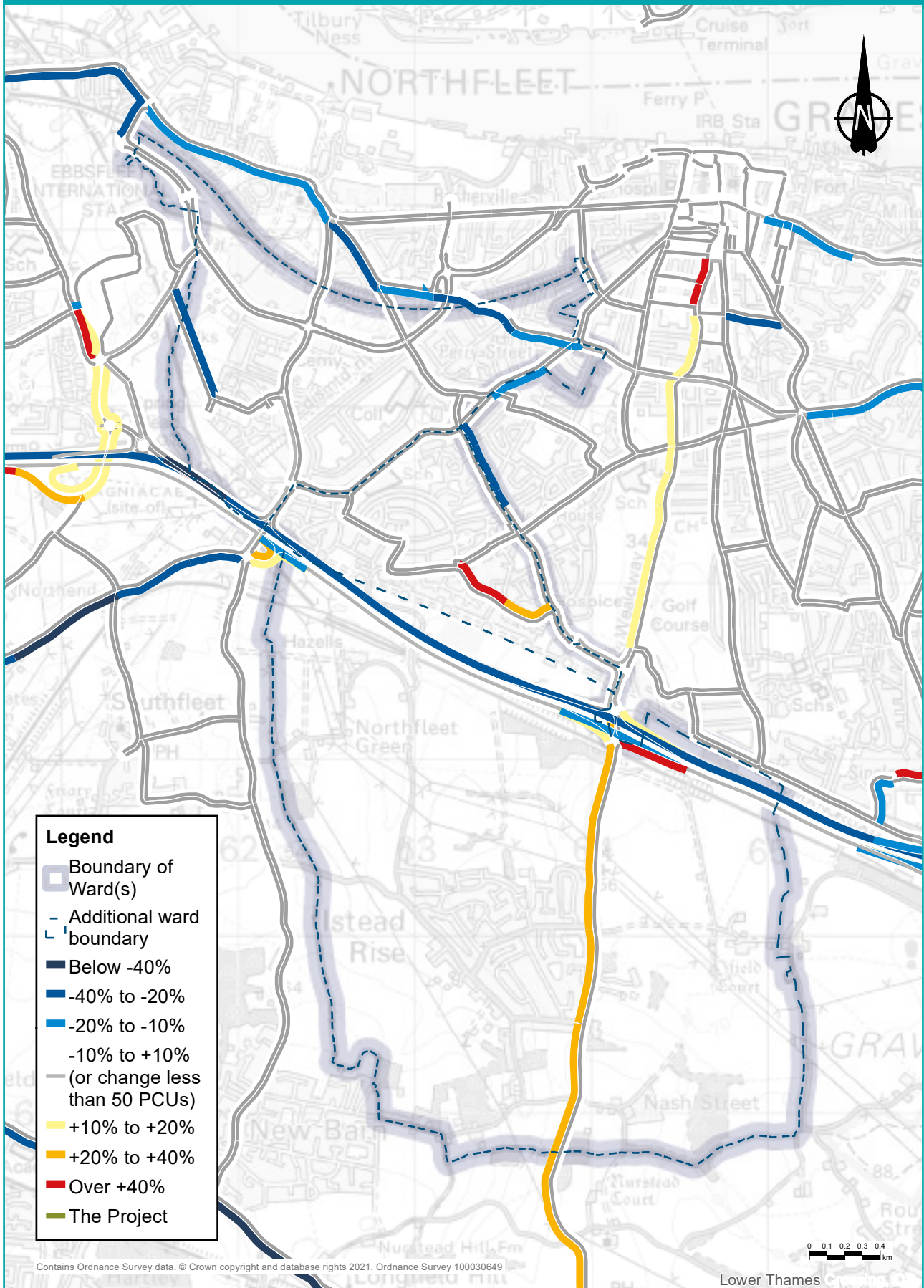


Figure 10.5: Predicted percentage change in traffic flows with the project during the morning peak in 2029



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Lower Thames

Figure 10.6: Predicted change in traffic flows (PCUs) with the project during the interpeak period in 2029

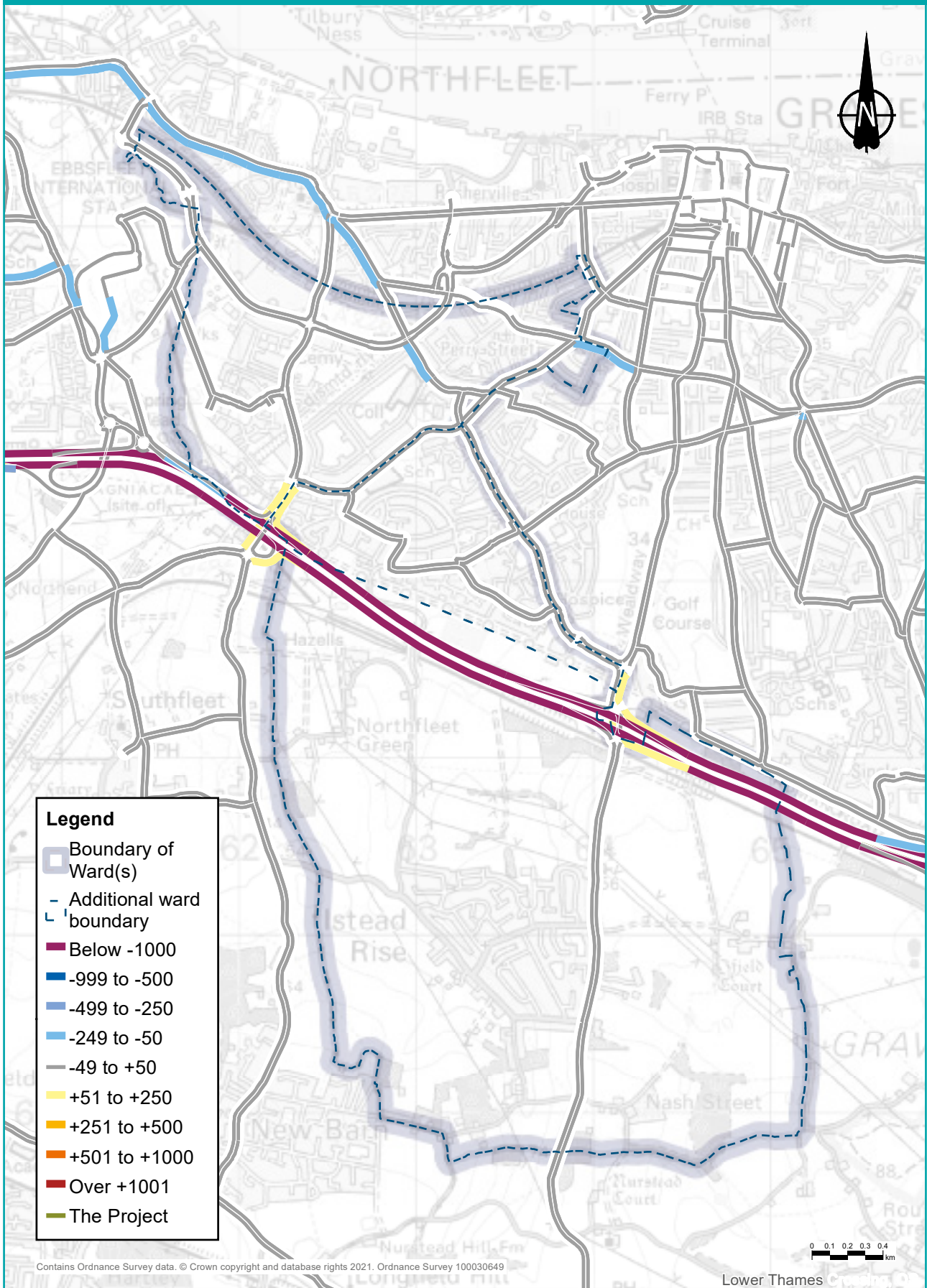


Figure 10.7: Predicted percentage change in traffic flows with the project during the interpeak period in 2029

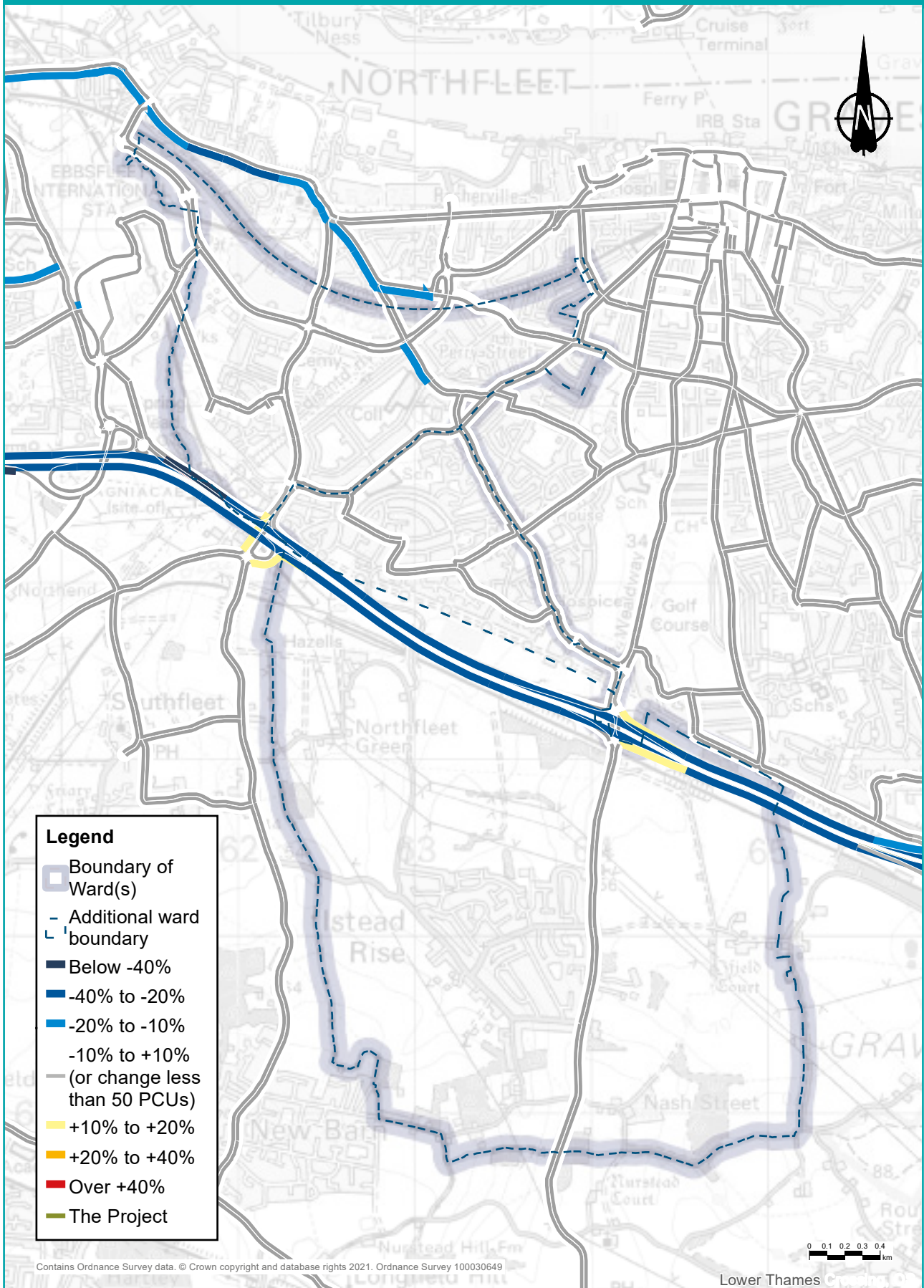


Figure 10.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

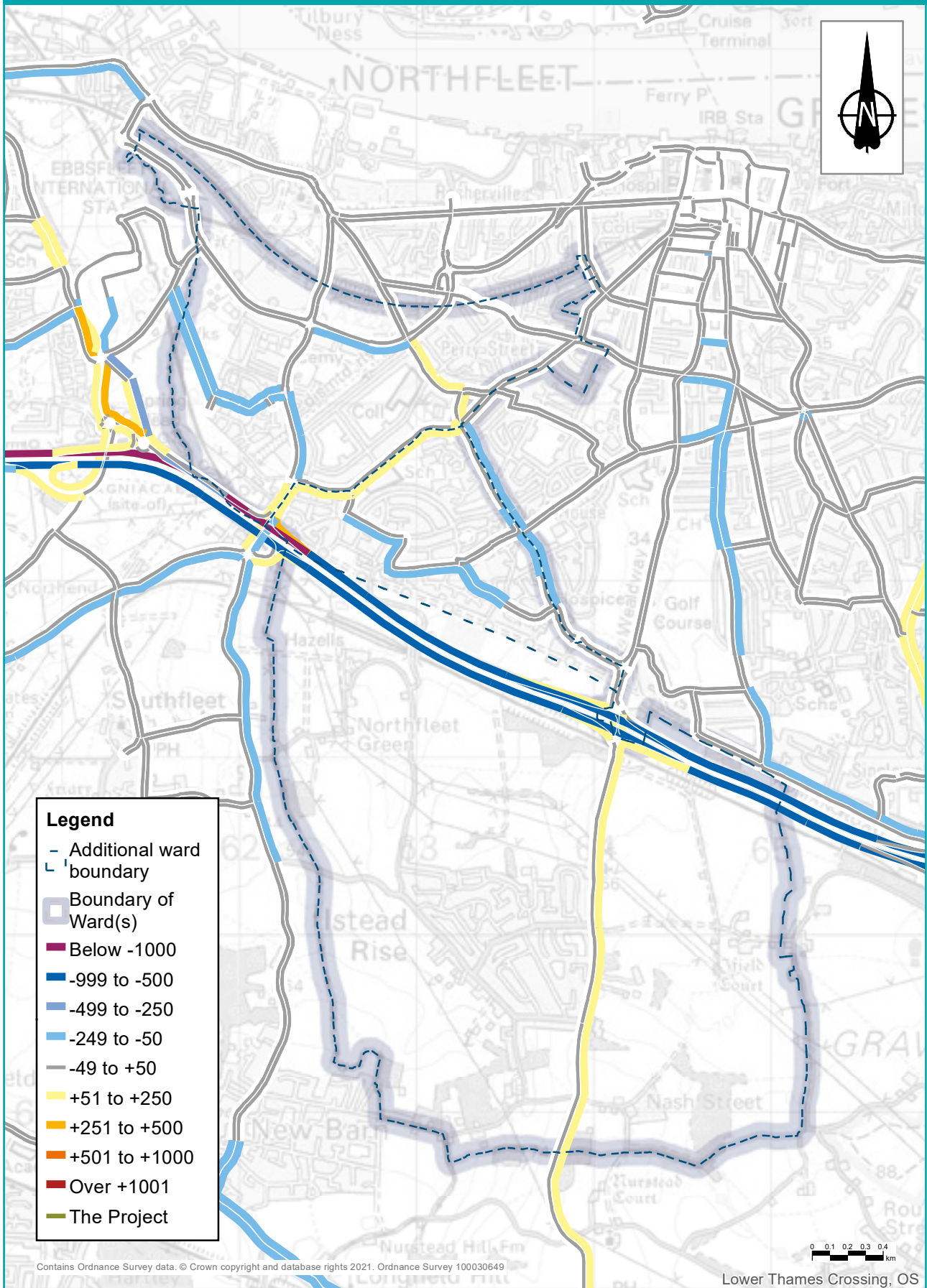
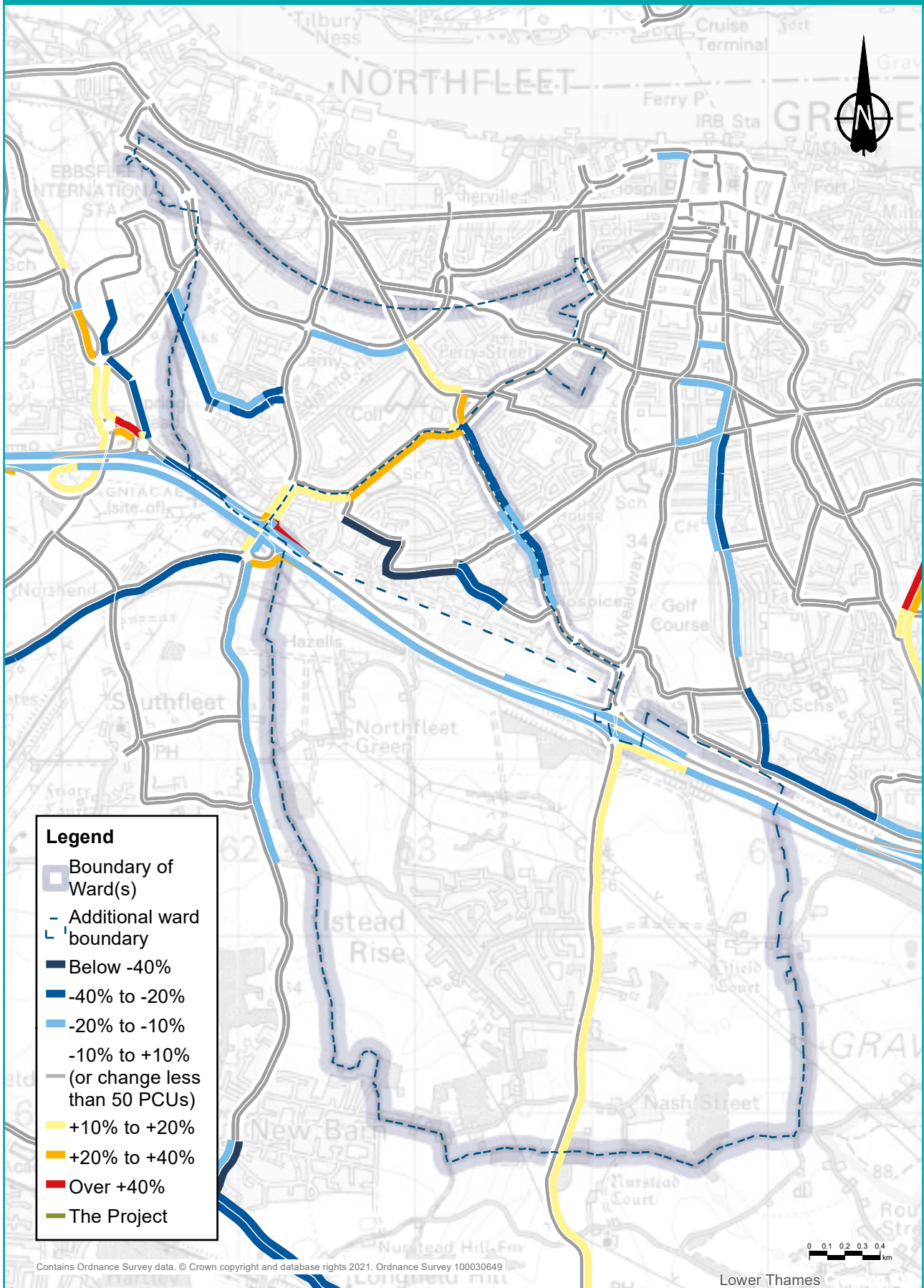


Figure 10.9: Predicted percentage change in traffic flows with the project during the evening peak in 2029



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Changes to journey times

Figure 10.10 shows the change in the area that could be reached within a 30-minute drive from the centre of the wards without and with the project. Figure 10.11 shows the change in areas within a 60-minute drive. The areas have been calculated for the morning peak hour (7am to 8am). The number of jobs within a 30-minute drive would increase by 42% with the project. The number within a 60-minute drive would increase by 22%, providing access to 570,000 additional jobs. Despite the project providing a substantial net gain in access for motorists within the wards, there are areas (shown in orange in the following maps) that would no longer be accessible by car within 30 or 60 minutes because of changes to traffic flows on the wider road network.

