

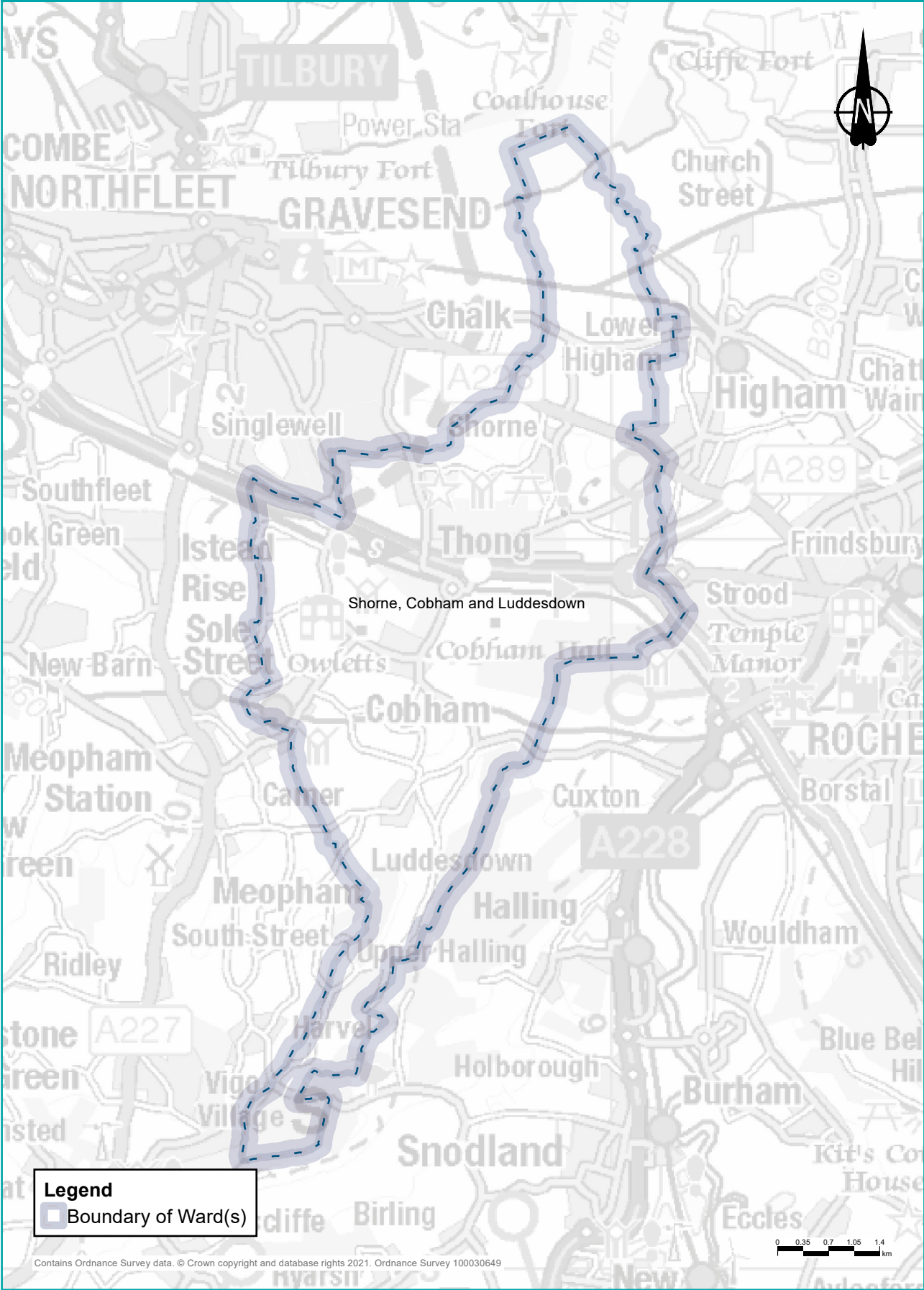
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Chapter 3: Shorne, Cobham and Luddesdown ward

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>

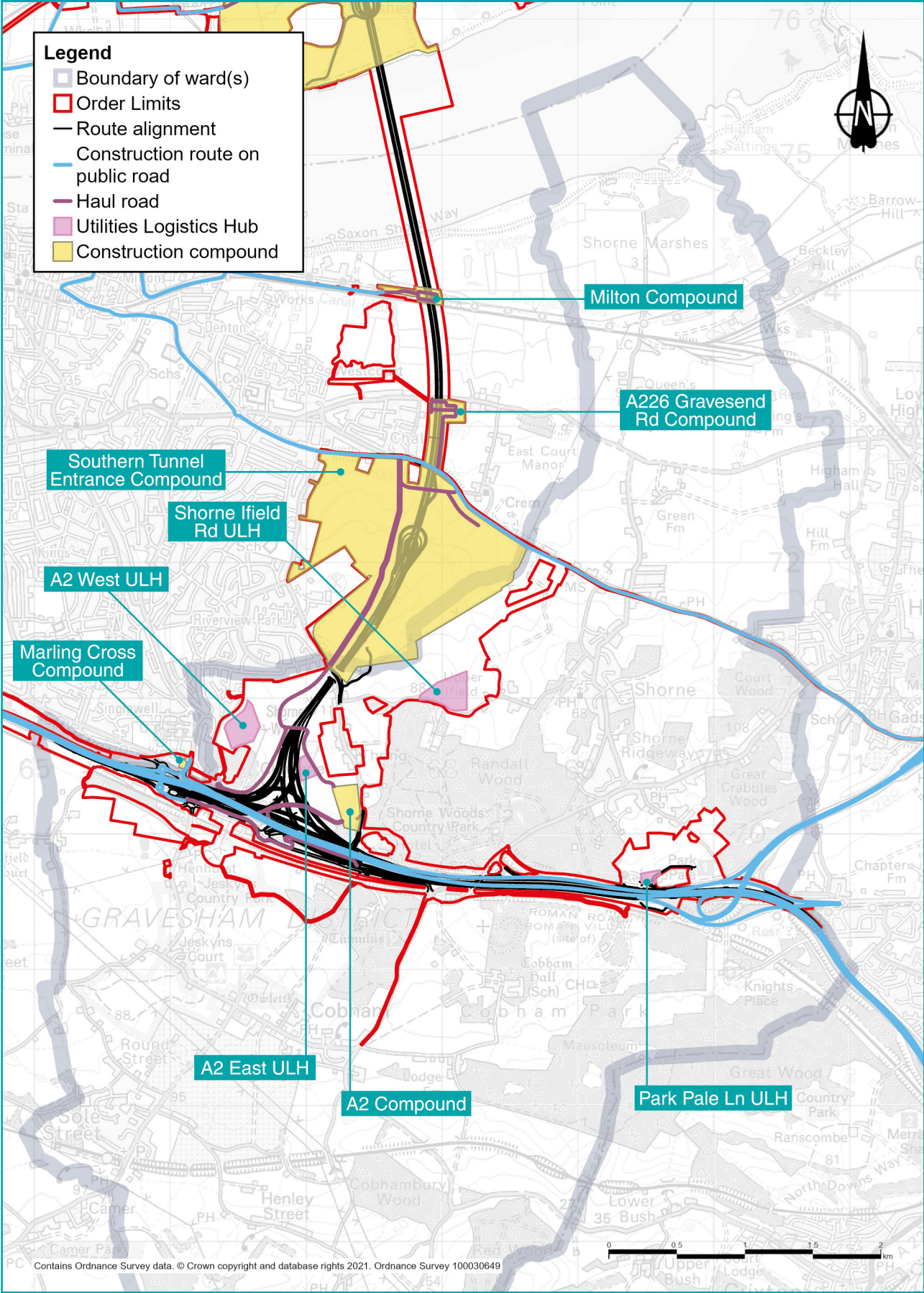
Topic	Construction	Operations
<p>Air quality</p>	<p>Impacts</p> <p>Analysis of traffic data along the A2 corridor shows that likely decreases in traffic between 2026-2028 would lead to a small temporary improvement in air quality. The A226 Gravesend Road is expected to experience an increase in traffic 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.

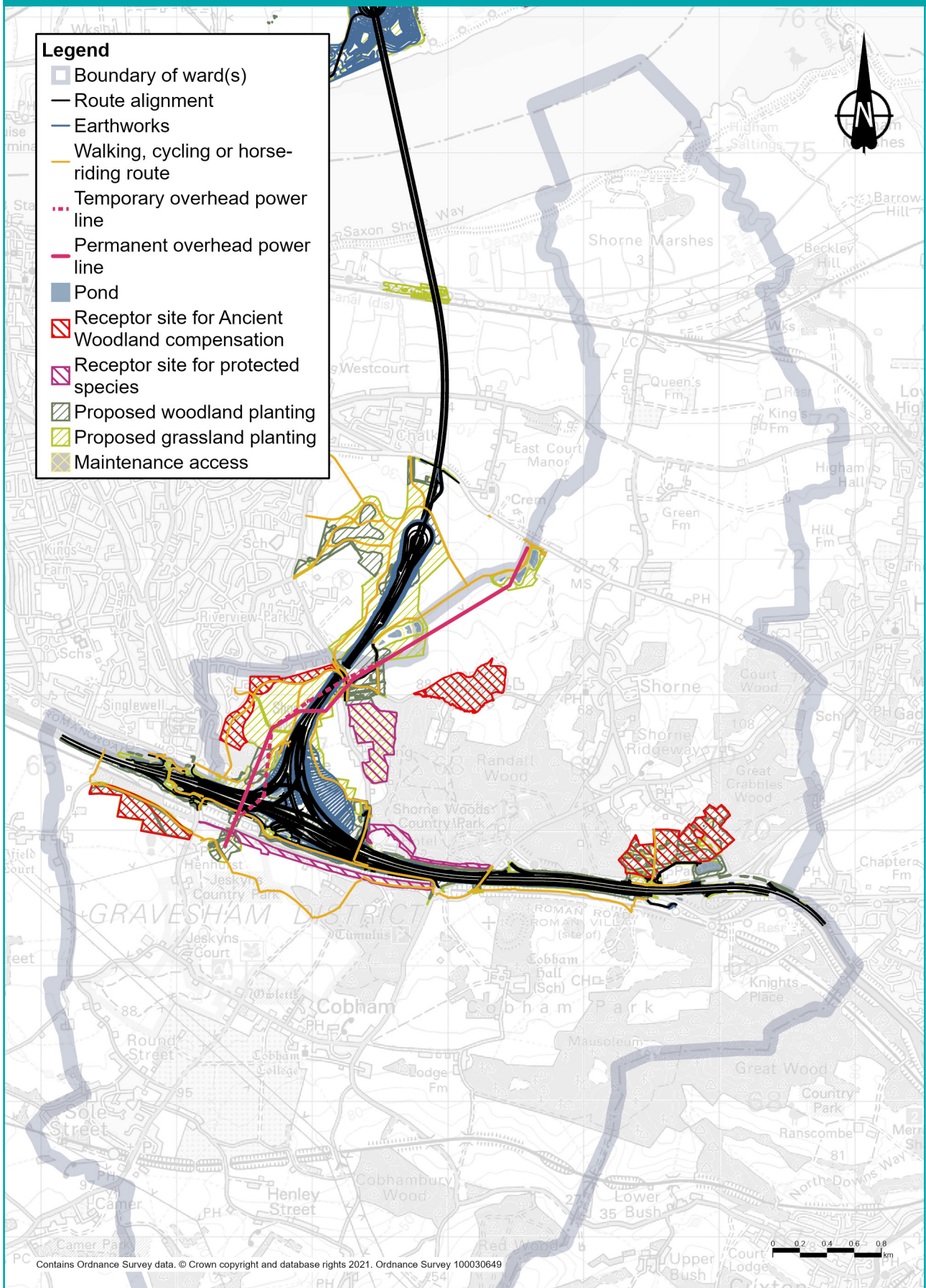
3.2.2 Operations

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)

