A122 LOWER THAMES CROSSING

Local Impact Report

Produced by Kent County Council
(Interested Party Reference Number: 20035779)

18th July 2023

Table of Contents

Executive Summary

This Local Impact Report (LIR) has been prepared by Kent County Council (KCC) as a statutory consultee, in accordance with advice and requirements set out in the Planning Act 2008, the Localism Act 2011 and Advice Note One: Local Impact Reports (Version 2, April 2012, The Planning Inspectorate). The LIR covers areas where the County Council has a statutory function or expertise. The County Council defers to Local Authorities on other matters, as set out within this LIR.

The Lower Thames Crossing (LTC) is a proposed new road link between the M25 in Havering; the A13 in Thurrock and the A2 in Kent, including a tunnel section to cross the River Thames to the east of the existing A282 Dartford Crossing. Key locations of impacts discussed in this LIR are shown in Appendix A.

The location of the scheme has a positive impact on KCC's overarching strategy for improving the routing of road haulage traffic between the north and international gateways of The Chanel Tunnel and especially the Port of Dover. The LTC must support the bifurcation or splitting of traffic such that a greater share of traffic can be routed along the A2/M2 corridor to Dover, rather than the M20/A20, for day-to-day use and to improve wider network resilience. To achieve this strategy though, the LTC must be supported by capacity enhancements along the entire M2/A2 corridor and improved links between the two motorway corridors.

Some characteristics of the Project are as follows:

- 14.3 miles of new road and around 50 new bridges and viaducts,
- Two 2.6-mile tunnels, becoming the longest road tunnel in the UK,
- Tunnel bore over 16 metres in diameter, becoming the third widest bored tunnel in the world,
- Three lanes in both directions (except the northern section of the route between the M25 and A13 where the road will be two lanes wide),
- Defined as an "all-purpose trunk road" but with restrictions so only vehicles allowed on motorways would be able to use it,
- No hard shoulder but featuring technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling, and
- Emergency areas spaced at intervals of less than one mile.

Key planning history milestones related to the Project include the following:

- The 1991 addition of capacity to the Dartford Crossing, with the Queen Elizabeth II (QE2) bridge catering for southbound traffic while northbound traffic uses two tunnels dating back to the 1960s and 1980s.
- The Channel Tunnel Rail Link Act 1996 and the introduction of domestic high speed rail services in Kent, together with the improvement of the A2 and M2 corridors in the vicinity of the southern tunnel portal of the Project.

- Consultations related to the Project in 2013, 2016, 2018, 2020 (two consultations), 2021, 2022 and 2023.

Relevant KCC policy documents include:

- Framing Kent's Future (2022)
- Local Transport Plan 4: Delivering Growth without Gridlock (2016-2031) (LTP4)
- Kent and Medway Growth and Infrastructure Framework (GIF) (2018)
- Active Travel Strategy
- Vision Zero Road Safety Strategy (2021)
- Kent Design Guide
- Kent Minerals and Waste Local Plan
- Drainage and Planning Policy Statement
- Rights of Way Improvement Plan (RoWIP) 2018-2028
- Kent Environment Strategy (2016)
- Kent and Medway Low Emission Strategy (2020)
- Kent Plan Tree (2022)
- Kent Plan Bee (2022)
- Kent Joint Health and Wellbeing Strategy

Relevant development proposals under consideration include:

- Local Plans developed by each Local Planning Authority.
- The London Resort - leisure development on Swanscombe Peninsular.
- Northfleet Harbourside - mixed-use development on land surrounding Ebbsfleet United Football Ground.

KCC has been consulted on the scope of the DCO and has considered the following local impacts which are brought to the attention of the Examining Authority:

- Highways and Transport
- Public Rights of Way
- Minerals and Waste
- Sustainable Urban Drainage Systems (SUDS)
- Biodiversity
- Climate Change
- Heritage Conservation
- Other Matters

This LIR outlines the positive, neutral and negative impacts KCC considers the Project will have on the local area. These categories of impacts are covered in the remaining paragraphs of this Executive Summary. For impacts relating to Air Quality, Landscape and Visual, and Noise and Vibration, we would defer to the Local Impact Reports produced by relevant Local Authorities.

Highways and Transport

KCC has identified the following Strategic Impacts:

- Strategic Impact A: Improved network resilience - Positive

- Strategic Impact B: Reduced journey time delays - Positive
- Strategic Impact C: Increased journey time reliability - Positive
- Strategic Impact D: Supports Bifurcation between A2/M2 and M20/A20 Corridors – Positive
- Strategic Impact E: Generation of economic benefits – Positive

KCC has identified the following Transport Impacts (shown in the map in Appendix A), not just through assessment of the application documents but also through use of a cordon of the Applicant's Lower Thames Area Model (LTAM), the use of KCC's own Kent Transport Model (KTM), and using the latter, the Wider Network Impacts (WNI) study (the work to date, the Task 1 Report, is attached in Appendix B):

- Transport Impact A: Impacts of the LTC on the Strategic Road Network (SRN) - Negative
- Transport Impact B: Wider Network Impacts (WNI) - Negative
- Transport Impact C: Impacts of the LTC on the A229 Blue Bell Hill - Negative
- Transport Impact D: Road Safety Impacts of the LTC - Positive (but Negative on LRN)
- Transport Impact E: Public Transport and Active Travel Impacts of the LTC - Negative
- Transport Impact F: Severance Issues for Walkers, Cyclists and Horse Riders (WCH) - Positive and Negative
- Transport Impact G: Dangerous Goods Vehicles and Oversized Vehicles – Negative (but potential to be Positive)
- Transport Impact H: Construction Shifts and Deliveries - Negative
- Transport Impact I: Construction Traffic Routeing - Negative
- Transport Impact J: Construction Impacts on the Condition of the Existing Local Road Network (LRN) - Negative
- Transport Impact K: Highways Asset generation and impact of transference from National Highways to Kent County Council - Negative

Public Rights of Way (PRoW)

KCC has identified the following impacts on Public Rights of Way (PRoW):

- PRoW Impact A: Enhancements to the Public Rights of Way Network - Positive
- PRoW Impact B: Omission of improvements to bring Hares Bridge up to cycling / equestrian standard - Negative
- PRoW Impact C: Omission of improvements to bring key structures up to cycling / equestrian standard - Negative
- PRoW Impact D: Designation of temporary National Cycle Route (NCR) 177 - Negative
- PRoW Impact E: Absence of construction detail - Negative
- PRoW Impact F: Existing leisure/recreation PRoW use - Negative

Minerals and Waste

KCC has identified the following impacts on Minerals and Waste:

- Minerals and Waste Impact A: Mineral Safeguarding - Neutral
- Minerals and Waste Impact B: Waste Generation – Positive

Sustainable Urban Drainage Systems (SUDS)

KCC has identified the following Sustainable Urban Drainage Systems (SUDS) impacts:

- SUDS Impact A: Departure on Peak Rainfall - Negative
- SUDS Impact B: Drainage design of realigned or widened highway - Positive
- SUDS Impact C: Watercourse channels - Neutral/Positive
- SUDS Impact D: Discharge rates - Positive
- SUDS Impact E: Surface flooding 1 - Negative
- SUDS Impact F: Surface flooding 2 - Neutral/Positive
- SUDS Impact G: Flood issue - Positive
- SUDS Impact H: Surface water flow path - Negative
- SUDS Impact I: Groundwater flooding - Negative/Neutral
- SUDS Impact J: Flooding from sewers and water mains - Negative
- SUDS Impact K: Surface water run off - Negative
- SUDS Impact L: Discharged water run off - Neutral
- SUDS Impact M: Contamination - Neutral
- SUDS Impact N: Permanent Drainage System - Negative
- SUDS Impact O: Box Culvert Installation - Negative
- SUDS Impact P: Management of surface water - Neutral
- SUDS Impact Q: Sustainable Drainage Systems - Neutral
- SUDS Impact R: Ponds - Neutral/Positive (but potential to be Negative)
- SUDS Impact S: Infiltration basins - Negative
- SUDS Impact T: Rainfall runoff - Negative

Health

KCC has identified the following Health impacts:

- Health Impact A: Air quality during construction and operation - Neutral (however further information is required)
- Health Impact B: Active Travel Impacts by Ward - Positive/Neutral

Biodiversity

KCC has identified the following impacts on Biodiversity:

- Biodiversity Impact A: Foraging/Commuting Bats and associated habitat - Negative/Neutral

- Biodiversity Impact B: Roosting Bats - Neutral
- Biodiversity Impact C: Dormouse - Negative/Neutral
- Biodiversity Impact D: Badgers - Negative/Neutral
- Biodiversity Impact E: Water Voles - Neutral
- Biodiversity Impact F: Otter - Neutral
- Biodiversity Impact G: Invertebrate - Negative
- Biodiversity Impact H: Loss of Ancient Woodland - Negative
- Biodiversity Impact I: Bird - Negative/Neutral
- Biodiversity Impact J: Outline Landscape and Ecology Management Plan (OLEMP) - Negative
- Biodiversity Impact K: Lighting - Negative
- Biodiversity Impact L: Biodiversity Net Gain - Negative
- Biodiversity Impact M: Green Bridges - Negative/Neutral
- Biodiversity Impact N: Nitrogen Deposition - Neutral
- Biodiversity Impact O: Reptiles and Great Crested Newts (GCNs) - Positive

Climate Change

KCC has identified the following impacts related to Climate Change:
- Climate Change Impact A: Construction and Operation Emissions: Negative

Heritage Conservation

KCC has identified the following impacts on Heritage and Conservation:
- Heritage Conservation Impact A: Conservation Areas - Negative/Neutral
- Heritage Conservation Impact B: Designated built heritage (Listed Buildings) - Negative
- Heritage Conservation Impact C: Non-designated built heritage - Negative
- Heritage Conservation Impact D: Archaeology – Scheduled Monuments - Negative/Neutral
- Heritage Conservation Impact E: Archaeology – Geology and Palaeolithic/Early Holocene archaeology - Negative
- Heritage Conservation Impact F: Archaeology – Non-designated archaeology - Negative
- Heritage Conservation Impact G: Registered Parks and Gardens - Negative
- Heritage Conservation Impact H: Historic landscapes - Negative

Other Matters

KCC has identified the following impacts on Skills/Employment and Community Assets:
- Workforce Impact A: Increase in employment in Kent - Positive
- Community Assets Impact A: Loss of revenue at Shorne Woods Country Park - Negative

- Community Assets Impact B: Tree removal and replanting at Shorne Woods Country Park - Negative
- Community Assets Impact C: Proposed Car Park at Thong Lane - Negative but with potential to be Positive
- Community Assets Impact D: Blighted Property Woodlands Cottage, Thong Lane - Negative

Conclusion

The proposed A122 Lower Thames Crossing will be a significant piece of new transport infrastructure, helping to relieve the considerable daily congestion at the existing Dartford Crossing whilst also being the first step to creating a new strategic link from the Channel Portals to the Midlands and the North.

It is inevitable that a scheme of this size and scale will result in a number of impacts to the local area. However, with the correct monitoring and mitigation measures in place, the adverse impacts on the local area could be reduced. Only with these mitigation measures will the Lower Thames Crossing be able to fully achieve its objectives.

1. Introduction

1.1. This report has been prepared by Kent County Council (KCC) as a statutory consultee, in accordance with advice and requirements set out in the Planning Act 2008, the Localism Act 2011 and Advice Note One: Local Impact Reports (Version 2, April 2012, The Planning Inspectorate).

1.2. The Advice Note states that a Local Impact Report (LIR) is a "report in writing giving details of the likely impact of the proposed development on the authority's area".

1.3. The Advice Note states that when the Examining Authority decides to accept an application, it will ask the relevant local authorities to prepare a LIR and this should centre around whether the local authority considers the development would have a positive, negative or neutral effect on the area.

1.4. The Report may include any topics that the local authority considers to be relevant to the impact of the development on their area and may be used as a means by which their existing body of knowledge and evidence on local issues can be fully and robustly reported to the Examining Authority.

1.5. This LIR has been written to incorporate some of the subject areas suggested in the Advice Note and in light of the application material submitted.

1.6. The LIR covers areas where the County Council has a statutory function or expertise. The County Council defers to local district authorities on other matters, as set out within this LIR.

2. Location

2.1. The Lower Thames Crossing (LTC) is a proposed new road link (the A122) between the M25 in Havering, the A13 in Thurrock and the A2 in Kent, including a tunnel section to cross the River Thames to the east of the existing A282 Dartford Crossing.

2.2. In Kent, the tunnel is proposed to emerge from beneath the River Thames to the east of the village of Chalk. The route of the A122 from the tunnel portal south of the A226 is in cutting as it lies to the east of the urban area of Gravesend close to the Riverview Park area and the village of Thong. It connects to the A2 at a new interchange between the existing Gravesend East and Thong Lane junctions. The scheme also includes alterations to the existing A2 from the new from the new junction to M2 Junction 1. All LTC works south of the Thames are located within the administrative area of Gravesham Borough Council (except for those in relation to Nitrogen Deposition which fall within the administrative areas of Tonbridge and Malling Borough Council and Maidstone Borough Council).

2.3. The tunnel portal is close to a Ramsar site and the new A122 road and the required alterations to the existing A2 are close to Sites of Special Scientific Interest (SSSI) and Ancient Woodland, including Shorne Woods Country Park, which will be affected by the scheme. The Project's works to alter the existing A2 are in part within the Kent Downs Area of Outstanding Natural Beauty (AONB). The whole scheme is within the Green Belt.

2.4. The location of the scheme has a positive impact on Kent County Council's overarching strategy for improving the routing of road haulage traffic between the north and international gateways of The Chanel Tunnel and especially the Port of Dover. As illustrated in Kent County Council's Local Transport Plan 4 *Delivering Growth without Gridlock (2016-2031),* the position of a new Thames Crossing must support the bifurcation or splitting of traffic such that a greater share of traffic can be routed along the A2/M2 corridor to Dover, rather than the M20/A20, for day-to-day use and to improve wider network resilience.

2.5. The location of the scheme supports its ability to provide a primary route for traffic via the A2/M2 corridor, whilst its proximity to the M2 Junction 3 with the A229 that links to the M20 corridor, supports the capability for the scheme to provide resilience. The scheme location enables a diversion option for traffic that we would ordinarily expect to route towards the M25 Dartford Crossing via the M20, as traffic would be able to divert to the scheme location, if necessary, during periods of network disruption once the scheme is delivered.

3. Description of Proposed Development

3.1. The County Council notes that the application is for a Development Consent Order (DCO) for a new road with a tunnel crossing beneath the River Thames between Kent, Thurrock and Essex.

3.2. The proposal includes 14.3 miles of new road and around 50 new bridges and viaducts. The crossing beneath the River Thames would comprise two 2.6-mile tunnels, and would become the longest road tunnel in the UK. The tunnel would be over 16 metres in diameter, making it the third widest bored tunnel in the world.

3.3. The new road link and tunnel section would be three lanes in both directions (except the northern section of the route between the M25 and A13 where the road will be two lanes wide). It would be defined as an “all-purpose trunk road” but would have additional restrictions so only vehicles allowed on motorways would be able to use it.

3.4. The LTC would operate with no hard shoulder but would feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Emergency areas would be provided, spaced at intervals between 800 metres and 1.6km (less than one mile).

4. Relevant Planning History

4.1. Within the area, major transport network infrastructure changes have taken place in the last twenty years designed to address travel demand through the north Kent and cross-Thames corridor, largely associated with the delivery of the Channel Tunnel Rail Link (and now known as the High Speed One line).

4.2. The Channel Tunnel Rail Link Act 1996 concerned the works to deliver the revised route for continental rail services to shift the terminus from Waterloo to London St Pancras. The Act included the improvement of the A2 at Cobham, in Kent, and of the M2 between junctions 1 and 4. As part of these works, the A2 road corridor in the vicinity of the now proposed scheme was realigned in the area around where Brewers Lane and Halfpence Lane interact with the A2. The Act also provided for the works to construct a rail tunnel under the Thames from Swanscombe in Kent to Grays in West Thurrock.

4.3. Following the works delivered by the aforementioned Act, the Channel Tunnel rail link was diverted to London St Pancras in 2006. In 2009, following the diversion of continental rail services, domestic high speed rail services in Kent were introduced running between east Kent via Ashford International and Ebbsfleet International to London, serving Stratford International and London St Pancras International stations. The rail link has been very successful, generating over £5bn of economic benefit since High Speed domestic services began in 2009, and prior to the Covid-19 pandemic was carrying 15 million domestic passengers and 11 million international passengers a year across the Thames.

4.4. However, the Dartford Crossing has been the only road link across the Thames, east of London, for over 50 years. The last time additional capacity was added at the Dartford Crossing was in 1991 with the Queen Elizabeth II (QE2) bridge which caters for southbound traffic while northbound traffic uses the two tunnels which date back to the 1960s and 1980s. A new road crossing is desperately needed to reduce congestion at the existing Dartford Crossing and to provide free-flowing north-south capacity. In 2009, the Department for Transport (DfT) published a study on the future need for additional crossing capacity of the Lower Thames. A public consultation by the DfT followed 2013 on route corridor options for a new crossing. Three potential route corridor options were consulted on: Option A (the existing Dartford Crossing), Option B (Swanscombe), Option C (east of Gravesend).

4.5. In response to the 2013 consultation, KCC supported Option C (to the east of Gravesend) but with the inclusion of the C Variant (which included enhancements to the A229 Blue Bell Hill link between the M2 and M20).

4.6. The Applicant, National Highways (named Highways England at the time) first consulted on proposals for a new road crossing of the River Thames connecting Kent and Essex in 2016. The consultation sought feedback on two potential location options; Location A (additional capacity at the existing Dartford Crossing) and Location C (a two bored tunnel to the east of Gravesend and Tilbury), with a further two route options south of the river to connect to the A2/M2: the Western Southern Link and the Eastern Southern Link.

4.7. KCC responded to the 2016 consultation expressing support for Location C, recognising that a new crossing to the east of Gravesend is the only viable location. KCC also supported the Western Southern Link, although this was not the Applicant's preferred route, as this route alignment avoided the village of Shorne and was comparatively less environmentally damaging compared to the Eastern Southern Link.

4.8. Throughout our response to the 2016 consultation we also called for the Applicant to urgently reconsider the inclusion of the C Variant (enhancements to the A229 link between the M2 and M20) and to improve the link via the A249 (M2 Junction 5 at Stockbury to M20 Junction 7).

4.9. In April 2017, the Secretary of State for Transport announced the preferred route alignment as Option C, a bored tunnel to the east of Gravesend, with the Western Southern Link (WSL) linking the new crossing with the A2.

4.10. National Highways then undertook a full statutory consultation on their latest plans for a new Lower Thames Crossing in 2018.

4.11. In response to the 2018 Statutory Consultation KCC stated its support for the Secretary of State's preferred route alignment. KCC welcomed the removal of the A226 junction (which had featured in the 2016 consultation) and extension of the tunnel portal 600m further south, along with widening of the A2 between M2 Junction 1 and the LTC junction.

4.12. After the 2018 Statutory Consultation, National Highways has undertaken a further five non-statutory consultations on refinements to their proposals for a new Lower Thames Crossing. These included:

- 2020 Supplementary Consultation (29th January – 25th March 2020)
- 2020 Design Refinement Consultation (14th July – 12th August 2020)
- 2021 Community Impacts Consultation (14th July – 8th September 2021)
- 2022 Local Refinements Consultation (12th May – 20th June 2022)
- 2023 Minor Refinements Consultation (17th May – 19th June 2023)

5. Relevant Kent County Council Policy Documents

5.1. *Framing Kent's Future (2022)*
The Council-wide strategy for Kent County Council. *Framing Kent's Future* establishes two priorities relevant to the scheme – namely Infrastructure for Communities and Levelling Up. As part of these priorities, the strategy emphasises the focus and need for national recognition of the important role Kent plays, including its transport system, and the need for infrastructure investment and delivery to match that role.

5.2. *Local Transport Plan 4: Delivering Growth without Gridlock (2016-2031) (LTP4).*
LTP4 as the Local Highway and Transport Authority's statutory Local Transport Plan (under the Transport Act 2000, as amended by the Local Transport Act 2008) sets out KCC policies to deliver strategic outcomes for transport, as well as key transport priorities and longer-term transport objectives. LTP4 supports a new Lower Thames Crossing to the east of Gravesend, which is stated as one of Kent's strategic priorities. Another key strategic priority relevant to this application is the bifurcation of port traffic. This involves splitting port traffic between the M20/A20 (Dover Western Docks and Channel Tunnel) and M2/A2 (Dover Eastern Docks) corridors, creating a more resilient transport network and assisting the regeneration of Dover. The Lower Thames Crossing would contribute to facilitating this by providing a new route via the M2/A2 to the Midlands and North, although fulfilment of the bifurcation strategy also relies upon delivery of improvements to the A2 corridor from Lydden to Dover, junction capacity upgrade at M2 Junction 7 (Brenley Corner), and capacity upgrades to the A229 Blue Bell Hill and its junctions with the M2 (J3) and M20 (J6).

5.3. *The Kent and Medway Growth and Infrastructure Framework (GIF) (2018)*
Kent and Medway Growth and Infrastructure Framework (GIF) provides a picture of emerging development and infrastructure requirements, to support growth across Kent and Medway, up to 2031. The GIF also provides a strategic framework across the county for identifying and prioritising investment across a range of infrastructure. The GIF states that the Lower Thames Crossing is a strategic priority and has the potential to reduce congestion on the Dartford Crossing, provide opportunities for investment and regeneration, offer safer and more reliable journeys and provide a brand-new transport corridor at a critical part of the road network. However, it also stresses that the impacts on the surrounding road networks will also need to be managed.

5.4. *Active Travel Strategy*
The Active Travel Strategy aims to make active travel an attractive and realistic choice for short journeys in Kent, by developing and promoting accessible, safer and well-planned active travel opportunities.

5.5. *Vision Zero Road Safety Strategy (2021)*
The Vision Zero Road Safety Strategy has been developed with the target of achieving zero, or as close as possible, fatalities and life changing injuries by 2050. The vision includes recognising the Safe System is the norm, Walking and cycling is a safe and easy choice and that Kent is at the forefront of road safety

innovation. Any development impacting on the local road network in Kent must be in line with the vision zero strategy.

5.6. *Kent Design Guide*
The Kent Design Guide provides design guidance to developers who are proposing new developments / amendments to the Kent highway network and sets out the criteria necessary for assessing planning applications. Any development that is proposed to take place on the local road network within Kent, including construction access/ egress, must adhere to the Kent Design Guide.

5.7. *Kent Minerals and Waste Local Plan*
As the Minerals and Waste Planning Authority for Kent, Kent County Council plans for sustainable waste management capacity and mineral supply to ensure that communities have the waste infrastructure and raw materials that they need, whilst protecting the environment.

5.8. The Kent County Council Minerals and Waste Local Plan (MWLP) 2013-2030 (With Amendments) includes strategic policies for minerals and waste development, as well as development management policies which are used to determine planning applications. The MWLP also includes the Mineral Safeguarding Areas across Kent which includes the relevant Gravesham Mineral Safeguarding Areas that fall within the area impacted by the scheme.

5.9. The main aims of the Plan are to drive waste up the Waste Hierarchy enabling waste to be considered as a valuable resource, while at the same time providing a steady supply of minerals to allow sustainable growth to take place. It will also ensure that requirements such as a Low Carbon Economy (LCE) and climate change issues are incorporated into new developments for minerals and waste development in Kent.

5.10. Of particular relevance to the scheme and its impacts, and for context concerning KCC's representations on this in section 10 of this Local Impact Report, the KCC MWLP spatial vision details the following:

- Seek to deliver a sustainable, steady and adequate supply of land-won minerals including aggregates, silica sand, crushed rock, brickearth, chalk and clay, building stone and minerals for cement manufacture.
- Facilitate the processing and use of secondary and recycled aggregates and become less reliant on land-won construction aggregates.
- Move waste up the Waste Hierarchy, reducing the amount of non-hazardous waste sent to landfill.
- Encourage waste to be used to produce renewing emerging incorporating both heat and power if it cannot be re-used or recycled.
- Ensure waste is managed close to its production.

5.11. *KCC Drainage and Planning Policy Statement – a Local Flood Risk Management Strategy Document (2019)*
This policy sets out how Kent County Council (KCC), as Lead Local Flood Authority (LLFA) and statutory consultee, will review drainage strategies and surface water management provisions associated with applications for major development. It is consistent with the Non-Statutory Technical Standards for

Sustainable Drainage (as published by Defra in March 2015) and sets out the policy requirements KCC has for sustainable drainage. It should be read in conjunction with any other policies that promote sustainable drainage, specifically the National Planning Policy Framework (NPPF) and any specific policy set out by the relevant Local Planning Authority. The policy seeks to ensure that multifunctionality of open space is now emphasised within development master planning. This provides an opportunity for Kent to look to wider benefits of sustainable drainage and strengthen policies for the delivery of drainage systems which are fully sustainable, thus providing quantity control, quality improvement, biodiversity enhancement and amenity.

5.12. *The Rights of Way Improvement Plan (RoWIP) 2018-2028*

The RoWIP is a statutory plan produced as a requirement of the Countryside and Rights of Way Act 2000. It is subject to within 10 years of publication. The current plan was published following extensive consultation. The LTC has the potential to deliver improvements to the Public Rights of Way network and support delivery of the objectives of the plan in supporting active lifestyles and the evolution of the network to provide more opportunities for off road /motor vehicle free cycling and riding.

5.13. *Kent Environment Strategy 2016 (KES)*

The Kent Environment Strategy and its associated implementation plan seeks to provide support to decision makers in ensuring that the county of Kent remains the highly desirable location of choice for visitors, residents, and businesses. Delivery of the strategy is designed to support a competitive and resilient economy, with business innovation in low carbon and environmental services driving economic growth. The strategy aims to support communities and businesses becoming resource efficient and prepared for severe weather and its impacts through an increased awareness of environmental risks and opportunities.

5.14. The Kent Environment Strategy has provided the basis for the following associated strategies, all aimed at achieving its overall aims.

5.15. Kent and Medway Low Emission Strategy 2020 (ELES)

The Kent and Medway ELES, published in 2020, sets out how KCC will respond to the UK climate emergency and drive clean, resilient economic recovery across Kent. Taking an evidence-based approach, it identifies a pathway to reduce greenhouse gas emissions, eliminate poor air quality, reduce fuel poverty, and promote the development of an affordable, clean, and secure energy supply for this county. It is informed by and delivers, but does not duplicate, the priorities and actions from other strategies related to energy and the environment.

5.16. The strategy has an aim to set up a smart connectivity and mobility modal shift programme – linking sustainable transport, transport innovations, active travel, virtual working, broadband, digital services, artificial intelligence, and behaviour change. The strategy also has an aim to set five-year carbon budgets and emission reduction pathways to 2050 for Kent with significant reduction by 2030.

5.17. *Kent Plan Tree (2022)*

Kent Plan Tree, published in 2022, sets an ambition for Kent to extend tree cover by 1.5 million new trees and increase the county's average canopy cover to 19%. Furthermore, KCC's existing woodland and trees health will be restored and afforded greater protection from loss.

5.18. The Strategy sets out some specific actions that KCC will take to progress delivery of the ambitions and objectives of Plan Tree. These actions focus on delivering against the tree establishment target; exemplar provision for trees on the KCC estate which includes the land owned around the highway network; improving protection to trees in Kent; improving understanding of Kent's trees; and developing the Kent carbon offset market for unavoidable emissions. The actual delivery of these actions will be laid out in a more detailed implementation plan that will sit alongside the Strategy.

5.19. *Kent Plan Bee*

Kent's Plan Bee, published in 2022, is the KCC pollinator action plan, adopted in 2019 and now refreshed after the initial two years of action. It is designed to take the lead in the county to mobilise everyone in Kent to act to improve the habitat and the food sources of these insects and to reverse their continuing decline. Plan Bee sets out what the Council is doing to help these insects vital to environment, food, and economy. Among the commitments in the plan are management of the land KCC owns, and to control and influence in a way which benefits pollinators' habitat and forage. This includes the highways network and the land around it.

5.20. *Kent Joint Health and Wellbeing Strategy*

The KCC Joint Health and Wellbeing Strategy had a horizon to 2021. It is designed to deliver the KCC vision to improve health and wellbeing outcomes, deliver better coordinated quality care, improve the public's experience of integrated health and social care services, and ensure that the individual is involved and at the heart of everything the Council does. Transport affects health outcomes in a multitude of ways, from a person's physical fitness, how they live their lives and the opportunities they can access to improve their circumstances, through to the ability to access the care they need.

6. Relevant Development Proposals Under Consideration

6.11. Kent's population is expected to grow. Kent County Council undertook housing-led forecasts in 2021, factoring in population estimates, fertility and mortality rates, and migration published by the Office National Statistics up to the 2020 mid-year estimates. The housing-led forecasts did not take account of the impact of the Covid-19 pandemic nor recent policy changes concerning housing delivery and targets for plan-making authorities.

6.12. The forecast was that approximately 222,757 dwellings would be built. Delivery across different parts of Kent, and the determination of the precise volume of homes will be dependent upon each Local Plan developed by each Local Planning Authority. We defer to the representations and impacts described by those Local Authorities in Kent for the detail of existing development proposals under consideration relevant to the scheme and its impacts.

6.13. The London Resort and Northfleet Harbourside are two major development proposals in the local area which are of significant size but have not yet obtained planning permission. These developments are not included within the LTC DCO Transport Assessment as they were not deemed committed development at the time the LTC DCO application was submitted.

6.14. A DCO application for The London Resort development on Swanscombe Peninsular was submitted to the Planning Inspectorate in 2021. However, the application was then withdrawn in March 2022 prior to the Preliminary Meeting taking place. The applicant for the London Resort has not engaged with KCC Highways and Transportation since March 2022 to address the significant number of outstanding issues with the proposal and after the designation of the Peninsular as a Site of Special Scientific Interest (SSSI), together with the land north of the river proposed as car parking no longer being available, means the likelihood of this application being resubmitted is considered to be low.

6.15. An outline planning application for a mixed-use development including 3,500 residential dwellings, retail, food & beverage, office, flexible E class use, local community, hotel and redevelopment and expansion of the existing football ground, on land surrounding Ebbsfleet United Football Ground was submitted to Gravesham Borough Council in October 2022 (ref 20221064). As the site is not allocated in the existing Gravesham Core Strategy, the application was not submitted until October 2022, together with the fact that the application is still live, means that in line with modelling guidance, this development has not been considered in the LTC DCO.

7. Likely Significant Effects of the Proposed Development

7.11. KCC has been consulted on the scope of the DCO and has considered the following local impacts which are brought to the attention of the Examining Authority:

1. Highways and Transport;
2. Public Rights of Way;
3. Minerals and Waste;
4. Sustainable Urban Drainage Systems (SUDS);
5. Biodiversity;
6. Climate Change;
7. Heritage Conservation;
8. Other Matters

7.12. These categories of impacts are covered in the remaining paragraphs of this section.

7.13. For impacts relating to Air Quality, Landscape and Visual, and Noise and Vibration, we would defer to the Local Impact Reports produced by relevant Local Authorities.

8. Highways and Transport (as Local Highway and Transport Authority)

Strategic Impacts

8.1. The Lower Thames Crossing (LTC) Development Consent Order (DCO) Document 7.9 Transport Assessment (APP-529) Section 7.5, Traffic forecasts for the wider road network, identifies traffic impacts of the LTC in Plates 7.10 to 7.24, in terms of changes in traffic flows and traffic volumes as a percentage of road capacity. These impacts are then illustrated as adverse and beneficial impacts in Plates 7.28 to 7.30 and 7.34 to 7.36 respectively, using the Applicant's scoring mechanism based on the volume to capacity (V/C) measure. The overall (network-wide) traffic impacts of the LTC can be generalised for Kent as follows:

- Positive traffic impacts of the LTC tend to occur to the south and west of the LTC junction with the A2, where the LTC relieves the network of traffic travelling between north of the Thames and east Kent;
- Negative traffic impacts of the LTC tend to occur to the east of the LTC junction with the A2, as the LTC caters for traffic travelling between north of the Thames and east Kent; and
- Neutral traffic impacts of the LTC tend to occur outside the area bounded by the M2, M20 and M25, where the effects of the crossing are diminished, as well as the area between the two Thames crossings, where traffic is dispersed.

8.2. A map showing all of the following Strategic Impacts and Transport Impacts detailed in the following sections is in Appendix A. As stated in our Relevant Representation, KCC believes the Lower Thames Crossing (LTC) project will provide the following key strategic positive impacts:

Strategic Impact A: Improved Network Resilience

8.3. The LTC in creating a new crossing of the Thames relieves the capacity restrictions at the existing Dartford Crossing and reduces the current risk of a single point of failure on this part of the Strategic Road Network (SRN). When the flow of traffic through the existing Dartford Crossing is severely restricted due to incidents and/or its limited capacity (which often happens) there is no alternative crossing of the Thames outside of London (the nearest is the Blackwall Tunnel) and this results in the failure of the SRN to perform its junction. The Local Road Network is also gridlocked as traffic attempts to re-route and mixes with the high volumes of local traffic in the Dartford area. The LTC creates an alternative crossing and reduces the reliance on this single pinch point on the SRN and thus improves network resilience, a positive impact.

Strategic Impact B: Reduced Journey Time Delays

8.4. The LTC provides relief to the restricted capacity of the existing Dartford Crossing and therefore reduces journey time delays. The effect of reduced journey time delays is reduced associated costs (value of time) for businesses and individuals, and ultimately encouraging economic growth both regionally and nationally, therefore this is a positive impact.

Strategic Impact C: Increased Journey Time Reliability

8.5. The LTC in creating increased crossing capacity of the Lower Thames, results in greater journey time reliability. Whereas currently with the existing Dartford Crossing, there is variability in journey times due to capacity restrictions and the resulting delays, creating uncertainty for how long trips will take. Greater journey time reliability provided by the additional capacity of the LTC will therefore create greater confidence in the time that journeys will take. This will provide residents and businesses with a much greater range of opportunities for work, education and leisure, a positive impact.

Strategic Impact D: Supports Bifurcation between A2/M2 and M20/A20 Corridors

8.6. The LTC provides the first part of the new strategic route from the Midlands and the North to the Channel portals. This supports KCC's long-term transport policy aim of bifurcation, or splitting, of traffic to/from the Channel portals along the M20/A20 and M2/A2 corridors, releasing capacity and relieving pressure on the M20, especially in times of disruption to cross-Channel services. This is a significant potential positive impact but only if the entire A2/M2 corridor is improved including with the Department for Transport (DfT) and National Highways' Road Investment Strategy (RIS) pipeline projects of A2 Brenley Corner (M2 Junction 7) and A2 Dover Access (Lydden to Dover) delivered (they are both uncommitted).

8.8. Realisation of this positive impact also requires improved linkages between the two motorway corridors, especially via the A229 Blue Bell Hill, a Large Local Major (LLM) scheme that is currently unfunded by the DfT and has a local funding gap, meaning delivery is uncertain (see Transport Impact C).

Strategic Impact E: Generation of Economic Benefits

8.7. The LTC will generate economic benefits to the local and national economy above that of the previously mentioned improved network resilience, journey time cost savings and reliability. The economic benefits of the scheme, as set out in Document 7.7 Combined Modelling and Appraisal Report - Appendix D - Economic Appraisal Package: Economic Appraisal Report (APP-526), demonstrate that, factoring in Level 2 wider economic benefits and journey time reliability have the potential to deliver a scheme that is of net economic benefit given the stated costs in the evidence, with an adjusted BCR around 1.22:1 reported in paragraph 12.2.3, representing a net gain of 22 pence for every pound spent on the scheme. This is a positive impact for the UK economy.

8.9. As the business case correctly considers, the nature of the assets and their long life, providing a new strategic river crossing for up to 100 years, and likely more, could increase the Benefit Cost ratio further, delivering a net gain per pound spent of around 70 pence (see paragraph 12.2.6 d.)

8.10. At a local level, we note (as reported in paragraph 12.2.5) that the distributional impact of the level 1 and level 2 benefits totals £2.762.8bn for the adjusted Benefit Cost Ratio for the standard 60 year appraisal period. Gravesham and the whole of Kent are covered within the area for which the applicant estimates these benefits will accrue. Whilst the total would be split with other authorities such as Essex, Medway and Thurrock, the magnitude of the economic benefit is nonetheless substantial over 60 years if assuming an approximate third accrue to Kent County Council's administrative area. This would total c. £900m in benefit or circa £15m per annum on average. All values above are in 2010 Present Values as reported in the scheme documents. This represents a positive impact for Kent County Council's administrative area and the residents and businesses within it.

8.11. The scheme will result in significant investment being made in the new infrastructure through the construction process which will benefit the local supply chain. There is also potentially a multiplier effect with business confidence improved with this investment being made into infrastructure in Kent (and north of the river) as further investment is attracted in other projects as road connectivity and capacity is enhanced. North Kent becomes a more attractive place to do business with better connectivity across the SRN, hence business and employment growth will occur. Housing growth is also potentially supported although we defer to Local Planning Authorities to comment on that impact. Overall, the LTC will produce positive economic impacts.

8.12. The scheme has the potential to have a positive impact on businesses within Kent and more widely, by attracting inward investment. As document 7.7 Combined Modelling and Appraisal Report - Appendix D - Economic Appraisal Package: Economic Appraisal Report (APP-526) states in paragraphs 10.9.5 to 10.9.7, the scheme has been assessed as having likely potential of increasing Foreign Direct Investment. Given the focus, efforts and status of the Thames Estuary within which the scheme lies, Kent businesses operating within the area would be likely beneficiaries of new foreign investment, helping to grow existing businesses and create new markets for the establishment of new businesses.

