

# **Lower Thames Crossing**

**Thurrock Council Local Impact Report**

**Appendix B - Transport Alternatives**

# **Lower Thames Crossing**

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**Appendix B Annex 1: History of and Public Transport Alternatives and  
Alternative Options**

## Appendix B Transport Alternatives

### B.1. History of Alternative Options

#### Introduction

- B.1.1 Thurrock Council has longstanding concerns that alternative modes have not been fairly considered during the development of LTC and instead a highways solution without provision for public transport has been pushed forward.
- B.1.2 The proposed alignment for LTC uses 10% of available land in the Thurrock Council area and severs the more populated south and west from key sites in the east such as DP World at London Gateway.
- B.1.3 Millions of tonnes of concrete, soil and steel will need to travel through Thurrock to build LTC, stressing the already congested highway network and causing air quality and noise problems for residents.
- B.1.4 As a result, Thurrock Council want to understand how the current proposed alignment for LTC was identified and whether alternative solutions were considered such as provision of a new rail line or integrating a public transport solution with a highways solution to best meet the needs of users.

#### Purpose of This Report

- B.1.5 This report outlines the history of decision making and option generation during the development of LTC with a particular focus on why alternative options were ruled out and whether these decisions make sense.
- B.1.6 This draws upon work that Stantec have been doing with the council as part of their response to LTC's DCO submission to investigate the potential for a Mass Rapid Transit system to support movements throughout Thurrock and into Kent and the rest of Essex and investigations into the potential impacts of LTC on the local highway network, with a particular focus on how decisions have been made regarding local junctions and the Tilbury Link Road.

#### Policy Context

##### National Networks National Policy Statement

- B.1.7 The National Networks National Policy Statement (NPS) sets out how nationally significant infrastructure projects (NSIPs) must be developed in order to gain consent. The 2008 Planning Act requires that all applications which seek development consent must follow the guidelines set out in the NPS.
- B.1.8 The NPS has specific guidance on how to approach assessment of alternatives in Sections 4.26 and 4.27:

*'Applicants should comply with all legal requirements and any policy requirements set out in this NPS on the assessment of alternatives. In particular:*

- *The EIA Directive requires projects with significant environmental effects to include an outline of the main alternatives studied by the applicant and the main reasons for the applicant's choice, taking into account the environmental effects.*

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*All projects should be subject to an options appraisal. The appraisal should consider viable modal alternatives and may also consider other options (in light of paragraphs 3.23 to 3.27 of this NPS). Where projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies or other appropriate policies or investment plan, option testing need not be considered by the examining authority or decision maker. For national road and rail schemes proportionate option consideration of alternatives will have been undertaken as part of the investment decision making process. It is not necessary for the Examining Authority and the decision maker to reconsider this process, but they should be satisfied that this assessment has been undertaken.'*

B.1.9 From this it is clear that alternative options should be fully considered as part of a national road scheme (such as LTC) alongside a clear rationale of the reasons for the option selection.

B.1.10 In addition, the NPS also refers to following other national guidance documents (for example TAG) in section 1.8:

*'It should be noted that where the NPS refers to other documents these other documents may be updated or amended over the time span of the NPS, so successor documents should be referred to.'*

### **DfT Transport Analysis Guidance**

B.1.11 The DfT's Transport Analysis Guidance (TAG) provides guidance for the role of transport modelling and appraisal. A key document in TAG is the Transport Appraisal Process (TAP) that provides guidance on the process of developing a transport scheme from intervention genesis through to the detailed appraisal required to support preparation of the business or investment cases to support subsequent approval stages.

B.1.12 The TAP is a three-stage process as outlined below:

- a. Stage 1 – Option Development
- b. Stage 2 – Further Appraisal
- c. Stage 3 – Implementation, Monitoring and Evaluation

B.1.13 There are nine key steps within Stage 1 that govern how the development of a new transport scheme should be approached as shown in Figure B1.1.

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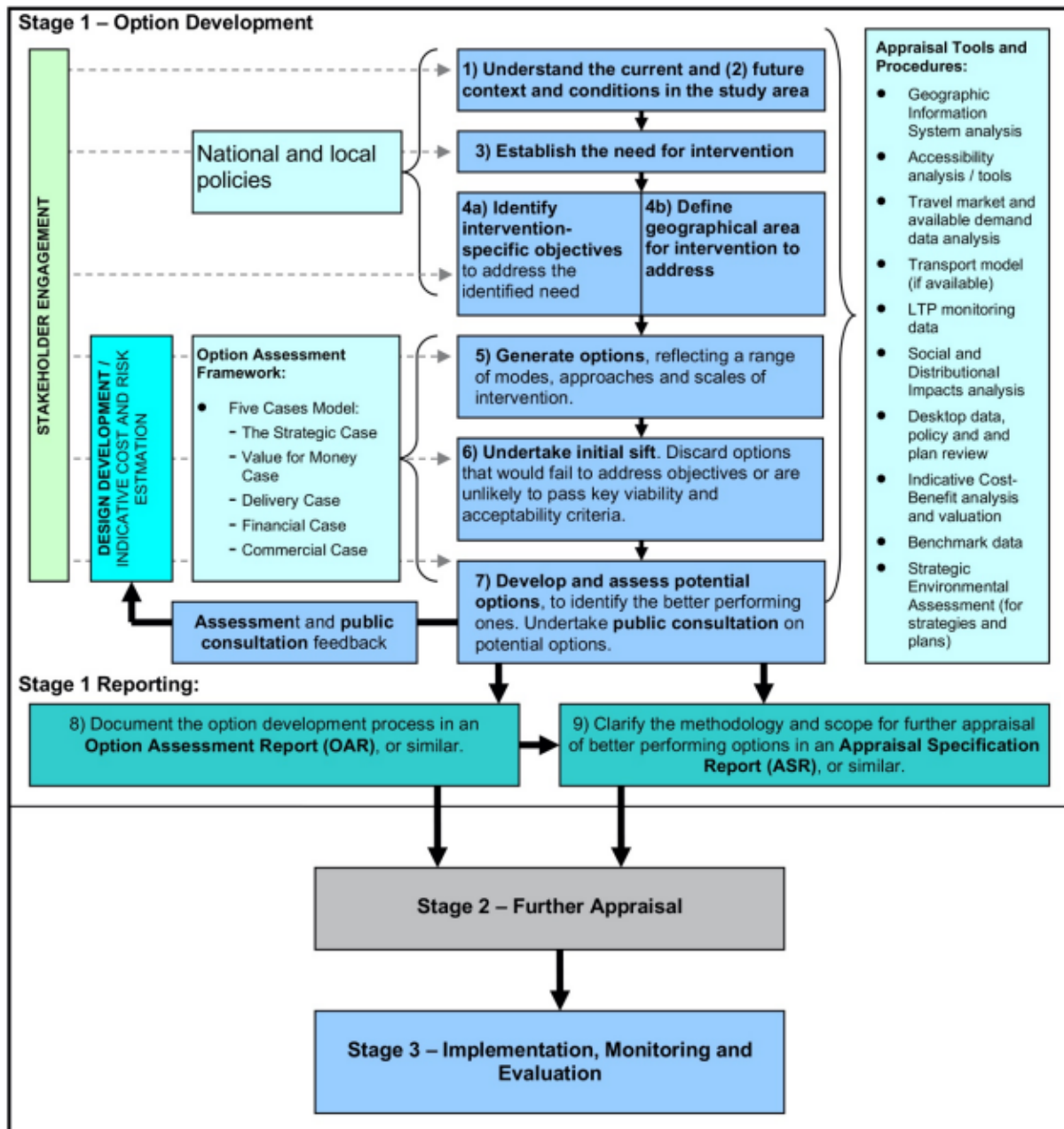


Figure B1.1: Transport Appraisal Process

B.1.14 The key step under consideration for this work is Step 5: Generate Options. The TAP provides further guidance on how to approach option generation in section 2.8 of the document:

*It is important that as wide a range of options as possible should be considered, including all modes, infrastructure, regulation, pricing and other ways of influencing behaviour. Options should include measures that reduce or influence the need to travel, as well as those that involve capital spend.*

*Studies should not start from an assertion about a preferred modal solution, or indeed that infrastructure provision is the only answer.*

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*Where highway solutions are being considered, options should include a consideration of different link/junction standards and other alternatives to address the problems in the area, such as public transport provision, demand management policies, traffic management measures and strategies.'*

- B.1.15 The TAP was under consultation in 2009 (when initial optioneering for LTC was developed) and has formed part of TAG since then. With this guidance having been in place for 13 years prior to the LTC DCO application, it would be expected that LTC would have reviewed their proposals to ensure they are consistent with this guidance, however, the documents provided at DCO do not show that the project has sufficiently covered the range of modes required under Step 5.

### **National Highways Guidance**

- B.1.16 In 2015 Highways England's Traffic Appraisal Modelling and Economics (TAME), now National Highways Transport Planning Group (TPG) developed a methodology to ensure that schemes promoted by National Highways meet their obligations under NPS and the TAP.
- B.1.17 This methodology (known as TAME Advice Note 2) recommends the production of an Alternative Mode Assessment Report to support scheme development. This report should seek to answer two questions:
- b. Could an alternative modal intervention solve the identified problem?
  - c. Knowing the benefits of the preferred option, what impact would a modal alternative require in order to relieve the problem to the same degree and is that viable?
- B.1.18 The guidance note is not in the public domain, however, other NSIPs such as A428 Black Cat to Caxton Gibbet and A303 Stone Henge have published their documents as part of the consultation and/or DCO process.
- B.1.19 To date the LTC Alternative Mode Assessment has not been provided as part of consultation or DCO, however, it is referenced in other documents.

### **History of Lower Thames Crossing Optioneering**

#### **Overview**

- B.1.20 Proposals for LTC have been based on nearly 30 years of studies and development. The key stages in optioneering are shown in Figure B1.2.

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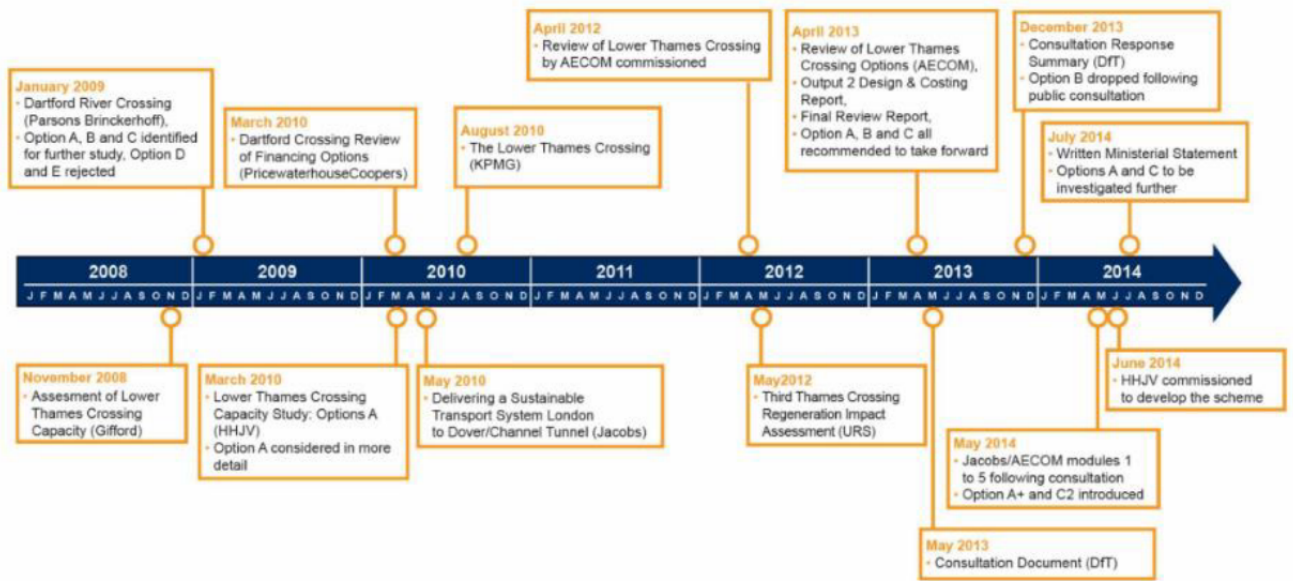


Figure B1.2: History of LTC Optioneering

B.1.21 The key points for option generation here are the 2009 Dartford River Crossing study, and 2013 Review of Lower Thames Crossing Options, as these are what the option progressed to DCO has been based on. In addition, there are two further documents published since 2014 which give some insight into optioneering; 2016 Summary Business Case for Consultation and the 2017 Post Consultation Review. The rest of this chapter outlines the information provided within these documents, published responses from local authorities and gaps identified as part of our review

**2009 Dartford River Crossing Study**

B.1.22 The 2009 Dartford River Crossing study was commissioned by DfT and completed by Parson Brinkerhoff. The study was intended to investigate ways to address capacity constraints at Dartford Crossing.

B.1.23 The Study had the following objectives:

- a. To advise the DfT about the future requirement for crossing capacity across the lower Thames over 30 years to 2037. This should include an initial evaluation of what role other modes (e.g. light / heavy rail, bus) might play in any plans for new capacity, leading to agreed options for evaluation. The study should look at demand and the consequential impacts (environmental and economic) of meeting that demand with new infrastructure.
- b. To investigate what may be done to improve traffic flow through the existing Dartford Crossing in the short to medium term, known as ‘making better use’ of the Crossing. This work should take into account existing Highways Agency plans for the Crossing and the motorway network in the immediate vicinity.
- c. To make best use of available traffic models to help understand the nature of current demand at the Crossing, the likely evolution of that demand and the impact that various options might have.

B.1.24 This study forms the foundation of options for LTC and builds upon historical studies including the 1994 Lower Thames Crossing Study and 1998 Dartford Local Crossing Study alongside stakeholder engagement with local authorities and other national bodies.

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B.1.25 The study considered the problems across both the road and rail networks to understand the scale of the problem and the potential options that could be used to solve capacity constraints across the River Thames to the east of London.

B.1.26 A clear highways problem was identified, however, when considering rail problems the study made the following key findings:

*'6.43 Total travel volumes between north Kent/Medway Towns and south Essex are fairly low, meaning that there is unlikely to be any significant demand for rail travel between these groups of stations, even assuming a direct rail service was provided (i.e. there is minimal latent demand). The SRA study quoted one-way movements across the present Dartford crossing between Essex / North East London and Kent / South East London of almost 20,000 from surveys in 2002. It stressed, however, that this value would not be representative of the level of potential modal shift that might be achieved with a Lower Thames rail crossing in place, due to issues of accessibility and service frequency.'*

*'6.79 As a result, there is unlikely to be any significant "generated" demand leading to modal shift to rail resulting from the provision of a direct rail passenger service between these groups of stations...the inclusion of rail freight provision as part of any new Lower Thames Crossing would not appear to address these issues and may even lead to a deterioration in rail congestion at certain points in the network.'*

B.1.27 Given these findings the study did not consider any rail options as part of the chapter on 'Additional Capacity Options' (Chapter 10). They did consider how well potential highways alignments for a new crossing could tie into proposed rapid transit schemes such as South Essex Rapid Transit (SERT) and Kent Fastrack and this formed part of the option assessment where Options A, B and C (all alignments for a Highways solution) were assessed as 'may provide a multi-modal linkage to local bus networks and the magnitude of impact is slight beneficial.'

B.1.28 As no public transport solutions were considered as part of the study there is no assessment of the potential impact a public transport solution could have. Medway Council's review of the 2009 Study presented to Medway Cabinet in June 2009 takes issue with the assumptions within the initial assessment of alternative modes:

*'4.4...the Study appears to ignore the substantial regeneration growth which is expected in the Thames Gateway area on both sides of the river and the increasing need to travel in this area. The Study suggests rail links orientated towards the east of the new crossing, yet there may be greater potential to attract passengers to a service which links the areas with a greater population between the new crossing point and London.'*

*'4.7 The study concludes that the inclusion of rail infrastructure within the scheme does not have a reasonable initial business case and is therefore discounted from the final scheme options considered in the Study. However, the study appears to ignore:*

- *The opportunity for international freight to access the new crossing if a link is constructed between the Ashford/Swanley line and the Medway Valley Line at Maidstone*
- *The work being carried out to develop a freight route from East Anglia to the West Coast Main Line via Ipswich and Peterborough which could allow services from the new crossing to avoid the need to avoid the congested parts of the London network and still reach the North-West of England*
- *The opportunity to offer increased capacity for passenger services into London if freight services can be diverted elsewhere.'*



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B.1.29 In effect, the Study ruled out a rail intervention because at the time of the study, the existing demand for cross river rail did not exist, while ignoring that there are significant issues with the existing rail provision (with the need to travel into London adding significant time and cost to any journey). The study also did not consider a number of new developments north and south of the River Thames that would lead to increased demand for cross-river movements.

Rail options were ruled out too early in scheme development without properly accounting for their potential to alleviate congestion at Dartford Crossing and growth was not properly considered.

B.1.30 The study considered 5 corridors for a highway alignment for a potential new link as shown in Figure B1.3 below. At that stage no decision was made regarding whether any alignment would require a tunnel, or a bridge solution and equal consideration was given to both.

