2

Chapter 2: Higham ward

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

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

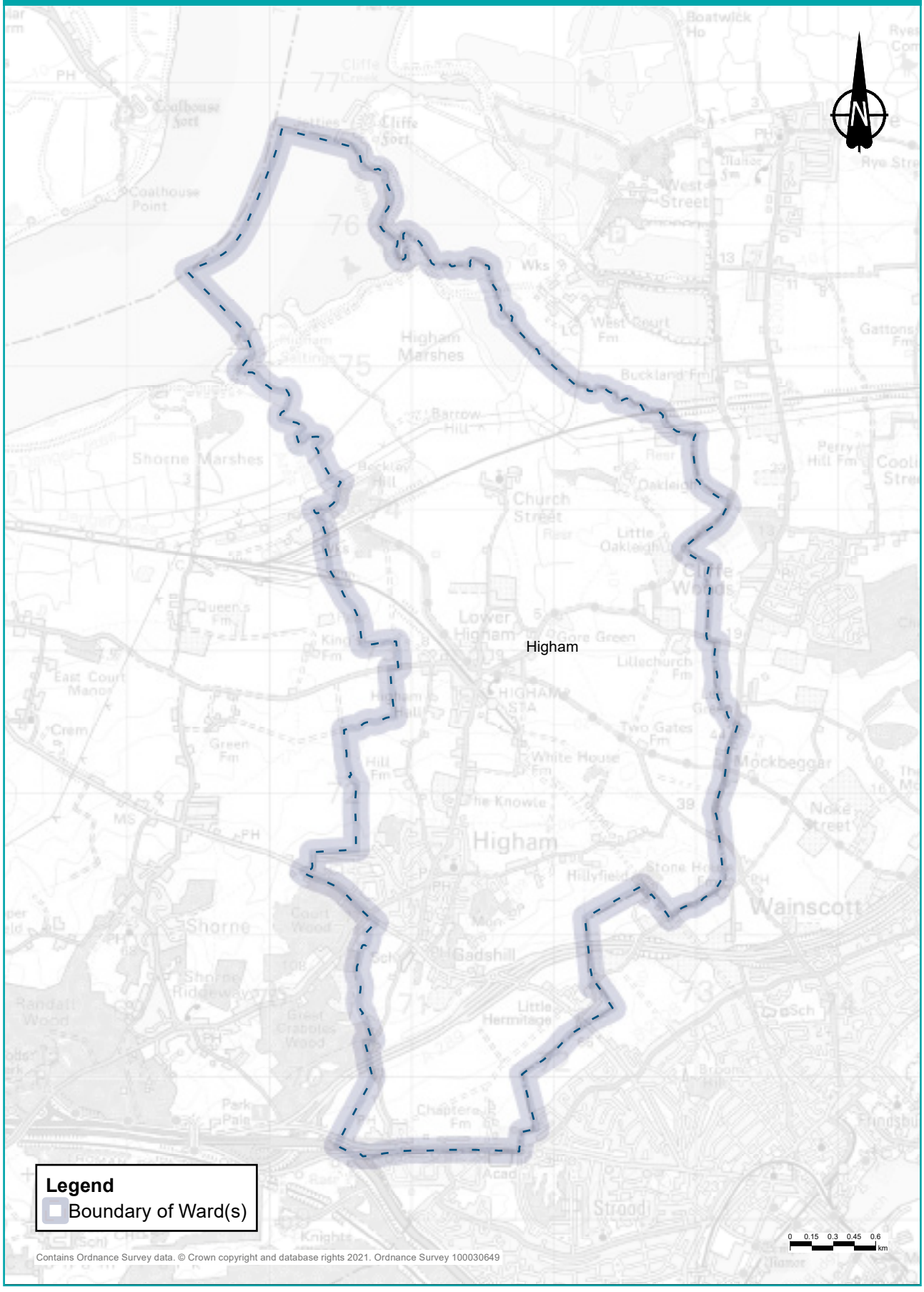
2.1 Overview

2.1.1 About this ward

Higham ward is located south of the River Thames in the borough of Gravesham and to the east of Shorne, Cobham and Luddesdown ward. Higham ward has an area of approximately 13km^2 and an estimated population of 3,868[1]. The ward includes Higham and Lower Higham villages to the north-west of the A226 Gravesend Road, along with areas of farmland and open space to the east and north, which include footpaths and bridleways. Higham station is located within the ward in Lower Higham, served by Southeastern and Thameslink services. The M2, including junction 1, runs along the southern boundary of the ward.

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

Figure 2.1: Ward boundary map for Higham ward



2.1.2 Summary of impacts

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

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

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

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

Topic	Construction	Operations
Air quality	**Impacts** Residents located within 200m of the project (east of the A2/M2 junction and west of the A226/A289 junction off Gravesend Road) may experience dust and emissions from construction equipment and traffic during the construction phase. Our analysis of construction traffic predicts that the impact on most roads in this ward would be negligible, although there would be a temporary minor worsening in air quality in the area around Chalk Road and A226 Gravesend Road as a result of traffic resulting from our traffic management and construction vehicles from 2026 to 2027. **Mitigation** The contractor would follow good practice construction measures which are presented in the CoCP and REAC to minimise the dust. Construction vehicles would need to comply with emission standards. An Air Quality Management Plan would be designed in consultation with the relevant local authorities. The plan would include details of monitoring, which would ensure measures are effectively controlling dust and exhaust emissions.	**Impacts** There are no predicted exceedances of NO_2 or PM_{10}. **Mitigation** As there are no predicted exceedances, no mitigation has been proposed.

Topic	Construction	Operations
Health	**Impacts** The construction phase of the project would present opportunities to access work and training. There is likely to be changes in the area that may result in negative impacts on health, including mental health and wellbeing. These include changes in accessibility of local resources and amenity as a result of construction traffic using the A226, as well as mental health and wellbeing impacts associated with stress and anxiety relating to the construction of the project. **Mitigation** 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.	**Impacts** There would be improvements in the accessibility of local facilities and amenities, better access to jobs and training, and to open spaces, including new recreational areas outside Higham, such as Chalk Park, near Gravesend. The operation of the project may give rise to some stress-related impacts. **Mitigation** No mitigation measures for health have been included.