8.13. Further economic benefits to Kent will arise from the employment generated by the scheme and this is covered in Workforce Impact A in Other Matters – Skills and Employment – Construction Workforce in Section 16 of this Local Impact Report.

Transport Impacts

8.14. KCC has been investigating and documenting potential highways-related impacts of the LTC since the 2018 Statutory DCO Consultation. Key negative Highways-related impacts of implementation of the LTC are recorded in the remaining paragraphs of this section; evidenced either by our own transport

model analysis or the content of the DCO documents; and cross-referenced to associated comments in our Written Representation. These impacts are referenced as follows (and shown in the map in Appendix A:

- Transport Impact A: Impacts of the LTC on the Strategic Road Network (SRN)
- Transport Impact B: Wider Network Impacts (WNI)
- Transport Impact C: Impacts of the LTC on the A229 Blue Bell Hill
- Transport Impact D: Road Safety Impacts of the LTC
- Transport Impact E: Public Transport and Active Travel Impacts of the LTC
- Transport Impact F: Severance Issues for Walkers, Cyclists and Horse Riders (WCH)
- Transport Impact G: Dangerous Goods Vehicles and Oversized Vehicles
- Transport Impact H: Construction Shifts and Deliveries
- Transport Impact I: Construction Traffic Routeing
- Transport Impact J: Construction Impacts on the Condition of the Existing Local Road Network (LRN)
- Transport Impact K: Highways Asset generation and impact of transference from National Highways to Kent County Council

Transport Impact A: Impacts of the LTC on the Strategic Road Network (SRN)

8.15. KCC has worked with National Highways since 2018 to study the traffic impacts of the LTC, using both National Highways' Lower Thames Area Model (LTAM) and KCC's proprietary Kent Transport Model (KTM). It was agreed between National Highways and KCC that the KTM provides more conservative output on impacts than LTAM and so there is a greater confidence level in the Kent impacts identified by the KTM. Future year transport and development scenarios were reviewed for the situation / scenario without the LTC and with the LTC. In our preliminary analysis, negative impacts manifested themselves in an increase in traffic volume to capacity (V/C) ratio on LTC implementation (the with-LTC scenario), with the road link or junction acting at or over capacity (where V/C = 100%).

8.16. The recording of traffic impacts of the LTC in this section refers to the latest modelling results, where LTC Opening Year is 2030 and Design Year is 2045. Since the modelling for the project was carried out this schedule has been advanced by two years, although all impacts stated remain valid.

8.17. In the latest KTM model runs, the following SRN junctions on the M25, A2, M2 and M20 were identified as negatively impacted by the LTC:

- M25 J2 (A2/A282) is forecast to approach capacity in Opening Year 2030 PM Peak, with the V/C ratio for the A2 eastbound on-slip increasing from 93% without LTC to 98% with LTC. A similar impact is forecast to take this movement over capacity to 109% in the Design Year 2045 PM Peak. Additionally, the southbound M25 on-slip is forecast to approach capacity in the Design Year 2045 AM Peak, with the V/C ratio increasing from 87% without LTC to 96% with LTC.

- A2 Pepper Hill (Hall Road) is forecast to exceed capacity in Opening Year 2030 AM Peak, with the V/C ratio for Hall Road Bridge northbound increasing from 106% without LTC to 118% with LTC. A similar impact is forecast for Design Year 2045 AM Peak.
- A2/A227 (Tollgate) is forecast to exceed capacity in Opening Year 2030 AM Peak, with the V/C ratio for the Wrotham Road southbound approach increasing from 94% without LTC to 101% with LTC. A similar impact is forecast for Design Year 2045 AM Peak. In the Design Year 2045 PM Peak, the V/C ratio for Wrotham Road A2 underpass northbound increases from 84% without LTC to 96% with LTC.
- A2 Gravesend East (Valley Drive) is forecast to exceed capacity in Opening Year 2030 AM Peak, with the V/C ratio for the Valley Drive southbound approach increasing from 90% without LTC to 101% with LTC. In the PM Peak the V/C ratio for the Hever Court Road eastbound approach to Valley Drive increases from 82% without LTC to 96% with LTC. Similar impacts are forecast for Design Year 2045 AM and PM Peaks.
- M2 J2 (A228) is forecast to exceed capacity in Opening Year 2030 AM Peak, with the V/C ratio for the A228 Sundridge Hill north-eastbound approach increasing from 93% without LTC to 103% with LTC. A similar impact is forecast for Design Year 2045 AM Peak. In the Design Year 2045 PM Peak the V/C ratio for the M2 southbound off-slip increases from 65% without LTC to 101% with LTC. Through traffic on the M2 main line is forecast to approach or exceed capacity in three out of the four peak periods studied.
- M2 J3 (A229) is forecast to approach capacity in Opening Year 2030 PM Peak, with the V/C ratio for the M2 southbound off-slip increasing from 78% without LTC to 93% with LTC. This movement exceeds capacity with LTC in the Design Year 2045 PM Peak. Similarly, the A229 northbound off-slip approaches capacity in Opening Year 2030 PM Peak, with the V/C ratio increasing from 90% to 96% with LTC; the movement then exceeding capacity with LTC in the Design Year 2045 PM Peak.
- M20 J6 (A229) is forecast to exceed capacity in all periods studied, with the V/C ratio for the M20 westbound off-slip increasing on LTC implementation to values between 114% and 141%.

8.18. The following SRN junctions were previously identified as <u>negatively</u> impacted by the LTC in studies of the LTAM/KTM and – while they are not flagged as impacted in the latest KTM review – they may re-join the list later due to the postponement of LTC construction by two years and accompanying traffic growth:

- M25 J3 (M20)
- A2 Springhead (A2260 & B259)
- M2 J1 (A289) (though we note and support the concerns of Medway Council on this Junction)
- M2 J4 (A278)

8.19. Most of the above impacts are also reflected in the Transport Assessment (APP-529) figures mentioned earlier in the discussion of overall (network-wide) traffic impacts for Kent (Plates 7.10 to 7.24; Plates 7.28 to 7.30 and Plates 7.34 to 7.36), although these figures cover the wider study area for the Project.

8.20. Transport Assessment (APP-529) Plates 7.2 and 7.3 indicate from the LTAM model that the highway links of the new junction of the LTC with the A2 are forecast to operate below 85% of capacity in the Design Year 2045 AM and PM Peaks. The KTM analysis is also able to assess highway "nodes" within the intersection, such as merges, diverges and roundabouts. The KTM shows that some nodes on this junction are operating at over 100% capacity in both AM and PM peaks in both Opening Year 2030 and Design Year 2045. The associated negative impacts are expected to be delays on the SRN and increased use of unsuitable routes on the local road network (LRN) to avoid SRN congestion in the vicinity of the A2/LTC intersection.

8.21. Transport Assessment Appendix B Journey Time Changes 2030 (APP-531) and 2045 (APP-532) indicate an impact of LTC implementation on journey times on the section of the M2 between Junction 1 (A289) and Junction 4 (A278) in both Opening Year 2030 and Design Year 2045. These increased journey times may lead to a negative impact of encouraging traffic to find alternative routes (rat runs) on unsuitable roads of the Local Road Network (LRN).

Transport Impact B: Wider Network Impacts (WNI)

8.22. As mentioned at the beginning of this Highways section, KCC acknowledges that both positive and neutral traffic impacts of the LTC tend to occur in areas where the effects of the crossing are diminished, or where traffic is dispersed by the presence of two Thames crossings.

8.23. Negative traffic impacts of the LTC on the LRN have been identified by KCC, using the same preliminary SRN analysis with the LTAM and KTM models, in studies that have been re-iterated several times during the consultation history of the Project. It was agreed between National Highways and KCC to review these impacts together in more detail, and to develop mitigations to the level of pre-Strategic Outline Business Case (SOBC) in the Wider Network Impacts (WNI) study.

8.24. The Kent WNI Study is a KCC owned study, funded by National Highways, to investigate impacts on the wider network in Kent. National Highways does not consider that the proposed interventions are required to make the Lower Thames Crossing acceptable, and that they should be developed in line with Government policy and funding mechanisms outside of the Lower Thames Crossing. National Highways has said, pursuant to its licence, that it will cooperate with KCC in this matter.

8.25. The WNI study is structured into two tasks. The Task 1 report (attached in full in Appendix B) forms the evidence base for the following transport impacts in terms of identifying the locations and quantifying the scale of the impacts. Task 2 of the WNI study, which is only just about to commence at the time of writing, is

developing options for mitigation at those locations up to pre-SOBC stage to identify a preferred way forward and to make the case for funding of costed schemes applicable to that stage of business case development. The WNI Study Task 2 Report will be made available to Examining Authority once it is completed – estimated October 2023.

8.26. The WNI study has confirmed the following key corridors of negative impacts of the LTC identified in the earlier work:

- The A2 between Springhead and Gravesend East: Impacts for this corridor include the SRN junctions mentioned earlier (Pepper Hill, Tollgate and Gravesend East). Tollgate and Gravesend East are also forecast to experience queue lengths blocking back through upstream junctions in the with-LTC scenario, with associated delays and road safety risks. Journey time increases of up to 6% on roads north of the SRN junctions to/from Gravesend are forecast with LTC, resulting in congestion and delays.
- The A227 between the A2 and the M20: Implementation of the LTC leads to significant increases in heavy goods vehicle (HGV) traffic on alternative routes between the A227 / Green Lane and A2 to access the LTC, including the villages of Meopham, Hook Green, Sole Street and Cobham.
- The A228 between the M2 and the M20: The vast majority of junctions along the A228 are forecast to see significant increases in traffic in the with-LTC scenario; with particularly HGV traffic flows along the A228 increasing by up to 160 vehicles per hour. A number of junctions are also forecast to operate over capacity with LTC, leading to further congestion and use of inappropriate alternative routes.
- Cycleway corridors: These corridors include sections of the A226 between Gravesend and Strood and a section of Chatham Road adjacent to the A229. Here the 2045 with-LTC scenario increases traffic flows in turn increasing the safety risks to cyclists in view of current active travel provision.

8.27. These impacts are detailed in the WNI Study Task 1 Report “Lower Thames Crossing Wider Network Impacts - Agreeing the Objectives” in Appendix B. The findings were reviewed with National Highways to agree the objectives for addressing the impacts before moving on to the next task of options assessment.

8.28. The WNI study Task 2 report will also be estimating a value for money for the proposed mitigations of LTC impacts identified; as well as outlining the wider economic impacts of leaving those impacts unmitigated. As previously stated, the WNI Study Task 2 Report will be made available to Examining Authority once it is completed – estimated October 2023.

Transport Impact C: Impacts of the LTC on the A229 Blue Bell Hill

8.29. As mentioned at the beginning of this Highways section, KCC acknowledges that both positive and neutral traffic impacts of the LTC tend to occur in areas where the effects of the crossing are diminished, or where traffic is dispersed by the presence of two Thames crossings.

8.30. One of the most negative traffic impacts of the LTC on the local / major road network in Kent is that on the A229 Blue Bell Hill (including M20 J6 and M2 J3), as identified in the Applicant's DCO documents as well as in KCC analysis of the LTAM and KTM models. This impact has been identified and re-iterated in KCC's responses during the consultation history of the Project. KCC has also requested at every opportunity, that mitigation measures for the impacts on A229 Blue Bell Hill are included in the Project.

8.31. The A229 Blue Bell Hill is a strategically important link providing the shortest and most direct route between the M2 and M20, critical for interchange between the motorways, for accessing and serving the Channel ports, and for connecting the County town of Maidstone and the conurbation of Medway to each other and providing both urban areas principal access to both motorways.

8.32. A229 Blue Bell Hill was excluded from the WNI study (Impact B) as it is subject to separate Strategic Outline Business Case (SOBC) development as part of the Department for Transport's (DfT) Large Local Majors (LLM) funding programme. However, it is important to note that the DfT is still to make a decision as to whether it proceeds to the next stage in the funding application, that of Outline Business Case (OBC). It is only after completion of OBC that a decision will be made by DfT on funding for scheme delivery. Even if successful, funding from LLM is only for 85% of the scheme costs. Therefore, at the time of comment it must be assumed that no improvement scheme is committed and hence there will be no mitigation for the negative impacts from the LTC.

8.33. Existing traffic conditions at M2 Junction 3 and M20 Junction 6 are poor at peak times with queues and delays experienced by all road users. Traffic on the A229 is forecast to increase significantly from the 2019 DfT manual count of 69,336 annual average daily traffic (AADT) with local growth and once the Lower Thames Crossing is opened.

8.34. A comparison of the with-LTC and without-LTC traffic model scenarios in the LTAM indicates that the LTC has a significant impact on A229 Blue Bell Hill and its motorway junctions. The Applicant's DCO documents indicate the following negative impacts of the LTC on the A229 Blue Bell Hill:

- Changes in traffic volumes: Transport Assessment (APP-529) Plates 6.2 to 6.4 show that the A229 Blue Bell Hill already takes as much traffic as parts of the M2 and M20. Plate 7.10 indicates a forecast increase in AM Peak traffic volumes of between 501 and 1,000 vehicles northbound on the A229 with LTC in Design Year 2045; and between 101 and 250 southbound. Plate 7.14 indicates a forecast increase in PM Peak traffic volumes of between 251 and 500 vehicles northbound and between 101 and 250 southbound.

- Changes in % traffic volumes: Plate 7.16 indicates a forecast increase in AM Peak traffic volumes of 10%-20% northbound on the A229 with LTC in Design Year 2045; and between +/-10% southbound. Plate 7.17 indicates a forecast increase in inter-peak traffic volumes of >=40% northbound and between +/-10% southbound. Plate 7.18 indicates between +/-10% changes in PM Peak traffic volumes northbound and southbound.
- Changes in traffic volume to capacity (V/C) ratios: Plates 7.19 and 7.20 indicate some increase in AM Peak traffic V/C ratios with LTC compared to without LTC, with the northern section of the A229 operating above 95% capacity in Design Year 2045. Plates 7.21 and 7.22 indicate an increase in inter-peak traffic V/C ratios to 85%-95% capacity with LTC, compared to 75%-85% capacity without LTC along the northern section of the A229. Plates 7.23 and 7.24 indicate an increase in PM Peak traffic V/C ratios to 85%-95% capacity with LTC, compared to 75%-85% capacity without LTC along the southern section of the A229.
- Scale of impacts: Plate 7.28 indicates adverse impacts of the LTC in the AM Peak of Opening Year 2030 according to the Applicant's scoring system based on V/C ratio changes with and without LTC. The figure indicates major adverse impacts of the LTC at the A229 intersections with the M2 and M20. Plate 7.29 indicates minor and moderate adverse impacts of the LTC at these intersections in the inter-peak. Plate 7.30 indicates a large number of minor and moderate adverse impacts of the LTC along the A229; together with one major adverse impact at the A229 intersection with the M2 in the PM Peak.
- Changes in traffic journey times: Table 7.11 indicates the A229 journey times between the M2 and M20 would increase by 1.6 minutes (+26.8%) northbound and 1.4 minutes (+13.2%) southbound in the AM Peak Opening Year 2030. A slightly reduced journey time is forecast for the PM Peak core growth, yet both the High and Low growth complementary scenarios show increases in journey times.
- Impacts on public transport: Table 7.14, Bus journey time impacts, does not cover bus route 101 (Maidstone - Gillingham), which is expected to be adversely impacted by increased traffic and delay on the A229 on implementation of the LTC. Plate 7.38, Bus/coach routes considered in analysis, indicates the A229 lies just outside the scope of the analysis.
- Impacts on walkers, cyclists and horse riders: Plate 7.42 indicates a section of severance due to increased traffic along the A229 with the LTC, in the vicinity of the A229 intersection with the M20. Impacts on walkers, cyclists and horse riders are also covered in later paragraphs of Impact C and in further detail in the section of this Local Impact Report on Public Rights of Way (PRoW).

8.35. A review of the outputs of LTAM model shapefiles provided to KCC by National Highways in April 2022 confirms the points made above. The following additional negative impacts of the LTC on the A229 Blue Bell Hill are apparent from the LTAM model shapefiles:

- Changes in HGV volumes: LTAM HGV flow plots indicate increases on northern sections of the A229 of approximately 100 HGVs with LTC in the AM and PM Peaks, although in the AM Peak the model appears to assign significant HGV traffic (100) to Warren Road. This route is a narrow, steep single carriageway which is signed as being unsuitable for HGVs. It is therefore expected that the HGVs assigned to this road in the model would actually use A229 Blue Bell Hill given that they are parallel routes. This is therefore giving an increase in HGV traffic on A229 of approximately 200 in the AM peak.
- Changes in traffic volume to capacity ratios at intersections: LTAM V/C ratio plots at Taddington intersection (M2/A229) indicate both northbound and westbound approaches to the roundabout are taken over capacity in the PM Peak with-LTC scenario. Similar impacts are shown for Running Horse intersection (M20/A229) for the eastbound M20 on-slip; the westbound M20 off-slip; and the northbound connector between the two roundabouts.

8.36. KCC continues to work on the A229 Blue Bell Hill Improvement Scheme, under the Department for Transport's (DfT) Large Local Majors (LLM) Programme, with a decision on proceeding to Outline Business Case (OBC) expected in June/July 2023.

8.37. The SOBC was undertaken initially using an LTAM cordon model in which A229 Blue Bell Hill was situated very close to the eastern extent of the model. It should be noted that compared with the output provided in the DCO from the full LTAM model, the results from the LTAM cordon model obtained by KCC seem to underestimate the changes in the traffic flows and subsequent impacts.

8.38. The A229 Blue Bell Hill Improvement Scheme work indicates the following negative impacts of the LTC on the A229 Blue Bell Hill:

- LTC traffic generation on A229 Blue Bell Hill: A Select Link Analysis (SLA) of the LTAM cordon provided to KCC provides the volume of traffic on the A229 that also uses the Thames River crossings in the 2045 AM peak. As shown in the table below, the level of traffic with and without LTC is low for vehicles also using the Dartford Crossing, however, the traffic also using LTC is a considerable proportion of the A229 Blue Bell Hill traffic with LTC in operation.

- The SLA shows that without LTC only 1.3% of two-way vehicles using A229 Blue Bell Hill will also use the river crossing at Dartford. In the scenario with LTC the use of the Dartford crossing by vehicles also using A229 reduces to 0.1% but vehicles using A229 and LTC is 21.4% of two-way traffic. Therefore, the LTC creates additional traffic on the A229 as route choices are changed as the LTC opens the opportunity to cross the Thames that was not previously there. In doing so, vehicles are routed up the A229 to join the M2/A2, whereas currently (with no LTC) to use the Dartford Crossing they continue on the M20 and join the M25.

- Journey times: There is currently a wide variability in journey times using A229 and the LTAM cordon model journey times do not seem to provide a realistic

result given the proposed increases in traffic and HGVs in particular. It is anticipated that journey times would be greater than the results given and there would also be significant journey time variability. To demonstrate this, the tables below show the results for journey times predicted by the LTAM cordon model in comparison with 2023 journey times taken from Google:

Table 1 shows Journey times between A229 Marconi Way Gyratory (Horsted) to Invicta Park roundabout on A229 Royal Engineers Road (not using M20 J6 or M2 J3):

Table 1 Journey Times on the A229

	2023 Car (google data)	2023 Bus (timetable information)	LTAM 2045 With LTC
NB AM	7-12	13-14	6.9
SB AM	10-20	15	8.1
NB PM	10-18	21	7.1
SB PM	9-16	19-20	6.9
Notes: 1. Journey times given in minutes. 2. Google data collected on 1 June 2023 for 7.45am and 5pm on a typical Wednesday. 3. Bus data provided as the route coincides with Arriva route 101 bus stop locations.			

Table 2 shows journey times between M20 J7 and M2 J2 (using M20 J6 and M2 J3)

Table 2 Journey times between M20 J7 and M2 J2 (using M20 J6 and M2 J3)

Route Description	**2023 AM Typical traffic**	**2023 PM Typical traffic**	**LTAM 2045 AM**			**LTAM 2045 PM**		
			Without LTC	With LTC	**Increase in Journey Time with LTC**	Without LTC	With LTC	**Increase in Journey Time with LTC**
From start of on slip at M20 J7 to end of off slip at M2 J2	10 - 16	12 - 24	15.2	18.3	**3.0**	14.5	17.6	**3.2**
From start of on slip at M2 J2 to end of off slip at M20 J7	12 - 24	12 - 24	16.2	18.7	**2.5**	17.1	20.4	**3.3**
Notes: 1. Journey times given in minutes. 2. Google data collected on 16 June 2023 for 7.45am and 5pm on a typical Wednesday.								

- HGV Traffic: Earlier paragraphs of Impact C provided details from the LTAM shape files on the increase in the number of HGVs expected on A229. KCC's work using the LTAM cordon model has also provided details of the proportion of HGVs on the network. The results shown in Tables 3 and 4 show significant increases in the percentage of HGVs, particularly in the PM peak (Table 4). It also shows that HGVs as a proportion of the total number of vehicles on the road increases indicating that LTC draws additional more HGVs than other types of traffic to use the route.

Table 3 HGV flows in 2045 AM peak from LTAM

Road name	**Road section**	**LTAM 2045 AM**							
		Flow without LTC	HGV without LTC	HGV % of flow	Flow with LTC	HGV with LTC	HGV % of flow	**% increase in HGV**	**(With LTC – Without LTC)**
A229 NB	South of Lord Lees	3,480	80	2.3	3,980	180	4.5	**225%**	**100**
A229 SB	South of Lord Lees	4,120	90	2.2	4,080	120	2.9	**133%**	**30**
A229 NB	North of Cobtree	2,860	100	3.5	3,300	190	5.8	**190%**	**90**
A229 SB	North of Cobtree	3,480	90	2.6	3,540	120	3.4	**133%**	**30**
Lord Lees Roundabout	Total Inbound traffic	5,920	180	3.0	6,270	310	4.9	**172%**	**130**
Taddington Roundabout	Total Inbound traffic	7,560	230	3.0	8,140	380	4.7	**165%**	**150**
Cobtree Roundabout	Total Inbound traffic	2,780	120	4.3	2,950	150	5.1	**125%**	**30**
The Running Horse Roundabout	Total Inbound traffic	4,600	150	3.3	4,910	190	3.9	**127%**	**40**

Table 4 HGV flows in 2045 PM peak from LTAM

Road name	**Road section**	**LTAM 2045 PM**							
		Flow without LTC	HGV without LTC	HGV % of flow	Flow with LTC	HGV with LTC	HGV % of flow	**% increase in HGV**	**(With LTC – Without LTC)**
A229 NB	South of Lord Lees	4,650	40	0.9	4,830	140	2.9	**350%**	**100**
A229 SB	South of Lord Lees	3,810	60	1.6	3,850	120	3.1	**200%**	**60**
A229 NB	North of Cobtree	3,410	50	1.5	3,660	100	2.7	**200%**	**50**

Road name	Road section	LTAM 2045 PM							
		Flow without LTC	HGV without LTC	HGV % of flow	Flow with LTC	HGV with LTC	HGV % of flow	**% increase in HGV**	**(With LTC – Without LTC)**
A229 SB	North of Cobtree	2,750	40	1.5	2,800	80	2.9	**200%**	**40**
Lord Lees Roundabout	Total Inbound traffic	7,980	120	1.5	7,710	270	3.5	**225%**	**150**
Taddington Roundabout	Total Inbound traffic	9,180	130	1.4	9,220	290	3.1	**223%**	**160**
Cobtree Roundabout	Total Inbound traffic	2,380	50	2.1	2,500	110	4.4	**220%**	**60**
The Running Horse Roundabout	Total Inbound traffic	4,570	80	1.8	4,790	140	2.9	**175%**	**60**

- Air Quality: Parts of the A229 and the M20, including M20 J6, lie within an Air Quality Management Area (AQMA). This was declared in 2018 due to exceedances of Nitrogen Dioxide. At the time of submitting the A229 Blue Bell Hill Improvement Scheme SOBC in December 2020, it was estimated that in order to meet the national air quality objectives, the M20 J6 required an 8.8% reduction in Nitrogen Dioxide concentrations and A229 Chatham Road required a 25% reduction in NO2 concentrations.

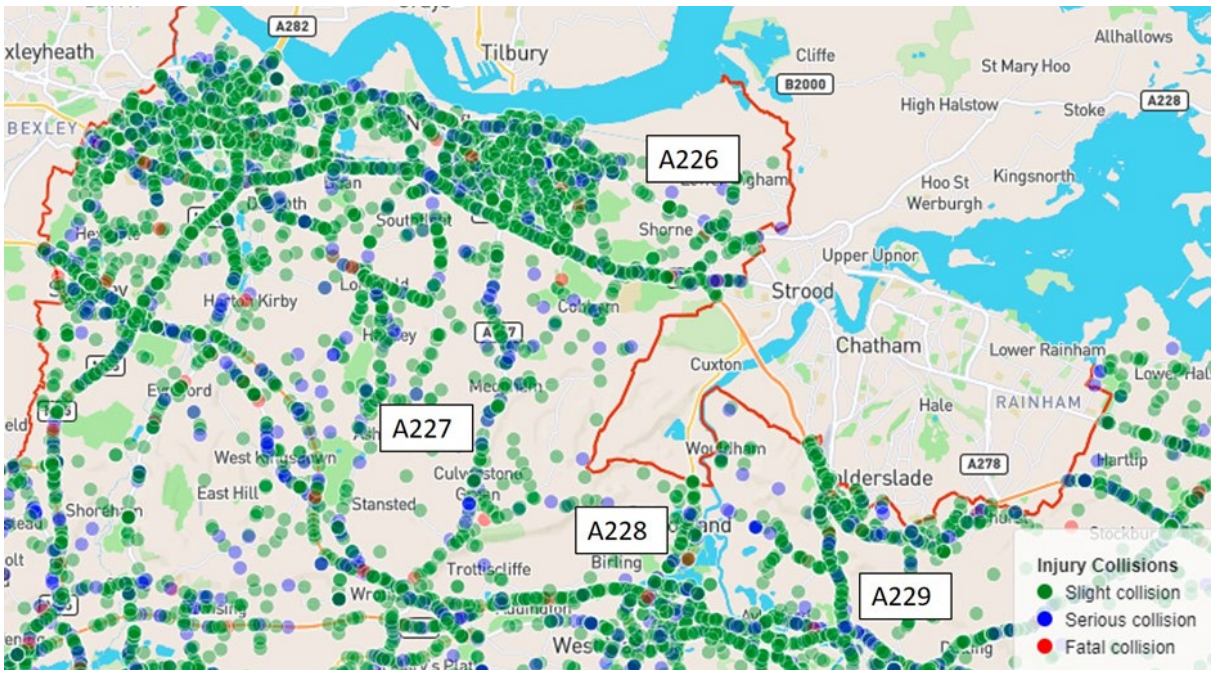
  There are a limited number of receptors quoted near M20 J6 in the Environmental Statement, Appendix 5.4 Air Quality Operational Phase Results (APP-348), but both show anticipated increases in Nitrogen Dioxide with LTC in operation. It should be noted that all 24 receptors (except one) around A229 Blue Bell Hill show increases in Nitrogen Dioxide which will mean that the required reduction in levels in the AQMA to meet national air quality objectives will become more difficult.

Transport Impact D: Road Safety Impacts of the LTC

8.39. KCC recognises and supports that National Highways has used the International Road Assessment Programme (iRAP) approach to measure the safety of their network, and that they exceeded their 2020 target to see 90% of travel on their network on 3 star or above roads. In this respect KCC acknowledges the Project will have an overall positive impact on road safety, assuming an iRAP assessment of the design of the A122 and connections to the existing SRN confirms the claim made in DCO Document 7.9 Transport Assessment (APP-529) paragraph 9.3.16 that “the Project will be designed to the latest safety standards” and ensures that the new infrastructure is above the 3-star rating standard, so that there will be no detriment to existing scores on the SRN.

8.40. However, Transport Assessment (APP-529), Plate 9.3, Spatial distribution of accidents by value over 60 years, indicates a negative impact of the Project on road safety on the A226, A227, A228 and A229. The Department for Transport's (DfT) Cost and Benefits to Accidents – Light Touch (COBALT) software accident analysis presented in Section 9.3, Collision analysis, uses default link rates for the local road network, but junctions do not appear to be assessed, as proposed by the COBALT User Manual. Even with this omission, the analysis identifies in Plate 9.3 increases in accident costs forecast with the Project for the A226, A227, A228 and A229. All these roads have a significant history of severe collisions, as evidenced by the historic junction accident analysis in Plate 9.5, Collisions A2/M2 junction, 2015 - 2019. An equivalent analysis of a wider area, including the A229, is shown in the Figure 1.

Figure 1 Collisions at A2/M2 junctions, 2015-2019 (source: STATS-19 database)



8.41. If the COBALT analysis had been completed for junctions as well as road links, the A226, A227 and A228 in particular, with their many at-grade junctions, would likely incur significantly higher costs / safety impacts. It is important to see how this might affect the overall accident per km metric for the Project, which is currently presented to show a positive impact, with a saving under the 'With Scheme' scenario.

8.42. KCC notes a COBALT analysis has not been carried out for the 11 phases of LTC construction, which have been modelled in the LTAM, so potential impacts on road safety during the construction phase of the project are not able to be quantified.

Transport Impact E: Public Transport and Active Travel Impacts of the LTC

8.43. As mentioned at the beginning of this Highways section, KCC acknowledges that both positive and neutral traffic impacts of the LTC tend to occur in areas where the effects of the crossing are diminished, or where traffic is dispersed by the presence of two Thames crossings. This tends to have a positive or neutral impact on public transport in the vicinity of the LTC once it is in operation. In particular, KCC believes the LTC will have a positive impact on Fastrack A and the Dartford bus network.

8.44. KCC has identified where construction of the LTC will have a negative impact on bus journey times. The Transport Assessment (APP-529) Section 8.9, Impacts on the public transport network, sets out the predicted delay to buses during the construction phase, where these are expected to be over two minutes per service per direction. The accumulation of delays on a bus trip increases journey time, requiring adjustment to schedules either to increase the cycle time or to reduce the level of service, both leading to a loss in patronage. Reductions in public transport service level often engender private car trips and reduction in revenue, which both need to be avoided.

8.45. KCC has taken the information in Transport Assessment (APP-529) Tables 8.70 to 8.79, identifying affected bus routes in the impacted first 10 phases of construction, and calculating the average delay per trip; the total additional hours; and the associated costs of the impacts. [*Our Ref: Lower Thames Crossing _ Construction TA impact on Buses v3.docx*] This analysis covers the costs of the known delays to buses, but not potential delays resulting from such things as temporary closure / diversions that have been referred to in the Transport Assessment (APP-529), but which cannot be quantified by National Highways at this stage. For the highest frequency services which are likely to suffer from Thong Lane closure and A226 Contraflow, bus priority should also still be considered.

8.46. KCC has identified negative impacts on active travel modes, largely in terms of what is not provided by the Project. Mitigations of these omissions are discussed in our Written Representation.

Transport Impact F: Severance Issues for Walkers, Cyclists and Horse Riders (WCH)

8.47. DCO document 7.7 Combined Modelling and Appraisal Report – Appendix D – Economic Appraisal Package: Distributional Impact Appraisal Report (APP-525), Tables 7.17 and 7.18 show 'Distributional analysis for links potentially impacted by traffic related severance' for the regional study area and for England & Wales respectively. Whilst it is noted that Gravesham and Tonbridge & Malling are predicted to receive some 'slightly beneficial – large beneficial' impacts, which will have a positive impact, Valley Drive, Wrotham Road and Forstal Road are predicted to receive 'slightly adverse – large adverse' impacts, yet no mitigation is proposed in these locations which will be impacted negatively. KCC has

considered the nature of these highways and the land uses along their length and concluded that no mitigations would be required along Forstal Road. In comparison, Valley Drive has residential land uses along its entire length on each side, interspersed with local commercial / retail / community land uses. As such, increases in severance, assessed as moderate adverse, should be mitigated. Severance along built-up sections of Wrotham Road should also be mitigated.

Transport Impact G: Dangerous Goods Vehicles and Oversized Vehicles

8.48. DCO Document 7.9 Transport Assessment (APP-529), Table 7.4, Hourly forecast cross-river flows, indicates that the Project will have the effect of reducing traffic flows using the Dartford Crossing by between 9% and 21% in the key AM and PM Peak periods of 2030 and 2045. Table 7.5, Comparison of HGV vehicle numbers on the Dartford Crossing and the A122 Lower Thames Crossing, indicates HGV reductions of between 17% and 33% in these key peak periods. In this respect KCC acknowledges the Project should have a positive impact in reducing delays related to the escort of Dangerous Goods Vehicles (DGVs), as well as incidents due to oversized vehicles. These issues are detailed in DCO Document 7.1 Need for the Project (APP-494) paragraphs 4.2.14 a and b:

- "*The western tunnel geometry excludes vehicles over 4.8 metres high, so taller vehicles must use the eastern tunnel and cross traffic lanes to do so. This leads to congestion and increased weaving which is a frequent cause of incidents. When vehicles that are too high mistakenly approach the western bore, traffic must be stopped while they are moved to the eastern bore, which causes disruption and delay to general traffic*."
- "*Due to the age and design of both tunnels, Dangerous Goods Vehicles, such as fuel tankers, are required to be escorted through the tunnels which slows traffic flow. Escorts are scheduled to take place every 15 minutes and 2019 data shows that about 2,000 escorts took place every month (23,732 escorts in the year) equivalent to 65 every day. The process of undertaking these escorts and removing escorted vehicles from general traffic lanes on the approach to the tunnels can also result in additional disruptions and loss of capacity of between 8–12%, equivalent to 5–7 minutes of closures each hour*."

8.49. KCC is not aware of any commitment to divert all DGVs and oversized vehicles to use the Project, which is designed to accommodate them, in order to phase out the use of the Dartford Traffic Management Cell, which organises the escorts. With HGV reductions of between 17% and 33% in the key peak periods, a negative impact of these two issues will therefore remain at the Dartford Crossing, albeit reduced, when it could easily be removed.

Transport Impact H: Construction Shifts and Deliveries

8.50. KCC acknowledges that, while the modelling of construction activities has been aligned with the LTAM peak periods (0700-0800 and 1700-1800) to provide a reasonable worst-case analysis, Transport Assessment (APP-529) paragraph 8.1.7 h ii confirms the proposed shift times will not align with peak traffic flows. This should result in a neutral impact, assuming shift times do not align with the local road network (LRN) peaks (0800-0900 and 1700-1800).

8.51. Plates 8.30 onwards show significant changes in peak hour traffic flows for the LRN around the Kent construction compounds for the various construction phases (typically in the two bands between +51 and +250 PCUs). Figures are not provided to demonstrate whether construction traffic increases congestion. The accompanying tables (Table 8.37 onwards) show increases in journey times of over 2 minutes or +18% on the A226 and over 1.4 minutes or +14% on Brewers Road / Halfpence Lane for some phases, suggesting there will be negative impacts of LTC construction if the proposed shift times do indeed align with peak traffic flows.

8.52. Similarly for construction deliveries, Transport Assessment (APP-529), paragraph 8.6.19 indicates the modelling of construction deliveries has also been aligned with the LTAM peak periods (0700-0800 and 1700-1800) to provide a reasonable worst-case analysis. It is expected that construction deliveries will not align in practice with the LRN peaks (0800-0900 and 1700-1800).

8.53. KCC has worked with National Highways to review modelled traffic congestion on an agreed worst-case PM Peak scenario during construction Phase 6. It was found that traffic volumes exceeded 90% of capacity with construction traffic in two key areas, with the resultant delays:

- A226 Gravesend Road near the LTC construction compound – eastbound traffic delay of 27s;
- A2 main line traffic management scheme (reduced lane widths and speed limits) – eastbound traffic delay of 87s – a delay which could encourage traffic to avoid the A2 main line and use unsuitable rural routes.

8.54. At the time of writing, KCC and National Highways has discussed mitigations for these impacts in terms of improved access to the A226 construction compound and for all construction related traffic to avoid peak periods on the LRN (0800-0900 and 1700-1800).

8.55. With regard to avoiding peak periods on the LRN, Framework Construction Travel Plan (APP-546), paragraph 1.1.6 indicates it will be required of contractors to develop Site-Specific Travel Plans (SSTPs) in respect of the sites for which they are responsible, rather than National Highways. Paragraph 10.5.2 indicates contractors rather than National Highways would be expected to provide a sum of money for each site to cover proportionate remedial measures. While KCC acknowledges this initiative, which should have a positive impact on the construction worker Travel Plan, the lack of commitment to funding from National Highways is concerning.

Transport Impact I: Construction Traffic Routeing

8.56. DCO document 7.9 Transport Assessment Appendix E – Construction Traffic Assessment Supporting Information (APP-534), Plate 1.2, Southern Tunnel Entrance Compound and Shornefield Road Utility Hub access and egress arrangements, shows access and egress for staff and HGVs from the A226. Transport Assessment (APP-529) Table 8.3 indicates that Haul Road H18, the haul road between the A2 and Southern tunnel entrance compounds, would be available between construction Phases 2 and 11. The use of haul roads is welcomed by KCC as they will help to reduce the impact on the LRN. However, given the existing congestion during the peak hours, KCC remain concerned with the negative impact on the LRN. All vehicles accessing the southern tunnel compound should be able to use Haul Road H18 when it becomes operational. This would reduce the impact on the LRN and in particular benefit the site access junction on the A226, thereby reducing delays to all traffic (see earlier KCC comments on modelled delays due to Phase 6 PM Peak construction traffic).