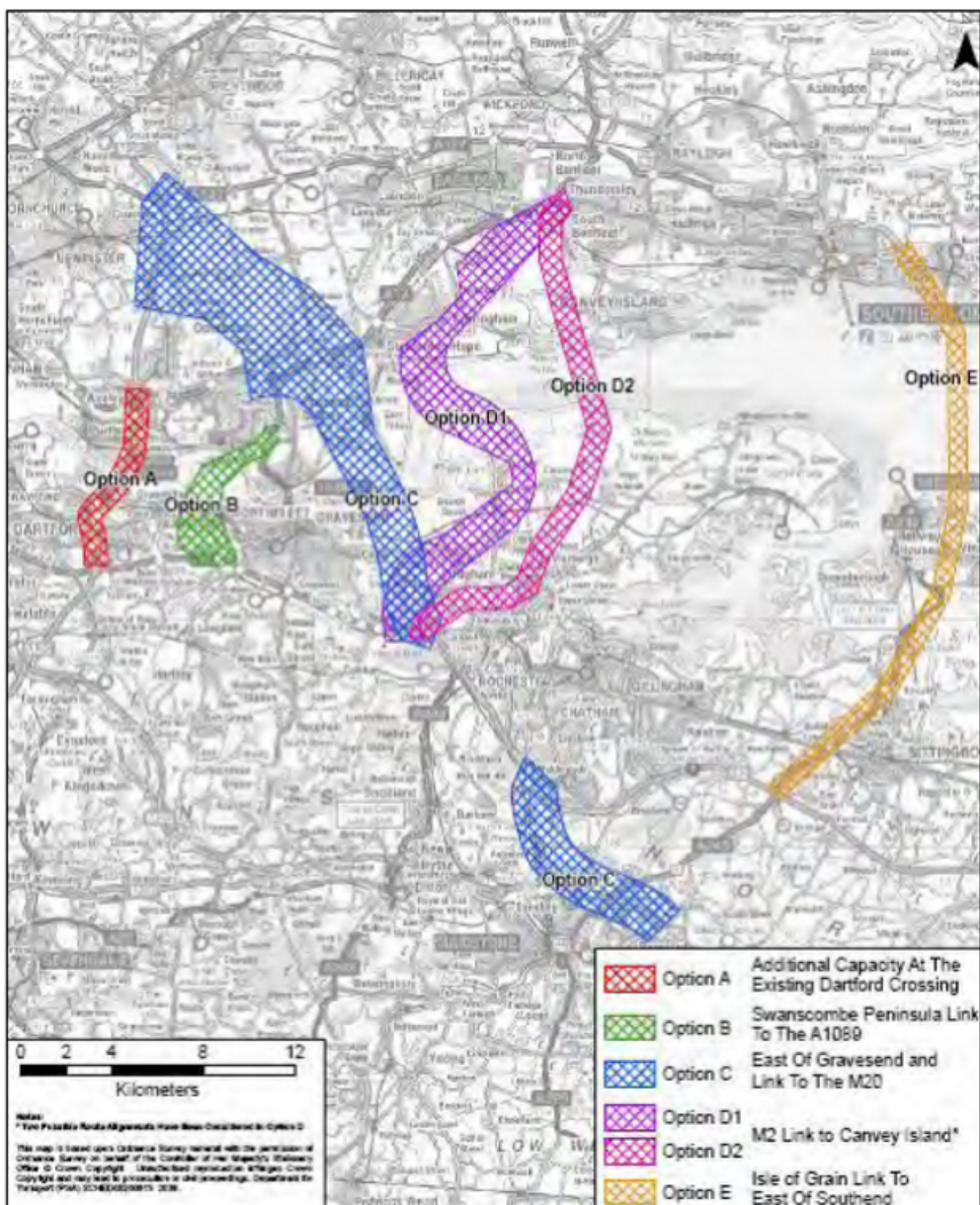


Figure B1.3: 2009 Dartford River Crossing Study Highway Alignments

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B.1.31 Each option was assessed against the following:

- a. Traffic flows
- b. Carbon
- c. Accidents
- d. Wider Economic Benefits
- e. Environmental impacts
- f. Integration and accessibility
- g. Stakeholder views
- h. Delivering a Sustainable Transport System (DaSTS) Strategic Goals
  - Support national economic competitiveness and growth, by delivering reliable and efficient transport networks
  - Reduce transport emissions of CO<sub>2</sub> and GHGs to tackle climate change
  - Contribute to better safety, security and health and longer life expectancy by reducing the risk of death, injury or illness arising from transport and by promoting travel modes that are beneficial to health
  - Improve quality of life for transport users and non-transport users, and to promote a healthy natural environment
  - Promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society

B.1.32 Options D and E were ruled following assessment as they were not expected to have a sufficient impact on the operation of the existing Dartford Crossing.

B.1.33 Options A, B and C were recommended to be taken forward for further development and assessment, however, all three options were expected to have adverse impacts on Carbon and the Environment.

### **2013 Review of Lower Thames Crossing Options**

B.1.34 In 2013 a review of the options being considered at LTC was carried out by AECOM. This review built upon the 2009 Study and undertook a review of the three highways options recommended for progression plus one variant that included a new connection to the M20 as shown in Figure B1.4.

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Figure B1.4: Options Considered in 2013

B.1.35 The review presented the findings of the 2009 report as fact, stating that rail was considered to alleviate the existing crossing, however, there is no additional data to show why a rail option was ruled out to address concerns raised in 2009 (as outlined in Medway Council’s response):

*‘1.2.3 For the longer term the 2009 Study identified that the capacity of the existing crossing is insufficient and that a further crossing will be required. The 2009 Study considered rail and five road options to alleviate the pinch point. It concluded that another crossing adjacent to the existing crossing could address the capacity problem. The existing crossing however provides the only linkage between Kent and Essex, and it may be that providing additional capacity at an alternative location could also provide better connectivity across the Thames and achieve improved resilience in operating the strategic road network. Of the options identified three location options were shortlisted as potential solutions.’*

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B.1.36 The scope of the review did not actually allow the consultants to consider alternative modes or new options. This is at odds with TAG guidance and the NPS.

*'1.3.2 The scope of the review did not re-open the assessment of additional crossing options.'*

B.1.37 In addition, the review of the options did not consider integration with other modes of transport. In 2009, the assessment considered the potential for crossing options to tie into Kent Fastrack and SERT but in this review the appraisal methodology did not consider this, instead they state:

*'4.6.2 Local bus services are unlikely to be affected by provision of a new crossing, unless the design severed local roads and hence caused changes to local bus services. Subsequent detailed scheme design would be required to assess whether the new route would sever or significantly divert local roads. Our assessment will, therefore, be limited to a consideration of the risks of severance that might be required in detailed design.'*

B.1.38 Therefore, provision of bus services across the River Thames as part of LTC was not considered at this stage.

Integration with other modes was not considered at this stage of scheme development.

B.1.39 The three shortlisted highways alignments taken forward from the 2009 study were assessed in line with the Treasury Five Case Model and looked at two key measures of success:

a. Improved travel times and connectivity:

- Levels of delay
- Journey time changes
- Journey time reliability

b. Environmental impacts:

- Incidents and accidents
- Noise and air quality
- Traffic volumes

B.1.40 When considering travel times and connectivity, Option A was found to have a smaller impact on congestion across the whole study area and its impacts are generally around the existing crossing. Option B was found to cause significant additional congestion on the A13 east of Basildon, but the new link was predicted to act in free flow and Option C was found to experience delays for northbound traffic.

B.1.41 Options B and C were expected to improve air quality in Thurrock and Dartford but were likely to have impacts on other AQMAs and also to lead to new noise impacts as the new links increasing exposure to properties and people that would otherwise be unaffected.

B.1.42 The study found that all three options would be technically feasible and that they could offer Value for Money (in that monetised benefits would exceed scheme costs), however, assumptions on costs seem optimistic, with a bored tunnel costing just 6% more than

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constructing a bridge. Option C is seen to be the most expensive and the least likely for operational revenues to pay back construction costs.

- B.1.43 Following public consultation on the three options, the government made the decision to not move forward with Option B due to limited support, the potential impact on local development plans and limited transport benefits.

**2016 Summary Business Case for Consultation**

- B.1.44 In 2016 a Summary Business Case was developed to support public consultation on LTC. This built upon the outcomes of the 2013 Review of Lower Thames Crossing Options, however, Option B (now named Location B) was not considered following a Government announcement that there was limited public support and the option was determined to have too large an impact on local developments and the lack of benefits for the option.

- B.1.45 The business case does consider option generation, but only around those routes already identified through previous studies:

*'2.5.1 Since 2014 Highways England has developed feasible alternative routes and assessed these against the project objectives. A range of route options at both Location A and Location C were tested against the scheme objectives and evaluated against technical, economic, environmental and traffic criteria as well as cost and value for money. '*

- B.1.46 As such no new options or options considering alternative modes were considered or presented at public consultation, despite previous concerns raised. The 2013 Review of Lower Thames Crossing Options builds upon the 2009 Dartford River Crossing therefore key decisions around the viability of public transport were made 7 years before the scheme consultation (and now 14 years before the DCO application), there have been significant policy, social and economic changes since then.

There have been major policy, social and economic changes at all levels since key optioneering decisions were made, evidence has not been presented showing that these have been considered.

- B.1.47 During the development of the business case a more detailed optioneering exercise was carried out to identify route options within the two corridors progressed in 2013 (A and C). 14 options were developed in location A, six for location C and four options for Location C Variant between the M2 and M20.
- B.1.48 Seven options at Location A and two each at Location C and C Variant were ruled out based on impacts on new developments, environmental constraints and initial feasibility/deliverability reviews. The options taken forward for further assessment are presented in Figure B1.4.

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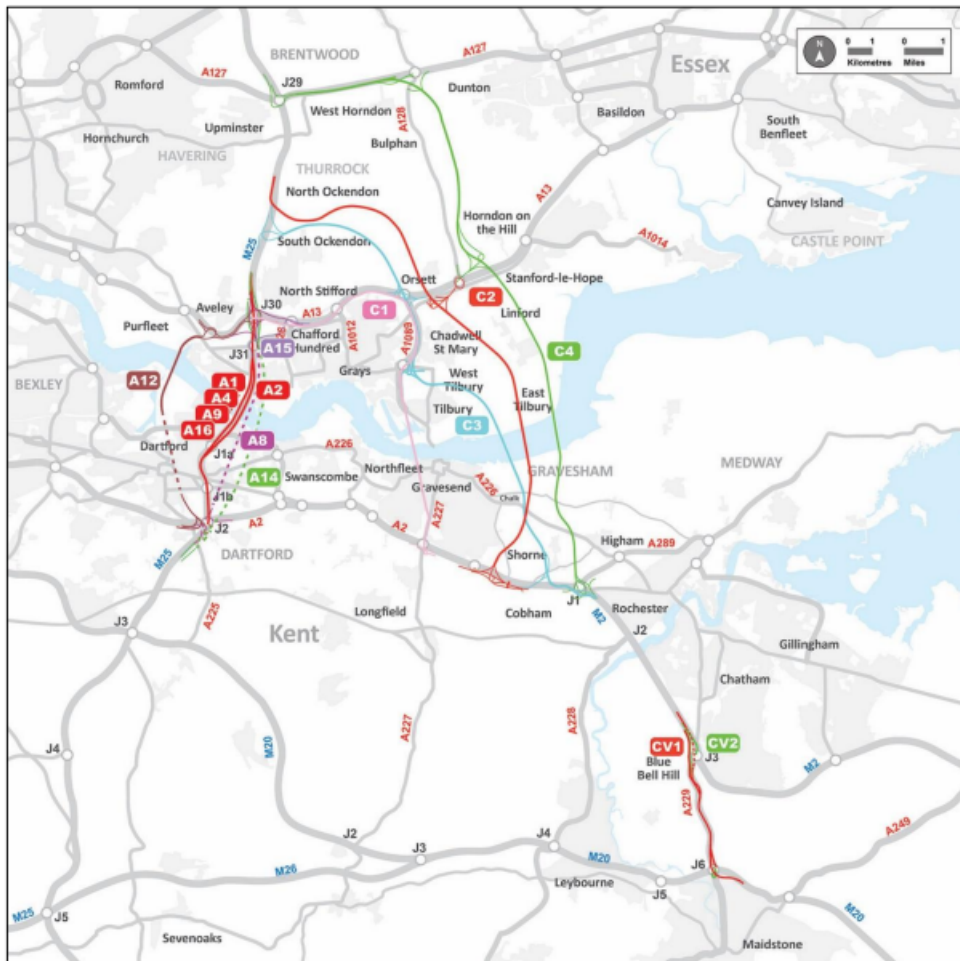


Figure B1.4: Long List Routes

B.1.49 Appraisal of these options was carried out in two stages. Initially options were appraised against the following criteria:

- a. Value for Money
- b. Significant environmental impacts
- c. Other significant impacts

B.1.50 This led to four options being sifted out, A8, A12, A14 and C3.

B.1.51 Options were then appraised in line with the Treasury Five Case model as shown in Figure B1.5 below. This led to options A2, A9, A15, A16, C1, C4 and C Variant being sifted out and the remaining four options at this stage are presented in Figure B1.6, renamed as Routes one to four.

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Main Criteria	Sub-Criteria	Scheme objective
Strategic	Fit with wider transport & government objectives	Ec1
	Fit with other (regional) objectives	
Economic	Travel time savings	Tr1 & Tr2
	Congestion	
	Resilience	Tr2
	Accident benefits	Tr3
	Wider economic benefits	Ec1
	Impact on current/ planned infrastructure	Ec1
Environmental	Carbon emissions	En1
	Historic environment	
	Biodiversity	
	Landscape & townscape	
	Air quality	
	Noise	
	Water environment	
Management	Implementation timetable	Ec3
	Practical feasibility	
Financial	Capital cost	Ec2 & Ec3
	Operation and maintenance cost	
Commercial	Revenue costs	Ec2

Figure B1.5: Appraisal Criteria

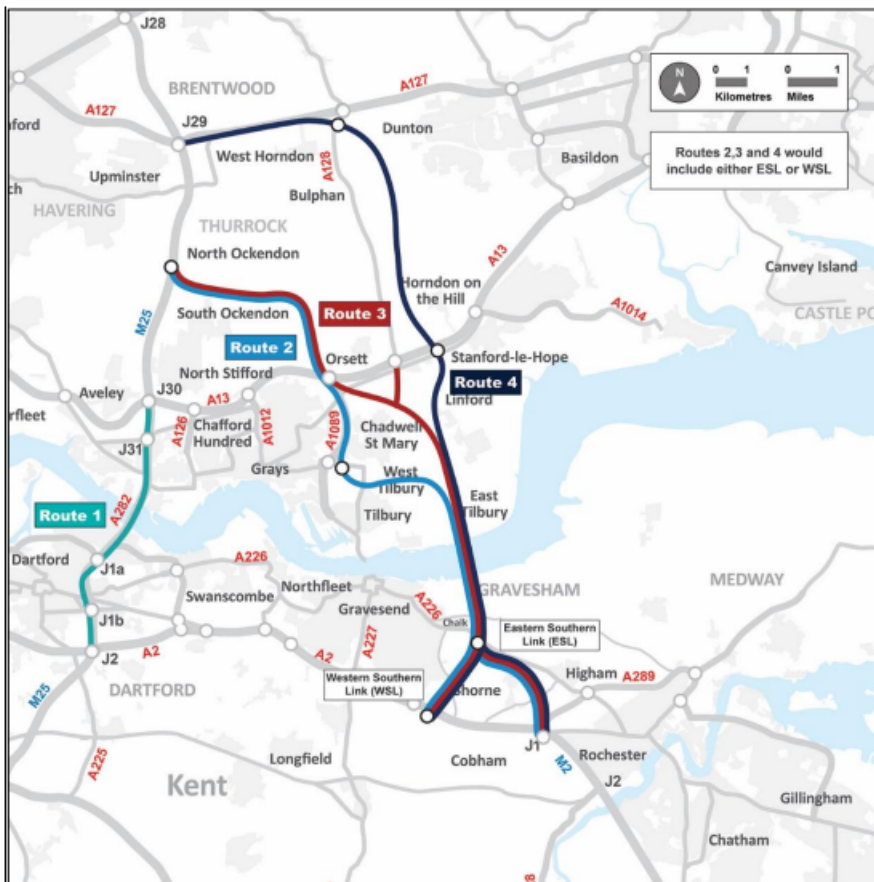


Figure B1.6: Shortlisted Options

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- B.1.52 Route 1 performed poorly against the traffic related scheme objectives, had issues with construction impacts and was assessed as offering poor value for money and as such was ruled out.
- B.1.53 The three routes east of the existing crossing were appraised against scheme objectives, Route 3, the shortest route, in general scored best against the objectives but all three routes were taken forward to consultation.
- B.1.54 The appraisal demonstrated risks to designated sites with the use of either an immersed tunnel or a bridge and as such a bored tunnel was considered the only viable option for crossing the River Thames.

#### **2017 Post Consultation Review**

- B.1.55 Following consultation, National Highways (then Highways England) produced a new Scheme Assessment Report, Volume 3 contains responses to public consultation findings. At public consultation a number of concerns were raised around the options presented and the lack of alternative mode options.

- B.1.56 Section 6.1 of the report states:

*'Some respondents raised the issue that there has been no serious consideration of any alternative strategy for relieving congestion and meeting both passenger and freight travel demands through other modal solutions. There is a lack of alternative public transport and this is stated to be the reason most people use the car for travel from Kent and Essex to other counties. In particular, the need to travel into London, interchange and then travel out again on the train to travel between Kent and Essex is seen as a major deterrent to rail use. Bus services using the Dartford Crossing are also minimal. If road traffic is encouraged to increase as a result of schemes of this nature, the UK will fail to abide by its international commitments (air, noise, climate change etc).'*

- B.1.57 The summary of public consultation then goes on to outline a range of potential solutions that were suggested by the public and/or other stakeholders as outlined below:

- a. A complete re-think of transport provision with no more road building and more public transport including a new rail link for passengers and freight (which could be on a different alignment) and enhanced bus services across the existing Dartford Crossing, reducing car demand.
- b. A combined road/ rail link (for passengers and freight) rather than a road only solution.
- c. More priority for bus services on any new crossing and the provision of more services linking towns in Essex and Kent.
- d. New ferry services across the Thames linking Essex and Kent.
- e. A revised national Ports strategy.

- B.1.58 The summary notes that not all of these suggested are intended as a replacement for a new highway crossing, some would be complementary or be accommodated as part of the design (e.g. a combined road/rail link).

- B.1.59 In the response to these concerns National Highways make reference to the 2009 Dartford River Crossing Study, which at this point was 8 years old, and state that:



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*'This concluded that rail passenger and freight did not provide a viable alternative to a new road crossing for the Thames and that there was no advantage in considering a combined road and rail crossing.'*

- B.1.60 They also state that these conclusions have been updated and re-examined in line with the guidance within TAME Advice Note 2:

*'Road and rail public transport solutions have been examined and it is clear from this analysis that whilst some of the alternative modes could be complementary to a new Lower Thames road crossing, none have the capability of solving the identified problem and meeting LTC objectives. There is no practical alternative that would provide 75% relief of the identified problem for the first 15 years (this equates to the occupants of 34,000 cars and more than 8,000 heavy goods vehicles in 2025) or which could return the flow to the capacity of the existing crossing in 2041.*

*Whilst the new crossing should ensure that there is adequate provision for non-motorised users and road-based public transport, these modes do not in themselves provide an alternative. Future developments in the rail network and inter-modal terminals may help to reduce the demand for freight by road but the percentage that would be diverted from the Dartford/ Lower Thames Crossing would not be sufficient to eliminate the need for a new road crossing, given the predicted increase in demands and existing congestion.*

*Alternative modes would therefore be complementary to a new crossing and not a replacement for it. Highways England will seek to work with Network Rail, public transport providers and the relevant local authorities to provide as many alternatives by public transport as possible. Whilst not providing a direct replacement for the LTC, road and rail public transport, ferries and rail freight would provide alternatives which would reduce the rate of growth in road traffic and increase the longevity of the infrastructure.'*

- B.1.61 This analysis has not been provided by National Highways to understand what options they considered and how they have assessed performance in comparison with the performance of their preferred option.

National Highways have not provided analysis justifying their assertion that a public transport option could not provide similar relief to Dartford Crossing.