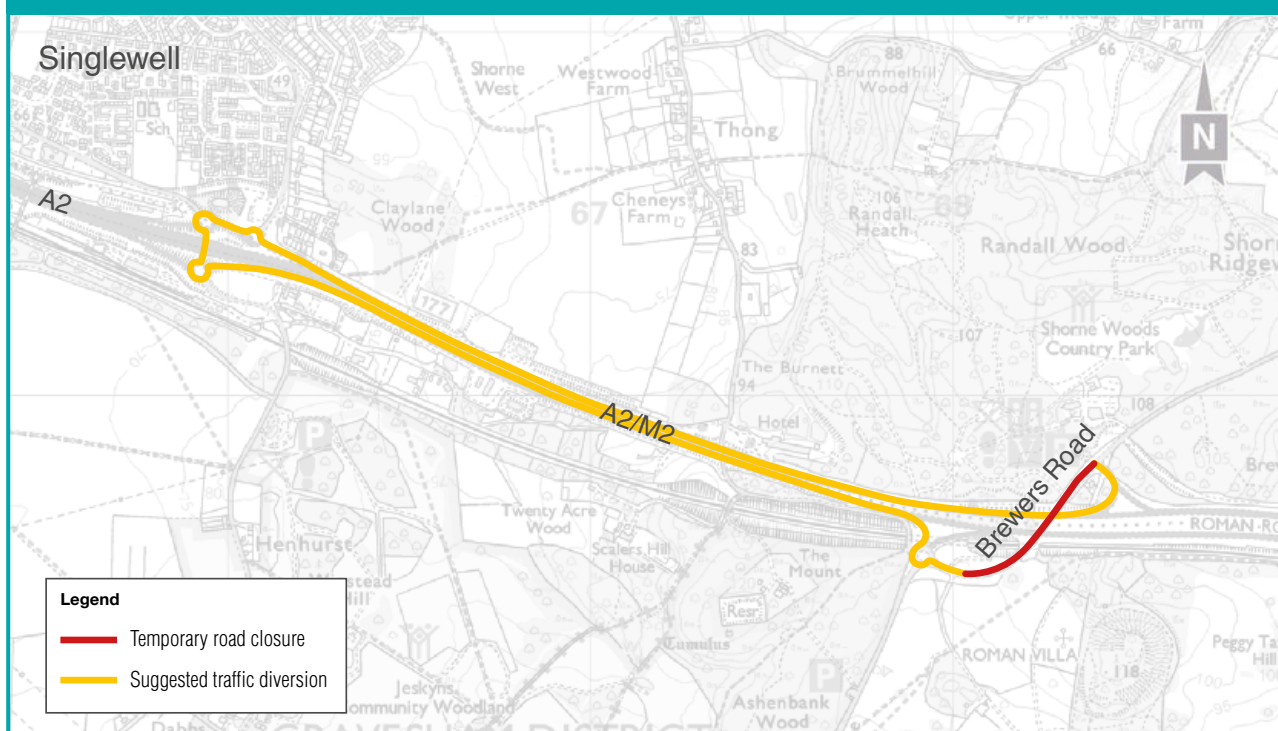
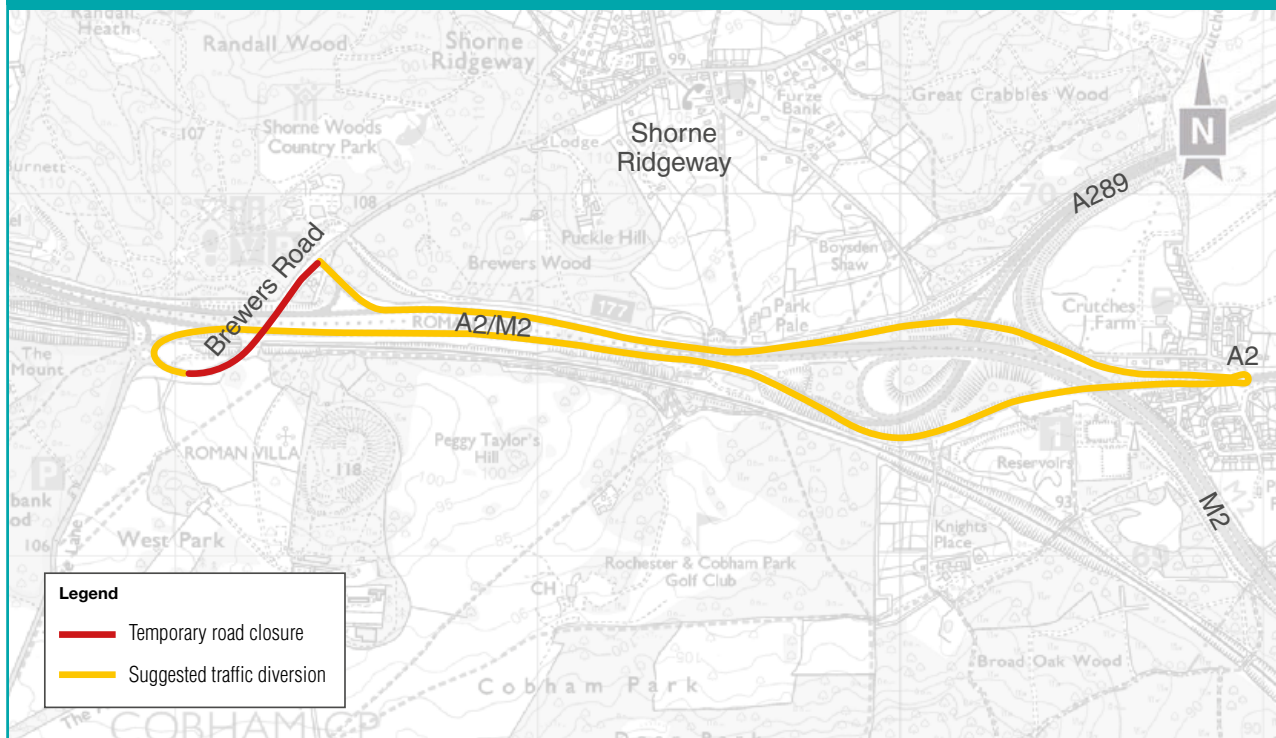


Figure 3.5: Brewers Road closure diversion (north to south)



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

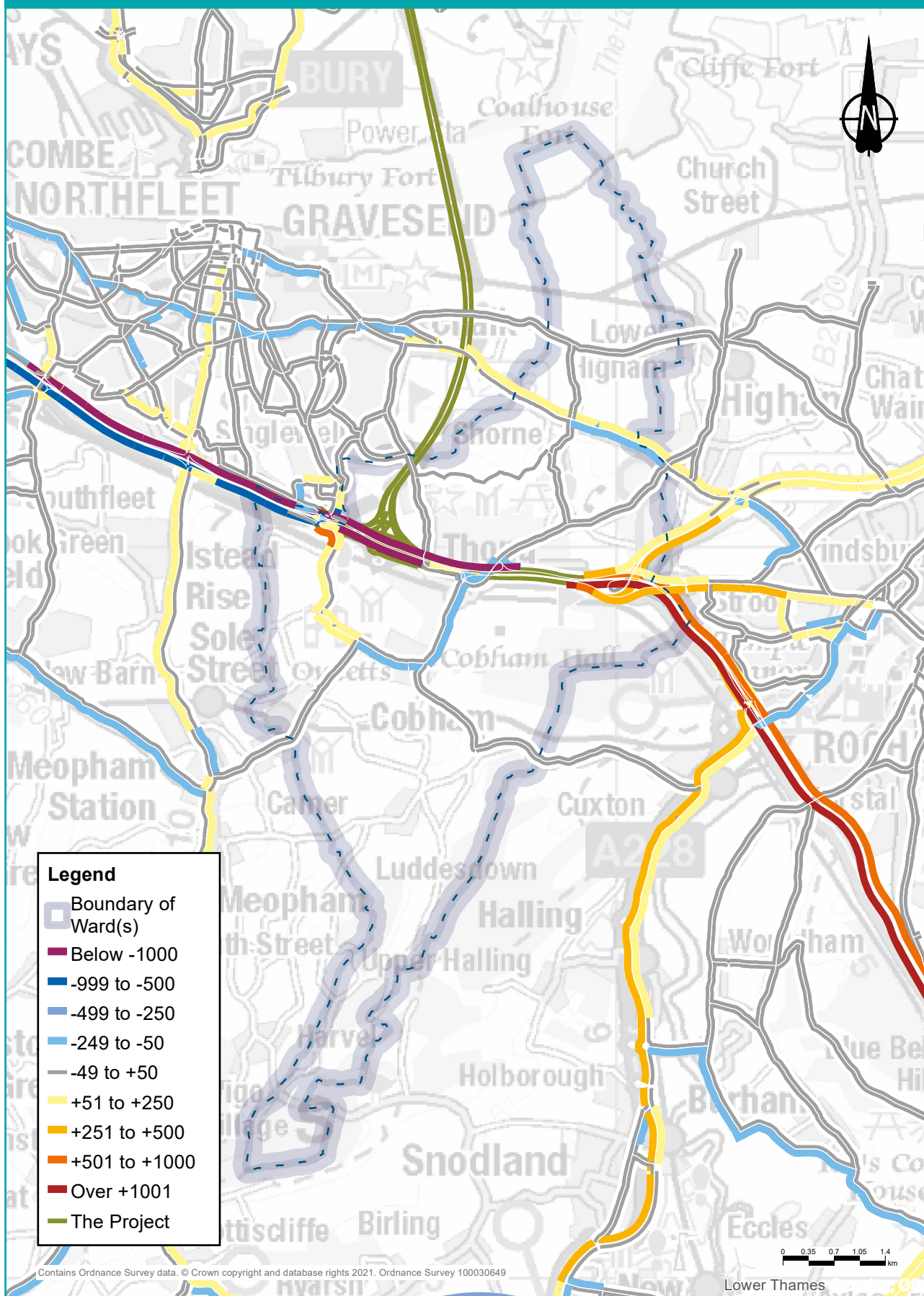


Figure 3.7: Predicted percentage changes to traffic flow in the morning peak in 2029