8.57. Transport Assessment Appendix E (APP-534) paragraph 1.1.7 states "There would be no left turn allowed at the egress location [of the Southern Tunnel Entrance Compound] for HGVs so these would need to turn right onto the A226. Staff would be allowed to turn left onto the A226". Whilst KCC welcome this proposal, we are concerned that this may not be provided or enforced, as this is one of two key negative impact points on the LRN for construction traffic (see earlier KCC comments on modelled delays due to Phase 6 PM Peak construction traffic).

8.58. Transport Assessment Appendix E (APP-534) paragraph 1.1.9 refers to access and egress for the A226 Gravesend Road compound, indicating HGVs will use the A226 and staff will use Lower Higham Road. KCC are concerned about the negative impact on Lower Higham Road. Construction workers should be permitted to use either access to reduce the impact on this access.

8.59. DCO document 7.14 Outline Traffic Management Plan for Construction (OTMPfC) (APP-547) paragraph 2.4.11 g confirms monitoring data will be captured and reported on "adherence to agreed vehicle routeing" by Main Works Contractors and utilities contractors for each compound. Given the congestion on the LRN and the rat running through local villages that already occurs on Kent roads, vehicle routing will be an important part of the construction process. Monitoring of adherence to the route is therefore welcomed. In response to previous KCC questions on how adherence to agreed routes would be managed, National Highways identified the use of a delivery booking system as described in DCO document 6.3 Environmental Statement – Appendix 2.2 Code of Construction Practice, First Iteration of Environmental Management Plan – Annex B – Outline Materials Handling Plan (APP-338) paragraph 3.5.11. KCC considers this does not go far enough and requires more detailed monitoring to mitigate these negative impacts.

8.60. The OTMPfC (APP-547) Plates 4.1, 4.2, 4.5 and 4.6 show the proposed routing of construction vehicles. These are welcomed as they propose to retain trips on the SRN where possible. However, Kent suffers from both traffic congestion and rat running through local villages and along unsuitable routes to avoid congestion; both of which have a detrimental impact on Kent residents and the LRN. As a result, the routing plans should be conditioned so that deviations can be monitored and enforced where necessary to mitigate these negative impacts.

Transport Impact J: Construction Impacts on the Condition of the Existing Local Road Network (LRN)

8.61. KCC has significant concerns over the negative impacts of LTC construction on the condition of the existing LRN and KCC's ability to maintain it.

8.62. Construction traffic for the LTC will place an increased loading on KCC's network resulting in faster deterioration than it would otherwise experience. The County Council has previous experience of dealing with the impact of construction and maintenance works on the A2 and is fully aware of the significant additional loads a project the scale of the LTC will place on KCC's roads from diverted traffic and especially local traffic that is rat-running due to delays caused by the works. This is especially an issue for local and rural routes which are structurally weaker and more likely to experience failures due to increased traffic.

8.63. Maintenance works on failed areas of carriageway will need to be carried out earlier and to a higher standard to avoid conflicts with the LTC construction works. KCC's network currently has a backlog of over £500million of planned renewal and preservation works, so it is of critical importance that the County Council spends its limited resources where they will achieve the most benefit to its network. Repairs due to the impact of this project do not necessarily represent good asset management practice and will divert resources and funding away from other areas of KCC's network which are in more need and may otherwise deliver more benefit.

8.64. Sections of roads that do reach the end of their service life during the LTC construction period, due to normal deterioration or otherwise, will either require more expensive interventions or more short-term repairs (which deliver poor value for money) to avoid having a significant impact on the LRN which will be especially sensitive during this time. Where this cannot be avoided, significant negative impacts on local residents and businesses may occur due to the combined impacts from the LTC works and required KCC maintenance works.

8.65. KCC has undertaken a review of its network and identified areas of concern that are on the principally affected routes likely to see significant construction traffic, diverted traffic or routes known from previous experience that locals will use to bypass other delays. These sites are approaching the end of their life, but the County Council believes failure during the LTC construction would present an unacceptable risk to both the existing road network and the LTC project.

Transport Impact K: Highways Asset generation and impact of transference from National Highways to Kent County Council

8.66. Within document 2.5 General Arrangement Plans, and specifically in respect of document numbers TR010032/APP/2.5 and TR010032/APP/2.13, indicate that some structures will become the responsibility of KCC under the proposed highway boundaries. This will have a negative impact on KCC arising from the cost and time to undertake the necessary assurance and approval process and the ongoing liability for operation, maintenance, renewal and replacement of the assets over their life.

8.67. The extent of the negative impact cannot be fully ascertained owing to the applicant not providing information confirming which structures will seek the be transferred to Kent County Council.

The Wider Network Impacts Management and Monitoring Plan (APP-545)

8.68. The Applicant proposes to address many of the negative impacts of the LTC mentioned above by means of a Wider Network Impacts Management and Monitoring Plan (WNIMMP) (APP-545). Our response to this proposal is detailed in our Written Representation.

9. Public Rights of Way (PRoW) (as Local Highway Authority)

PRoW Impact A: Enhancements to PRoW Network

9.8. KCC has identified the following positive and neutral impacts of the Applicant's plans and proposals regarding public rights of way (PRoW):

- The provision of a coherent network of walking, cycling and horse riding (WCH) routes is welcomed; some of the network severance issues arising from earlier transport schemes are addressed and our view of the proposed future network is broadly positive.

- The provision of new parking and equestrian parking facilities at Thong Lane is considered a positive benefit in providing an additional gateway to the new routes.

- The construction of green bridges at Brewers Road and Thong Lane provides segregated non-motorised user (NMU) provision and is considered a positive benefit.

9.9. KCC has identified the following negative impacts of the Applicant's plans and proposals regarding PRoW:

PRoW Impact B: Hares Bridge

9.10. The omission of improvements to bring Hares Bridge up to cycling / equestrian standard is considered a negative impact of the PRoW proposals for the Project. Hares Bridge is shown in DCO document 2.7 Rights of Way and Access Plan Volume B (APP-025) (points 8/28 to 10/4) Sheet 6 and currently meets pedestrian requirements but is inadequate for cycle and equestrian use. It is a key link in the NMU network; the layout of which may encourage use that it was not designed to support and is unlikely to be adequately mitigated by a sign requiring cyclists to dismount. Cycle dismount signs are not permitted in current standards, as they are not inclusive, as disabled people often cannot dismount.

PRoW Impact C: Future Provision

9.11. In a similar vein, KCC is unable to determine from the following structures plans whether provision has been made for future improvements to bring the following structures cross sections up to cycling / equestrian standard as per the requirements of LTN 1/20 and CD 143 Designing for walking, cycling and horse-riding. Failure to provide for this would be considered a negative impact of the PRoW proposals for the Project. These structures will provide for key active travel movements across the A2 and the LTC itself:

  - Brewers Road Bridge, as shown in DCO document 2.13 Structures Plans (Volume B) (Sheets 12 to 79) (APP-044) Structures Plans 5(2)(o) Work No. 1D Sheet 20

- Thong Lane Green Bridge (over A2), as shown in (APP-044) Structures Plans 5(2) (o) Work No. 1H Sheet 21
- Thong Lane Green Bridge (over A122 LTC), as shown in (APP-044) Structures Plans 5(2) (o) Work No. 3B Sheet 26
- Marling Cross Overbridge, as shown in (APP-044) Structures Plans 5(2) (o) Work No. 2F Sheet 71

PRoW Impact D: Designation of temporary National Cycle Route (NCR) 177

9.12. The designation of temporary National Cycle Route (NCR) 177 as a permissive route in DCO document 2.7 Rights of Way and Access Plan Volume B (APP-025) Sheets 5 & 6 (between points 6/53 and 8/22) is considered a negative impact. KCC remains concerned that what is to be a key link in the NMU network, and integral to long-term east-west connectivity south of the M2 corridor, is to be delivered by means of a permissive agreement. The route is also to accommodate NCR 177 on a temporary basis through the construction phase. There is no clarification as to the nature of the permissive agreement, the terms of the agreement or the parties to the agreement. There can therefore be no certainty moving forward that permission will not be rescinded – removing the link for NMUs and specifically equestrians and cyclists. Currently the provision south of the M2 corridor through Jeskyns Community Woodland cannot be considered adequate. Should the permission be revoked at some future point the only viable alternative for recreational users would be the replacement NCR 177 route; this route is conceived as meeting the needs of commuting cyclists. It will inevitably, given its location, be of considerably lower amenity and unlikely to be used by equestrians given the proximity to traffic. Permissive access cannot and should not be viewed as a suitable alternative/compensatory provision for NMUs. The permissive route needs to have Public Bridleway designation.

PRoW Impact E: Absence of construction detail

9.13. The absence of construction detail for the Public Rights of Way/ WCH routes to be provided is a negative impact. In the absence of such detail, it is not possible to assess the suitability of the construction or to calculate commuted sum requirements.

PRoW Impact F: Existing leisure/recreation PRoW use

9.14. LTC construction will have a negative impact on existing leisure / recreation PRoW use, with the prolonged closure of PRoW within the red line boundary of the Project. These effects will need to be monitored effectively. Their impact is also more likely to be prolonged or permanent if PRoW are not restored to pre-construction standard or better.

10. Minerals and Waste (as Minerals and Waste Planning Authority)

Minerals and Waste Impact A: Mineral Safeguarding

10.8. LTC DCO Document 6.3 Environmental Assessment Appendices Appendix 11.2 – Mineral Safeguarding Assessment (MSA) (APP-436) identifies that the tunnel bore will affect safeguarded mineral deposits, these being the sub-Alluvial River Terrace Deposits and River Terrace Deposits, identified on the Gravesham Borough Council minerals map (Lynch Hill and Taplow sand and gravel).

10.9. The safeguarded minerals are located beneath and adjacent to the Thames Estuary and Marshes Special Protection Area and Ramsar site. The Applicant's MSA (APP-436) quantifies it being of an area of approximately 14,500m2 (1.4ha) though does not identify a tonnage or potential tonnage. Given that this deposit has a 5m average thickness [according to the British Geological Survey] there could be as much as 72,500m3 or 116,000 tonnes of mineral sterilised by the project.

10.10. This would normally require prior extraction to be explored. However, as the area has an international designation due to its ecological and hydrological importance, prior extraction is not deemed appropriate due to the potential negative impact. Paragraph 4.2.5 of the Applicant's MSA (APP-436) recognises this and states:
'Although the Project would result in the potential sterilisation of a proportion of the safeguarded sub-Alluvial River Terrace Deposits and the River Terrace Deposits, prior surface extraction under Policy DM 9 is not deemed appropriate due to the potential adverse effects the works may have on the Thames Estuary and Marshes Ramsar site, which has an international designation.'

10.11. Moreover, where a proportion of the mineral is actually intercepted by the tunnel bore the Applicant's MSA (APP-436) states that:
'It should be noted, however, that the Project is in tunnel in this area, and it is envisaged that some mineral resources would be extracted through the tunnelling works and reused, recycled and recovered in the Project works.'

This demonstrates that the Applicant is proposing some mitigation for potential loss of overall mineral resources to a wider sterilisation, though it is accepted that any prior extraction would not be environmentally acceptable. Therefore, the use of these materials in the project is considered a neutral impact derived from the overall scheme.

10.12. In conclusion, from a mineral safeguarding position the local impact is considered neutral.

Minerals and Waste Impact B: Waste Generation

10.13. The main issue of concern is that waste generated by the project meets the requirement to be reused, recycled or otherwise used, rather than disposed of, generally to land. This is in line with Kent County Council's Waste and Minerals Local Plan 2013-30 [as partially Amended 2020] and the waste directives of the government's Circular Economy Package policy statement (July 2020).

10.14. While it is understood that a degree of non-hazardous waste and hazardous waste will be produced by the project that may require management off-site, the main concern is the inert waste arisings (called construction, demolition and excavation wastes or C,D and E wastes) from the project's main activity (tunnel boring) and how that will be managed. DCO Document 6.1 Environmental Statement Chapter 11 – Material Assets and Waste (APP-149) states:

> ***'Current construction, demolition and excavation (CDE) waste reuse, recycling and/or recovery***
>
> *11.4.11 DMRB LA 110 Material assets and waste (Highways England, 2019) requires highways schemes to divert material from disposal. DMRB LA 110 states that 'at least 70% (by weight) of CDW shall be subjected to material recovery in accordance with the Waste Directive'.*
>
> *11.4.12 Through a combination of one or more of reuse, recycling and/or recovery the Contractors shall achieve a minimum of 70% (by weight) with a target of 90% (by weight) of non-hazardous excavated wastes and a minimum of 70% (by weight) with a target of 90% (by weight) of non-hazardous construction and demolition waste that are destined for off-site waste management outside the Order Limits, and therefore would be diverted from final disposal in landfill (REAC Ref. MW013).'*

10.15. Therefore, only relatively limited quantities of waste, with a particular emphasis on the C,D and E wastes, would require management outside the parameters of the project and is to be used as part of the construction material needs of the project. This would have a positive impact of not taking up the now relatively limited and finite inert landfill resources in both Kent and Essex at this time.

10.16. In this regard KCC is of the view that the proposed project's local impact in waste management capacity and waste hierarchical terms is positive.

11. Sustainable Urban Drainage Systems (SUDS) (as Lead Local Flood Authority)

SUDS Impact A: Departure on Peak Rainfall

11.8. Paragraph 4.72 of DCO Document 6.3, Appendix 14.6, Part 6 (APP-465) states:

"the Environment Agency verbally agreed at a meeting held on 4 May 2022 that a 5% departure on peak rainfall intensities was acceptable"

Whilst KCC accepts that this departure has been agreed (see item number 2.1.63 of the Statement of Common Ground Ref (5.4.1.1) between National Highways and The Environment Agency) it would appear to solely relate to the 100 year critical rainfall event, no consideration appears to have been given to the now required uplift to the 30 year critical rainfall event.

11.9. Given that the requirement is for a 35% uplift to be applied to the 30 year event and that this is above the 5% accepted departure (being that no uplift has been applied to the 30 year event) there is a possible negative impact to Local Area whereby the risk of flooding could be increased due to the recommend climate change uplift factor not being applied to the 1 in 30 year critical rainfall event.

SUDS Impact B: Drainage design of realigned or widened highway

11.10. Paragraph 6.3.17 of DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), states with regards to existing sections of the highway which are to be realigned or widened in association with the LTC commits that:

"If the latest drainage standards are more stringent than the ones used to design the current highway, a more robust drainage design would be afforded"

11.11. KCC is pleased to note this commitment and are of the opinion that this would result in a positive impact to the local area given the more stringent requirements and the associated benefits afforded to managing flood risk.

SUDS Impact C: Watercourse channels

11.12. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 6.3.23 states:

"Alteration of watercourse channels and structures would only be considered as a last resort. Exceptions could include the following:

a. Where there is an opportunity to change an engineered (straight) channel to a more natural (meandering) channel

b. Replacing an undersized structure, which acts as a constraint to freewater flow
c. Returning culverted sections of watercourse to open channel where possible and practicable."

11.13. Improvement of existing watercourse channels structures as part of the scheme would have a positive impact on the Local Area, at best should no works be undertaken the impact should remain neutral.

SUDS Impact D: Discharge rates

11.14. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 6.3.26 states:

"Reducing discharge rates from existing highway drainage assets (e.g. retention ponds) will hold back and slow down the flow of water in watercourses, thereby reducing flood risk on a catchment level"

11.15. Any reduction in the discharge rate from existing highway drainage, from a flooding aspect, will benefit downstream flood risk and as such should have a positive impact on the local area.

SUDS Impact E: Surface flooding 1

11.16. Paragraph 8.2.4. of DCO Document 6.3, Appendix 14.6, Part 6 (APP-465) states:

"Some isolated pockets of surface water flooding within the curtilage of the highway would be lost and some would be partially lost. This may cause a minor redistribution of surface flooding beyond the curtilage of the Project road, but this is not considered to present a significant flood risk. Furthermore, any such redistribution would mostly lie within land for which National Highways would be seeking permanent acquisition"

11.17. Whilst it is understood that the redistribution of surface flooding maybe regarded as minor and that it will 'mostly' lie in land which will be in the ownership of the Applicant, this would still be seen as a negative impact given that areas of flooding could occur where they did not before.

SUDS Impact F: Surface flooding 2

11.18. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 8.2.6. indicates three areas within KCC's responsibility, as LLFA, whereby the project may have an offsite impact on surface water flooding as shown from the long-term flood risk information map for surface water (Environment Agency, 2022c), these being:

a.EFR-1-SW-01: Western end of the A2/M2 corridor (Marling Cross Interchange)

b.EFR-1-SW-02: M2/A2/Lower Thames Crossing junction
c.EFR-1-SW-03: Eastern end of the A2/M2 corridor (Park Pale Interception)

11.19. Further detailed descriptions are provided within tables 8.1 through 8.3 of the possible risk from surface water that could be experienced, and the mitigation measures proposed, these being:

a.EFR-1-SW-01:

Risk: Existing High Risk of Surface Water Flooding due to existing low point where water naturally accumulates.

Mitigation: Where the Project ties in with the existing A2/M2 highway, the existing highway drainage infrastructure would be reconfigured to accommodate runoff from new catchments and catchments affected by the Project, all in accordance with current DMRB standards.

b.EFR-1-SW-02:

Risk: Existing surface water flow path which crosses the projects red line and could be restricted/terminated by the project proposals.

Mitigation: No mitigation required: The slip road would be on viaduct where it crosses the flow path (the level of the viaduct would exceed the surface water flooding level at the crossing point.

c.EFR-1-SW-03

Risk: Known existing widespread flooding exacerbated by overland surface water flow paths.

Mitigation: Where the Project ties in with the existing A2/M2 highway, the existing highway drainage infrastructure would be reconfigured to accommodate runoff from new catchments and catchments affected by the Project, all in accordance with current DMRB stand

11.20. Given that these relate to existing flood issues and that mitigation is proposed to either reduce the issues experienced or 'do nothing' (EFR-1-SW-02) KCC is of the opinion that this has a neutral to positive impact on the Local Area.

SUDS Impact G: Flood issue

11.21. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 8.2.9 details that a further flood issue is known of via the Highways Agency Drainage management System (HADDMS) – "The hotpot encompasses the western part of junction 1 of the M2 (Park Pale Interchange) end extends westward, along both carriageways, to Cobham junction"

11.22. Proposed mitigation to resolve this issue is given in subsequent para 8.2.12 whereby *"the Project would encompass the location of all reported flood events so any legacy issues associated with these events would be eliminated. Furthermore, the new drainage provisions would extend across the full length of the flood hotspot"*

11.23. KCC would therefore regard the elimination of known flood issues in this area as a positive impact.

SUDS Impact H: Surface water flow path

11.24. Drawing number HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-00130 as provided in DCO Document 6.3, Appendix 14.6, Part 9, Annex A (APP-469) provides details of the extent of known surface water flooding and whilst the areas above are referenced with regards to mitigation measure to resolve the issues we note there is an existing Surface water flow path shown to the west of A2 which crosses the projects red line (immediately south of the golf course) but does not appear to be considered in the Flood Risk Assessment.

11.25. Should the work proposed in this area be such that they could interfere with the existing flow path (an embankment for example) it could increase the risk of flooding from surface water and thus have a negative impact on the local area.

SUDS Impact I: Groundwater flooding

11.26. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 8.2.14 through 8.2.22 considers the risk to and from Groundwater flooding as a result of the project.

11.27. The majority of the risk from groundwater flooding to the project is mitigated by the fact that the highway in locations at risk of groundwater flooding is within the tunnel and below the superficial deposits associated groundwater risk thereby having a neutral effect.

11.28. The risk of groundwater flooding resulting from the project is given as being in association with the possibility of intercepting perched water (essentially water trapped between permeable and impermeable stratums) as a result of civil construction works e.g. the creation of a cutting.

11.29. Should the emittance of groundwater occur in association with the works proposed, this will be managed through incorporating appropriate drainage details such as combined surface and sub-surface drains. Whilst this will be a negative impact with regards to the possible emittance of groundwater where it did not occur before, by it being managed should it occur, we deem the risk of impact to the local area as neutral.

11.30. With regards to the project possibly impacting on the existing groundwater flow regime, none of the cuttings proposed within catchment EFR-1 transgress into the Chalk Formation aquifer water table and so are deemed to have a neutral effect on the regime and hence local impact.

11.31. Paragraphs 8.2.21 and 8.2.22 consider the impact of the proposed infiltration basins on ground water levels and the resultant risk of groundwater flooding. Whilst it is stated that "the detailed assessment presented in Appendix 14.5: Hydrogeological Risk Assessment (APP-458) shows that the proposed infiltration basins would not cause mounding that would reach ground surface" on checking it is apparent that (from para 2.5.8 of DCO Document 6.3, Appendix 14.5, Part 1 of 2 9APP-458)) that the departure from standard as agreed with the Environment Agency, and as already discussed in SUDS Impact A above, that no climate change uplift assessment has been made for the 3.3% AEP event and as such we cannot be certain that the introduction of surface water to ground water via infiltration will not ultimately lead to excessive mounding of ground water resulting in flooding and a negative impact to the local area.

SUDS Impact J: Flooding from sewers and water mains

11.32. DCO Document 6.3, Appendix 14.6, Part 6 (APP-465), Paragraph 8.2.25 through 8.2.27 considers the risk of flooding from sewers and water mains and that these items will have been diverted prior to the construction works taking place thus having little to no associated flood risk for the operational phase of the proposals.

11.33. There is however a risk of a sewer or water main becoming damaged in association with the works whereby they are diverted which could have a temporary negative impact on the Local Area, although one would assume the method of these diversion works would be approved/overseen by the various asset owners.

SUDS Impact K: Surface water run off

11.34. DCO Document 6.1, Chapter 2 (APP-140), Paragraph 2.4.85, discusses how surface water run off from the tunnel approaches will be manged and states that: *"The surface water runoff collected at the southbound sump would be pumped to an infiltration basin."*

11.35. Given the use of the tunnel the surface water runoff collected from the entrances will be of a highly polluted nature and whilst methods of treatment are considered further on in the chapter (para 2.7.66), no specific mention is given to the treatment of run off from the tunnel entrance. Given the seemingly direct link via pumping from collection mechanism to the infiltration basin, there is a risk of pollution to ground water which would have an obvious negative effect to the local area.

SUDS Impact L: Discharged water run off

11.36. DCO Document 6.1, Chapter 2 (APP-140), Paragraph 2.7.64 states that *"Where required, temporary attenuation of construction site generated surface water runoff to existing discharge rates / greenfield run off rates would be provided."*

11.37. Given that it is proposed for water to be discharged at the equivalent greenfield runoff rate, this would have a neutral impact to the local area.

SUDS Impact M: Contamination

11.38. DCO Document 6.1, Chapter 2 (APP-140), Paragraph 2.7.65 considers the issue of possible contamination in association with surface water run off and states:
"Temporary drainage systems would incorporate pollution control systems designed in line with industry good practice guidance and comply with the requirements of DMRB CG 501 (Highways England, 2020f)."

11.39. Whilst the issue of contamination is an undesirable one, KCC is of the opinion that it has been considered and that via the use of suitable pollution control systems as proposed, its impact will be neutral to the Local Area.

SUDS Impact N: Permanent Drainage System

11.40. DCO Document 6.1, Chapter 2 (APP-140), Paragraph 2.7.68 considers the permanent drainage system in association with the operational phase of the proposals and states:
"Drainage works would also include the construction of drainage ponds to store and treat surface water. These would be excavated prior to earthworks where practicable, and could be used during the construction phase to meet temporary drainage requirements, for example drainage from completed sections of road."

11.41. Given the ultimate design of the drainage system is to serve a much wider catchment, it could be assumed that there is no risk in association with temporary drainage connections. However, these will not be what the system has been designed for and so could have a negative impact on the local area.

SUDS Impact O: Box Culvert Installation

11.42. DCO Document 6.1, Chapter 2 (APP-140), Paragraph 2.7.75 provides a general description on the general installation method in association with a box culvert and details the application of a bitumen coating as a waterproof membrane.

11.43. Given that the box culvert is to be used for the conveyance of surface water there are concerns raised with regards to the use of bitumen as a waterproofing material and possible issues of contamination to the water as a result which could have a negative impact to the local area as a result.

SUDS Impact P: Management of surface water

11.44. DCO Document 6.1, Chapter 2 (APP-140), Paragraphs 2.7.161 through 2.7.164 considers the management of surface water in association with the southern tunnel entrance compound and proposes a series of interconnected settlement ponds whereby the final settlement pond will discharge via a pumped mechanism to the ditch network supplementing the RAMSAR area water.

11.45. The RAMSAR site itself is not overseen by KCC, so ultimately the approval to discharge there is granted by others. However, the proposals to deal with settlement of solids prior to the discharge of waters at the equivalent greenfield runoff rate appear acceptable and KCC is of the opinion that it would have a neutral impact to the local area.

SUDS Impact Q: Sustainable Drainage Systems

11.46. DCO Document 6.1, Chapter 14 (APP-152), Paragraph 14.5.9b states:
"b. The drainage design incorporates Sustainable Drainage Systems (SuDS) and reduces the risk of causing flooding elsewhere by using attenuation features as presented on Figure 2.4: Environmental Masterplan (Application Document 6.2). Drainage of operational areas on greenfield sites would be designed to ensure that post-development surface water runoff rates do not exceed existing rates (LSP.16). Where this attenuation is provided via ponds, the ponds would be designed to appear as naturalistic elements within the wider setting, with planting provided to soften edges where this is appropriate (LSP.17). Conveyance of runoff would be by means of drainage ditches and pipes, and drainage ditches would be used wherever practicable (LSP. 28). This strategy would protect receiving watercourse flow regimes as well as preventing increased scour near drainage outfalls and changes to sediment deposition/accretion in downstream reaches."

11.47. Given that it is proposed that the conveyance of post development surface water runoff is to be at a rate not in exceedance of the existing, we would deem the proposals to have a neutral impact on the risk of flooding from surface water.

SUDS Impact R: Ponds

11.48. DCO Document 6.1, Chapter 14 (APP-152), Paragraph 14.5.9h and paragraph 14.5.9.i states:
"Where a natural pond would be removed as part of the construction, this would be replaced. These newly created ponds would be of a similar area, depth and habitat characteristic to the removed ponds and would be provided as part of the proposed landscape mitigation illustrated in Figure 2.4:

Environmental Masterplan (Application Document 6.2). Further details are provided in Chapter 8: Terrestrial Biodiversity."

And

"Realigned channels would be constructed to reflect the size and form of existing channels to accommodate baseline flow and sediment regimes. The Design Principle S9.10 (Application Document 7.5, Design Principles) commits to, where practicable, constructing realigned channels that are more naturalised in form and that follow historic ditch patterns, promoting morphological and habitat diversity."

11.49. Whilst it could be argued these are to have a neutral to positive effect on flood risk due to the 'like for like' replacement of existing ponds. Should they be required to be removed and the existing channels improved, there will be a negative impact on the area given the possible loss of habitat and the time taken for the newly created areas to become established.

SUDS Impact S: Infiltration basins

11.50. DCO Document 6.1, Chapter 14 (APP-152), Paragraph 14.5.9o states:
"Infiltration basins to form part of the operational drainage system shall only be used to receive runoff from completed sections of highway; general site runoff shall not be discharged to these infiltration basins"

11.51. This would seem to contradict the statement referenced under Impact N whereby the use of operational ponds for the construction phase works is given as a possibility. Should the infiltration basins be utilised as part of the construction phase works there is a risk that excessive siltation loads could be imposed on the basins, meaning they would not operate effectively and result in a negative impact due to an increased risk of flooding to the local area.

SUDS Impact T: Rainfall runoff

11.52. DCO Document 6.1, Chapter 14 (APP-152), Paragraph 14.6.34 states:
"Rainfall runoff from the southern tunnel entrance compound would be discharged to a ditch, referred to as the western ditch, in Filborough Marshes. The ditch, and wider interconnected network of watercourses, would convey the runoff to the River Thames via an existing outfall. Impacts on baseline water quality would be prevented through provision of a treatment system at the compound that would, for example, remove suspended sediments and chalk fines. As secured by REAC Ref RDWE033, measures would also be taken to manage runoff from large areas of chalk stockpiles at the compound. The quality of the discharge would be governed by the conditions of an EA discharge consent. The water quality attribute of the ditch network is assigned high importance, and a negligible magnitude of impact is assessed, due to the provision of treatment measures as described above. The overall significance of effect is classified as temporary slight adverse, which is not significant."

11.53. Similarly, DCO Document 6.1, Chapter 14 (APP-152), Paragraph 14.6.42 states:

"During the construction phase, it is proposed to discharge treated rainfall runoff from the southern tunnel entrance compound to a ditch that is in Filborough Marshes. The ditch, and wider interconnected network of watercourses, would convey the runoff to the River Thames via an existing outfall. The outfall structure would cause a very localised and temporary effect on the ditch while being installed. However, discharges would be limited to the 1 in 2-year greenfield runoff rate or 1l/s (whichever is greater) to prevent scour/erosion or changes to the hydrological regime (RDWE033). The hydromorphology attribute of the ditch is assigned low importance and the impact magnitude is assessed as minor. Therefore, the overall significance of effect is classified as temporary slight adverse, which is not significant."

11.54. Even though the impact has been identified as temporary, a slight adverse effect on surface water quality will result in a negative impact to the local area.

12. Health (as Public Health Authority)

Health Impact A: Air Quality during construction and operation

12.8. DCO Document 7.10 Health and Equalities Impact Assessment (HEqIA) (APP-539), Tables 7.25 and 7.28, Health outcome -air quality, assessed changes in air quality during construction and operation as neutral.

12.9. As detailed in DCO Document 6.1 Environmental Statement Chapter 5 (APP-143) – Air Quality paragraph 5.1.1, air quality impacts are determined in relation to compliance with Air Quality Strategy objectives and Limit Values. Using these measures KCC acknowledges the evidence provided the project will have a neutral impact on compliance with air quality objectives and limit values.

12.10. KCC notes that the World Health Organisation (WHO) have developed air quality guidelines which consider evidence of effects on mortality lower than UK Air Quality Standards. As stated in DCO Document 7.10 HEqIA (APP-539) in paragraph 1.1.1:
"This Health and Equalities Impact Assessment (HEqIA) reports the findings of the assessment of likely effects of the construction and operation of the A122 Lower Thames Crossing (the Project) on human health and equality."

12.11. However, KCC is unable to determine how the assessed changes in air quality during construction and operation will impact on human health. Further information is required to determine whether there will be a positive, neutral or negative impact.

Health Impact B: Active Travel Impacts by Ward

12.12. DCO Document 7.10 HEqIA (APP-539) Table 1.4, Summary of health outcomes by ward for sensitive populations (operation) indicates positive impacts on active travel in all but four wards in Gravesham outlined as wards directly or indirectly affected by the project, these are Riverside, Northfleet South, Central and Coldharbour where the impacts are indicated as neutral.

12.13. Table 3.3 *Assessment of sensitivity by ward of the HEqIA* identifies Riverside and Coldharbour wards as having a high level of sensitivity, whereas Northfleet South and Central were classed as having a medium sensitivity level. These assessments are based on a number of datasets outlined in DCO Document 7.10 HEqIA Appendix C– Baseline (APP-542) , including:

- Paragraph 5.4.8 a. – "*Northfleet North in Gravesham is ranked in the 10% most deprived nationally, with a further 10 areas ranked in the 10–20% most deprived (these include areas within Northfleet South, Riverside, Singlewell and Westcourt wards).*"

- Paragraph 5.4.9 a. – "*There are two areas in Gravesham ranked in the top 10% most deprived nationally (one in Central ward and one in*

Riverside ward), with a further six areas ranked in the 10–20% most deprived (including areas within Riverside, Westcourt, and Northfleet South wards)"

- Paragraph 6.5.5 a. – "*Variations in life expectancy between genders – for example, Riverview in Gravesham has the highest life expectancy at birth for males (84.5) compared to Riverside male life expectancy of 75.0."*

- Paragraph 6.8.4 – "*Table 6.22 looks at obesity in children, using indicators of excess weight/ obesity in Reception Year and Year 6. Again, figures at local authority level are much higher than is the case for England as a whole (with the exception of Medway, where proportions are only marginally higher). Wards with particularly high proportions of children with excess weight/obesity levels are Riverside, Westcourt, Singlewell, Coldharbour and Woodlands in Gravesham, and Strood South and Strood North in Medway."*

12.14. In addition, the document also provides information on car ownership levels and proportion of local trips for work purposes:

- Paragraph 7.3.3 – "*At ward level, there is more variation as shown in Table 7.4. For example, Riverside and Coldharbour wards in Gravesham have a higher proportion of households with no access to a car or van than is the case nationally (33.6% and 32.7% compared to 25.8% for England as a whole)."*

- Paragraph 7.5.10 – "*In Gravesham, residents of the Riverside and Woodlands wards take a higher proportion of more local trips for work purposes (less than 2km) compared to the local authority average (18.4% and 16.9% compared to 14.9%)."*

12.15. DCO document 7.10 HEqIA (APP-539) provides an evidence base and recognition on how accessibility, car ownership and active travel implications impact upon different demographics and communities:

- Paragraph 7.2.3 – "*Accessibility by a variety of transport means is fundamental to access employment, services and social opportunities (Mackett and Thoreau, 2015). Transport barriers are not experienced equally across populations and are more likely to affect some groups than others. Transport-related social exclusion includes those with no access to a car or the skills and confidence to use available transport. Populations of low income and socio-economic groups are the most likely to be excluded from full access to transport (Government Office for Science, 2019)."*

- Paragraph 7.2.7 – "*Car ownership levels are highest among those in full time employment, as opposed to people who are unemployed or economically inactive. Lack of access to a car or increased travel costs associated with car ownership may contribute to social exclusion. Car*

ownership among vulnerable groups (such as young people, older people, disabled people and those on low incomes) is typically low."

- Paragraph 7.5.6 – "*There is a link between socio-economic grouping, health and active travel. For example, there are inequalities in obesity rates between different socioeconomic groups – research shows that among children in reception and Year 6, the prevalence of obesity in the 10% most deprived groups is approximately double that in the 10% least deprived (PHE, 2013). Encouraging active travel within these socio-economic groups can thereby improve health.*"

12.16. Overall KCC supports the evidence base outlined by the Applicant and recognises the impacts during operation on active travel of the wards outlined in Table 1.4 as positive and neutral.

13. Biodiversity

Biodiversity Impact A: Foraging/Commuting Bats and associated habitat (APP-397 and APP-408)

13.8. The impacts on foraging/commuting bats could have been under estimated due to habitats overall being assessed as moderate, while some habitats (such as Ancient Woodland) provide high suitability for foraging/commuting habitat.

13.9. The Applicant's surveys have not fully assessed the significance of how bats commute across the A2/HS1 line. However, it is clear there will be a loss of habitat resulting in a decline in suitable foraging/commuting habitat.

13.10. This impact is negative but has the potential to be neutral in the long term if the key habitats being lost (hedgerows and woodland) are successfully established/managed/monitored in the long term.

Biodiversity Impact B: Roosting Bats (APP-397 and APP-408)

13.11. The impact of the Project on Roosting Bats has the potential to be neutral but the replacement roosts need to be located in an area where connectivity and foraging will be retained/maintained (Potential impacts discussed within Biodiversity Impact A). Individual species needs (e.g. light adverse species) to be taken in to account.

Biodiversity Impact C: Dormouse APP-398 and APP-414

13.12. DCO Document 6.3 Environmental Statement – Appendix 8.9 – Dormouse (APP-398) has not fully demonstrated why the proposed vegetation clearance approach is appropriate given it's deviation from current best practice guidelines.

13.13. Ultimately, the impact on Dormouse is negative as there will be a short to medium term loss of habitat resulting in a decline in suitable foraging/commuting/nesting habitat. From the EPS draft licence (6.3 Environmental Statement - Appendix 8.18 - Draft EPS Mitigation Licence Application – Dormouse APP-414) information, KCC understands that 52ha of optimum habitat and 5km of hedgerow will be lost, supporting an estimated 202 dormice. Table D5.2 stated that habitat supporting an estimated 134 dormice will be lost, and habitat supporting an estimated 68 dormice will be disturbed.

13.14. However, this impact has the potential to be neutral in the long term if the key habitats being lost (hedgerows and woodland) are successfully established/managed/monitored in the long term.

Biodiversity Impact D: Badgers APP-401 and APP-415

13.15. Limited information has been provided by the Applicant on how badgers commute/forage through the site. This restricts understanding of the impact the proposal will have on commuting/foraging badgers and how it will impact badgers in any setts which are being retained outside/edge of the Order Limits.

13.16. The Project will result in a negative impact on badgers as there will be a short to medium term loss of habitat, resulting in a decline in suitable foraging/commuting habitat. The loss of habitat also increases the risk of badgers going on the roads (both existing and proposed) which could cause an increase risk of Road Traffic Accidents.

13.17. However, this impact has the potential to be neutral in the long term if the key habitats being lost (chalk grassland, hedgerows and woodland) are successfully established/managed/monitored in the long term.

Biodiversity Impact E: Water Voles APP-399 and APP-416

13.18. It will be imperative that the works to displace water vole are not carried out outside the recommended period (15th Feb – 31st March in SE England, Water Vole Cons Handbook Dean 2016, Appendix 1 Displacement Protocol). Furthermore, mitigation should follow best practice to avoid impacts on young born during that calendar year.

13.19. Displacing the water voles may not be sufficient and a translocation must be required. Habitats must be established sufficiently prior to works commencing.

13.20. This impact has been identified as being neutral pending protection of retained water course/habitat during construction of the LTC.

Biodiversity Impact F: Otter APP-400

13.21. The impact on Otters has currently been identified as neutral, pending protection of retained water course/habitat during construction. However, there is a need for updated surveys to inform a detailed mitigation strategy.