### **Post Consultation Assessment**

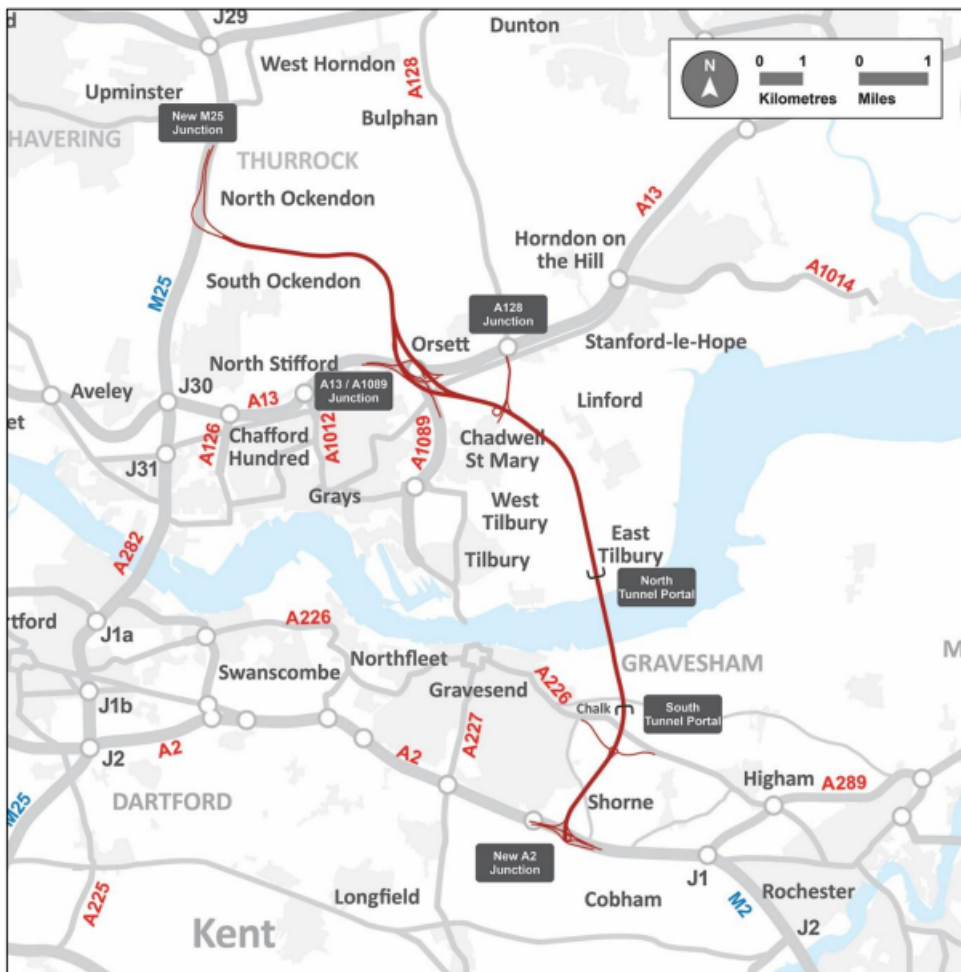
- B.1.62 Following consultation, a more detailed appraisal to inform the identification of the preferred option was undertaken and this included:
- a. Development of engineering designs of feasible crossing types.
  - b. Design of horizontal and vertical alignments for highways and junctions.
  - c. Estimating construction and operation and maintenance costs.
  - d. Traffic forecasting using the V2.1 LTC (SATURN) traffic model, taking into account planned housing and commercial developments.
  - e. Undertaking economic appraisal of each option in accordance with WebTAG guidance using outputs from the V2.1 LTC traffic model, using DfT's updated October 2015 consultation values of time.
  - f. Assessing the impact on people and property.

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- g. Appraisal of the environmental impacts both long term and during construction.
- B.1.63 Route 1 was still appraised as a short-listed option despite not being recommended for consultation.
- B.1.64 Route 2 was not considered following consultation as it was the least popular route north of the river, would cause more disruption during construction (as it is closer to more densely populated areas), had safety concerns over incorporating the A1089, required more property purchase and a number of environmental concerns were raised by the public.
- B.1.65 Route 1 does not meet transport objectives, increasing flow on the M25 and at key junctions along the M25 A282 corridor, worsening congestion, it does not improve resilience for the M25 and would require 6.5 years of speed restrictions on the M25 and existing crossing.
- B.1.66 Route 3 has the shortest route and would provide an entirely new route for traffic between A2/M2 and the M25, it also has the lowest capital cost and highest value for money and received greater support at consultation than Route 4.
- B.1.67 The ESL had greater support at consultation than the WSL, but concerns were raised over impacts on nationally designated landscapes, habitats, Green Belt and ancient woodland. Further design and appraisal was undertaken to try and address these.
- B.1.68 The preferred route was therefore designated as Route 3 with a bored tunnel and the Eastern Southern Link as shown in Figure B1.7. Importantly at this stage the exact arrangements for local junctions and the potential for Tilbury Link Road were not decided and further development work was required.

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NOTE: THIS DRAWING IS BASED ON THE ROUTE PRESENTED AT PUBLIC CONSULTATION. THE INCLUSION OF LOCAL JUNCTIONS AT TILBURY AND WITH THE A226 WILL BE EXAMINED IN THE NEXT STAGE OF SCHEME DEVELOPMENT

Figure B1.7: Preferred Route

**2018 Statutory Consultation**

B.1.69 For the 2018 Statutory Consultation, major decisions were made regarding local junction arrangements and the inclusion of Tilbury Link Road.

**Orsett Cock Junction**

B.1.70 The proposed design for the A13/A1089 Junction (Orsett Cock) changed radically from that shown in Figure B1.8 to Figure B1.9 and Tilbury Link Road had been removed.

B.1.71 The Project Design Report, submitted as DCO Document 7.4 outlines how this decision was made.

B.1.72 After the Preferred Route Announcement (PRA) further design work was undertaken at the junction seeking to address some of the most immediate concerns. Two options were developed:

- a. Further Option 1 – preferred route with an enhanced Orsett Cock junction
- b. Further Option 2 – simplified Orsett Cock junction in combination with a junction at Tilbury

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B.1.73 Appraisal of these junction options showed that while there were some improvements on the preferred route neither addressed all the issues and there were still several concerns, in particular, over the complexity of the junction and the impacts at the Orsett Cock junction. In the case of the latter, even with additional improvements, the more detailed traffic assessments of the junction's performance indicated that there could still be congestion.

B.1.74 Initially NH considered that Further Option 2 was the most appropriate solution and should be included in the Statutory Consultation, however, further internal NH assessment identified several issues:

- a. The complexity of the A13/A1089 junction which included long viaduct structures on links carrying relatively little traffic.
- b. The need to widen the A13 between the A1012 Stifford junction and the Project's route.
- c. The need to demolish and replace the A1089 bridge under the A13 leading to significant buildability concerns.
- d. Without the Tilbury link road, the connections between the A1089 and A13 need to be retained. The addition of an at-grade roundabout with the A1013 would not be appropriate due to the delays that it would introduce.

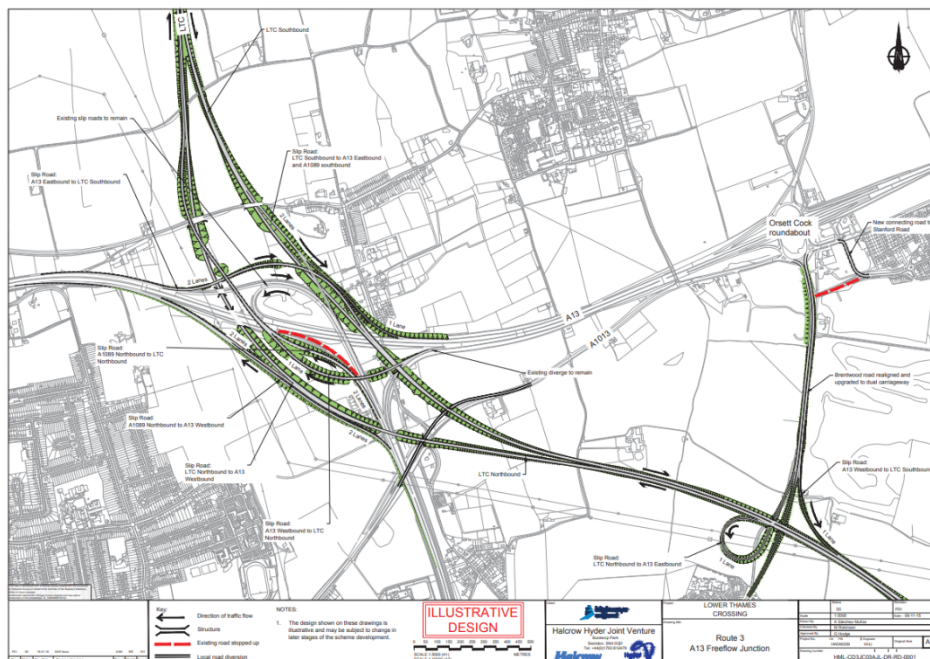


Figure B1.8: 2016 A13/A1089/LTC Junction

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Figure B1.9: 2018 A13/A1089/LTC Junction

**Tilbury Link Road**

- B.1.75 The Planning Statement submitted as DCO Document 7.2 states that Tilbury Link Road was removed from the design as it would not contribute to the scheme Objectives of relieving the existing Dartford Crossing despite providing benefits to the local community. Instead, NH recommended to DfT that Tilbury Link Road should be considered as an independent project.
- B.1.76 The Project Design Report, submitted as DCO Document 7.4, outlines work undertaken to investigate Tilbury Link Road which included further design and assessment work such as:
  - a. Inclusion of a junction near Tilbury both as a stand alone feature and in combination to changes at Orsett Cock.
  - b. Junctions to the west of East Tilbury that located both north and south of the Tilbury Loop Railway
- B.1.77 Though no link road was shown at Statutory Consultation, a junction was retained at Tilbury to give access to a Rest and Service Facility and maintenance depot area. Proposals were developed for its layout on site and landscape integration. Station Road was shown diverted around the new facility.
- B.1.78 The Council has concerns about the justifications for dropping Tilbury Link Road based on impacts at the existing Dartford Crossing as modelling shows that LTC with Tilbury Link Road reduces the flow across Dartford Crossing in both the AM and PM Peak.

Justification to not include a junction at Tilbury and Tilbury Link Road are not supported by evidence made available to the council.

**Summary**

- B.1.79 Figure B1.10 summarises the optioneering undertaken on LTC.

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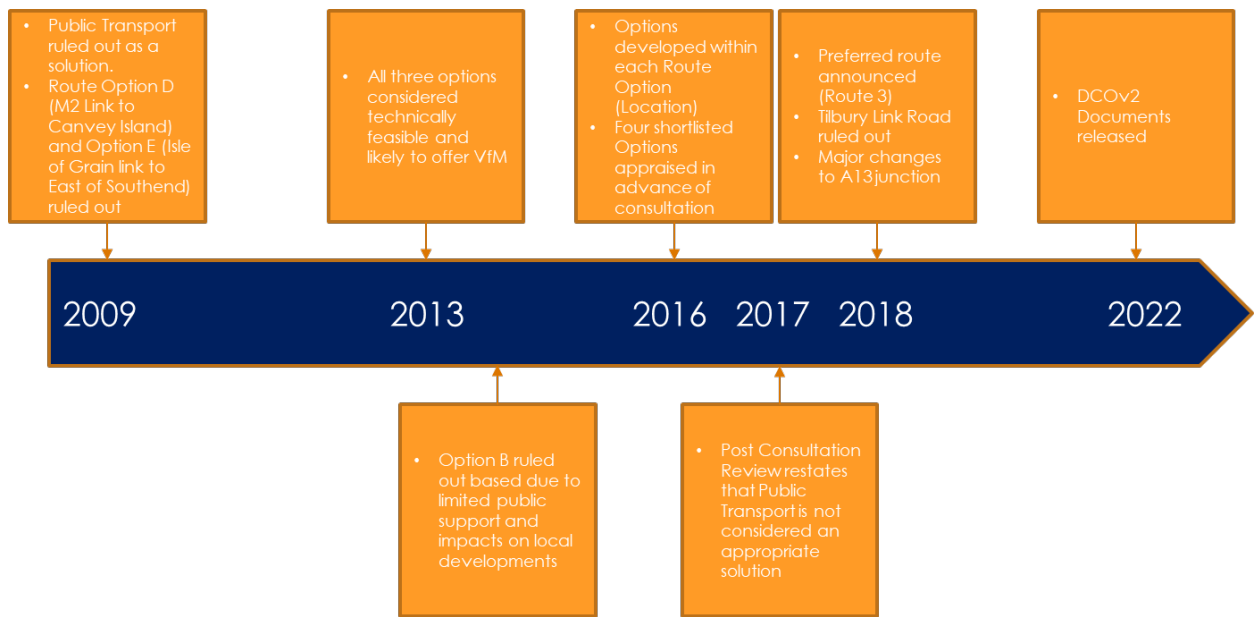


Figure B1.10: History of LTC Optioneering

**Alternatives to a Highway Solution**

- B.1.80 Fundamentally the option generation process for LTC can be traced back to the 2009 study which ruled out alternative modal solutions at an early stage. However, concerns were raised that not all aspects had been considered when reviewing the demand for public transport across the River Thames with significant employment and housing growth either side of the river likely to drive additional demand.
- B.1.81 The are surrounding the proposed LTC and the UK as a whole have changed significantly since 2009 when major decisions were made with regards to the opportunity for an alternative mode solution.

There have been major policy, social and economic changes at all levels since key optioneering decisions were made, evidence has not been presented showing that these have been considered.

- B.1.82 The 2017 Post Consultation Scheme Assessment Report stated that these assumptions had been revisited in line with the guidance provided in TAME Advice Note 2, therefore meeting National Highways' obligations under the NPS. However, this analysis has not been provided.
- B.1.83 The NPS states that schemes with significant environmental impacts (such as LTC) must outline what options were considered and provide the rationale for them not being considered. While the NPS says that the Examining Authority or Decision maker does not need to revisit the option generation process, the lack of information from the updated assessment of alternative modes does not give Thurrock Council confidence that National Highways have met their obligations under NPS and the 2008 planning act.

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### Choice of Highway Solution

- B.1.84 The development of the current PRA for LTC has taken place over the past 16 years and in general follows a logical trail from identifying potential corridors in 2009, shortlisting corridors in 2013 and identifying an appropriate corridor in 2016-2018.
- B.1.85 There are some anomalies highlighted that may have influenced some decisions but that would not have fundamentally changed the progression of one option over another:
- a. Scheme costs in 2013 appear optimistic – this impacts all options.
  - b. Option C (which ultimately becomes the preferred route) scores worst against environmental impacts – all options are expected to have negative environmental impacts.
  - c. Option C scores worst against safety – all options are expected to have negative safety impacts through the increase in traffic.
- B.1.86 There are concerns over the removal of Tilbury Link Road and a junction at Tilbury from the scheme, NH states this is based on not providing sufficient relief at the existing crossing but modelling shows that flow across the crossing is reduced when the Link Road is added to LTC.

### Issues with optioneering

#### Growth not Considered

- B.1.87 As per Medway Council's response to the 2009 Study, a number of key development sites on either side of the River Thames were ignored when reviewing the need for a public transport option.

#### Age of Assumptions on an Alternative Mode Solution being Ruled Out

- B.1.88 The 2009 Study underpins all the option generation carried out for LTC, this in turn is based on studies from as early as 1994, 28 years before the submission of the LTC DCO v2.
- B.1.89 There have been significant changes at a local, regional and national level that impact the assumptions made in 2009.

#### Local

- B.1.90 Provision at Dartford Crossing has changed with toll booths removed and toll price increased. Removal of the toll booths and moving to an online payment system has made the existing crossing operate more smoothly, reducing incidents and delays. The increased price of the toll could increase the cost of private car journeys, making public transport more appealing.
- B.1.91 Kent Fastrack has successfully extended to the south of the River Thames, this shows there is latent demand for a functioning transit system in the area. Combined with new provision for public transport crossing the River Thames, it is likely there is a market for a public transport service.
- B.1.92 London Gateway has developed into a major employment hub with Thurrock Council's area with DP World providing thousands of jobs at the site, encouraging people from Kent to want to commute into Essex to access these new opportunities.
- B.1.93 Thames Freeport is one of eight new freeports designated in the 2021 Budget where different economic regulations apply incentivising investment and growth. Two of the three Thames

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Freeport sites are located within Thurrock Council Area, London Gateway and Tilbury Port, with Dagenham the third outside the area. With these sites expected to experience significant growth it is likely that even more residents in Kent would be attracted to jobs at these sites, increasing the need for a cross River Thames public transport solution.

### Regional

- B.1.94 Silvertown Tunnel, a new crossing of the River Thames closer to central London has been approved. This new crossing, intended to relieve congestion through the Blackwall Tunnel includes dedicated lanes for buses and HGVs.
- B.1.95 Similarly, the Elizabeth Line has provided a new cross connection across the River Thames for public transport users to the east of central London.
- B.1.96 The provision of new public transport crossings of the River Thames widens the gap for public transport between what is on offer within London and what happens to the east.
- B.1.97 The Thames Estuary Growth Commission has been established, a new body setting out future aspirations for growth within the Thames Estuary. Their 2050 Vision sets out an ambitious delivery plan for north Kent, south Essex and east London that includes the aspiration for improved connections between and within cities, towns, villages and industries.

### National

- B.1.98 At a national level the UK has gone through a seismic level of change since the 2009 study (and especially since the 1994 work some of it is based on). The 2009 study was delivered in the immediate aftermath of the 2008 Economic Crisis which impacted growth in both employment and housing and led to residents taking decisions to save costs.
- B.1.99 Since then, the country has seen the growth of the economy in the immediate aftermath of the recession and then into Brexit and subsequently the Covid-19 pandemic. Both of these events have fundamentally changed the economic outlook of the UK.
- B.1.100 Some of LTC's major benefits are associated with providing access from the south east coast ports to the major north-south arterial routes (A1, M1 and M40) without the need to use the already congested existing Dartford Crossing. However, is the same level of demand likely following Brexit?
- B.1.101 Traffic modelling used to justify investment in LTC is based on pre-pandemic data, the pandemic accelerated changes in work patterns and travel behaviour that are still being established, can the forecasts in the LTC modelling be relied upon to estimate post-pandemic impacts?

### Induced Demand

- B.1.102 One of the key findings of the 2009 study was that a rail solution was unlikely to remove significant trips from the network to alleviate the problem. This was based on commuting patterns observed at the time, however, because there is no readily useable public transport system that crosses the River Thames to the East of the M25, this was an estimate.
- B.1.103 Modelling of LTC has shown that the new crossing actually leads to more movements across the River Thames than would be expected to use the existing Dartford Crossing. This induced or latent demand is reflective of people moving jobs or travelling to new locations they would not previously have been able to due to the level of delay across the existing crossing and people switching modes from public transport to car.



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B.1.104 The question is therefore, how can the assumption in the 2009 study, that there isn't sufficient latent demand to justify consideration of a rail option be considered valid when modelling of the proposed scheme shows induced demand on the highway network?