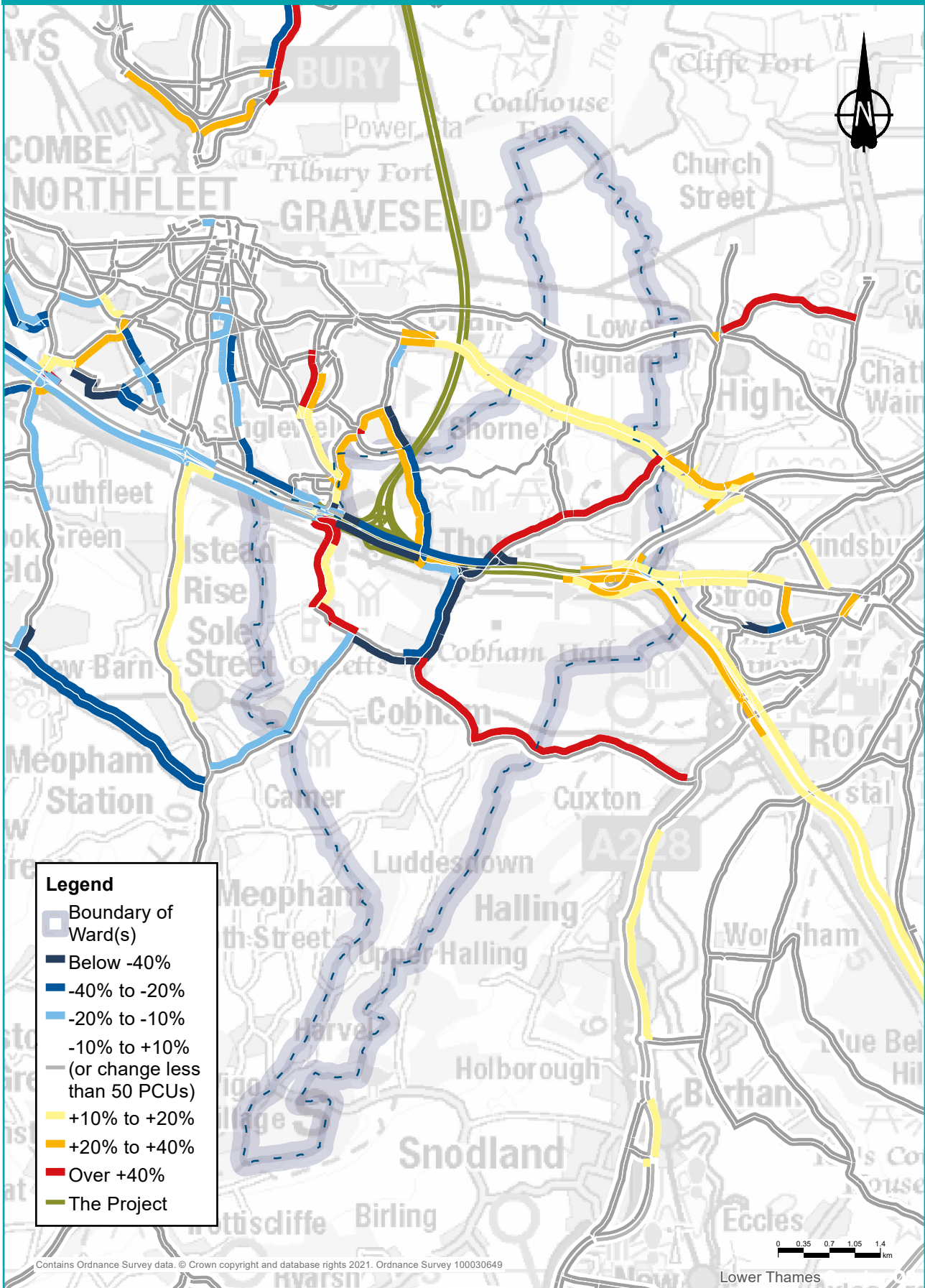


Figure 3.8: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

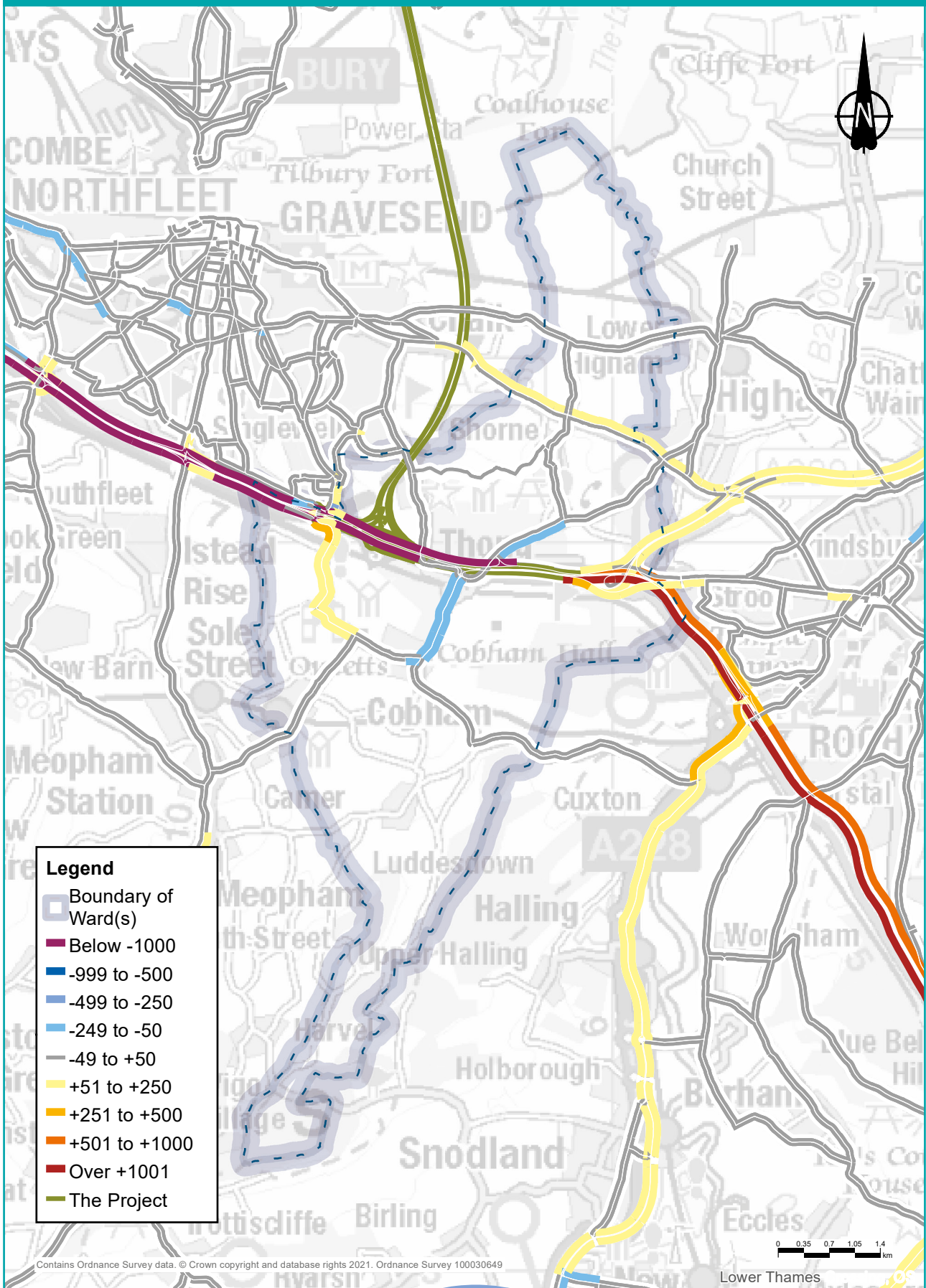


Figure 3.9: Predicted percentage changes to traffic flow in the interpeak in 2029

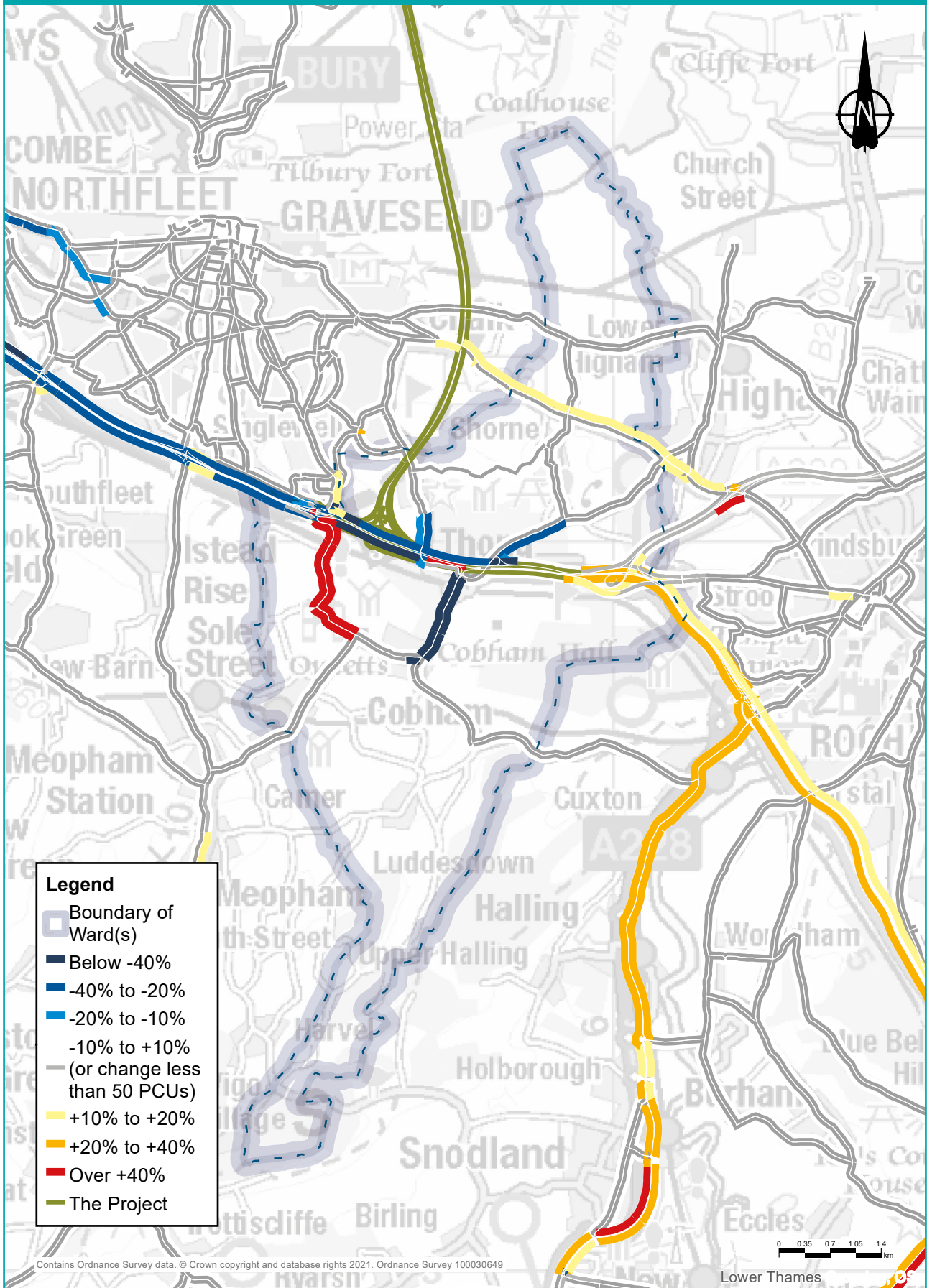
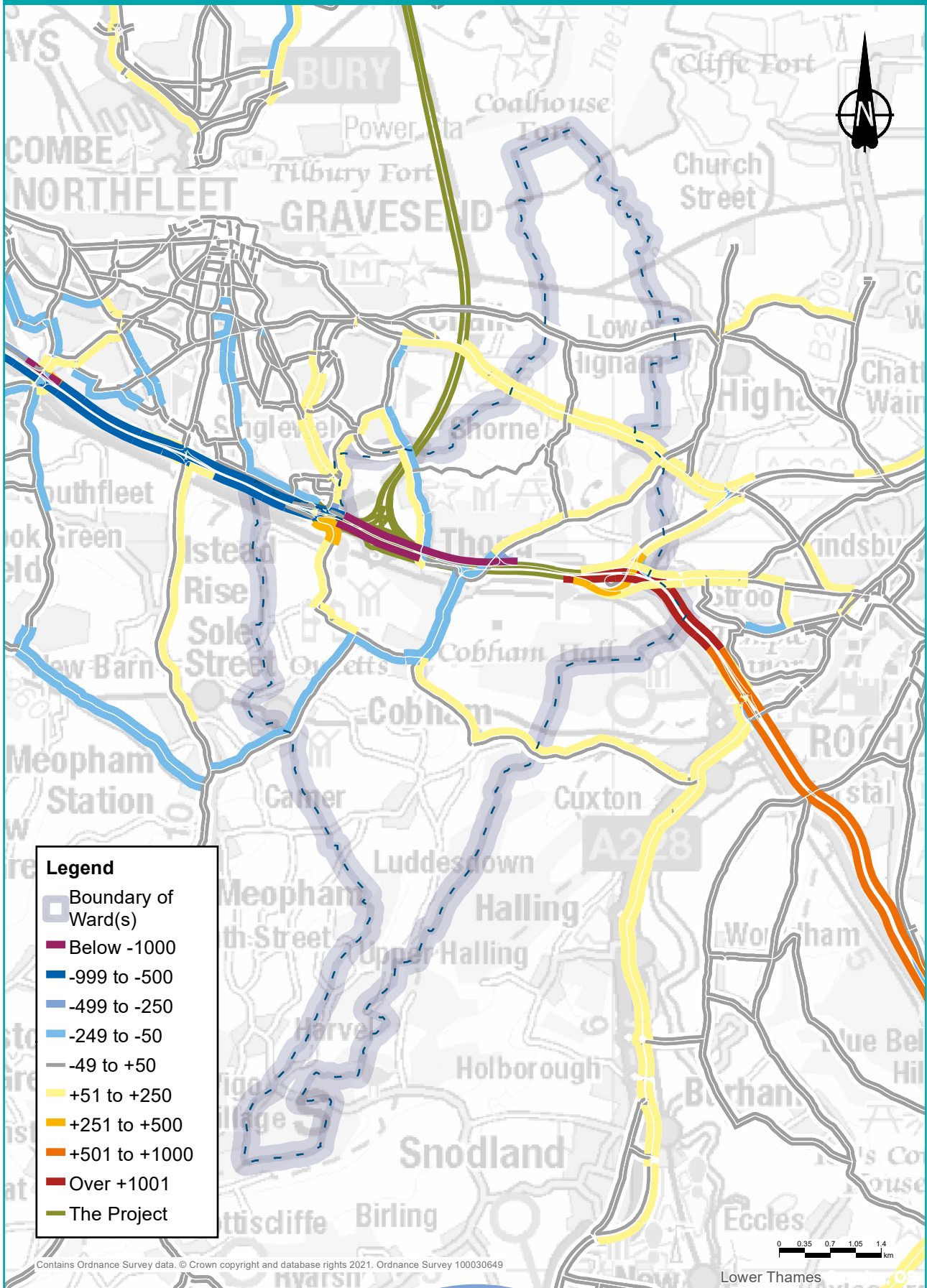
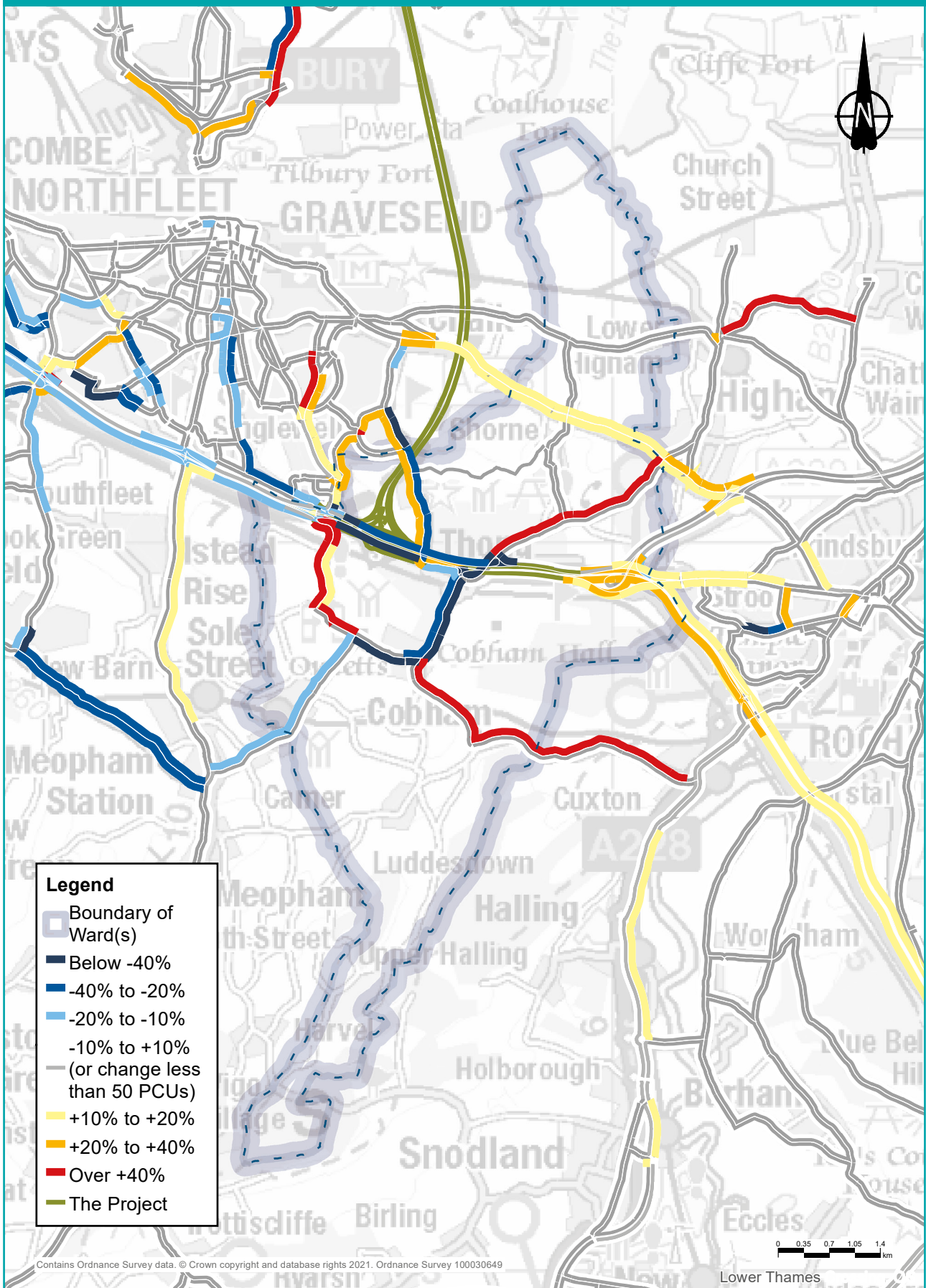