Biodiversity Impact G: Invertebrate APP-392

13.22. The Project will result in a loss of overwintering invertebrate habitat through the removal of scrub/hedgerows. Furthermore, an increase in lighting within the whole site negatively impacting invertebrates.

13.23. No Moth surveys have been carried out by the Applicant to understand how they will be impacted by the works.

13.24. Loss of veteran trees and no proposal to retain standing deadwood/strapping of deadwood or veteranisation.

13.25. The Register of Environmental Actions and Commitments document (not submitted by the Applicant as part of the DCO application) has not been updated to include specific and explanatory wording committing to veteranisation, strapping of veteran hulks, retention of standing deadwood, retention of scrub material and dead hedging.

13.26. It is therefore deemed that the Project will have a negative impact on Invertebrate in the local area.

Biodiversity Impact H: Loss of Ancient Woodland

13.27. The Project will result in a loss of Ancient Woodland vegetation and potentially soils. The exact amount is pending contamination surveys and detailed design, however, if the soil is contaminated then Ancient Woodland soil translocation cannot be carried out.

13.28. It is therefore deemed that the Project will have a negative impact on Ancient Woodland in the project area, especially the Ancient Woodland that makes up Shorne Woods Country Park.

Biodiversity Impact I: Birds APP-396

Breeding birds

13.29. There will be a short to medium term loss of habitat resulting in a decline in suitable foraging/commuting/nesting habitat for breeding birds, resulting in a negative impact.

13.30. However, there is the potential for this impact to be neutral in the long term if the key habitats being lost (hedgerows and woodland) are successfully established/managed/monitored in the long term.

13.31. An area of suitable habitat could expand across the Order Limits as land gets taken out of current management (for example the Southern Valley Golf Course) and the breeding bird interest increases across the site.

Wintering Birds

13.32. The impact on wintering birds would be neutral if the Applicant includes proposals to manage land to support wintering birds associated with the SPA during the construction period.

Biodiversity Impact J: Outline Landscape and Ecology Management Plan (OLEMP) APP-490

13.33. KCC is concerned with how the proposed LEMPS will be developed. The OLEMP (APP-490) states: *"The LEMP shall be further developed by the Contractor for each section of the development, and future iterations of the document will include details of management regimes, management expectations and monitoring requirements for each part of the authorised development, not just those outlined in this document"*

13.34. Currently the OLEMP (APP-490) is not very detailed and therefore there is risk the individual LEMPS will be disjointed and there will be no continuity between areas.

13.35. Concerned that the management required in the short, medium and long term will not be carried out and there is a need to ensure that there is ongoing funding to implement it.

Biodiversity Impact K: Lighting APP-199

13.36. We have outstanding concerns regarding the limited information provided and potential impacts of lighting on existing and proposed habitats, mitigation areas and connectivity routes. We advise that there is significant potential for negative impacts of lighting on the behaviour of bats, invertebrates, badger and hazel dormouse in the long term.

13.37. The submitted information details that Lux levels from roadside lighting drops to < 0.5 Lux at 30m, which is "standard use for Highways". Due to the location adjacent to SSSI and AW and within 100m of the SPA/Ramsar/SSSI we would expect the lighting design to go above and beyond standard use for highways.

Biodiversity Impact L: Biodiversity Net Gain APP-417

13.38. Document 7.1 Need for the Project (APP-494) acknowledges unavoidable significant adverse impacts on a SSSI and irreplaceable habitats, such as veteran trees and ancient woodland. This loss should be compensated through an overall Biodiversity Net Gain (BNG) through the Project's legacy of creating new green infrastructure (new parks) and Road Investment Strategy 2 (RIS2) aims to achieve BNG with its schemes. However, the LTC Project's anticipated Biodiversity Net Gain (BNG) will be lower than 3% for Kent.

13.39. KCC is also concerned that trading rules have not been satisfied and thus the positive net gain scores south of the Thames will be invalid.

13.40. We are also concerned that condition assessment information may be inaccurate – a limitation the Applicant's ecologists acknowledge. BNG has been discussed since the original DCO submission, there has therefore been adequate time for this information to be collated.

13.41. There is no mention in the BNG report about how additionality has been dealt with, with regards to protected species. For example, receptor sites for Great Crested Newts (GCN)/reptiles should only be allowed within the calculations up to no net loss and it is not clear within the submission if this point has been addressed.

Biodiversity Impact M: Green Bridges APP-159 and APP-160

13.42. There is concern that the green bridges offer poor connectivity to other suitable habitats and the inclusion of roads on the green bridges provides additional hazards (including increased lighting) to animals trying to use the bridges to access other areas of suitable habitat.

13.43. The existing bridges over the A2 will be enhanced to create habitat and there are limits on the space available to create habitat and ensure it will be retained long term. Concern that it will not mitigate for the loss of the vegetation within the central reservation/HS1 planting.

13.44. The proposed A2 green bridges are expected to have a negative impact to biodiversity, whereas the Thong Lane Green Bridge is likely to have a neutral impact provided it is established, managed and monitored.

Biodiversity Impact N: Nitrogen Deposition APP-418

13.45. Woodlands are proposed to be created to mitigate for the impact on the areas of Ancient Woodland (AW) along the route of the A2 and surrounding area and there is a need to ensure they can be established, retained and managed in the long term. This is expect to have a neutral impact.

Biodiversity Impact O: Reptiles and Great Crested Newts (GCNs) APP-395, APP-409 - APP-414 and APP-394

13.46. Concerns that insufficient information has been submitted with the DCO demonstrating the proposed receptor sites would be able to support the reptile/GCN populations. Meetings with the Applicant's project team have confirmed that there is sufficient capacity but it is not demonstrated within the submitted documents.

13.47. GCNs only: Concerns with the potential use of gully pots which are known to trap amphibians.

13.48. This impact has the potential to be positive if the replacement land for loss of arable/golf course areas are actively managed for reptiles (which includes in the long term chalk park and nitrogen deposition sites).

14. Climate Change

Climate Change Impact A: Construction and Operation Emissions

14.8. KCC is committed to playing its part in helping the Government meet the UK's Net Zero target and to meeting the legally binding ambitions of the Paris Agreement (see Section 5: Relevant Kent County Council Policy Documents). At a local level, Kent County Council has set targets relating to climate change and has been clear that the Lower Thames Crossing should not disbenefit these. The proposals in their current form do not adequately address these concerns. A significant proportion of both the construction and operational emissions from LTC will take place within our boundaries. In addition, increased traffic volumes on Kent's roads resulting from LTC will also negatively affect our ability to meet these targets.

14.9. The proposals do not set out how National Highways will mitigate the impacts of the LTC on Kent's climate ambitions, and obvious opportunities to do so have been missed. National Highways is reliant on DfT's Transport Decarbonisation Plan, which is ambitious, and it is missing opportunities to support the DfT's plan by providing Electric Vehicle charging along the route and prioritising the use of public transport.

14.10. The DfT has recently updated Circular 02/2013 to Circular 01/2022 "Strategic road network and the delivery of sustainable development". The missed opportunities identified in the above paragraph demonstrate how the LTC, arguably a flagship project for the SRN, does not comply with a number of sustainability requirements stated in the updated document, such as:

"*In particular, the company [National Highways] will prepare and plan for the delivery of future transport technology on the network, such as the installation of high-powered charge points for electric vehicles*."

A service area which could provide facilities such as electric charging points has been removed from the LTC proposals.

14.11. Furthermore, no such provisions have been made for cross-Thames active travel movements in the planning of the LTC, despite the DfT's *"Strategic road network and the delivery of sustainable development"* policy stating:

"*It will support initiatives that reduce the need to travel by private car and enable the necessary behavioural change to make public transport, cycling and walking the natural first choice for all who can take it*."

14.12. Overall, there will be a negative impact in terms of climate change.

15. Heritage Conservation

15.8. The project lies within an area of very high, multi-period cultural heritage and archaeological interest. The historic environment of the project area comprises a range of heritage assets with archaeological interest which survive from the ice ages (Palaeolithic) through to the recent past (e.g. the remains of RAF Gravesend), representing a unique, finite and non-renewable record of the history of the area.

15.9. National Highways (LTC) understands that the project will have a range of significant negative impacts on the cultural heritage and archaeological interest of the area (within and beyond the Order Limits) and has undertaken a wide range of heritage and archaeological assessment, field evaluation and design refinement to help limit impacts to heritage assets.

15.10. The DCO documents, including (AS-044) and (APP-375), set out clearly the national and local policy context and the approach to data collation and assessment, construction and operational effects and mitigation proposals. The effects of proposed mitigation, such as tree planting for screening, to impact on below-ground archaeology, is also considered.

15.11. This LIR summarises KCC's understanding of the historic environment (cultural heritage and archaeological interest) and the likely impacts of the scheme. The impacts, as set out in the DCO documents, will be either negative or neutral. No positive benefits from the project for the historic environment, south of the Thames are considered likely. The accompanying Written Representations (WR) document sets out KCC's recommendations for mitigation, which in most parts confirm the proposals put forward by the applicant.

15.12. Whilst much work has been carried out to understand the archaeological resource of the project area, and the likely impacts on this resource, and to define mitigation, there is uncertainty about the nature of the below-ground archaeological resource in specific areas and therefore about the impacts in those areas. However, KCC officers are working closely with the Applicant on these matters and we have included reference to them in this LIR and in the accompanying WR.

15.13. This KCC LIR focuses on the physical effects of development construction and operation and, following the approach adopted for the DCO process, the historic environment impacts are referenced as follows:

- Heritage Conservation Impact A: Conservation areas
- Heritage Conservation Impact B: Designated built heritage (Listed Buildings)
- Heritage Conservation Impact C: Non-designated built heritage
- Heritage Conservation Impact D: Archaeology - Scheduled Monuments

- Heritage Conservation Impact E: Archaeology - Geoarchaeology and Palaeolithic/Early Holocene archaeology
- Heritage Conservation Impact F: Archaeology - Non-designated archaeology
- Heritage Conservation Impact G: Historic Landscape - Registered Parks and Gardens
- Heritage Conservation Impact H: Historic landscapes

Historic Built Environment

Heritage Conservation Impact A: Conservation Areas

15.14. The LTC project in Kent would have a negative impact on an area of important historic rural settlement between Gravesend, Thong and Cobham. This is acknowledged within DCO document 6.3 Environmental Statement Appendices – Appendix 6.10 – Assessment Tables (AS-052). Table 1.1 – Conservation areas assessment table identifies the following five Conservation areas that would experience impacts:

- **Queen's Farm, Shorne** (ES CA8) is assessed in the Environmental Statement (ES) as likely to experience limited, neutral construction and operation setting impacts.
- **Shorne Village** (ES CA9) is assessed in the ES as likely to experience negative (minor adverse) construction and operational impacts because of the presence of the construction infrastructure and, subsequently, the new road, though no mitigation is proposed.
- **Thong Village** (ES CA10) is assessed as likely to have a temporary negative (moderate) construction impact and a permanent negative (minor) impact, following mitigation by screening of construction compounds. The operational impact to the Thong Village Conservation Area is recognised as likely to be negative (moderate adverse) even after mitigation by use of earthworks and woodland planting.
- **Cobham Village Conservation Area** (ES CA11) and Gravesend Riverside Conservation Area (CA14) are both recognised as likely to receive negative (minor adverse) temporary construction impacts resulting from increased noise, dust and traffic, but operational impacts are considered to be neutral and no mitigation is proposed.

Heritage Conservation Impact B: Designated built heritage (Listed Buildings)

15.15. The richness of the cultural heritage of the LTC project area is also illustrated by the hundreds of Listed Buildings within the Order Limits 1km study area. These are described in the DCO document 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044) and DCO document 6.3 Environmental Statement Appendices – Appendix 6.10 – Assessment Tables (AS-052) - Table 1.12: Listed Buildings Assessment Table: South of the River Thames.

15.16. The following listed buildings are located south of the Thames, near or within the Project's Order Limits:

Grade 1 listed buildings outside but close to the Order Limits

- Cobham Hall (LB122), which is located within Cobham Hall Grade II* Registered Park and Garden (RPG1), 'partly designed by Humphry Repton, which lies south of the A2 and east of the village of Cobham, and forms the setting for a group of seven high-value listed buildings. The designation includes approximately 22ha of formal gardens and pleasure grounds, surrounded by 316ha of parkland, 120ha of which are wooded. Two scheduled monuments are located within the western half of the park (SM8) and (SM10).
- Cobham College (LB196) which is located within Cobham Village Conservation Area (CA11)
- Gad's Hill Place (LB241) which is located immediately to the south of the A226 and the Order Limits in Higham. (AS-044 Section 6.4.110).

Grade 2 listed buildings within the Order Limits

- The medium value Grade II listed Parish Boundary Stone (LB105) is located within the Registered Park and Garden (RPG1), along with several high value listed buildings comprising: a. LB122 Grade I listed Cobham Hall (including Kitchen and Stable Court) b. LB189 Grade I listed The Mausoleum c. LB176 Grade II* listed The Dairy, Cobham Hall d. LB79 Grade II listed The Engine House, Cobham Hall e. LB123 Grade II listed The Temple, Cobham Hall f. LB31 Grade II listed The Mount, Cobham Hall g. LB175 Grade II listed The Aviary, Cobham Hall' (AS-044, ES 6.4.113).

Listed buildings outside the Order Limits

- Outside the Order Limits and within the 1km landscape Kent study area 105 listed buildings of high value have been defined based on their individual aesthetic, historic, evidential and communal values and the contribution of their settings (ES 6.4.112).

15.17. The LTC will have a significant, negative impact on the setting of a number of these listed buildings, through the introduction of physical construction elements into their rural settings during construction, and as a result of the presence of the road during its operation. This is recognised and described in DCO document 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044) (sections 6.6.19 – 6.6.22).

15.18. Listed Buildings which will be subject to negative impacts include Filborough Farmhouse and associated buildings, Baynards Cottage and White Horse Cottage. It is acknowledged in DCO document 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044) that in many cases it will

not be possible to mitigate the significant construction impacts to these listed buildings.

15.19. In addition, it is recognised that there will be temporary negative impacts resulting from increased noise, dust and traffic associated with the proposed development and that these impacts would affect many heritage assets (including listed buildings as well as non-designated buildings). These are described in DCO document 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044) (Section 6.6).

Heritage Conservation Impact C: Non-designated built heritage south of the Thames

15.20. Negative impacts to the non-designated built heritage will mostly result from changes to the setting of buildings. These are recognised in DCO document 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (APP-044) and are listed in AS-052 Table 1.13: Non-designated built heritage Assessment Table: South of the River Thames).

For example, a 'Moderate' adverse permanent impact resulting from the operation of the scheme is recorded for the non-designated Cheney's Farm and White Horse Cottage Farmstead and a 'Moderate' adverse temporary impact is also predicted for five other non-designated buildings. Mitigating the negative impacts to these heritage assets will be difficult because of the change to their rural setting that will result from the introduction of the road and associated changes to the landscape.

15.21. Two built heritage assets are identified which would have to be physically removed to make way for construction. These are:

- Caves that were converted to air raid shelters in Thong Lane, Shorne (Asset 1562), which would be removed for the establishment of a construction haul road, utility works and multi-utility networks and.
- A WW2 Air raid shelter (Asset 1875) which would be removed to make way for utility groundworks (gas) and establishment of Native Woodland LE2.1.

The DCO documentation states that these structures would be subject to historic building recording (Historic England Level 3) before their loss (AS-052) and in the dAMS-OWSI (APP-367). It would be preferable if these heritage assets could be recorded and conserved.

15.22. KCC welcome the fact that mitigation through design changes has saved the non-designated early 20th century Homes for Heroes, at the northern end of Thong village (Asset 1561) from being demolished. However, it is noted that part of the original plot would be reduced in size because of the realignment of Thong Lane. It would be preferable if the original plot size, which forms the setting of the buildings, could be maintained.

Archaeology

15.23. The LTC project area has a very rich archaeological heritage, represented by nine scheduled monuments assessed in Kent and more than 2,000 assessed non-designated heritage assets (including buildings) with archaeological interest in Kent (See: 6.3 Environmental Statement - Appendix 6.15 - Master Gazetteer of Heritage Assets (APP-373)). These heritage assets span nearly half a million years of human history, with evidence for activity in the project area, during all archaeological periods for at least the last six thousand years.

Heritage Conservation Impact D – Archaeology: Scheduled Monuments

15.24. 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044) notes that *'In the 1km study area south of the River Thames (including the landscape study area and specifically included assets beyond 1km) there are 9 scheduled monuments which are all of high value (SM8, SM10, SM20, SM21, SM22, SM23, SM24, SM26, SM27). No scheduled monuments are located within the Order Limits. Three further high-value scheduled monuments located outside the 1km study area, landscape study area and the Order Limits have been included within this assessment (SM15, SM16, SM17)… The high value scheduled monuments of the Romano-British villa and 19th century reservoir in Cobham Park (SM10), New Tavern Fort (SM17), the Roman Town of Vagniacae (SM21) and the Springhead Roman Site (SM22) are predicted to experience a change to their setting during construction which would result in a temporary impact of negligible adverse magnitude and a* slight *adverse effect, which is assessed as not significant.'*

15.25. The construction impacts of the scheme are assessed as being negative (adverse) but not significant. The operational impacts of the scheme on the setting of Scheduled Monuments, including the possible Bronze Age barrow in Ashenbank Wood, are considered to be neutral due to their locations outside the Order Limits and their screening.

Heritage Conservation Impact E – Archaeology: Geoarchaeology and Palaeolithic/Early Holocene

15.26. The LTC is in an area of high Palaeolithic archaeological and Quaternary geological importance spanning the last half a million years (c.500,000 to c.12,000 years ago). The Pleistocene sediments in the area are mostly silts, sands and gravels in terraces formed by early courses of the Thames.

The more recent Holocene sediments, dating from c.12,000 years ago to the present, tend to be alluvial deposits associated with the modern Thames floodplain and its tributaries as well as colluvial hill wash resulting from agricultural cultivation, starting approximately five to six thousand years ago during the Neolithic and Bronze Age periods.

15.27. The evidence about this important early prehistoric aspect of the archaeology of the scheme area is set out by the Applicant in the following DCO documents:

- 6.1 Environmental Statement – Chapter 6 – Cultural Heritage (Version 2) (AS-044)
- 6.3 Environmental Statement Appendix 6.5 - Lower Thames Crossing - Palaeolithic and Quaternary Deposit Model (PQDM) and Desk-based Assessment of Palaeolithic Potential (APP–358)
- 6.3 ES Appendix 6.6 - Lower Thames Crossing - Standalone Palaeolithic Archaeological Assessment and Research Framework (SPAA-&-RF) (APP–359).

15.28. DCO document (APP-358) provides an overview of the varying Quaternary deposit character and archaeological potential along the route of the project and models the Palaeolithic/Quaternary potential of the LTC corridor based on desk-based information, and data from the project's ground investigation (GI) work and archaeological trial trench (ATT) investigations.

15.29. Along the full LTC project area 33 distinct zones (PQ zones) of varying Palaeolithic/Quaternary deposit character and importance have been defined of which zones PQ1-9 and PQ29 are in Kent or span the River Thames area. Each zone has been attributed a category of low, medium or high Palaeolithic and geo-archaeological potential (PQDM Section 8; Table 8). Details of each zone are discussed, together with consideration of their importance and suitable approaches to further investigation (Section 8; Appendices H and I).

15.30. A zone-by-zone summary of the Palaeolithic assessments is also provided in Table 9.1 of the SPAA-&-RF (APP – 359) with details of each zone in annex F and a series of larger-scale maps are provided, showing each zone in relation to known Palaeolithic sites, geological mapping, topography and previous quarrying.

15.31. DCO document (APP–358) states that '*Relatively little detailed work has yet been undertaken on Pleistocene or Holocene deposits in the area of scheme impact. However, as-yet-undiscovered sites of similar high importance to those already known are likely to be present in the LTC impact footprint in the areas identified as of high importance in this report*'.

15.32. Table 5 below provides a summary of the zones in Kent with a brief description of their character and potential with related recommendations for further investigations. The latter are also set out in KCC's accompanying Written Representation.

Table 5 Summary of the zones in Kent with a brief description of their character and potential with related recommendations for further investigations

Zone	Character Description	Geoarchaeological and Palaeolithic Potential	Recommendations for further investigations
PQ-1	An area of c.11ha of the Ebbsfleet International car park.	Low/Moderate	This zone is outside the Order Limits of the Project so will not be impacted by the LTC.
PQ-2	An area of c.3.5ha of the Ebbsfleet Valley (unquarried southwest part) with similar deposits to those at the HS1 Ebbsfleet Elephant site	Uncertain	This zone is outside the Order Limits of the Project so will not be impacted by the LTC.
PQ-3	An area of c.24ha of the Ebbsfleet Valley upland catchment with Chalk and Thanet Sand bedrock and Head infilling dry valleys and as intermittent spreads/patches on the valley sides and less sloping areas	Uncertain The PQDM notes '*three Palaeolithic findspots within this area (LTC 1661, 2368, 3197), the former probably representing an undisturbed palaeo-landsurface under older pre-Devensian colluvium on which was found a handaxe and knapping debitage. Other nearby remains from outside the area, but from deposit-types likely to be present in the area, include minimally disturbed Late Upper Palaeolithic knapping scatters (LTC 2370, 4045) from fine-grained colluvial sediments infilling dry valleys, as well as various more-derived lithic finds (LTC 3197, 3370)'.* LTC 1661 is described in the DCO documentation as *'a rare type of site, associated with an unmapped spread of Pleistocene colluvium. LTC 4045 is likewise a rare site-type, although associated with mapped dry valley deposits'*.	The recommendation in the DCO documentation is for *'preliminary evaluation test pitting to (a) evaluate whether other Lower/Middle Palaeolithic sites are present in this zone in similar topographic locations to LTC 1661, and (b) to evaluate for pre-Last-GlacialMaximum sequences (including pre-Devensian), and for Late Upper Palaeolithic occupation associated with dry valley colluvial infill'.* The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise test pits located carefully in relation to geological mapping and GI data and following review of ATT data but Annex I of the PQDM (APP-358) does not recommend the need for Stage 1 investigations. The zone covers land adjacent to the A2.

PQ-4	An area of c.42ha of the Shorne Woods Plateau, a high-ground interfluve between Thames and Medway, formed of an outcrop of Lambeth and Thames Group bedrock	Low/Moderate The PQDM (APP-158) notes that *'no Palaeolithic finds are reliably known from within zone, but notes finds of a handaxe and Levallois flakes from the general Shorne area (LTC 3374) and two handaxes from the analogous high point of Windmill Hill, Gravesend (LTC 4051). Sediments from solifluction and colluviation are present and ranging from ?Late Devensian to Holocene in date with any artefacts and faunal remains likely to be reworked'*.	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise transects of test pits.
PQ-5	An area of c.72ha of the Jeskyns shelf, a broadly-level area of high-ground between Thames and Medway catchments and slightly lower than PQ-4. It is characterised by Thanet Sand with wide spreads of Head and possibly small outcrops of high "plateau gravels"	Uncertain The PQDM (APP-158) notes '*Several records of surface finds of Lower/Middle Palaeolithic artefacts from general area (LTC 4035, 4039, 4050), as well as nearby discovery of handaxe and debitage from palaeo-landsurface under unmapped colluvium (LTC 1661)'* and recommends '*Basic characterisation of sequences - is there evidence for pre-Devensian colluvial deposits in the area, do they contain Palaeolithic remains of any type, and are there any artefacts less-disturbed than in dry valley fill deposits*'.	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise test pits located in transects across areas mapped as Head - test pits positioned in more-level areas and/or areas where depressions in bedrock might have become infilled.
PQ-6	An areas of c.420ha of the Thong Lane dip slope of North Downs characterised by Chalk and Thanet Sand bedrock with Head in dry valleys and intermittently across bedrock sides and plateau surface	Low/Moderate The PQDM (APP-158) notes '*One reworked Palaeolithic findspot within this area (LTC 3123). Some important nearby finds from deposit-types likely to occur in this zone, notably a handaxe and knapping debitage from unmapped colluvium (LTC 1661), and minimally disturbed Late Upper Palaeolithic knapping*	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise test pits in relation to topography and geological mapping, near areas where the Bullhead flint bed is likely to have been exposed, and in areas identified as more promising by the archaeological trial trenching.

		scatters (LTC 2370, 4045) from fine-grained colluvial sediments infilling dry valleys, as well as several nearby finds of most-likely residual/re-worked material (LTC 3197, 4035, 4039, 4055)' and questions whether there is 'evidence for pre-Devensian colluvial deposits in the area, do they contain Palaeolithic remains of any type, and is there evidence for Late Upper Palaeolithic occupation associated with dry valley colluvium?'.	
PQ-7	An area of c.7ha of the so-called Filborough-Thames terraces (Lynch Hill and Taplow) lying on Chalk bedrock at the foot of dip slope above the south bank of Thames	Moderate/High The PQDM (APP-158) notes Moderate palaeoenvironmental potential and '*Several Lower/Middle Palaeolithic artefacts known from nearby area (LTC 4052, 4054), and some specifically from gravel deposits that are likely equivalent to the mapped terrace deposits of this zone (LTC 4053)'* and recommends *' Test pits/boreholes to investigate whether the different mapped terraces are really there? What is the nature of the sedimentary sequences in the different terraces? Are there artefacts, faunal remains and/or materials for dating present?'.*	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise test pits/boreholes to investigate whether the different mapped terraces are there, the nature of the sedimentary sequences in the different terraces and the present of artefacts, faunal remains and/or materials for dating.
PQ-8	An area of c.9ha of the Thames southern floodplain edge, comprising Holocene alluvium overlying potential Pleistocene terrace deposits	Moderate/High The PQDM (APP-158) notes moderate/high palaeoenvironmental potential and '*Late Upper Palaeolithic remains known from base of alluvium at several sites along southern side of Thames floodplain (e.g. LTC 3406). Also, nearby records of Mousterian bout coupé handaxes from Tilbury (LTC 4028) suggest there may be unrecognised deposits/remains of this era in places'*. Recommendations are made for Stage	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise boreholes (and test pits, if ground conditions permit), guided by GI results and closely spaced in broadly north-south transects transverse to presumed eastward fluvial flow.

		1 mitigation comprising '*Boreholes and test pits to address what are the nature and age of the sub-alluvial Pleistocene sediments in the zone, and do they have any Palaeolithic remains? What is the nature of the surface of the Pleistocene sediments, and what, if any archaeology rests on this surface? When did Holocene sedimentation begin and are there Holocene archaeological remains in the alluvium?'*.	
PQ-9	An area of c.300ha of the Thames floodplain characterised by Holocene alluvium overlying Late Pleistocene gravel (Shepperton)	Low/Moderate The PQDM (APP-158) notes *'Late Upper Palaeolithic remains known from base of alluvium at several sites along southern side of Thames floodplain (eg. LTC 3406). Also, nearby records of Mousterian bout coupé handaxes from Tilbury (LTC 4028) suggest there may be unrecognised deposits/remains of this era in places, although most Palaeolithic remains are most-likely derived and transported (LTC 4036)'*. The DCO PQDM recommends that Stage 1 mitigation should evaluate whether the sands seen on the northern side of the zone are Holocene or Pleistocene (i.e. the equivalent of those in PQ-8) and address the research question of when sedimentation began across the surface of the Shepperton Gravels.	The SPAA-&-RF, Annex F (APP-359) recommends stage 1 fieldwork to comprise boreholes, guided to complement (or supplement) GI results, and positioned ed in broadly north-south transects transverse to presumed eastward fluvial flow.
PQ-29	An area of c.76ha defined as the Park Pale - South Downs (Medway basin) area of chalk downs with Palaeocene outcrops (Thanet Sand, Lambeth Group) dissected by Head-filled dry valleys.	Moderate The area contains late Pleistocene Head deposits. It is noted that whilst no finds are recorded from this area, Lower/Middle Palaeolithic remains have been found in areas with similar deposits (1661 in PQ-3; and 4039)	This zone will need to be subject to stage 1 investigation.

15.33. The scheme construction process result in a negative impact on Palaeolithic deposits of archaeological interest in zones PQ3-9 and 29) and this is reflected in the ES section 6.6.119 (AS-044). The Applicant acknowledges the need for archaeological investigation (as set out above) and that large extents of geological deposits may contain 'sites' of archaeological significance, and that in Kent, some of the geo-archaeological deposits are of relatively limited extent, and therefore negative project impacts could be relatively significant.

Heritage Conservation Impact F - Non-designated archaeology (within and outside the order limits)

15.34. Impact B2 focused on archaeological evidence from c.500,000 years ago to c.12,500 years ago. This impact focusses on the archaeological evidence for human activity from c.12,500 years ago until the present day on which the scheme will have an impact.

15.35. The DCO document ES Chapter 6 (AS-044) sets out the range of assessment and field evaluation undertaken, including geophysical surveys, aerial photographic studies and archaeological trial trenching. The research undertaken provides a significant amount of data which demonstrates a human presence in the project area since the end of the last ice age.

15.36. Section 6.9 of DCO document (AS-044) summarises the cultural heritage of the project area: *'The Project would be located in a landscape with a variety of heritage assets. South of the River Thames, archaeological remains include extensive Roman period activity, associated with Watling Street on the approximate route of the A2. These include a villa, settlement and temple, which are scheduled monuments, and non-designated settlement, agricultural and funerary remains. This activity was predated by prehistoric activity, evidenced by Neolithic funerary remains, Bronze Age settlement and funerary remains and Iron Age settlement evidence. More recently in the Post-Medieval period the area has been characterised by the formal parkland of Cobham Park, designed by Humphry Repton, and the agricultural landscape associated with the villages to the south and east of Gravesend. The modern period saw the development of military activity, including the conversion of Gravesend Airfield to an RAF base and the development of associated camps and defensive features…..The River Thames has influenced the character of the area considerably, both as a route for trade and travel and as an important defensive location on the river approach to London, as demonstrated by the coastal forts'*.

This Environmental Statement high level summary does not fully capture the complex and interesting narrative that is emerging from the investigations carried out by the Applicant.

15.37. Important evidence has been found within the LTC project area during the Applicant's Archaeological Trial Trenching (ATT). The evidence found is of

activity during the Mesolithic, a period characterised by a 'hunting/gathering' lifestyle before agriculture, monument building and the introduction of pottery, and which spans over half of the time between the last ice age and the present day.

15.38. The summary reflects in part, the Environmental Statement approach to organising the assessment and description of individual heritage assets by their value, rather than by more considered groups of related assets of the same period or by character area, as has been achieved for the Palaeolithic. The work of synthesising the very large amounts of data presented in the present DCO documents is being undertaken by the Applicant and we note in our Written Representation that this new information should be added to the DCO documentation during the Examination process to help inform agreement of mitigation methods

The need for further investigation and recording work

15.39. It is recognised in the DCO documentation that further archaeological investigations are required to understand the archaeological resource more fully and to define in detail the specific methods of mitigation.

For example, in the DCO ES (AS-044), it states that *'Thirty-three* medium value non-designated archaeological assets of Prehistoric, Roman or unknown date are recorded within the Order Limits and would be removed or truncated by the Project: through the construction of the main alignment, associated earthworks, landscaping, the Southern Tunnel Entrance compound, temporary storage stockpiles 1 and 2, and utility diversion works. They are located between the A2 west of Thong and the A226 Gravesend Road to the south of Chalk'. These are the known sites. Other, presently unknown sites will be impacted in areas which have not yet been subject to archaeological trial trenching.*' [*ES table 6.7 records that 44 assets of medium value would receive a permanent and significant negative impact].

The need for further investigations is also set out in the dAMS-OWSI (APP-367).

15.40. The Applicant recognises that known heritage assets with archaeological interest that would be destroyed will need to be recorded through detailed archaeological investigation and excavation with post-fieldwork, scientific analysis and publication of the results.

Justification for the recording of heritage assets before impacts is set out in ES 6.5.21 where it states that *'Essential mitigation measures for cultural heritage during the construction phase are set out and discussed in the Draft AMS-OWSI (REAC Ref. CH001; Application Document 6.3, Appendix 6.9). Paragraph 5.140 of the NNNPS states that 'the Secretary of State should require the applicant to record and advance understanding of the (sic) heritage asset, before it is lost (wholly or in part)'. Recording is an important principle*

of cultural heritage mitigation and comprises the survey, excavation and reporting of heritage assets. The recording of the heritage asset captures the information that contributes to the understanding of the past. The mitigation measures are described in the context of the heritage assets to which the mitigation measures apply in Section 6.6 of this chapter. They are identified by specific reference numbers that correspond to the detail within Table 3.1 of the AMS-OWSI and are listed in brief summary form below in Table 6.5'.

15.41. The DCO documentation also recognises that the wider construction and mitigation works for the road project would result in a negative impact on a large number of important non-designated heritage assets with archaeological interest.

For example, in (AS-044 Section 6.6.50) it states that 'The activity associated with these utility works, compound construction works and establishment of landscaping would require at least the removal of or excavation into topsoil, and in some areas deeper excavation exposing any archaeological remains present. Consequently, the works would permanently impact these medium-value non-designated archaeological assets. This impact would be mitigated by archaeological excavation and recording (REAC Ref. CH001; AMS-OWSI No. 4). This would result in permanent impacts of moderate adverse magnitude and a moderate adverse effect, which is assessed as significant'. The relevant details are also listed in ES Tables 1.8, 1.14 and 1.15 (AS-044) and (APP-367).

15.42. The importance of undertaking field evaluation is illustrated by the evidence for Mesolithic and early Neolithic activity identified by the LTC archaeological trial trenching north of Claylane Woods (e.g. assets 3640 and 3643) where there is evidence for buried land surfaces and an *in situ* flint scatter below later hill wash.

15.43. The DCO documentation (AS-044) also records evidence for a Mesolithic presence on high ground within Shorne Woods (asset 3545) as well noting that the *'The lower-lying areas of former floodplain to the north of the South Portal within the Order Limits have potential to contain waterlogged organic remains dating from the Mesolithic period onwards'. ES Section 6.4.46 records that an in-situ Mesolithic site campsite (3769) is preserved beneath deeply stratified layers of colluvium present within a dry valley in the Order Limits to the south of the A226 (in the vicinity of Palaeolithic colluvium deposits (3768). The campsite was identified by the presence of burnt clay interpreted as hearths and worked flint artefacts. Due to its evidential value for in-situ Mesolithic occupation, a relatively uncommon site type, asset (3769) is assessed as high value'*.

ES Section 6.4.86 records that '*An early Mesolithic flint microlith (3737) was recovered from a ditch fill during trial trenching, north of Shorne Ifield Road. Although an isolated find, it contributes to potential for a concentration of early*

activity within the area, with other Mesolithic finds identified in proximity (1516, 3736). Asset (3737) holds evidential value and is of low value'.

ES Section 6.4.102 records that '*Trial trench evaluation to the west of Thong (Appendix 6.8, Trial Trenching of Land Parcels 80 and 81, Application Document 6.3) identified a Mesolithic to Neolithic flint assemblage (3642) within a large feature investigated by Trench 11. The assemblage included burnt and worked flints of likely Mesolithic/Neolithic date which were recovered from several layers of the feature. The large feature may have been a prehistoric quarry or shaft or could have been an extensive sinkhole; such features can contain significant horizons of early prehistoric material at depth, and as the feature in Trench 11 was not bottomed, it is possible that early prehistoric horizons exist lower down in the fill. Asset (3667) is of medium value due to its evidential and historical value to potentially yield evidence of Early Prehistoric activity within this area'.*

15.44. The examples given above for the Mesolithic and Neolithic periods are illustrative of similar potential within the Order Limits for the archaeological evidence for Bronze Age and Iron Age rural settlement, the transition of the landscape into the Roman period with important evidence for settlement west of Thong village and south of the A226. There is evidence for early medieval settlement, some of which has been safeguarded from formerly proposed tree planting mitigation near the Ifield Road, as well as evidence for Medieval, Post-Medieval and modern land use.

15.45. The examples quoted above also illustrate the importance of agreeing further investigations in areas not yet subject to archaeological trial trenching. The additional information will be needed to finalise details of archaeological mitigation for the scheme.

15.46. The evidence set out in the ES (AS-044), whilst presented as similarly value-assessed groups of individual heritage assets, nonetheless demonstrates the rich, multi-period, archaeological potential of the project area. Although in some areas, agricultural cultivation has already had a significant negative impact on below-ground archaeological remains, the LTC project would result in the truncation and removal of a unique and finite resource over a significant area. This significant adverse impact is recognised in the DCO documents. If the project is to proceed, a well-defined and very detailed approach to further investigation and mitigation is required. The applicant recognises this and sets out the overall approach in the dAMS-OWSI (APP-367), In addition the Applicant's archaeologists are engaged in ongoing discussions with KCC Heritage Conservation about the detailed scope of further investigations, mitigation excavation and recording, and in the accompanying Written Representation KCC asks that these details are included in an updated dAMS-OWSI (and relevant supporting documents) during the DCO Examination process.

Impacts to parks, gardens and historic landscapes

Heritage Conservation Impact G –Registered Parks and Gardens

15.47. The LTC project will have a negative impact on the Grade II* registered Cobham Park and Garden (RPG1) which dates from the late medieval period and is characterised by late 18th and early 19th century ornamental gardens and pleasure grounds and which formed part of the wider estate of Cobham Hall. (see ES Table 1.9: Registered Parks and Gardens Assessment Table (AS-052) and ES Section 6.4.186 (AS-044)).