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

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

2.2 Project description

2.2.1 Construction

Construction activities

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

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

Construction compounds and Utility Logistics Hub

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

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

Figure 2.2: Main construction areas in Higham ward

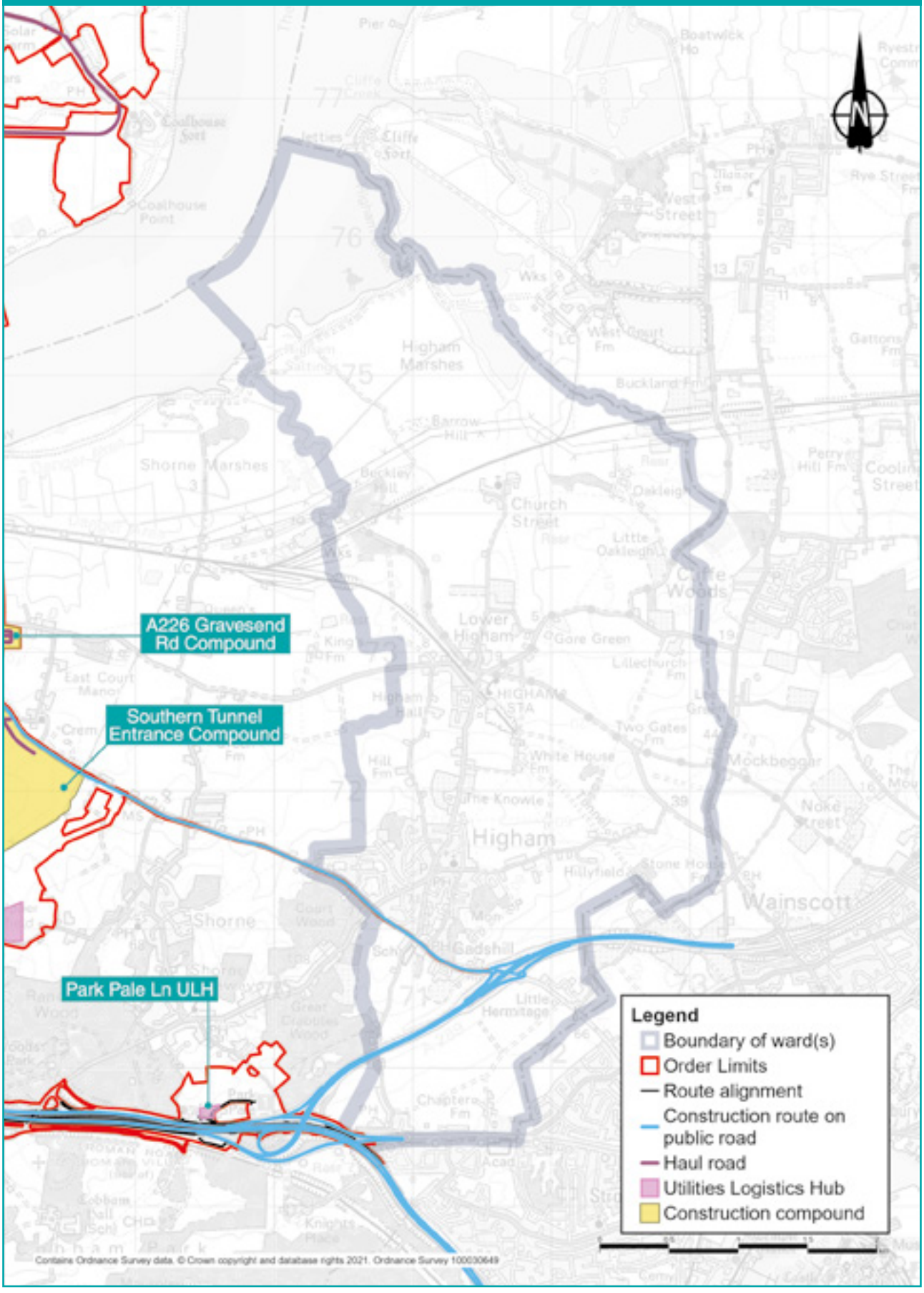


Table 2.2: Average daily vehicle numbers going to compounds near Higham ward

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

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

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

Construction routes on public roads

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

Construction schedule

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

Construction working hours

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

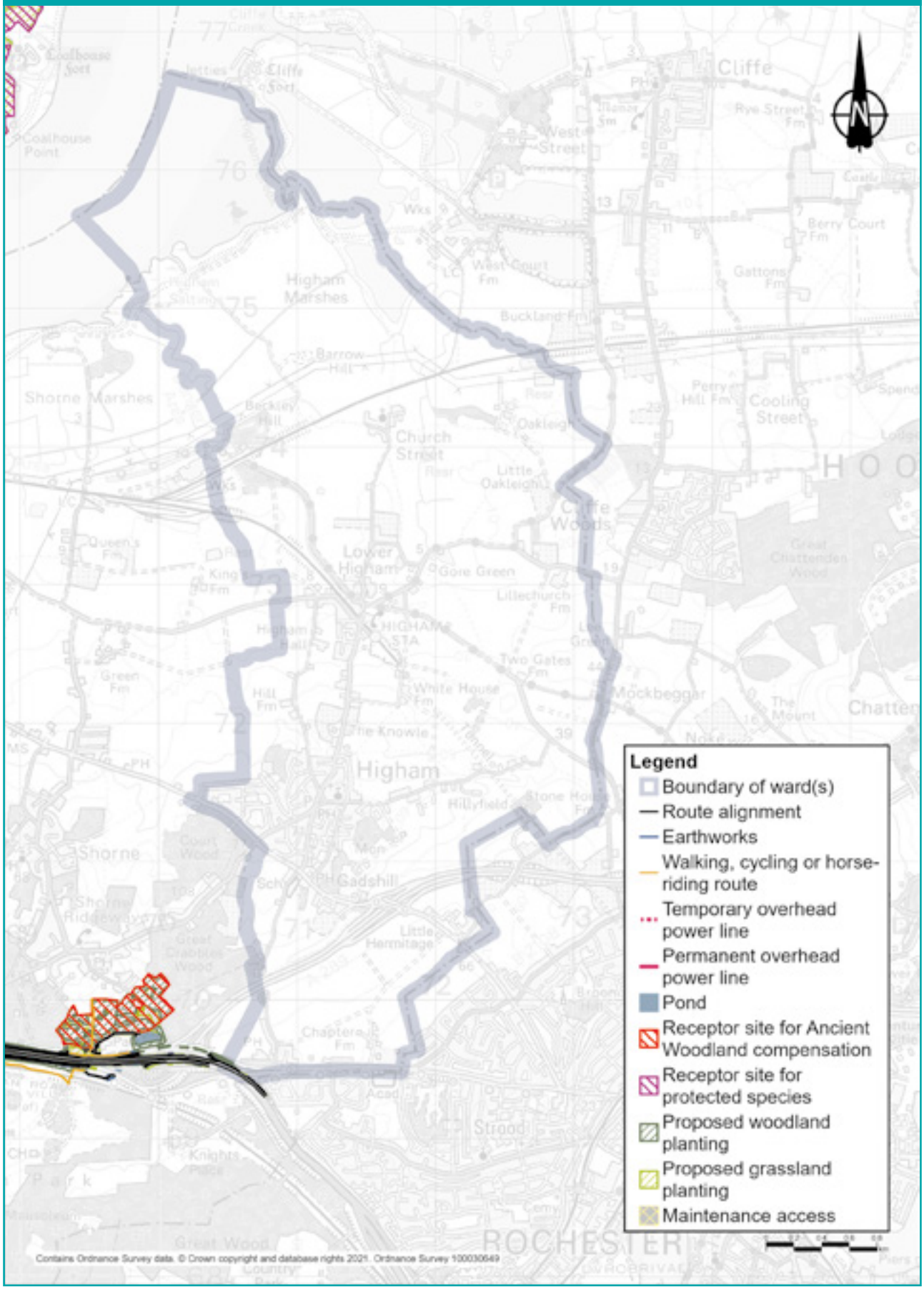
Traffic management

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

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

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

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



2.2.2 Operations

The completed project

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

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

Changes to the project since our design refinement consultation

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

Impacts on open space land

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

2.3 Traffic

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

2.3.1 Construction

Construction traffic impacts

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

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

Measures to reduce construction traffic impacts

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

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

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

2.3.2 Operations

Operational impacts

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

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

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

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

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

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

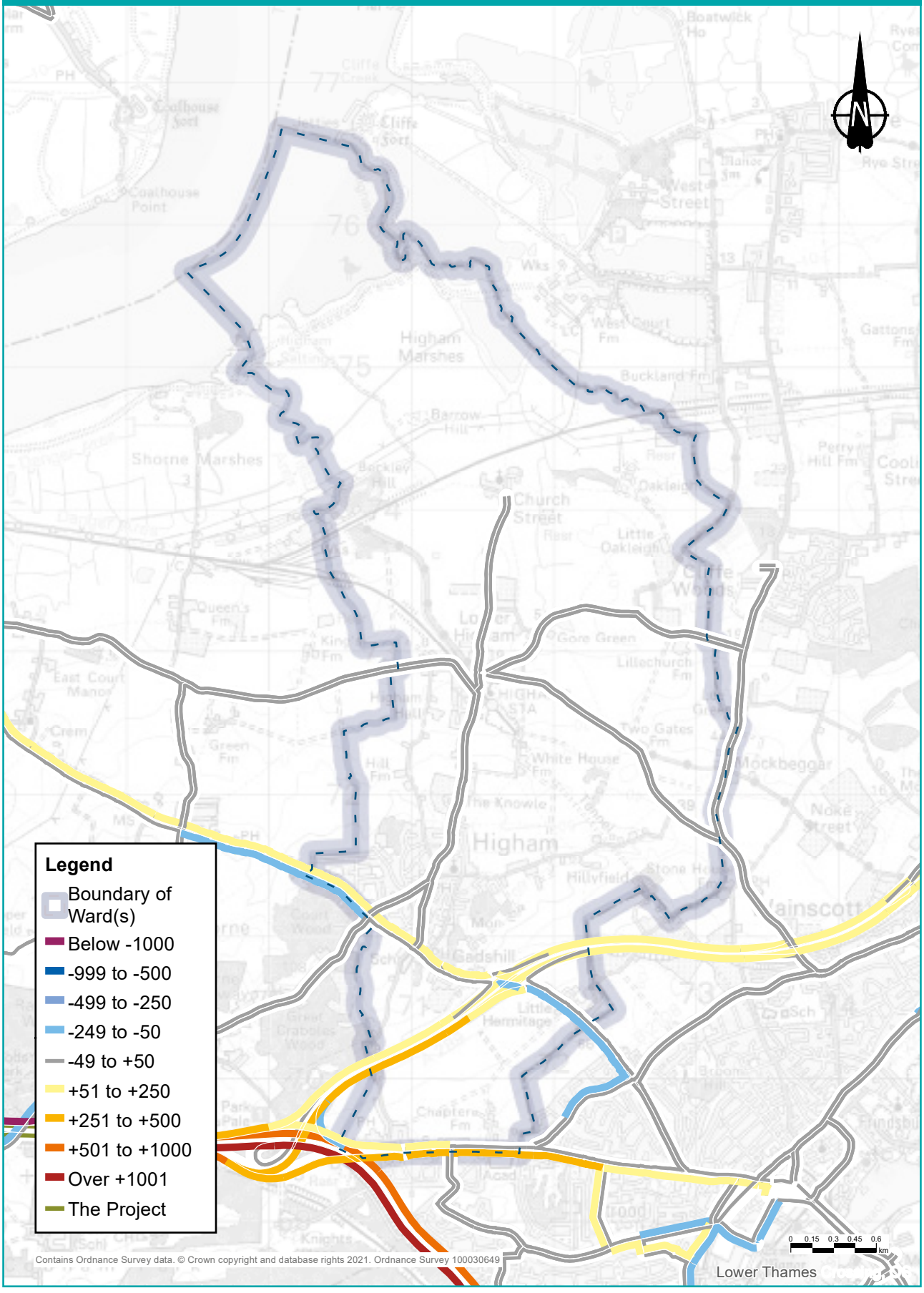


Figure 2.5: Predicted percentage changes to traffic flow during the morning peak in 2029