Figure 10.10: Change in area that motorists could drive to within 30 minutes from Northfleet South, Istead Rise and Painters Ash wards

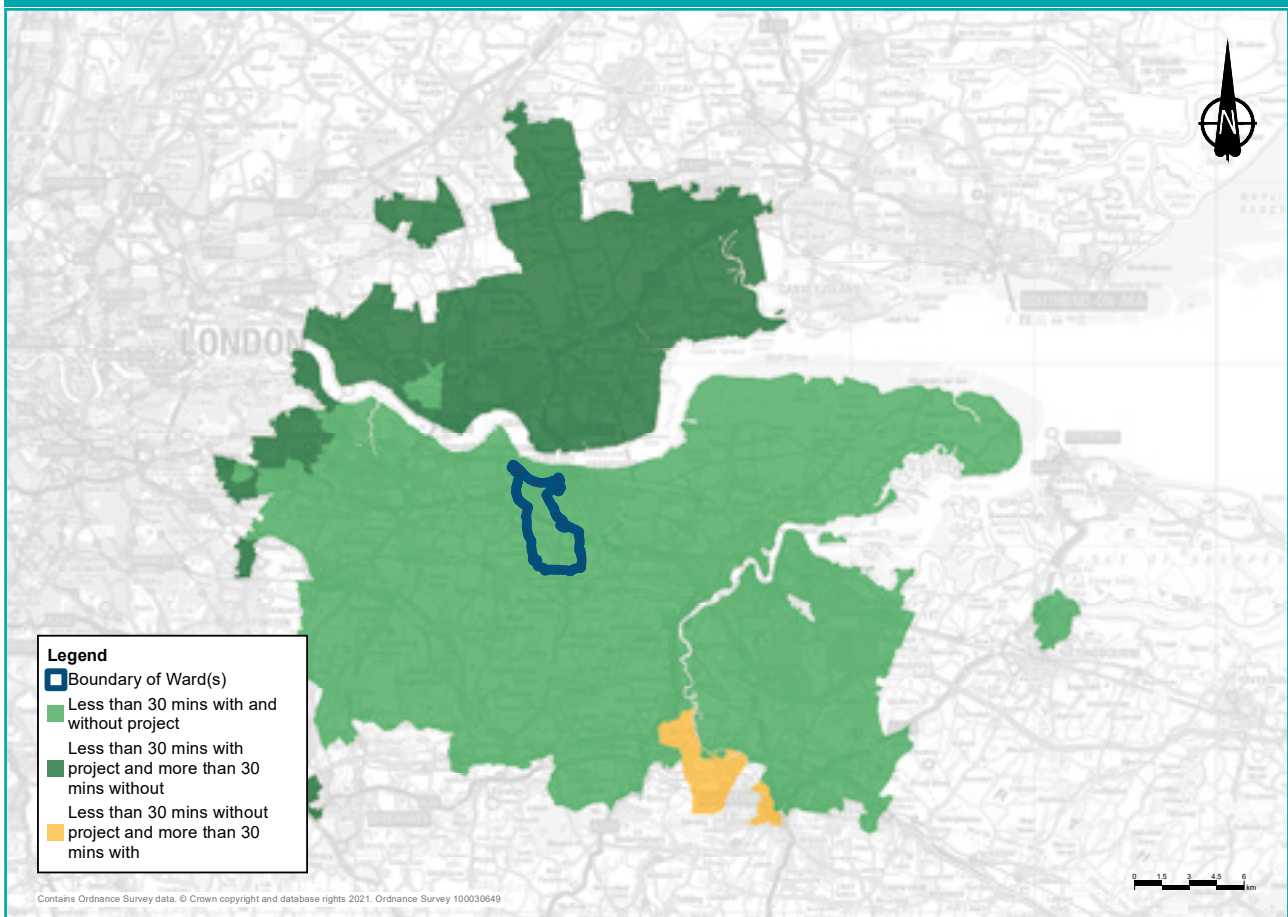
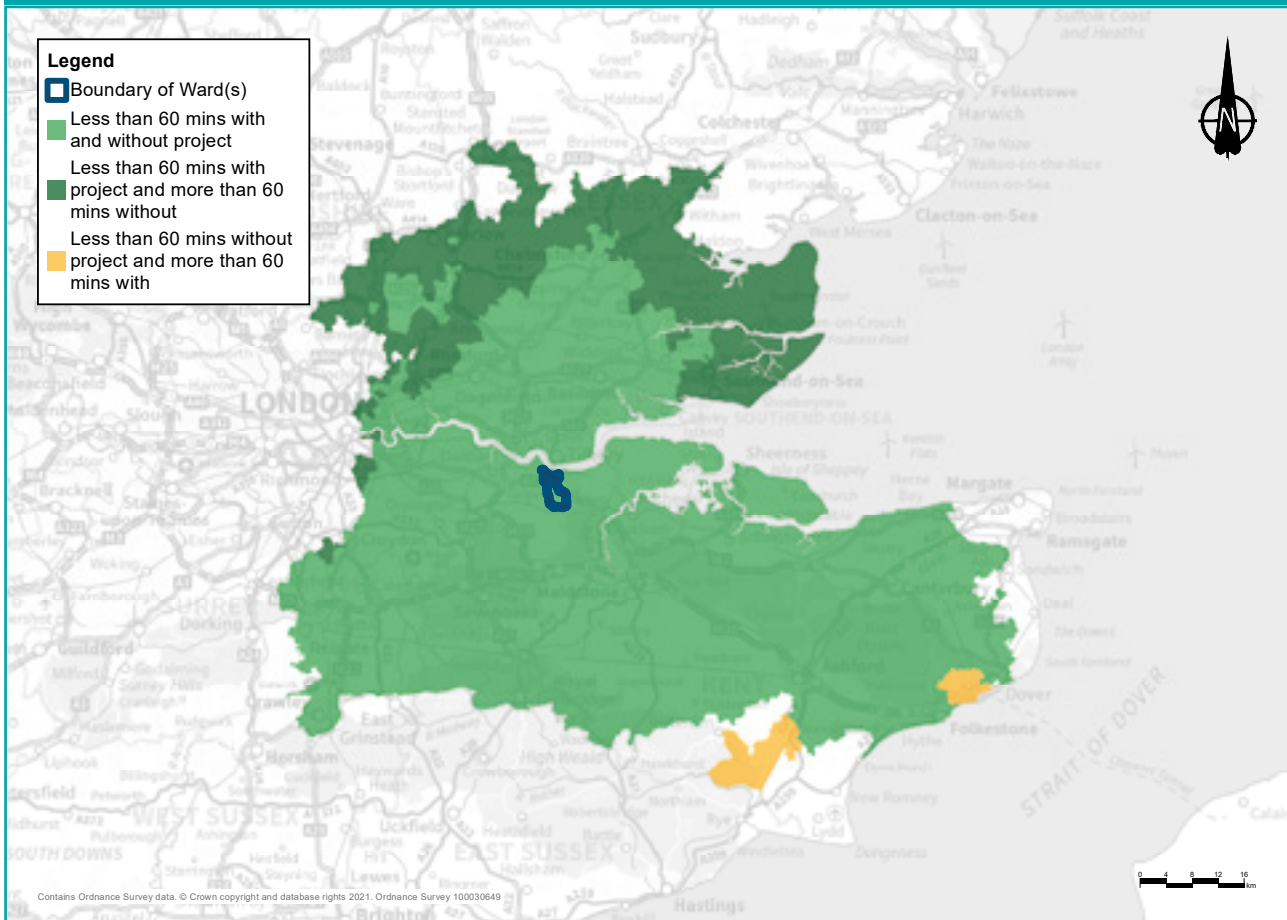


Figure 10.11: Change in area that motorists could drive to within 60 minutes from Northfleet South, Istead Rise and Painters Ash wards



Operational traffic flows

Once the road is open, traffic impacts on the affected road network would be monitored, including local roads. Where appropriate, we would work with the relevant highway authority to seek funding from the Department for Transport for further interventions.

10.4 Public transport

Existing situation

There are no railway stations in Northfleet South, Istead Rise or Painters Ash wards. There are, however, stations within neighbouring wards including Ebbsfleet International station, which provides Southeastern services to London and a wide variety of destinations in Kent and south London.

There are a number of buses within the wards, including the 1, 3, 34, 223, 305, 306, 308, 408, 416, 418, 481, 483, 489, 695, 735, 736, 770, G1, S1, B fastrack, and the school buses NAG1, NAG2, Meopham1 and VIGO. Regional coach services use the A2 through these wards.

10.4.1 Construction

Buses

There would be no changes to bus journey times during construction as a result of activities within these wards. There may, however, be some increases to journey times for buses and coaches using the A2 due to activities in adjacent wards.

Rail

There would be no noticeable change in local journey times to Ebbsfleet or Meopham stations, and no changes to the rail services at these stations.

10.4.2 Operations

Buses

There would be no changes to bus routes through these wards once the road opens, and no noticeable change to bus journey times. The only bus route that would experience a slight increase in journey time, of around two minutes, is the 695 school bus westbound from Rochester Grammar School via Cobham and Sole Street to Meopham School and on to Istead Rise.

Rail

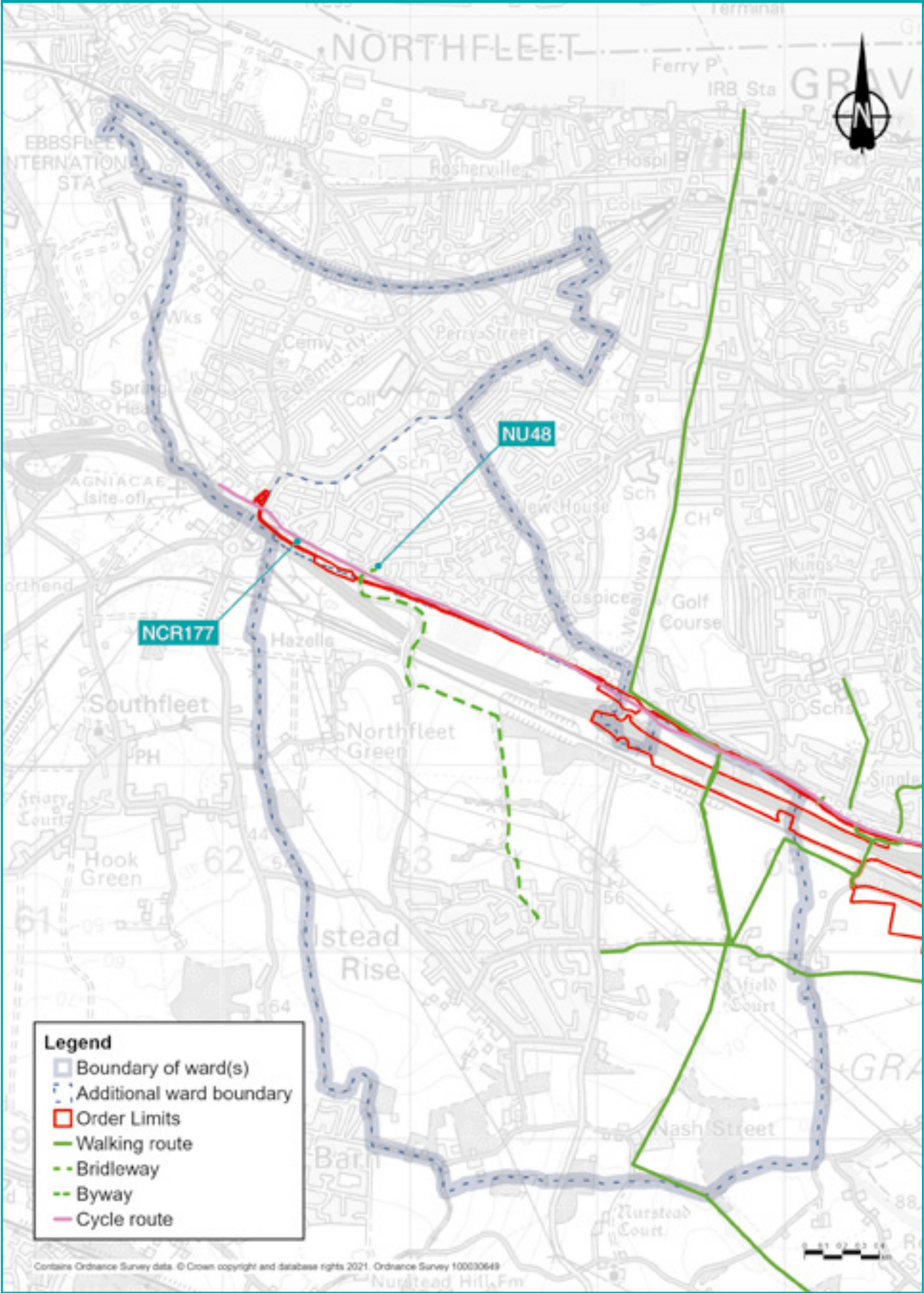
There would be no noticeable change in local journey times to Ebbsfleet or Meopham stations, and no changes to the rail services at these stations.

10.5 Footpaths, bridleways and cycle routes

Existing situation

Northfleet South, Istead Rise and Painters Ash wards are largely suburban wards with Green Belt surrounding Istead Rise to the south of the A2. The wards are connected by a network of footpaths. For other potential impacts, see the other sections in this chapter, such as Visual and Noise and vibration.

Figure 10.12: Footpaths, bridleways and cycle routes in the vicinity of the project in Northfleet South, Istead Rise and Painters Ash wards



10.5.1 Construction

Construction impacts

Due to the construction activities around the A2, there would be minor disruption during the construction period:

- Bridleway NU48 would be affected by utility works, and would need to be closed for six months.
- Cycle route NCR177 within these wards would be affected by utility works in this area, potentially requiring temporary diversion of the existing route. For information about impacts on NCR177 east of these wards, see chapters 3 and 8.

10.5.2 Operations

Operational impacts

Overall, the proposals for walking, cycling and horse riding include more than 46km of new, diverted, extended or upgraded footpaths, bridleways and cycle routes. These would provide greatly improved connections across the project. We developed our proposals after consultation and engagement with local communities and stakeholders. For an overview of the proposed improvements to footpaths and bridleways across the Lower Thames Crossing, see chapter 7 of the Operations update.

- Cycle route NCR177 would be unaffected within Northfleet South, Istead Rise and Painters Ash wards. For information about impacts on NCR177 east of these wards, see chapters 3 and 8.

10.6 Visual

Existing situation

Northfleet South is surrounded by an urban area and there would be no views of the land on which the project would be built from this ward.

The land on which the project would be built in Istead Rise ward is visible from local footpaths south of the A2, including Wealdway long-distance footpath and from the Cyclopark recreational facility. Otherwise, views of the land on which the project would be built from this ward are limited by a combination of the landscape and existing vegetation. Current views towards the land on which the project would be built from the Wealdway long-distance path include flat arable land with hedges and trees along the HS1/A2 corridor. However, A2 gantries and HS1 infrastructure are visible through breaks in the vegetation. There are similar views from other nearby footpaths. There are views from the Cyclopark towards Roman Road, where utility works would take place.

Views from Painters Ash ward towards the project area are mostly limited to properties on the southern edge of Gravesend, and those using cycle route NCR177. Current views towards the project from these homes are screened or densely filtered by a combination of roadside hedgerows and garden vegetation. From NCR177, there are views along the Roman Road green corridor, flanked by Cyclopark and glimpses of the A2 beyond.

10.6.1 Construction

Construction impacts

More information about how the area would look during construction, including visualisations, can be found in the Construction update.

From Istead Rise, the main construction activities likely to be seen are the widening of the A2 corridor and utility diversions. Views of construction activities from the Wealdway and nearby footpaths would be likely to include works to widen the A2 and the erection of new tunnel entrance gantries.

From the Cyclopark, views of the utility works along the Roman Road would be expected, including from NCR177.

From Painters Ash, the main construction activities likely to be seen are utility diversions, including from NCR177. Views of these activities from homes along the southern edge of Gravesend would be screened by vegetation.

Measures to reduce visual impacts during construction

Given the relatively limited views of the project from these wards and the existing A2's effect on views, no specific mitigation measures are considered necessary.

The visual impacts of the project would be controlled through good practice measures set out in the CoCP and the REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

10.6.2 Operations

Operational impacts

There would be minimal visual impact from the project along the Wealdway and nearby footpaths, and from the Cyclopark in Istead Rise. There would be no visual impacts in Northfleet South and Painters Ash.

Measures to reduce visual impacts during operation

Landscape restoration and screen planting would be the primary mitigation in Istead Rise. No measures would be required in Northfleet South or Painters Ash.

10.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in these three wards is mainly traffic noise from the A2, A227, A226, A2260 and the B262. There is also noise from the railway.

As part of our environmental assessment process, we carried out surveys of existing background noise at one location in Istead Rise. The levels monitored at these locations recorded average existing noise level of 63dB (A)⁴.

To understand how noise levels would vary with and without the new road, we use noise modelling to predict what noise levels would be like in the project's proposed opening year if the road was not built. We model this because we cannot assume that noise levels when the road opens would be the same as they are now. For example, our assessment of the opening year noise levels takes into account predicted changes in traffic levels.

We also model the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the project would change the noise levels in the project's opening year if the road was built.

4 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

In the opening year, noise levels without the project are predicted to range, on average:

- from 40 to 73dB(A) during the day and from 29 to 59dB(A) during the night, at the locations within Northfleet South
- from 59 to 66dB(A) during the day and from 45 to 53dB(A) during the night, at the locations within Istead Rise
- from 51 to 79dB(A) during the day and from 35 to 64dB(A) during the night, at the locations within Painters Ash

As such, our noise assessments predict that by opening year, noise levels would increase compared with the existing situation even if the road is not built. Information on how they would change with the project is below.

10.7.1 Construction

Construction activities

The main construction activities expected to make noise and vibration in these wards are those associated with the A2 upgrade works and utilities works.

There are no main works compounds or Utility Logistics Hubs currently proposed to be located within the Northfleet South, Istead Rise and Painters Ash wards, nor are there any haul roads proposed within these wards.

There are no percussive or vibratory works proposed within these wards.

Daytime construction noise impacts

Construction noise levels have been predicted at six locations across these wards, chosen to provide a representation of the level of noise communities are expected to experience during construction. For more information about how we carried out these assessments, see chapter 1.

Noise levels are shown using the standard units for major projects, dB LAeq (12-hour), which represent the average noise level for the assessed 12-hour daytime period. While there might be short-term noises that are louder than the noise level shown during the assessed period, the averaged figure provides a fair representation of what the overall noise impacts would be.

Figure 10.13: Construction noise assessment locations in Northfleet South, Istead Rise and Painters Ash wards

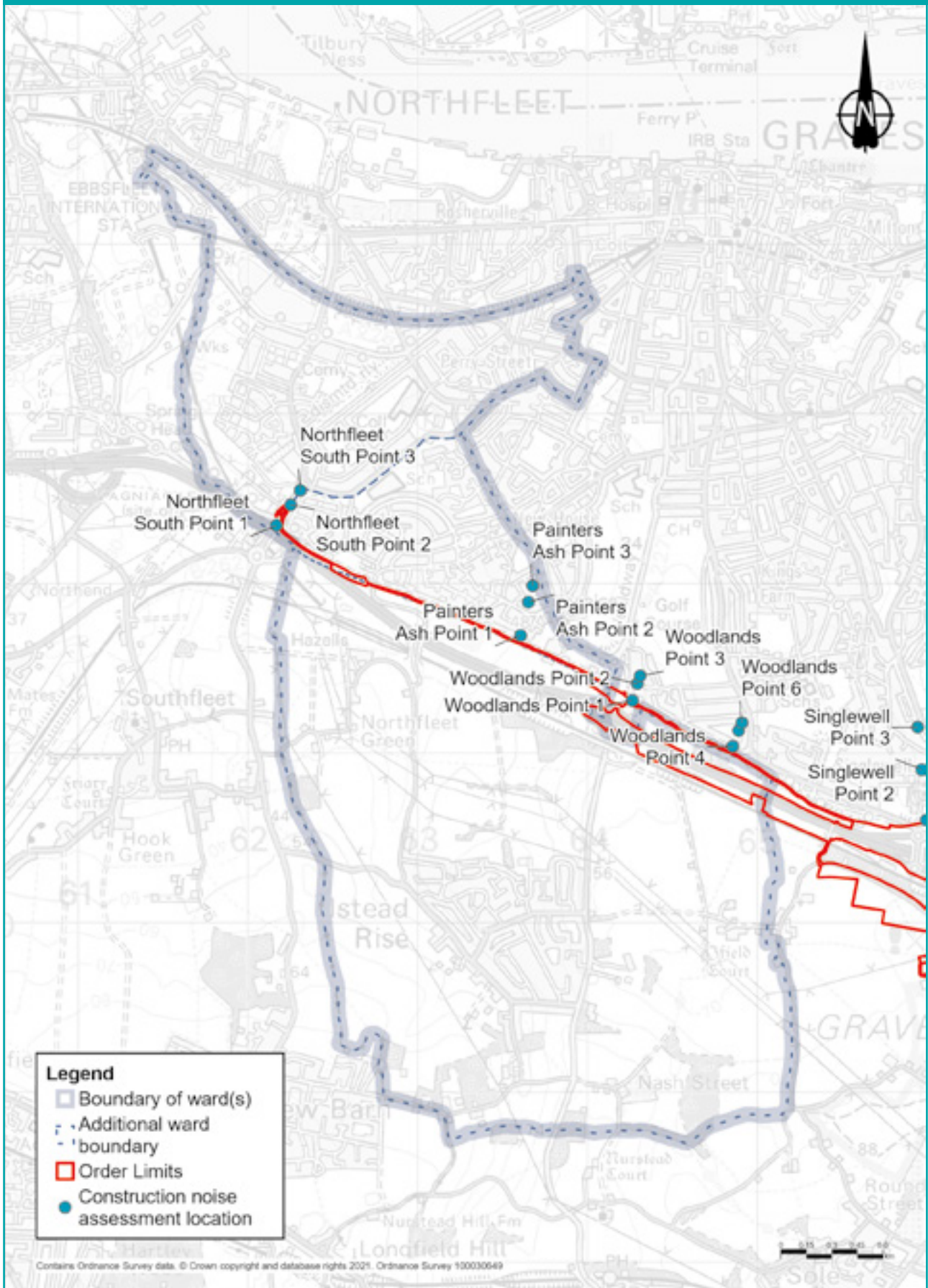


Figure 10.13 shows the locations at which we have predicted the daytime construction noise during construction.