15.48. The DCO documentation recognises that woodland in Shorne Woods Country Park (Asset 1311) was established in the post-medieval period and 'is associated with Cobham Hall Grade II* registered park and garden (RPG1), although it is now separated from it by the A2 dual carriageway and M2 junction 1. Its setting, principally its historic associations with Cobham Hall (RPG1) to the south and with Thong to the west (CA10 make important contributions to its historical legibility and aesthetic value' (AS-044, 6.4.128 and see also 6.4.185).

15.49. However, the Applicant has assessed the impact of the development on RPG1 as less than significant (see ES 6.6.109, AS-044) but recognises in section 6.6.110 that 'The Order Limits extend slightly into the northern edge of the high-value Cobham Hall Grade II* Registered Park and Garden (RPG1). Long-term online main construction routes would be present along the A2 and M3. Construction activity would take place along the A2 and the Brewers Road overbridge would be replaced. The visual impact of construction activity along the A2 would be mitigated by the use of hoarding of a sensitive appearance, such as a plain and dark green style (REAC Ref CH001; AMS-OWSI No. 1, Application Document 6.3)'.

15.50. The description of negative impacts to RPG1 is continued in section 6.6.111 where it states that '*During the construction phase, a cycleway would be constructed along the northern edge of RPG1 parallel to HS1 and the park boundary (partially along an existing PRoW) (Application Document 6.2, Figure 6.6, Viewpoint S-(CH)02), which would result in the removal of small areas of trees and vegetation immediately to the south of HS1 and to the east and west of Brewers Road within RPG1. Multiple utility works would take place along Brewers Road and Halfpence Lane within RPG1 but would not cause removal of trees within the park. Other multi-purpose utility works would take place within the park south of the A2, east and west of Park Pale, and a Park Pale-A2 link would be constructed, resulting in the removal of trees in these areas. The removal of trees would take place in a strip of land located between the A2 and HS1, already physically severed from the rest of the park. However, this would still be mitigated by vegetation replanting west of Park Pale to restore the screening of the A2 (Linear Belt Shrubs and Trees LE2.4).*

Mitigation in the form of archaeological excavation and recording (REAC Ref. CH001; AMS-OWSI No. 4) would also be carried out during groundworks within RPG1 to mitigate the physical impact to below-ground archaeological remains associated with RPG1, such as the park pale. Overall, this would result in a permanent impact of minor adverse magnitude and a slight adverse effect, which is assessed as not significant'.

Heritage Conservation Impact H – Historic landscapes

15.51. The LTC will have a negative impact on the historic landscape between the Thames, Gravesend, Thong and Cobham. A Historic Landscape Characterisation (HLC) study has been undertaken and is presented in the DCO DBA (Appendix 6.1, Application Document 6.3) (APP-352).

15.52. It is recognised in ES Section 6.3.50 (AS-044) that *'…historic landscapes which would suffer a permanent physical impact from construction and potentially a further permanent impact as a result of the replacement of part of the historic landscape with the Project's landscaping. In order to provide a holistic assessment, impacts on the historic landscape from construction and operation have been considered cumulatively within the operational phase assessment'.*

15.53. The area is divided into seven categories of historic landscape character:

- reclaimed land,
- woodland,
- parkland/common land/recreational land,
- farmland,
- settlement,
- industry/infrastructure
- military/defence

The attributed values are set out in DCO Table 1.11: Historic Landscape Character Assessment Table: South of the River Thames (AS-052).

15.54. Of these categories reclaimed land, woodland, parkland and settlement are assessed as of being of Medium value. The remaining three; farmland, industry/infrastructure and military/defence, are assessed as being of Low value. However, KCC would recommend that when archaeological evidence is considered, these three categories should also be assessed as being of Medium rather than Low value.

15.55. The historic landscape category of parkland, commons and recreational land is recognised as particularly important (see ES Section 6.4.184) with Cobham Park (RPG1) as the focus but with evidence existing for the previously related, and much larger Cobham estate, which included the lands north of the A2 and around Thong village, which would be directly impacted by the LTC project.

This type of historic landscape is defined as being of Medium value, and not higher, due to the amount of division and modern alteration to the former extent of the Cobham estate. However, it is recognised that the LTC project will have a negative impact on the former estate lands (see ES 6.4.185 (AS-044).

15.56. The LTC project will also result in a negative impact on the historic farmed landscape of the project area, which is assessed by the applicant as being of Low Value, although north of the river the farmed landscape is assessed as being of Medium Value.

Paragraph 6.4.188 of the Environmental Statement states *'Farming of the land has been a continuous means of managing the landscape south of the River Thames for centuries. Although evidence as early as the Mesolithic is present within the study area for human interaction with the landscape, an understanding of farming is present from the Medieval period onwards'* and *'The farming landscape south of the River Thames has historical value for understanding how the land has been managed in the past. However, its low valuation reflects the lack of time depth evident in changes to field systems'.*

It is stated in the ES that the historic farmed landscape can only be understood from the medieval period. The archaeological evidence presented in the DCO documents for archaeological monuments, settlements, stock enclosures, field boundaries and routeways, indicates that it may be possible, with more research, to define a greater time-depth stretching back to Romano-British and before that, prehistoric land use. The historic farmed landscape, though much changed over time and fragmented, provides the setting for the surviving historic farmsteads and settlements, such as Thong village, which are the successors to prehistoric, Roman and medieval settlements.

15.57. In a similar way the archaeological evidence for historic routeways through the landscape and the evidence for past industrial activity (e.g. the presence of quarries) and the militarily strategic location of project area, adjacent to the Thames and approach to London, add to the argument that these categories could also be considered to be of Medium value.

The project area has a rich network of historic routeways (some of which have been identified through archaeological evaluation) and some of which form the basis of the present day public rights of way (PROW) which will be subject to negative impacts by the proposed scheme. It will be important that archaeological and historical information is used to ensure that the scheme maintains and delivers a comprehensive and historically relevant public rights of way network.

15.58. Other areas of the historic landscape of the project area that will be negatively impacted include Shorne Woods Country Park, which will be impacted by utilities works along the southern border. These works will need to be

mitigated by a programme of archaeological works. At present the Assessment Table (AS-052) (Asset 1311) Table 1.13 Non-designated built heritage assessment table: South of the River Thames, notes that Construction Mitigation will be 'best practice'. More detail on the exact approach to mitigation is required in the dAMS-OWSI.

15.59. Likewise, in the north of the project area more detail is required on the impact and mitigation that will be required for the Thames and Medway Canal (AS-052) (Asset 1449) which it is proposed would have a ground protection shaft tunnel excavated in its base. At present it is stated in the ES (AS-044) that mitigation of negative impacts will include restoration of the canal and an archaeological watching brief because of the nature of the alluvial deposits in this area. KCC recommends the need for field evaluation in such cases to understand the impacts and to agree the appropriate mitigation.

Conclusion of Cultural Heritage Impacts

15.60. The Environmental Statement (ES) (AS-044) Chapter 6 covers cultural heritage. In the ES the effects of the project are described as beneficial, adverse or neutral, and permanent or temporary.

15.61. The assessment of effects on cultural heritage has 'considered construction and operation effects on archaeological remains, built heritage, historic landscapes, and the palaeoenvironmental and geoarchaeological resource. Assessments were undertaken in accordance with DMRB LA 104 (Highways England, 2020b) and DMRB LA 106 (Highways England, 2020a) and took account of best practice advice produced by Historic England and the Chartered Institute for Archaeologists'.

15.62. ES chapter 6 describes the mitigation proposed to avoid, reduce or compensate for adverse impacts to heritage assets. The proposed mitigation includes preservation in situ, recording of upstanding heritage assets (including historic building recording), non-intrusive archaeological fieldwork, intrusive archaeological fieldwork such as strip, map and sample excavation, and where necessary, archaeological monitoring during construction.

15.63. Taking proposed mitigation into account most impacts to the historic environment and heritage assets with archaeological interest will be adverse/negative, a small number of impacts will be neutral, none south of the river, are defined as beneficial/positive.

15.64. Design refinement means that a limited number of heritage assets with archaeological interest could be preserved in situ. Across much of the scheme, however, the adverse physical impacts would be unavoidable and archaeological remains would have to be recorded in advance of their loss. The detailed approach to such mitigation recording is yet to be agreed.

15.65. The general processes for achieving this mitigation are, however, set out in (APP-367) 6.3 Environmental Statement - Appendix 6.9 - Draft Archaeological Mitigation Strategy and Outline Written Scheme of Investigation (dAMS-OWSI). The dAMS-OWSI will be updated during the DCO process with the details of mitigation within each parcel of land within the order limits. This is the subject of ongoing discussions between KCC Heritage Conservation and the Applicant.

Potentially beneficial/positive outcomes of the scheme

15.66. Despite the overwhelmingly negative effects of the proposed scheme on the cultural heritage and archaeological interest of the area, the scheme is having, and could have, some positive outcomes for cultural heritage, if the results of archaeological investigations are fully reported on and brought to as wide an audience as possible.

15.67. If the project were to proceed, the mitigation of development impacts, including, but not limited to, archaeological investigations, excavations, public engagement, post-excavation assessment, analysis, interpretation (including art works), reporting and the provision of archive capacity, could all be positive outcomes.

15.68. There are some limited beneficial effects described in the ES resulting from hedgerow restoration as an essential part of mitigation of adverse effects. However, because of the permanent loss of other heritage assets, these remain as overall adverse effects.

15.69. In ES Chapter 6: 6.4.429 (AS-044) it is noted that buried archaeological remains in cultivated fields would be likely to continue to deteriorate and the recording of remains which would be impacted by this project, would represent a beneficial effect (outcome), though not reducing the overall effect of the impact to a neutral or beneficial one. Being able to record the archaeological remains is not a justification for their loss, even considering the deterioration that might be anticipated from continued agricultural cultivation, or for example, future climate change impacts. However, because of archaeological mitigation, positive outcomes can result.

15.70. DCO document (AS-044) sets out commitment to mitigation. In Section 6.5.3 it states ‘Embedded mitigation is included within the Design Principles (Application Document 7.5) or as features presented on ES Figure 2.4: Environmental Masterplan (Application Document 6.2). *Design Principles relevant to mitigation of effects on cultural heritage are described below, each with an alpha-numerical reference code (e.g. LSP.XX). Good practice and essential mitigation are included in the Register of Environmental Actions and Commitments (REAC). The REAC forms part of ES Appendix 2.2 the Code of Construction Practice (CoCP) (Application Document 6.3). Each entry in the*

REAC has an alpha-numerical reference code (e.g. REAC Ref. CH0XX) to provide cross reference to the secured commitment. Relevant good practice and essential mitigation to reduce cultural heritage effects are identified below. 6.5.4 The Design Principles (Application Document 7.5), Environmental Masterplan (Application Document 6.2), CoCP and REAC (Application Document 6.3), all form part of the Project control plan. The control plan is the framework for mitigating, monitoring and controlling the effects of the Project. It is made up of a series of 'control documents' which present the mitigation measures identified in the application that must be implemented during design, construction and operation to reduce the adverse effects of the Project. Further explanation of the control plan and the documents which it comprises is provided in the Introduction to the Application (Application Document 1.3)'.

This section (6.5.3 of the ES (DCO ASS-044) provides an important definition of how the commitment to mitigation is embedded in the DCO documentation and which will be the subject of the Requirements.

15.71. It is important to reiterate, however, that there are areas of the project where we remain uncertain about what level of impact will occur and therefore, we are not able to say with certainty whether the scheme would have a positive, negative or neutral impact in certain areas. These are primarily the areas within the Order Limits which have not been subject to archaeological trial trenching.

15.72. Within our accompanying Written Representation KCC requests that the Applicant undertakes further investigations at the earliest opportunity and well before preliminary construction works would start.

16. Other Matters

Skills and Employment – Construction Workforce

Workforce Impact A: Increase in employment in Kent

16.8. Further economic benefits to Kent will arise from the employment generated by the scheme. Document 7.18 Workers Accommodation Report (APP-551) forecasts a peak workforce on the scheme of 4,514 workers. On the southern section of the scheme, within Kent, the workforce is forecast to peak at 885 workers. Both figures cited from paragraph 5.3.2. The Workforce Accommodation Strategy in table 5.6 and 5.7 has assumed that 35% of workers could be locally sourced; however, it also highlights that other major projects in the country have achieved higher proportions - see paragraph 5.4.4.

16.9. Nonetheless, if 35% is achieved, this would mean at least 310 workers employed from the Kent labour pool. Assuming an average Gross Value Added (GVA) for Kent workers on the scheme equal to the South East average as reported by ONS in 2021 of £36,174 per head, then at its peak £11.2m of GVA would be generated for the Kent workforce population, benefiting the local economy through the additional earnings and spending that generates. Over the life of the scheme the value could be substantially higher if the 35% proportion is maintained and applied to the total Full Time Equivalent workforce working on the southern section of the scheme.

16.10. Additionally, a well implemented Skills, Employment and Education strategy will add further to this total through the apprenticeships, skills, graduates and so on delivered by the scheme. Also through the access to opportunities for Kent workers on the northern part of the scheme which will be within realistic travel access times for residents in north and west Kent owing to the presence of the existing Dartford crossing.

16.11. The workforce required for the scheme and the potential employment from local labour, which should be secured and delivered by an effective Skills, Employment and Education strategy, provides a likely positive impact to Kent.

Impacts on Community Assets

Community Assets Impact A: Loss of revenue at Shorne Woods Country Park

16.12. There are concerns that there will be considerable disruption during construction with significantly increased traffic movements and construction activities leading to significant noise, dust, vibration and particulate pollution.

This is likely to deter people from using the Park for a substantial period of time and will impact on the Park resources.

16.13. The concern follows that there will be a negative impact of the finances of the Park as the substantial disruption caused is likely to lead to reduced Park use and thus revenue as the community go elsewhere to avoid the disruption. At the worst-case scenario, the viability of the Park and the wider park estates is threatened, potentially leading to a devastating wider impact for the Park estates.

16.14. In addition, the closure of Brewers Road bridge for any period would be significant for the park and have a negative impact on visitor numbers as well as increasing traffic along local country lanes and through Shorne village.

16.15. Where community assets/facilities are affected throughout the six-year construction period then suitable compensation should be arranged to offset the impact. KCC wishes to see National Highways work with local asset managers and owners, including Shorne Woods Country Park, to agree a sufficient monitoring strategy and mechanism of claiming compensation when there is evidence to prove construction of the Project has had a clear adverse impact on revenue generated.

Community Assets Impact B: Tree removal and replanting at Shorne Woods Country Park

16.16. The Applicant has indicated to the Council that no land is to be acquired on a permanent basis. It is understood that the applicant instead requires new rights for a land strip for utilities diversions. The Council understands that the applicant has made a commitment to reinstate, re-seed and replant the land to the satisfaction of the Council. This would also need to satisfy the requirements of Natural England as this land is part of the SSSI so the work would require formal consent before it is undertaken.

16.17. In the event of the maximum extent of the development area needing to be used, this could lead to the need for a diversion of the existing shared user route, also part of the local Darnley Trail wider waymarked route, which would impact on visitors in the park. It will also mean that the road impact moves up to 30m nearer the outdoor classroom space impacting on the suitability of this location for classes.

16.18. The Council recognise that there may be the loss of some trees and that mitigation planting has been offered. The loss of any parkland, be it woodland, amenity or any other land is detrimental to the fabric, environment and character of this historic park and therefore a negative impact and we will seek to minimise any impacts or land take.

16.19. The Council understand that the applicant has offered to maintain the mitigation planting for a period of 10 years. The Council welcomes this commitment, however, will require the planting and maintenance of the new woodland to be led by members of the Council Parks team, as experts in their field.

Community Assets Impact C: Proposed Car Park at Thong Lane

16.20. The Project proposes to utilise part of the A2 construction compound as an additional car parking facility for Shorne Woods Country Park once construction of the LTC is complete. Whilst this has the potential to leave a positive legacy for the country park and wider area, it must be understood that there have been no discussions with the Applicant around the long term management and maintenance of the proposed car park.

16.21. As it stands, KCC is not committed to taking on the management/ownership of the proposed car park unless the facility has a sustainable business case with sufficient income generation potential to cover its ongoing revenue and capital costs. The business case must be approved by KCC in advance of any agreement to transfer/manage the facility and income generation must include commercial business opportunities in addition to Pay & Display charges. If the car park does not generate enough income to cover the costs of its long term management then the proposed car park would have a negative impact on the County Park and result in a significant financial and resource burden to KCC.

Community Assets Impact D: Blighted Property Woodlands Cottage, Thong Lane

16.22. The Council has concern in relation to a residential dwelling that it owns known as Woodlands Cottage situated in Thong Lane. This property is within close proximity of the development boundary. It is understood that there is a high probability that this property will be blighted.

17. Conclusion

17.1. This Local Impact Report has been prepared by Kent County Council (KCC) as a statutory consultee and host authority. The report covers the areas of which KCC has a statutory function or expertise, and outlines the positive, neutral and negative impacts KCC considers the Project will have on the local area. The County Council defers to Local Authorities on other matters such as Air Quality, Noise and Vibration, and Landscape and Visual.

17.2. Table 6 below provides a summary of the impacts that have been presented throughout this report.

Table 6 Summary of Impacts

Impact	Description of Impact	Nature of Impact
Strategic Impacts		
Strategic Impact A	Improved Network Resilience	Positive
Strategic Impact B	Reduced Journey Time Delays	Positive
Strategic Impact C	Increased Journey Time Reliability	Positive
Strategic Impact D	Supports Bifurcation between A2/M2 and M20/A20 Corridors	Positive
Strategic Impact E	Generation of Economic Benefits	Positive
Transport Impacts		
Transport Impact A	Impacts of the LTC on the Strategic Road Network (SRN)	Negative
Transport Impact B	Wider Network Impacts (WNI)	Negative
Transport Impact C	Impacts of the LTC on the A229 Blue Bell Hill	Negative
Transport Impact D	Road Safety Impacts of the LTC	Positive for SRN Negative for LRN
Transport Impact E	Public Transport and Active Travel Impacts of the LTC	Negative
Transport Impact F	Severance Issues for Walkers, Cyclists and Horse Riders (WCH)	Positive e.g., Cobham area Negative e.g., Valley Drive
Transport Impact G	Dangerous Goods Vehicles and Oversized Vehicles	Negative but potential to be Positive
Transport Impact H	Construction Shifts and Deliveries	Negative
Transport Impact I	Construction Traffic Routeing	Negative
Transport Impact J	Construction Impacts on the Condition of the Existing Local Road Network (LRN)	Negative
Transport Impact K	Highways Asset generation and impact of transference from National Highways to Kent County Council	Negative

Impact	Description of Impact	Nature of Impact
Public Rights of Way (PRoW) Impacts		
PRoW Impact A	Enhancements to the Public Rights of Way Network	Positive
PRoW Impact B	Omission of improvements to bring Hares Bridge up to cycling / equestrian standard	Negative
PRoW Impact C	Omission of improvements to bring key structures up to cycling / equestrian standard	Negative
PRoW Impact D	Designation of temporary National Cycle Route (NCR) 177	Negative
PRoW Impact E	Absence of construction detail	Negative
PRoW Impact F	Existing leisure/recreation PRoW use	Negative
Minerals and Waste Impacts		
Minerals and Waste Impact A	Mineral Safeguarding	Neutral
Minerals and Waste Impact B	Waste Generation	Positive
Sustainable Urban Drainage Systems (SUDS) Impacts		
SUDS Impact A	Departure on Peak Rainfall	Negative
SUDS Impact B	Drainage design of realigned or widened highway	Positive
SUDS Impact C	Watercourse channels	Neutral/ Positive
SUDS Impact D	Discharge rates	Positive
SUDS Impact E	Surface flooding 1	Negative
SUDS Impact F	Surface flooding 2	Neutral/ Positive
SUDS Impact G	Flood issue	Positive
SUDS Impact H	Surface water flow path	Negative
SUDS Impact I	Groundwater flooding	Negative/ Neutral
SUDS Impact J	Flooding from sewers and water mains	Negative
SUDS Impact K	Surface water run off	Negative
SUDS Impact L	Discharged water run off	Neutral
SUDS Impact M	Contamination	Neutral
SUDS Impact N	Permanent Drainage System	Negative
SUDS Impact O	Box Culvert Installation	Negative
SUDS Impact P	Management of surface water	Neutral
SUDS Impact Q	Sustainable Drainage Systems	Neutral
SUDS Impact R	Ponds	Positive/ Neutral (but potential to be Negative)
SUDS Impact S	Infiltration basins	Negative
SUDS Impact T	Rainfall runoff	Negative

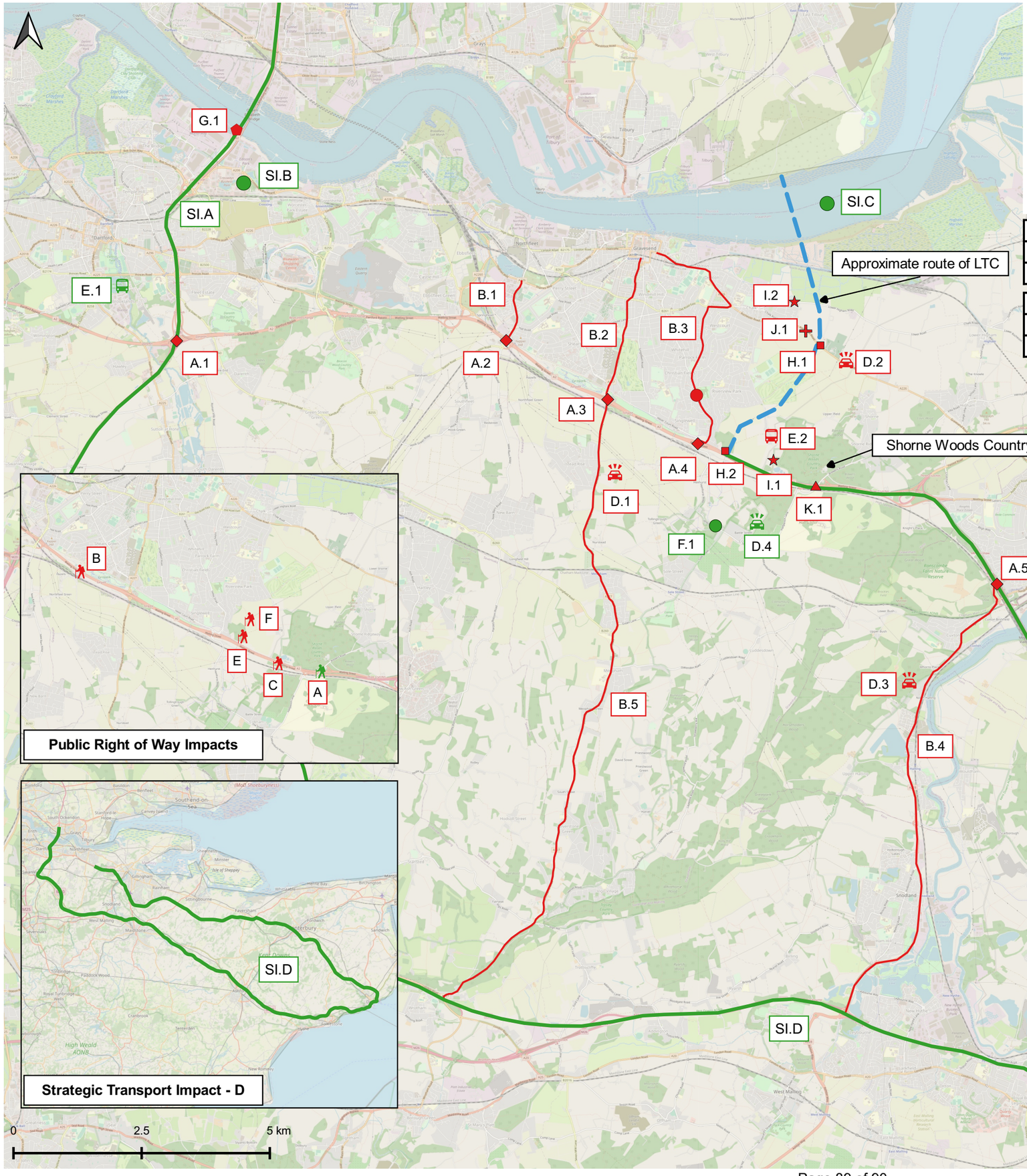
Impact	Description of Impact	Nature of Impact
Health Impacts		
Health Impact A	Air quality during construction and operation	Neutral (however further information is required)
Health Impact B	Active Travel Impacts by Ward	Positive/ Neutral
Biodiversity		
Biodiversity Impact A	Foraging/Commuting Bats and associated habitat	Negative/ Neutral
Biodiversity Impact B	Roosting Bats	Neutral
Biodiversity Impact C	Dormouse	Negative/ Neutral
Biodiversity Impact D	Badgers	Negative/ Neutral
Biodiversity Impact E	Water Voles	Neutral
Biodiversity Impact F	Otter	Neutral
Biodiversity Impact G	Invertebrate	Negative
Biodiversity Impact H	Loss of Ancient Woodland	Negative
Biodiversity Impact I	Bird	Negative/ Neutral
Biodiversity Impact J	Outline Landscape and Ecology Management Plan (OLEMP)	Negative
Biodiversity Impact K	Lighting	Negative
Biodiversity Impact L	Biodiversity Net Gain	Negative
Biodiversity Impact M	Green Bridges	Negative/ Neutral
Biodiversity Impact N	Nitrogen Deposition	Neutral
Biodiversity Impact O	Reptiles and Great Crested Newts (GCNs)	Positive
Climate Change		
Climate Change Impact A	Construction and Operation Emissions	Negative
Heritage Conservation Impacts		
Heritage Conservation Impact A	Conservation Areas	Negative/ Neutral
Heritage Conservation Impact B	Designated built heritage (Listed Buildings)	Negative
Heritage Conservation Impact C	Non-designated built heritage	Negative
Heritage Conservation Impact D	Archaeology – Scheduled Monuments	Negative/ Neutral
Heritage Conservation Impact E	Archaeology – Geology and Palaeolithic/Early Holocene archaeology	Negative

Impact	Description of Impact	Nature of Impact
Heritage Conservation Impact F	Archaeology – Non-designated archaeology	Negative
Heritage Conservation Impact G	Registered Parks and Gardens	Negative
Heritage Conservation Impact H	Historic landscapes	Negative
Other Matters		
Workforce Impact A	Increase in employment in Kent	Positive
Community Assets Impact A	Loss of revenue at Shorne Woods Country Park	Negative
Community Assets Impact B	Tree removal and replanting at Shorne Woods Country Park	Negative
Community Assets Impact C	Proposed Car Park at Thong Lane	Negative but with potential to be Positive
Community Assets Impact D	Blighted Property Woodlands Cottage, Thong Lane	Negative

17.3. The proposed A122 Lower Thames Crossing will be a significant piece of new transport infrastructure, helping to relieve the considerable daily congestion at the existing Dartford Crossing whilst also being the first step to creating a new strategic link from the Channel Portals to the Midlands and the North.

17.4. It is inevitable that a scheme of this size and scale will result in a number of impacts to the local area. However, with the correct monitoring and mitigation measures in place, the adverse impacts on the local area could be reduced. Only with these mitigation measures will the Lower Thames Crossing be able to fully achieve its objectives.

Appendix A: Map of Strategic and Transport Impacts of the LTC on Kent



Strategic Impacts A and B
Positive

Strategic Impacts B and C
Positive

Transport Impact A
Negative

Transport Impact B
Negative

Transport Impact C
Negative

Transport Impact D
Negative
Positive

Transport Impact E
Negative
Positive

Transport Impact F
Negative
Positive

Transport Impact G
Negative

Transport Impact H
Negative

Transport Impact I
Negative

Transport Impact J
Negative

Transport Impact K
Negative

Impact ID	Impact	Positive/Negative
SI.A	Strategic Impact A	Positive
SI.D	Strategic Impact D	Positive

Impact ID	Impact	Positive/Negative
C.1	Strategic Impact C	Positive
B.1	Strategic Impact B	Positive

Transport Impact ID	Impact	Junction	Positive/Negative
A.1	A	M25 J2	Negative
A.2	A	A2 Pepper Hill	Negative
A.3	A	A2/A227 Tollgate	Negative
A.4	A	A2 Gravesend East	Negative
A.5	A	M2 J2 (A228)	Negative
A.6	A	M2 Junction 3	Negative
A.7	A	M20 J6	Negative

Transport Impact ID	Impact	Junction/Corridor	Positive/Negative
B.1	B	A2 Springhead Corridor	Negative
B.2	B	A2 Wrotham Road Corridor	Negative
B.3	B	A2 Valley Road	Negative
B.4	B	A228	Negative
B.5	B	A227	Negative

Transport Impact ID	Impact	Junction/Corridor	Positive/negative
C.1	C	A229 Blue Bell Hill	Negative

Transport Impact ID	Impact	Junction/Corridor	Positive/Negative
D.1	D	A227	Negative
D.2	D	A226	Negative
D.3	D	A228	Negative
D.4	D	Overall	Positive
D.5	D	A229 Blue Bell Hill	Negative

Transport Impact ID	Impact	Junction/Location	Positive/Negative
E.1	E	Dartford Fastrack A	Positive
E.2	E	Thong	Negative

Transport Impact ID	Impact	Junction/Corridor	Positive/Negative
F.1	F	Cobham	Positive
F.2	F	Valley Drive	Negative

Transport Impact ID	Impact	Junction/Location	Positive/Negative
G.1	G	Dartford Crossing	Negative

Transport Impact ID	Impact	Junction/Location	Positive/Negative
H.1	H	Construction routes	Negative
H.2	H	A2 main line traffic	Negative

Transport Impact ID	Impact	Location	Positive/Negative
I.1	I	Villages - Thong/Shorne	Negative
I.2	I	Lower Higham Road	Negative

Transport Impact ID	Impact	Juntction/Location	Positive/Negative
J.1	J	LRN	Negative

Transport Impact ID	Impact	Junction/Location	Positive/Negative
K.1	K	Brewers Road Bridge and other structures	Negative

PROW Impact ID	Location	Positive/Negative
A	Brewers Road Bridge	Positive
B	Hares Bridge	Negative
C	Thong Lane Bridge	Negative
F	PROW across LTC alignment	Negative
E	LTC alignment	Negative

Appendix B: Lower Thames Crossing Wider Network Impacts (WNI) Task 1 Report: Agreeing the Objectives. WSP for Kent County Council, July 2023

Kent County Council

Lower Thames Crossing Wider Network Impacts

Agreeing the Objectives

70099014-TN01
July 2023

Confidential

Kent County Council

Lower Thames Crossing Wider Network Impacts

Agreeing the Objectives

Type of document (version) Confidential

Project no. 70099014

Our Ref. No. 70099014-TN01

Date: July 2023

WSP

Grosvenor House
2 Grosvenor Square
Southampton, Hampshire
SO15 2BE

Phone: +44 23 8010 1700

WSP.com

Quality control

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Prepared by	SK/CW/PM	SK/CW/PM	CW/PM	CW/PM	PM	VG	N/A
Checked by	GH	GH	GH	GH	CW	PM	N/A
Authorised by	N/A	N/A	N/A	CW	CW	GH	GH
Project number	70099014	70099014	70099014	70099014	70099014	70099014	70099014
Report number	TNO1	TNO1	TNO1	TNO1	TNO1	TNO1	TNO1

Contents

Tables

1 INTRODUCTION

1.1 Preamble

1.1.1. WSP has been commissioned by Kent County Council (KCC) to produce a pre-Strategic Outline Business Case (SOBC) desktop study on the impact of the Lower Thames Crossing (LTC) on the local highway network within Kent. This commission has been split into several tasks as outlined below:

- Task 1a - Agree Priority Order;
- Task 1b – Identification of the Problem;
- Task 1c – Agree the Objectives of the Scheme;
- Task 1d – Generate a Long List of Options;
- Task 1e – Initial Sift of Options;
- Task 1f – Develop and Assess the Options;
- Task 2 – Traffic assessment overview including consideration of the impact of taking no action;
- Task 3 – Economic Appraisal;
- Task 4 – Indicative Timetable of development, planning and construction;
- Task 5 – Stakeholder support;
- Task 6 – Identification of key risks, assumptions and uncertainties;
- Task 7 – Reporting.

1.1.2. National Highways requested that the following note be added to this report on 18th July 2023. The text in italics has been added unedited as provided to us.

> *The Kent Wider Network Impact (WNI) Study is a KCC owned study, funded by National Highways, to investigate impacts on the wider network in Kent. National Highways does not consider that the proposed interventions are required to make the Lower Thames Crossing acceptable, and that they should be developed in line with Government policy and funding mechanisms outside of the Lower Thames Crossing. National Highways has said, pursuant to its licence, that it will cooperate with KCC in this matter.*

1.1.3. This Technical Note (TN01) provides a summary of work completed up-to completion of Task 1c. Noting the interrelationships that exist between Task 1a, 1b and 1c it was agreed that identifying the problem and objectives of the scheme were required to agree a priority order. This note completes the identification of the problem and which junctions and corridors experience material impacts from LTC that deteriorate traffic conditions. It provides the basis for the remaining parts of Task 1 including identifying the specific challenges in particular locations and developing options to mitigate the impact of LTC on KCC's highway network.

1.2 Traffic Modelling

1.2.1. Extensive traffic modelling on the impacts of LTC has been completed by National Highways using the Lower Thames Area Model (LTAM), including analysis in the 2018 statutory consultation and 2020 supplementary consultation. In relation to this consultation, Stantec were commissioned by KCC to review the LTAM and produced a report in September 2020 that identified potential mitigation measures that may be required on KCC's highway network as a result of LTC.

1.2.2. Following on from a further update of the LTAM and Kent Transport Model (KTM) in 2021 it was agreed with National Highways that the KTM would be used as part of the wider impact assessments study. This allowed consideration of the following:

- Variable Demand Modelling (VDM) comparisons;
- Detail of KCC network; and
- Peak hours assessed within model.

1.2.3. Outputs from the KTM have been provided to WSP for the forecast years of 2030 (LTC opening year) and 2045 (LTC design year), Do Nothing (without LTC) and Do Something scenario (with LTC). The only difference between the Do Nothing and Do Something scenario is the completion of the Lower Thames Crossing and no additional development traffic is included in the Do Something compared to the Do Nothing scenario.

1.3 Initial Scope of Assessment

The LTAM and KTM assessments completed to-date have identified the following corridors and junctions for inclusion within the pre-SOBC study:

1. A206 between Crayford Way and Burnham Road:
   - WNI101: A206 Thames Road / B2186 Crayford Way; and
   - WNI102: A206 Thames Road / A206 Burnham Road
2. A2 between Spring Head and Gravesend East;
   - WNI201: A2 Spring Head (incl. A2260 and B259 roundabouts);
   - WNI202: A2 Pepper Hill (incl. Spring Head Road / Hall Road);
   - WNI203: A2 Tollgate (incl. Wrotham Road / Coldharbour Road); and
   - WNI204: A2 Gravesend East (incl. Valley Drive / Marling Way).
3. A227 between A2 and M20:
   - WNI301: A227 / Istead Rise;
   - WNI302: A227 / Green Lane; and
   - WNI303: Link mitigations / traffic management to promote strategic route hierarchy and reduce use of inappropriate routes between A2 and M20.
4. A228 between M2 and M20:

- WNI401: A228 / Cuxton Road;
- WNI402: A228 / Bush Road;
- WNI403: A228 / Kent Road;
- WNI404: A228 / Peter's Bridge
- WNI405: A228 / Manley Boulevard
- WNI406: A228 / Holborough Road;
- WNI407: A228 / Malling Road;
- WNI408: A228 / Leybourne Way; and
- WNI409: Link mitigations / traffic management to promote strategic route hierarchy and reduce use of inappropriate routes between M2 and M20.

1.3.1. In addition to these locations, the outputs from the KTM have been reviewed to consider if there are other locations where mitigation may be required as result of LTC.

1.4 Structure of Technical Note

1.4.1. The remainder of this Technical Note is set out as follows:

- Section 2 provides a summary of the findings from a corridor perspective, detailing those that have been identified in addition to the original scope;
- Section 3 details the metrics used to identify locations where mitigation may be required as result of the LTC;
- Section 4 provides a summary of problems identified and objectives of any mitigation on the A206 between Crayford Way and Burnham Road (Corridor 1);
- Section 5 provides a summary of problems identified and objectives of potential mitigation on the A2 between Spring Head and Gravesend East (Corridor 2);
- Section 6 provides a summary of problems identified and objectives of potential mitigation on the A227 between A2 and M20 (Corridor 3);
- Section 7 provides a summary of problems identified and objectives of potential mitigation on the A228 between M2 and M20 (Corridor 4);
- Section 8 provides a summary of any other problems identified outside of the original scope and objectives of potential mitigation; and
- Section 9 provides a summary of the next steps for the project.