### **Impact of an Alternative Mode Solution**

B.1.105 The 2017 Post Consultation Scheme Assessment Report states that no alternative mode solution is likely to provide 75% relief of the identified problem (capacity across the existing Dartford Crossing) for the first 15 years, i.e. the removal of 34,000 cars and 8,000 heavy goods vehicles in 2025. The analysis supporting this statement is not provided so a review of the assumptions and methodology has not been possible.

B.1.106 However, following submission of the LTC DCO v2 in November 2022 the performance of the preferred option is presented in the Combined Modelling and Appraisal Report (ComMA) Transport Forecasting Package (TFP).

B.1.107 The TFP suggests that by 2045 (15 years after opening) LTC will only be removing 613pcu from the existing Dartford Crossing in the AM peak in both directions, a 4% reduction while in the PM peak only an 11% reduction would be seen.

B.1.108 The 2009 Study stated that the Dartford Crossing had a capacity of approximately 5,900 PCUs in each direction in 2007, so a two-way capacity of 11,800 PCUs. As mentioned there have been changes made to increase capacity at the crossing with the removal of toll booths, however, the proposed solution for LTC currently shows 14,900 PCUs on the existing crossing in the AM peak and 13,500 PCUs in the PM peak in 2045. Up to 26% higher than the estimated capacity in 2007.

B.1.109 Given the lack of impact that the proposed option has on the existing Dartford Crossing, particularly in the AM peak is it fair to state that an alternative mode solution cannot provide 75% relief of the problem if it is also unlikely the proposed highways solution can either?

### **Non-inclusion of Tilbury Link Road**

B.1.110 The decision not to include Tilbury Link Road is not supported by evidence made available to the council.

B.1.111 NH state in the LTC Planning Statement ([APP - 495](#)) that *'the Tilbury link road would not contribute to the Scheme Objectives of relieving the congested Dartford Crossing and approach roads and improve their performance by providing free flowing north-south capacity'* which suggests that inclusion of Tilbury Link Road increases traffic volumes across the existing Dartford Crossing.

B.1.112 As part of the Council's interaction with NH in advance of the DCO being submitted additional model runs were requested from NH for the following options:

- a. LTC with Tilbury Link Road
- b. LTC with Tilbury link Road, no direct access to LTC from A1089 at Orsett Cock
- c. LTC with Tilbury Link Road, no direct access to LTC from A1089 or A13 East to LTN North at Orsett Cock
- d. LTC with Tilbury Link Road, no Orsett Cock junction.

B.1.113 The results of this modelling show that all options that include Tilbury Link Road and some form of junction at Orsett Cock reduce two-way traffic over the existing Dartford Crossing

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compared to the preferred option, which does not support NH's assertion that Tilbury Link Road does not contribute to the Scheme Objectives.

## B.2. Public Transport Alternatives

### Purpose of This Report

- B.2.1 In advance of the LTC DCO Submission, the Council commissioned a high-level Mass Rapid Transit (MRT) feasibility study investigating public transport solutions for moving people within Thurrock, connecting to Essex and crossing the River Thames into Kent, this considered options with and without LTC being delivered.
- B.2.2 This report examines the options developed as part of the MRT feasibility study in the context of providing an alternative or complimentary solution to LTC, recasting objectives to match LTC's Scheme Objectives and consideration of any additional options that were not considered as part of the MRT feasibility study that could be considered as an alternative to LTC.

### Overview of MRT Study

#### Identified Challenges

- B.2.3 The MRT study considered available data to form a socio-economic and traffic baseline and identify challenges facing the Council that a potential public transport improvement would seek to address.
- B.2.4 In total four key challenges were identified as shown in Table B2.1 below.

Table B2.1: MRT Study Key Challenges

ID	Challenge
C1	Current crossings of the River Thames limit employment opportunities for residents of Thurrock
C2	The economy of Thurrock is growing slower than the national average
C3	Public transport connectivity from Thurrock to the rest of Essex and Kent is limited (and vice versa)
C4	High car usage in Thurrock causes congestion and air quality problems

#### Strategic Objectives

- B.2.5 Strategic Objectives for any public transport option to meet were developed for the study based on the identified challenges, prevailing socio-economic trends and the Council's needs to meet national, regional and local policy.
- B.2.6 Five objectives were identified as shown in Table B2.2.

Table B2.2: MRT Study Strategic Objectives

ID	Objective
O1	Improve accessibility to jobs, healthcare, education, and leisure to improve quality of life

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O2	Support local economic growth and key development areas
O3	Improve liveability and connectivity between Kent and Essex, stimulating growth.
O4	Provide a high-quality, affordable, and sustainable option for crossing the Thames Estuary
O5	Reduce emissions and improve sustainable transport in Thurrock and North Kent

### Options

B.2.7 A long list of options was developed working with the Council and stakeholders in nearby local Authorities and taking lessons learnt from elsewhere in the UK. Overall 17 initial options were considered as shown in Table B2.3.

Table B2.3: MRT Options

ID	Option
<b>Bus-Based Options</b>	
1.1	Extend the existing X80 Bus service – Proposals to extend the X80 service that runs between Lakeside and Bluewater Shopping centres to major population centres in Thurrock (Grays and Tilbury) and North Kent (Gravesend and Dartford)
1.2	Extend Kent Fastrack – Extend the existing Kent Fastrack Bus Rapid Transit (BRT) into Thurrock, including new BRT corridors and infrastructure in Grays/Tilbury and beyond.
1.3	South Essex Rapid Transit (SERT) – SERT is a BRT proposal that aims to link Lakeside, Grays, Stanford le Hope and Basildon and potential additional connections to Tilbury and Purfleet, Canvey Island and Southend
1.4	BRT Tunnel - Provision of a dedicated BRT Tunnel to link Thurrock and North Kent with the potential to integrate with SERT and Fastrack
1.5	Bus-Based Loop service – Combine the existing X80 service and Kent Fastrack to create an integrated loop service that could continue to use LTC (see later options) if delivered or integrate with the Tilbury-Gravesend ferry service and could combine with SERT (or other South Essex services).
<b>Ferry Options</b>	
2.1	Uber Boats – Implement existing plans for Uber Boat services from central London to Tilbury and Gravesend
2.2	Enhance River Boat Service – Alternative addition to Uber Boat proposals, providing additional stops in Thurrock and North Kent. Option would require piers to be constructed/renovated
<b>Multi-Modal Options</b>	
3.1	Ferry/Bus modal integration – enhancing connection to exiting cross-river ferry service by extending bus/BRT services to piers in Tilbury or Gravesend
<b>Rail-Based Options</b>	
4.1	KenEx Tram – Implement KenEx which proposes a tram network covering South Essex and North Kent, featuring a tunnel under the Thames between Grays and Ebbsfleet
4.2	Light Rail / Tram-Train service – Construction of new rail tunnel which is able to operate along existing c2c and Southeastern lines. Alternatively, the rail line could operate

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	independently with potential to connect to future Dockland Light Rail (DLR) extensions of KenEx.
4.3	Railway Station Infill – Providing a new station on the Highspeed 1 line near to Purfleet Station to link to local services.
4.4	Crossrail extension – Extension of the Crossrail into Thurrock either via Abbey Wood or a Crossrail 2 connection
LTC Options	
5.1	Rail/Tram on LTC – Provision of railway infrastructure on LTC, either a tram/light railway line or a heavy rail connecting c2c, Southeastern and potentially Eurostar services. This could be considered as an alternative crossing for KenEx or Lightrail/Tram-train options
5.2	Bus Access on LTC – Provision of bus access measures on LTC, making use of bus gates or emergency vehicle slip roads to improve connectivity for public transport and provide more direct routes for public transport instead of routing via Orsett Cock
5.3	Bus Lanes on LTC – Using either one or two lanes of LTC’s tunnel lanes for bus only travel. Potential to extend segregated bus lanes along key corridors in Thurrock and Kent.
5.4	Additional bus services on LTC – Implement a traditional bus service between Tilbury, Grays and Gravesend via LTC without any changes to the existing LTC design. Potential for buses to use Tilbury junction to avoid lengthy re-routing.
Future Technologies	
6.1	Demand Responsive Transport (DRT) and Autonomous vehicles – Provision of a Thurrock/North Kent DRT system making use of the Dartford Crossing and LTC if delivered.

### Option Assessment

B.2.8 Each option was assessed using a methodology similar to DfT’s Early Assessment and Sifting Tool (EAST). Each option was evaluated at a high level against the following:

- a. Each of the 5 Strategic Objectives
- b. Each of the 4 key challenges
- c. Policy: How well does this option fit with policy
- d. Economy: How likely is this option to provide economic benefit
- e. Public acceptability: How well is this option likely to be received by stakeholders and the public
- f. Deliverability: How deliverable is this option, is it technically feasible.
- g. Cost

B.2.9 All evaluations except for cost were given a score out five in line with the below.

- a. 5 – Excellent: option addresses item very well
- b. 4 – Good: option addresses item to a good extent
- c. 3 – Average: option addresses item to an acceptable level

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- d. 2 – Poor: option addresses problem to some degree but not sufficiently
- e. 1 – Very Poor: Option does not address item

B.2.10 Assessments were based on professional judgement as no modelling was undertaken, however, analysis of data from the cordoned SATURN traffic model and available census data was used to inform scoring.

B.2.11 Cost was considered differently with a score out of five based on the cost bands below:

- a. 5 – Less than £1m
- b. 4 - £1-10m
- c. 3 - £10-100m
- d. 2 - £100m-1bn
- e. 1 – Greater than £1bn

B.2.12 Costing was based on professional judgement as no design work was undertaken but were benchmarked against similar schemes elsewhere in the UK.

B.2.13 Figure B2.1 provides a summary of the assessment of the long list.

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Option		O1	O2	O3	O4	O5	C1	C2	C3	C4	3	4	5	6	7	Sum (Excluding cost)
Extend X80 Bus	1.1	4	3	3	3	4	3	3	4	3	4	3	5	5	< £1m	47
Extend Kent Fastrack	1.2	5	4	5	5	4	5	4	5	4	5	4	4	4	£10-100m	58
SERT	1.3	5	5	2	2	2	1	4	3	5	5	4	4	4	£10-100m	46
BRT Tunnel	1.4	5	5	5	5	5	5	4	5	5	4	4	2	1	> £1bn	55
Bus Loop Service	1.5	5	5	5	5	5	5	5	5	5	5	5	3	4	£10-100m	62
Uber Boats	2.1	2	2	3	2	3	1	2	2	2	3	2	3	5	< £1m	32
New River Services	2.2	3	3	4	3	2	2	2	3	3	4	4	4	5	£10-100m	42
Multi-Modal Integration	3.1	4	4	4	3	3	3	3	4	4	4	3	4	4	< £1m	47
KenEx Tram	4.1	5	5	5	5	5	5	5	5	5	5	5	3	2	> £1bn	60
Light Rail Service	4.2	5	4	5	5	5	5	5	5	5	3	4	2	1	> £1bn	54
High-Speed Station	4.3	3	2	4	4	4	3	5	4	3	4	4	3	1	> £1bn	44
Crossrail Extension	4.4	5	5	5	2	3	5	5	5	5	4	4	2	1	> £1bn	51
Rail on LTC	5.1	4	5	5	4	4	4	4	5	5	2	4	1	1	> £1bn	48
Bus Access on LTC	5.2	4	4	4	4	4	4	3	4	5	4	3	4	4	< £1m	51
Bus Lanes on LTC	5.3	4	3	4	5	4	4	3	4	3	3	3	2	1	< £1m	43
Regular Bus on LTC	5.4	2	2	3	3	3	4	2	3	3	4	4	3	5	< £1m	41
Future Technologies	6.1	2	4	4	5	3	3	4	3	2	2	2	1	1	£100-1bn	36

Figure B2.1: MRT Study Option Assessment

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B.2.14 Overall the best performing option was a new bus loop as shown in Figure B2.2 that could connect the Fastrack, and X80 services with a new loop through Grays and Tilbury which could cross the river over LTC or through integration with the Tilbury-Gravesend Ferry (bus to pier, crossing on pedestrian ferry using single ticket).

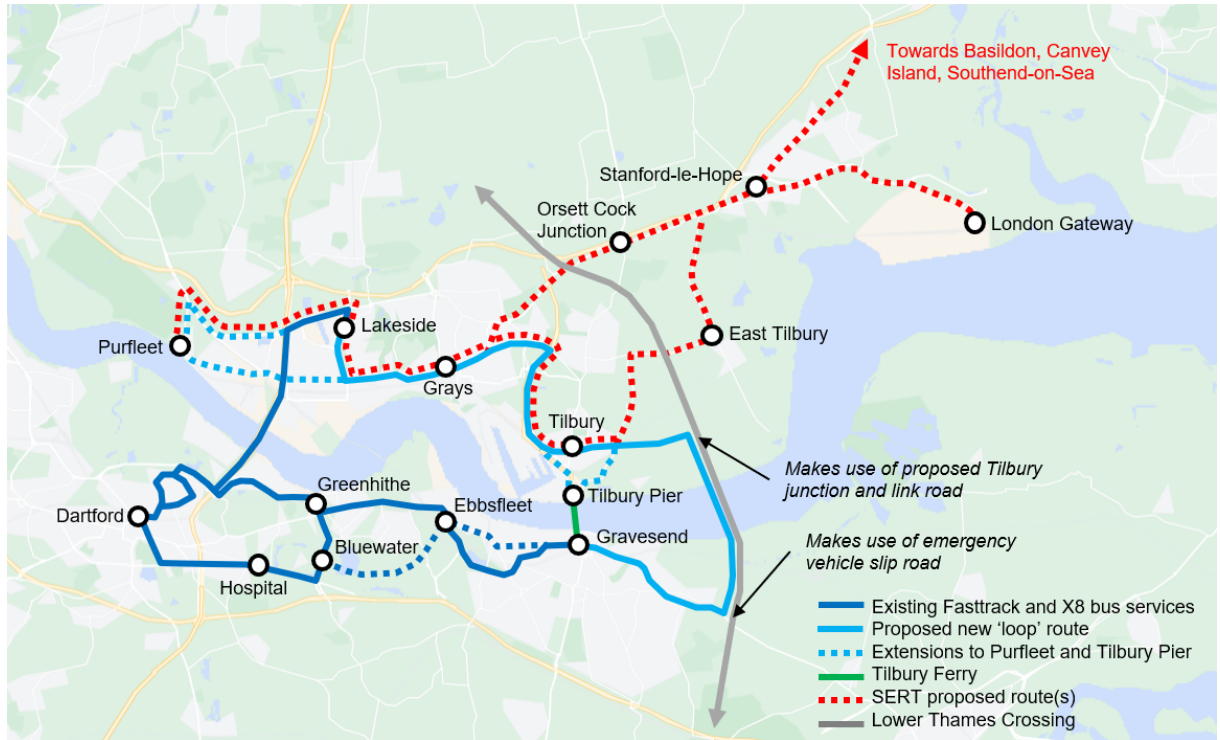


Figure B2.2: Bus Loop Option

B.2.15 Other options were also considered to perform well and were shortlisted for further investigation either individually, as part of, or complementary to the best performing option:

- a. Extending X80 bus route (stage one of an incremental approach to delivery of the bus loop)
- b. Extending Kent Fastrack (also forms part of the bus loop)
- c. SERT (provides opportunities to link Thurrock with the rest of South Essex but could also connect to the bus loop)
- d. Enhanced river services
- e. Multi-modal integration (part of the bus loop should the ferry crossing be required)
- f. Bus facilities on LTC (all three options could function with the bus loop)

### Updating Objectives

B.2.16 To assess alternative options in comparison to LTC it is important to use a consistent set of objectives. As such, the scheme objectives for LTC, as outlined in 7.1 The Need for The Project ([APP-494](#)) are used, these are shown in Table B2.4.

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Table B2.4: LTC Scheme Objectives

ID	Area	Objective
O1	Transport	To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity
O2		To improve the resilience of the Thames crossings and the major road network
O3		To improve safety
O4	Community and environment	To minimise adverse impacts on health and the environment
O5	Economic	To support sustainable local development and regional economic growth in the medium to long term
O6		To be affordable to government and users
O7		To achieve value for money

## Options

### Options from MRT Study

B.2.17 Initially all options from the MRT study were considered, however, an initial review identified that Option 1.3 (South Essex Rapid Transit) would have minimal impact on numbers using the existing Dartford crossing. All other options shown in B2.4 have been considered, however, Option 1.5 (Bus Loop) has been split into two options to differentiate between with and without LTC:

- a. 1.5a – Bus Loop (Ferry links): Extends Kent Fastrack and X80 bus service to Tilbury and Gravesend Ferry piers, single ticket allows use of Ferry and Bus.
- b. 1.5b – Bus Loop (use of LTC): Extends Kent Fastrack and X80 bus service into a single loop serving North Kent and Thurrock crossing the river on both the Dartford Crossing and LTC (using Tilbury Link Road and Tilbury Junction).

### New options

B.2.18 A number of new options have been considered as an alternative to Lower Thames Crossing and will also be assessed, in addition some options have been formally combined to differentiate options:

Table B2.5: New Options

ID	Option
Demand Management	
71	Increased Tolls (fixed price) – Increasing the existing Dartford Crossing Charge from £2.50 to £5.00
Packages	



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8.1	Provision of Bus Loop (using Tilbury-Gravesend Ferry) with demand management (increased Dartford Crossing toll)
8.2	Provision of Bus Loop (using Lower Thames Crossing) with demand management (increased Dartford Crossing toll)

### Option Assessment

#### Overview

- B.2.19 Using a similar approach to the option assessment used as for the MRT Study options have been assessed against objectives, challenges (as identified at the MRT Study), policy fit, impact on the economy, acceptability, deliverability and cost.
- B.2.20 Where possible options have been compared to the performance of the proposed LTC option (based on information presented in the Combined Modelling and Appraisal Report) when making assessments on each option's potential impact on congestion, environmental impacts etc.
- B.2.21 No new modelling has been undertaken and all assessment is based on professional judgement informed by available data.

#### Assessment against LTC Objectives

##### Congestion Relief at Dartford Crossing

- B.2.22 A high-level estimate of relief at Dartford Crossing has been estimated for each option based on a combination of census and model data.

#### Public Transport Impacts

- B.2.23 For public transport impacts the estimate is based upon a combination of model and census data.
- B.2.24 Census data has been used to identify the percentage of commuters who use public transport for three key movements, between Thurrock and Kent, between Thurrock and the rest of Essex and between Thurrock and London. Each of these movements has been assessed on a five-point scale for the quality of public transport connections as shown in Table B2.6 below.