Figure 3.10: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029



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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

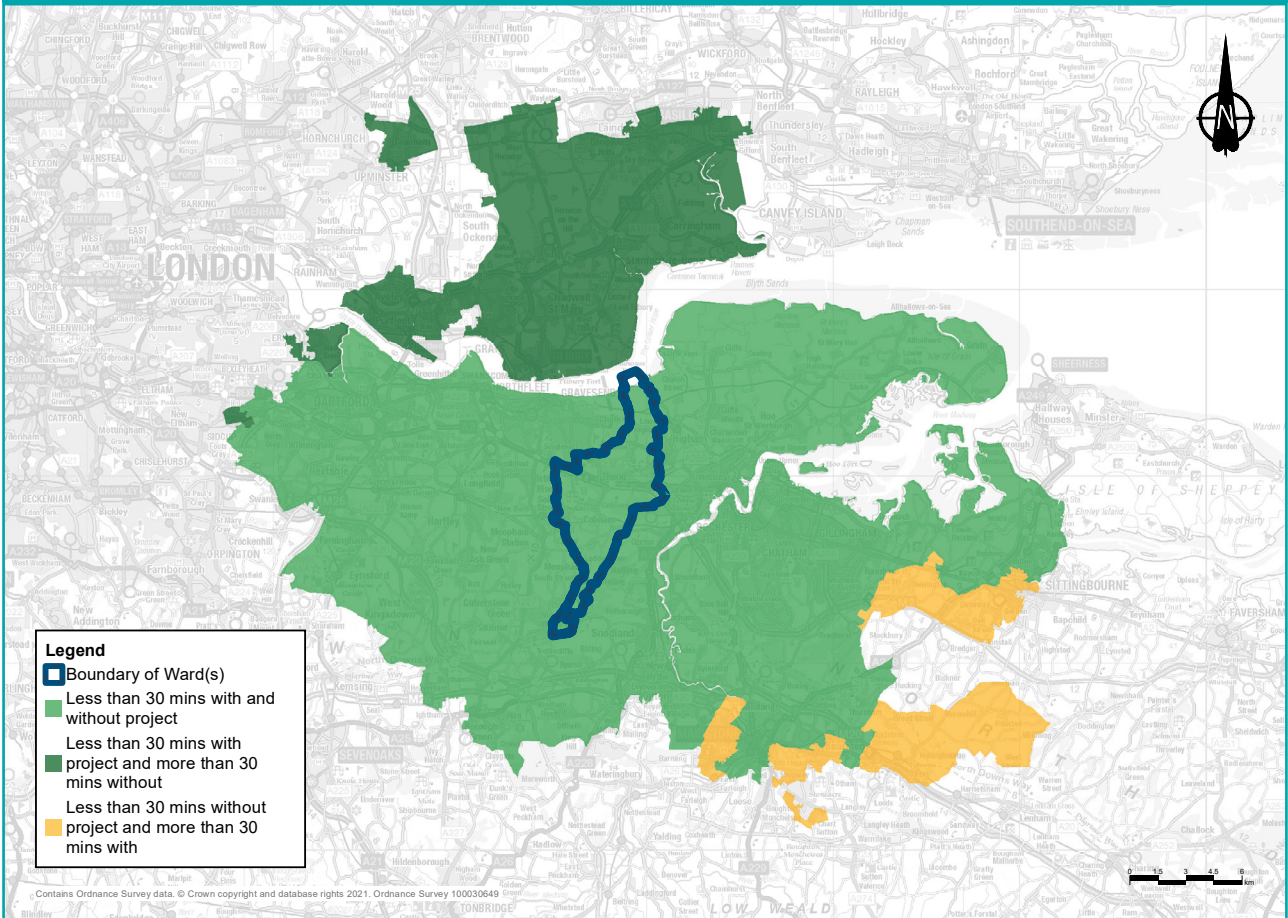
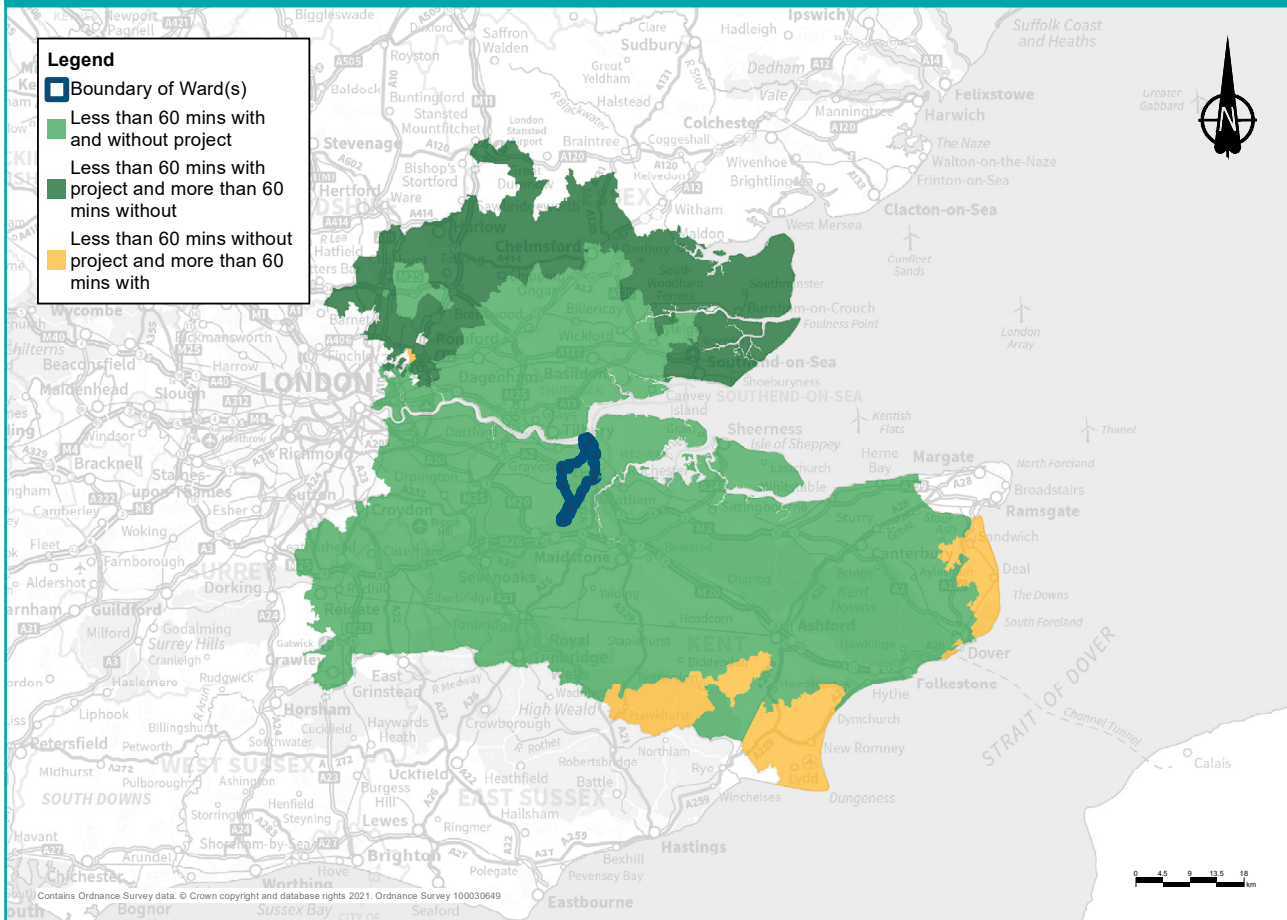