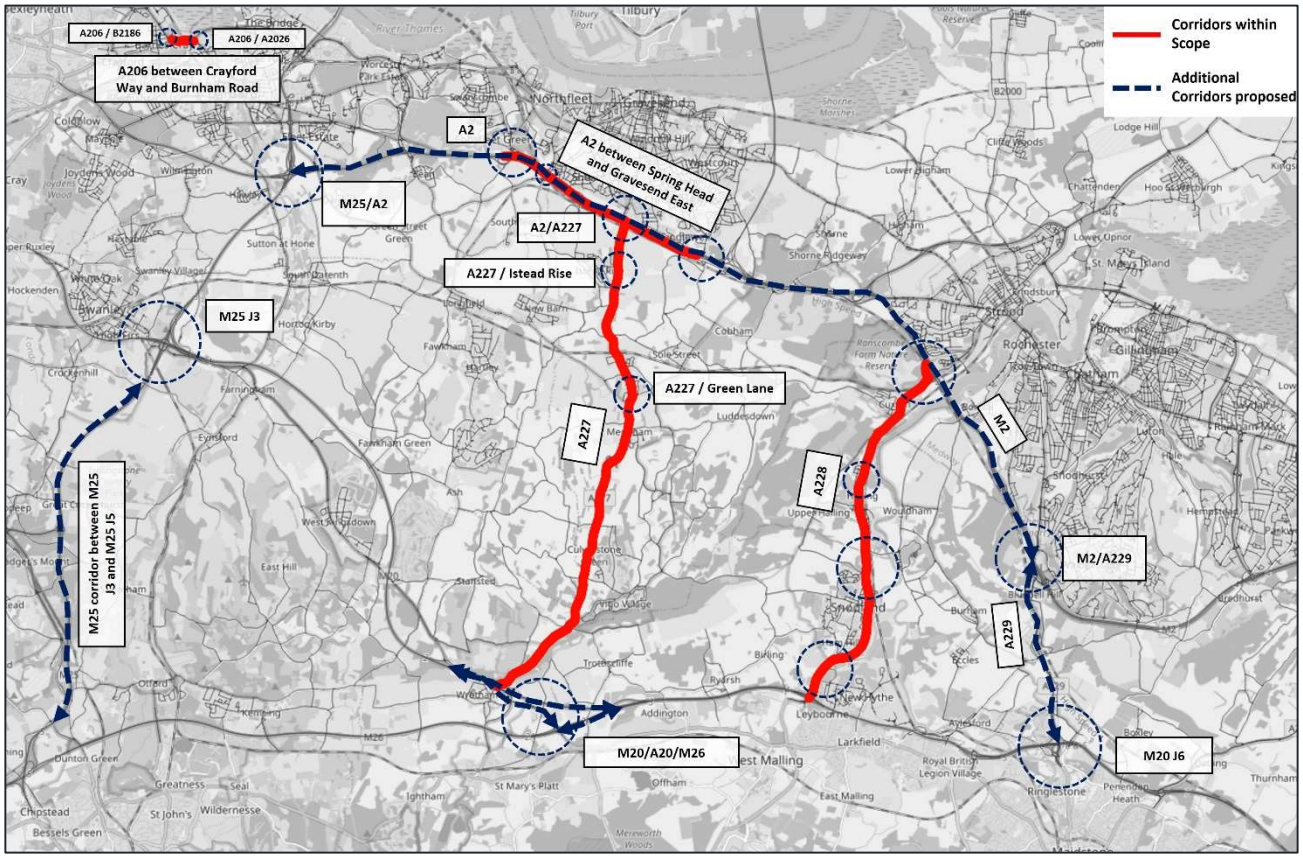
2 Summary of Findings and Next Steps

2.1 Identified Junctions and Corridors

2.1.1. **Figure 2-1** shows the junctions and corridors identified through the problem identification process and the corridors that were identified in the original brief. The map shows that significant additional corridors and junctions were picked up by the assessment metrics which are described in Section 3. A further review of these has limited the number that are proposed to be taken forward for further examination. Further mapping is included in Appendix A of this report and presents some of the tabulated results on maps.

2.1.2. The analysis shows a clear and far-reaching impact on Kent's wider road network from the introduction of the LTC. Subsequent chapters of this Technical Note provide further detail on the issues identified and the prioritisation.

Figure 2-1 - Network Map showing corridors identified in original brief and additional corridors identified though our analysis



2.1.3. The results are presented here grouped into the nine corridors, four of which were identified in the original brief and five new ones. The associated junctions are reported on within each corridor. The majority of the newly identified corridors are on National Highways' network

but have been included due to the possible impacts at junctions which affect traffic on local roads. The corridors are listed here and the detailed results for each are in the following chapters. Corridors included in the brief are:

- A206 corridor between Crayford Way and Burnham Road: The assessment of this corridor did not highlight any significant impacts as a result of LTC and therefore this will not be taken forward for further consideration / mitigation;
- A2 corridor between Spring Head and Gravesend East: Traffic congestion issues have been identified on junctions with the A2, leading some junctions operating over capacity as a result of LTC. This corridor will therefore be taken forward for further consideration / mitigation;
- A227 corridor between A2 and M20: General traffic and HGV flow increases have been identified along the A227 and adjacent links through areas such Meopham, Hook Green, Sole Street and Cobham. This corridor and adjacent areas will therefore be taken forward for further consideration / mitigation; and
- A228 corridor between M2 and M20: The A228 is shown to experience in general traffic / HGV flows as a result of LTC leading to detrimental impacts on journey times and junction capacities. This corridor will therefore be taken forward for further consideration / mitigation.

2.1.4. Additional corridors identified as part of this analysis:

- A229 corridor between M2 and M20;
- M25 corridor between J3 and J5;
- A2 corridor between M25 and A2 corridor included within original scope;
- M2 corridor between A2 and A229;
- A20 corridor between M20 and M26; and
- M26 corridor between A20 and M20.

2.1.5. Further inspection of the newly identified corridors has shown that impacts are largely isolated to the National Highways network and in some cases only one identification metric is triggered, and others show positive changes indicating the overall impact from LTC may be neutral or positive. As a result, only the following additional corridor is recommended for progression to the next phase of analysis:

- A229 corridor between M2 and M20.

2.1.6. Following discussions with KCC, it has been confirmed that the A229 Corridor is currently subject to a Large Local Major (LLM) SOBC, which includes improvements to Blue Bell Hill, Lord Lees Roundabout, Taddington Roundabout, A229 and A229 / M2 slip road. The objectives of this scheme are to reduce forecast traffic congestion, improve road safety, alleviate poor air quality and accommodate local growth and additional traffic from LTC. As such, whilst options for improving traffic flow on the A229 corridor will not be considered as part of this study, the proposals that form part of the LLM SOBC will be taken into consideration as part of recommendations being made for the in-scope network.

2.1.7. In addition to the five additional corridors a number of standalone junction / link locations have been identified within the study area through use of the assessment metrics discussed in Section 3. These additional locations consist of:

- A226 Gravesend Road, where traffic flow increases associated with LTC are likely to have a detrimental impact on existing on-carriageway cycle route provision; and
- Chatham Road (South of Bluebell Hill), where traffic flow increases associated with LTC are likely to have a detrimental impact on existing on-carriageway cycle route provision.

2.1.8. Further information on these identified locations is included in Section 8 and 9 of this Technical Note.

2.2 Treatment of 'Rat-Runs' and HGV routes

2.2.1. The identification of the corridors has included an assessment of the local roads in the study area. In several cases there are local roads that connect two corridors which show increased traffic levels, often referred to as 'rat-runs'. Where the traffic on these local roads is clearly only linking two other corridors they have not been categorised as corridors themselves and the issues are addressed as part of the associated main corridors.

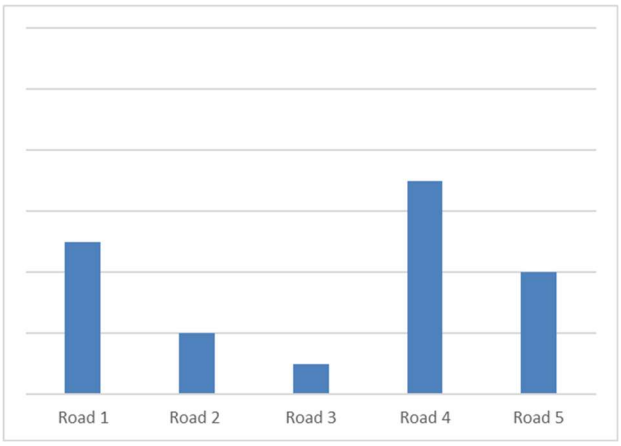
The results also show increased HGV traffic on local roads. Several of these roads are unable to handle HGV traffic, some are narrow and single carriageway, and the Local Highway Authority will want to prevent HGVs from using many of these local roads for road safety, noise, environmental and practicality reasons. It is expected that in reality some of this HGV traffic will be redistributed onto the core HGV network.

2.2.2. Figure 2-2 illustrates how increased HGV traffic on five roads might be modelled and how in reality this results in higher-than-expected HGV use of a few critical corridors and junctions.

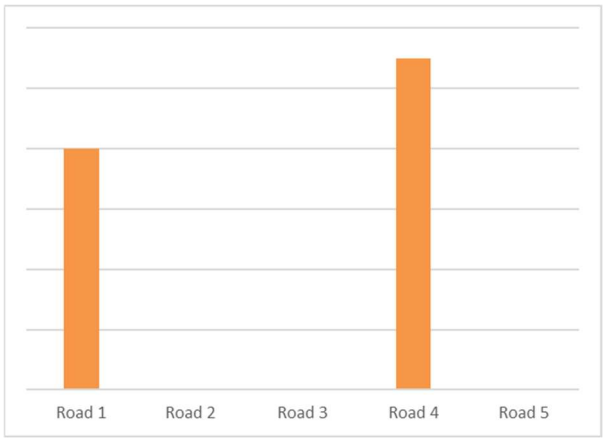
2.2.3. The next phase of our analysis will consider where this reallocation of HGV traffic is likely to exacerbate the modelled results in other locations, for example where installing a weight limit on certain minor roads, may lead to HGV traffic being re-routed onto the A227 / A228. This will need to involve discussion with KCC and possibly National Highways about what the preferred HGV routes in the area are.

Figure 2-2 Illustration of modelled HGV route demand vs likely reality

Modelled Outputs



Likely Reality



Roads 1 and 4 are the main HGV routes, roads 2, 3 and 5 are inappropriate for HGV's and may have future restrictions in place. Modelled HGV traffic on roads 2, 3 and 5 in reality chooses to travel on the main HGV corridors resulting in traffic on roads 1 and 4 being higher than modelled.

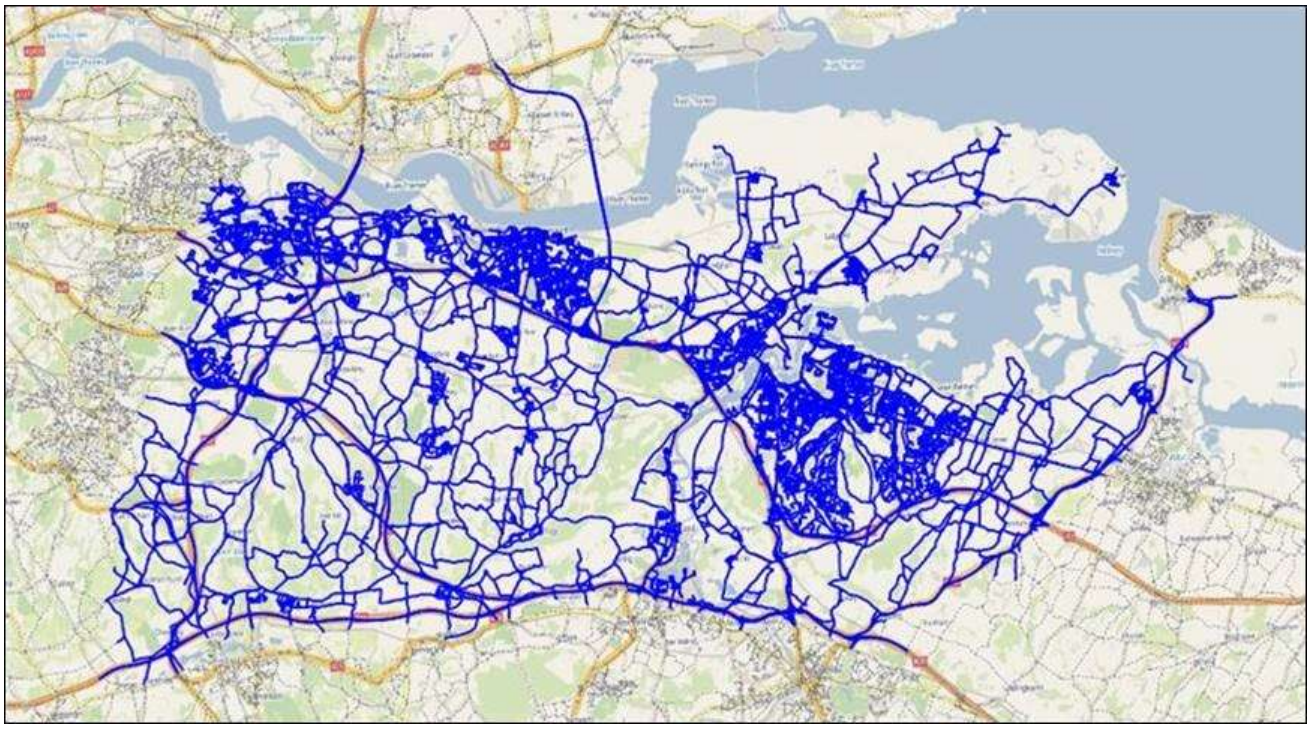
2.2.4. During the next stage WSP will undertake a qualitative and quantitative assessment for the manual reassignment of HGV and private vehicles. The assessment will identify the scale of potential reassignment and then provide an estimate on the approximate level of traffic which may use a route and if further mitigation will be required.

3 Priority Order and Identification of the Problem

3.1 Introduction

3.1.1. This section provides a summary of how the model outputs have been interrogated and analysed allowing junctions and corridors to be identified and prioritised for assessment. **Figure 3-1** shows the cordon area of the Kent Transport Model for which data has been provided.

Figure 3-1 - Kent Transport Model Cordon Area



3.2 Priority Order of Assessment

3.2.1. The 2030 forecast scenario (LTC opening year) will be prioritised for assessment purposes. This reflects the following:

- 2030 forecast scenario shows the immediate impacts that are predicted to occur on KCC's local highway network as result of LTC. Issues that present themselves in 2030 are those which are most pressing and require action soonest, they are also those that rely least on forecasts which means these model outputs have a higher level of confidence;
- An initial review of the results suggested that the majority of the issues identified in 2030 worsened in 2045, as opposed to there being new issues in 2045 only; and
- The prioritisation of the LTC opening year scenario ensures that issues resulting from background traffic growth between 2030 and 2045 are excluded from the initial prioritisation.

3.2.2. The 2045 forecast scenario (LTC design year) will be used to inform the scale of the problem and the criticality in 2030. For example, issues that do not worsen significantly between 2030 and 2045 will have a lower priority than those which deteriorate more. This detailed examination will be part of the next phase of analysis at each of the identified junctions and corridors.

3.3 Assessment Metrics

3.3.1. A range of metrics have been developed by WSP to assess the wider network impact of the LTC. These metrics have been selected to ensure that all highway users are considered and to ensure that the identification of impacts and subsequent mitigation is not based solely on highway capacity improvements and instead considers all highway users. This approach is aligned to KCC's Local Transport Plan 4 ambitions and the National Planning Policy Framework.

3.3.2. The initial set of metrics are shown in Table 3-1 below, these were later refined to those in Table 3-2 through the thought process outlined below. Prioritisation is not considered at this stage, so each metric is considered equally.

Table 3-1 –Primary Assessment Metrics

No.	Junction / Link Metrics	Criteria 1	Criteria 2
1	Link / Junction Capacity	Volume to Capacity (V/C) increases by more than 10% in Do Something (DS) scenario	The DS V/C level is more than 85%
2	Queue length	Does it now obstruct another junction or entry/exit in DS scenario?	
3	Delay	Travel time increase by 10% in DS scenario	Travel time increases by more than 5 minutes in DS scenario
4	HGV Flow	10% increase of HGV in DS scenario (IEMA guidance)	
5	Public Transport	Bus route journey time increases by 5% across a corridor in DS scenario	1-minute journey time increase at individual junctions as a result of LTC
6	Active Travel	Signed cycle routes where a step-change in link or crossing provision (DMRB CD195) in DS scenario	Increases in road vehicles in proximity to signed active travel routes in DS scenario

7	Development Impact	Major development planned within 3 miles and not included in DS scenario	
No.	**Corridor Metrics**	**Criteria 1**	**Criteria 2**
1	Journey time	Increase in journey time of 10% in DS scenario	Increase of journey time of 10 minutes or more in DS scenario

3.3.3. For all scenarios, KTM outputs for the Do Nothing (DN) scenario (without LTC) have been compared against the Do Something (DS) scenario (with LTC) to identify problems. All KTM outputs are provided in vehicle numbers rather than Passenger Carrying Units (PCUs). A link or junction is taken forward for further assessment where it triggers a single criteria across either of the two different assessment years or either of the AM or PM peak periods.

3.3.4. Based on the Primary Assessment Metrics set-out in Table 3-1 a long-list of corridors and junctions were identified for assessment with an initial sift of these completed to remove anomalies and ensure that identified locations require mitigation as a direct result of the LTC. This sifting has taken account of the following examples, which would not be picked up through use of the initial metrics:

- Increases in Volume to Capacity (V/C) ratio may not result in traffic congestion or increased traffic congestion as a result of the LTC, with some junctions identified by the primary metrics still operating within capacity or experiencing a negligible impact;
- Where HGVs have increased by more than 10% this can include roads which have very low HGV traffic and see a small increases. For example, three HGVs per day increasing to four as a result of LTC is more than a 10% increase but would not have a significant impact;
- Increases in queue lengths are most likely to occur at junctions operating over capacity or where the LTC has a significant impact on V/C ratio;

3.3.5. In considering refinement of the metrics, delay has not been taken forward in problem identification because it is a factor of increasing congestion and journey times, both of which are already being identified.

3.3.6. Queue length analysis was undertaken on an earlier set of model outputs that became superseded. When new model runs became available the V/C ratios were updated and showed that queue length analysis would not change significantly so they were not updated.

3.3.7. The development impact metric has also been removed for the initial problem identification as junctions which do not exhibit the other criteria cannot be said to be affected by the LTC. For the junctions and corridors that are identified, local developments will be reviewed during the following stages when individual junctions are focused upon.

3.3.8. Taking this into account, Table 3-2 presents the Secondary Assessment Metrics taking account of the initial sift outlined in the bullets above. These metrics will be taken forward for assessment for each junction, corridor and additional areas for assessment, as detailed in subsequent chapters of the report. As with the Primary Assessment Metrics, a link / junction is deemed to have 'failed' a test and is taken forward for further assessment if it triggers any of the identified criteria across either of the two different assessment years or either of the AM or PM peak periods. This provides a holistic approach to assessing the impacts of LTC on KCC's local highway network and avoids the subsequent mitigation measures being based upon only the alleviation of traffic congestion.

Table 3-2 – Secondary Assessment Metrics

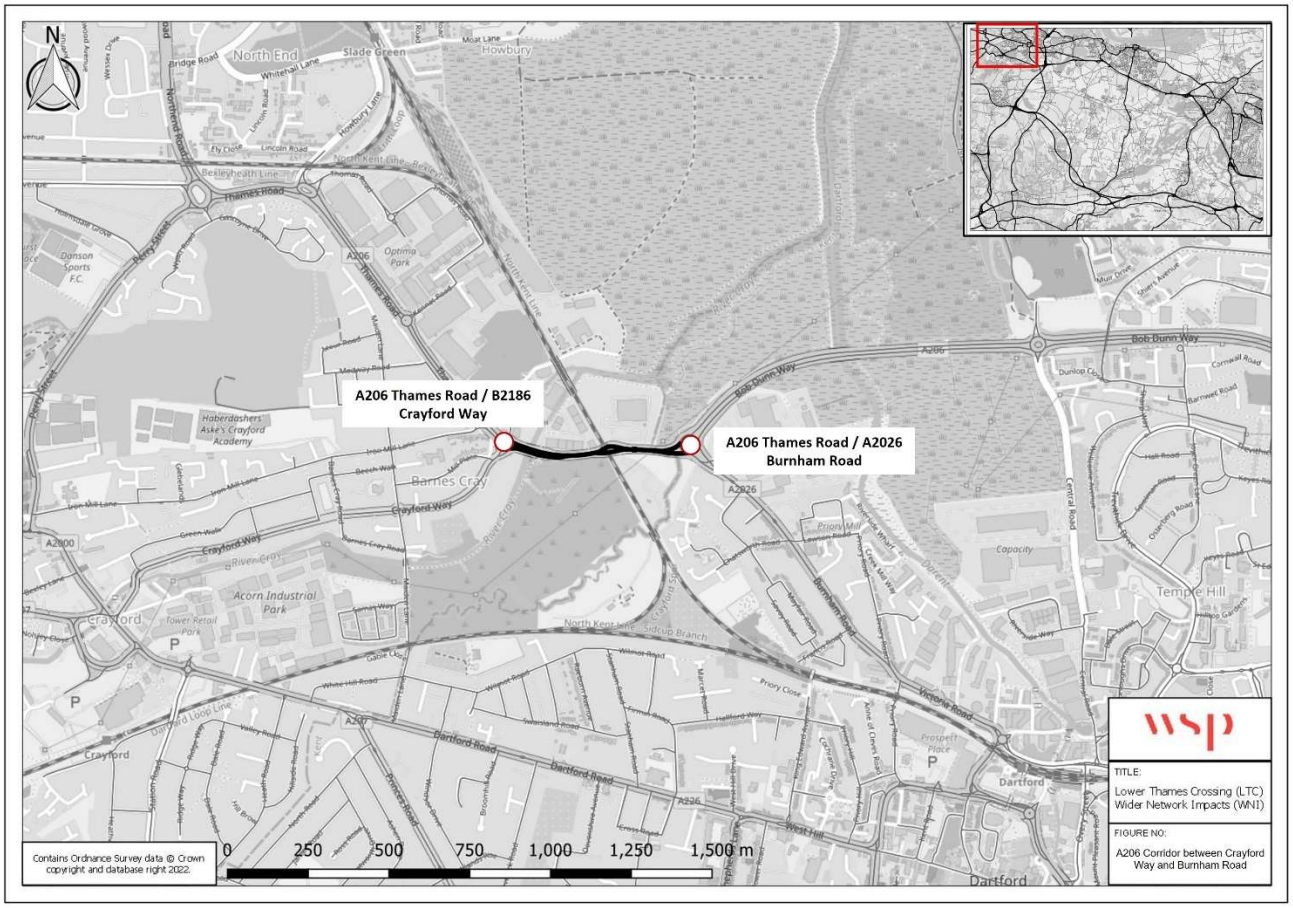
No.	Junction / Link Metrics	Criteria 1	Criteria 2
1	Link / Junction Capacity	Junctions where V/C ratio increases by more than 10% at junctions with V/C ratio of >100%	Junctions where the DN V/C ratio is <100% in DN and >100% in DS.
2	Queue length	See Table 3-1 and Section 3.3.6	
3	HGV Flow	HGV increase by 60 in any direction	HGVs double in any direction
4	Public Transport	Bus route journey time increases by 5% across a corridor in DS scenario	
5	Active Travel	Links that form part of signed cycle network where there is on-road cycle provision and traffic flow increase by 5% or more	
No.	**Corridor Metrics**	**Criteria 1**	**Criteria 2**
1	Journey time	Increase in journey time of 10%	Increase of journey time of 10 minutes

4 A206 corridor between Crayford Way and Burnham Road

4.1 Introduction

This section provides a summary of the assessments undertaken for the A206 between Crayford Way and Burnham Road.

Figure 4-1 A206 corridor between Crayford Way and Burnham Road



4.2 Corridor Journey Times

4.2.1. Table 4-1 and Table 4-2 show the forecast eastbound (EB) and westbound (WB) journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Eastbound Distance – 0.53km
- Westbound Distance – 0.54km

Table 4-1 – A206 Corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak EB	01:17	25	01:16	25	-00:01	+0	-1%
AM Peak WB	01:30	22	01:30	22	00:00	0	0%
PM Peak EB	01:26	22	01:31	21	+00:05	-1	6%
PM Peak WB	01:30	22	01:30	22	00:00	0	0%

Table 4-2 – A206 Corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak EB	01:39	19	01:31	21	-00:08	+2	-8%
AM Peak WB	01:30	22	01:30	22	00:00	0	0%
PM Peak EB	01:39	19	01:39	19	00:00	0	0%
PM Peak WB	01:31	21	01:31	21	00:00	0	0%

4.2.2. The results in Table 4-1 and 4-2 show that the LTC has a negligible impact on journey times and average speeds on the A206 between Crayford Way and Burnham Road, with the most significant change being an eight second reduction in journey time experienced in the 2045 AM Peak.

4.3 Junction Metrics

4.3.1. Table 4-3 shows a summary of how each of the junctions within Corridor 1 performed against the assessment metrics defined in Section 3. Where issues have been identified a corresponding objective of potential mitigation has also been included within the table. The table indicates a “problem”, or impact of LTC implementation, as “Fail”, and a “Pass” where the metric is not triggered.

Table 4-3 – A206 Corridor: Problems and Objectives Identified

Junction Ref	Location	Junction / Link Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
WNI101	A206 Thames Road / B2186 Crayford Way	Pass	Pass	Pass	Pass	-Pass	Pass
WNI102	A206 Thames Road / A2026 Burnham Road	Pass	Pass	Pass	Pass	Pass	Pass
N/A	A206 Corridor	Pass	Pass	N/A	Fail		Pass

Corridor Wide Summary / Objectives

Journey times do not appear to be significantly affected and other results do not indicate a clear negative impact, despite the junctions operating over capacity in the 2030 and 2045 DN scenarios. For example, V/C values on the A206 Thames Road / B2186 Crayford Way only change by 1% in 2030 DS scenarios and up 4% in the 2045 DS scenarios. Similarly, the A206 Thames Road / Burnham Road junction has maximum V/C increases of 1% and 6% in the 2030 and 2045 scenarios, respectively.

HGV flows double as a result of LTC but remain less than 10 vehicles per hour. As the A206 is a route through a primarily commercial area of Dartford and this increase is unlikely to have a significant impact.

No impacts were identified in relation to public transport or active travel routes.

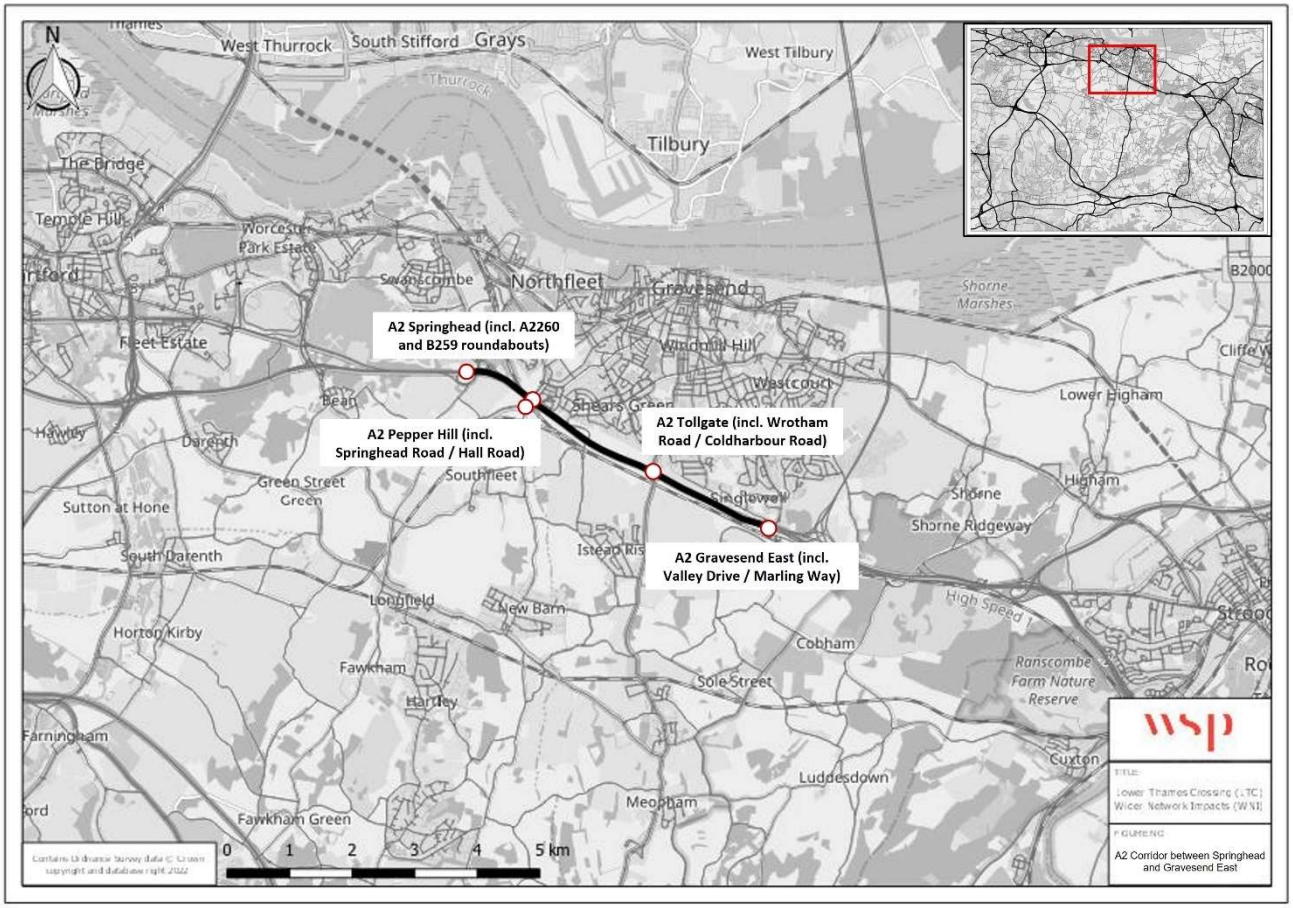
The results of our analysis indicate that the A206 is unlikely to merit investment in mitigation as a direct result of LTC.

5 A2 corridor between Spring Head and Gravesend East

5.1 Introduction

This section provides a summary of the assessments undertaken for the A2 between Spring Head and Gravesend East.

Figure 5-1 A2 corridor between Spring Head and Gravesend East



5.2 Corridor Journey Times

5.2.1. Table 5-1 and 5-2 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Southeast bound Distance – 6.27km
- Northwest bound Distance – 7.25km

Table 5-1 – A2 Corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak EB	04:55	77	04:41	80	-00:14	+3	-5%
AM Peak WB	07:41	58	07:01	63	-00:46	+6	-9%
PM Peak EB	06:00	63	05:18	71	-00:42	+8	-12%
PM Peak WB	06:10	72	05:59	74	-00:11	+2	-3%

Table 5-2 – A2 Corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak EB	05:08	73	04:50	78	-00:18	+5	-6%
AM Peak WB	08:26	53	07:35	59	-00:51	+6	-10%
PM Peak EB	06:54	55	05:42	66	-01:12	+11	-17%
PM Peak WB	06:28	69	06:17	71	-00:11	+2	-3%

5.2.2. As summarised in Table 5-1 and 5-2, a significant journey time reduction is experienced in the AM both in the 2030 and 2045 DS scenarios as compared to the respective DN scenarios, which is reflected in an increase in average speed. In the PM peak, it is forecast that there will be significant reductions in journey time in each of the 2030 and 2045 DS scenarios as compared to the respective DN scenarios eastbound whilst in the westbound the journey improvements are negligible. LTC is anticipated to have a positive impact on the journey times in this corridor.

5.3 Junction Metrics

5.3.1. Table 5-3 shows a summary of how each of the junctions within Corridor 2 performed against the assessment metrics defined in Section 3. Where issues have been identified a corresponding objective of potential mitigation has also been included within the table. Where relevant, additional junction that have been identified where they met the criteria for assessment.

Table 5-3 – A2 Corridor: Problems and Objectives Identified

Junction Ref	Location	Junction Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
WNI201	A2 Spring Head (incl. A2260 and B259 roundabouts)	Pass	Pass	Pass	Pass	Pass	Pass
WNI202:	A2 Pepper Hill (incl. Spring Head Road / Hall Road)	Pass	Fail	Pass	Pass	Fail	Pass
WNI203	A2 Tollgate (incl. Wrotham Road / Coldharbour Road)	Pass	Fail	Fail	Pass	Fail	Pass
WNI204	A2 Gravesend East (incl. Valley Drive / Marling Way)	Fail	Fail	Fail	Pass	Fail	Pass
NEW	Hall Road / Station Road / New Barn Road (South of A2)	Fail	Pass	Pass	Pass	Fail	Pass
N/A	A2 Corridor	Pass	Pass	N/A	Fail		Pass

Corridor Wide Summary / Objectives

The A2 Pepper Hill junction is operating close to capacity in the DN scenario and is forecast to experience worst-case increases of 1% in the 2030 DS PM and 4% in 2045 DS PM scenarios. In the 2045 DS PM scenario the junction is forecast to operate over capacity with the V/C value increasing from 97% in the DN scenario to 101% in the DS scenario.

The A2 Tollgate junction fails to operate within capacity as a result of LTC, leading to queue lengths blocking back along Wrotham Road / Coldharbour Road junction for a length of 110 metres in the 2045 DS PM which is an increase of 10m from the 2045 DN PM scenario. The impact of LTC was most significant in the 2030 AM where the V/C ratio increased from 94% to 101%.

The A2 Gravesend East junction is forecast to experience large V/C ratio increases towards Valley Drive of 53% in the 2030 DS AM scenario, 55% in the 2030 DS PM scenario, 62% in the 2045 DS AM scenario and 63% in the 2045 DS AM scenario. The V/C ratio increased to 100% for the 2030 DS AM scenario, 99% for the 2030 DS PM scenario and to 115% for the 2045 DS AM and to 114% for the 2045 DS PM scenarios, showing that LTC has a significant detrimental impact on the operation of this junction. The A2 Gravesend East junction away from Valley Drive is operating over capacity in the DN scenario and is forecast to experience V/C increases of 6% in the 2030 DS AM scenario, 19% in the 2030 DS PM scenario, 6% in the 2045 DS AM scenario and 21% in the 2045 DS PM scenario. The forecast queue at the junction is 120m in the 2045 DS PM this is an increase of approximately 35m when compared to the 2045 DM PM scenario. The forecast queue increases in the 2045 DS AM by 25m when compared to the 2045 DM AM scenario.

Hall Road / Station Road / New Barn Road is operating over capacity in the DN scenario and are forecast to experience significant increases in V/C values of 12% in the 2030 DS AM and 16% in 2045 DS AM scenarios, as a result of LTC.

On all junctions except the A2 Springhead, the peak hour HGV flows increase significantly as a result of LTC, which is likely to put further strain on junction capacity whilst also having a detrimental impact on pedestrians and cyclists in the vicinity of these junctions. This included worst-case increases at the A2 / Wrotham Road Roundabout for 2030 AM from 222 to 262, 2030 PM from 113 to 125, 2045 AM showing the largest increase of 40 per hour, from 233 to 273 and 2045 PM forecast increasing from 116 to 139.

However, the journey time analysis presented in Table 5-1 and 5-2 show that the A2 itself is not negatively impacted by LTC with regards the average speed of journey times. The objectives of any mitigation will therefore focus on capacity improvements that bring junctions identified to within capacity in the DS scenario. Based on our analysis the junctions should be prioritised in the following order:

1. A2 Gravesend East (incl. Valley Drive / Marling Way: This junction mitigation will be considered highest priority as a result of LTC pushing the junction overcapacity in the AM peak, the significant V/C increases forecast in the DS scenarios and the anticipated increases in queue lengths and HGV flow at the junction. Each of these metrics suggest that LTC will result in a significant increase in congestion at this junction in comparison with the DN scenario;

2. A2 Tollgate (incl. Wrotham Road / Coldharbour Road): Due to the junction being pushed over capacity as a result of LTC, with queue lengths forecast to block back through upstream junctions;

3. Hall Road / Station Road/ New Barn Road: Due to the junction being over capacity and showing significant increases in V/C as a result of LTC but without forecast issues with queue lengths; and

4. A2 Pepper Hill (incl; Springhead Road / Hall Road): Whilst this is pushed over capacity as a result of LTC, V/C increases by 1-4% and there being no issues forecast with queue lengths

5.4 Gravesend Corridor Journey Times

5.4.1. Further to the assessment of the A2 corridor, an additional assessment has been completed of the highway corridors running across the A2 and north towards Gravesend, given the junction impacts identified in Table 5-8. This assessment has been completed confirm if the impacts reported at each junction continue to occur on key corridors to / from Gravesend, which is in a unique location being the only major urban conurbation located between LTC and the existing Dartford Crossing. As such there is likely to be a change in trip distribution as a result of LTC for those travelling north of the river and this will impact the key corridors into Gravesend.

5.4.2. The additional corridors identified for assessment are as follows:

- Corridor 1 – B259 – Stanhope Road – High Street between A2260 Ebbsfleet Gateway and A226
- Corridor 2 – Hall Road / Springfield Road between south of the A2 and B2175 London Road;
- Corridor 3 - A227 Wrotham Road between A2 and Rathmore Road; and
- Corridor 4 – Valley Drive between A2 and B261 Old Road East.

5.4.3. A227 Wrotham Road (Corridor 3) and Valley Drive (Corridor 4) include a number of local bus services, which may be negatively impacted by additional or different traffic movements associated with LTC. These bus routes are summarised in Table 5.4 and Table 5.5 below.