Table B2.6: Public Transport share

Movement	Quality of Public Transport connectivity	% commuters using public transport	% commuters using car
Thurrock – Kent	Very Poor	4.3%	90.7%
Thurrock – Essex	Poor	7.2%	89.2%
Thurrock – London	Very Good	39.7%	68.1%

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B.2.25 Assumptions have then been made to estimate a percentage of public transport use for commuters for “moderate” and “good” public transport connections using an exponential trendline with a 0.9999r2 value as shown in Figure B2.3.

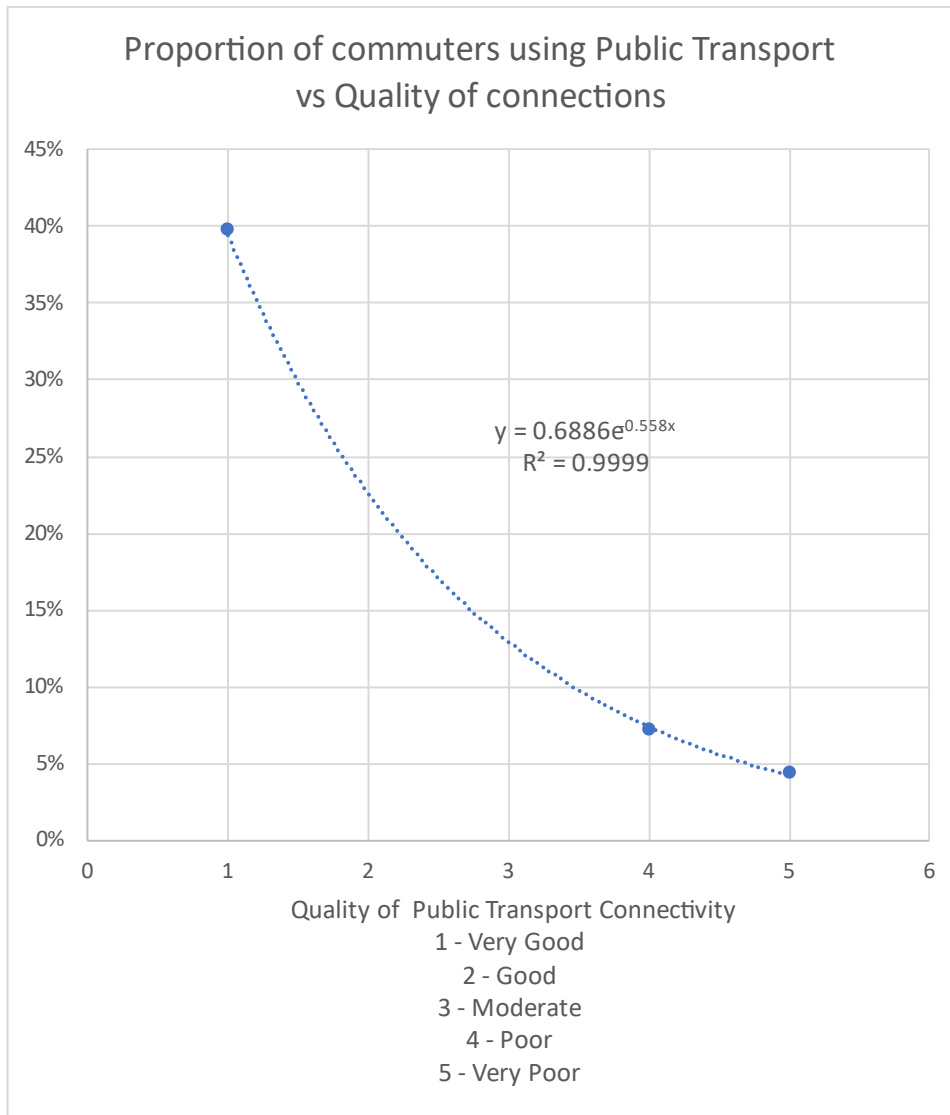


Figure B2.3: Proportion of commuters using public transport vs quality of connections

B.2.26 This gives the following proportions of commuters using public transport:

- a. Very good public transport connections – 39.7%
- b. Good public transport connections – 22.6%
- c. Moderate public transport connections – 12.9%
- d. Poor public transport connections – 7.2%
- e. Very poor public transport connections – 4.3%

B.2.27 To estimate the potential relief on Dartford Crossing this data has been combined with data from the cordoned SATURN model to estimate the potential shift away from car if all trips used

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the same proportions as commuting trips. Assumptions were made to allow for trips that cannot switch to public transport for example those with more remote origins or destinations.

B.2.28 Two-way trips removed from Dartford Crossing in the AM peak for each category are shown below:

Table B2.7: Quality of Public Transport relationship to trips

Quality of Public Transport Connections	Increase in Public Transport share	Commuting Trips removed from Dartford Crossing (AM Peak 2045)
Very Good	+35.4%	1,530
Good	+18.3%	791
Moderate	+8.6%	372
Poor	+2.9%	125
Very Poor	-	-

B.2.29 Each public transport option has been assessed to compare public transport connectivity across the River Thames to estimate the potential impact on congestion at Dartford

### Demand Management Impacts

B.2.30 The LTC Combined Modelling and Appraisal (ComMA) Report ([APP-518](#)) contains information on the modelling and appraisal undertaken as part of LTC. This includes investigation of how users react to tolling (an “elasticity”), information on the total trips assigned in the model, the total distance in the model, average speed in the model and so on.

B.2.31 This information has been used to undertake an initial assessment of the impact a change in toll charge on Dartford Crossing would result in.

B.2.32 Average trip costs for car journeys have been estimated based on TAG guidance and information provided in the ComMA report incorporating assumptions around average trip length to allow for the impact of HGVs and LGVs on total assigned distance in the model.

B.2.33 These average trip costs were assumed to include the Dartford Crossing toll (£2.50) as the model includes this. A new trip cost was developed for the average trip cost where the toll was increased and this was used alongside the toll elasticity data from the ComMA to estimate in an “own cost elasticity” calculation to understand what proportion of trips currently using the crossing would be likely to cancel/re-route or change destination to avoid the charge.

### Assessment scoring

B.2.34 The options have been assessed using the information presented above to understand the potential impact on congestion at Dartford Crossing and awarded a score on a scale of one to five where:

- a. 1 = Minimal impact at Dartford Crossing
- b. 2 = small impact at Dartford Crossing
- c. 3 = Similar impact to LTC at Dartford Crossing (removing 613 trips in the AM peak and 1717 in the PM Peak)

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- d. 4 = larger impact than LTC at Dartford Crossing
- e. 5 = Significant improvement on LTC at Dartford Crossing

B.2.35 The results are presented in the overall summary of option assessment in Figure B2.4.

### Improved Resilience of the Thames Crossings and SRN

B.2.36 Options have been assessed on their ability to provide an alternative crossing over the River Thames, providing greater resilience. This is primarily focused on road traffic as cars/vans/lorries cannot re-route to use a new rail bridge for example, however, a potential BRT tunnel could be opened to regular traffic in the case of an emergency.

B.2.37 Options have been scored on a scale of one to five based on professional judgement where:

- a. 1 = No increase in resilience
- b. 2 = small improvement in resilience
- c. 3 = similar improvement to proposed LTC for resilience
- d. 4 = larger improvement in resilience than LTC
- e. 5 = Significant improvement on LTC

B.2.38 The results are presented in the overall summary of option assessment in Figure B2.4.

### Improved Safety

B.2.39 There is an established relationship between volume of traffic and number of collisions and as such, accident rates are typically presented in collisions per million vehicle km. As a result, new roads schemes, such as LTC, that attract new trips that may previously have not been made or made on another mode typically lead to an increase in the number of collisions observed compared to the baseline or do minimum.

B.2.40 Options have been assessed based on professional judgement informed by the potential impact on demand (as outlined in the assessment of congestion relief at Dartford Crossing) and information from the ComMA which shows the safety impact of LTC. Options have been scored on a scale of one to five where:

- a. 1 = Large increase in the number of accidents from do minimum
- b. 2 = small increase in the number of accidents from do minimum
- c. 3 = No change in number of accidents from do minimum
- d. 4 = small decrease in the number of accidents from do minimum
- e. 5 = large increase in the number of accidents from do minimum

B.2.41 The results are presented in the overall summary of option assessment Figure B2.4.

### **Minimise adverse impacts on health and the environment**

B.2.42 The assessment against this objective is based on professional judgement informed by the likely impact of each option to reduce traffic volumes at key locations and is scored on a scale of one to five where:

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- a. 1 = Significantly worse than LTC
- b. 2 = worse than LTC
- c. 3 = Similar performance to LTC
- d. 4 = Better than LTC
- e. 5 = Significantly better than LTC

B.2.43 The results are presented in the overall summary of option assessment Figure B2.4.

Support sustainable local development and regional economic growth

B.2.44 Assessment of this objective has been approached similarly to the assessment of the MRT Study objective to support local economic growth and key development areas. Each option's ability to support key developments in Thurrock has been qualitatively assessed on a five-point scale where one is minimal support and five strongly supports the Council's development aspirations through providing improved connectivity via sustainable modes.

Affordable to the government and users

B.2.45 Assessment of this objective has been approached similarly to the assessment of affordability for the MRT Study, however, consideration has also been given to the affordability for users which was not included previously. For example, increasing the toll on the existing Dartford crossing is in theory very cheap in terms of cost to deliver but makes travel for users more expensive so these need to be balanced against each other.

Provides Value for Money

B.2.46 Assessment of this objective has been approached similarly to the assessment of VfM for the MRT Study and is based on professional judgement informed by the likely cost of an option and their benefits.

**Assessment against Challenges, Policy, Impact on the Economy, Acceptability, Deliverability and Cost**

B.2.47 In line with the approach adopted within DfT's EAST tool the options have been assessed against the key challenges identified as part of the MRT study, the option's fit with policy, the option's impact on the economy, the option's public and stakeholder acceptability, the option's deliverability and cost.

B.2.48 The same five-point scales have been used as outlined previously.

**Assessment Results**

B.2.49 The results of the option assessment are presented in Figure B2.4.

B.2.50 Overall, this assessment shows that alternative options could perform better than the proposed LTC option and warrant additional investigation to fully understand their impacts.

B.2.51 The best performing options against LTC's objectives are Options 1.5a, 1.5b, 8.1 and 8.2.

B.2.52 Options 1.5a and 8.1 both provide a bus loop that connects to the Tilbury to Gravesend ferry, linking Thurrock and North Kent through a single high quality public transport route. However, these options score poorly against LTC's objective to improve resilience across the river Thames and the wider SRN.

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- B.2.53 Options 1.5b and 8.2 both operate in addition to the proposed LTC option with the addition of Tilbury Link Road to provide improved public transport connectivity from Grays and Tilbury onto LTC and remove the need to use the bus. Through working as a package with LTC, these options do provide improved resilience, however, the cost of LTC makes them much less affordable.
- B.2.54 Option 8.2 would likely have the biggest impact in reducing congestion at Dartford Crossing but would force additional trips onto LTC, limiting the performance economically of the combined package.
- B.2.55 Options 1.1 and 1.2 also perform well, however, these also perform poorly against LTC's objective to improve resilience across the river Thames and wider SRN and would not be expected to have as large an impact on flows at Dartford Crossing as other options.

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### Lower Thames Crossing

ID	Option	Dartford Crossing congestion relief	Resilience	Safety	Environmental Impacts	Sustainable Growth	Affordability	Value for Money	C1	C2	C3	C4	Policy	Economy	Acceptability	Deliverability	Cost
0	Lower Thames Crossing	3	3	1	3	3	1	2	4	3	2	1	3	5	3	4	1
Bus-Based Options																	
1.1	Extend X80 Bus Service	1	1	3	4	3	5	5	3	3	4	3	4	3	5	5	5
1.2	Extend Kent Fastrack	2	1	4	4	3	4	4	5	4	5	4	5	4	4	4	3
1.4	BRT Tunnel	2	2	4	4	4	1	1	5	4	5	5	4	4	2	1	1
1.5a	Bus loop (using Ferry)	2	1	4	4	4	3	5	5	5	5	5	4	4	5	4	3
1.5b	Bus loop (using LTC)	4	3	2	4	5	1	4	5	5	5	5	4	5	3	4	1
Ferry Options																	
2.1	Uber Boats	1	1	3	4	3	5	3	1	2	2	2	3	2	3	5	5
2.2	Enhanced river boat service	1	2	3	4	4	3	3	2	2	3	3	4	4	4	5	3
Multi-Modal Options																	
3.1	Ferry/Bus modal integration	1	1	3	4	3	5	4	3	3	4	4	4	3	4	4	5
Rail-Based Options																	
4.1	KenEx Tram	3	1	4	4	5	1	2	5	5	5	5	5	5	3	2	1
4.2	Light Rail/Tram-train Service	3	1	4	4	4	1	2	5	5	5	5	3	4	2	1	1
4.3	Railway station infill	3	1	4	4	2	1	2	3	5	4	3	4	4	3	1	1
4.4	Crossrail extension	2	1	3	4	5	1	2	5	5	5	5	4	4	2	1	1
LTC Additional Options																	
5.1	Rail/Tram on LTC	4	3	1	4	5	1	1	4	4	5	5	2	4	1	1	1
5.2	Bus access on LTC	4	3	1	4	4	1	2	4	3	4	5	4	3	4	4	1
5.3	Bus lanes on LTC	2	2	2	4	3	1	1	4	3	4	3	3	3	2	1	1
5.4	Additional bus services on LTC	3	3	1	3	2	1	2	4	2	3	3	4	4	3	5	1
Future Technologies																	
6.1	DRT/Autonomous vehicles	1	1	3	3	4	2	2	3	4	3	2	2	2	1	1	2
Demand Management																	
7.1	Increased Tolls	3	1	4	4	1	3	3	1	1	1	3	2	3	2	3	5
Packages																	
8.1	Bus loop (using Ferry) with increased toll	3	1	4	4	4	3	4	5	5	5	5	4	4	2	4	3
8.2	Bus loop (using LTC) with increased toll	5	3	2	3	5	1	3	5	5	5	5	3	3	2	4	1

Figure B2.4: Option Assessment Results

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Lower Thames Crossing

## Summary

- B.2.56 The report has identified a series of interventions that could be implemented as a standalone alternative to LTC or delivered as a complementary addition to the scheme.
- B.2.57 Assessment of these options has shown that alternatives perform well against most of LTC’s scheme objectives apart from their ability to provide additional resilience to crossings over the river Thames and the wider SRN. In many cases alternatives are expected to perform better than the proposed LTC solution, especially for safety, environmental impact and affordability.
- B.2.58 Overall, the best performing alternative to LTC is the provision of a new high quality bus loop providing connectivity between Tilbury, Grays, Lakeside, Dartford, Bluewater, Swanscombe and Gravesend with integrated ticketing to use the Tilbury-Gravesend Ferry service. This option provides strong integration with other public transport networks north and south of the river Thames making public transport use more appealing for cross-river travel. Other options could better reduce congestion at Dartford Crossing but would be much more expensive or would involve an increase of the toll at Dartford Crossing which is likely to be much less acceptable to the public and would impact the affordability of travel.
- B.2.59 Assessment has also shown that the addition of complementary public transport interventions to LTC would strengthen performance against LTC’s scheme objectives, drawing additional traffic away from Dartford Crossing while reducing the environmental impact of the proposed option. As a complementary option expanding the stand-alone bus loop to use LTC, creating a continuous bus loop is the best performing option, however, this is predicated on the delivery of a junction at Tilbury and Tilbury Link Road. If this is not included then it is likely the performance of any Public Transport option will be limited.
- B.2.60 Table B2.8 below compares the proposed LTC Option against the best performing stand alone and complementary options.

Table B2.8: Comparison of top performing options to LTC

LTC scheme objective	LTC proposed option	High quality bus loop using Tilbury-Gravesend ferry	High quality bus loop using LTC via Tilbury Link Road
Relieving congestion at Dartford crossing	3	2	4
Improving the resilience of the Thames Crossings	3	1	3
Improving Safety	1	4	2
Minimising adverse impacts on health and the environment	3	4	4
Supporting sustainable growth	3	4	5
Affordability	1	3	1
Value for Money	2	5	4
Option scores worse than LTC	Option scores the same as LTC	Option scores better than LTC	



### B.3. Local Junction Alternatives

B.3.1 See Appendix B Annex 2.

### B.4. Alternative Options

#### Purpose of This Report

- B.4.1 LTC has been in development in various forms for over 20 years and seeks to increase road capacity over the River Thames to the east of London, relieving congestion on the existing Dartford Crossing.
- B.4.2 The council are concerned that the proposed LTC scheme and its forecast impacts on the road will lead the area facing significant challenges that risk constraining growth of the Thames Freeport and other local growth as well as having significant adverse impacts for local residents due to increased congestion on local roads, worsened air quality and noise, impacts to health and increased severance
- B.4.3 As a result, a number of alternative options have been developed either to replace the current LTC proposals or alter them to provide better outcomes for Thurrock and its residents.
- B.4.4 This report presents the best performing options developed under the following headings:
- a. Public transport alternative to LTC
  - b. LTC with public transport
  - c. LTC with revised local junction arrangements
  - d. LTC with revised local junction arrangements and public transport
- B.4.5 Each option has been assessed against LTC's scheme objectives (as shown in Table B4.1).

Table B4.1: LTC Scheme Objectives

ID	Area	Objective
O1	Transport	To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity
O2		To improve the resilience of the Thames crossings and the major road network
O3		To improve safety
O4	Community and environment	To minimise adverse impacts on health and the environment
O5	Economic	To support sustainable local development and regional economic growth in the medium to long term
O6		To be affordable to government and users
O7		To achieve value for money

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**Alternative Options**

**Public Transport Alternative**

- B.4.6 The best performing public transport alternative, when assessed against LTC’s scheme objectives, is a new high quality BRT service as shown in Figure B4.1. This option will be referred to as Option 1.
- B.4.7 This new service would combine the existing X80 service between Lakeside and Bluewater with new links through Chafford Hundred, Grays, Chadwell St Mary and Tilbury to Tilbury Pier to the north of the River Thames and an extended Kent Fastrack service through Dartford, Ebbsfleet, Northfleet and Gravesend to Gravesend Pier to the south of the river.
- B.4.8 This option would integrate the Tilbury-Gravesend Ferry service into the BRT network providing a high quality, frequent and bidirectional loop servicing the major towns in Thurrock and North Kent and provides connections to the proposed South Essex Rapid Transit (SERT) scheme.
- B.4.9 Other options have been considered that could potentially have more significant impacts but would be significantly more expensive than this option.