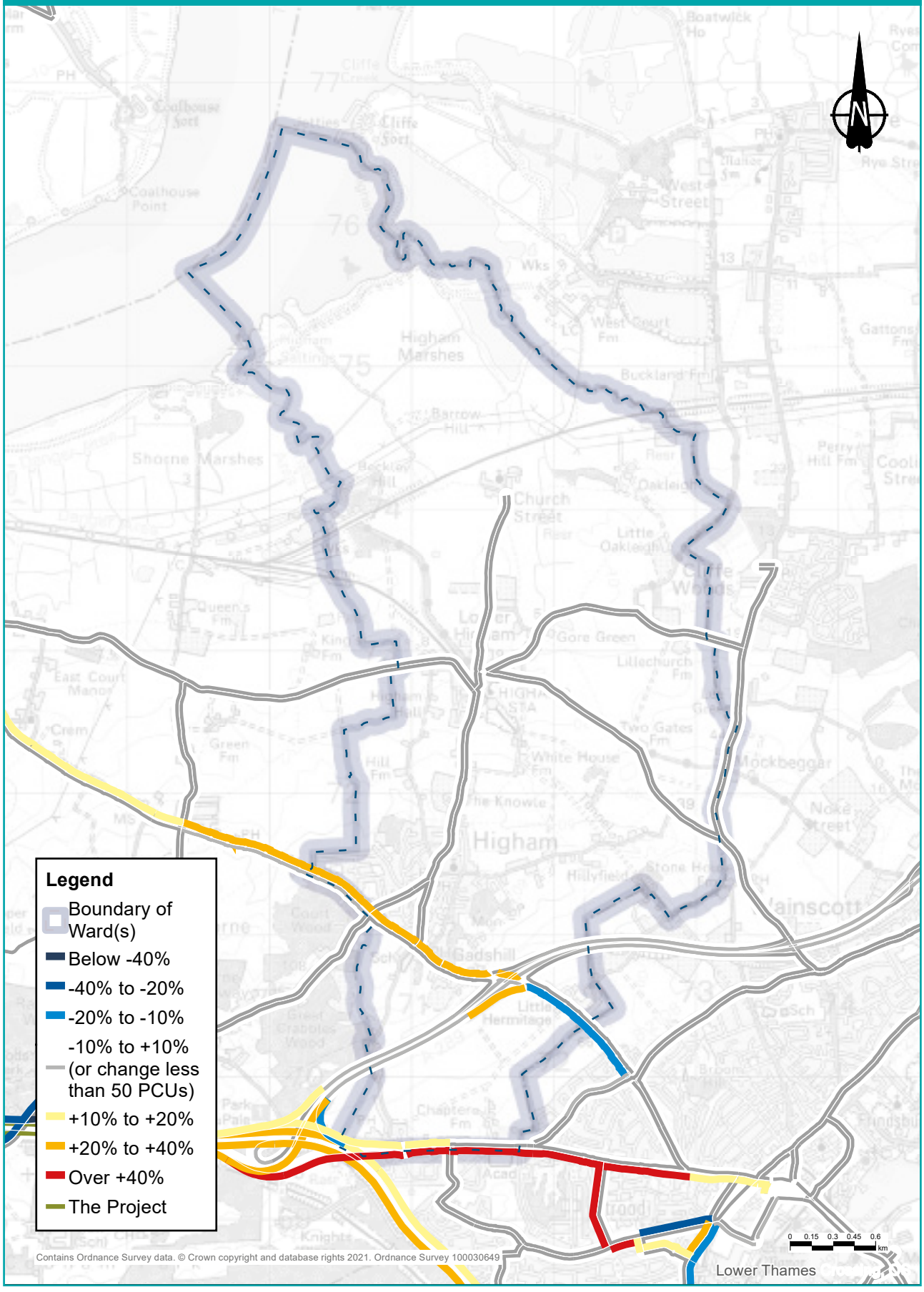


Figure 2.6: Predicted change in traffic flows (PCUs) with the project during the interpeak in 2029

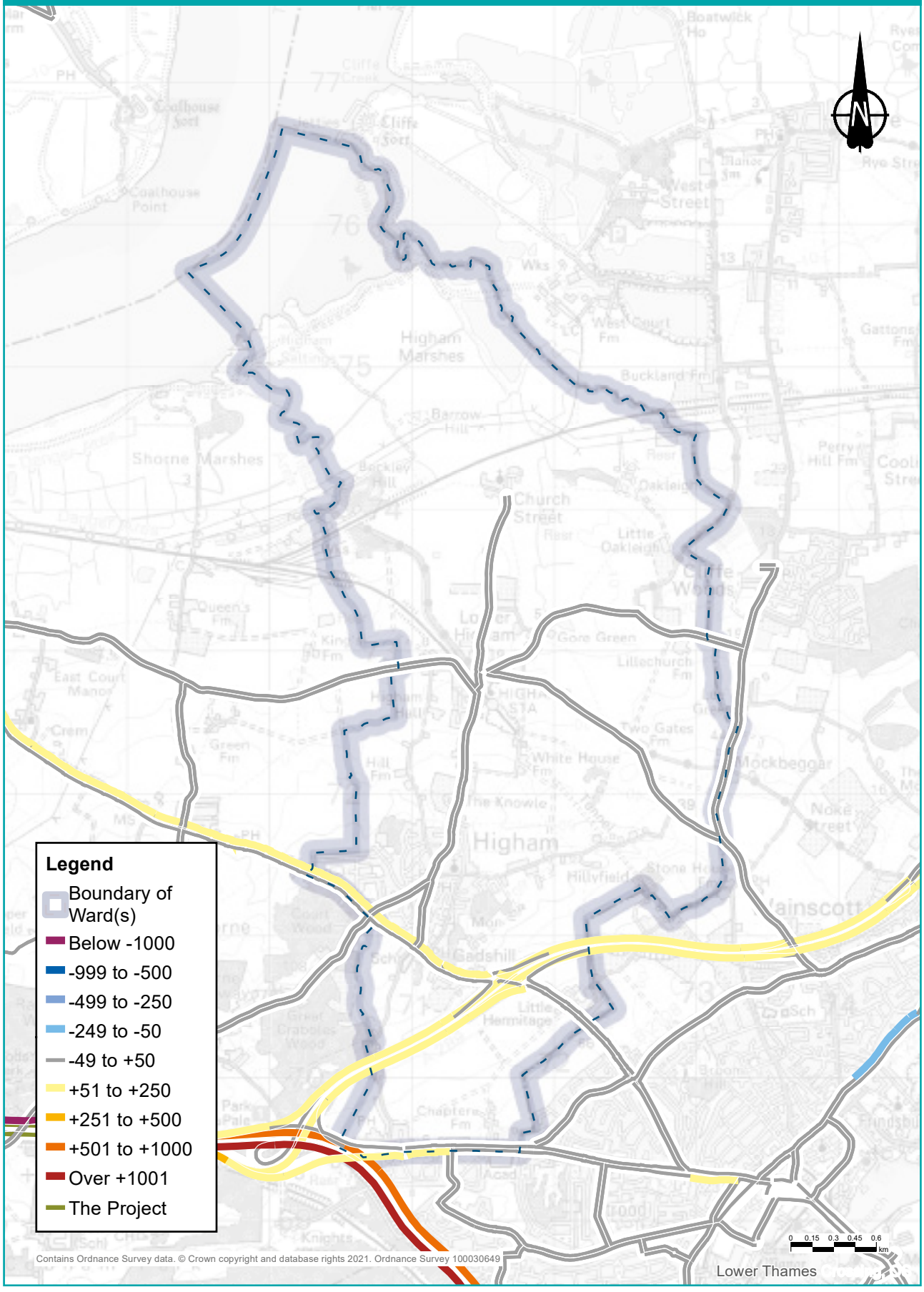


Figure 2.7: Predicted percentage changes to traffic flow during the interpeak in 2029

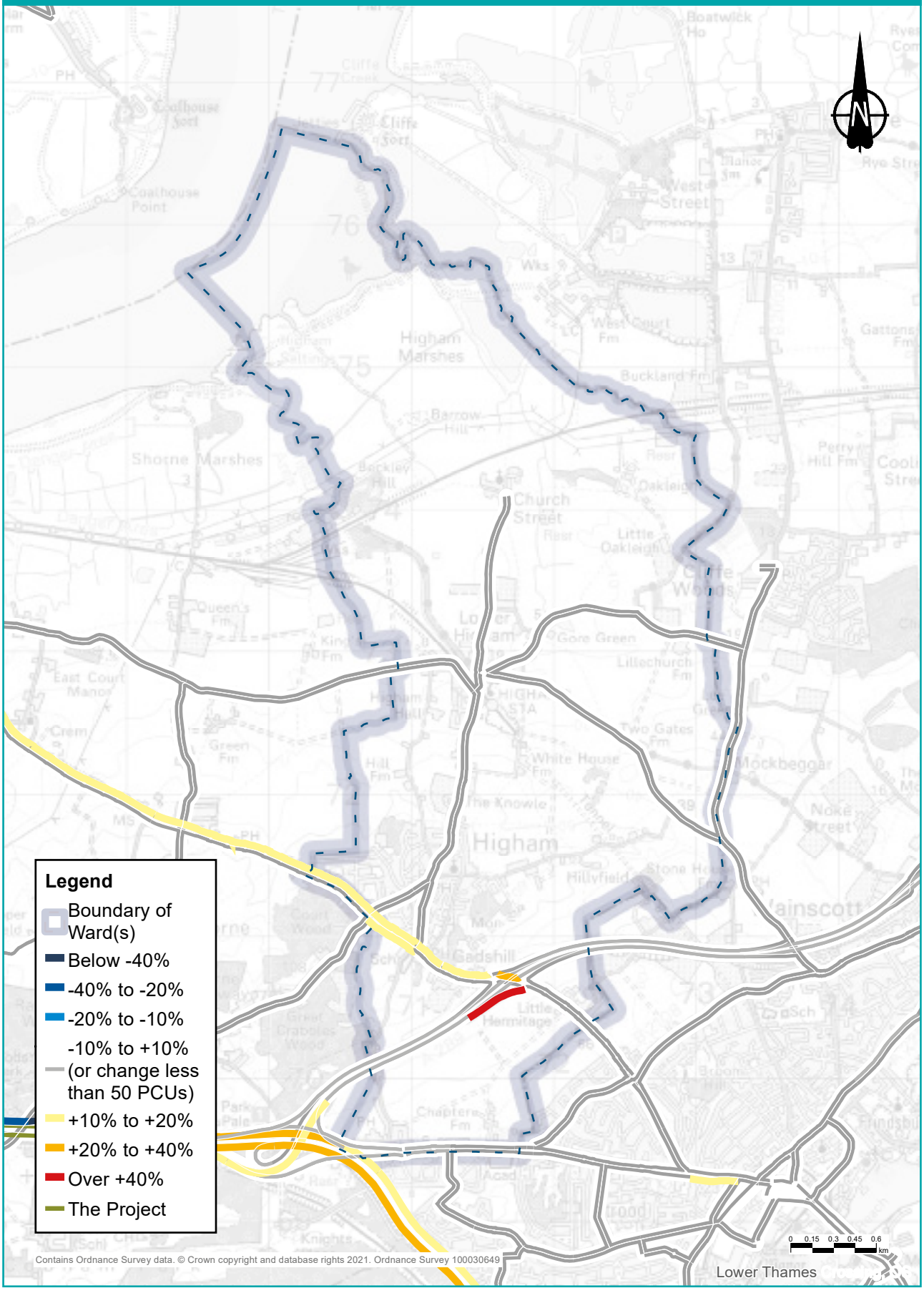


Figure 2.8: Predicted change in traffic flows (PCUs) with the project during the evening peak in 2029