Table 5-4 – Corridor 3 Bus Services

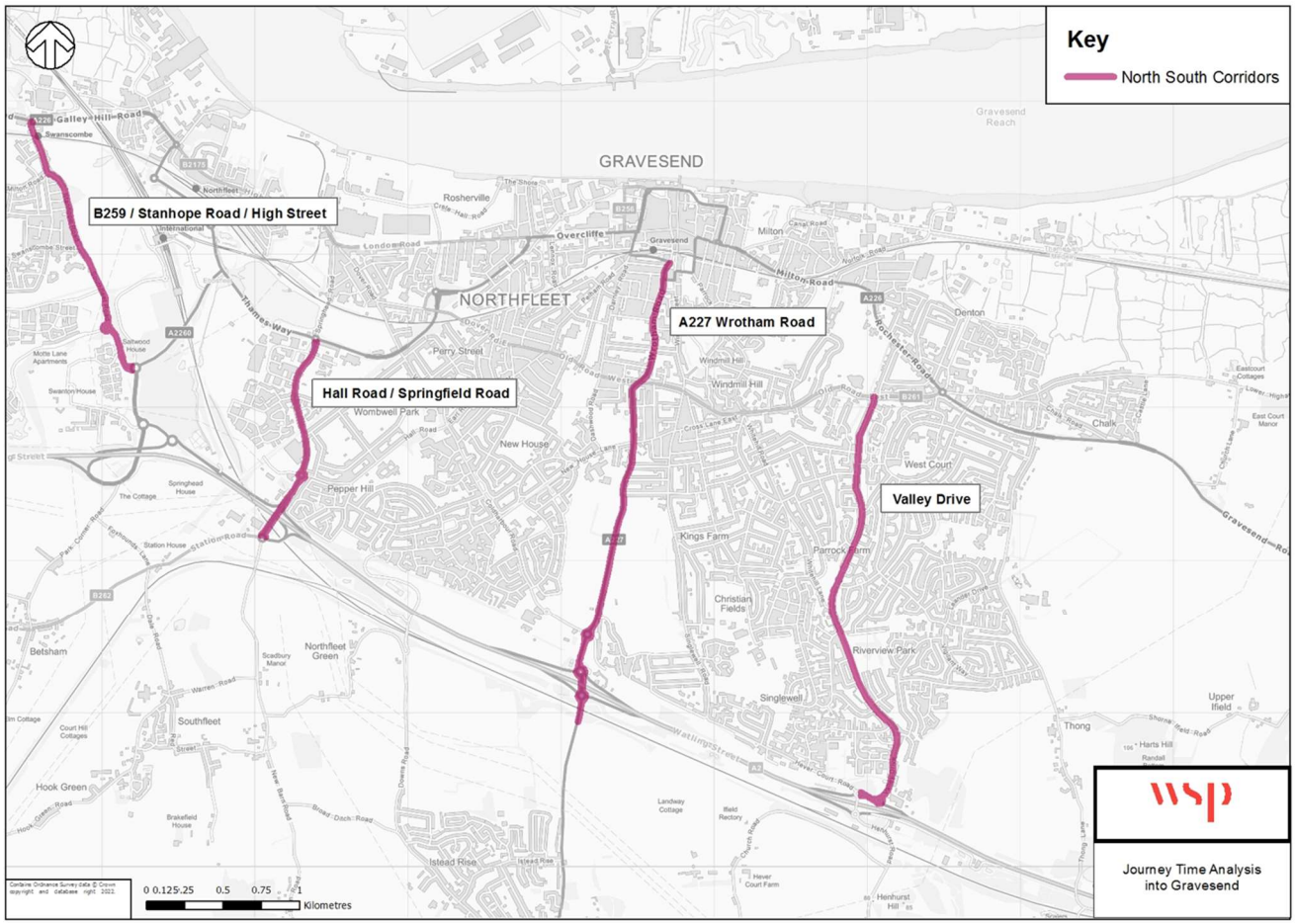
Service	Route	Direction	First Bus	Last Bus	Peak Frequency	Off-peak Frequency
Red Route Bus 306/308	Sevenoaks – Meopham – Gravesend	North / West bound *	07:40	19:06	Every Hour	Every hour and a half
		South / East bound **	09:00	17:46	Every Hour	Every hour and a half

Table 5-5 – Corridor 4 Bus Services

Service	Route	Direction	First Bus	Last Bus	Peak Frequency	Off-peak Frequency
Arriva 480 / 490	Singlewell / Valley Drive / Gravesend Swanscombe / Bluewater / Dartford	North / West bound *	04:30	23:55	Every 20 -22 minutes	Every 20 minutes
		South / East bound **	04:26	00:46	Every 20 -22 minutes	Every 20 minutes

5.4.4. The assessment has been undertaken due to the number of bus services which utilise the roads and to understand the impact on LTC on these services. Figure 5-2 presents the locations of the each of the Journey Times for the corridor Gravesend.

Figure 5-2 - Locations of Journey Times into Gravesend



5.4.5. The following tables present the journey times on the corridors below. Corridors will be taken forward for assessment if any of the journey times increase by 10% for private vehicles or 5% where there is a significant number of bus routes utilising the corridor, as aligned to the Assessment Metrics defined in Section 3.

Table 5-6 – B259 – Stanhope Road – High Street Corridor

	2030				2045			
	DN Scenario	DS Scenario	LTC Impact		DN Scenario	DS Scenario	LTC Impact	
	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact
AM Peak NB	02:54	02:54	00:00	0%	03:07	03:08	00:01	1%
AM Peak SB	02:49	02:53	00:04	2%	03:01	03:03	00:02	1%
PM Peak NB	02:43	02:45	00:02	1%	02:45	02:50	00:05	3%
PM Peak SB	03:10	03:13	00:03	2%	03:48	03:30	-00:08	-4%

Table 5-7 – Hall Road and Springhead Road

	2030				2045			
	DN Scenario	DS Scenario	LTC Impact		DN Scenario	DS Scenario	LTC Impact	
	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact
AM Peak NB	02:47	03:02	00:15	9%	02:50	03:01	00:11	6%

AM Peak SB	02:32	02:32	00:00	0%	02:36	02:40	00:04	3%
PM Peak NB	02:43	02:42	-00:01	-1%	03:12	03:03	-00:09	-5%
PM Peak SB	03:10	03:25	00:15	8%	03:07	03:29	00:22	12%

Table 5-8 – A227 Wrotham Road

	2030				2045			
	DN Scenario	DS Scenario	LTC Impact		DN Scenario	DS Scenario	LTC Impact	
	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact
AM Peak NB	03:23	03:25	00:02	1%	03:23	03:26	00:03	1%
AM Peak SB	03:35	03:47	00:12	6%	03:40	03:52	00:12	5%
PM Peak NB	03:31	03:37	00:06	3%	03:34	03:40	00:06	3%
PM Peak SB	03:42	03:47	00:05	2%	03:40	03:48	00:08	4%

Table 5-9 – Valley Drive

	2030				2045			
	DN Scenario	DS Scenario	LTC Impact		DN Scenario	DS Scenario	LTC Impact	
	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact	Journey Time (mm:ss)	Journey Time (mm:ss)	Journey Time (mm:ss)	% Impact
AM Peak NB	04:05	04:11	00:06	2%	04:09	04:16	00:07	3%
AM Peak SB	04:23	04:45	00:22	8%	04:25	04:58	00:33	12%
PM Peak NB	04:17	04:41	00:24	9%	04:18	04:46	00:28	11%
PM Peak SB	04:15	04:28	00:13	5%	04:17	04:40	00:23	9%

5.4.6. Based on the metrics outlined in Table 3-2, three of the four corridors presented in this section will be taken forward for assessment as part of the A2 Corridor as a result of the following journey time increases:

- Hall Road and Springhead Road experiences an 8-12% increase in journey time in the PM peak southbound direction as a result of LTC. This matches the assessment period where A2 Pepper Hill junction is forecast to pushed over capacity as a result of LTC and therefore reflects an increase in congestion approaching the A2. It is also noted that whilst it is not a major public transport route, bus service 489 crosses the A2 on Hall Road on a route between New Ash Green and Gravesend.
- A227 Wrotham Road is forecast to experience journey time increases of 5-6% in the AM peak southbound direction as a result of LTC and is a major bus corridor, serving six buses in the AM peak and three buses in the PM peak. This again reflects the V/C impacts reported in Table 5-3 with the A2 Tollgate junction pushed over capacity as a result of LTC in the AM peak. It is also noted that queue lengths are forecast to block back through upstream junctions as a result additional congestion created by LTC, meaning that real world journey time impacts are likely to be higher than the model forecasts; and
- Valley Drive is forecast to experience an increase in journey time of 8-12% in the AM peak southbound direction and 9-11% in the PM peak northbound direction as a result of LTC. This is a major public transport corridor as it has six buses per hour in the AM and

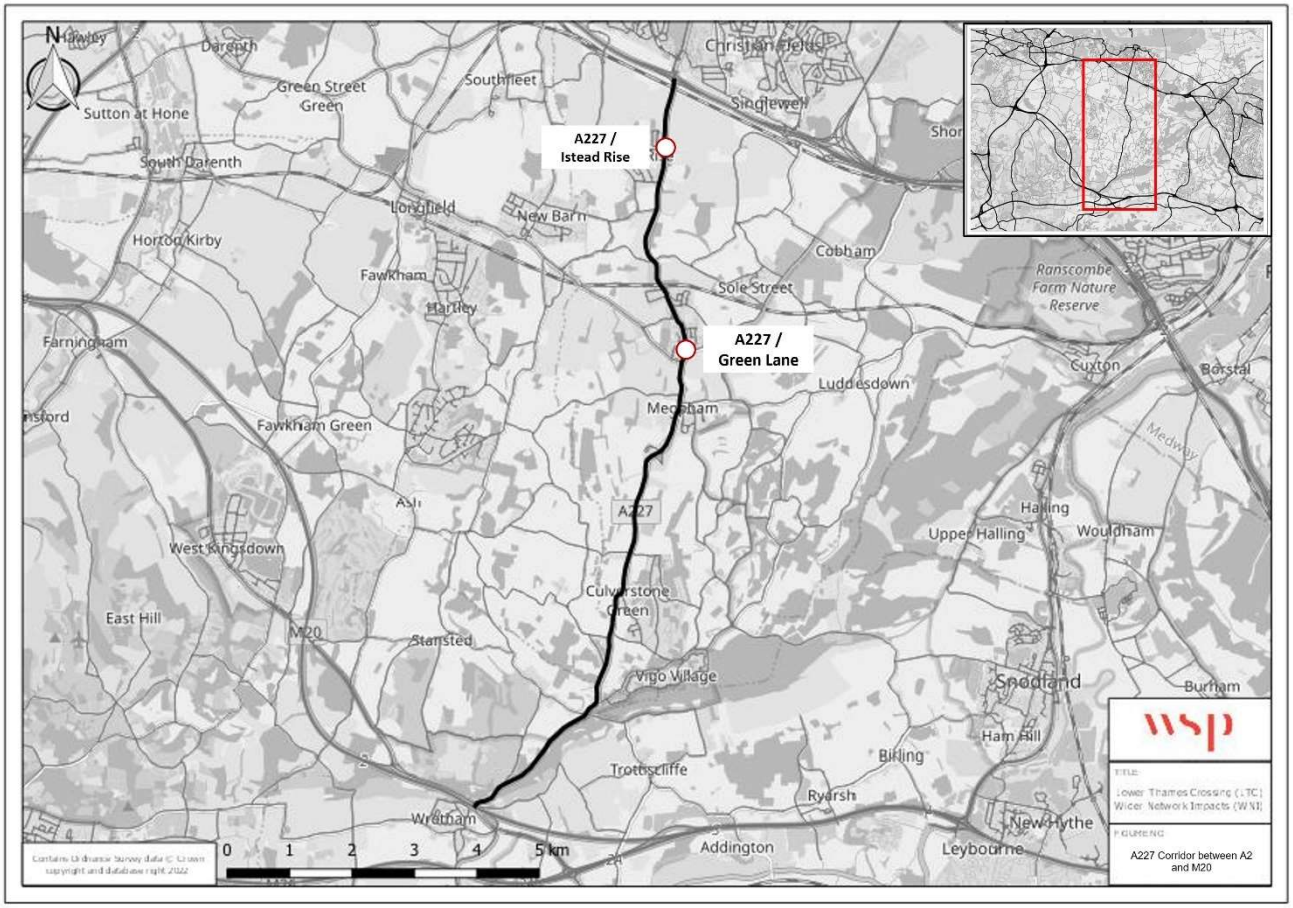
PM peak. As with the two corridors above, these journey time increases are reflective of the increases congestion experienced at the A2 Gravesend East junction as a result of LTC.

6 A227 corridor between A2 and M20

6.1 Introduction

This section provides a summary of the assessments undertaken for the A227 between A2 and M20.

Figure 6-1 A227 corridor between A2 and M20



6.2 Corridor Journey Times

6.2.1. Table 6-1 and 6-2 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northbound Distance – 13.02km
- Southbound Distance - 13.02km

Table 6-1 – A227 Corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	15:42	50	15:51	49	+00:09	-1	1%
AM Peak SB	15:53	49	15:56	49	+00:03	0	0%
PM Peak NB	16:53	46	16:50	46	-00:03	0	0%
PM Peak SB	15:37	50	15:55	49	+00:18	-2	2%

Table 6-2 – A227 Corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	15:57	49	16:08	48	+00:11	-1	1%
AM Peak SB	16:20	48	16:23	48	+00:03	0	0%
PM Peak NB	17:22	45	17:19	45	-00:03	0	0%
PM Peak SB	15:58	49	16:19	48	+00:21	-1	2%

6.2.2. As summarised in Table 6-1 and 6-2, AM and PM journey time results show a negligible increase in the 2030 and 2045 DS scenarios as compared to the respective DN scenarios.

6.2.3. The journey times along this corridor is not significantly impacted by LTC.

6.3 Junction Metrics

6.3.1. Table 6-3 shows a summary of how each of the junctions within Corridor 3 performed against the assessment metrics defined in Section 3. Where issues have been identified a corresponding objective of potential mitigation has also been included within the table.

Table 6-3 – A227 Corridor: Problems and Objectives Identified

Junction Ref	Location	Junction Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
WNI301	A227/Istead Rise	Pass	Pass	Pass	Pass	Pass	Pass
WNI302:	A227/Green Lane	Pass	Pass	Pass	Pass	Fail	Pass
N/A	A227 Corridor	Pass	Pass	N/A	Pass		Pass

Corridor Wide Summary / Objectives (Including WNI303: Link mitigations / traffic management to promote strategic route hierarchy and reduce use of inappropriate routes between M2 and M20)

The review of data from the KTM has showed that LTC does not result in capacity or queue length issues at either of the junctions included within the original scope of assessment. For example, V/C values at A227 Istead Rise remained below 62% in all scenarios while at A227 / Green Lane, V/C values are forecast to remain below 54%.

The A227 / Green Road junction however does experience a significant increase in HGV traffic as a result of LTC, which suggests use of inappropriate routes through Meopham, Hook Green, Sole Street and Cobham to access LTC. This impact is further highlighted through the HGV traffic flows experienced south of the A227 / Green Lane junction, where increases of 25%-75% are shown across the DS 2030 and 2045 scenarios, which is the equivalent to 68 to 90 per hour in 2030 AM and 71 to 95 in 2045 AM. Similar increases are expected during PM rush hour, showing increase from 30 to 47 HGVs in 2030 and 35 to 52 HGVs in 2045, DN to DS respectively. The findings of this investigation are supported by findings from National Highways that increased traffic in this area would be likely to increase noise levels and so should be mitigated. The use of these routes reflects concerns raised by local stakeholders and existing issues which will be exacerbated by additional HGV traffic associated with LTC. Therefore the forecast HGV flows are considered to provide a robust estimate of future network conditions in this location.

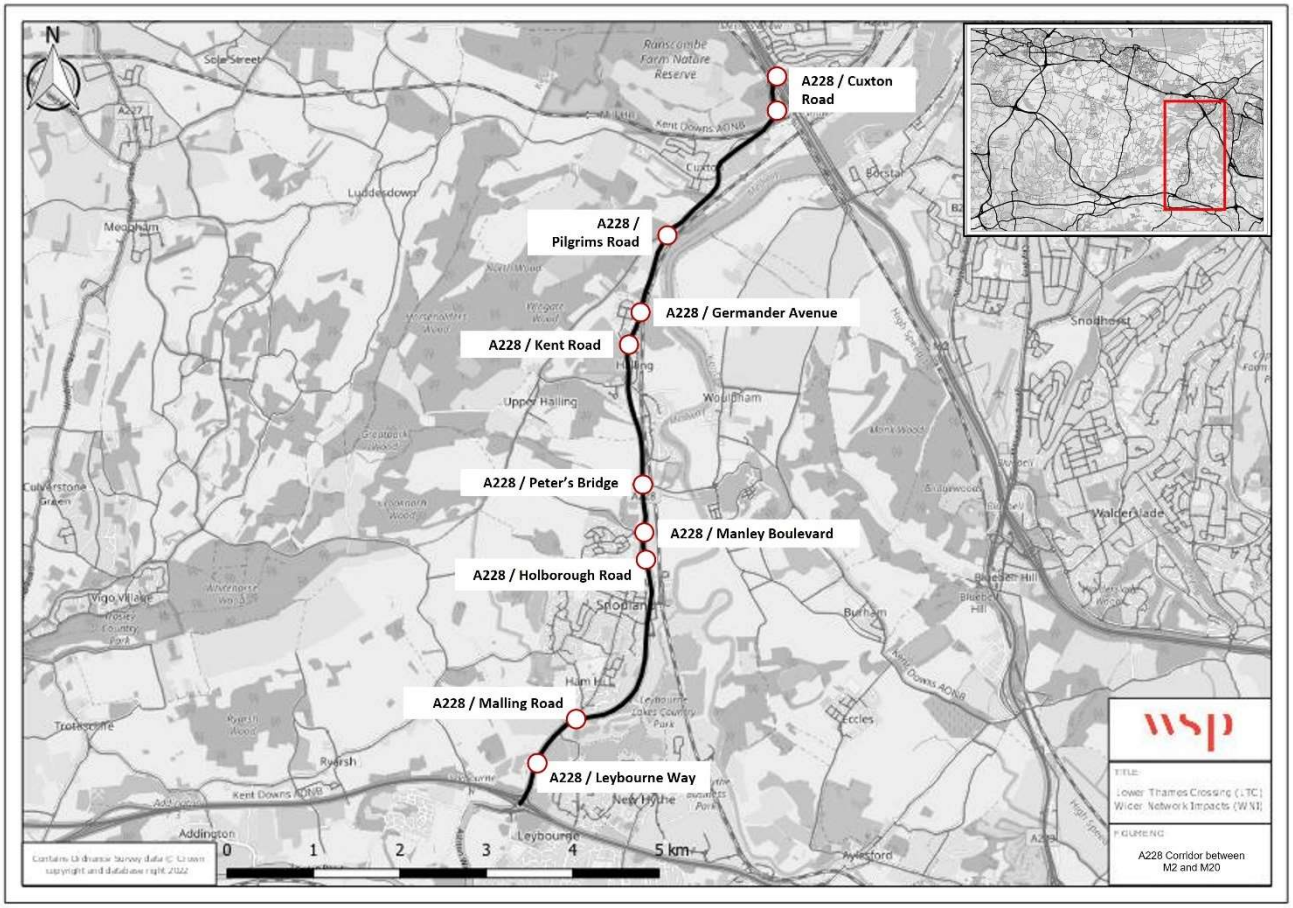
Based on these results, the mitigation for the A227 should focus upon reducing HGV traffic flows from using the A227 and the route through Hook Green, Sole Street and Cobham to access LTC.

7 A228 corridor between M2 and M20

7.1 Introduction

This section provides a summary of the assessments undertaken for the A228 between M2 and M20.

Figure 7-1 A228 corridor between M2 and M20



7.2 Corridor Journey Times

7.2.1. Table 7-1 and 7-2 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northbound Distance – 9.67km
- Southbound Distance - 9.71km

Table 7-1 – A228 Corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	11:12	52	12:07	48	+00:55	-4	8%
AM Peak SB	11:35	50	12:38	46	+01:03	-4	9%
PM Peak NB	12:08	48	12:38	46	+00:30	-2	4%
PM Peak SB	10:44	54	12:09	48	+01:25	-6	13%

Table 7-2 – A228 Corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	11:39	50	12:40	46	+01:01	-4	9%
AM Peak SB	12:43	46	13:36	43	+00:53	-3	7%
PM Peak NB	13:02	45	13:26	43	+00:24	-2	3%
PM Peak SB	11:11	52	12:31	46	+01:20	-6	12%

7.2.2. The results presented in Table 7-1 and 7-2 show that the A228 experiences a 7-13% increase in journey times as a result of LTC, which is the equivalent to approximately 60-90 seconds. The PM peak experiences the most significant increase in each of the 2030 and 2045 scenarios, with a 12-13% increase in journey time. This is also reflected by decreases in average speed across all of the scenarios tested and most significantly in the southbound direction in the 2045 PM peak.

7.3 Junction Metrics

7.3.1. Table 7-4 shows a summary of how each of the junctions within Corridor 4 performed against the assessment metrics defined in Section 3. Where issues have been identified, a corresponding objective of potential mitigation has also been included within the table.

7.3.2. To highlight the increases in HGVs reported along the A228, Table 7-3 provides a summary of forecast traffic flows along the corridor and adjacent links Whilst it should be noted that baseline HGV flows reported in the DN scenario relate to land-uses located in the vicinity of the A228, such as the Tesco distribution centre, Mid Kent Business Park (incl. Royal Mail depot) and Smurfit Kappa recycling centre, these land-uses are not the cause of the impacts reported. As stated in Section 3, KTM outputs for the DN scenario (without LTC) have been compared against the DS scenario (with LTC) to identify problems directly associated within the introduction of LTC.

Table 7-3 - Actual HGV Increase on A228 and Adjacent Links

		No LTC		LTC		Difference		No LTC		LTC		Difference	
		2030 AM	2030 PM	2030 AM	2030 PM	2030 AM	2030 PM	2045 AM	2045 PM	2045 AM	2045 PM	2045 AM	2045 PM
Green Lane	EB	4	9	9	15	5	6	4	12	11	19	5	7
	WB	5	3	19	11	14	8	6	3	20	11	14	8
Bush Road	EB	27	5	28	6	1	1	22	5	30	6	8	1
	WB	8	8	12	8	4	0	9	8	13	9	4	1
Village Road	NB	2	1	2	1	0	0	2	2	2	1	0	-1
	SB	1	1	1	0	0	-1	1	2	3	1	2	-1
Rochester Road	NB	6	6	9	15	3	9	5	2	7	14	2	12
	SB	34	35	46	45	12	10	36	30	50	43	14	13
Ford Lane	NB	5	2	8	6	3	4	6	3	9	6	3	3
	SB	7	2	17	7	10	5	7	3	17	7	10	4
A228	NB	70	50	139	88	69	38	70	51	149	91	79	40
	SB	68	41	161	134	93	95	73	40	173	145	72	105

Table 7-4 – Corridor 4: Problems and Objectives Identified

Junction Ref	Location	Junction Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
WNI401	A228 / Cuxton Road	Pass	Fail	Pass	Pass	Pass	Pass
WNI402	A228 / Bush Road	Pass	Fail	Pass	Pass	Fail	Pass
WNI403	A228 / Kent Road	Pass	Pass	Pass	Pass	Fail	Pass
WNI404	A228 / Peter's Bridge	Pass	Pass	Pass	Pass	Fail	Pass
WNI405	A228 / Manley Boulevard	Pass	Pass	Pass	Pass	Fail	Pass
WNI406	A228 / Holborough Road	Pass	Pass	Pass	Pass	Fail	Pass
WNI407	A228 / Malling Road	Pass	Pass	Pass	Pass	Fail	Pass
WNI408	A228 / Leybourne Way	Pass	Pass	Pass	Pass	Pass	Pass
NEW	A228 / Station Road	Pass	Fail	Pass	Pass	Fail	Pass
NEW	A228 / Pilgrims Road	Pass	Fail	Pass	Pass	Fail	Pass
NEW	A228 / Sundridge Hill roundabout	Fail	Fail	Pass	Pass	Fail	Pass
NEW	A228 / Germander Avenue	Pass	Fail	Pass	Pass	Fail	Pass
N/A	A228 Corridor	Fail	Pass	N/A	Fail		Pass

Corridor Wide Summary / Objectives (Including WNI409: Link mitigations / traffic management to promote strategic route hierarchy and reduce use of inappropriate routes between M2 and M20)

The A228 / Cuxton Road junction operates over capacity in the 2030 AM, 2045 AM and 2045 PM DN scenarios but is pushed over capacity by LTC in the 2030 PM scenario with the V/C value increasing from 98% to 104%. At worst, the V/C value increases by 8% to 127% in the 2045 DS PM scenario.

The A228 / Bush Road junction operates between 81% and 97% in the DN scenarios and is pushed over capacity in the 2045 AM DS Scenario where the V/C value increases from 97% in the DN scenario to 101% in the DS scenario. In the other scenarios V/C values increase by 9% in the 2030 DS AM scenario, 13% in the 2030 DS PM scenario, and 15% in the 2045 DS PM scenario but the junction operates within capacity.

The A228 / Manley Boulevard, Holborough Road, and Malling Road junctions are operating below 49%, 25% and 77% for the DS scenarios respectively.

The A228 / Station Road, A228 / Pilgrims Road and A228 / Germander Avenue junctions all operate over capacity in the 2045 AM scenario as a result of LTC, with V/C values increasing from 97% to 101% at all junctions. In addition, V/C values are forecast to increase by 4-10% in each of the 2030 DS scenarios leading to the junctions operating at capacity with V/C values of 98% and 100%

The A228/ Sundridge Hill Roundabout experiences a significant increase in V/C from 102% to 115% in the 2045 PM peak, whilst the junction is pushed over capacity by LTC in each of the 2030 DS scenarios with V/C values increasing from 93% to 103% and 99% to 108%.

Most junctions experience a significant increase in the number of HGVs in one direction in the either the AM or PM peak as a result of LTC. The junctions at both Bush Road and Pilgrim Way forecast identical increases for all four scenarios. 2030 AM shows an increase from 204 (DN) to 366 (DS); 2030 PM forecasts increase from 110 (DN) to 245 (DS), 2045 AM shows 205 (DN) to 392 (DS), and the 2045 PM forecast shows an increase of 113 for DN to 261 DS. The A228/ Malling Road Roundabout is forecast to experience an increase in HGV traffic for all four scenarios. 2030 AM shows an increase from 187 (DN) to 332 (DS), 2030 PM from 140 (DN) to 258 (DS), 2045 AM from 332 (DN) to 367 (DS), and 2045 PM from 258 (DN) to 282 (DS).

These results validate Kent County Council's concerns regarding rat running of HGVs as well as other traffic between the A229, A228 and A227 to connect between the M2/A2 corridor and the M20/A20 corridor. Many of these roads are unsuitable to accommodate HGV traffic due to their narrow width, tight bends and routes through village centres. In addition to the junctions listed above, the roads that see an increase in vehicles or HGVs between the DS and DN include Bush Road, Village Road, Birling Road, Rochester Road, White Horse Road. This is not an exhaustive list but provides some examples of rat running corridors.

These results highlight that additional traffic movements associated with LTC will have a significant detrimental impact on the A228 corridor with a forecast increase in traffic congestion at a number of junctions and significant increases in HGV traffic. This will impact upon all road users, leading to a deterioration in air quality and increased road safety risks, whilst also encouraging the use of alternative local routes that are unsuitable for high volumes of traffic.

Based on these results, the mitigation for the A228 should focus on reducing HGV traffic flows from the A228 and reducing the capacity constraints at northern junctions on the route, whilst also ensuring that this is not transferred to the A227 or other surrounding routes where identified impacts would be worsened.

8 Other Locations Identified

8.1 Introduction

8.1.1. This section provides a summary of additional locations which have been identified as potentially requiring mitigation as a result of LTC. This analysis has been completed to reflect that the KTM outputs used supersede all previous assessments of KCC's highway network and reflect the latest LTAM Uncertainty Log and LTC design proposals.

8.1.2. The starting point for the identification of additional junctions was those locations that met Criteria 1 of the Link / Junction Capacity Primary Assessment Metric (V/C >85%) before additional sifting was undertaken as per the original scope of assessment.

8.1.3. As with the original scope, these have been categorised as corridors where possible although in some instances individual junctions have been identified. Additional corridors that have been identified are summarised in Section 8.2 to 8.8 whilst other standalone locations are included in Section 8.9

8.2 Additional Corridors Identified

The following additional corridors have been identified as potentially requiring mitigation as a result of LTC:

- A229 corridor between M2 and M20;
- M25 corridor between M25 J3 and M25 J5;
- A2 corridor between M25 and A2 west of corridor included within original scope;
- M2 corridor between A2 and A229;
- A20 corridor between M20 and M26; and
- M26 corridor between A20 and M20.

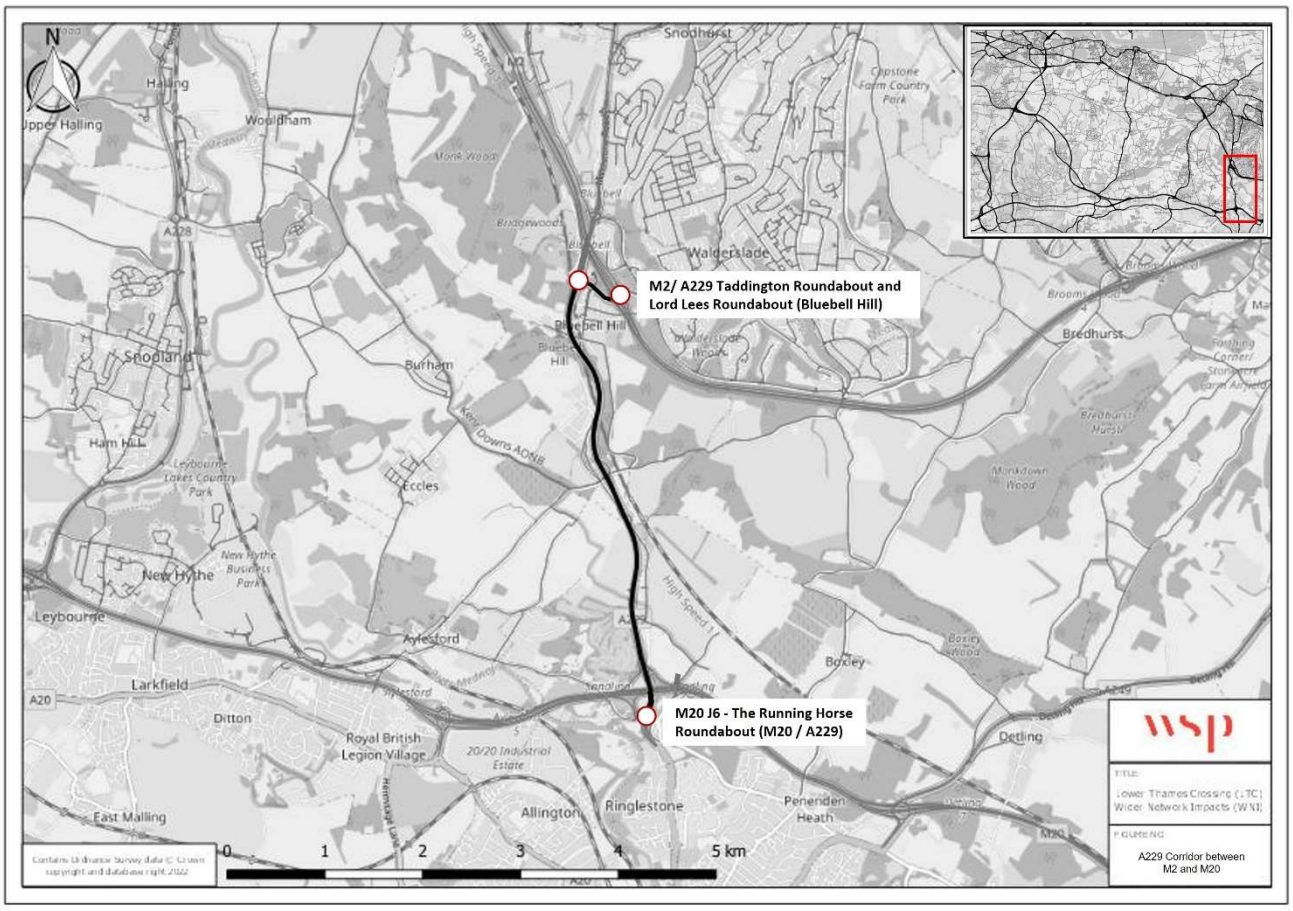
8.2.1. As part of the assessment of these corridors, a review has been undertaken of local network junctions and on/off-slip roads that are located within or at the start / finish of each corridor. Where such issues have been identified they have been summarised within the subsequent sections.

8.3 A229 corridor between M2 and M20

8.3.1. As noted in Section 2, KCC have confirmed that the A229 Corridor is currently subject to a Large Local Major SOBC, which includes capacity improvements to Blue Bell Hill, Lord Lees Roundabout, Taddington Roundabout, A229 and A229 / M2 slip road. A summary of forecast impacts however has been provided given that the corridor is anticipated to be operating over capacity with V/C values of more than 100% in each of the 2045 DS scenarios.

8.3.2. The corridor is shown to have a V/C no less than 90%, with the majority of the corridor over 100% in all of 2030 and 2045 DS scenarios.

Figure 8-1 A229 corridor between M2 and M20



8.3.3. Table 8-1 and 8-2 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northbound Distance – 4.52km
- Southbound Distance – 4.42km

Table 8-1 – A229 corridor between M2 and M20 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	04:00	70	04:17	66	+00:17	-4	7%
AM Peak SB	06:23	50	06:28	49	+00:05	-1	1%

PM Peak NB	05:00	56	05:19	53	+00:19	-3	6%
PM Peak SB	04:49	66	05:35	57	+00:46	-9	16%

Table 8-2 - A229 corridor between M2 and M20 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	04:07	60	04:43	68	+00:36	-8	15%
AM Peak SB	07:03	45	07:12	44	+00:09	1	2%
PM Peak NB	05:38	50	06:08	46	+00:30	-4	9%
PM Peak SB	05:03	63	06:08	52	+01:05	-11	21%

8.3.4. Based on the summarised results for journey times along A229 between M2 and M20 in Table 8-1, an increase in journey times was demonstrated in the 2030 DS scenarios as compared to the DN scenarios. This was also reflected by a decrease in average speed of between 1km per hour and 11km per hour.

8.3.5. An increase in journey time is also forecast in the 2045 DS scenario compared to the corresponding DN scenario as shown in Table 8-2. The journey times are expected to increase by up to 21%, with average speeds decreasing by between no change and 11km per hour.

8.3.6. LTC, thus is anticipated to have negative impact on the journey times and average speeds along this corridor and has been taken forward for a more detailed assessment of individual junctions, as identified in Table 8-3 below.

Table 8-3 - A229 corridor: Problems and Objectives Identified

Junction Ref	Location	Junction / Link Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
501	M2 / A229 Taddington Roundabout and Lord Lees Roundabout (Bluebell Hill)	Fail	Pass	Fail	Fail		Pass
502	A2045 Walderslade Wood / \Fostington Way Roundabout	Pass	Fail	Pass	Pass	Pass	Pass
503	The Running Horse Roundabout (M20 / A229)	Fail	Fail	Fail	Pass	Fail	Pass
N/A	A229	Pass	Fail	N/A	Fail		Pass

Corridor Wide Summary / Objectives

The review of data from the KTM has showed that LTC does have a significant impact on the A229 corridor with three of the four junctions being pushed over capacity. In addition, the interchange of the M2 / A229 at Taddington Roundabout and Lord Lees Roundabout (Bluebell Hill) experiences increases with the V/C increases of 6% for 2045 AM DS for 2045 PM DS (from 101% to 107%). with queueing back through the junction forecast to interfere with upstream junctions causing capacity issues to the highway network.

The A2045 Walderslade Wood / Fostington Way junction is operating close to or at capacity in the DN scenario and is forecast to experience worst-case increases of up to 6% in the DS scenarios, with the junction operating over capacity as a result of LTC in the 2045 PM scenario where the V/C value increases from 101% (DN) to 107% (DS). The 2045 DS AM scenario is forecast to be 96% from 93% in the 2045 DN PM scenario.

The Running Horse Roundabout (M20 / A229) also experiences a significant increase in V/C from 117% in the DN scenario to 141% in the 2045 AM DS scenario and 110% in the DN scenario to 119% in the 2045 PM DS scenario, which reflects the increased usage of the junction as a result of LTC.