Figure 3.13: Change in area that motorists could drive to within 60 minutes from Shorne, Cobham and Luddesdown ward



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

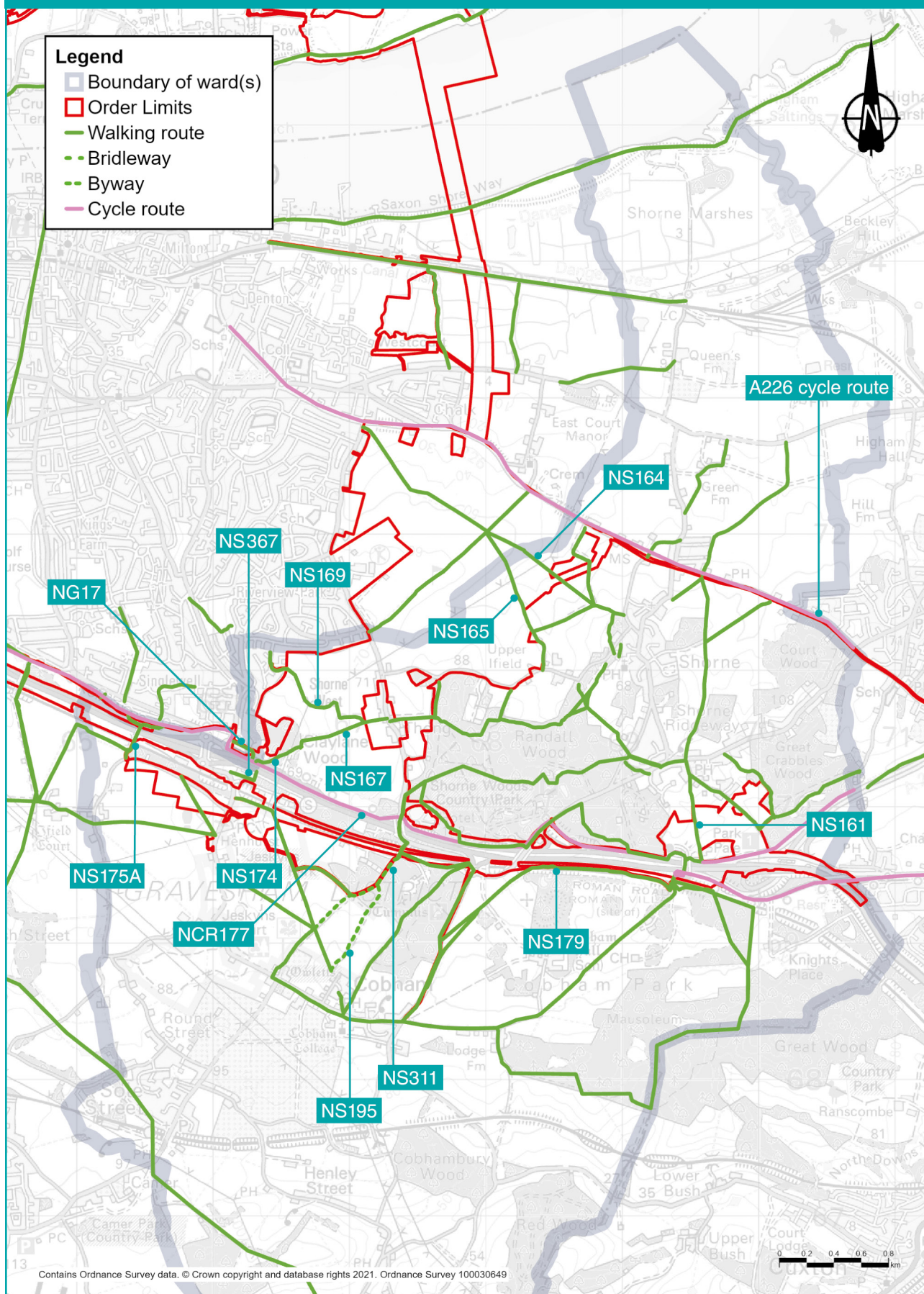
Construction impacts

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.

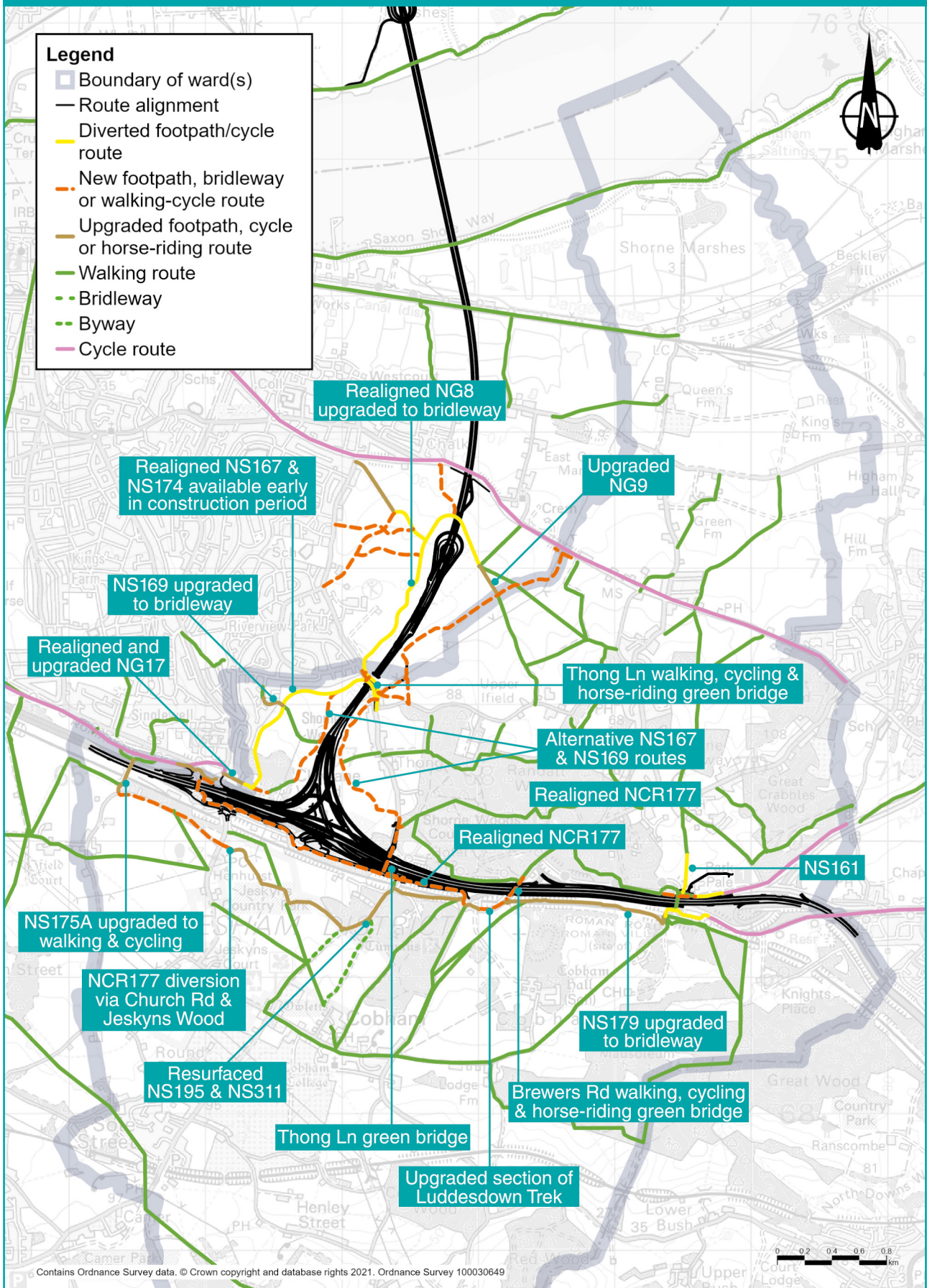
- The eastern section of footpath NG17 would be permanently closed due to construction of the new slip-road linking the A2 eastbound to the new road. Early in the construction period, this footpath would be permanently realigned to link to the new footpath heading north through Claylane Wood. It would 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.

Figure 3.14: Footpaths, bridleways and cycle routes in Shorne, Cobham and Luddesdown ward



- 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.

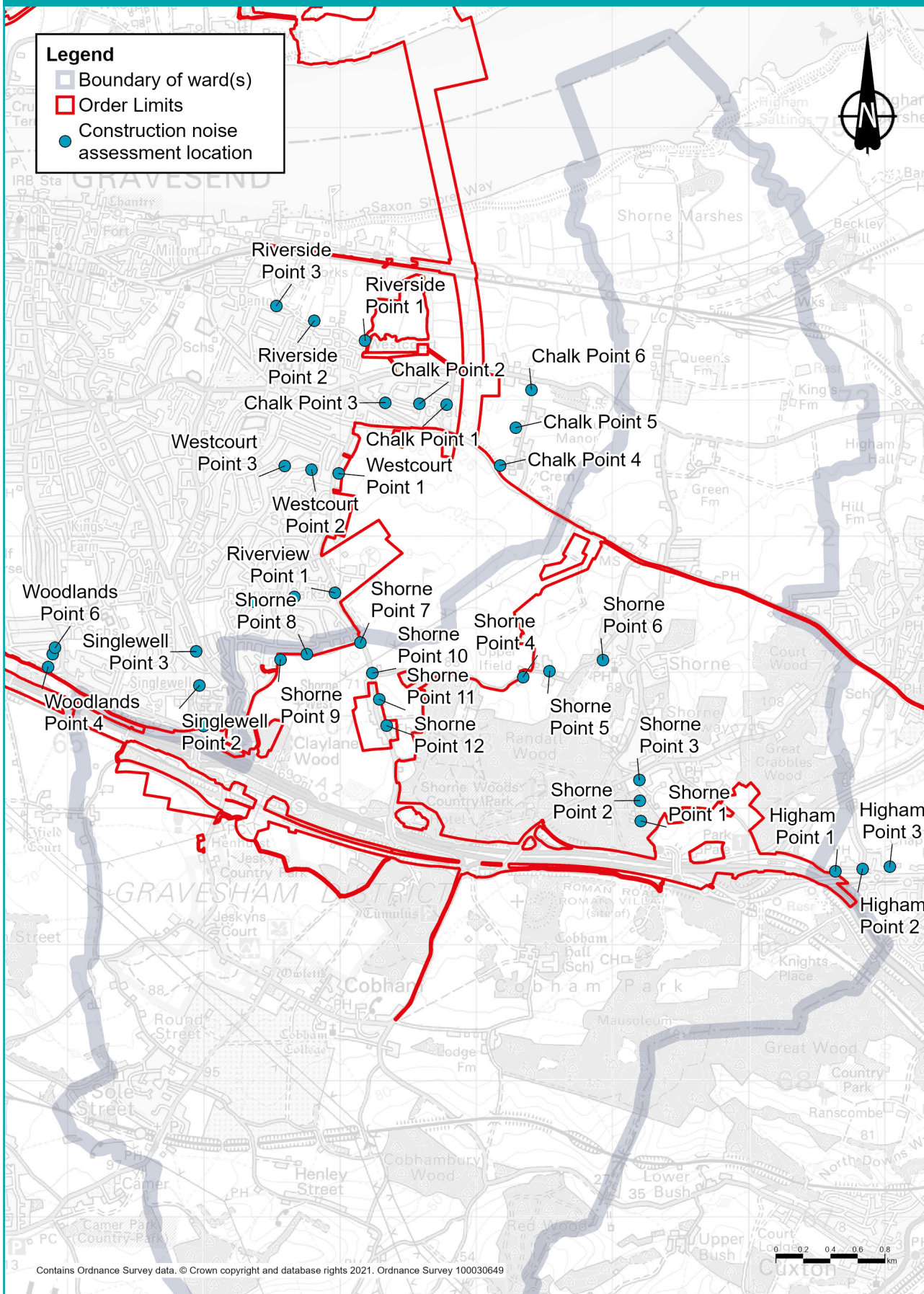
Within the ward there are four proposed structures expected to be constructed using vibratory or percussive piling, but these works would not be within 100 metres of any sensitive receptor and as such no vibration impacts during the construction works are predicted to occur.