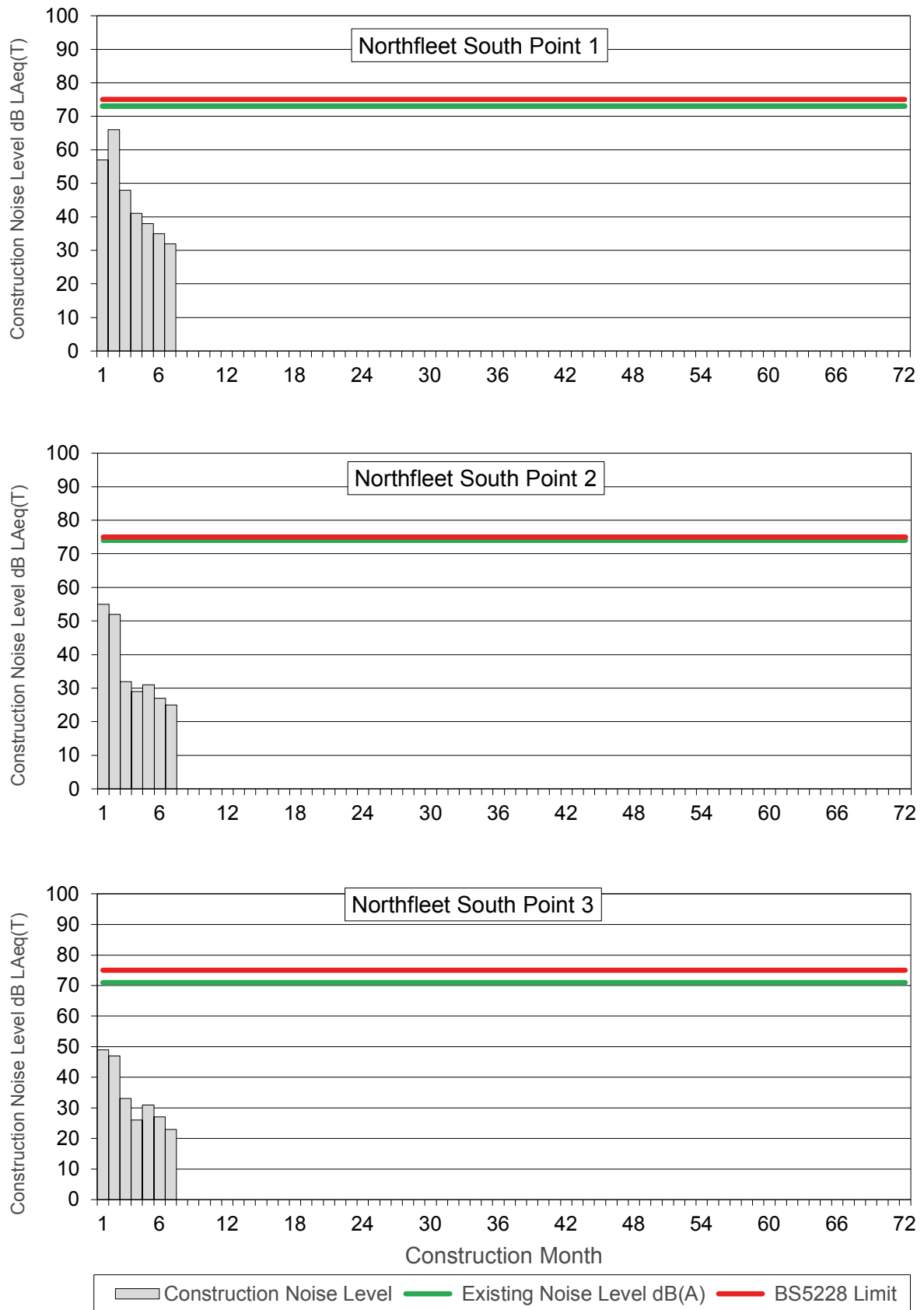
Each vertical bar in figures 10.14 and 10.15 show the predicted noise levels for that month of the construction period (months 1 to 72). The horizontal green line in each chart represents the existing background noise level at each assessment point without the project. The horizontal red line shows the level at which construction noise would exceed acceptable thresholds (see chapter 1 for more information about these thresholds). If noise is predicted to exceed acceptable levels, then specific measures would be implemented to reduce the noise.

The predicted construction noise levels show that higher noise levels and disturbance would be experienced closer to construction activity. Levels gradually diminish as a result of increased distance with additional buildings and other features screening the noise from more distant residential areas.

With reference to figure 10.14, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 32 to 66dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 2, construction noise levels are predicted to range from 25 to 55dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 3, construction noise levels are predicted to range from 23 to 49dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.

Figure 10.14: Construction noise by month for assessment locations 1, 2 and 3 in Northfleet South ward



With reference to figure 10.15, the following summarises the noise level changes over the construction period for points 1 to 3:

- At point 1, construction noise levels are predicted to range from 21 to 63dB LAeq (12-hour). Construction noise would exceed the existing background daytime noise level for approximately one month. However, they would not breach the defined threshold.
- At point 2, construction noise levels are predicted to range from 14 to 34dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.
- At point 3, construction noise levels are predicted to range from 21 to 32dB LAeq (12-hour). Construction noise is not expected to exceed the existing background noise levels.

24/7 construction working

As can be seen in figure 10.16, there is no proposed night-time working in Northfleet South, Istead Rise, and Painters Ash wards.

Construction traffic noise impacts

Maps showing predicted changes in road traffic noise within these wards during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within these wards are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1dB change in noise levels) during all construction years.

Figure 10.15: Construction noise by month for points 1, 2 and 3 in Painters Ash ward

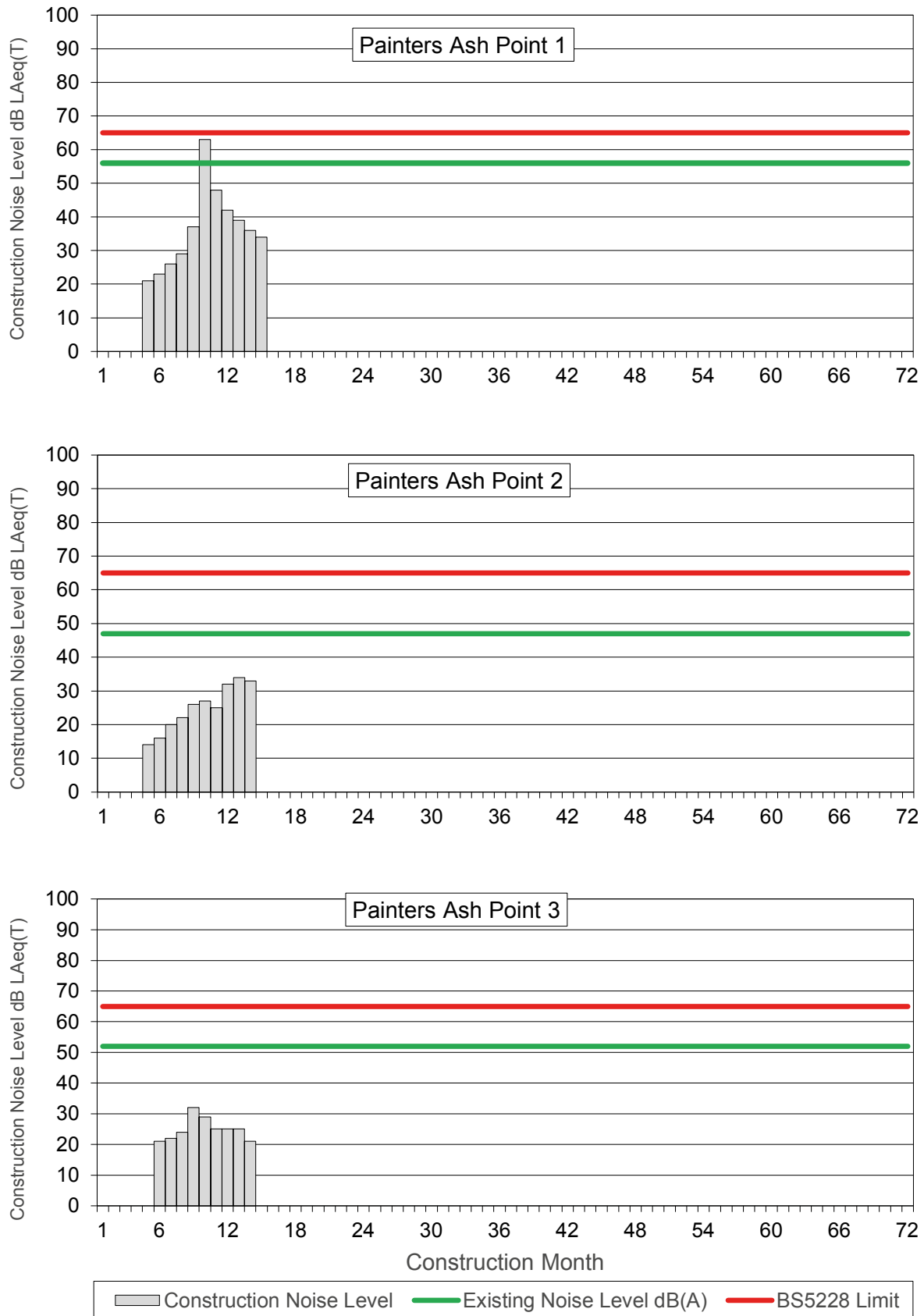
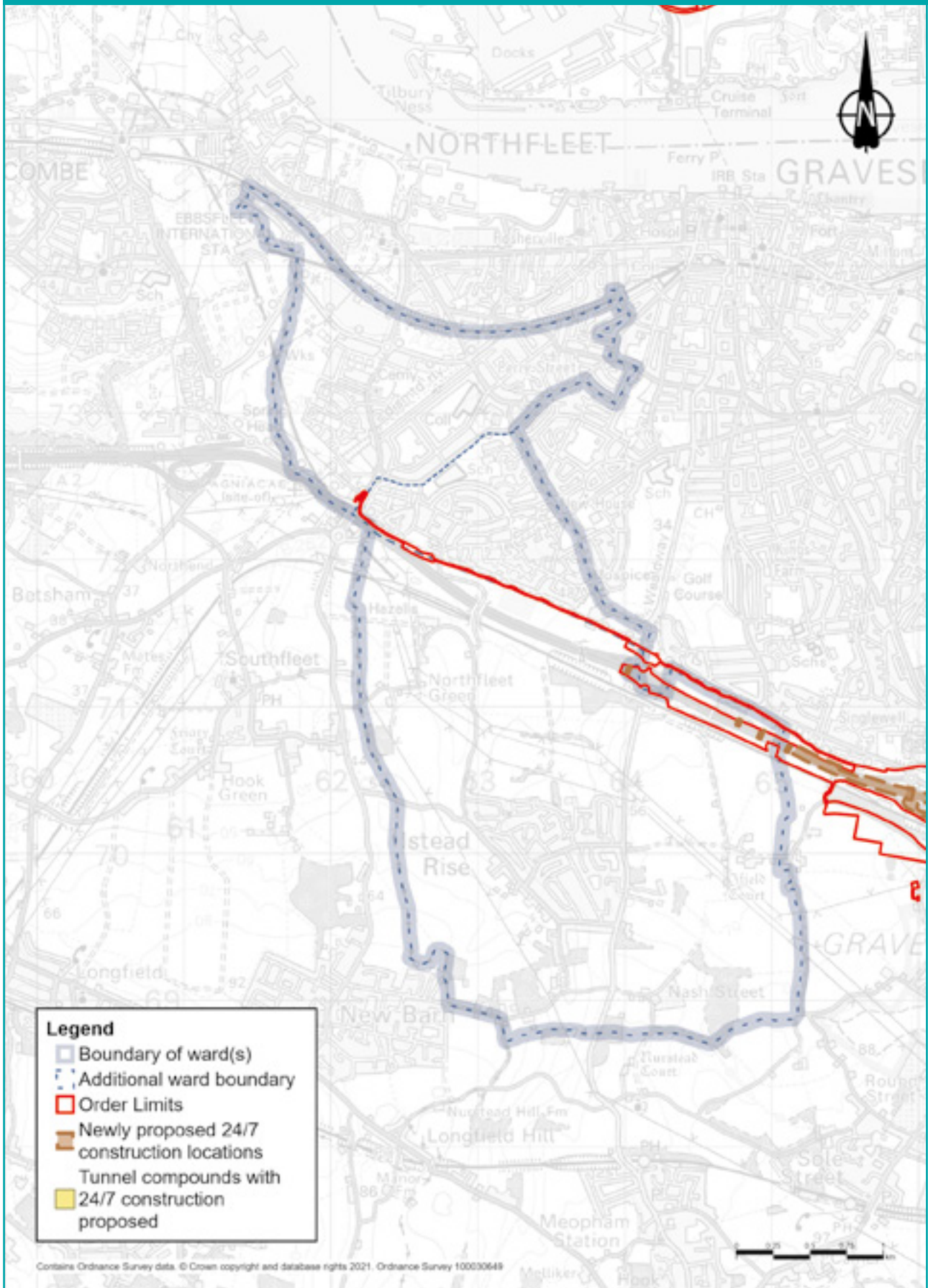


Figure 10.16: Newly proposed and tunnel 24/7 working locations in Northfleet South, Istead Rise and Painters Ash wards



Measures to reduce construction noise

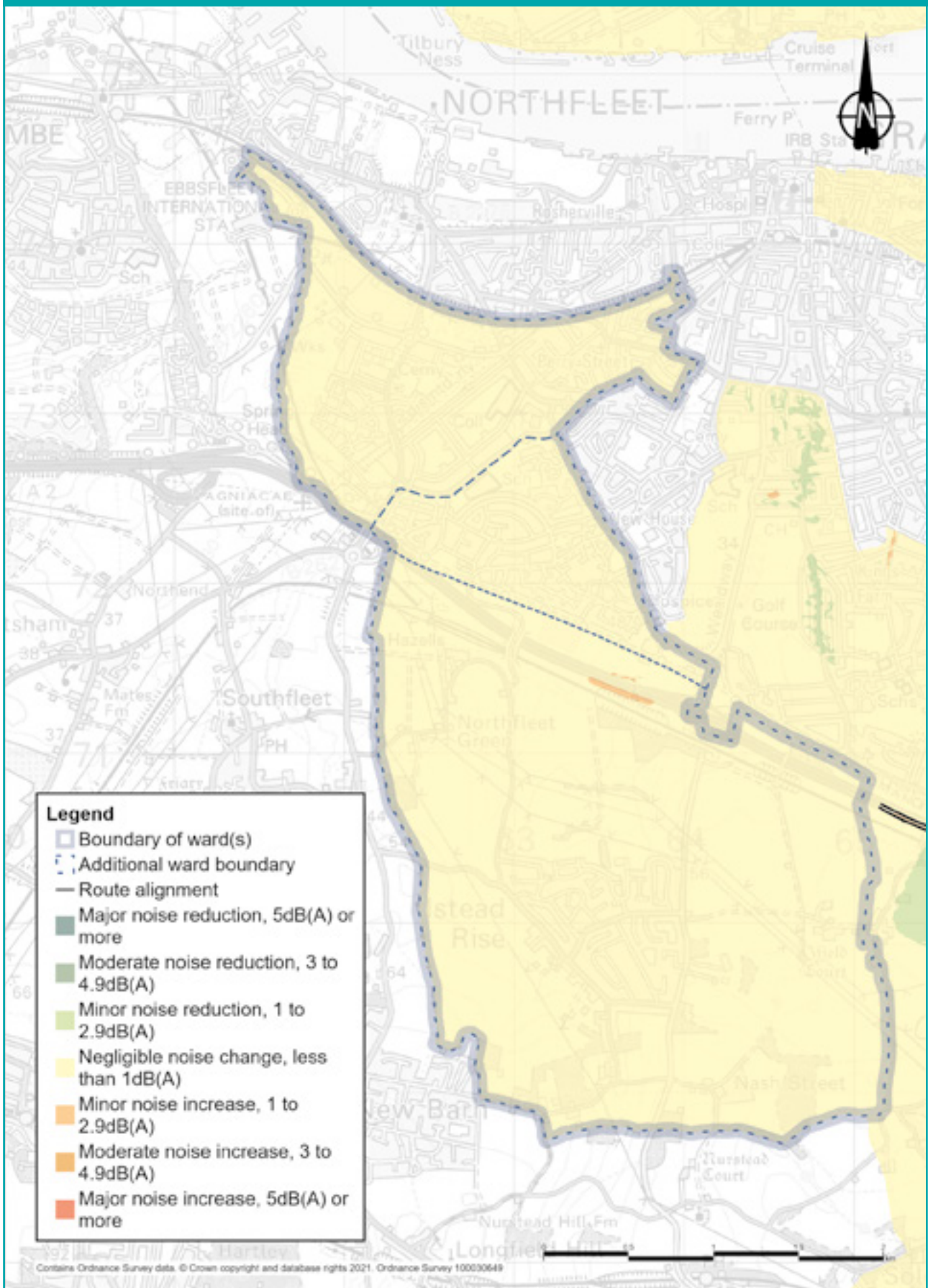
Construction noise levels would be controlled by using Best Available Techniques (BAT), with specific measures used at certain locations such as:

- installing and maintaining hoardings around the construction areas likely to generate noise
- keeping site access routes in good condition, with on-site condition assessments to inspect for defects such as potholes
- turning off plant and machinery when not in use
- maintaining all vehicles and mobile machinery so loose body fittings or exhausts do not rattle or vibrate
- using silenced equipment where available, in particular power generators and pumps
- not allowing music or radios (for entertainment purposes) outdoors on-site
- planning site layout to make sure reversing is kept to a practical minimum. Required reversing manoeuvres would be managed by a trained banksman/vehicle marshal so they are completed safely and quickly

All control measures, including those above, fall under the principles of BAT and are secured in the REAC. For more information, see sections NV001 to NV010, which set out how we would work under the supervision of the relevant local authorities to implement noise-reduction measures where appropriate.

The CoCP sets out additional measures that would be implemented to reduce noise and vibration during the construction period.

Figure 10.17: Noise impacts during operation in Northfleet South, Istead Rise and Painters Ash wards



10.7.2 Operations

Operational noise impacts

Figure 10.17 shows the predicted changes in traffic noise in the opening year of the road. Within the Northfleet South, Istead Rise and Painters Ash wards, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to range from negligible change of less than 1.0dB to minor increases of between 1.0 and 2.9dB (within Istead Rise ward only). For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Northfleet South

As this ward is located around 3.5km to the west of the project, there would be no direct noise impacts from the project in the ward. There would be negligible noise impacts as a result of changes in traffic flow, the number of HGVs, and traffic speed on the existing roads in the ward.

Istead Rise

The ward is located around 1.7km to the west of the project and, as such, there would be no direct noise impacts from the project in the ward. However, there would be indirect noise as a result of changes in traffic flow, the number of HGVs, and traffic speed on the existing roads in the ward, and physical alterations/upgrade work along the A2 in the north of the ward.

Painters Ash

As Painters Ash is located around 2.8km to the west of the project, there would be no direct noise impacts from the project in the ward. There would be indirect noise as a result of changes in traffic flow, the number of HGVs, and traffic speed on the existing roads in the ward.

Measures to reduce traffic noise and vibration during operation

The main methods of controlling noise across the project would be, where practical, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

For more information about the proposed measures to reduce operational noise, see the REAC (including references NV011 and NV013).