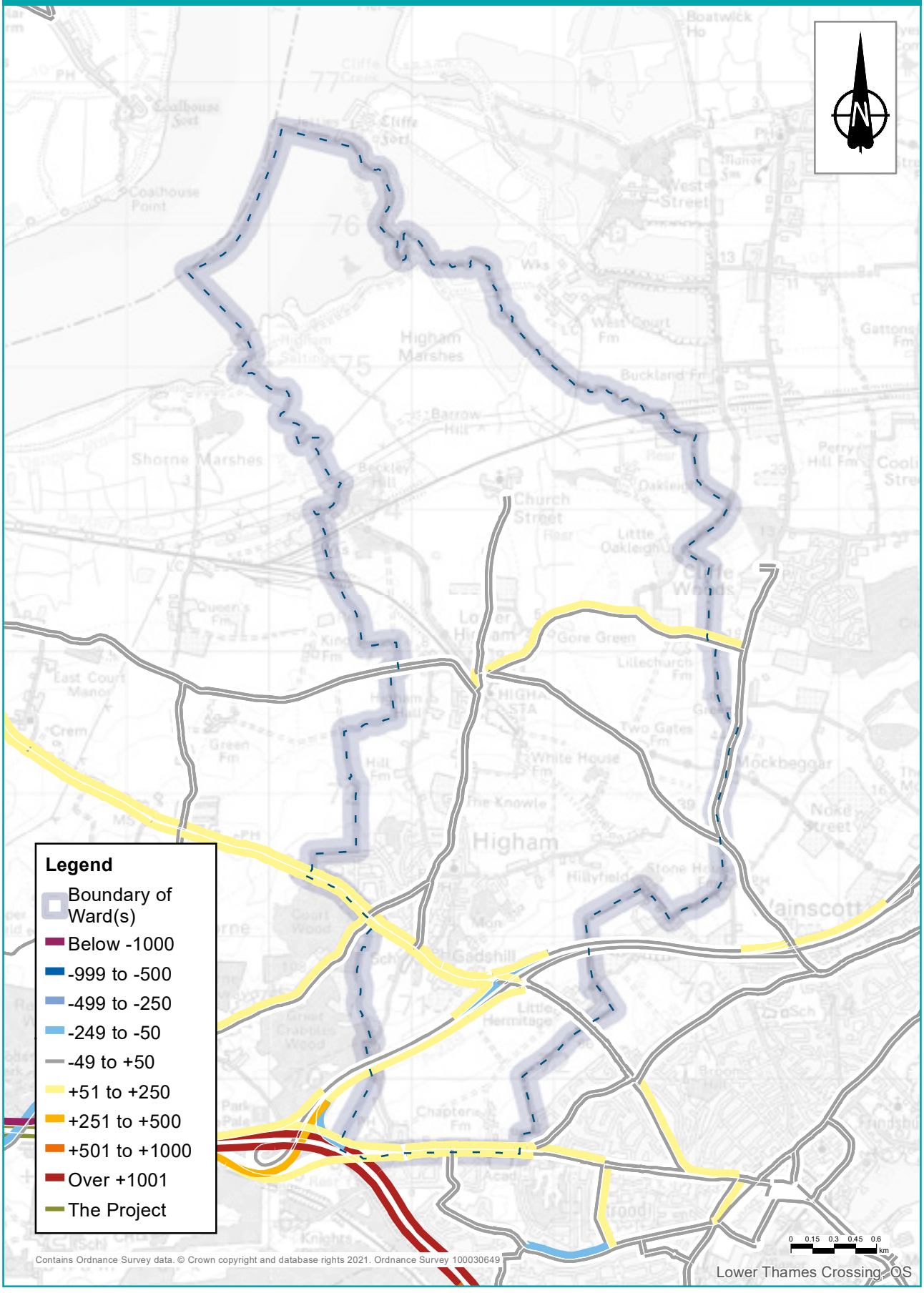
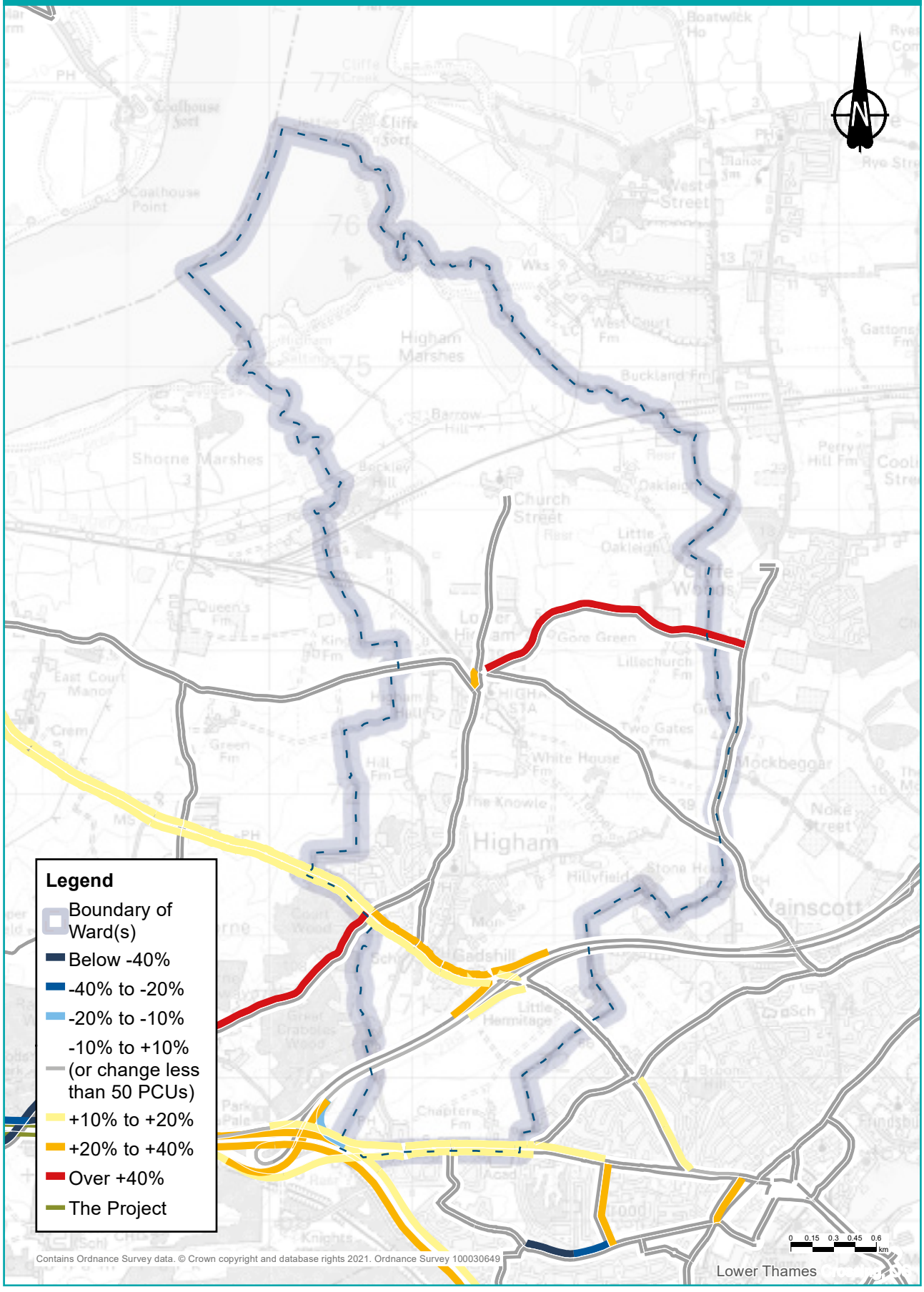


Figure 2.9: Predicted percentage changes to traffic flow during the evening peak in 2029