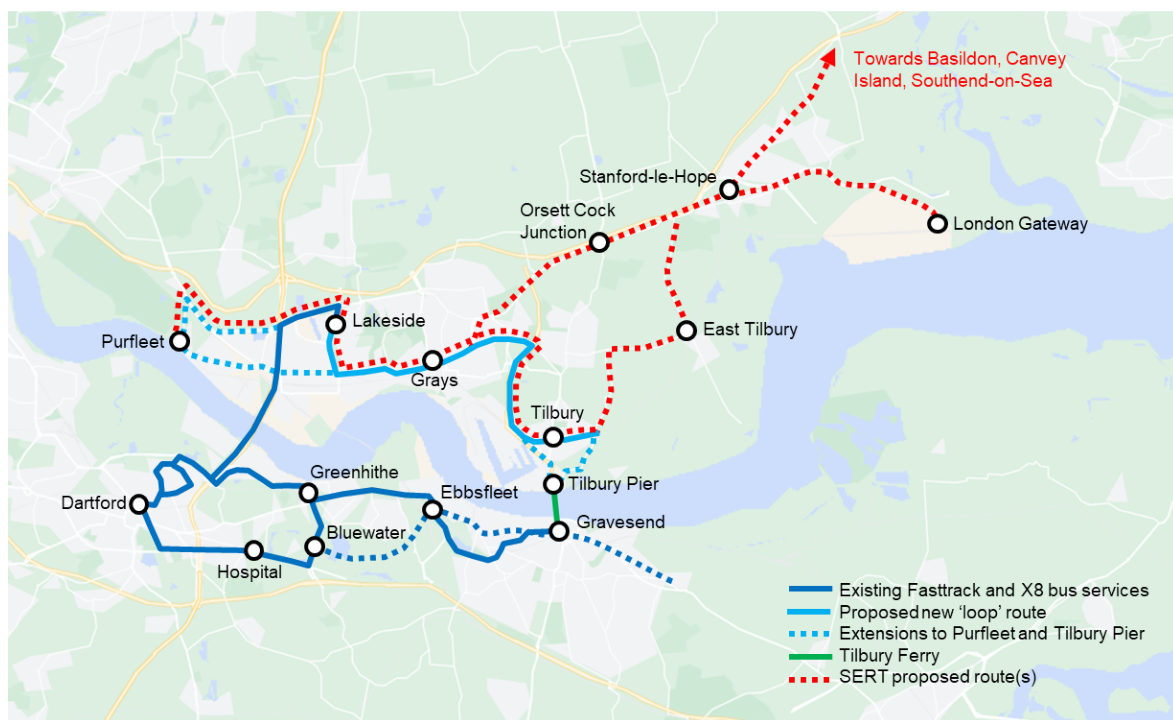


Figure B4.1: Public Transport Alternative

**LTC with Public Transport**

- B.4.10 The best performing public transport option with the current LTC proposals is to extend the bus loop described above to access LTC at the proposed A13/A1089 Junction at Orsett Cock and the proposed junction with the A2 as shown in Figure B4.2. This option will be referred to as Option 2.

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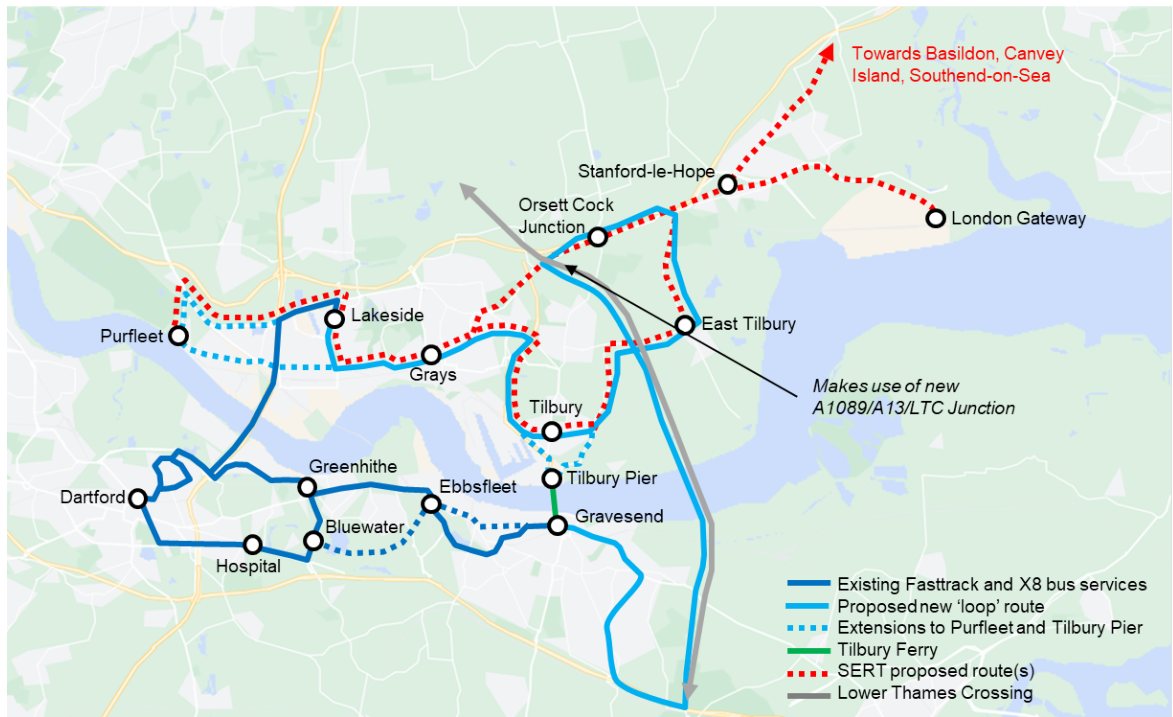


Figure B4.2: LTC with Alternative Public Transport

**LTC with Revised Local Junction Arrangements (1)**

B.4.11 This option alters the proposed LTC arrangements through providing a new junction at Tilbury and incorporation of Tilbury Link Road without changes to any other junctions as shown in Figure B4.3. This option will be referred to as Option 3.

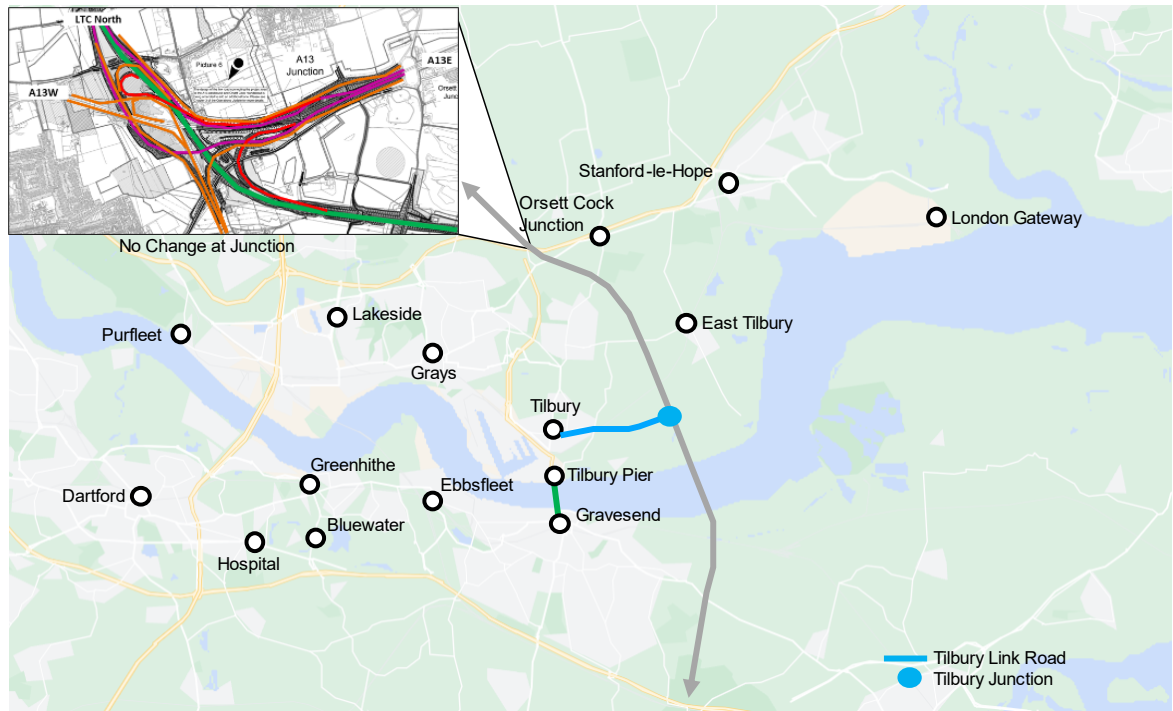


Figure B4.3: LTC with Revised Local Junction Arrangements (1)

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**LTC with Revised Local Junction Arrangements (2)**

B.4.12 This option makes three alterations to the proposed LTC option as outlined below:

- a. Provision of a junction at Tilbury and the TLR
- b. Removal of connections between the A1089 and LTC at Orsett Cock
- c. Removal of the connection from the A13 East to LTC North at Orsett Cock.

B.4.13 This option will be referred to as Option 4 and is shown in Figure B4.4 below.



Figure B4.4: LTC with Revised Local Junction Arrangements (2)

**LTC with Revised Local Junction Arrangements and Public Transport**

B.4.14 This option combines Option 2 and Option 4 so that the BRT service accesses LTC via TLR as shown in Figure B4.5. This option will be referred to as Option 5.

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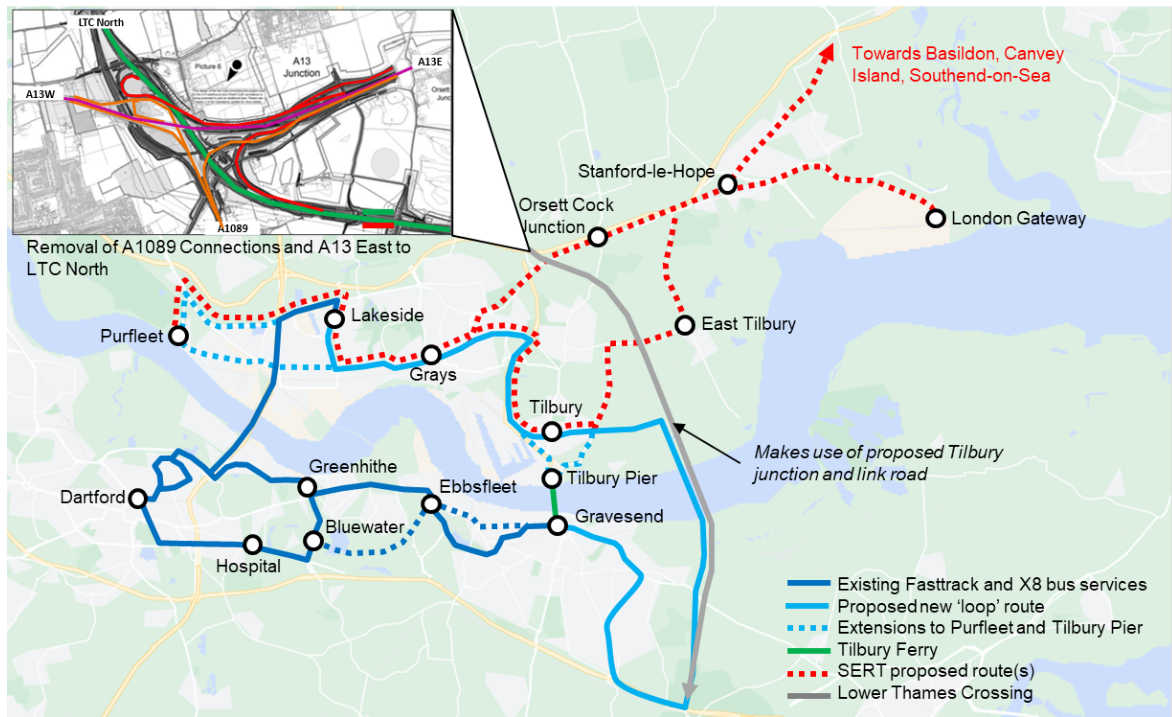


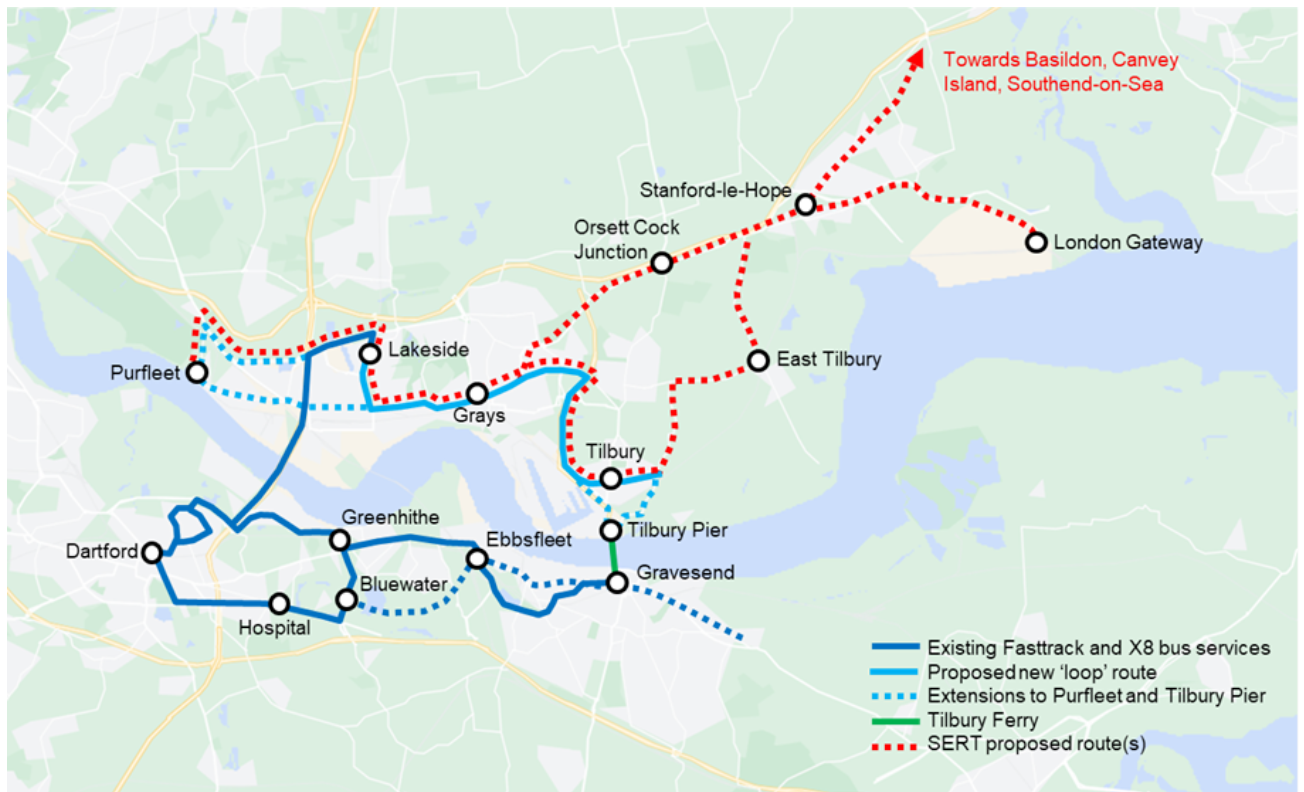
Figure B4.5: LTC with TLR and Public Transport

### Option Comparison

B.4.15 This section assesses each option's performance against LTC's scheme objectives in comparison to the proposed LTC scheme with each option either scoring "better", "similar" or "worse".

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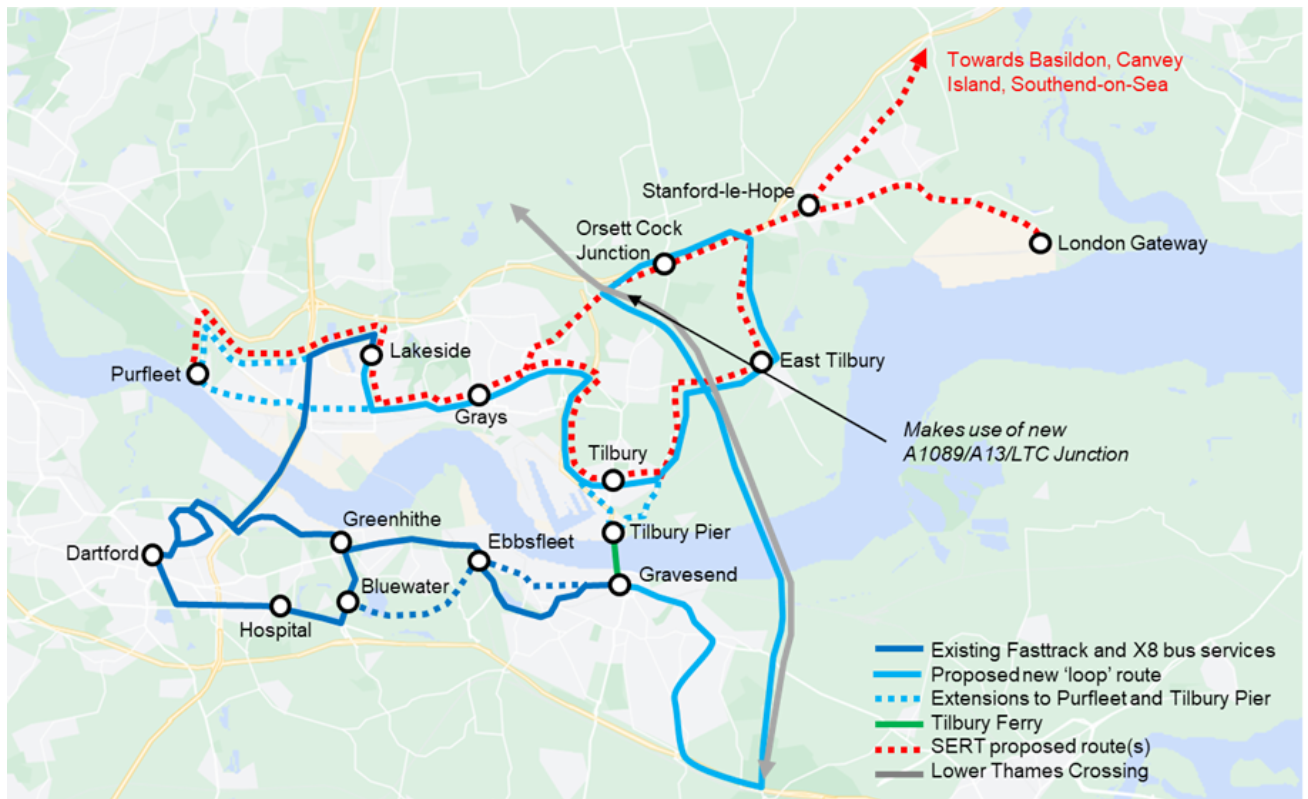
**Option 1 - Public Transport Alternative**