10.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within these wards, the A2 at the southern boundary of Northfleet South and Painters Ash, and either side of the A2 and M2 at the northern edge of Istead Rise have been declared an Air Quality Management Area (AQMA) due to annual levels of airborne pollution exceeding accepted standards.

AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the ward have been identified as AQMA.

10.8.1 Construction

Construction impacts

For information about construction in these wards, see the Project description section above. Construction activities have the potential to affect nearby air quality through the release of dust and emissions from construction equipment and traffic. The areas most likely to be affected are those close to haul roads, compounds and soil storage areas.

Properties more than 200 metres from the worksite, which is the majority of properties within these wards, are outside the area likely to be affected by construction dust or emissions from the worksite. In these wards, there are only a few properties within 200 metres of the worksite, including some east of the proposed A2/M2 junction and the new road. In Northfleet South ward, there are only a few properties within 200 metres of the worksite, including along the B262 near Pepper Hill. In Istead Rise and Painters Ash wards, there are only a few properties within 200 metres of the worksite, including the A2 corridor. Air quality impacts on these properties during construction would be temporary and we would put in place measures to minimise the dust impacts (see below). The proposed measures to reduce dust and emissions are ones that have been proven to be effective when used on similar construction projects in the past. The change in air quality during the construction phase would be negligible, and there would be no discernible effect on health.

Our analysis of construction traffic predicts that the impact on most roads in these wards would be negligible, although there would be a minor improvement in air quality in the area the A2 corridor as a result of the traffic management in place from 2026 to 2028. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

The impact of construction machinery and traffic on air quality would be controlled through the range of good practice measures set out in the CoCP and the REAC. For example, there would be measures to suppress dust, such as damping down dry haul roads and spoil heaps, as well as the use of low-emission machinery and vehicles. We would put in place an Air Quality Management Plan to ensure the measures set out in the CoCP and the REAC would effectively monitor and control dust and exhaust emissions. The location and type of monitoring would be submitted in advance to Gravesham Borough Council for consultation (see REAC entry AQ006).

10.8.2 Operations

Operational impacts

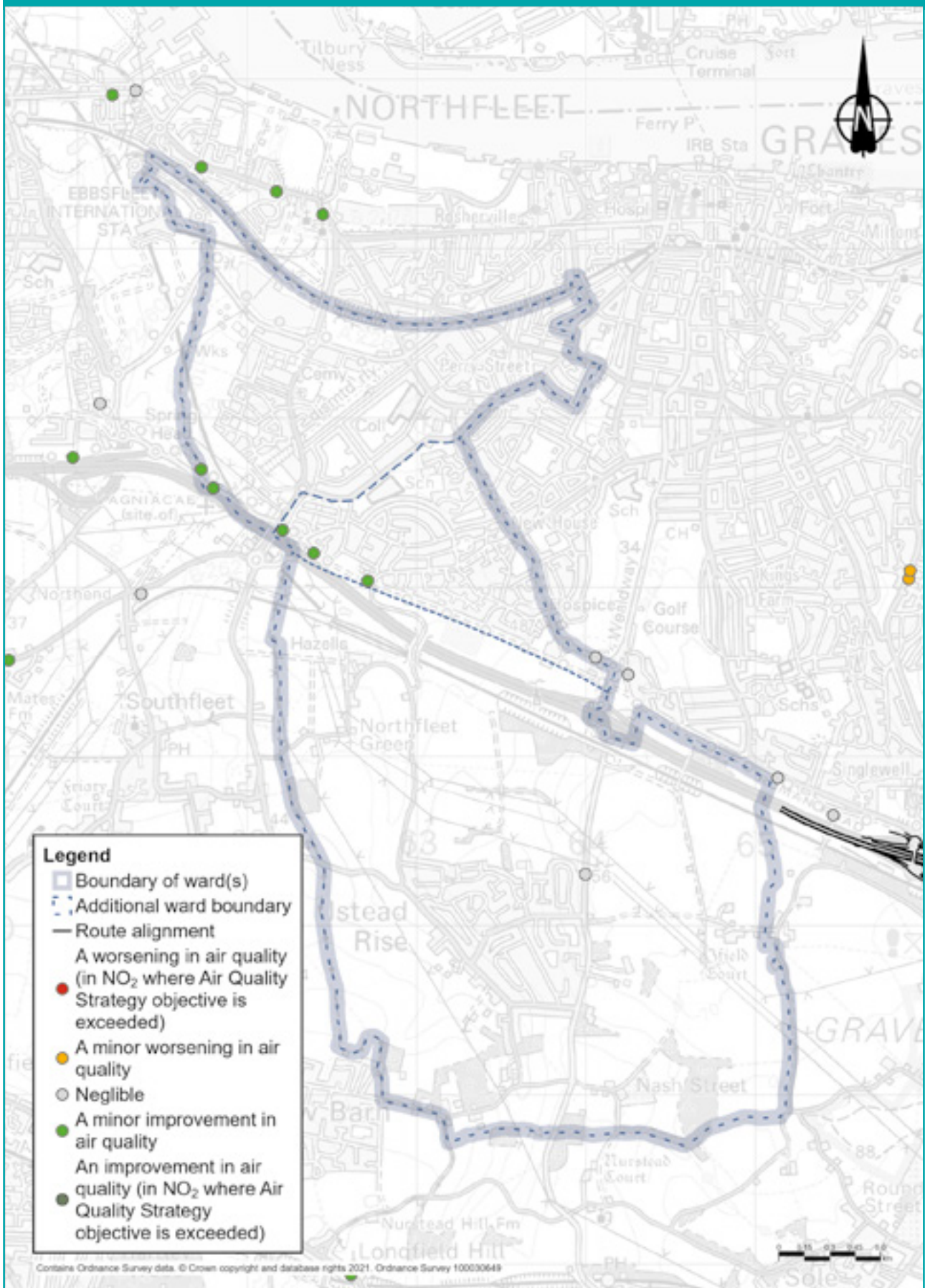
We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

At all locations within the wards, there are no predicted exceedances of air quality thresholds. There are receptors (properties or habitats that are sensitive to changes in air quality) within Northfleet South and Painters Ash, close to the existing A2, that would experience a minor improvement in air quality for nitrogen dioxide (NO₂). Likewise, in Istead Rise, identified locations would experience negligible changes in air quality for NO₂, the main traffic-related pollutant⁵. The highest modelled yearly average NO₂ concentration:

- within Northfleet South ward is 30.1 µg/m³, which is below the yearly average threshold of 40µg/m³
- within Istead Rise ward is 18.2 µg/m³, which is below the yearly average threshold of 40µg/m³
- within Painters Ash ward is 29.8 µg/m³, which is below the yearly average threshold of 40µg/m³

⁵ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

Figure 10.18: Predicted changes in NO₂ levels in Northfleet South, Istead Rise and Painters Ash wards once the new road is open



Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Furthermore, local air quality data shows an overall downward trend in NO₂ over recent years, which means that future air quality improvements at this location are likely (for example, through increased use of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO₂, our assessment predicts that PM₁₀ levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation.

The assessed air quality impacts in this area as a result of the project would not trigger the need for additional monitoring or other mitigation measures once the road is open.

10.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health, and different groups may be more sensitive to these – for example, children, older people or those with pre-existing health conditions.

Northfleet South

Northfleet South is characterised by a younger population, with over 25% of residents under the age of 16. In addition, Northfleet South has a significantly lower proportion of residents who are aged 60+ when compared with Gravesham as a whole, 15.1% and 22.6% respectively. There are also fewer older people living alone than the average for Gravesham (10.0% compared with 12.2%). Economic activity is generally higher than for Gravesham wards. Home ownership is relatively low when compared with other wards found throughout Gravesham and for Gravesham as a whole.

Self-reported health status is generally good, with more than 80% of residents reporting very good or good health. Life expectancy at birth is 81.0 years for females and 80.5 years for males (slightly higher for males and slightly lower for females for the UK average life expectancy recorded for 2017-19 of 79.4 years for males and 83.1 years for females). Deaths from all causes (these are causes where all or most deaths could potentially be prevented by public health interventions in the broadest sense), respiratory diseases, coronary heart disease and all cancers are similar to that of Gravesham as a whole.

Istead Rise

Istead Rise is characterised by an older population (with 38.5% of residents aged over 60 – a significantly higher proportion than for Gravesham as a whole and nationally). There are also more older people living alone than the average for Gravesham (13.3% compared with 12.2%). Economic activity rates are generally similar to other Gravesham wards. A very high proportion of residents own their own property when compared with other wards found throughout Gravesham and for Gravesham as a whole.

Self-reported health status is generally good, with more than 80% of residents reporting very good or good health. Life expectancy at birth is 87.8 years for females and 82.7 years for males (above the UK average life expectancy recorded for 2017-19 of 79.2 years for males and 83.1 for females). Deaths from all causes (these are causes where all or most deaths could potentially be prevented by public health interventions in the broadest sense) are lower for Istead Rise than is the case for Gravesham as a whole. Deaths from respiratory diseases, coronary heart disease and all cancers are similar to that of Gravesham.

Painters Ash

Painters Ash is characterised by an older population (with 32.5% of residents aged over 60 – a significantly higher proportion than for Gravesham as a whole and nationally). There are also more older people living alone than the average for Gravesham (15.9% compared with 12.2%). Economic activity rates are generally similar to other Gravesham wards. A higher proportion of residents own their own property when compared with Gravesham as a whole.

Self-reported health status is generally poor, with less than 80% of residents reporting very good or good health, a lower proportion than for Gravesham as a whole. Similarly, Painters Ash has a relatively low proportion of residents who report that their day-to-day activities are not limited. Life expectancy at birth is 81.2 years for females and 77.8 years for males (lower than the UK average life expectancy recorded for 2017-19 of 79.2 for males and 83.1 years for females). Deaths from all causes (these are causes where all or most deaths could potentially be prevented by public health interventions in the broadest sense) and respiratory diseases are worse than is the case for Gravesham as a whole.

10.9.1 Construction

Construction health impacts

For information about the construction activities in these wards, see the Project description section above.

Elements of these activities could affect human health (including mental health and wellbeing), whether this is through noise associated with construction activities or construction traffic, air quality (as a result of dust emissions), severance caused by construction traffic, or road or footpath closures.

A range of personal, social, economic and environmental factors influence our health. These are known as health determinants and include the physical environment, income levels, employment, education, social support and housing. Different groups may be more sensitive to changes in these determinants – for example, children, older people or people with pre-existing health conditions.

Northfleet South ward

- The main construction activities expected to cause noise impacts in this ward relate to the A2 works and utilities works during core daytime hours.
- The works on the project's main route are more than 3km from the ward boundary and therefore unlikely to present any impacts.
- There are few properties in the ward within 200 metres of the Order Limits, which reduces the impact on air quality of increased dust or emissions from construction. However, those properties within 200 metres could be affected. In Northfleet South, there are only a few properties within 200 metres of the worksite, including along the B262 near Pepper Hill.
- Negative health outcomes may be experienced by sensitive groups within the ward as a result of changes to:
 - accessibility (for example, people who are dependent on public transport and have less choice about how they travel and the route they take)
 - severance (where road and footpath closures may affect some people's ability to access services or facilities)
 - access to open space (people without access to private cars may have fewer alternatives within a reasonable travel time)
 - changes to the noise environment
 - mental health and wellbeing (for example, issues associated with stress and anxiety relating to the project)
- Positive health outcomes may also be experienced by residents as a result of access to work and training opportunities presented by construction activities.

Istead Rise ward

- Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In Istead Rise wards, there are only a few properties within 200 metres of the worksite, including the A2 corridor.
- The main construction activities expected to cause noise and vibration impacts in the ward relate to A2 works and utilities works during core daytime hours.
- The main alignment works are more than 2.5km from the ward boundary and therefore unlikely to have any impacts.
- Construction traffic on the public highway close to Istead Rise could increase traffic noise.
- Views of A2 construction activities would be visible from the local footpath network to the south of the A2, including Wealdway long-distance footpath, and to the north of the A2 from the Cyclopark recreational area.
- Negative health outcomes may be experienced by sensitive groups within the ward as a result of changes to:
 - accessibility (for example, people who are dependent on public transport and have less choice about how they travel and the route they take)
 - severance (where road and footpath closures may affect some people's ability to access services or facilities)
 - access to open space (people without access to private cars may have fewer alternatives within a reasonable travel time)
 - changes to the noise environment
 - mental health and wellbeing (for example, issues associated with stress and anxiety relating to the project)
- Positive health outcomes may also be experienced by residents as a result of access to work and training opportunities presented by construction activities.

Painters Ash ward

- Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In Painters Ash wards, there are only a few properties within 200 metres of the worksite, including the A2 corridor.
- The main construction activities expected to cause noise and vibration impacts in this ward relate to A2 works and utilities works during core daytime hours.
- The Marling Cross Compound would be unlikely to cause additional noise during core daytime hours, over and above the works on the A2 and the prevailing noise in an area dominated by the A2. The main alignment works are more than 2.5km from the ward boundary and therefore unlikely to present any impacts.
- Construction traffic on the public highway near Painters Ash could increase local traffic noise, but this would be controlled through the CoCP and traffic management measures.
- Negative health outcomes may be experienced by sensitive groups within the ward as a result of changes to:
 - accessibility (for example, people who are dependent on public transport and have less choice about how they travel and the route they take)
 - severance (where road and footpath closures may affect some people's ability to access services or facilities)
 - access to open space (people without access to private cars may have fewer alternatives within a reasonable travel time)
 - changes to the noise environment
 - mental health and wellbeing (for example, issues associated with stress and anxiety relating to the project)
- Positive health outcomes may also be experienced by residents as a result of increased access to work and training opportunities presented by construction activities.

Measures to reduce impacts on health during construction

Within these wards, construction traffic would be limited to the A2. Where possible, we have reduced the volume of construction traffic that would use this road during the construction period.

Construction noise levels would be controlled by using Best Available Techniques (BAT), with specific measures used at certain locations.

The main methods of controlling noise across the project would be, where practical, to design the road within landscaped features such as cuttings and bunds (walls of earth). The use of low-noise surfacing would also reduce the traffic noise once the road is in use.

10.9.2 Operations

Operational health impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

At all locations within these wards, there are no predicted exceedances of air quality thresholds. There are receptors (properties or habitats that are sensitive to changes in air quality) within Northfleet South and Painters Ash, close to the existing A2, that would experience a minor improvement in air quality for nitrogen dioxide (NO₂). Likewise, in Istead Rise, identified locations would experience negligible changes in air quality for NO₂, the main traffic-related pollutant.

The conclusion of our air quality assessment is that the project would not result in significant air quality changes in these three wards.

Residents may also experience positive health outcomes in these wards as a result of improvements to accessibility, access to work and training, and access to open space.

Measures to reduce operational health impacts

Over and above mitigation relating to noise and visual impacts already described elsewhere, no specific measures to address health outcomes have been identified in these wards.

10.10 Biodiversity

Existing situation

Only a small part of Northfleet South falls within the project's Order Limits, and this is restricted to an area around the B262 Hall Road. The habitat here consists of woodland and scrub. The ward contains no designated site within 1km of the Order Limits. A single non-designated site, Ebbsfleet Marshes Local Wildlife Site (LWS), is located within 500 metres of the Order Limits. Surveys to establish a baseline for assessment were carried out within the Order Limits and in the areas around them, and we identified no protected species.

Only a small part of Istead Rise and Painters Ash fall within the project's Order Limits, and this is restricted to an area around the bridleway north of the A2 along Roman Road. The habitat here consists of some landscape planting and grassland.

Painters Ash ward contains no designated or non-designated sites. Surveys to establish a baseline for assessment were undertaken within the Order Limits and in the areas around them. The only protected species identified in this ward were reptiles within the landscape planting and grassland along the bridleway.

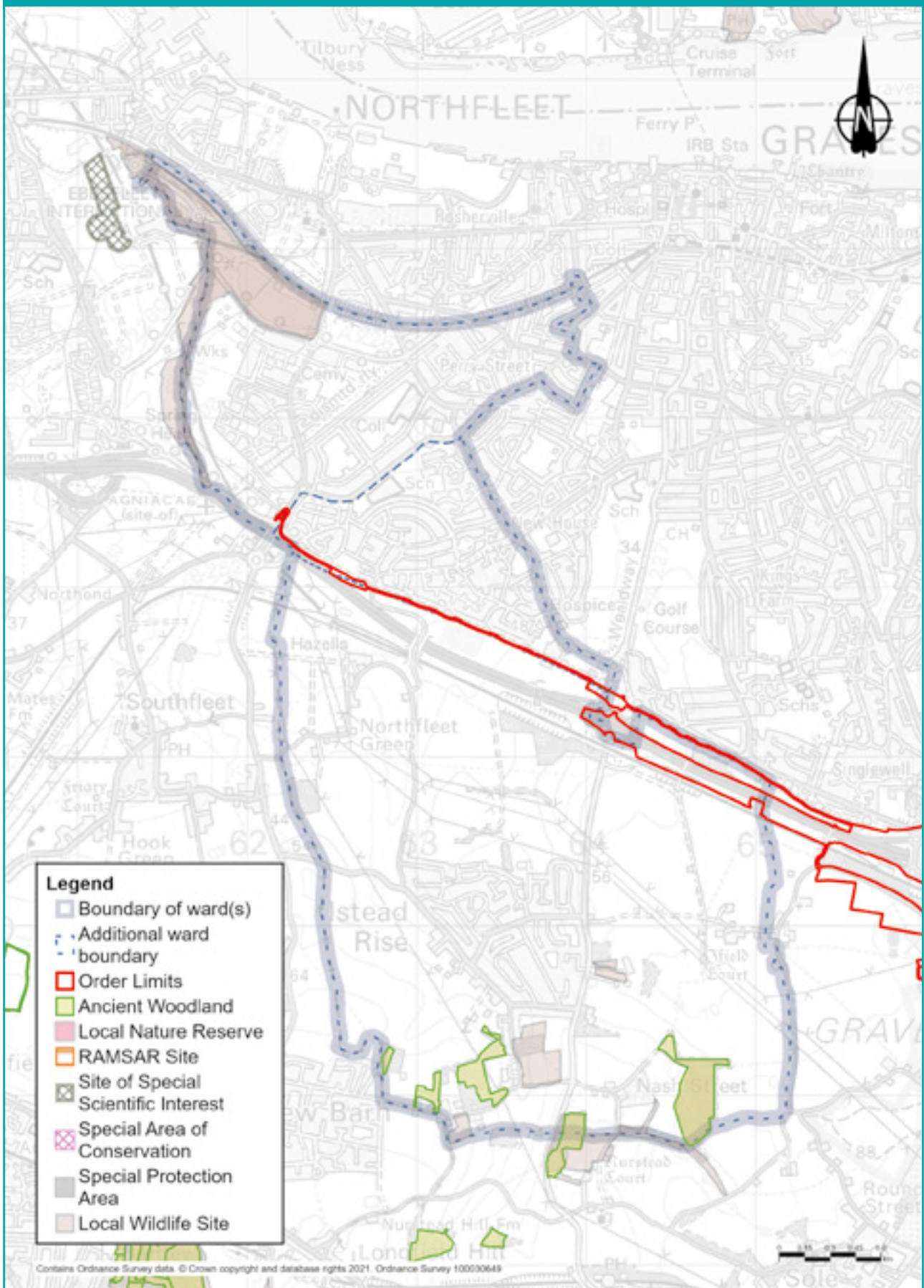
10.10.1 Construction

Construction impacts

Ebbsfleet Marshes LWS would not be directly affected by construction activity in Northfleet South. Removal of woodland and scrub habitat would be necessary for the construction of the utility diversion. Disturbance from construction traffic using the B262 is possible, but it is a busy road, so this is considered unlikely.

In Istead Rise and Painters Ash wards, landscape planting and grassland habitat would need to be removed, both temporarily and permanently, from the route alignment. This habitat supports a range of protected and notable species that would be impacted by construction through direct habitat loss (reptile habitat), and disturbance to retained habitat.

Figure 10.20: Designated and non-designated biodiversity sites in Northfleet South, Istead Rise and Painters Ash



Measures to reduce biodiversity impacts during construction

Vegetation clearance would take place during winter where possible, to avoid disturbing breeding birds. Where this is not practical, clearance would be supervised by an environmental clerk of works to ensure no nests are disturbed or destroyed. Where protected species are present, they would be moved away from the site before any construction activities take place, either through habitat manipulation (for example, strimming to reduce the height of vegetation and displace reptiles), or translocation. Any habitat lost for temporary construction would be reinstated after construction.