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



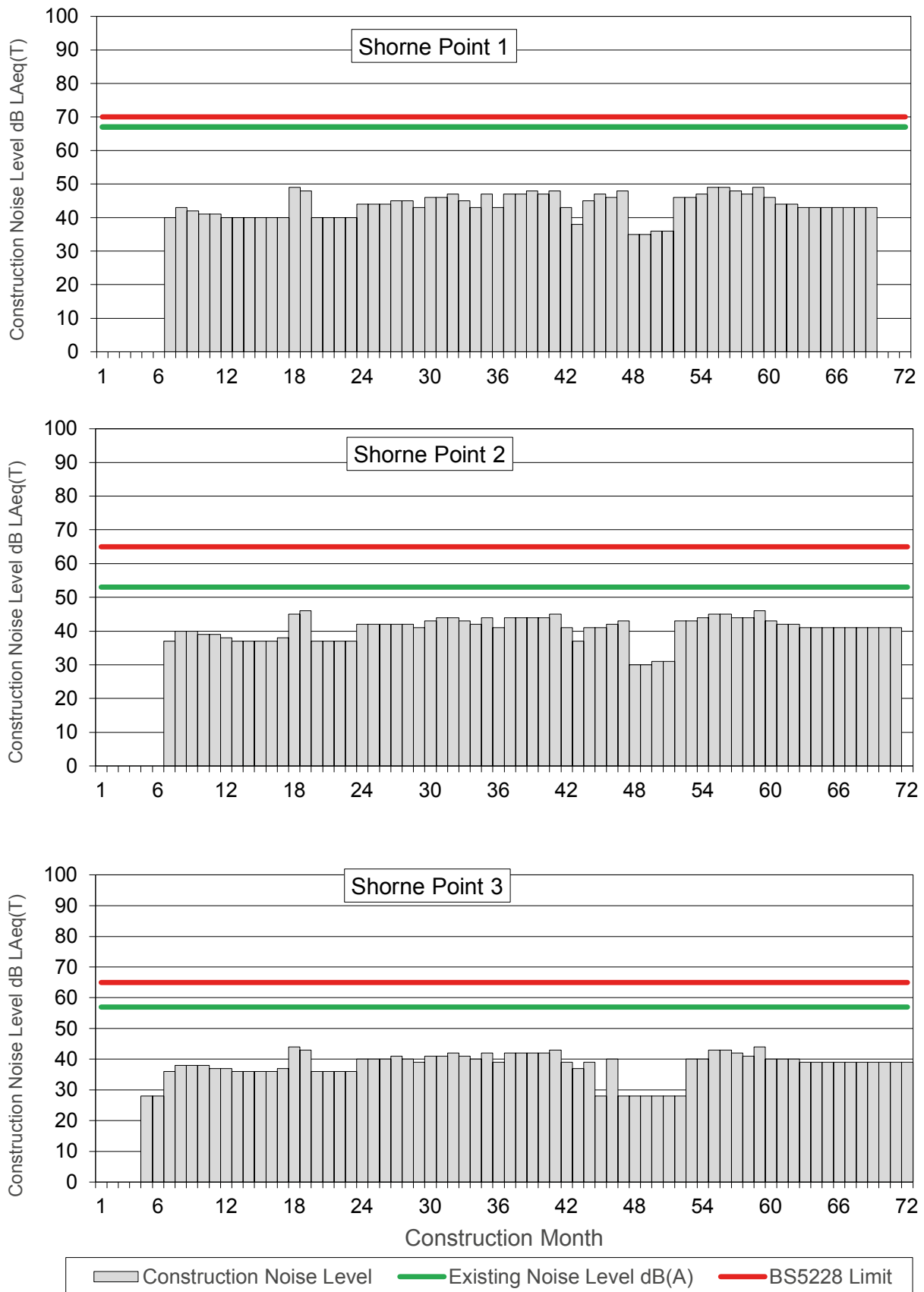
Each vertical bar in figure 3.17, 3.18, 3.19 and 3.20 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart shows the existing background noise level at each assessment point without the project. The horizontal red 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:

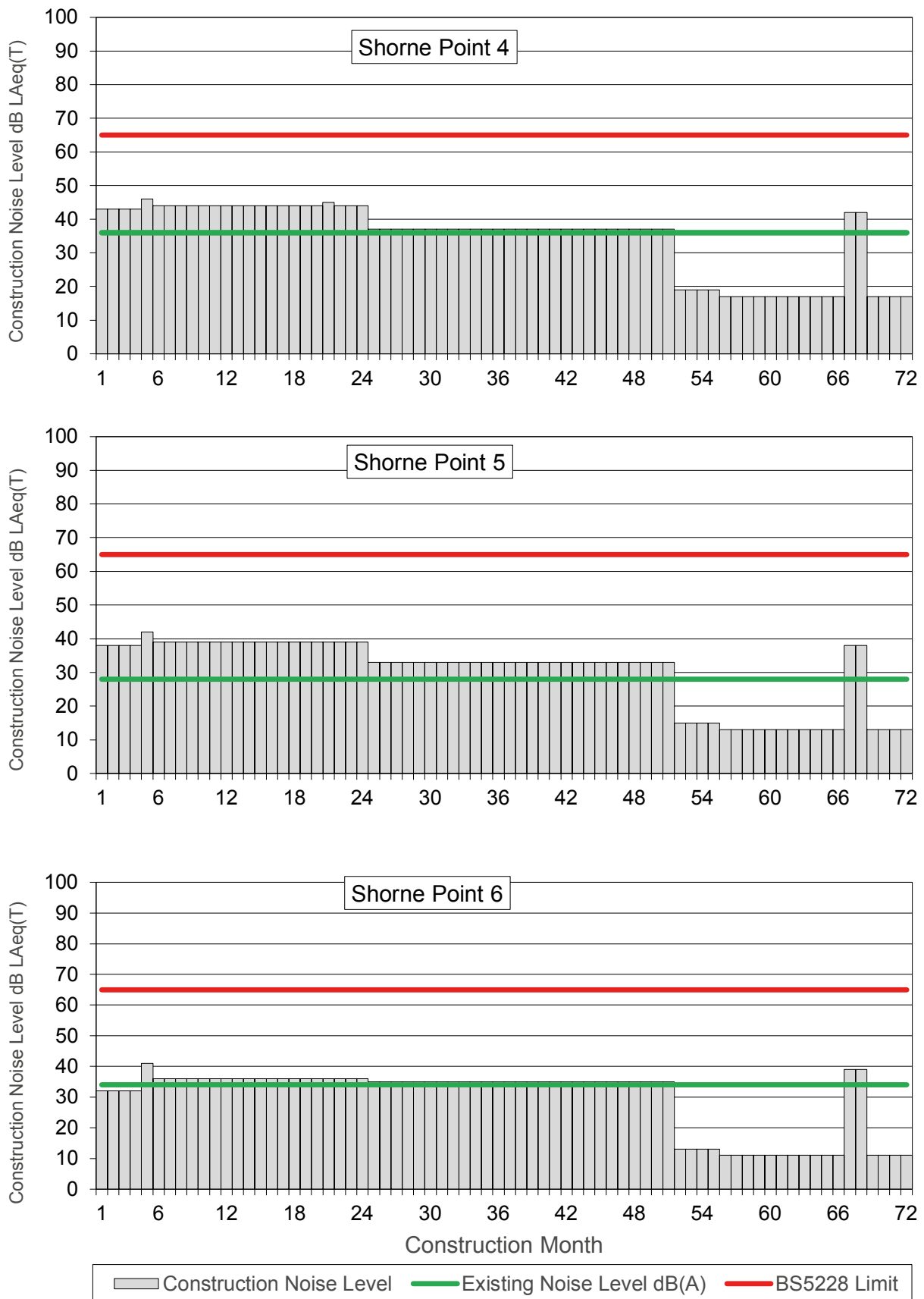
- At point 1, construction noise levels are predicted to range from 35 to 49dB LAeq (12-hour) during the six-year construction programme. Construction noise levels are not predicted to exceed the existing background noise levels at this location.
- At point 2, construction noise levels are predicted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

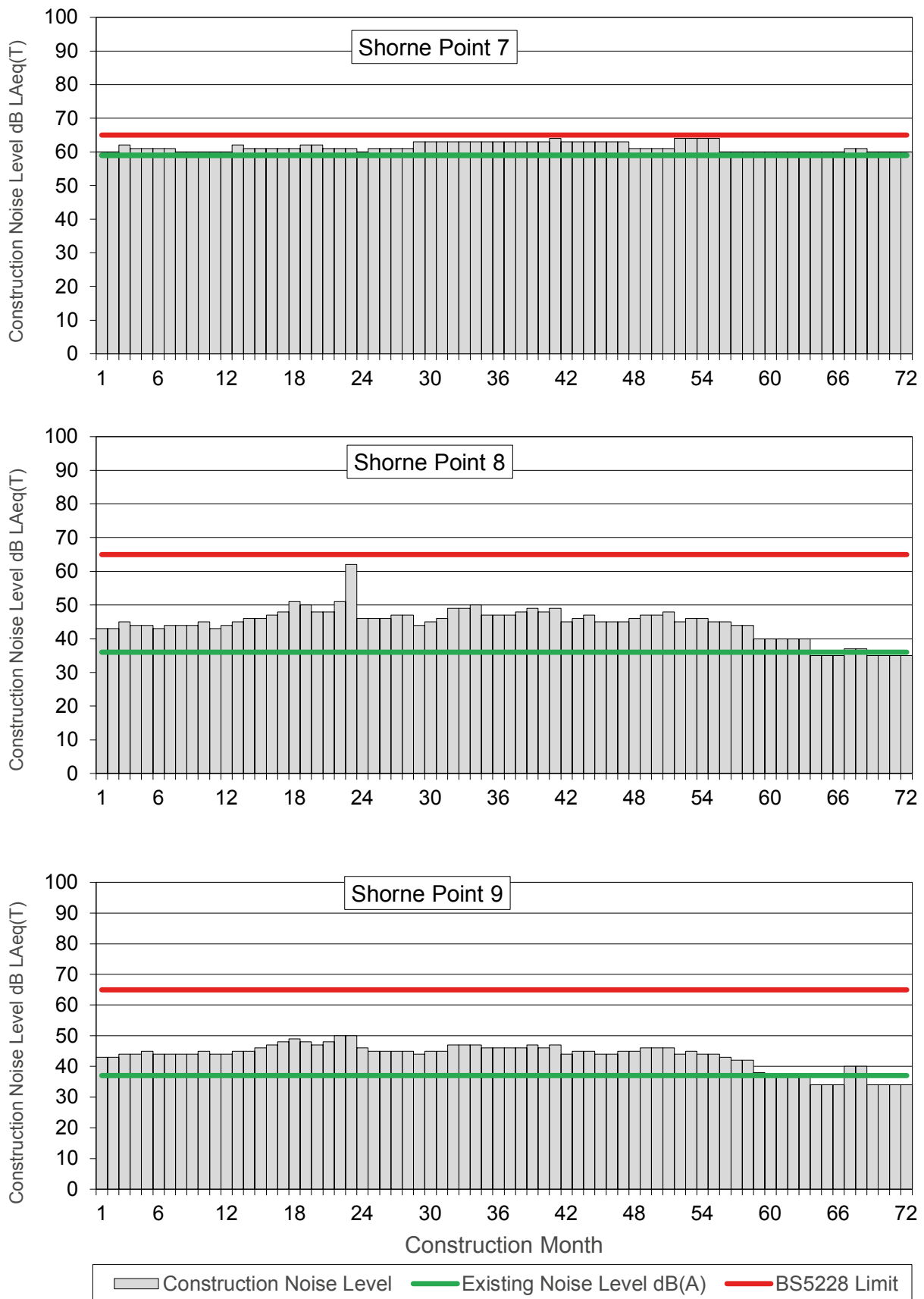
Figure 3.18: Construction noise by month for points 4, 5 and 6 in Shorne, Cobham and Luddesdown



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.