Changes to journey times

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

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

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

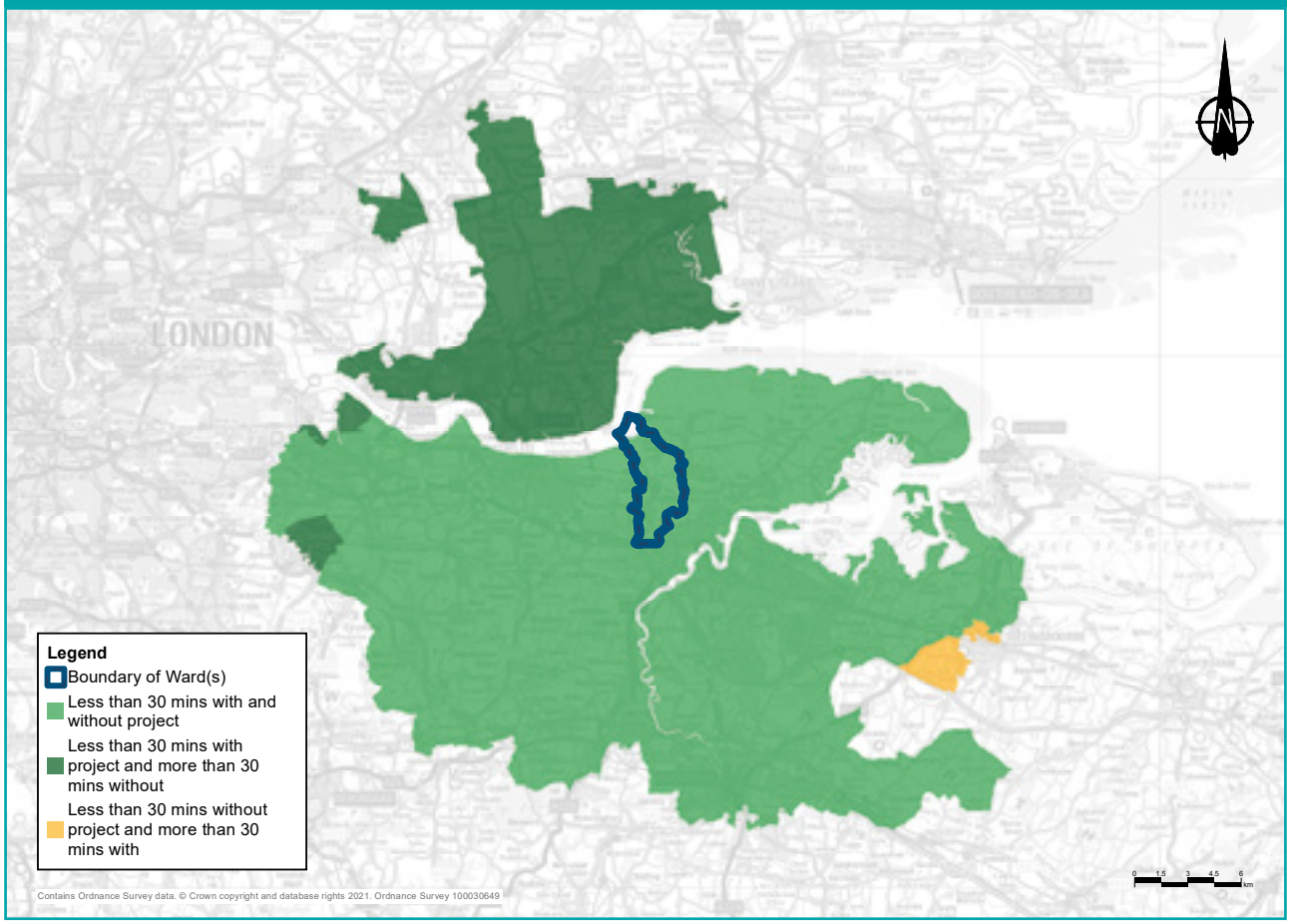
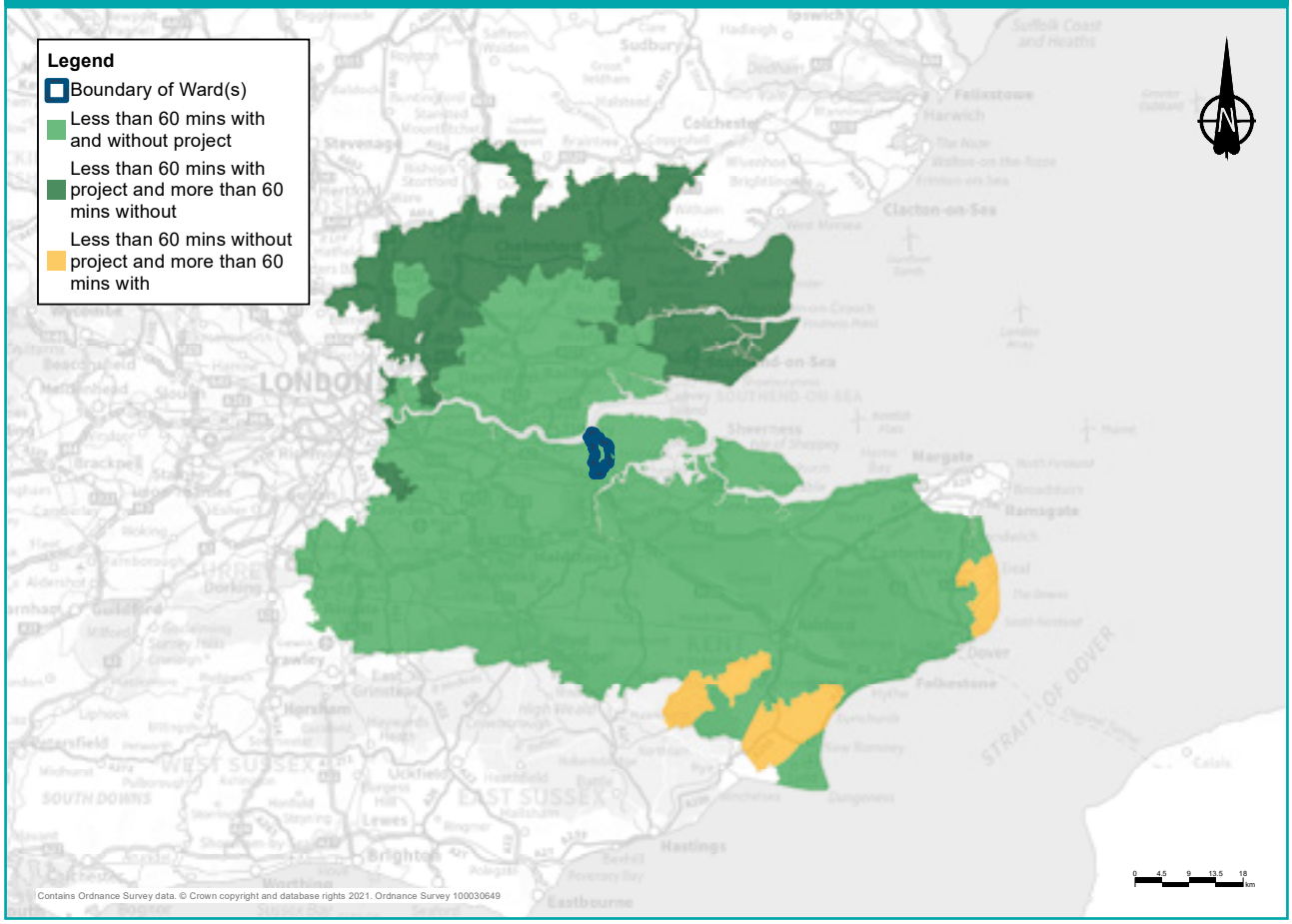


Figure 2.11: Change in area that motorists could drive to within 60 minutes from Higham ward



Operational traffic flows

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

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

2.4 Public transport

Existing situation

Higham ward is served by the North Kent railway line from London Charing Cross to Strood, which is used by Southeastern services from Kent into London, and Thameslink Services, which run from Kent and across London to destinations such as St Albans, Luton and Bedford. There is only one station in Higham ward, which is Higham station located in the hamlet of Lower Higham.

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

2.4.1 Construction

Rail

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

Buses

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

2.4.2 Operations

Rail

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

Buses

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

2.5 Footpaths, bridleways and cycle routes

Existing situation

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

2.5.1 Construction

Construction impacts

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

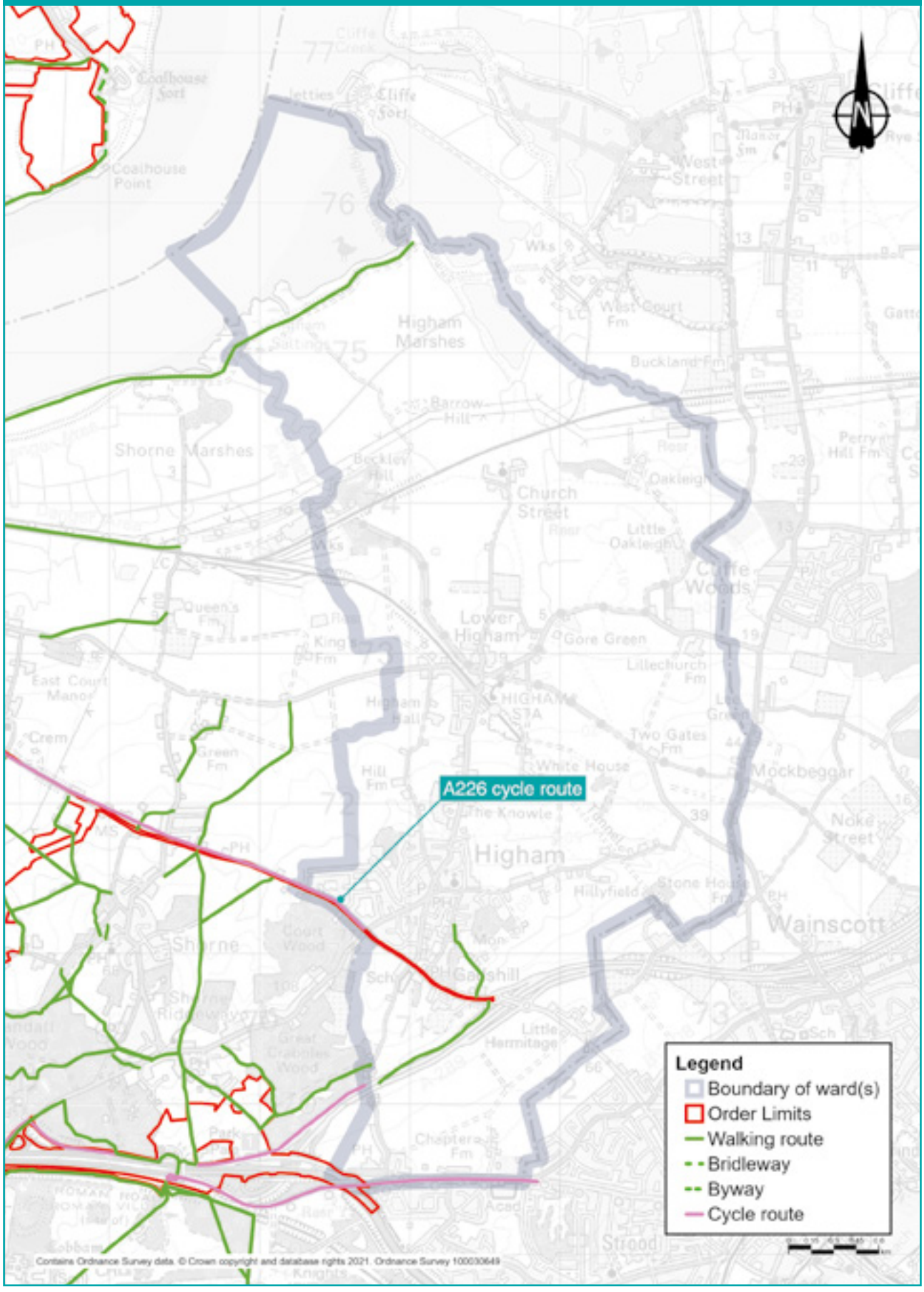
The cycle lanes along the A226 would be impacted during the first year of construction while access to work compounds are constructed. During this period, the A226 would be under a single lane traffic control system.