The impact of construction on biodiversity would be controlled through good practice measures set out in the CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

10.10.2 Operations

Operational impacts

Once the new road opens, it is unlikely to cause significant additional disturbance to species in Northfleet South, Istead Rise and Painters Ash beyond that from the existing A2.

Measures to reduce biodiversity impacts during operation

Newly created habitat, including that formed specifically to support animals moved from the construction area, would be managed to ensure that they provide high-quality habitat to support a broad range of different plant and animal species.

The impact of operation on biodiversity would be controlled through good practice measures set out in the CoCP and REAC. See chapter 1 of the Construction update for more information about this and the project's other control documents.

10.11 Built heritage

Existing situation

A scheduled monument has been identified in Northfleet South in relation to the project. No listed buildings are located in the ward that would be affected by the project.

Scheduled monuments – Northfleet South ward

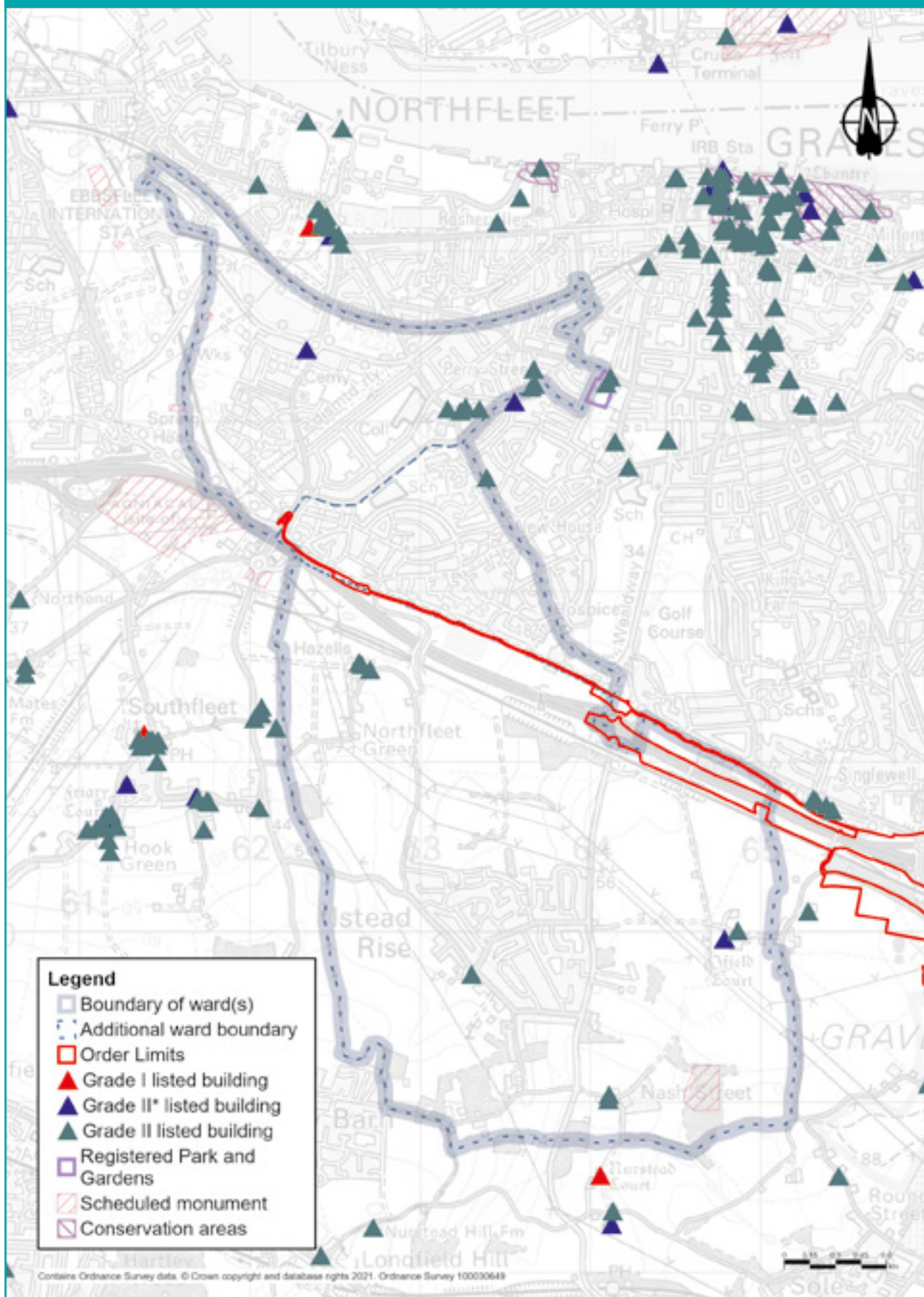
The Neolithic site near Ebbsfleet is a scheduled monument of high heritage value. The monument includes two prehistoric sites situated alongside the Ebbsfleet River, one in Northfleet South and the other in neighbouring Ebbsfleet ward to the west. Both sites are thought to have been riverside settlements and have produced finds of Neolithic pottery, stone tools and a buried land surface. The site in Northfleet South is around 1.2km to the northwest of the project, and would not be disturbed by it.

Scheduled monuments – Istead Rise ward

A scheduled monument and six listed buildings have been identified in Istead Rise in relation to the project. One of the listed buildings is Grade II* listed and the other five are Grade II listed.

The deserted medieval manorial settlement of Cossington is a scheduled monument of high heritage value. It is located west of Church Road, around 1.2km south of the project. The monument is the remains of a medieval settlement and survives only as earthworks. The remains include the platforms of at least six buildings enclosed by a bank and ditch, along with areas of former paddocks and fields. Documentary sources suggest the land was originally owned by the Ifield estate before being sold to the Cossington family in the late 13th or early 14th century. The settlement was well established by 1365, and is believed to be the site of Cossington Manor, bought in the 15th century by Edward IV.

Figure 10.21 Built heritage in Northfleet South, Istead Rise and Painters Ash wards



Grade II* listed buildings

- Ifield Court is a Grade II* listed building of high value located around 900 metres south of the A2 and the project. The building is a late 18th century house built onto a 15th century manor. Parts of the earlier manor house remain within the building. The house sits in its own gardens and includes outbuildings, farm buildings, an orchard and paddock land forming part of the former estate.
- Court Cottage
- Garden Cottage
- Tudor Cottage
- Hazells
- Hazells Farm Barn and attached oast
- Calf house or stable with granary above

No buildings of historical relevance have been identified in Painters Ash in relation to the project.

10.11.1 Construction

Construction impacts

Construction activities affecting these wards relate to utilities works along Roman Road. More information can be found in the Project description section above. No scheduled monuments or listed buildings would be affected physically or indirectly by the project's construction activities.

Measures to reduce the impacts during construction

Mitigation is not required as no built heritage would be affected by the project during construction.

10.11.2 Operations

Operational impacts

There are not anticipated to be any effects on built heritage in these wards once the road is open.

Measures to reduce the impacts during operation

Mitigation is not required as no built heritage would be affected by the project once operational.

10.12 Contamination

Existing situation

From a desk-based review of historical maps and environmental data, there are no known medium or high-risk sources of contamination that could be at risk of disturbance during construction or operation of the project within Northfleet South, Istead Rise and Painters Ash wards.

Construction

By following a construction management plan and ensuring that, where potential sources of contamination are used (such as oils, lubes, mechanical plant), that an appropriate spill containment and emergency response procedure is in place to prevent adverse environmental impacts.

Operation

When the road opens, should an incident occur, such as a traffic accident resulting in localised contamination, significantly affected soils would be assessed, and if necessary, removed to reduce the risk of contamination migrating across a wider area or entering controlled waters. For more information on these controls, see the REAC.

Chapter 11: Newtown, Stone Castle, Stone House, Bridge and Temple Hill wards

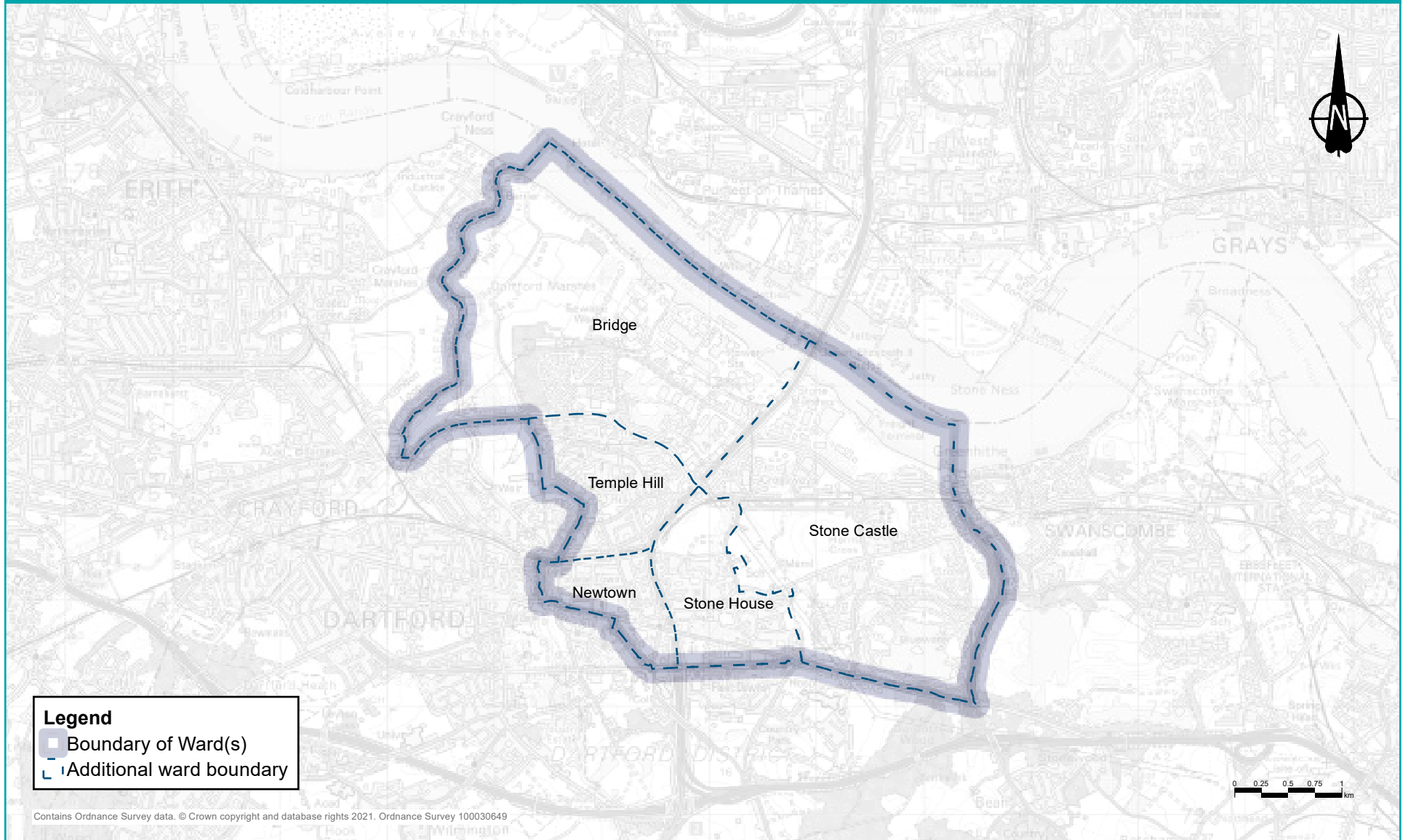
This chapter summarises the activities in Newtown, Stone Castle, Stone House, Bridge and Temple Hill wards relating to the project's construction and operational phase (when the new road is open). These wards comprise the area of Dartford closest to the Dartford Crossing, where the project is likely to have substantial impacts due to changes in traffic flow. The activities within, and impacts on, these five wards are presented together in one chapter because they are all affected by the project in similar ways due to their proximity to the Dartford Crossing.

These wards do not include any elements of the project's construction or operation and have been included in our Ward impact summaries because they would experience impacts due to changes in traffic flows at the Dartford Crossing that are a result of the implementation of the Lower Thames Crossing. We predict a reduction in traffic flow at the Dartford Crossing of 21% in 2029, the project's opening year, which would have an impact on journey times, noise and air quality in these wards. The reduction in traffic at the Dartford Crossing is one of the key objectives of the project.

For more information about the assessments in this chapter and other information available during this consultation, see chapter 1, which also includes a map showing all the wards described in this document.

Within this document, we sometimes advise where additional information can be found in other consultation documents, including the Construction update, Operations update, You said, we did, Register of Environmental Actions and Commitments (REAC), Code of Construction Practice (CoCP), Outline Traffic Management Plan for Construction (OTMPfC) and Design principles. To find out more about these documents, see chapter 1. References to these documents provide an indication as to how our proposals to reduce the project's impacts will be secured within our application for development consent.

Figure 11.1: Ward boundary map for Newtown, Stone Castle, Stone House, Bridge and Temple Hill wards



11.1 Overview

11.1.1 About these wards

The five wards of Newtown, Stone Castle, Stone House, Bridge and Temple Hill are in Dartford, which is located to the west of the project. The district of Dartford has an area of around 72km² and a population of 112,606¹. The A282 runs north-south through the area, carrying traffic from the M25 over the Dartford Crossing. The Dartford Crossing comprises tunnels flowing northbound and the Queen Elizabeth Bridge southbound. The crossing is prone to congestion, especially during peak periods, and congestion can spill out into local roads in Dartford as rat-running traffic tries to avoid delays. There are train stations at Dartford and Stone Crossing within these wards.

¹ Office for National Statistics, 2018 ward-level population estimate

11.1.2 Summary of impacts

Table 11.1: Summary of impacts during the project's construction and operation

Topic	Construction	Operations
Traffic	There would be no discernible impact on the performance of the highway network during construction and therefore no mitigation is required.	<p>Impact</p> <p>There would be substantial decrease in traffic flows on the A2 and A282. In these wards, there would be little change in traffic flows on the local road network, and a small increase along Bob Dunn Way. More information about the impacts on traffic flows once the road is open can be found in the Traffic section of this chapter.</p> <p>Mitigation</p> <p>None required.</p>
Public transport	<p>Buses</p> <p>There would be no impacts on buses during construction.</p> <p>Rail</p> <p>There would no impacts on rail services or access times to stations.</p>	<p>Buses</p> <p>In addition, it is not predicted that there would be changes to bus routes once the road opens. Three bus routes are predicted to experience a reduction in journey times: the 700, X80 and Fastrack A.</p> <p>Rail</p> <p>There would be no discernible change in local access times to local stations and no change to the rail services at those stations when the road is open.</p>
Footpaths, bridleways and cycle routes	No footpaths, bridleways or cycle routes would be affected during construction in these wards. For other potential impacts, see the other sections in this chapter, such as Visual and Noise and vibration.	No footpaths, bridleways or cycle routes would be affected in these wards when the road opens. For other potential impacts, see the other sections in this chapter, such as Visual and Noise and vibration.
Visual	There would be no visible effects in these wards.	

Topic	Construction	Operations
Noise and vibration	<p>Impact</p> <p>There would be negligible changes in road traffic noise during all construction years.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impact</p> <p>Once the road is open, changes in road traffic noise are predicted to range from minor decreases to minor increases in noise levels.</p> <p>Mitigation</p> <p>None required.</p>
Air quality	<p>Impact</p> <p>Our analysis of construction traffic along the A282 corridor predicts that the air quality impact on all roads in these wards would be negligible.</p> <p>Mitigation</p> <p>None required.</p>	<p>Impact</p> <p>If the road is not built, it is predicted the air quality thresholds would be exceeded in this area. However, with the project in place, our modelling predicts that the air quality thresholds for NO₂ in these wards would not be exceeded.</p> <p>Mitigation</p> <p>None required.</p>
Health	<p>Impact</p> <p>The construction phase of the project would present opportunities to access work and training.</p> <p>Mitigation</p> <p>None required</p>	<p>Impact</p> <p>Positive health outcomes are expected in this ward as a result of:</p> <ul style="list-style-type: none"> ▪ reductions in noise ▪ improvements in air quality ▪ reduction in congestion and stationary traffic at and around the Dartford Crossing ▪ improved connectivity and accessibility <p>Mitigation</p> <p>None required</p>
Biodiversity	<p>These wards are over 5km from the Order Limits. There are no ecological features in these wards, or any construction or operational impacts.</p>	
Built heritage	<p>No buildings of historic relevance have been identified within the Dartford wards that would be affected by the road during its construction or when it opens.</p>	
Contamination	<p>There are no known medium or high-risk sources of contamination within these wards that could be at risk of being disturbed during construction of the new road.</p>	

11.2 Project description

These wards do not include any elements of the project's construction or operation and have been included in our Ward impact summaries because they would experience impacts due to changes in traffic flows at the Dartford Crossing that are a result of the opening of the Lower Thames Crossing. We predict a reduction in traffic flow at the Dartford Crossing of 21% in 2029, the project's opening year, which would have an impact on journey times, noise and air quality in this ward. The reduction in traffic at the Dartford Crossing is one of the main objectives of the project.

11.3 Traffic

We carried out traffic assessments to understand how construction and operation would affect nearby roads, compared with the situation if the project was not implemented. Information about how we carried out these assessments can be found in chapter 4 of the Operations update.

11.3.1 Construction

Construction impacts

There would be no works, traffic management or construction routes in Newtown, Stone Castle, Stone House, Bridge or Temple Hill wards. There would be no discernible impact on the performance of the highway network in these wards during construction.

11.3.2 Operations

Operational impacts

The project's primary purpose is to relieve congestion at the Dartford Crossing and on its approach roads by providing a new, free-flowing north-south crossing over the River Thames. It would also make Thames crossings, and key sections of the strategic road network, safer and more resilient.

Traffic modelling has been carried out to predict the change in traffic flows on roads in the area, including those within or on the boundary of Dartford for the first year of operation, 2029.

Figures 11.2, 11.4 and 11.6 show the predicted changes in traffic in the morning peak (7am to 8am), interpeak (an average hour between 9am and 3pm) and evening peak (5pm to 6pm) measured in Passenger Car Units (PCUs per hour), where 1 PCU is equivalent to a car, and 2.5 PCUs is equivalent to an HGV. Figures 11.3, 11.5 and 11.7 show the predicted percentage changes in traffic flow during the morning, interpeak and evening peak. For information about how we assessed operational traffic impacts, see chapter 1. For more information about how we carried out our traffic modelling, see chapter 4 of the Operations update.

In these wards, there would be a large decrease in flows on the A2 and A282, and a small increase along Bob Dunn Way.

Over the Dartford Crossing, there would be a reduction in traffic northbound of more than 1,000 PCUs an hour in the morning peak hour and an average interpeak hour. This is a reduction of between 10% and 20% in the morning peak hour, and between 20% and 40% in an average interpeak hour. There would be a reduction in flows of between 500 and 1,000 PCUs in the evening peak hour, a decrease of between 10% and 20%. Southbound, there would be a decrease of over 1,000 PCUs an hour during all modelled periods. This is a reduction of between 10% and 20% in the morning peak hour, and between 20% and 40% in an average interpeak hour and the evening peak hour.

On the A282 on the approach to the Dartford Crossing, between the junction with Princes Road and the junction with Bob Dunn Way and Cotton Lane (junction 1a), there would be a substantial decrease in traffic flows on over 1,000 PCUs in all the modelled hours and in both directions. In the morning and evening peak hours in each direction, this is a decrease of between 10% and 20%. In an average interpeak hour, this is a reduction in traffic flows by between 20% and 40%. Transferring some of the traffic that was using the Dartford Crossing to the Lower Thames Crossing frees up capacity at Dartford. Some of this would be filled up by other trips, as those who previously stayed one side of the River Thames travel to destinations on the other side. This would result in additional traffic on some roads leading to the Dartford Crossing. Bob Dunn Way lies to the east of the Dartford Crossing and leads to the A282. There would be an increase in traffic here between 250 and 500 PCUs, an increase of between 20% and 40% in traffic flows westbound in the morning peak hour. In all other modelled time periods westbound, and in all modelled time periods eastbound, there would be an increase on traffic flows of between 50 and 250 PCUs, an increase of between 0% and 10%.