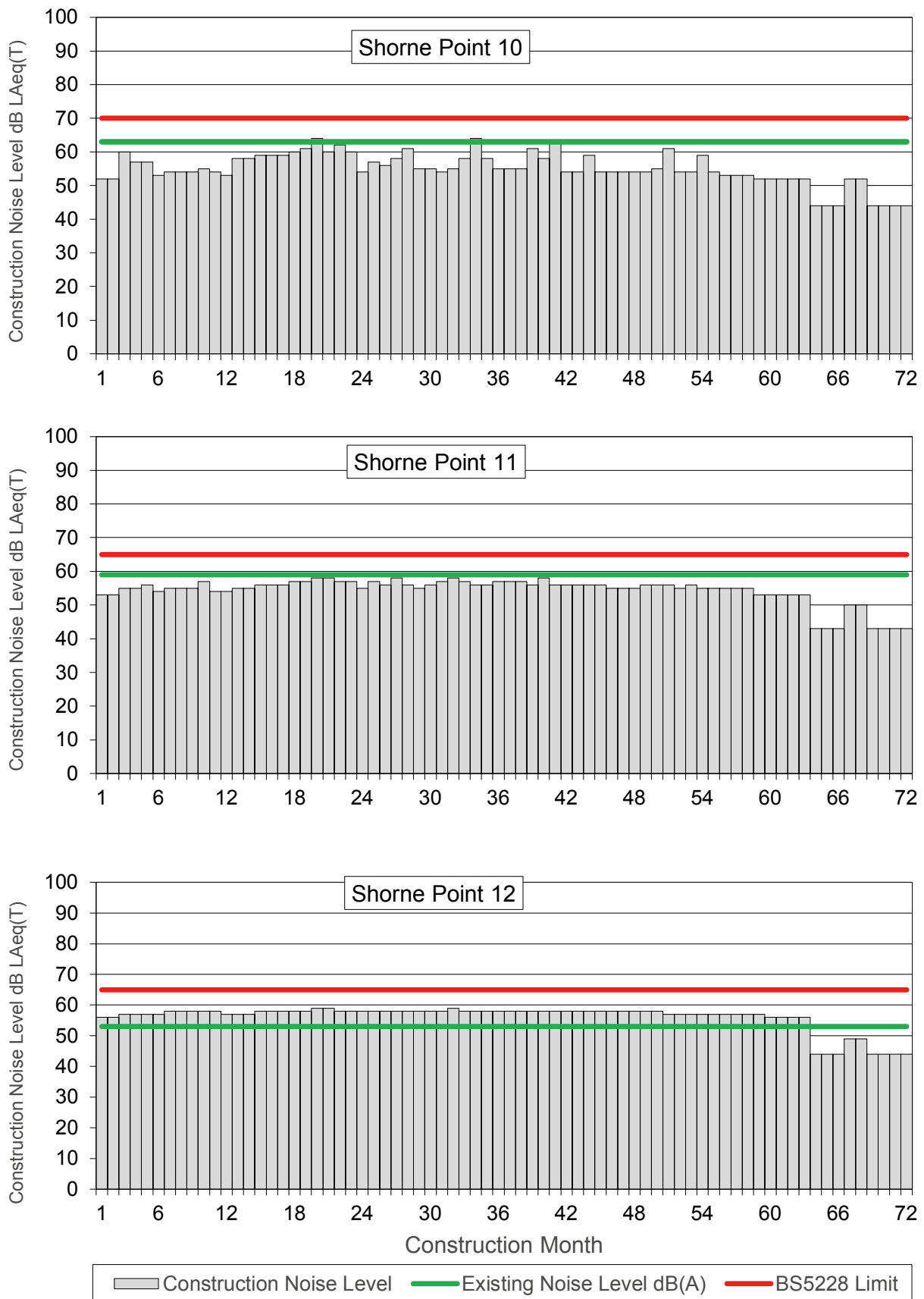
Figure 3.19: Construction noise by month for points 7, 8 and 9 in Shorne, Cobham and Luddesdown



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

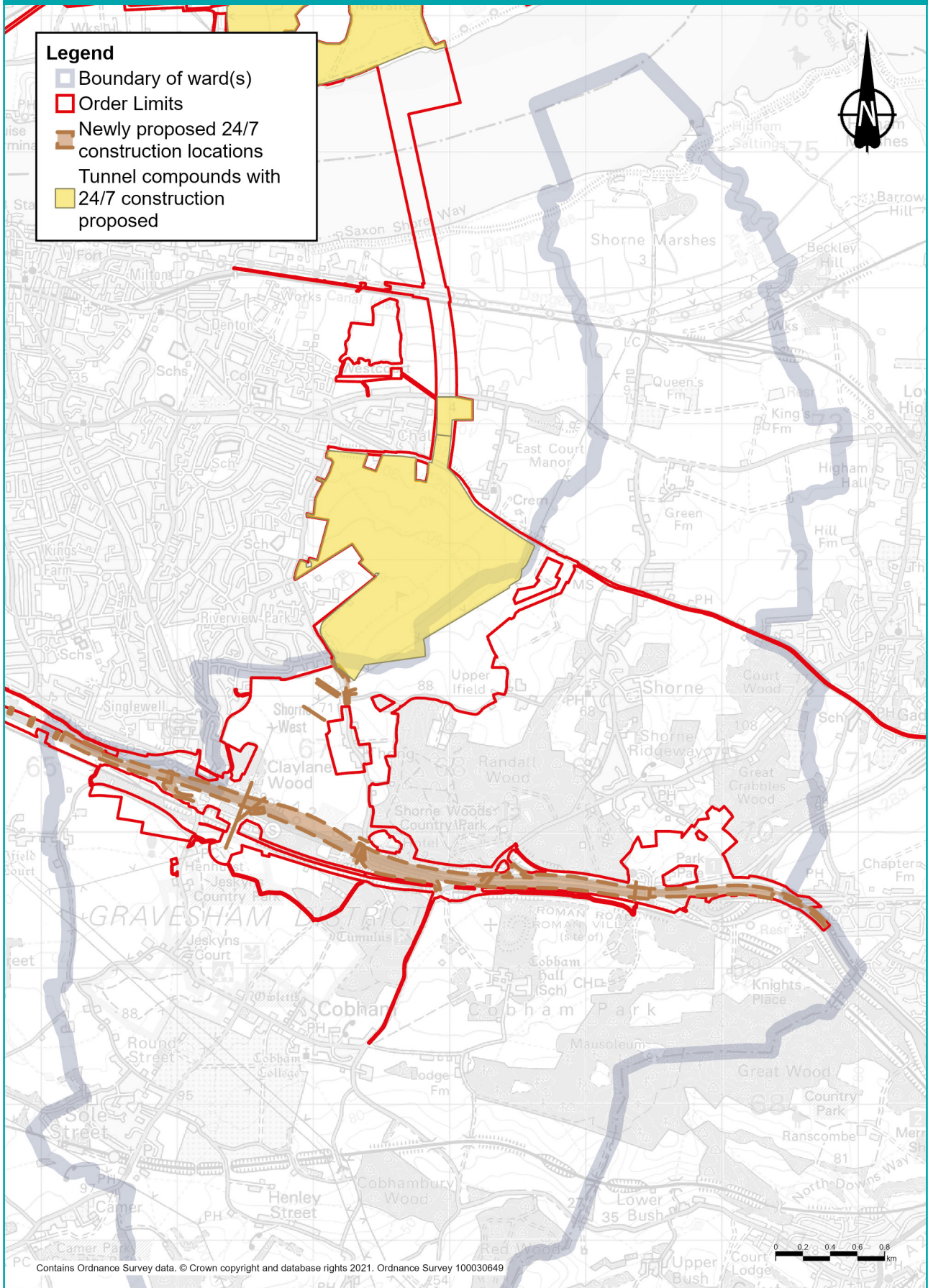


Table 3.4: Construction traffic noise in Shorne, Cobham and Luddesdown ward

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.

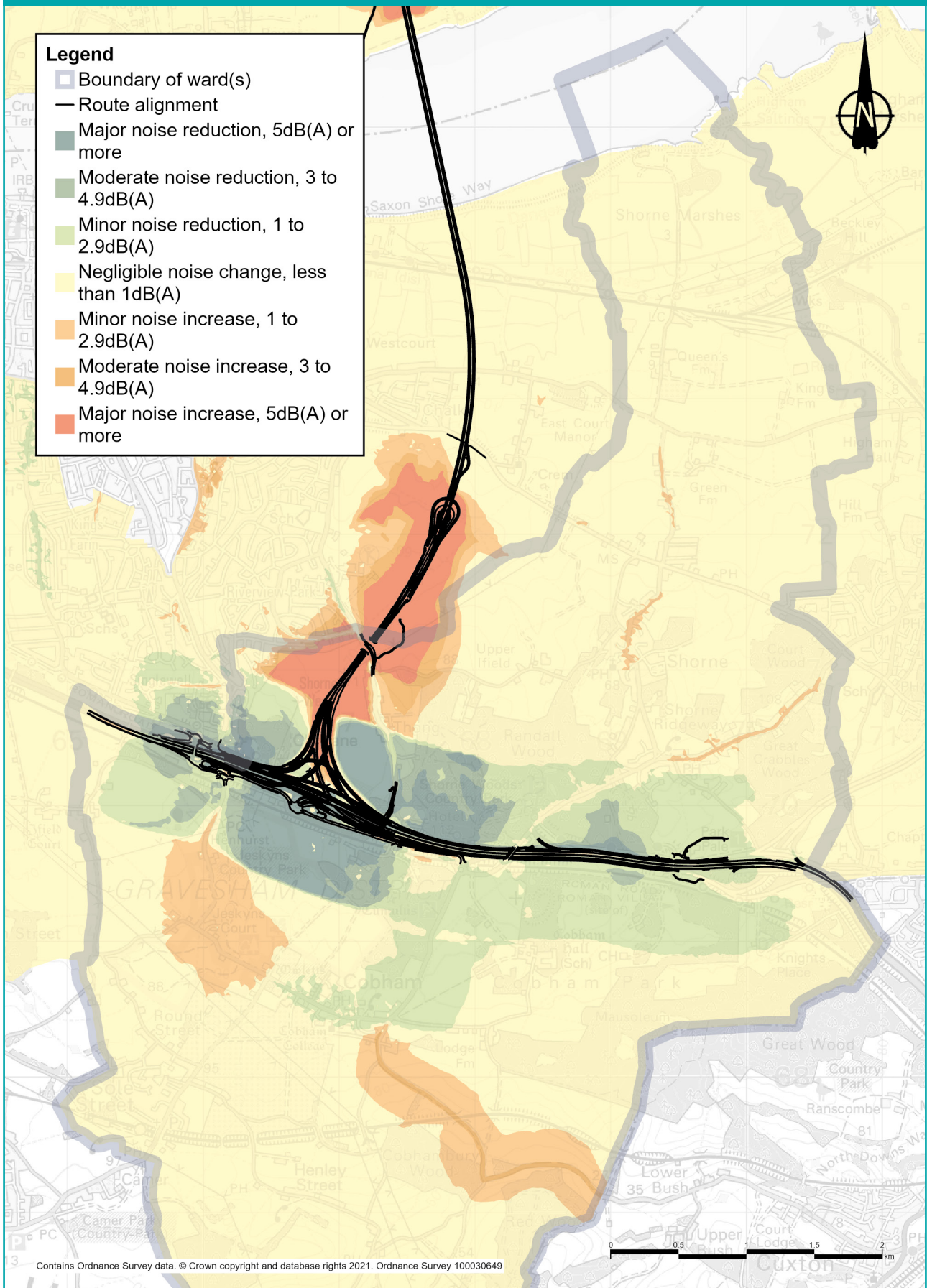
Figure 3.22 shows the predicted changes in operational road traffic noise in the opening year of the project. Within the ward, changes in road traffic noise at identified noise-sensitive receptors (such as nearby properties) are predicted to range from major reductions in noise levels of greater than 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.