2.5.2 Operations

Operational impacts

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

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



2.6 Visual

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

Existing situation

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

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

2.6.1 Construction

Construction impacts

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

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

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

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

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

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

Measures to reduce visual impacts during construction

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

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

2.6.2 Operations

Operational impacts

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

Measures to reduce visual impacts during operation

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

2.7 Noise and vibration

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

Existing situation

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

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

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

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

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

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

2.7.1 Construction

Daytime construction noise impacts

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

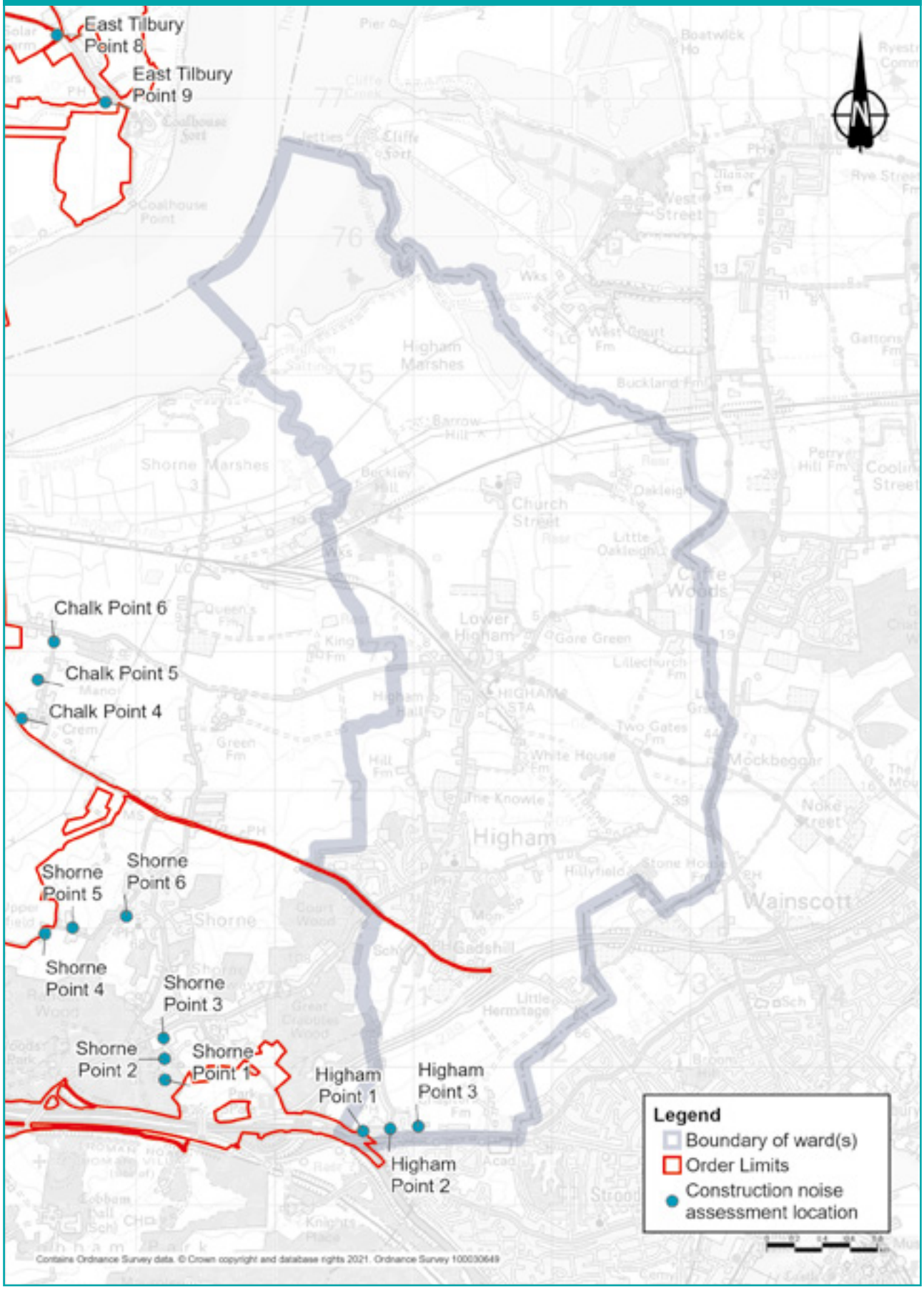
Within the ward there aren't any percussive or vibratory works proposed to be undertaken.

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

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

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

Figure 2.13: Construction noise assessment locations in Higham ward



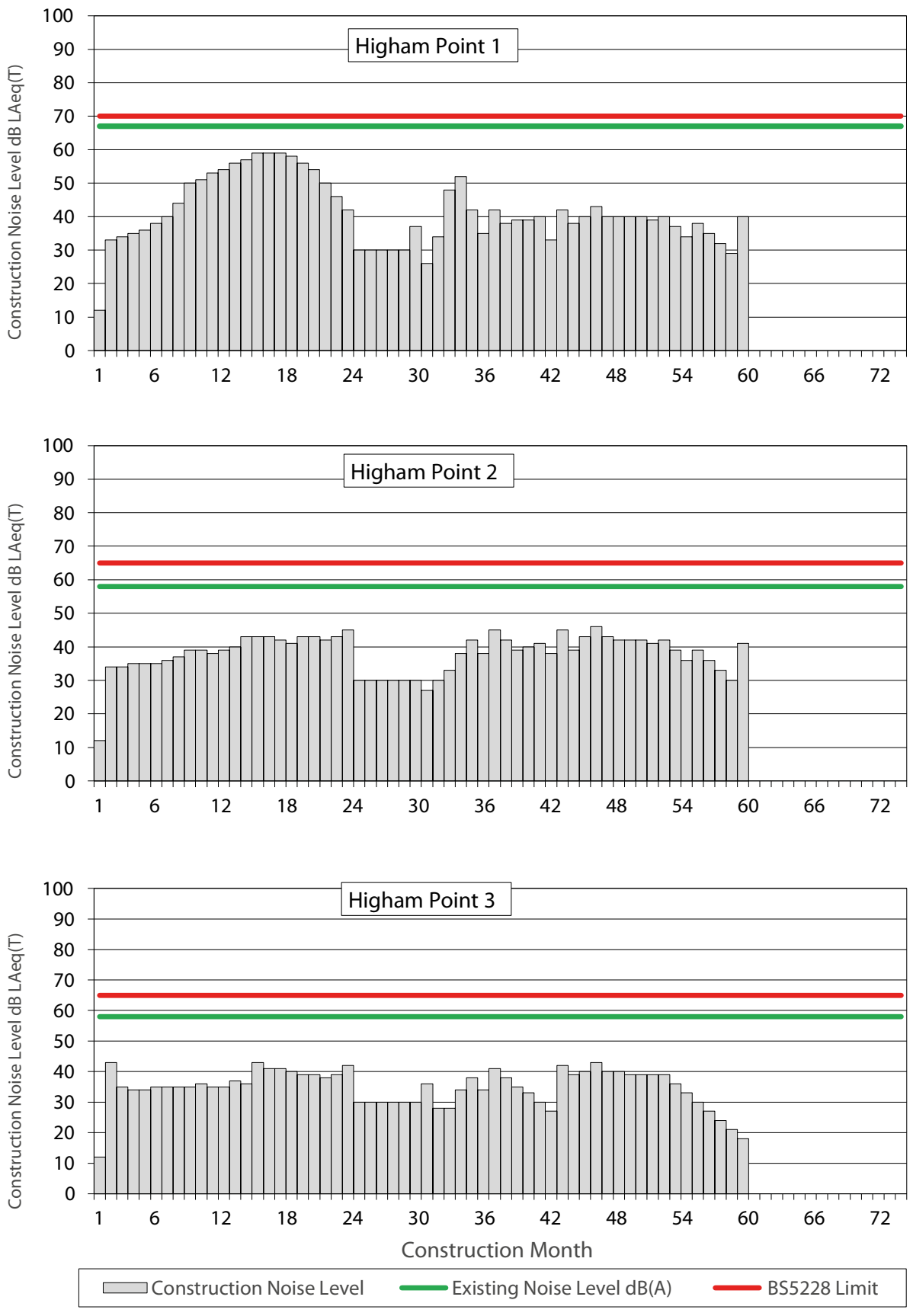
Each vertical bar in figure 2.14 shows the predicted noise levels for that month of the construction period (from month 1 to month 72). The horizontal green line in each chart shows the existing background noise level at each assessment point without the project. The horizontal red line shows the level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