Figure 11.2: Predicted change in traffic flows (PCUs) with the project during the morning peak in 2029

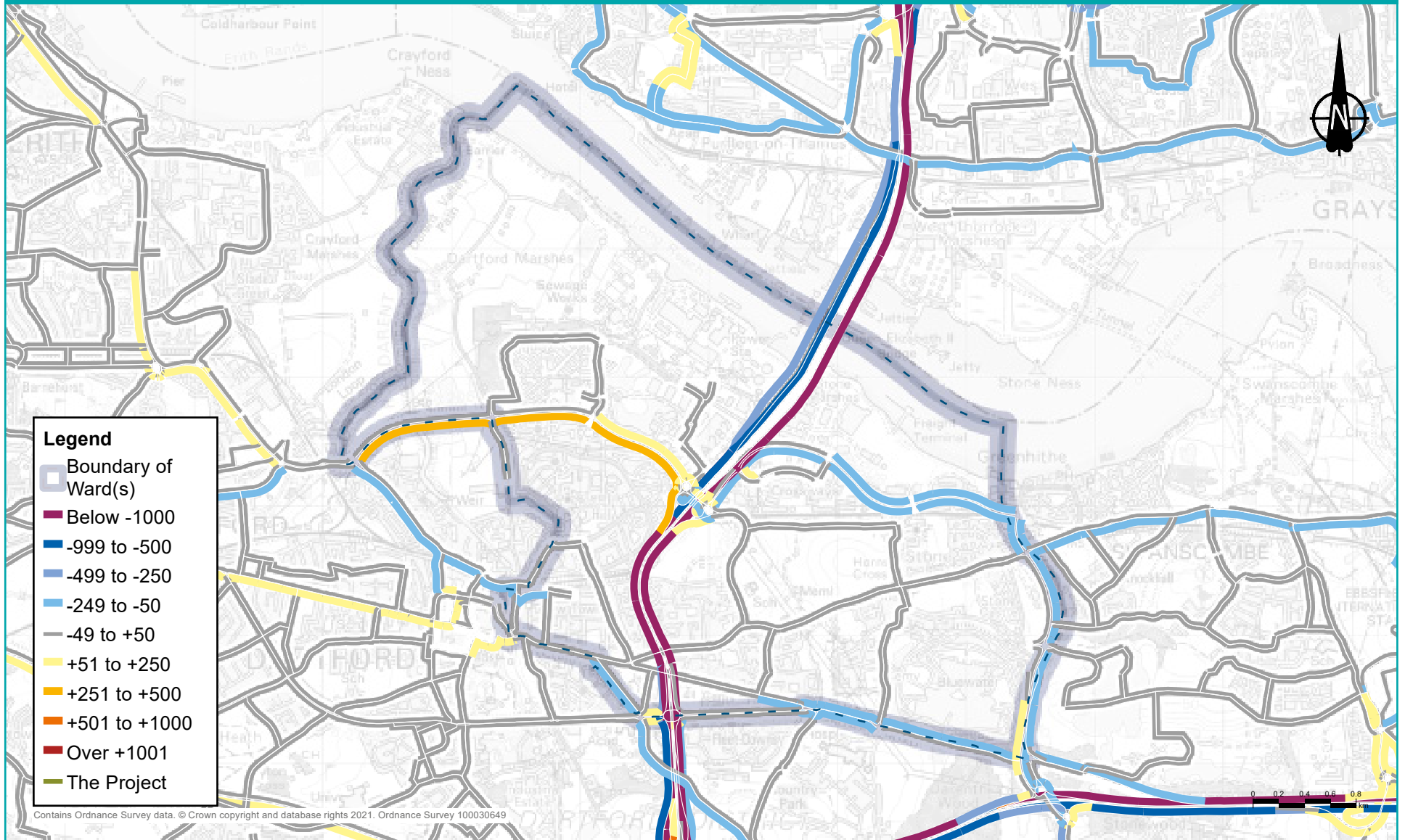


Figure 11.3: Predicted percentage change in traffic flows with the project during the morning peak in 2029

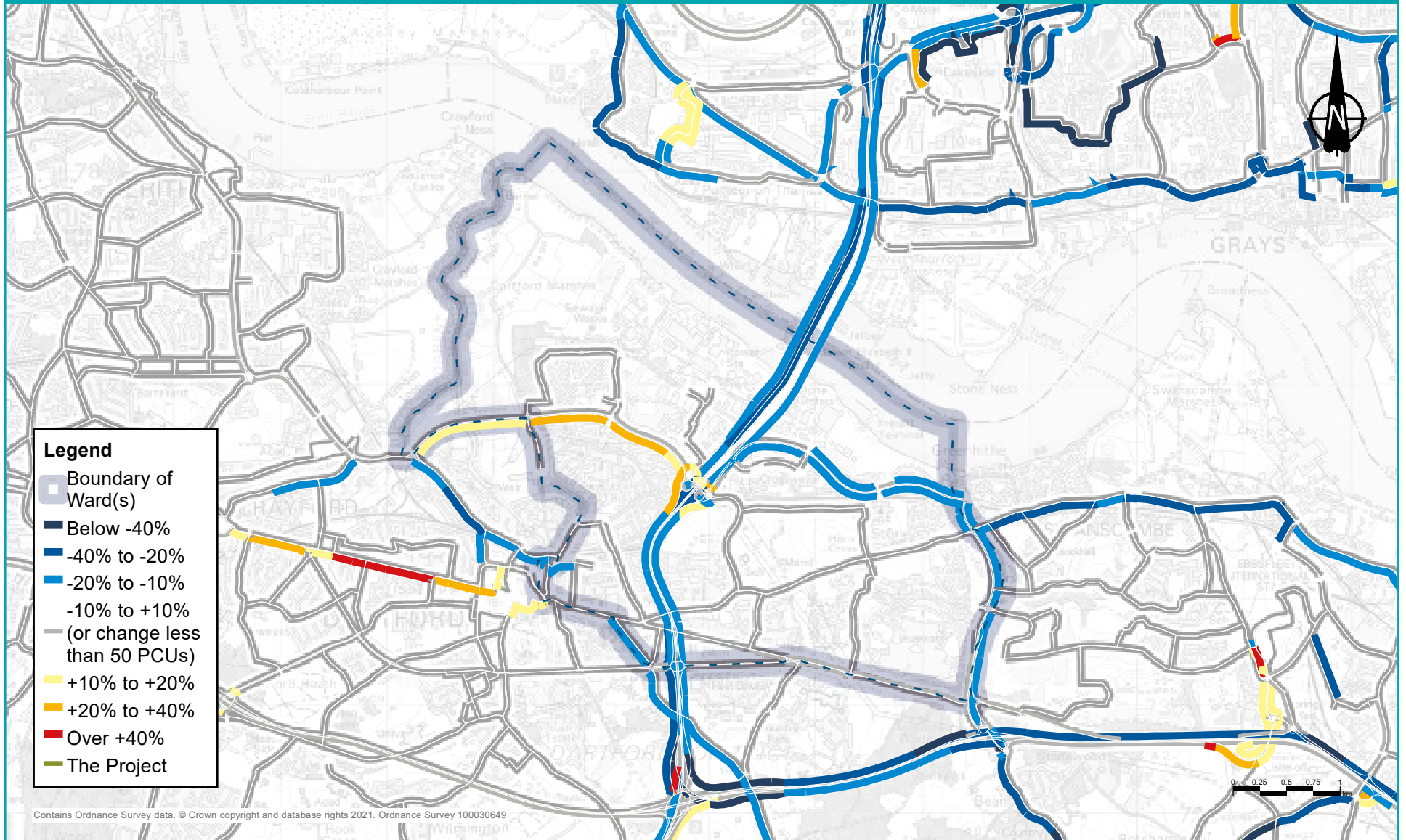


Figure 11.4: Predicted change in traffic flows (PCUs) with the project during the interpeak period in 2029

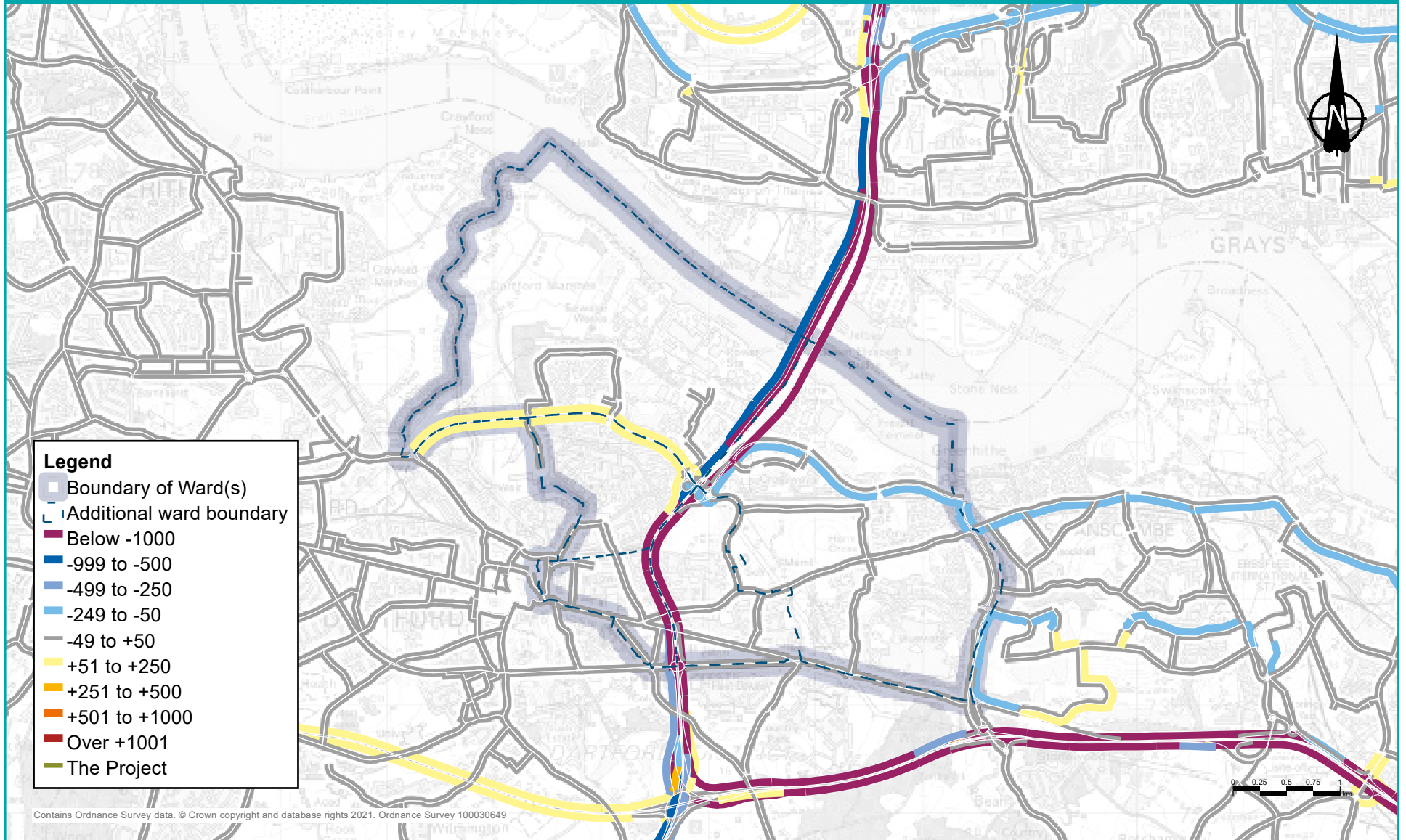


Figure 11.5: Predicted percentage change in traffic flows with the project during the interpeak period in 2029

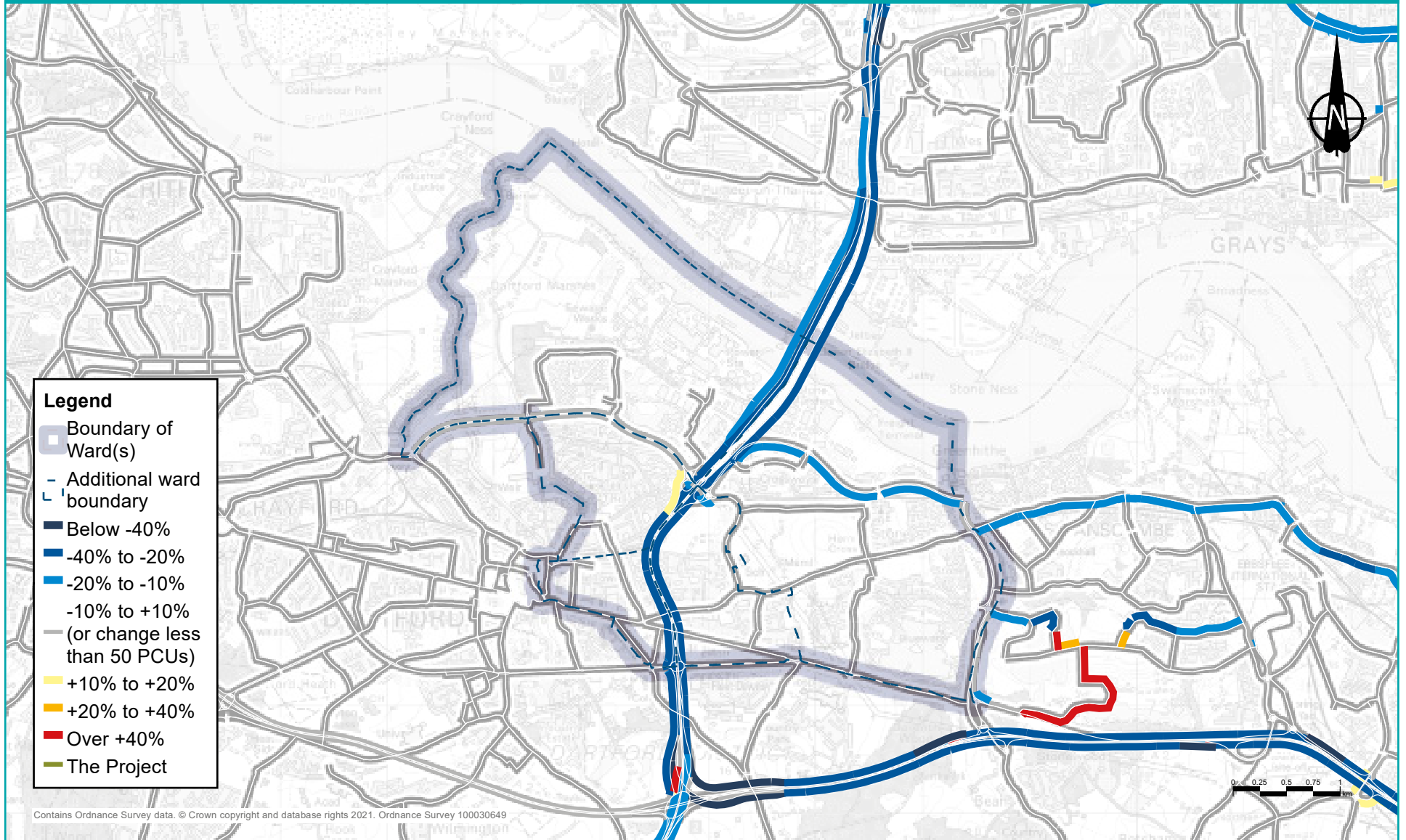


Figure 11.6: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

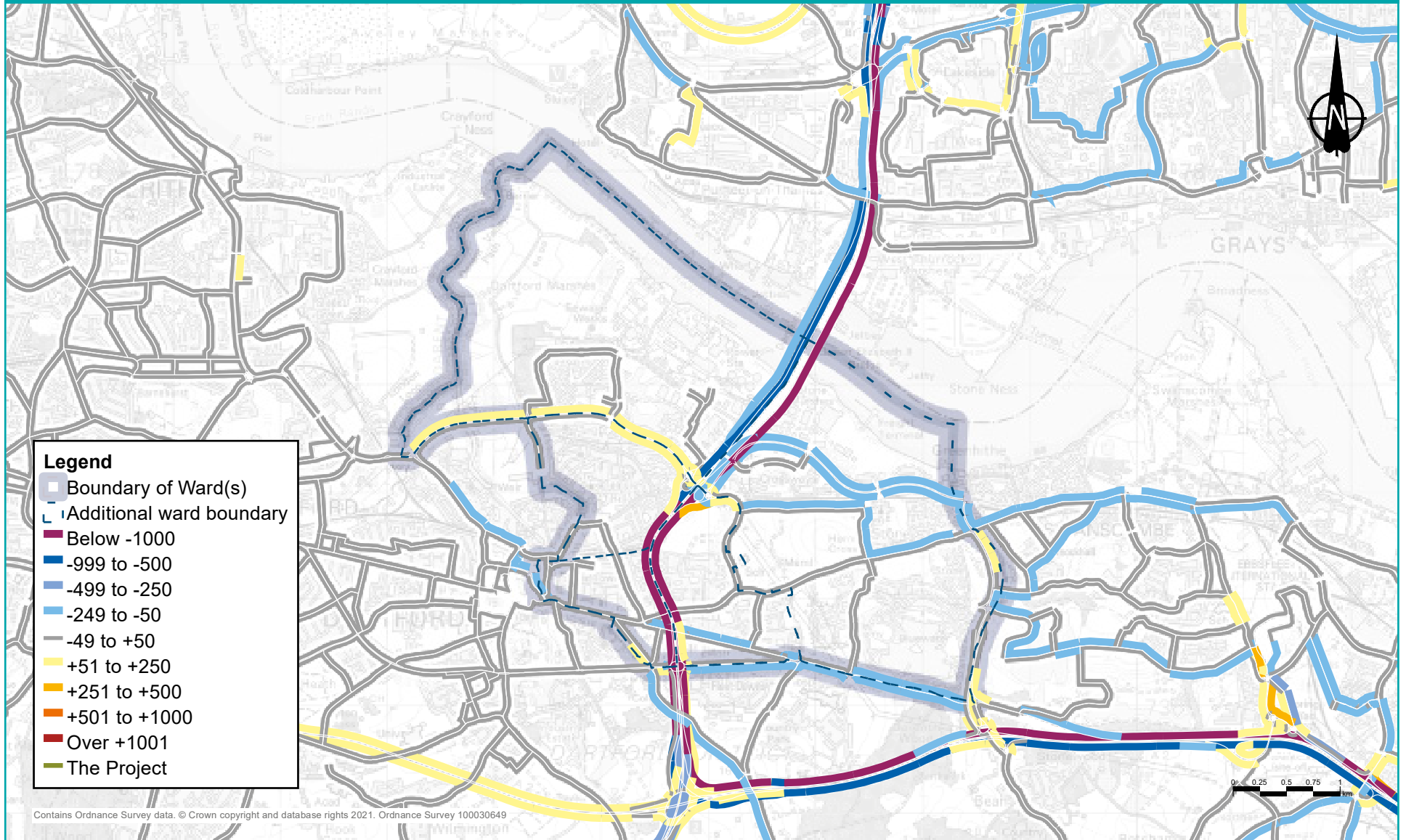
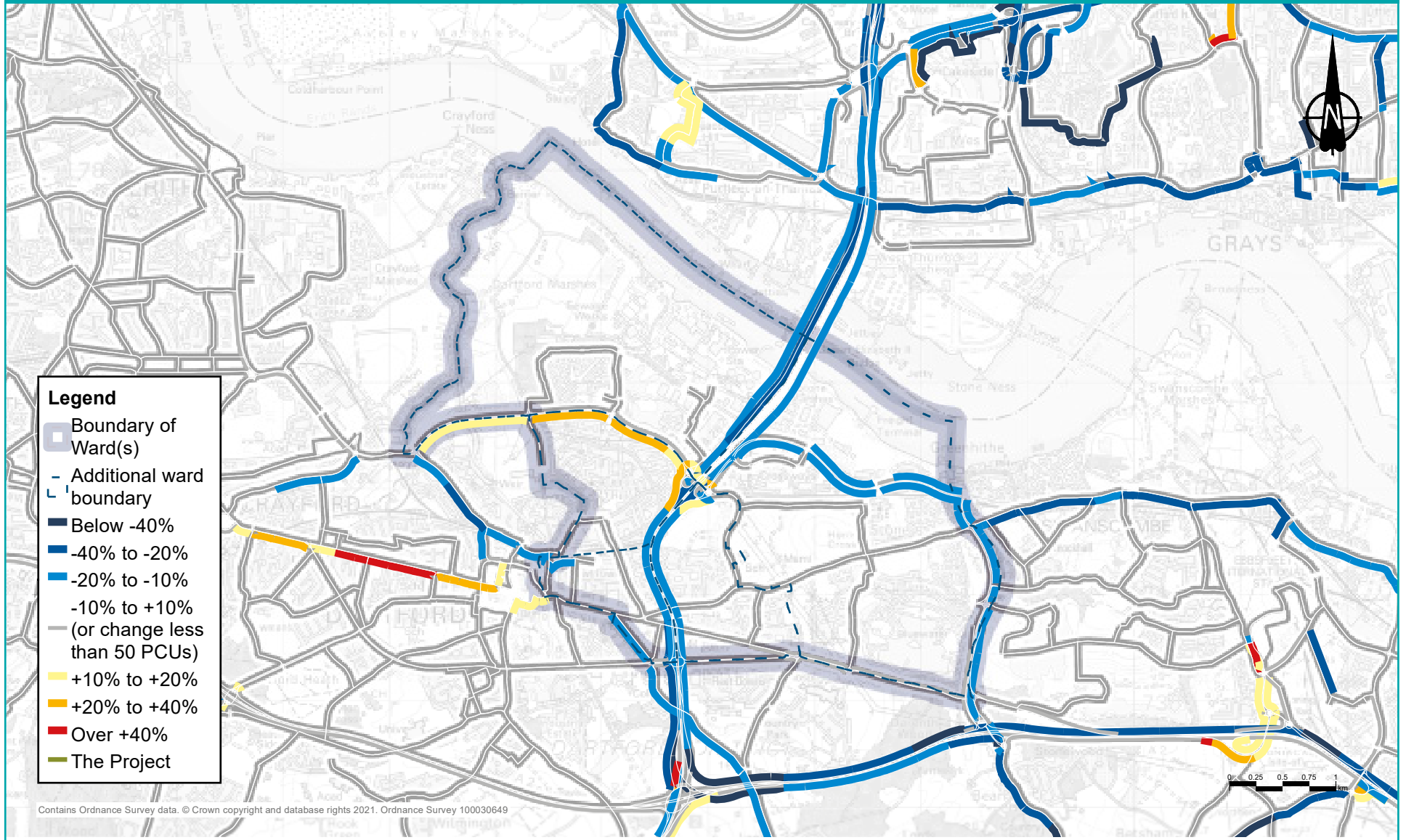


Figure 11.7: Predicted percentage change in traffic flows with the project during the evening peak in 2029



Changes to journey times

Figure 11.8 shows the change in the area that could be reached within a 30-minute drive of the centre of the wards without the new road and with it. Figure 11.9 shows the change in areas within a 60-minute drive. The drive times have been calculated for the morning peak hour (7am to 8am). The number of jobs within a 30-minute drive would increase by 20%, an increase of 134,300 jobs, and within a 60-minute drive would increase by 2%, an additional 86,000 jobs.