Scheme Objective	Performance	Reasoning
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	Worse	This option is likely to have a smaller impact on Dartford Crossing as integration with Tilbury Ferry and the need to transfer will limit the attractiveness of the bus for cross river travel
To improve the resilience of the Thames crossings and the major road network	Worse	This option does not provide additional routes to cross the river Thames
To improve safety	Better	This option is likely to improve safety due to reducing the number of vehicles on the highway network
To minimise adverse impacts on health and the environment	Better	This option has a much smaller environmental impact than the proposed scheme and supports movement using sustainable transport
To support sustainable local development and regional economic growth in the medium to long term	Better	This option provides better links across the River Thames to the Port of Tilbury and integrates well with public transport proposals north and south of the river.
To be affordable to government and users	Better	This option is likely to be significantly cheaper than the proposed scheme
To achieve value for money	Better	Due to the low cost of the scheme, it is likely this option would offer higher value for money

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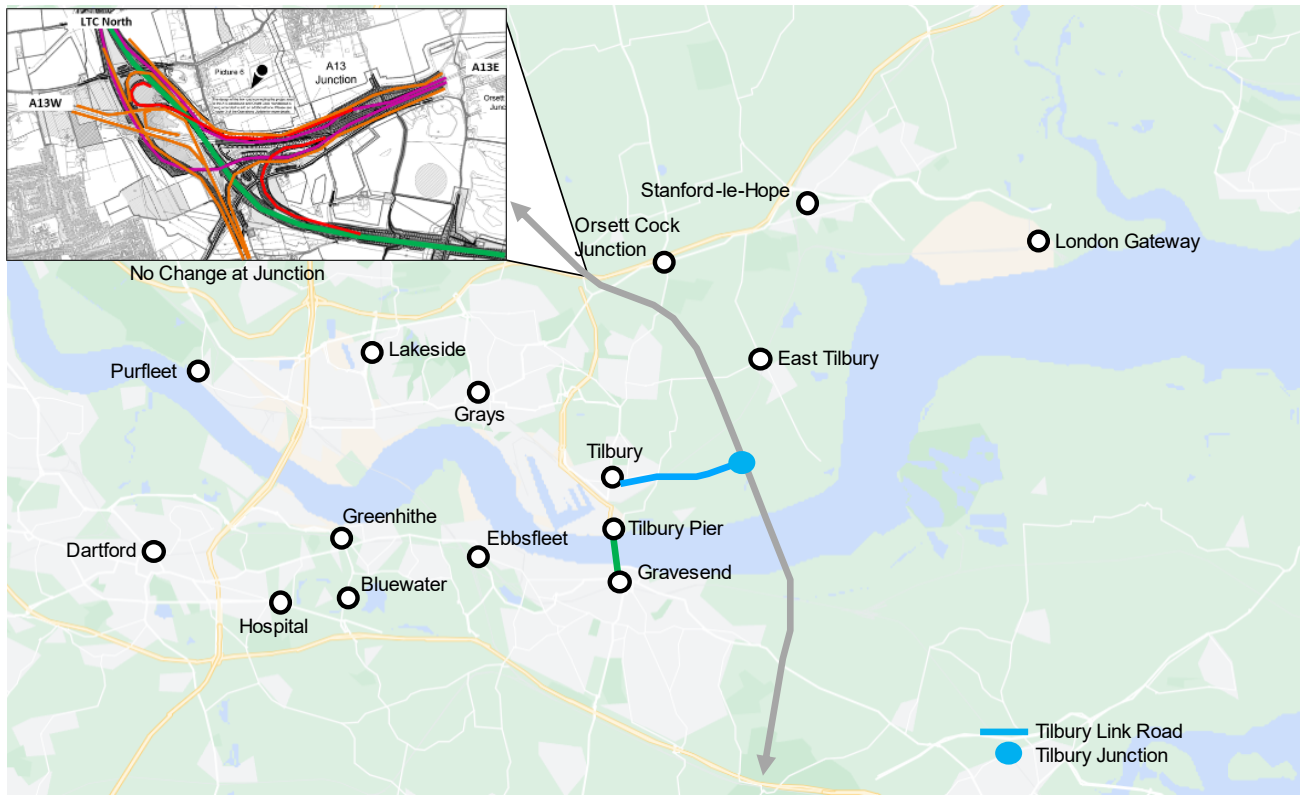
Option 2 - LTC with Public Transport



Scheme Objective	Performance	Reasoning
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	Better	Addition of a high-quality public transport service is likely to draw additional trips away from the highway network, better relieving Dartford Crossing.
To improve the resilience of the Thames crossings and the major road network	Similar	This option provides the same level of resilience as the proposed option
To improve safety	Better	This option is likely to improve safety due to reducing the number of vehicles on the highway network compared to the proposed option.
To minimise adverse impacts on health and the environment	Better	This option is likely to have improved environmental outcomes through supporting movement on sustainable travel
To support sustainable local development and regional economic growth in the medium to long term	Better	This option provides sustainable access from Kent and Essex into the Port of Tilbury via public transport from both sides of the River Thames.
To be affordable to government and users	Similar	This option is unlikely to cost significantly more than the proposed option
To achieve value for money	Similar	This option is likely to offer additional benefits on top of the proposed scheme, however, this is unlikely to have a large impact on the overall Value for Money of the scheme.

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Option 3 - LTC with Revised Local Junction Arrangements (1)

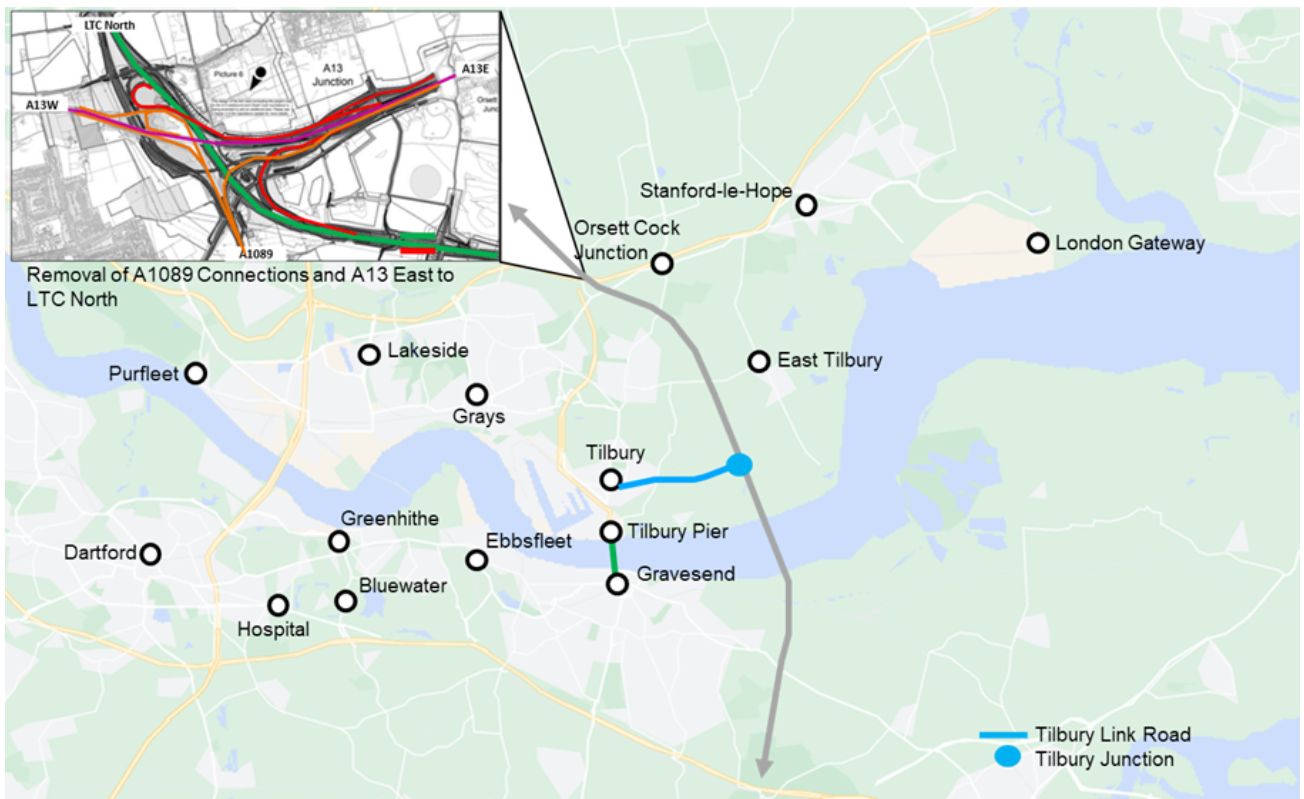


Scheme Objective	Performance	Reasoning
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	Better	Modelling has shown this option is likely to further reduce the volume of traffic using the Dartford Crossing
To improve the resilience of the Thames crossings and the major road network	Similar	This option provides the same level of resilience as the proposed option
To improve safety	Similar	This option is likely to lead to an increased number of accidents, similar to the proposed option
To minimise adverse impacts on health and the environment	Similar	This option is likely to have some benefits to the local network within Thurrock, particularly in Chadwell St Mary and Linford, but is still likely to have the forecast negative impacts of the proposed scheme
To support sustainable local development and regional economic growth in the medium to long term	Better	This option provides improved access from key development sites onto the SRN via TLR. This option also provides better connections for any local public transport services who could access the SRN via TLR.
To be affordable to government and users	Similar	This option is unlikely to cost significantly more than the proposed option
To achieve value for money	Better	This option is likely to offer additional benefits on top of the proposed scheme as a result of improved journey times within Thurrock and across the Dartford Crossing.



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Option 4 - LTC with Revised Local Junction Arrangements (2)



Scheme Objective	Performance	Reasoning
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	Better	Modelling has shown this option is likely to further reduce the volume of traffic using the Dartford Crossing
To improve the resilience of the Thames crossings and the major road network	Similar	This option provides the same level of resilience as the proposed option
To improve safety	Similar	This option is likely to lead to an increased number of accidents, similar to the proposed option
To minimise adverse impacts on health and the environment	Similar	This option is likely to have some benefits to the local network within Thurrock, particularly through relief on the A13 and key local junctions but is still likely to have the forecast negative impacts of the proposed scheme when additional impacts from TLR are considered.
To support sustainable local development and regional economic growth in the medium to long term	Better	This option provides improved access from key development sites onto the SRN via TLR, however, this option does increase journey times to the SRN from London Gateway. This option also provides better connections for any local public transport services who could access the SRN via TLR.
To be affordable to government and users	Similar	Through reduced land take and structures required at the A13/A1089/LTC Junction costs are likely to be similar to the proposed option despite TLR and Tilbury Junction

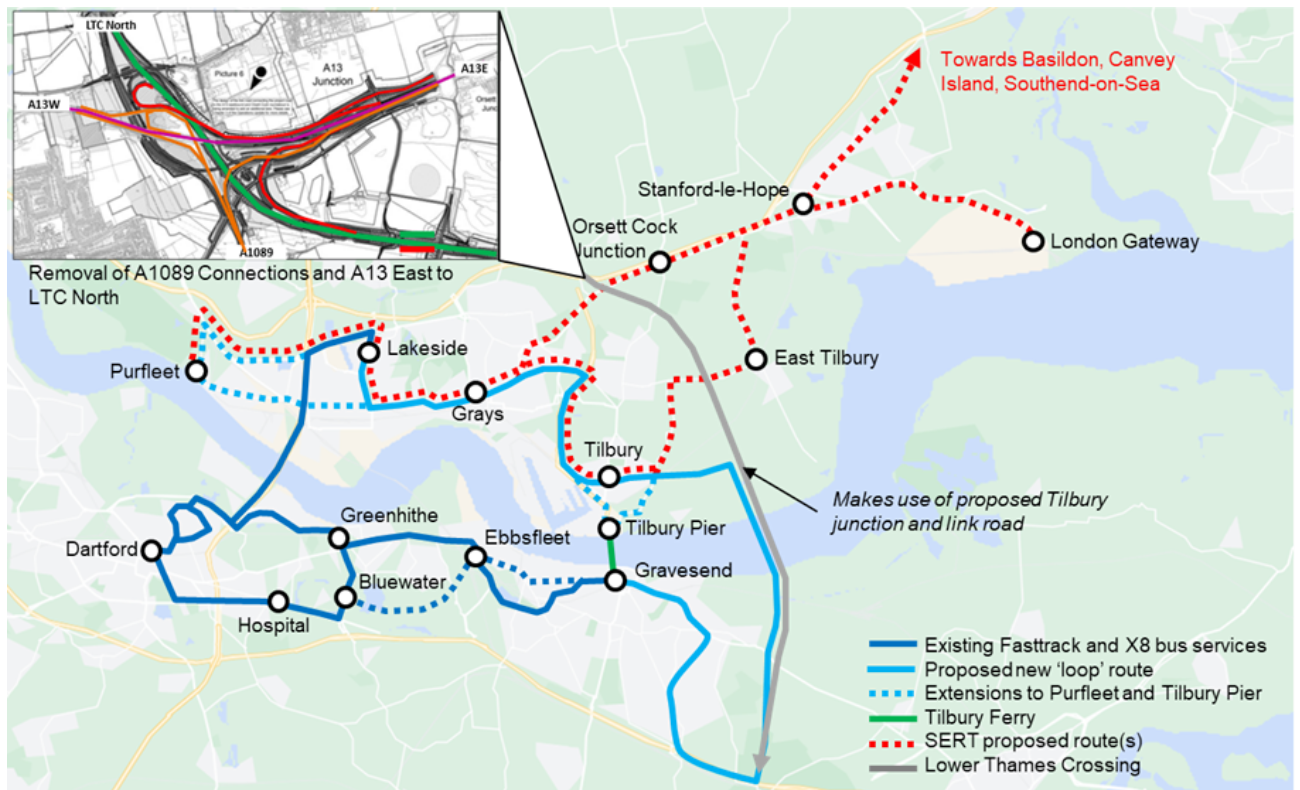
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 Lower Thames Crossing

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To achieve value for money	Better	This option is likely to offer additional benefits on top of the proposed scheme as a result of improved journey times for key movements and within Thurrock.
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**Option 5 - LTC with Revised Local Junction Arrangements and Public Transport**



Scheme Objective	Performance	Reasoning
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	Better	This option is likely to have a larger impact on reducing congestion at Dartford Crossing than Option 4 which modelling suggests will have a larger impact than LTC.
To improve the resilience of the Thames crossings and the major road network	Similar	This option provides the same level of resilience as the proposed option
To improve safety	Better	This option is likely to lead to improved safety compared to the proposed LTC option as some highway traffic will change mode.
To minimise adverse impacts on health and the environment	Similar	This option is likely to lead to improved environmental outcomes compared to the proposed scheme as traffic shifts to sustainable modes, reducing the increase in AQ impacts forecast, however, additional impacts would be expected near the TLR.
To support sustainable local development and regional economic growth in the medium to long term	Better	This option provides improved access from key development sites onto the SRN via TLR for car users and public transport from both the north and south of the River Thames.
To be affordable to government and users	Similar	Through reduced land take and structures required at the A13/A1089/LTC Junction costs are likely to be similar to the proposed option despite inclusion of TLR and Tilbury Junction

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To achieve value for money	Better	This option is likely to offer additional benefits on top of the proposed scheme as a result of improved journey times for key movements.
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## Summary

B.4.16 This report has shown that the inclusion of public transport or alterations to junction design/locations as part of the proposed LTC option would better support the overall scheme objectives as shown in Table B4.2.

B.4.17 A public transport only solution is unlikely to address scheme objectives as strongly as the proposed scheme but as a low-cost option could offer greater value for money and significantly improved environmental outcomes.

Table B4.2: Summary of Option Performance

Objective	LTC	Option 1	Option 2	Option 3	Option 4	Option 5
To relieve the congested Dartford Crossing and approach roads and improve their performance by providing free-flowing north-south capacity	=	-	+	+	+	+
To improve the resilience of the Thames crossings and the major road network	=	-	=	=	=	=
To improve safety	=	+	+	=	=	+
To minimise adverse impacts on health and the environment	=	+	+	=	=	=
To support sustainable local development and regional economic growth in the medium to long term	=	+	+	+	+	+
To be affordable to government and users	=	+	=	=	=	=
To achieve value for money	=	+	=	+	+	+

# **Lower Thames Crossing**

**Thurrock Council Local Impact Report**

**Appendix B Annex 2 - LTC Alternatives: TLR and A13 Junction**




Thurrock Council - Lower Thames Crossing

## Appendix B Annex 2 – LTC Alternatives – TLR and A13 Junction

Strategic Model Review and Option  
Assessment

January 2023



 [thurrock.gov.uk](http://thurrock.gov.uk)



# Document Control Sheet

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**Client / Project Ref:** Thurrock Council / 43879

**Report Title:** Appendix B Annex 2 – LTC Alternatives – TLR and A13 Junction

**Doc Ref:** Revision C

**Date:** January 2023

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Revision	Date	Description	Prepared	Reviewed	Date
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B	08 Nov 2022	Draft Issued to Thurrock Council for Discussion	NB	CB/KM	22/11/2022
C	24 Jan 2023	Final	NB	KM/CB	24/01/2023

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**Executive Summary****1. Introduction and Background**

- Lower Thames Crossing (LTC) Scheme and Objectives
- Risks to Growth in Thurrock
- Scale and Significance of Local Harm in Thurrock
- Lack of Alternative Options Appraisal by National Highways
- Report Purpose

**2. Thurrock Council's Alternative Options**

- Tilbury Link Road
- LTC/A13/A1089 Interchange Reconfiguration

**3. Approach to Strategic Assessment of Options****4. Summary of Findings****5. Conclusions****6. Recommendations****Appendices**

**Appendix A1:** Summary Model Data, Dashboards and Appraisal Tables for Do Minimum, LTC Only and Alternative Options

**Appendix A2:** Delay Plots (All Options)

**Appendix A3:** LTC/A13/A1089 Junction Land Take Plans





## Executive Summary

Thurrock Council is extremely concerned that the currently proposed LTC scheme configuration and its forecast impacts on the road network will leave the area facing significant challenges that risk constraining Freeport expansion and its ability to deliver future Local Plan growth. Also that LTC will result in significant adverse local harm in Thurrock relating to land take and property impacts, severance, traffic delay, safety and congestion, health, air quality, noise, accessibility and the economy. Given these issues the Council contends that there is a significant burden of proof resting with NH to demonstrate that a full range of alternative options have been thoroughly assessed in justifying the currently proposed scheme design.

The Council has long held the view that, should the scheme progress, alternative configurations of the LTC scheme (including the Tilbury Link Road and reducing connectivity at the LTC/A13/A1089 interchange) could potentially maintain good strategic benefits, better support local growth aspirations whilst reducing the significant adverse local harm LTC will create in Thurrock. However, despite regular requests from the Council, NH have not provided evidence that these alternative options have been fully assessed.

In December 2021, NH finally agreed to testing four of these potential alternative LTC configurations for the Council. Cordoned version of the LTAM alternative option models (covering the Thurrock area only) and some limited data from the full LTAM model were shared with the Council for review thus limiting the Council's ability to assess these alternatives. Whilst NH have also presented the Council with some high level findings from their model runs a full assessment of these alternative LTC configuration options has not been provided. The council has therefore in the undertaken its own strategic assessment of the LTC scheme and these alternative options based on the limited information it has available. The findings of this assessment are presented in this report.