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

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

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

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



24/7 construction working

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

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

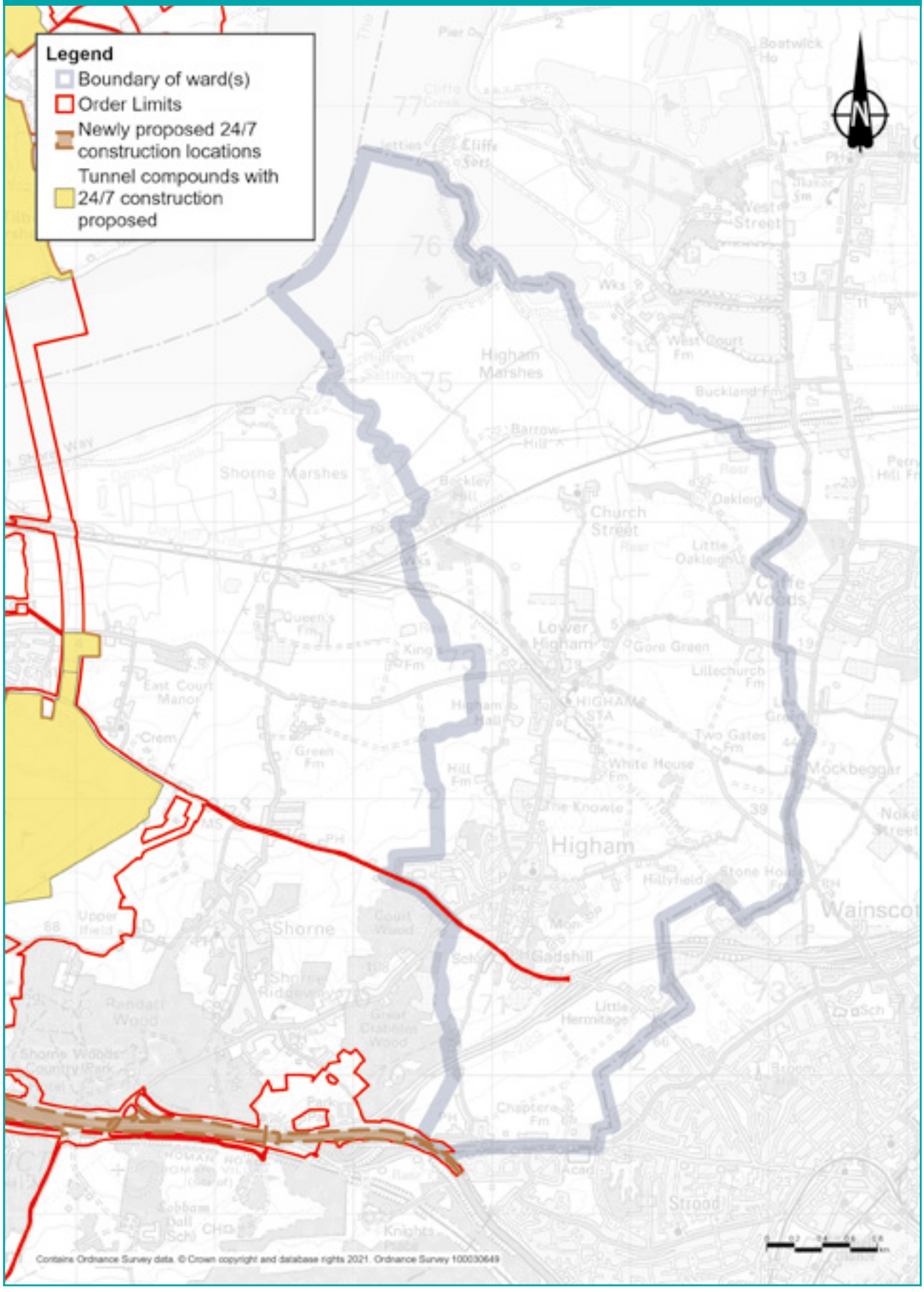
Construction traffic noise impacts

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

Table 2.3: Construction traffic noise in Higham ward

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

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



Measures to reduce construction noise and vibration

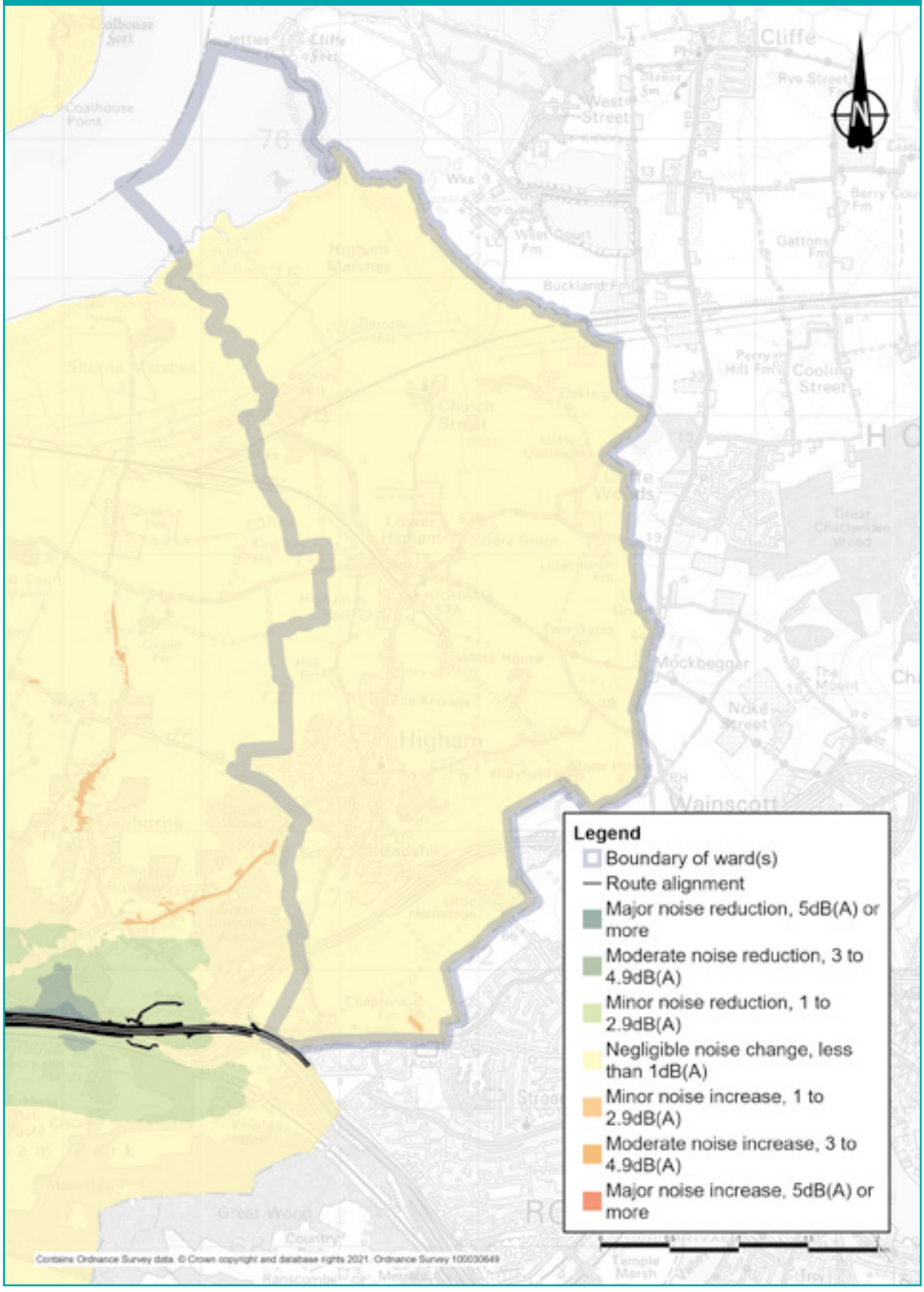
Construction noise levels would be controlled primarily through the implementation of Best Available Techniques (BAT), with specific measures used at certain locations such as:

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

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

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

Figure 2.16 Noise impacts during operation in Higham ward



2.7.2 Operations

Operational noise impacts

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

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

Measures to reduce traffic noise during operation

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

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

2.8 Air quality

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

Existing situation

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

2.8.1 Construction

Construction impacts

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

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

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

Measures to reduce air quality impacts during construction

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

2.8.2 Operations

Operational impacts

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

There are receptors (properties or habitats that are sensitive to changes in air quality) within the ward, close to the east of the proposed A2/M2 junction and west of the A226/A289 junction off Gravesend Road that are predicted to experience a minor worsening in the air quality for nitrogen dioxide (NO_2), the main traffic-related pollutant[3]. The highest modelled yearly average NO_2 concentration within this ward is 36.0 µg/m³ (close to the M2), which is below the yearly average threshold of 40µg/m³. Our assessment is based on our opening year model, which represents a worst-case scenario, without accounting for the increase in less-polluting vehicles on our roads over time.

3 NO_2 levels are measured in 'micrograms per cubic metre', or µg/m³, where a microgram is one millionth of a gram.

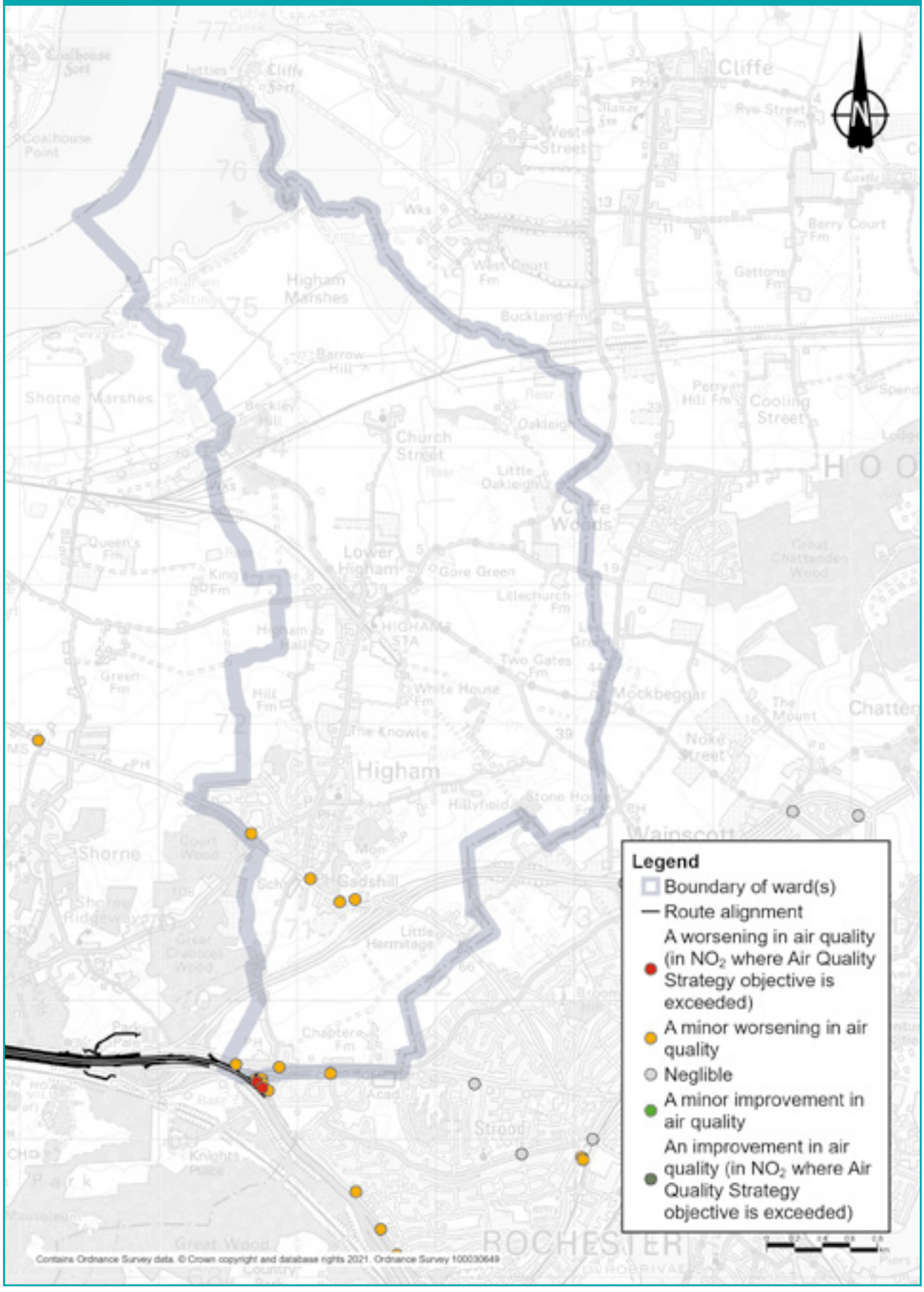
Furthermore, local air quality data shows an overall downward trend in NO_2 over recent years, which means that future air quality improvements at this location are likely (for example, through increased adoption of electric vehicles meaning a reduction in exhaust emissions).