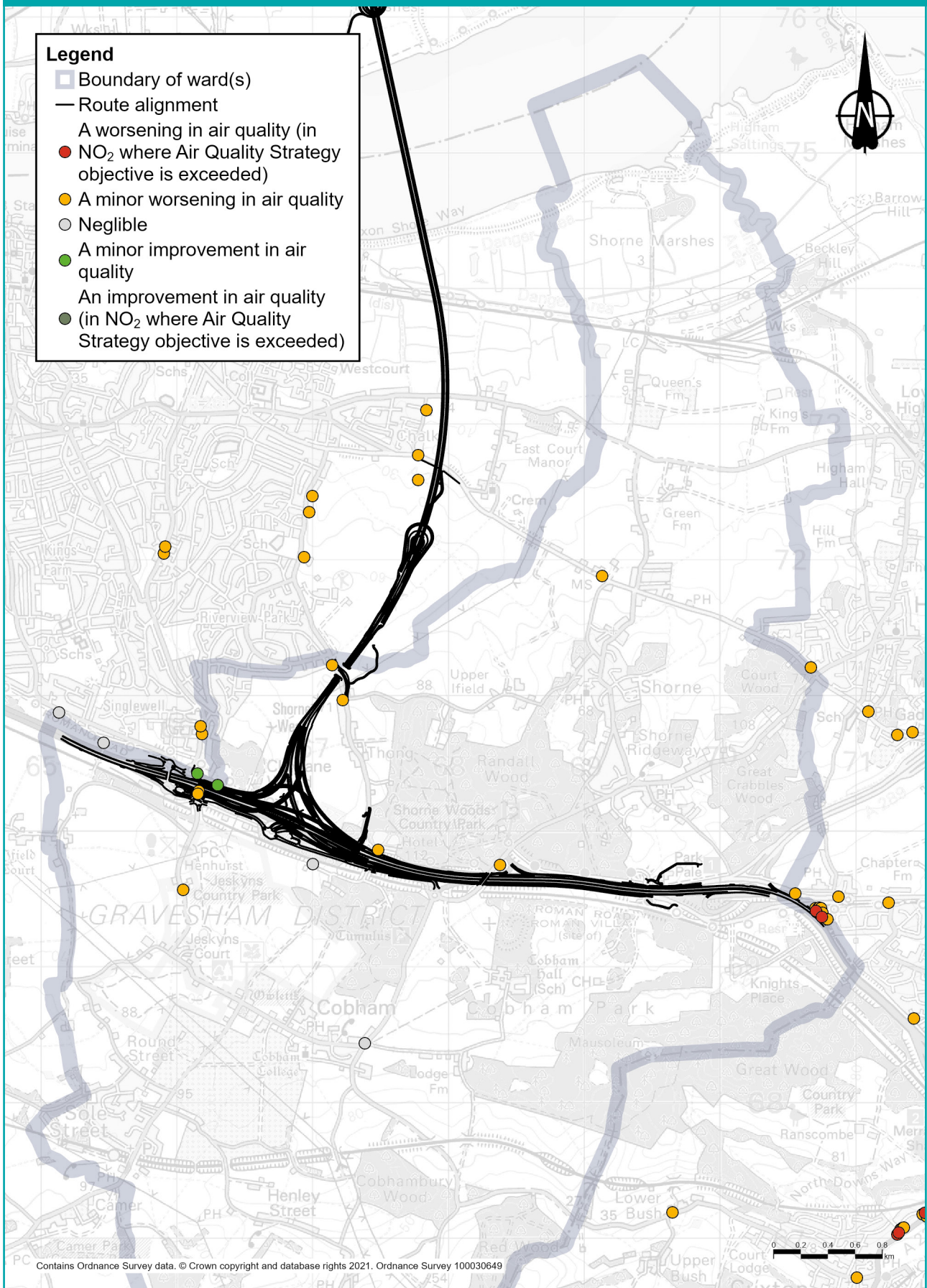
Properties more than 200 metres from the worksite, which is the majority of properties within this ward, are outside the area likely to be affected by construction dust or emissions from the worksite. In this ward, there are only a few properties within 200 metres of the worksite, including some east 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

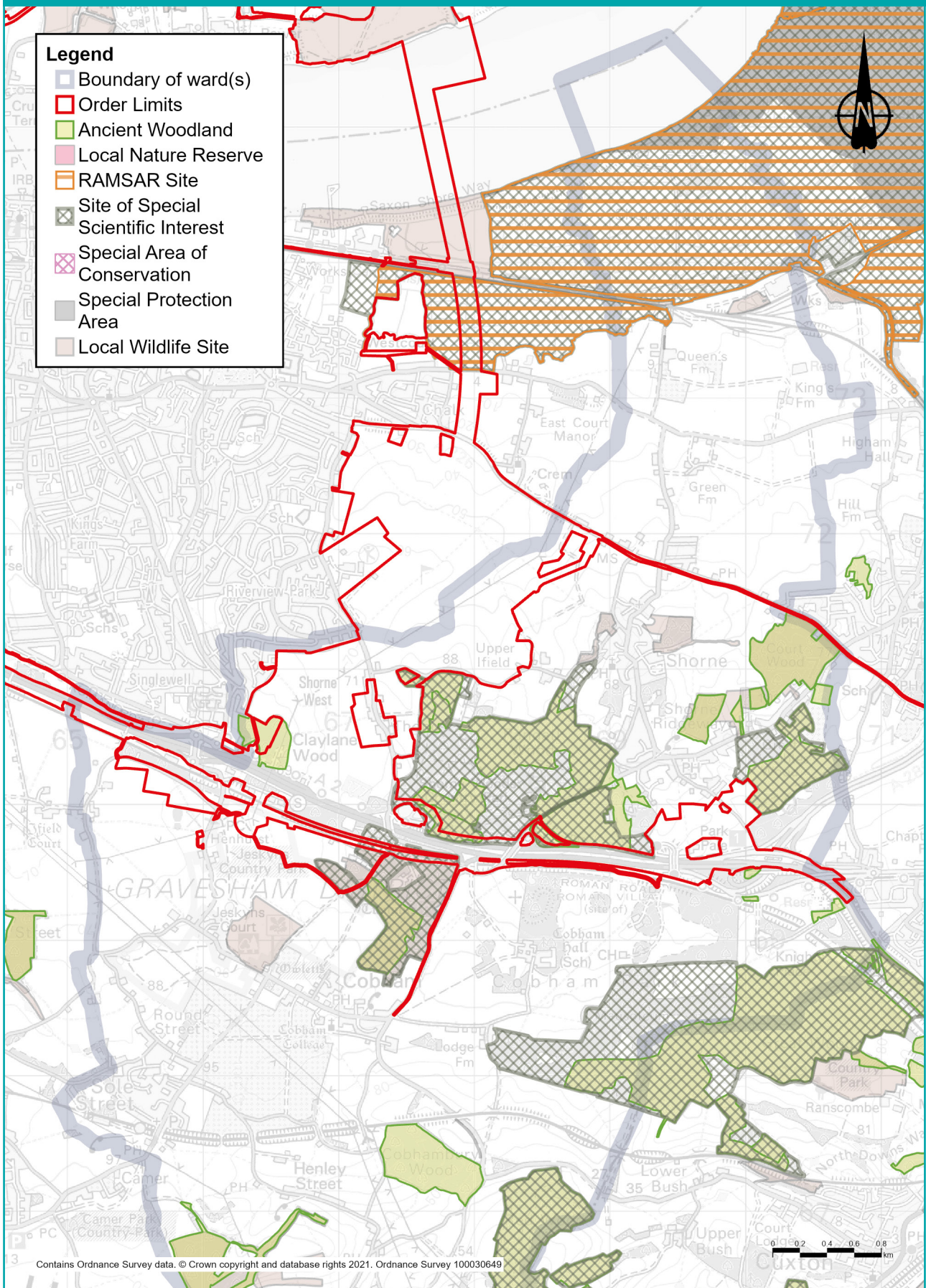
The main habitats within the Order Limits in the Shorne, Cobham and Luddesdown ward are areas of arable and pasture, rough grassland, plus large areas of woodland. Much of this woodland is either designated ancient or protected.

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

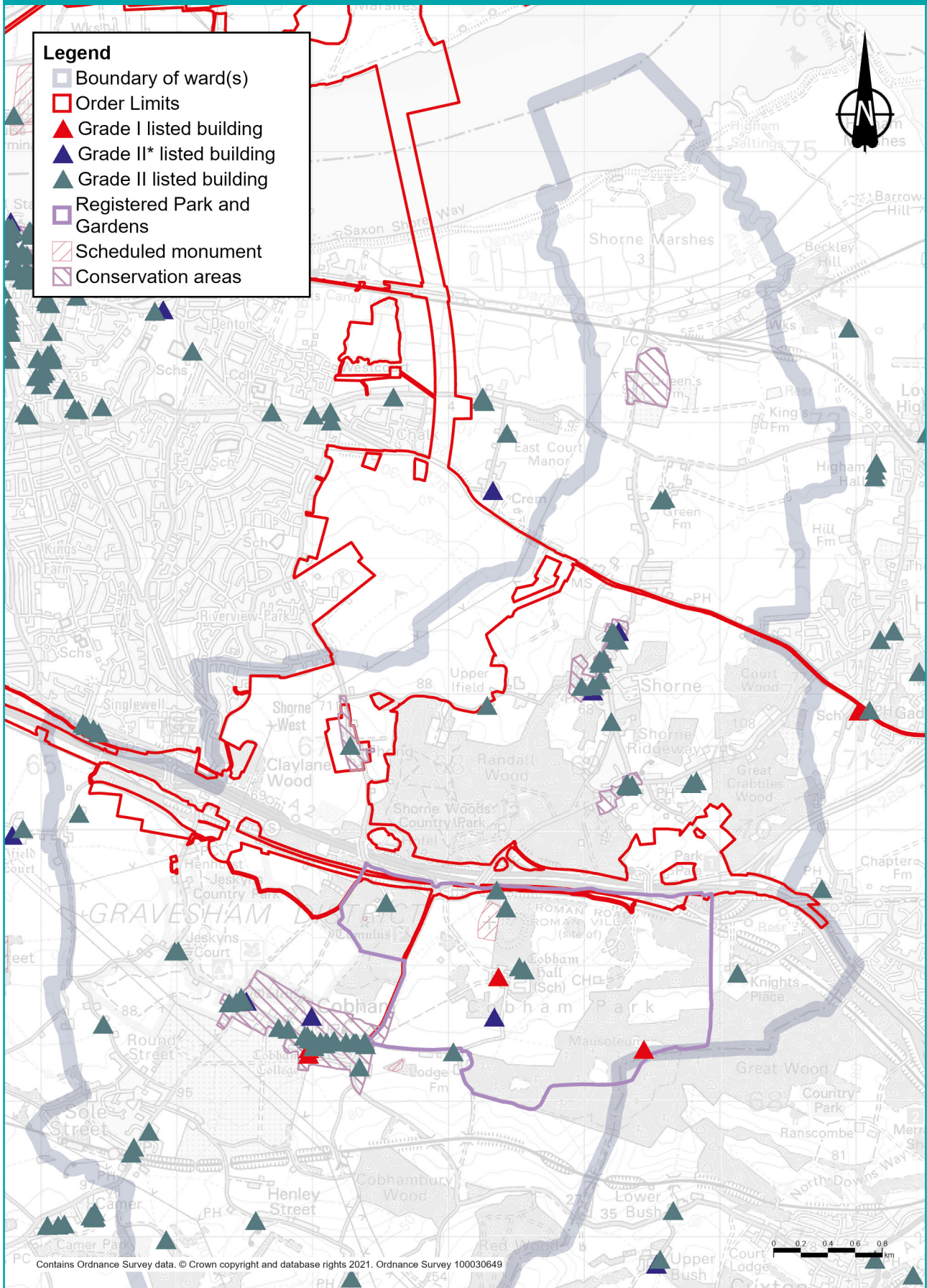
Existing situation

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.