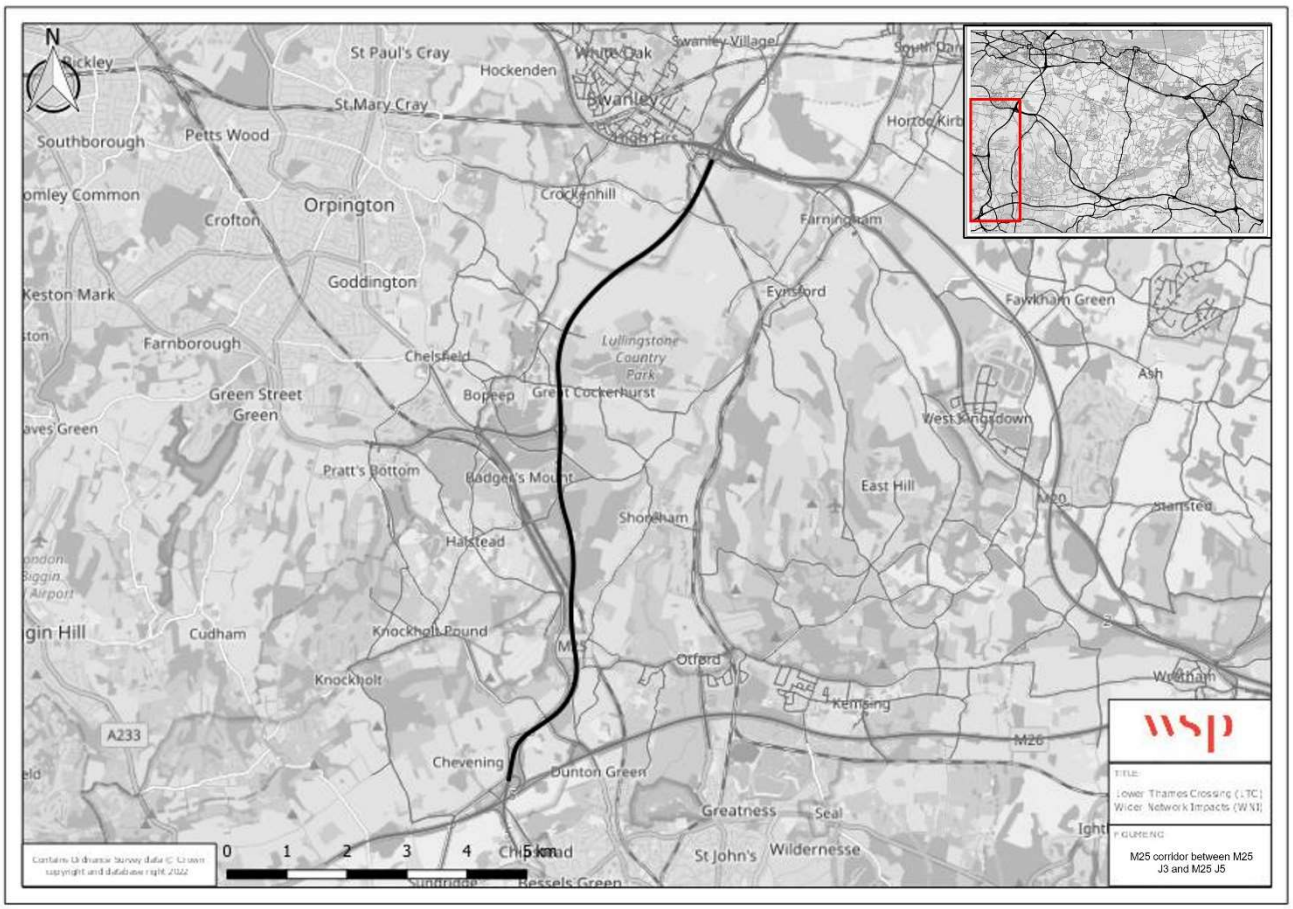
In terms of HGV flows the Taddington Roundabout at the M2 / A229 junction demonstrates a significant increase in HGVs for all four scenarios between DN and DS. For example, 2030 AM shows an increase from 95 to 167, 2030 PM shows an increase from 38 to 133, 2045 AM shows an increase from 140 to 237, and 2045 PM shows an increase from 105 to 194 HGVs per hour. The Running Horse Roundabout (M20 / A229) is also forecast to experience a significant increase in HGV traffic in the 2045 AM scenario; an increase between DN and DS from 53 to 118 is expected. This additional HGV traffic will put a greater strain on highway capacity and may increase traffic congestion further due to the higher volume of slow-moving HGV traffic.

Results indicate this corridor will experience significant worsening of conditions with LTC in place and this is to be expected as it would be the fastest existing route for traffic from the southeast, including freight from Europe, to access LTC. Given the road network it is expected that this corridor will experience more severe issues than the modelling shows as it is likely other corridors will be unsuitable for freight vehicles and the A229 will remain the default route for much of the traffic irrespective of traffic conditions. Mitigating these issues, through the implementation of capacity improvements identified through the Large Local Major SOBC, will also assist in reducing forecast traffic increases and associated congestion on the A227 and A228 given that these routes will be used to avoid delays on the primary road network and SRN (A229 and M2). It is therefore considered essential that improvements along the A229 are progressed, through the current SOBC or other funding routes, to mitigate the impact of LTC.

8.4 M25 corridor between M25 J3 and M25 J5

8.4.1. This corridor has been included for the initial assessment as it was shown to be over capacity during the 2045 Do Something scenario, with a V/C greater than 100% during the PM scenario. This route was shown to operate with V/C values below 100% in the DN and DS scenarios in 2030.

Figure 8-2 M25 corridor between M25 J3 and M25 J5



8.4.2. Table 8-4 and 8-5 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northbound Distance – 11.86km
- Southbound Distance - 10.93km

Table 8-4 – M25 corridor between M25 J3 and M25 J5 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	07:12	99	07:12	99	00:00	0	0%
AM Peak SB	06:55	95	06:56	95	+00:01	0	0%
PM Peak NB	07:37	93	07:43	92	+00:06	-1	1%
2030 PM Peak SB	06:24	102	06:24	102	00:00	0	0%

Table 8-5 – M25 corridor between M25 J3 and M25 J5 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
AM Peak NB	07:27	96	07:33	94	+00:06	-2	1%
AM Peak SB	07:15	90	07:26	88	+00:11	-2	3%
PM Peak NB	08:06	88	08:23	85	+00:17	-3	3%
PM Peak SB	06:39	99	06:42	98	+00:03	-1	1%

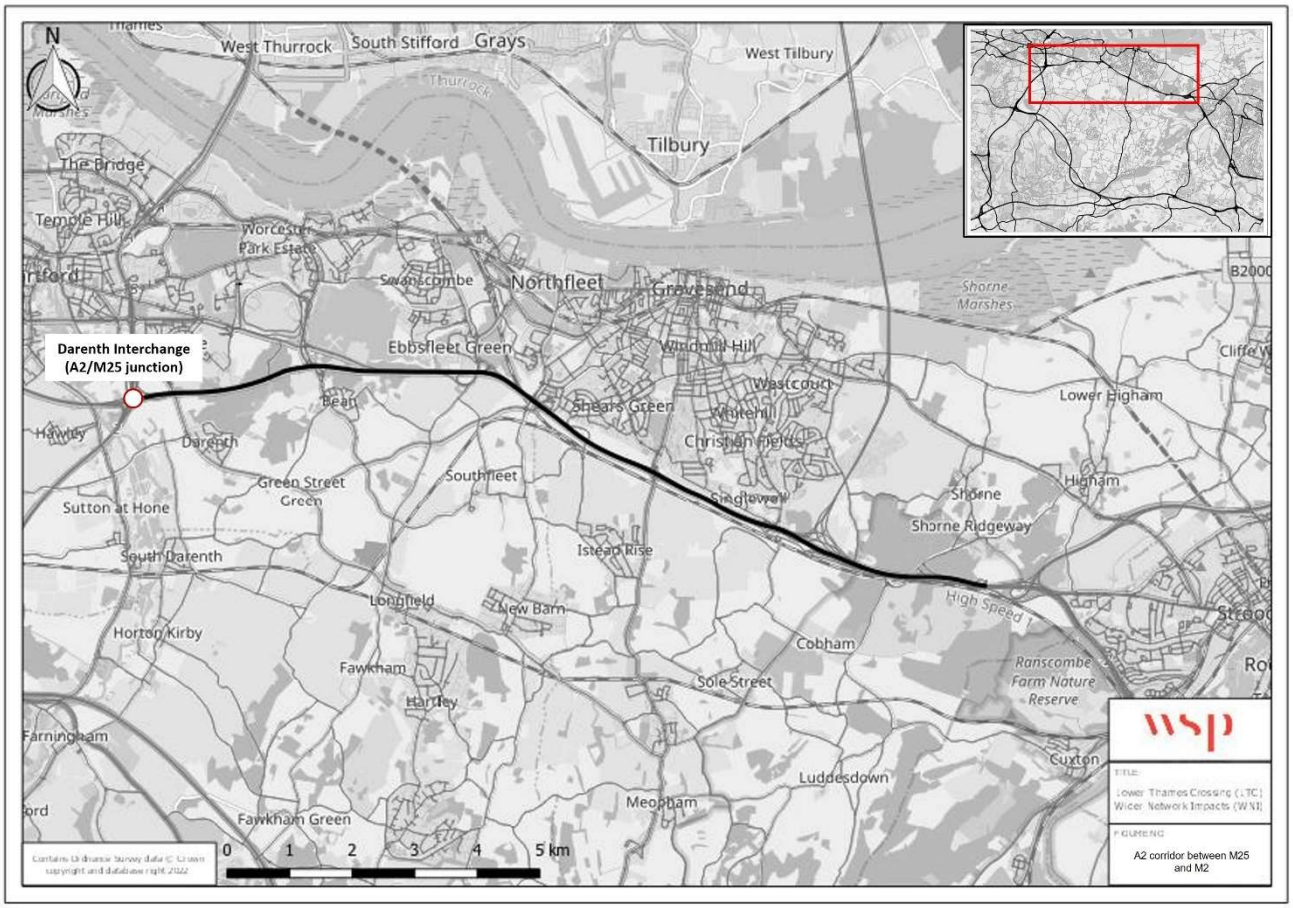
8.4.3. Based on the summarised results for journey times along M25 between M25 J3 and M25 J5 in Table 8-4 and Table 8-5, a negligible increase in AM and PM journey times and average speeds is anticipated in the 2030 and 2045 DS scenarios as compared to the respective DN scenarios. Generally, it is observed that the journey times along this corridor are not impacted by LTC. Also, as there were no impacts identified on junctions that form part of

KCC's local highway network, and so this corridor has not been taken forward for further assessment.

8.5 A2 corridor between M25 and M2

8.5.1. The A2 corridor has been included in the initial assessment as it is forecast to be over capacity during both the 2045 Do Something AM and PM scenario. During the PM scenario, the majority of the corridor has a V/C over 100%. The corridor here is an alternative extended section of the original A2 corridor to assess whether a longer corridor should be taken forward.

Figure 8-3 A2 corridor between M25 and M2



8.5.2. Table 8-6 and Table 8-7 show the forecast journey time impacts for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Eastbound Distance – 14.21km
- Westbound Distance – 13.45km

Table 8-6 – A2 corridor between M25 and M2 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
2030 AM Peak EB	09:47	87	09:02	94	-00:45	+7	8%
2030 AM Peak WB	11:50	70	10:17	83	-01:33	+13	13%
2030 PM Peak EB	13:23	64	10:52	78	-02:31	+14	19%
2030 PM Peak WB	08:59	95	08:37	99	-00:22	+4	4%

Table 8-7 - A2 corridor between M25 and M2 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
2045 AM Peak EB	10:30	81	09:34	89	-00:56	+8	9%
2045 AM Peak WB	13:34	63	11:14	76	-02:20	+13	17%
2045 PM Peak EB	16:06	53	11:54	72	-04:12	+19	26%
2045 PM Peak WB	09:42	88	09:04	94	-00:38	+6	7%

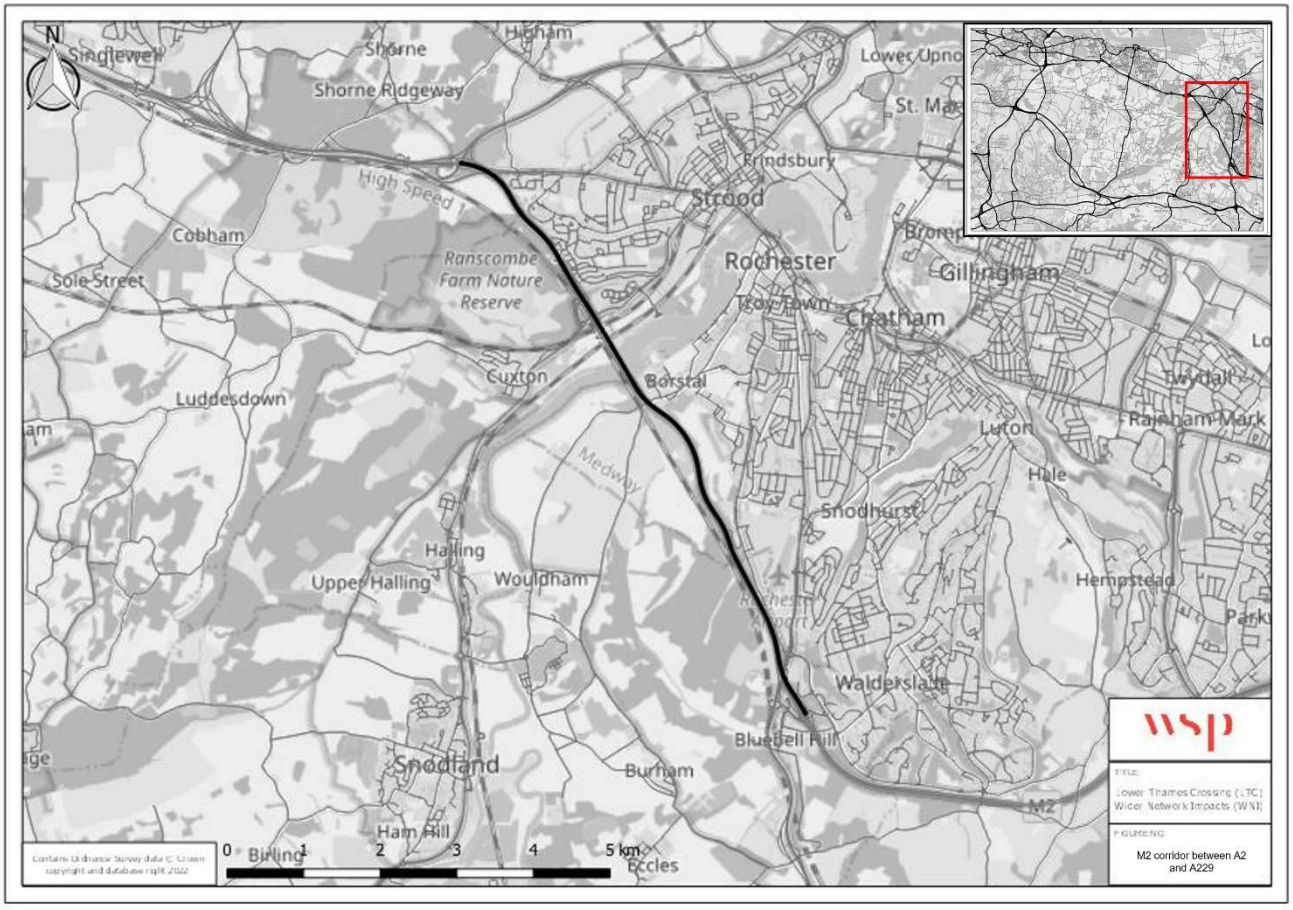
8.5.3. The AM and PM journey time results are summarised in Table 8-6 and Table 8-7 which demonstrate that for traffic on the A2 between M25 and M2, decreases are expected in the 2030 and 2045 DS scenarios as compared to the respective DN scenarios. This is reflected in increases in average speeds across all of the assessed scenarios.

8.5.4. Parts of the corridor are already congested in 2030 with sections reporting Volume over Capacity (V/C) ratios greater than 90% in both Do Nothing and Do Something scenarios. However, given the journey time improvements and as there were no impacts identified on junctions that form part of KCC's local highway network, this extended corridor has not been taken forward for further assessment.

8.6 M2 corridor between A2 and A229

8.6.1. This corridor has been included in the initial assessment because during the 2045 Do Something AM and PM scenarios this corridor is shown to be over capacity including several junctions.

Figure 8-4 M2 corridor between A2 and A229



8.6.2. Table 8-8 and Table 8-9 show the forecast journey time increases for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northwest bound Distance – 9.38km
- Southeast bound Distance - 9.35km

Table 8-8 – M2 Corridor between A2 and A229 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
2030 AM Peak EB	05:23	105	05:41	104	+00:18	-1	6%
2030 AM Peak WB	05:24	105	05:27	99	+00:03	-6	1%
2030 PM Peak EB	05:22	98	05:35	93	+00:13	-5	4%
2030 PM Peak SB	05:45	105	06:04	101	+00:19	-4	6%

Table 8-9 - M2 Corridor between A2 and A229 2045 Journey Time Impacts

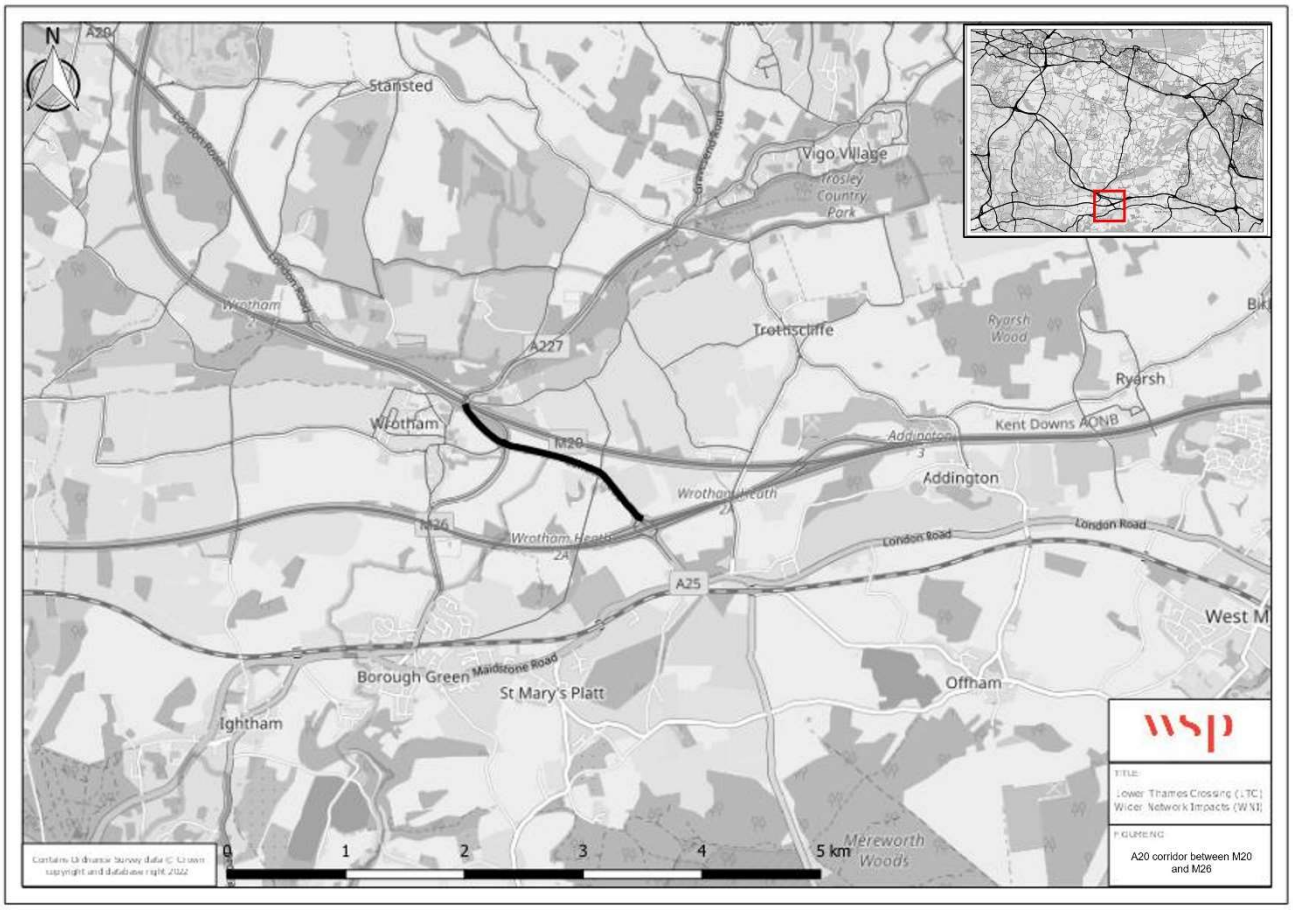
	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	Journey Time (mm:ss)	Average Speed (Km/h)	% Impact
2045 AM Peak EB	05:30	103	06:02	101	+00:32	-2	10%
2045 AM Peak WB	05:30	102	05:36	93	+00:06	-9	2%
2045 PM Peak EB	05:31	95	05:53	84	+00:22	-11	7%
2045 PM Peak WB	05:58	102	06:42	96	+00:44	-6	12%

8.6.3. Table 8-8 and Table 8-9 demonstrate that journey times are forecast to increase across all of the scenarios assessed with corresponding reductions in average speed of between 1km per hour and 11 km per hour. However, despite these impacts, further analysis using the Assessment Metrics did not highlight any KCC junctions that were negatively impacted by LTC. As a result, this corridor has not been taken forward for further assessment.

8.7 A20 corridor between M20 and M26

8.7.1. This corridor has been included in the initial assessment as it is expected to be over capacity during the 2045 Do Something AM and PM scenarios. The AM peak shows a minimum V/C of 85%, with a maximum of over 100%.

Figure 8-5 A20 corridor between M20 and M26



8.7.2. Table 8-10 and Table 8-11 show the forecast journey time impacts for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Southeast bound Distance – 1.90km
- Northwest bound Distance - 1.91km

Table 8-10 – A20 corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time	Average Speed	Journey Time	Average Speed	Journey Time	Average Speed	% Impact
2030 AM Peak EB	02:38	41	02:36	44	-00:02	+3	1%
2030 AM Peak WB	02:46	44	02:34	44	-00:12	+1	7%
2030 PM Peak EB	02:15	32	02:14	33	-00:01	+1	1%
2030 PM Peak WB	03:34	51	03:30	51	-00:04	0	2%

Table 8-11 - A20 corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time	Average Speed	Journey Time	Average Speed	Journey Time	Average Speed	% Impact
2045 AM Peak EB	02:58	37	02:53	40	-00:05	+3	3%
2045 AM Peak WB	03:07	39	02:52	40	-00:15	+1	8%
2045 PM Peak EB	02:28	30	02:28	30	-00:00	0	0%
2045 PM Peak WB	03:50	46	03:47	46	-00:03	0	1%

8.7.3. Table 8-10 and Table 8-11 shows that the A20 corridor is anticipated to experience an improvement in journey time and average speed across all of the assessed scenarios as a result of LTC. As there were no impacts identified on junctions that form part of KCC's local highway network, this corridor has not been taken forward for further assessment.

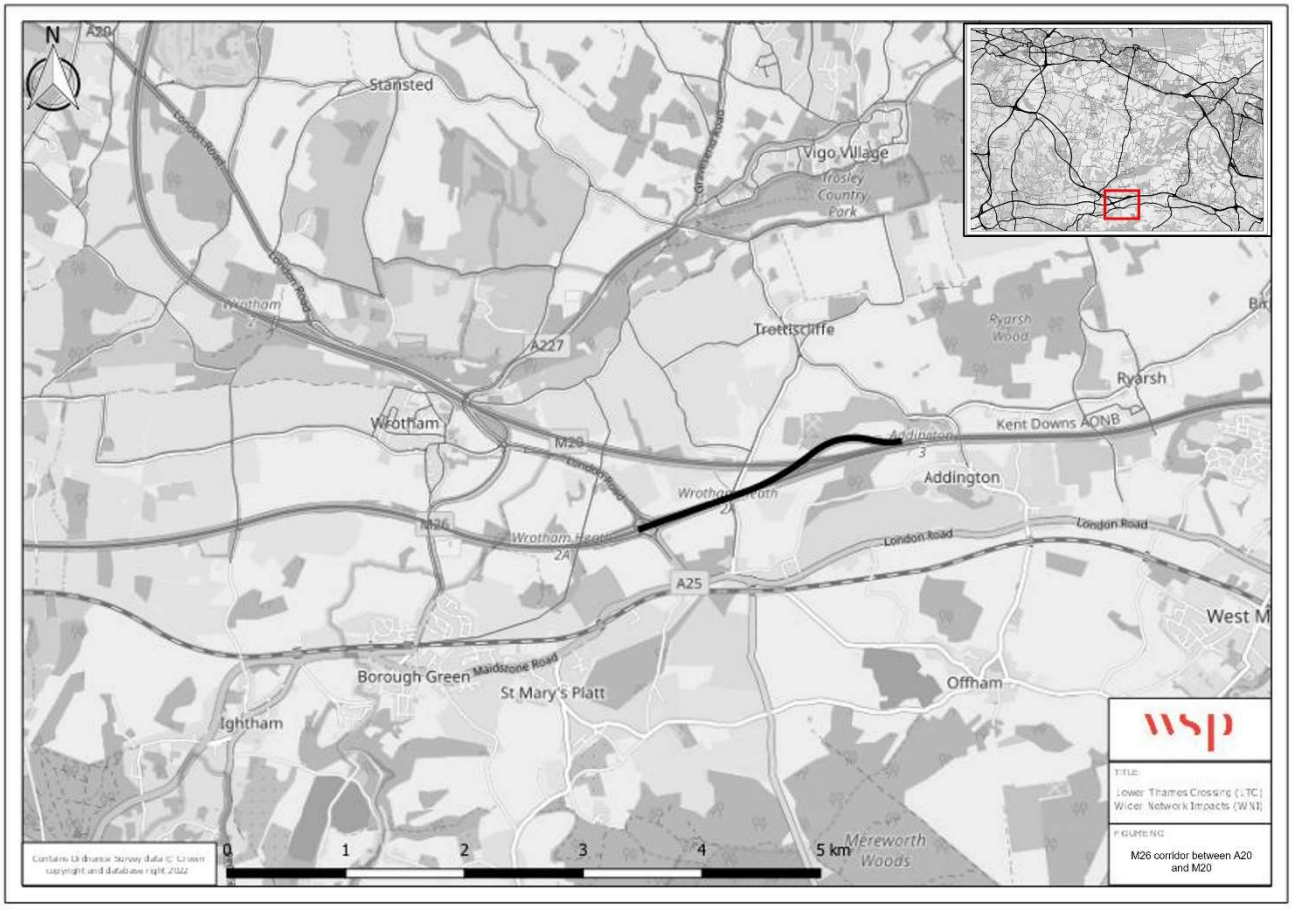
8.7.4. In reviewing these journey times, it was also noted that the A20 / M26 Wrotham Heath Interchange is forecast to operate over capacity in the 2030 PM and 2045 PM DN and DS

scenarios. However, given the impact of LTC is only forecast to be 1%, this junction will not be taken forward for further assessment.

8.8 M26 corridor between A20 and M20

8.8.1. The M26 corridor between A20 and M20 was included in the initial assessment as it is expected to experience a V/C over a 100% in the 2045 Do Something PM peak and a minimum of 85% during the AM peak. This means the link is forecast to operate above capacity.

Figure 8-6 - M26 Corridor between A20 and M20



8.8.2. Table 8-12 and 8-13 show the forecast journey time impacts for the 2030 and 2045 DN and DS Scenarios. The distance for each of the journey times is as follows:

- Northeast bound Distance – 2.31km
- Southwest bound Distance - 2.36km

Table 8-12 – M26 Corridor 2030 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time	Average Speed	Journey Time	Average Speed	Journey Time	Average Speed	% Impact
2030 AM Peak EB	01:29	93	01:29	93	00:00	0	0%
2030 AM Peak WB	01:36	89	01:36	89	00:00	0	0%
2030 PM Peak EB	03:18	42	03:14	43	-00:04	0	2%
2030 PM Peak WB	01:25	100	01:25	100	00:00	0	0%

Table 8-13 - M26 Corridor 2045 Journey Time Impacts

	Do Nothing Scenario		Do Something Scenario		LTC Impact		
	Journey Time	Average Speed	Journey Time	Average Speed	Journey Time	Average Speed	% Impact
2045 AM Peak EB	01:34	88	01:34	88	00:00	0	0%
2045 AM Peak WB	01:46	80	01:43	83	-00:03	+3	3%
2045 PM Peak EB	04:13	33	04:12	33	-00:01	0	0%
2045 PM Peak WB	01:29	96	01:28	97	-00:01	+1	1%

8.8.3. Table 8-12 and Table 8-13 shows that the M26 corridor is anticipated to experience a negligible impact in journey times and average speeds as a result of LTC. As there were no impacts identified on junctions that form part of KCC's local highway network, this corridor has not been taken forward for further assessment.

8.9 Individual Junctions Identified

8.9.1. Table 8-14 shows a summary other individual junctions / locations identified against the assessment metrics defined in Section 3. Where issues have been identified a corresponding objective of potential mitigation has also been included within the table.

Table 8-14 – Individual Junctions: Problems and Objectives Identified

Junction Ref	Location	Junction / Link Capacity		Queue length	Share of HGV		Active Travel
		Criteria 1	Criteria 2	Criteria 1	Criteria 1	Criteria 2	Criteria 1
	A226 Gravesend Road, between Church Road and Crown Lane - Medway	Pass	Pass	Pass	Pass	Pass	Fail
	A226 Gravesend Road, between Crutches Lane and A289 – Medway	Pass	Pass	Pass	Pass	Pass	Fail
	A226 Gravesend Road, between A289 and Dillywood Lane	Pass	Pass	Pass	Pass	Pass	Fail
	Chatham Road, between Old Chatham Road and A229 – Kit's Coty (South of Bluebell Hill)	Pass	Pass	Pass	Pass	Pass	Fail

Summary of Issues / Objectives

The A226 Gravesend Road has been identified in three separate locations as experiencing traffic flow increases that would have a detrimental impact upon users due to the existing level of cycle provision which consists of a 1-1.5m mandatory cycle lane on each side of the carriageway. In 2045 DS scenario this route is forecast to experience an increase in traffic flow of between 5-12% from a DN baseline ADDT of approximately 8,000-9,000 as a result of LTC. With the 40/50mph speed limit and forecast traffic flows the provision of segregated cycle tracks is required in accordance with DMRB CD195.

Similarly, Chatham Road, between Old Chatham Road and A229 has narrow on road advisory cycle provision and is forecast to have a 7% increase in AADT from 5,612 to 6,026 as a result of the LTC in the 2045 DS scenario. This increase, equivalent to an additional 400 vehicles per day, will have a detrimental impact on users of this cycle route. Given the traffic are flows are in excess of 5,000 vehicles AADT, this provision should also be upgraded to segregated cycle tracks.

8.10 Summary of Additional Corridor Assessments

8.10.1. The review of the additional corridors has shown that most of those identified are not forecast to experience detrimental impacts because of changing traffic associated with LTC. This is reflected by the fact that journey times are forecast to either remain static or improve on most routes and the limited number of local network junctions that have been identified as experiencing capacity issues.

8.10.2. The exception to this is the A229 corridor, which is forecast to experience significant journey time increases and congestion issues in both the 2030 and 2045 DS scenarios. The introduction of LTC worsens congestion problems identified in the DN scenario, such as at the M2 / A229 Bluebell Hill interchange but is also the cause of the Walderslade Wood roundabout and M20 / A229 Running Horse Roundabout operating over capacity in the peak hours.

8.10.3. These delays on the A229 will lead to increased traffic using the A227 and A228 as alternative routes and it is therefore important that these issues are resolved, either through the Large Local Major SOBC or alternative funding streams. Given the SOBC process is already underway, options for improving the A229 will not be considered as part of this study.

8.10.4. It should also be noted that significant changes to the A229 would impact the expectation of problems on the rest of the local network and would be likely to impact the recommendations for investment in the wider network. A scheme that significantly improves the A229 and its motorway interchanges would materially affect driver route choice.

8.10.5. The following additional locations will be taken forward for further assessment:

- A226 Gravesend Road; and
- Chatham Road, Kit's Coty.

9 Next Steps

9.1 Introduction

9.1.1. This Technical Note has assessed the impact of LTC on KCC's highway network and identified the locations where this impact is expected to be most problematic.

9.1.2. The next phase of this project will focus more closely on the locations identified, determining potential mitigation measures to alleviate the identified problems through a more detailed assessment of each location and identified concern.. Options for mitigating these issues will then be developed and presented to KCC for consideration.

9.2 Draft Prioritised List of Junctions and Corridors

9.2.1. Taking account of the analysis contained within this Technical Note, the corridors and / or junctions shown in Table 9-1 are proposed to be taken forward to Task 1d, which will involve the development of a long list of options to mitigate the identified issues. For reference Table 9-1 also includes a summary of the issues and identified at each location, the objectives of any mitigation measures and the priority order in which they will be considered.

Table 9-1: Draft Prioritised list of junctions and Corridors.

Priority Order	Corridor	Locations	Reason	Objectives
1	A2 Corridor between Spring Head and Gravesend	Local highway junctions on A2 Corridor between Spring Head and Gravesend Road including: 1. A2 Gravesend East 2. A2 Tollgate (incl. Wrotham Road / Coldharbour Road) 3. Hall Road / Station Road/ New Barn Road 4. A2 Pepper Hill. In addition, the following corridors, located between the A2 and Gravesend centre ▪ Hall Road and Springhead Road (north of A2 Pepper Hill junction) ▪ A227 Wrotham Road (north of A2 Tollgate junction); and ▪ Valley Drive (North of A2Gravesend East junction as a result of LTC).	Significant capacity issue have been identified at multiple local network junctions as a result of the traffic redistribution effects associated with LTC, with the following junctions forecast to operate over capacity in the 2030 and/or 2045 DS scenario: • 1. A2 Gravesend East • 2. A2 Tollgate (incl. Wrotham Road / Coldharbour Road) • 3. Hall Road / Station Road/ New Barn Road • A2 Pepper Hill. Of these junctions the A2 Tollgate and A2 Gravesend East junctions were forecast to experience queue lengths which block back through upstream junctions, which would likely lead to greater levels of delay than reported by the KTM whilst also generating a potential road safety risk. The Hall Road / Springhead Road north corridor is included due to journey time increases exceeding 10%, partly related to congestion increased at the A2 Pepper Hill junction as a result of LTC. A227 Wrotham Road and Valley Drive have been included as a result of them being servicing a number of local bus services and having forecast journey time increases of at least 5% as a result of LTC.	The primary objective will be to improve junction capacity at the junctions highlighted in order to reduce traffic congestion, particularly where these are shown to block back through other junctions and lead to additional delays / road safety issues. Whilst partly related to the congestion forecast at the junctions with the A2, the second objective will be to reduce residual journey times increases between the A2 and Gravesend with a focus on those corridors serving main bus routes.
2	A228 Corridor between M2 and M20	A228 Corridor between M2 and M20 (including all junctions, alternative routes identified within Table 7-3 and the following junctions which are forecast to operate over capacity with LTC: • A228 / Cuxton Road; • A228 / Bush Road; • A228 / Station Road; • A228 / Pilgrims Road; • A228 / Sundridge Hill roundabout; and • A228 Germander Avenue.	The vast majority of junctions along the A228 are forecast to see significant increases in HGV traffic as a result of LTC with HGV traffic flows along the A228 increasing by 143-322 vehicles per hour PM peak 2045. A number of junctions are also forecast to operate over capacity either as a direct result of LTC or with LTC in place, which lead to further congestion and use of inappropriate alternative routes	The objectives of the A228 corridor will need to consider a number of different aspects - a balance needs to be achieved between implementing capacity improvements at junctions shown to be operating over capacity and mitigation along the A228 to reduce impacts of HGV traffic, whilst also ensuring these do not lead to increases in use of inappropriate alternative routes.

				ensuring that these capacity improvements do not promote use of alternative routes and considering mitigation
3	A227 between A2 and M20	A227 between A2 and M20 with particular focus on alternative routes north of the A227 / Green Lane junction	Significant increases in HGV flow on alternative routes between A227 / Green Lane and A2, including villages of Meopham, Hook Green, Sole Street and Cobham to access LTC.	The aim will be to remove additional HGV traffic forecast in the DS scenarios from the A227 and unsuitable routes between the A227 / Green Lane and A2.
4	A226 Gravesend Road, between A289 and Dillywood Lane		Traffic flow increases as a result of LTC will have a detrimental impact on cyclists using the existing on-road cycle lanes	The objectives will be to enhance existing on-carriageway cycle provision to ensure that traffic flow increases associated with LTC do not have a detrimental impact on cyclists / potential to cycle.
6	Chatham Road, between Old Chatham Road and A229 – Kit's Coty (South of Bluebell Hill)		Traffic flow increases as a result of LTC will have a detrimental impact on cyclists using the existing on-road cycle lanes	The objectives will be to enhance existing on-carriageway cycle provision to ensure that traffic flow increases associated with LTC do not have a detrimental impact on cyclists / potential to cycle.

9.3 Final List of Prioritised Junction and Corridors

9.3.1. Following on from submission of this Technical Note to National Highways on 30th November 2022 and a subsequent meeting held on 8th December 2022 a final list of prioritised junctions and corridors was agreed between Kent County Council and National Highways. Table 9-2 below shows this agreed priority list, which has been taken from Technical Note 'Response to 700099014-TN01 – Revision 3' (Doc No: T0253-TN-0001) completed by Arcadis on behalf of National Highways and included in Appendix B.

Table 9-2: Agreed Prioritised list of junctions and Corridors

Priority Order	Corridor	Locations	Recommendation
1	A2 Corridor between Spring Head and Gravesend	1A – A2 Gravesend East Junction and Valley Drive Corridor	Combine junction and corridor assessment
		1B – A2 Tollgate (Incl. Wrotham Road / Coldharbour Road Junction	Wrotham Road excluded as it only marginally triggers the public transport metric by 1% and buses are infrequent along this route (hourly in peak time and every 90 mins off peak)
		1C – Hall Road / Station Road / New Barn Road in combination with A2 Pepper Hill and Hall Road and Springhead Road Corridor	Combine junctions due to proximity along with corridor assessment.
2	A228 Corridor between M2 and M20		Freight strategy for A228 and A227 combined. Mitigation of HGV traffic on the A228 to be assessed to understand rerouting and possible ease on the junction capacities before further assessment of junctions along this route
	A227 Corridor between M2 and M20		Combined freight strategy with A228 corridor
3	A226 Gravesend Road between A289 and Dillywood Lane		Option generation for cycling mitigation impact
4	Chatham Road between Old Chatham Road and A229 – Kit's Coty (South of Bluebell Hill		Option generation for cycling mitigation impact

Grosvenor House
2 Grosvenor Square
Southampton, Hampshire
SO15 2BE

wsp.com