In addition to our assessment of NO_2, our assessment predicts that PM_{10} levels (small particles of dust, mainly from vehicle exhausts and brakes) are unlikely to exceed threshold levels across the assessed area.

Measures to reduce air quality impacts during operation

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

Figure 2.17: Predicted changes in NO_2 levels within Higham ward once the new road is open



2.9 Health

Existing situation

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

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

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

2.9.1 Construction

Construction impacts

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

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

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

Measures to reduce impacts on health during construction

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

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

2.9.2 Operations

Operational health impacts

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

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

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

Measures to reduce operational health impacts

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

2.10 Biodiversity

Existing situation

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

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

2.10.1 Construction

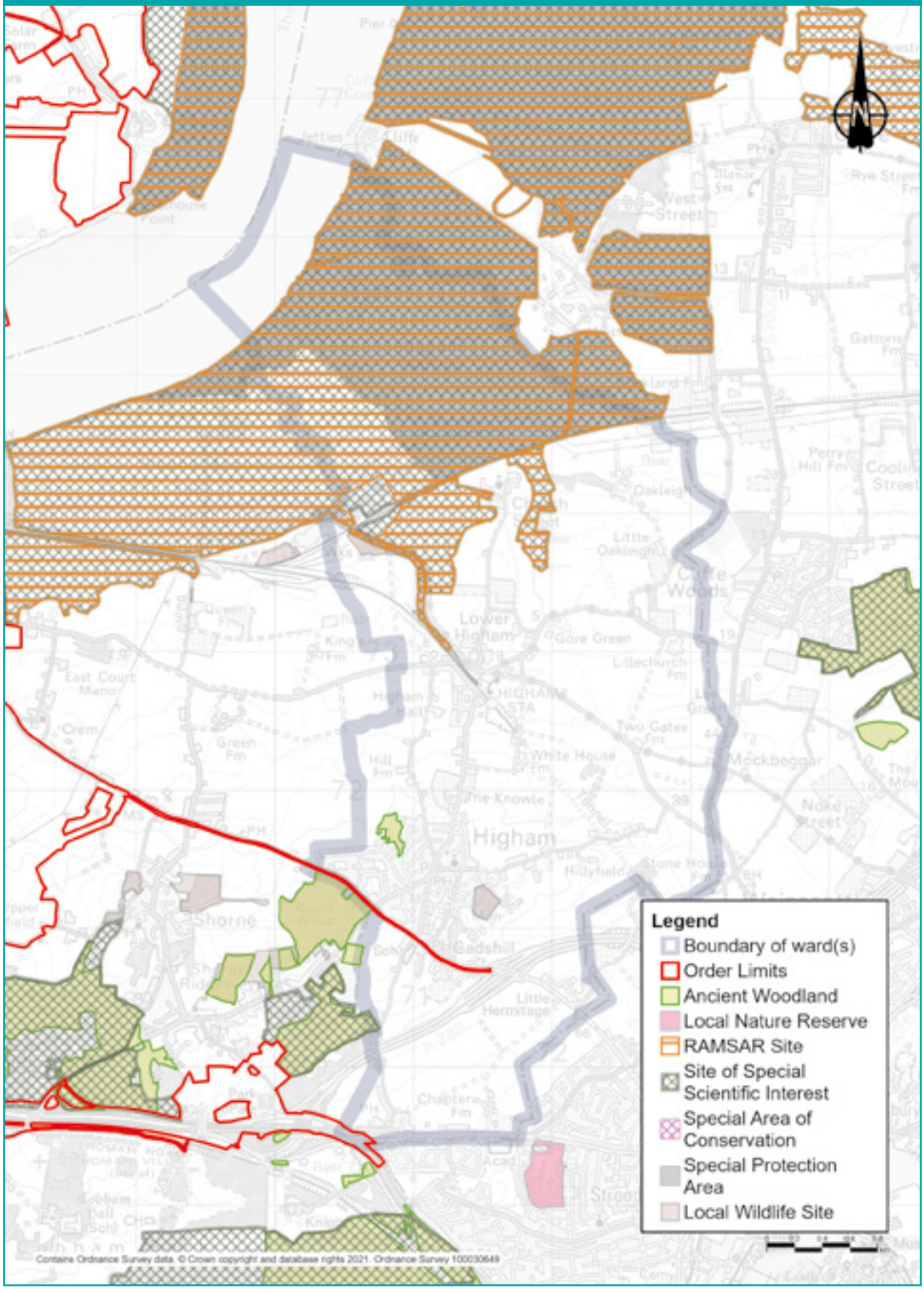
Construction impacts

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

Measures to reduce biodiversity impacts during construction

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

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



2.10.2 Operations

Operational impacts

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

Measures to reduce biodiversity impacts during operation

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

2.11 Built heritage

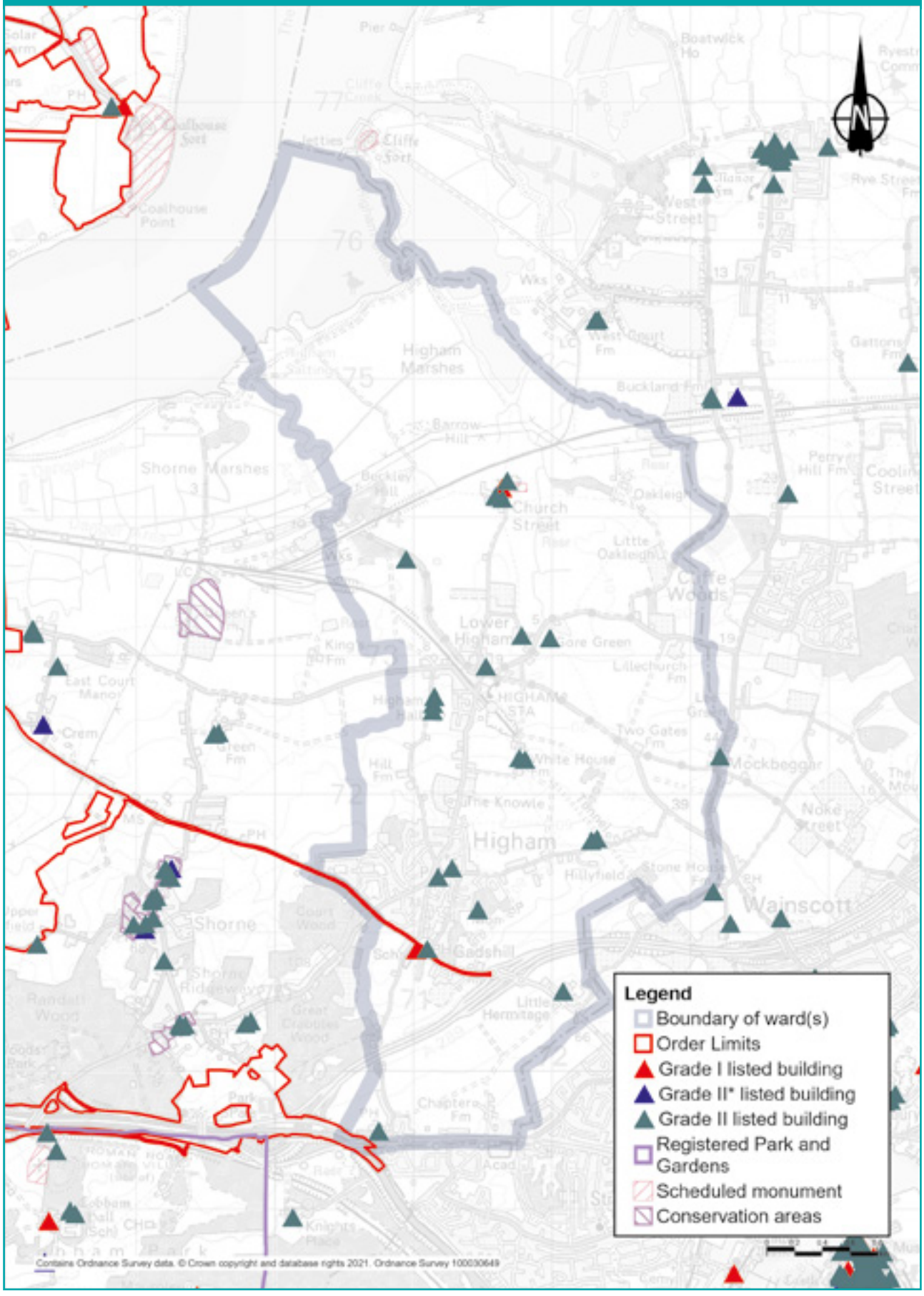
Existing situation

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

The listed buildings are:

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

Figure 2.19 Built heritage in Higham ward



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

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

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

2.11.1 Construction

Construction impacts

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

Measures to reduce construction impacts on built heritage

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

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

2.11.2 Operations

Operational impacts

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

Measures to reduce the operational impacts

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

2.12 Contamination

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

2.12.1 Construction

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

2.12.2 Operations

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