Figure 11.8: Change in area that motorists could drive to within 30 minutes from the Dartford area

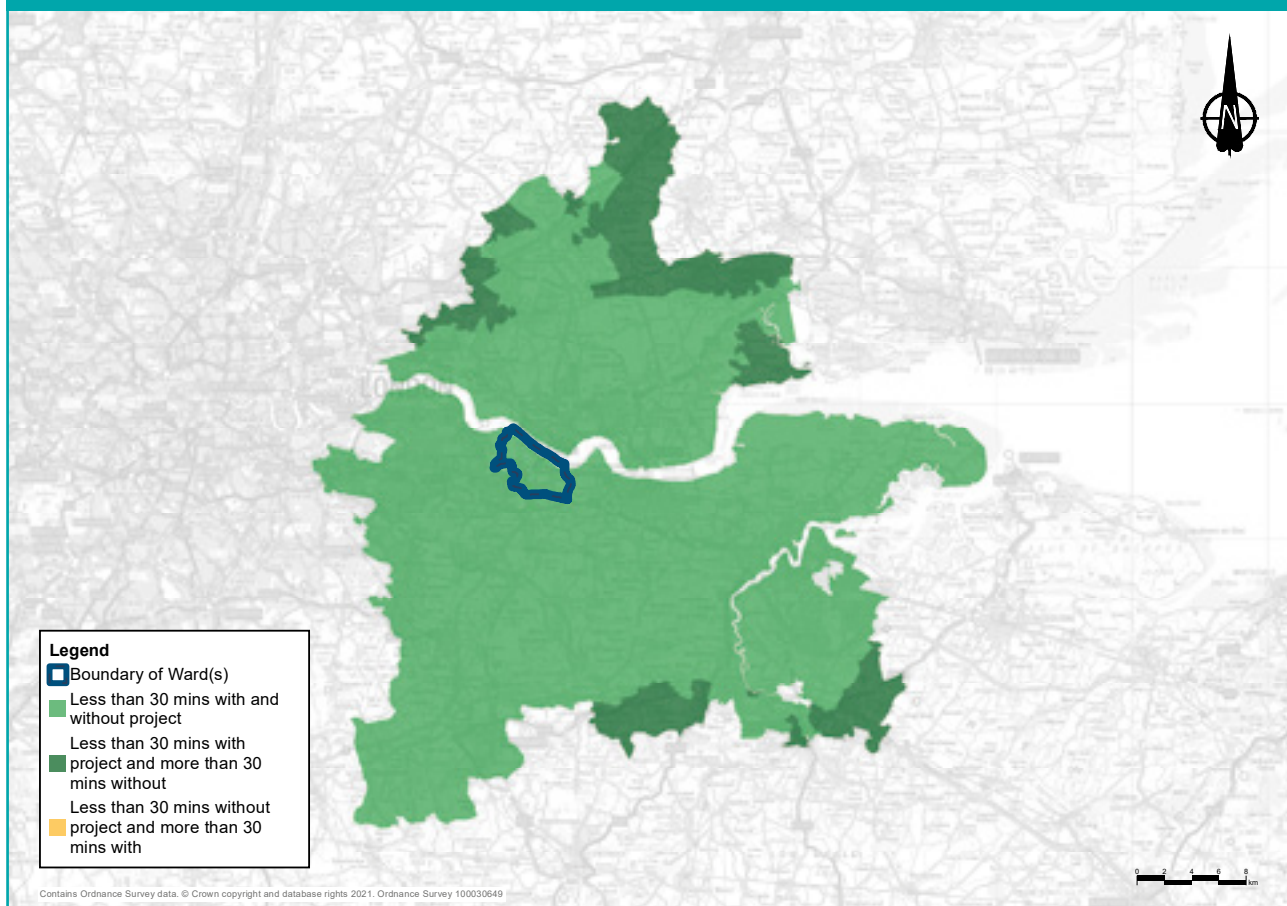
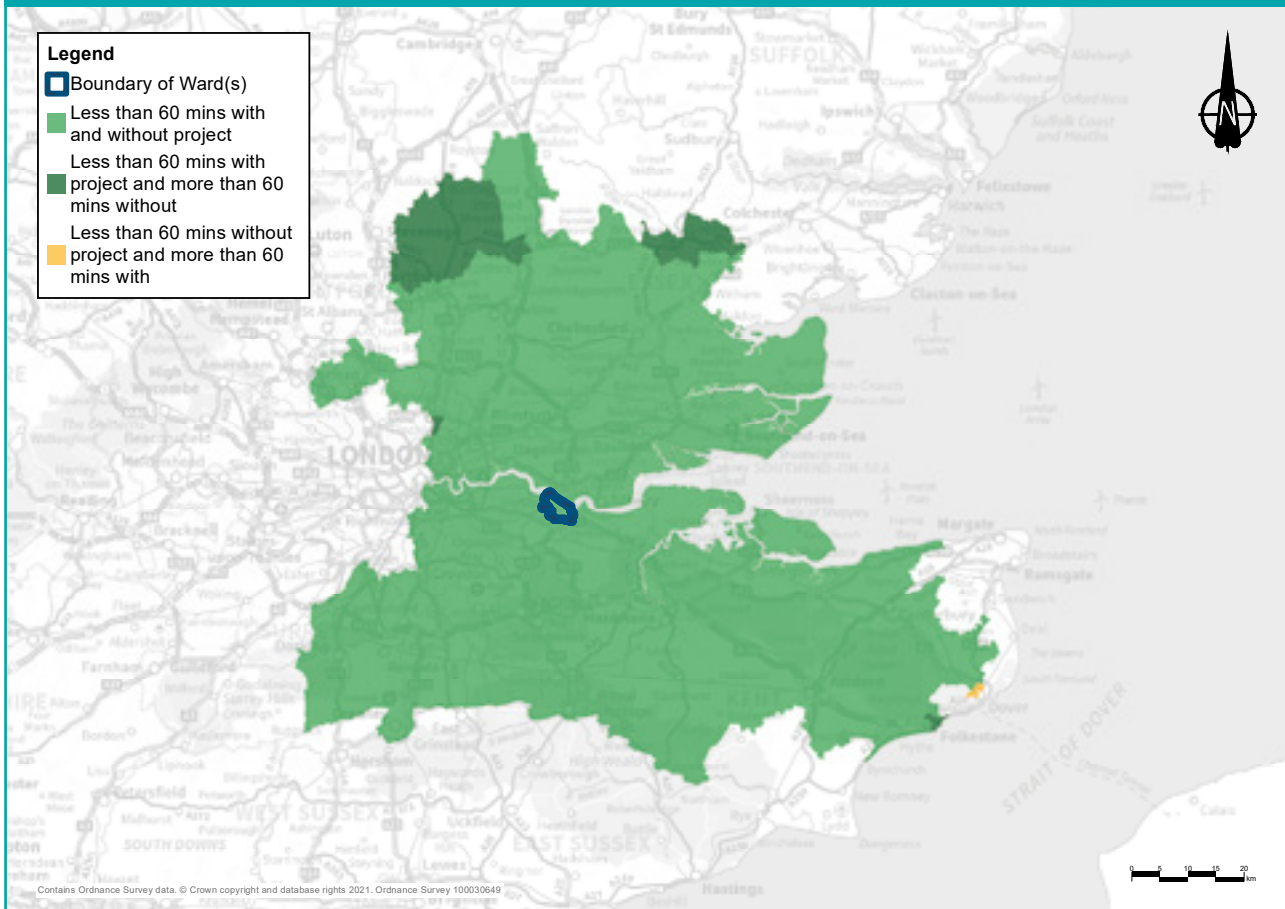


Figure 11.9: Change in area that motorists could drive to within 60 minutes from Dartford area



Despite the project providing a substantial net gain in access for motorists within the wards, there is a small area (shown in orange in figure 11.9) that would no longer be accessible by car within 60 minutes because of changes to traffic flows on the wider road network.

Operational traffic flows

No mitigation required.

11.4 Public transport

Existing situation

The Dartford area is served by Dartford and Stone Crossing railway stations, both of which are used by Southeastern services from Kent to London, and Thameslink services, which run from Kent across Greater London to destinations including St Albans, Luton and Bedford.

There are numerous buses serving the area, including the 228, 3, 34, 414, 423, 428, 429, 433, 474, 475, 477, 480, 481, 484, 485A, 490, 492, 96, D2, Dart1, Dart2, Dart3, Fastrack A, Fastrack B, S1, 483 and the X80.

11.4.1 Construction

There are no anticipated impacts on public transport associated with the construction of the project in these wards.

11.4.2 Operations

Rail

There would be no discernible change in local access times to Dartford or Stone Crossing stations, and no change to the rail services at those stations when the road is open.

Buses

No changes to bus routes would be required in these wards once the road opens. There are two bus routes that would experience a small change in journey times: the 700 and Fastrack A. The 700 from Bluewater to Strood, Rochester and Chatham Waterfront would experience a quicker journey by just over a minute throughout the day, and Fastrack A services would be slightly quicker in the evening peak hour eastbound.

The main change in bus journey times would be for the hourly X80 service that runs from Bluewater, over the Dartford Crossing, to Lakeside and Chafford Hundred station. There would be a reduction in journey time of around five minutes during all modelled periods for the northbound route and around three to four minutes in the peak hours southbound.

11.5 Footpaths, bridleways and cycle routes

No footpaths, bridleways or cycle routes would be affected during construction or operation of the new road in these wards.

11.6 Visual

There are no views of the land on which the project would be built from any of these five wards in Dartford. So there would be no visual effects experienced during construction or operation.

11.7 Noise and vibration

We have carried out noise and vibration assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out below are based on earlier versions of the project. The information provided still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

The existing noise environment in Dartford wards is mainly characterised by traffic noise, with a contribution from railway noise and human activity. The main sources of road traffic noise within these wards are from the M25, A13, A282, A126, A226, A206 and A296.

As part of our environmental assessment process, we carried out surveys of existing background noise at two locations in these wards, which were agreed with the local authority. We recorded average existing noise levels at these locations in the range of 57 to 58 dB(A)² during the day.

To understand how noise levels would vary with and without the project, we used noise modelling to predict what noise levels would be like in the project's proposed opening year if the project was not built. We modelled this because we cannot assume that noise levels when the road opens would be the same as they are now. For example, our assessment of the opening year noise levels takes into account predicted changes in traffic levels.

We also modelled the predicted noise levels for the opening year with the project in place. This provides a useful comparison as to how the new road would change the noise levels in its opening year if the project was to go ahead.

2 Decibel (dB) is the unit used to measure noise levels, with dB(A) being a standardised way of averaging noise levels that accounts for how humans hear sounds. The typical level of sounds in the environment ranges from 30 dB(A), which is a quiet night-time level in a bedroom, to 90 dB(A), which is how it would sound by a busy road. See chapter 1 for more information about what decibel levels mean.

In the opening year, noise levels without the project are predicted to range, on average, from 48 to 79dB(A) during the day and from 36 to 69dB(A) during the night at the identified locations within the wards. So our noise assessments predict that by opening year, noise levels would increase compared with the existing situation even if the road is not built. Information about noise levels during construction and operation are below.

11.7.1 Construction

Daytime construction noise impacts

No construction activities and construction routes are expected to make noise or vibration in these wards.

There are no main works compounds or Utility Logistics Hubs currently proposed to be located within the Dartford wards, nor are there any haul roads proposed.

Within these wards, there are no percussive or vibratory works proposed.

Construction traffic noise impacts

Maps showing the predicted changes in road traffic noise within these wards during each year of construction can be found in chapter 7 of the Construction update. Based on the currently available traffic data (which offers a representative picture of what receptors within these wards are likely to experience), during the construction period there would be negligible changes in road traffic noise (less than 1 dB change in noise levels) during all construction years.

Measures to reduce construction noise levels

As no construction noise and vibration impacts are expected, no specific mitigation measures would be required in these wards.

11.7.2 Operations

Operational impacts

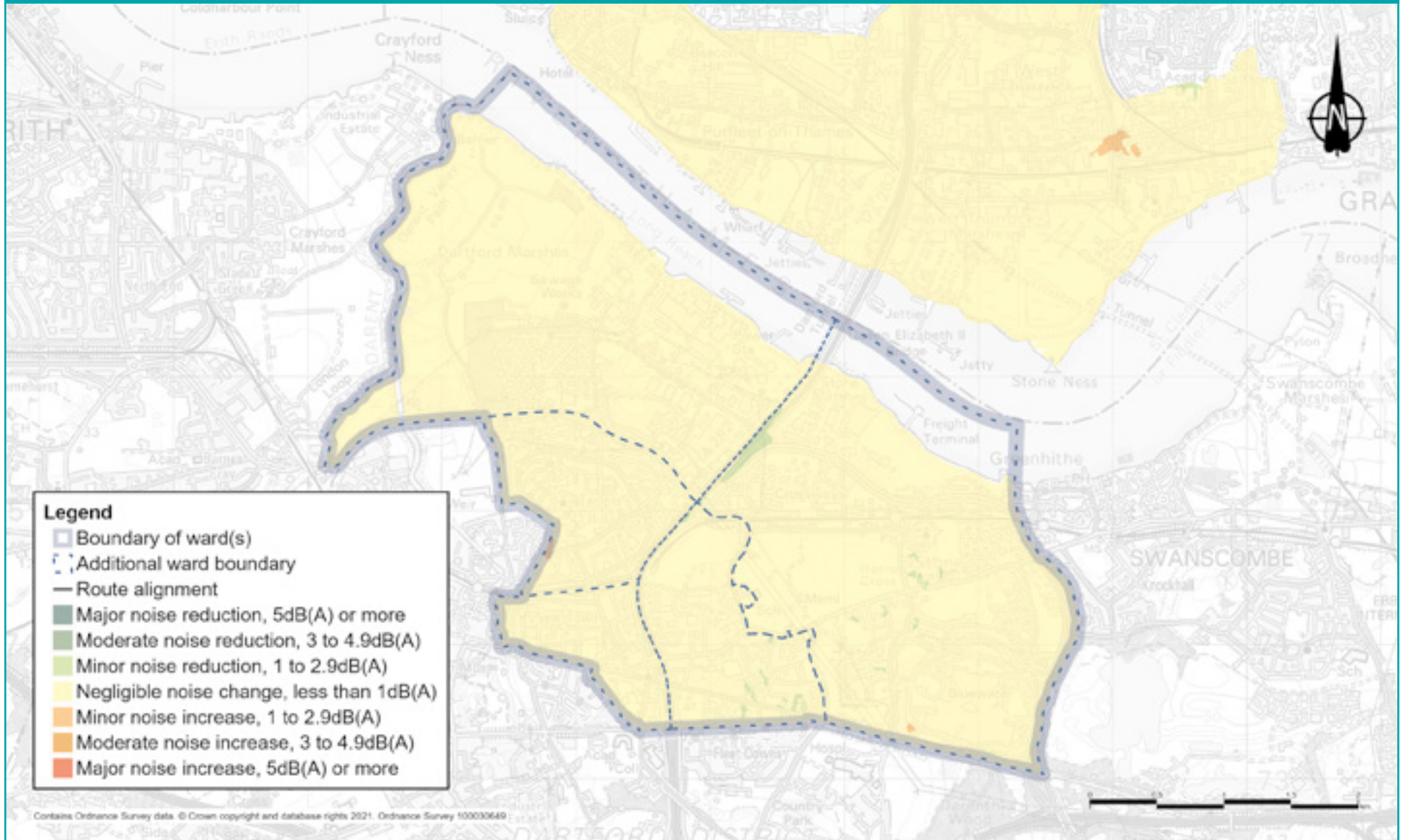
These Dartford wards are located approximately 8km to the west of the main project route and, as such, there would be no direct noise impacts from the project. Noise impacts within these wards would be as a result of changes in traffic flow, the number of HGVs, and traffic speeds on the existing road network in the wards.

Figure 11.10 below shows the predicted changes in traffic noise in the opening year of the road. Within these wards, changes in road traffic noise at identified noise sensitive locations (such as nearby properties) are predicted to range from minor decreases in noise levels of between 1.0 and 2.9 dB to a minor increase in noise levels of between 1.0 and 2.9 dB. For more information about how we define noise impacts (negligible, minor, moderate and major), see chapter 1.

Measures to reduce traffic noise and vibration during operation

There are no noise mitigation measures proposed in these wards because they are not adversely impacted by changes in traffic noise as a result of our project.

Figure 11.10 Noise impacts during operation in Dartford wards



11.8 Air quality

We have carried out air quality assessments for both the construction and operational phases of the project. As explained in chapter 1, some of the assessments set out here are based on earlier versions of the project. The information provided here still presents a reasonable representation of the likely effects from the proposals presented during this consultation.

Existing situation

Within Dartford wards, the A282 corridor, London Road and Dartford Town has been declared an Air Quality Management Area (AQMA) due to yearly levels of airborne pollution being above accepted standards. AQMAs are areas that have been identified by local authorities as areas of poor air quality that require additional monitoring and controls. No other areas within the wards have been identified as AQMA.

11.8.1 Construction

Construction impacts

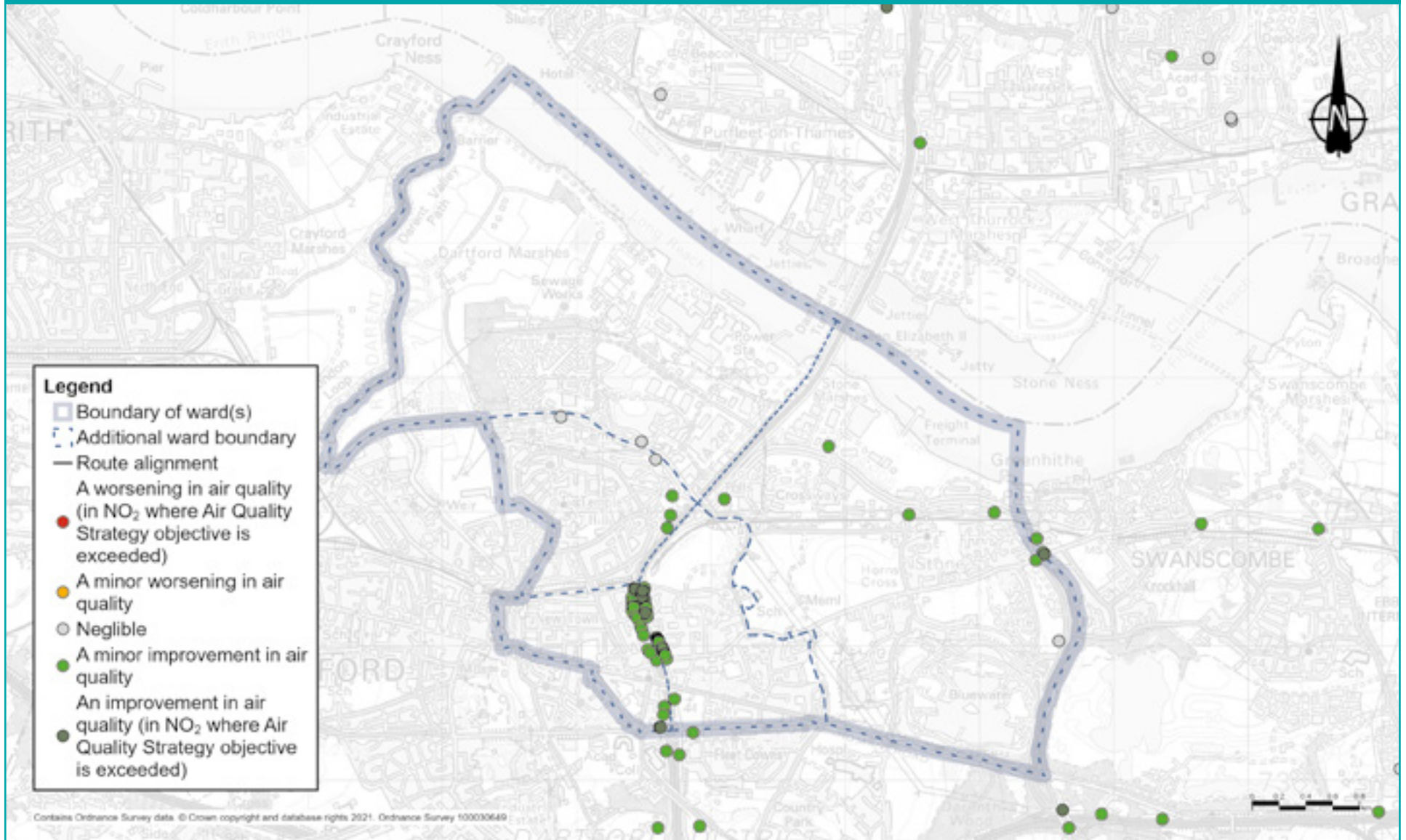
There are no construction activities in these wards, so there is no risk of airborne dust from the project affecting local people.

Our analysis of construction traffic (along the A282 corridor) predicts that the impact on all roads in these wards would be negligible. More information about construction traffic impacts on air quality can be found in chapter 7 of the Construction update.

Measures to reduce air quality impacts during construction

There are no air quality mitigation measures proposed in these wards because they are not adversely impacted by construction activities as a result of our project.

Figure 11.11: Predicted changes in NO₂ levels in the Dartford wards once the new road is open



11.8.2 Operations

Operational impacts

We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update.

At all locations within these wards, an improvement in air quality is predicted. There are receptors (properties or habitats that are sensitive to changes in air quality) within the Dartford wards of Newtown, Stone Castle, Stone House, Bridge and Temple Hill that are predicted to experience an improvement in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant³. The highest modelled yearly average NO₂ concentration within these wards with the new road in place is 39.0µg/m³, which is below the yearly average threshold of 40µg/m³. Without the new road being built, the modelled yearly average would be 43.6µg/m³, which would exceed the yearly average threshold.

Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

Measures to reduce air quality impacts during operation

The assessed air quality impacts in this area as a result of the project would be an improvement in air quality, so there would be no need for monitoring or other mitigation measures once the new road is open.

³ NO₂ levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

11.9 Health

Existing situation

A range of personal, social, economic and environmental factors influence our health. Different groups within the population may be more sensitive to these factors than others – for example, children, older people or those with pre-existing health conditions.

When compared with Dartford as a whole, the combined wards have:

- a higher proportion of people under the age of 16 (26% compared with 23.2% for Dartford)
- a lower proportion of residents aged 60 and over (13.4% and 18.9% respectively)
- a higher proportion of black residents (5.5% and 3.7% respectively)

According to the English Index of Multiple Deprivation, levels of deprivation across the area vary significantly. For example, areas found in Bridge and Stone Castle are in the top 20% most deprived in England, whereas another area in Stone Castle is in the 40% least deprived.

Economic activity rates are lower across the combined wards, when compared with Dartford as a whole. Home ownership rates are significantly lower across the combined wards, when compared with Dartford as a whole, with the remainder socially rented.

Around 83% of residents across the wards report their health to be very good or good (slightly lower than for Dartford as a whole). A slightly higher proportion of residents across the wards than Dartford as a whole report their day-to-day activities as limited a lot, or a little, as a result of long-term health problems or disability, when compared with Dartford as a whole.

Life expectancy at birth for residents across the wards averages 78.3 for men and 83.2 for women. When compared with UK average life expectancy recorded (2013 – 2017), rates are slightly lower for males and slightly higher for females, 79.1 and 82.3 respectively. Rates of deaths from all causes (these are causes where all or most deaths could potentially be prevented by public health interventions in the broadest sense) and respiratory diseases are lower across the wards when compared with Dartford as a whole. Conversely, deaths from coronary heart diseases and from all cancers are higher across the wards than is the case for Dartford as a whole.

11.9.1 Construction

Construction health impacts

There are no main construction works or activities that are expected to have a noise or vibration impact in these wards.

Other potential impacts are presented below:

- Journey times for buses using the Dartford Crossing would improve, improving accessibility for those who are more dependent on public transport and have less choice about how they travel and the route they take.
- Residents may experience positive health outcomes as a result of access to work and training opportunities presented by construction activities.
- Any increase in road traffic noise on the existing road network during construction is predicted to be less than 1 dB(A).
- There would be no views of construction activities from any of these five Dartford wards.
- There are no properties in these Dartford wards within 200 metres of the Order Limits (the area of land required to construct and operate the project, formerly known as the development boundary), so there is no risk of dust from the project's construction.

Measures to reduce construction health impacts

No essential mitigation specifically to address health outcomes has been identified within these wards over and above mitigation relating to noise and visual impacts described elsewhere.

11.9.2 Operations

Operational health impacts

Residents may experience positive outcomes in these Dartford wards:

- Some residents are likely to benefit from positive health benefits associated with reductions in noise.
- Reducing congestion and stationary traffic at and around the Dartford Crossing is expected to improve air quality and therefore be beneficial for local communities and improve the lives of local residents.

- We have carried out an assessment of the operational impacts of the new road on air quality. The assessment area includes a 200-metre buffer around the roads within the affected road network, with this area being the most likely to experience changes to air quality as a result of the new road. More information about air quality impacts once the road is open can be found in chapter 5 of the Operations update. At all locations within these wards, an improvement in air quality is predicted. There are receptors (properties or habitats that are sensitive to changes in air quality) within the Dartford wards of Newtown, Stone Castle, Stone House, Bridge and Temple Hill that are predicted to experience an improvement in the air quality for nitrogen dioxide (NO₂), the main traffic-related pollutant.
- Residents are predicted to benefit from changes in opportunity to access healthcare, shopping facilities, the town centre, open space, education and jobs.
- Dartford would benefit from improved connectivity and resilience across the wider road network, with reduced congestion at the Dartford Crossing.
- Positive mental health outcomes are anticipated.

Measures to reduce operational health impacts

No essential mitigation measures to address health outcomes have been identified within these wards apart from those relating to noise and visual impacts described elsewhere.

11.10 Biodiversity

These wards are over 5km from the Order Limits. There are no ecological features in these wards, or any construction or operational impacts.

11.11 Built heritage

No buildings of historic relevance have been identified within the Dartford wards that would be affected by the project during its construction or operation.

11.12 Contamination

There are no known medium or high-risk sources of contamination within these wards that could be at risk of being disturbed during construction of the project.

How to have your say

Please let us know your views on our community impacts consultation. All the information, including the response form, is available at www.highwaysengland.co.uk/ltcconsultation

The easiest way to comment is by filling out our online consultation response form, but you can submit a response by using any of the methods listed below. Please note, we cannot guarantee that responses sent to any other address will be considered. Responses will be accepted until 23.59 on 8 September 2021.

If you would like to comment on aspects of our proposals from earlier consultations, please use the 'Other comments' section on the response form.

Online

Fill in the survey at www.highwaysengland.co.uk/ltcconsultation

Post

Send your response form, or comments, to **FREEPOST
LTC CONSULTATION**

The Freepost address is the only text needed on the envelope, and you don't need a stamp.

Email

Send your comments to
LTC.CONSULTATION@TRAVERSE.LTD

Telephone surgery

You can book a call back from a member of the project team to discuss any questions or provide comments on the proposal.

From 14 July 2021, call us on **0300 123 5000** (weekdays between 9am and 5pm) to book an appointment

Home delivery

If you do not have access to the internet, from 14 July 2021 you can order printed copies of this guide to consultation, a feedback form and Freepost return envelope, maps and other documents.

Please call us on **0300 123 5000** to request a consultation pack.

These will be delivered free of charge – there is a limit of one pack per household.

Data privacy notice

We are committed to protecting your personal information.

Whenever you provide this information, we are legally obliged to use it in line with all applicable laws concerning the protection of personal data, including the General Data Protection Regulation (GDPR).

How will Highways England use the information we collect about you?

We will use your personal data collected via this consultation to:

- analyse your feedback to the consultation
- produce a summary report, based on our analysis of responses (individuals will not be identified in our Consultation Report)
- write to you with updates about the results of the consultation and other developments
- keep up-to-date records of our communications with individuals and organisations

Any personal information you include in this form will be available to, or used by:

- Highways England
- Traverse (an independent company we are using to analyse feedback to the consultation)
- the Planning Inspectorate (the Government agency that will consider our application for permission to build the Lower Thames Crossing)
- the Secretary of State for Transport (who will decide on our application)
- our legal advisers
- consultants working on the Lower Thames Crossing project

It is also possible that trusted third-party providers, for example construction companies, may later use your contact details to communicate with you about this project.

Under the terms of the GDPR, you have certain rights over how your personal data is retained and used by Highways England. For more information, see our full data privacy statement at www.highwaysengland.co.uk/our-work/lower-thames-crossing/privacy-notice/

Glossary

Term	Explanation
2029 Opening year	A modelled year in the LTC traffic model in which flows are estimated for each option
2044 Design year	A modelled year in the LTC traffic model. The design year is typically 15 years after opening - for LTC the design year is 2044.
AADT	Average Annual Daily Traffic
Affected Road Network	This comprises the area within which roads could be considered within the air quality model (selection of the roads within the model depends upon a number of criteria such as changes in Heavy Duty Vehicle flows).
Alignment	The alignment is the horizontal and vertical route of a road, defined as a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
AM	07:00 to 10:00
AOD	Above ordnance datum, vertical datum used by an ordnance survey as the basis for delivering altitudes on maps.
AONB	Area of Outstanding Natural Beauty: Statutory designation intended to conserve and enhance the ecology, natural heritage and landscape value of an area of countryside.
APTR	All-purpose trunk road
AQMA	Air Quality Management Area: an area, declared by a local authority, where air quality monitoring does not meet Defra's national air quality objectives.
AQSO	Air Quality Strategy Objective: Objective set by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland to improve air quality in the UK in the medium term. Objectives are focused on the main air pollutants to protect health.
BAT	Best Available Techniques used for controlling construction noise levels
Best Practicable Means	Practicable relates to local conditions, circumstances, the current knowledge and understanding of technical aspects with consideration to financial implications. The means to be employed ("Means") include the design, installation, maintenance, and manner and periods of operation of plant and machinery.
Bluewater	Bluewater Shopping Centre, an out of town shopping centre in Stone, Kent
Chart Datum	The level of water from which charted depths displayed on a nautical chart are measured.

Term	Explanation
CoCP	Code of Construction Practice - provides a framework to manage construction and operational activities so that environmental mitigation commitments are met.
Dart Charge	The Dartford Crossing free-flow electronic number plate recognition charging system (operates between 0600 and 2200).
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs: the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland.
Design principles	Guidance that underpins the design measures that integrate the new road into the local landscape and establishes parameters that must be met in the final design of the road.
DfT	Department for Transport: the government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.
Disbenefit	A disadvantage or loss resulting from something.
DMRB	Design Manual for Roads and Bridges: A comprehensive manual (comprising 15 volumes) which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (Highways England, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. The DMRB has been developed as a series of documents published by the Overseeing Organisations of England, Scotland, Wales and Northern Ireland. For the Lower Thames Crossing the Overseeing Organisation is Highways England.
EA	Environment Agency: The Environment Agency was established under the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England and Wales. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways.

Term	Explanation
Ecological Clerk of Works	This person(s) would provide advice about ecological and environmental issues during the construction period, monitor the work to ensure site-based construction activities are delivered in accordance with wildlife law and ensure that any necessary permits or licensing is acquired.
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESL – Eastern Southern Link	The Eastern Southern Link (ESL) is an alternative for shortlist Routes 2, 3 and 4 to the south of the River Thames. The route would connect into Junction 1 of the M2 and would pass to the east of Shorne and then northwest towards Church Lane and Lower Higham Road. This route could connect into any of the Routes 2, 3 and 4 north of the river utilising all of the crossing options for these route options.
Fastrack	A bus rapid transit scheme operating in the Thames Gateway area of Kent, operated by Arriva Southern Counties.
FCTP	Framework Construction Travel Plan - sets out a framework to reduce the impact of the project's construction workforce on the road network as a result of travel to and from construction areas and compounds.
GHG	Greenhouse gas emissions are emissions of greenhouse gases that cause climate change by creating a greenhouse effect in the earth's atmosphere.
GIS	Geographic information system: an integrated collection of computer software and data used to view and manage information about geographic places, analyse spatial relationships, and model spatial processes.
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment: A tool developed by the European Commission to help competent authorities (as defined in the Habitats Regulations) to carry out assessment to ensure that a project, plan or policy will not have an adverse effect on the integrity of any Natura 2000 or European sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites), (either in isolation or in combination with other plans and projects), and to begin to identify appropriate mitigation strategies where such effects were identified.
HS1	High Speed 1 rail line (formerly Channel Tunnel Rail Link (CTRL))
Inter-peak	10:00 to 16:00

Term	Explanation
Jacked box tunnelling	Jacked box tunnelling is a method of construction that enables engineers to create underground space at shallow depth in a manner that avoids disruption of valuable infrastructure and reduces impact on the human environment.
Lakeside	Lakeside Shopping Centre, branded as Intu Lakeside, is a large out-of-town shopping centre located in West Thurrock, in the borough of Thurrock, Essex just beyond the eastern boundary of Greater London.
Location A	The location for LTC route options close to the existing Dartford crossing.
Location C	The location for LTC route options connecting the A2/ M2 east of Gravesend with the A13 and M25 (between Junctions 29 and 30) north of the River Thames.
London Gateway	A new deep-water port, able to handle the biggest container ships in the world, and part the London Gateway development on the north bank of the River Thames in Thurrock, Essex, 20 miles (32 km) east of central London.
London Resort	A proposed theme park and entertainment precinct on the Swanscombe peninsula, Kent, being developed by London Resort Company Holdings. Construction could begin in 2022 with the opening estimated for 2024.
LTC	Lower Thames Crossing: a proposed new crossing of the Thames estuary linking the county of Kent with the county of Essex, at or east of the existing Dartford Crossing.
LWS	Local wildlife site
Mainline	The through carriageway of a road as opposed to a slip road or a link road at a junction Mardyke A small river, mainly in Thurrock, that flows into the River Thames at Purfleet, close to the QEII Bridge.
NCR	National Cycle Route: a cycle route part of the National Cycle Network created by Sustrans to encourage cycling throughout Britain.
NMU	Non-motorised user, e.g. pedestrians, cyclists, equestrians.
NO₂	Nitrogen dioxide.
NPSNN	National Policy Statement for National Networks: The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.

Term	Explanation
NSIP	Nationally significant infrastructure project: major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc.
OLEMP	Outline Landscape and Ecology Management Plan - sets out the management regimes, management expectations and monitoring requirements for parcels of land that perform specific landscape and ecological mitigation functions for the project, such as habitat creation or visual screening.
oMHP	Outline Materials Handling Plan - sets out the approach and high-level principles for handling construction materials and waste.
ONS	Office for National Statistics: the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to the UK Parliament.
oSWMP	Outline Site Waste Management Plan - sets out the overarching principles and procedures that would be applied for the management of waste during the construction of the project.
oTMPfc	Outline Traffic Management Plan for construction - outlines the approach to carrying out temporary traffic management for the safe construction of the project and the management measures to reduce the impact on local communities.
pcu	passenger car units. This is a metric to allow different vehicle types within traffic flows in a traffic model to be assessed in a consistent manner. Typical pcu factors are: 1 for a car or light goods vehicle; 2 for a bus or heavy goods vehicle; 0.4 for a motorcycle; and 0.2 for a pedal cycle.
PEIR	Preliminary Environmental Information Report
PLA	Port of London Authority: a self-funding public trust established by The Port of London Act 1908 to govern the Port of London. Its responsibility extends over the Tideway of the River Thames and its continuation (the Kent/ Essex strait). It maintains and supervises navigation and protects the river's environment.
PM	16:00 to 19:00
PM₁₀	Particulate matter (in this example, particulates smaller than 10µm that can cause health problems).
PoTLL	Port of Tilbury London Limited, operator of the Port of Tilbury

Term	Explanation
PRoW	Public Right of Way: A right possessed by the public, to pass along routes over land at all times. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route. The mode of transport allowed differs according to the type of public right of way which consist of footpaths, bridleways and open and restricted byways.
Ramsar	A wetland of international importance, designated under the Ramsar convention.
REAC	Register of Environmental Actions and Commitments - identifies good practice and essential mitigation that will be adopted during the construction and operation of the project.
RSPB	Royal Society for the Protection of Birds: A charitable organisation that works to promote conservation and protection of birds and the wider environment through public awareness campaigns, petitions and through the operation of nature reserves throughout the United Kingdom.
SAC	Special Area of Conservation: defined in the European Union's Habitats Directive (92/43/EEC), also known as the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora. SACs are to protect the 220 habitats and approximately 1000 species listed in annex I and II of the directive which are considered to be of European interest following criteria given in the directive.
Setting	This is defined in the National Planning Policy Framework as 'The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of the asset, may affect the ability to appreciate that significance or may be neutral.'
SPA	Special Protection Area: A designation under the European Union Directive on the Conservation of Wild Birds.
SPZ	Source protection zone: EA-defined groundwater sources (2000) such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area.
SRN	Strategic Road Network, the core road network, managed in England by Highways England.
SSSI	Site of Special Scientific Interest: A conservation designation denoting an area of particular ecological or geological importance.
SuDS	A sustainable drainage system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges.

Term	Explanation
TAG	Transport Analysis Guidance: national guidance document produced by the Department for Transport.
TBM	Tunnel boring machine, machine used to excavate tunnels with a circular cross section.
tCO2e	Tonnes of carbon dioxide equivalent; a standard unit for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO2 that would create the same amount of warming.
TfL	Transport for London: created in 2000, the integrated body responsible for London's transport system.
ULH	Utilities Logistics Hubs
V/C	Volume over Capacity (volume/capacity)
VMS	Variable Message Sign, typically mounted on a portal gantry.
WNIMMP	Wider Network Impacts Management and Monitoring Plan - summarises the work undertaken to date to identify and assess areas of the road network where monitoring and potential interventions may be necessary to better manage additional traffic as a result of the project.
WSL - Western Southern Link	The Western Southern Link (WSL) is an alternative for shortlist Routes 2, 3 and 4 to the south of the River Thames. The route would connect into the A2 to the east of Gravesend and would go to the west of Thong and Shorne and east of Chalk towards Church Lane and Lower Higham Road. This route could connect into any of the Routes 2, 3 and 4 north of the river utilising all of the crossing options for these route options.

If you need help accessing this or any other Highways England information, please call **0300 123 5000** and we will help you.

The wards covered in this summary are:

Higham

Shorne, Cobham and Luddesdown

Chalk

Riverside

Westcourt

Riverview

Singlewell

Woodlands

Northfleet South, Istead Rise, Painters Ash

Newtown, Stone Castle, Stone House, Bridge and Temple Hill

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