It was agreed with NH at the time of scoping the alternative options for LTAM model runs that these would be initial tests, and that an iterative approach would be needed to refine alternatives on the basis of the evidence provided by the model outcomes. It was highlighted by the Council that tests to incorporate Local Plan and port growth would be needed, as well as refinements to include road space reallocation for alternative modes as part of the A1089/TLR route to assess the potential to manage demand for car use on local roads and limit through traffic through the urban area. This is a normal part of an iterative approach to scheme development. NH have not undertaken any further option modelling.

This strategic assessment highlights that the alternative LTC highway configurations identified by Thurrock, including the TLR alongside a re-configured LTC/A13 junction, could help re-balance the LTC's outcomes and impacts, still providing strategic and local benefits whilst reducing scale of local impacts and harm within Thurrock. Overall, it is concluded that LTC highway configuration options CTL01 and CTL05 modelled have good additional benefits in comparison to the current LTC scheme and have the potential to provide a better balance between strategic benefits and local harm in Thurrock. The main benefits of option CTL01 and CTL05 in comparison to the LTC are summarised in **Table E1**.

It is the Council's view that:

- options CTL01 and CTL05 should be further reviewed and considered by NH in order to develop an alternative LTC scheme that is better suited to support local growth, reduce local impacts and environmental harm and provide better scheme value for money
- these options should also be developed and assessed as part of an 'integrated alternative option' including a package of supporting sustainable transport and behaviour change/demand management measures to promote more public transport use and active travel across the area. These will be essential to help address the carbon emissions, local air quality and environmental disbenefits associated with all these LTC highway configuration options and to ensure sustainable port and local growth aspirations can be delivered
- the current LTC scheme should not have been submitted as a DCO application until this work had been properly completed



# Summary of Main Benefits of Options CTL01 and CTL04 Compared to Current LTC Scheme

Table E1: CTL01 and CTL04 - Additional Benefits, Reduced Harm and VfM Opportunities

<p>LTC + Tilbury Link Road LTC/A13 Interchange: No Change  (Option CTL01)</p>	<p>LTC + Tilbury Link Road LTC/A13 Interchange: No Direct Connections from A1089 to LTC <u>AND</u> from A13E to/from LTC North (Option CTL05)</p>
<p>This option would better support sustainable Freeport and Local Plan growth, reduce local harm in Thurrock and provide better value for money by:</p> <ul style="list-style-type: none"> <li>• providing more direct connections between LTC and Port of Tilbury</li> <li>• unlocking opportunities for faster cross river and local public transport connections via the Tilbury Link Road and LTC</li> <li>• providing additional journey times savings across the area, particularly for trips between Tilbury and areas south of the river</li> <li>• improving the scheme’s strategic road network benefits by providing additional relief to the Dartford crossings, at M25 Junctions 30 and 31, on the A13 West of LTC and on the A1089 including at the Asda Roundabout</li> <li>• reducing LTC’s negative impact on the Local Road Network including on A13 Corridor (East of LTC) and at the A13 Orsett Cock junction</li> <li>• mitigating the negative impacts of LTC on local communities particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary), Rectory Rd (Orsett) and Buckingham Hill Road (Linford).</li> </ul>	<p>This option would better support sustainable Freeport and Local Plan growth, reduce local harm in Thurrock and provide better value for money by:</p> <ul style="list-style-type: none"> <li>• providing a more direct connection between LTC and the Port of Tilbury</li> <li>• unlocking opportunities for faster cross river local public transport connections via the Tilbury Link Road and LTC</li> <li>• still delivering strategic road network benefits - providing relief to the Dartford Crossings, on M25 approaches, on A13 Corridor (west of LTC) and significantly reducing traffic demand on A1089 and at Asda Roundabout</li> <li>• reducing some of LTC’s negative local traffic and environmental impacts – the total distance travelled by all vehicles across Thurrock is reduced by 3%-4% compared to the current LTC scheme (average vehicle trip lengths are also reduced)</li> <li>• reducing the negative impacts of LTC local communities, particularly by reducing traffic on Brentwood Road, Chadwell Hill (Chadwell St Mary), Muckingford Rd and Buckingham Hill Road (Linford)</li> <li>• reducing the LTC/A13 interchange footprint and significantly reducing LTC’s land take and local environmental impacts in Thurrock</li> <li>• reducing the embedded carbon associated with the scheme</li> <li>• reducing local air quality and noise impacts along the route of LTC through Thurrock as a result of reduced traffic flow on LTC and also along the A1089 in Tilbury</li> <li>• providing an opportunity to reduce scheme costs (associated with the LTC/A13 interchange) and freeing up project funding for the TLR and targeted measures to mitigate wider network impacts and support sustainable transport measures</li> <li>• reducing construction impact and timescales (associated with the LTC/A13 interchange)</li> </ul>

# 1. Introduction and Background



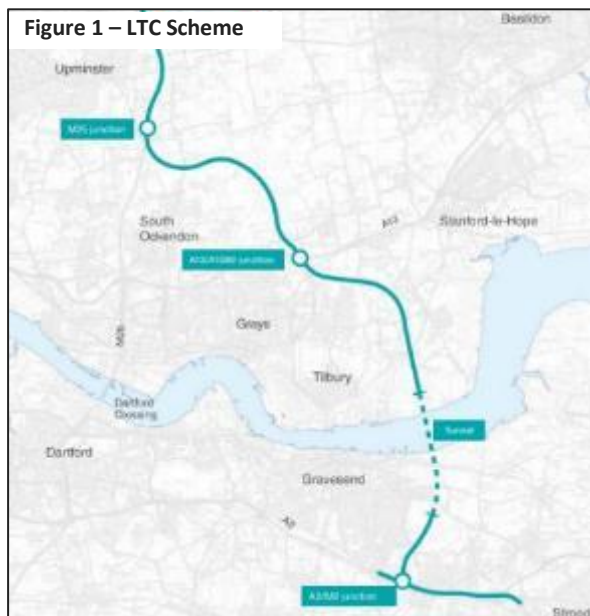


# Introduction and Background

## Current LTC Scheme and Objectives

The Lower Thames Crossing (LTC) scheme shown in **Figure 1** is approximately 14.3 miles (23km) of new road and tunnel connecting the A2/M2, south-east of Gravesend, to the M25, to the north of North Ockendon. It has been at pre-application stage since 2018 and National Highways (NH) made a new DCO application in November 2022. Thurrock would accommodate approximately three quarters of the above-ground LTC route. The Lower Thames Crossing would offer an alternative route across the Thames to the existing crossings at Dartford and has the following scheme objectives:

- to relieve the congested Dartford Crossing and approach roads, and improve their performance by providing free flowing, north-south capacity
- to improve resilience of the Thames crossings and the major road network
- to improve safety
- to support sustainable local development and regional economic growth in the medium to long term
- to be affordable to Government and users
- to achieve value for money
- to minimise adverse impacts on health and the environment

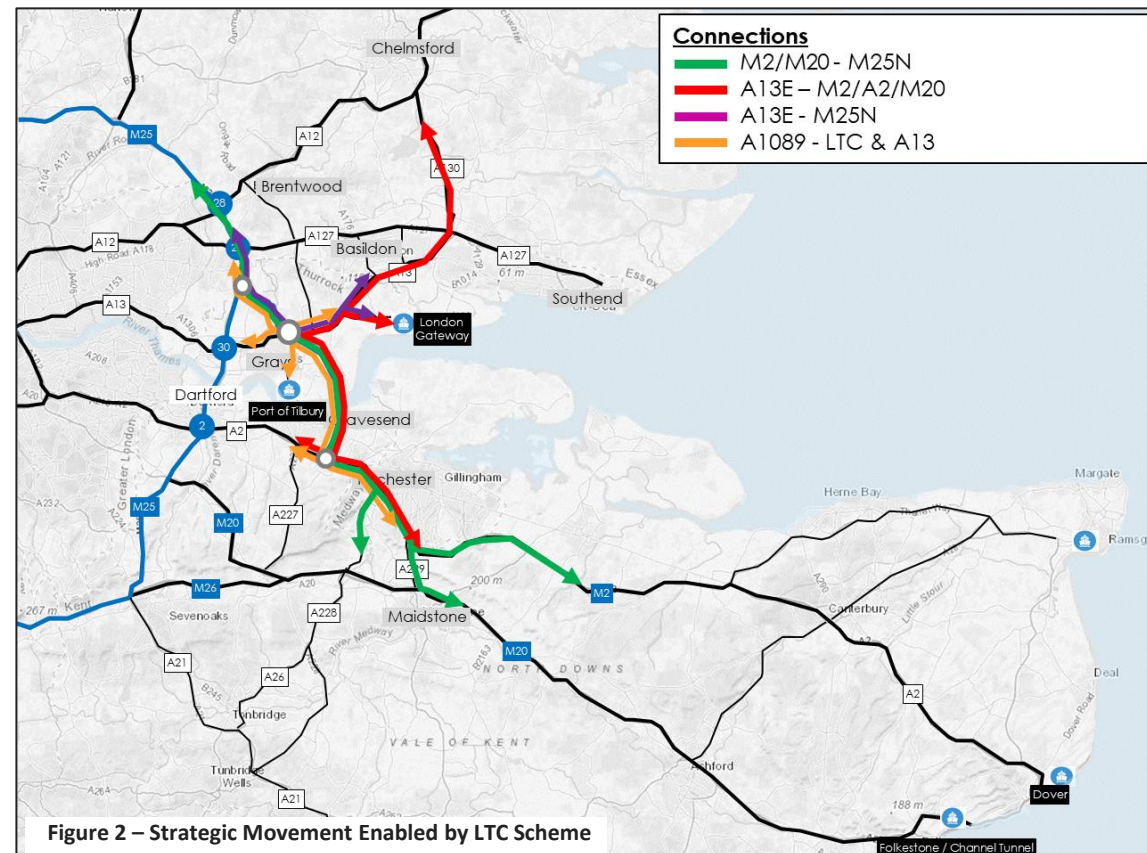


## Strategic Movements and Interchange

The current LTC scheme and the major interchange proposed between the LTC, A13 and A1089 will facilitate a number strategic movements across the region. It will also create a host of diversionary routes when the M25 is congested. The strategic movements LTC facilitates are highlighted in **Figure 2** and include:

1. M2/M20/A2 to/from M25 North (green)
2. A13 East to/from M2/A2/M20 (red)
3. A13 East to / from M25 North (purple)
4. A1089 to LTC and A13 (orange)

**Figure 5** shows the proposed complex new LTC / A13 / A1089 interchange design, its links and how the same strategic movements are directly catered for within the interchange design.



# LTC: Risks to Future Growth in Thurrock

Thurrock Council is extremely concerned that the currently proposed LTC scheme configuration and its forecast impacts on the road network will leave the area facing significant challenges that risk constraining Freeport and future Local Plan growth, including:

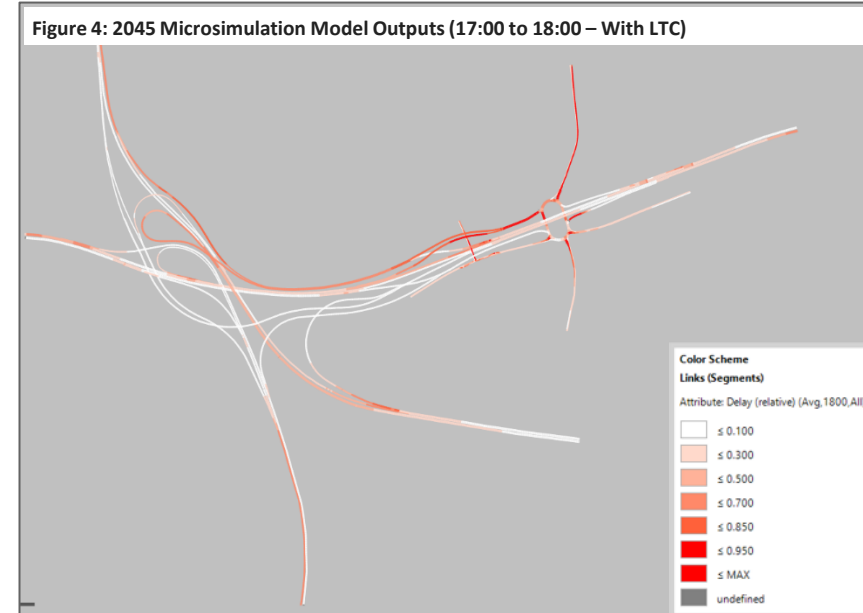
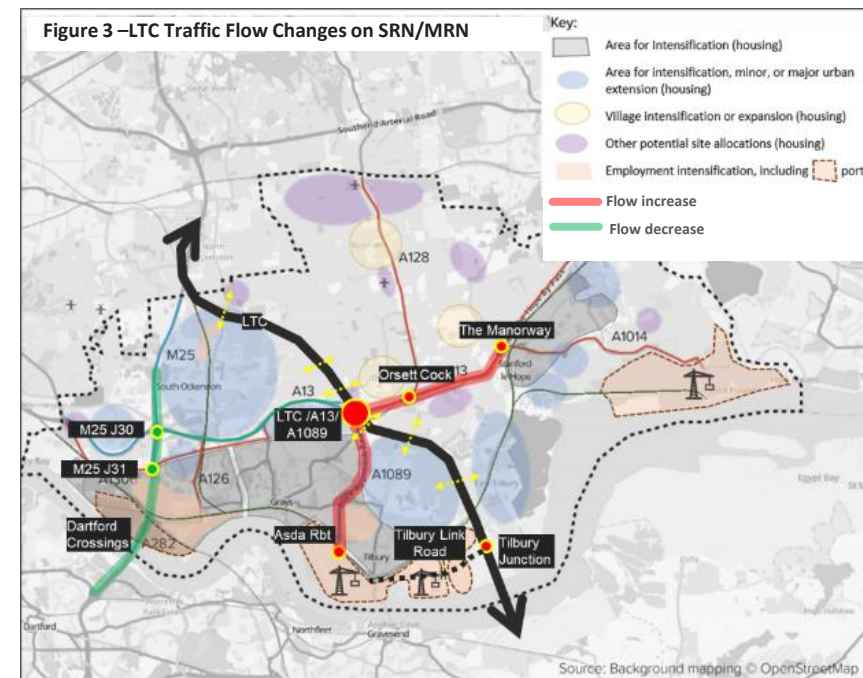
- **Poor port connectivity and road network resilience** – even with LTC the Port of Tilbury will still only have a single access via A1089 and the complex LTC/A13/A1089 interchange will provide indirect connectivity from LTC to Tilbury and the Port (via the A13 Orsett Cock) increasing journey distances and times;
- **More traffic and congestion on the A13 east of LTC and on the A1089** - impacting on strategic and local road network performance, in particular at key local junctions such as A13 Orsett Cock, A13 The Manorway and A1089 Asda Rbt Junctions, restricting access to Port of Tilbury and London Gateway and constraining future Local Plan growth aspirations;
- **Constrained opportunities to promote use of public transport and active travel across the area** – particularly the ability to provide much needed new public transport connectivity to areas south of River Thames and to new growth areas proposed across Thurrock as part of the emerging Local Plan.

## Forecast Congestion at A13 Orsett Cock Junction

The current configuration of the LTC scheme and the LTC/A13/A1089 interchange relies heavily on the Orsett Cock junction, in particular to facilitate some movements to/from parts of the SRN (including from LTC to the A1089 and from A13 East to A1089). The future operation of the Orsett Cock junction is therefore critical to supporting Freeport and Local Plan growth aspirations also to minimising impacts on local roads and communities in Orsett, Chadwell St Mary, Linford and East Tilbury.

Results from NH’s A13 Orsett Cock microsimulation model have confirmed the Council’s long held concerns about the potential adverse impact of LTC on the operation of this junction (and also that NH’s strategic traffic model – LTAM - has significantly underestimated the scale of impacts of LTC on Orsett Cock). The microsimulation modelling reveals that within 15 years of opening the impact of the LTC is materially adverse and is forecast to leave the area facing significant congestion and long delays. **Figure 4** shows the extent of the delays and queues forecast in the PM peak hour at Orsett Cock by 2045.

NHs has been unable to put forward sufficient design modifications to Orsett Cock junction that would resolve the serious traffic congestion issues identified by the local junction modelling work. It is the Council’s view that alternative LTC configurations should have been considered that include a Tilbury Link Road and a modified LTC/A13/A1089 interchange that could improve port access and reduce the scheme’s impact on the local highway network and at key junctions such as Orsett Cock.

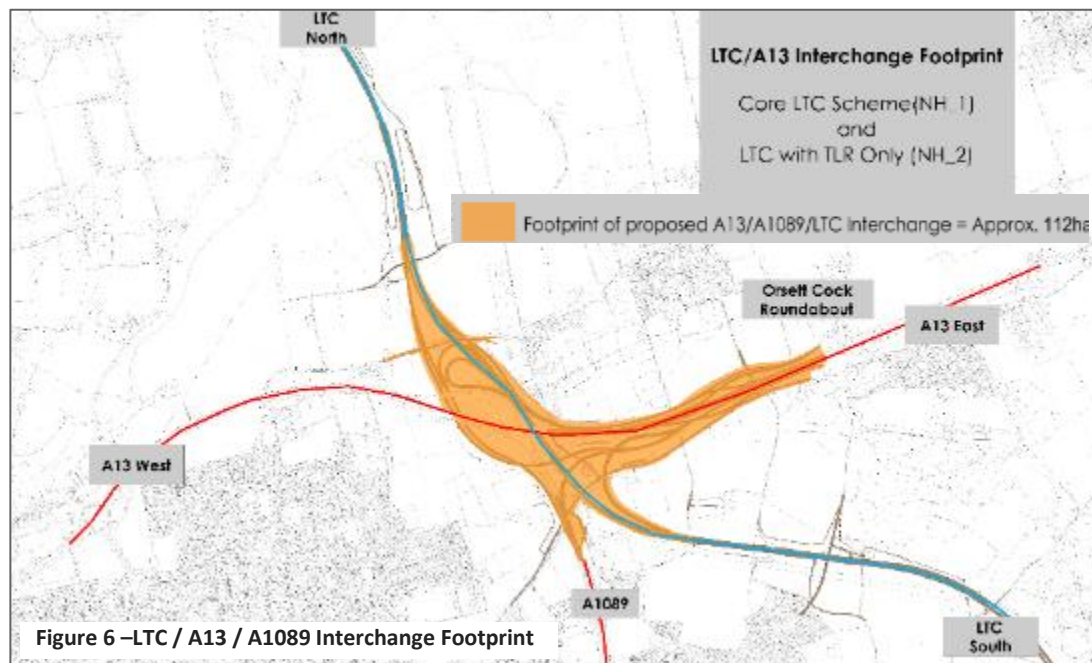
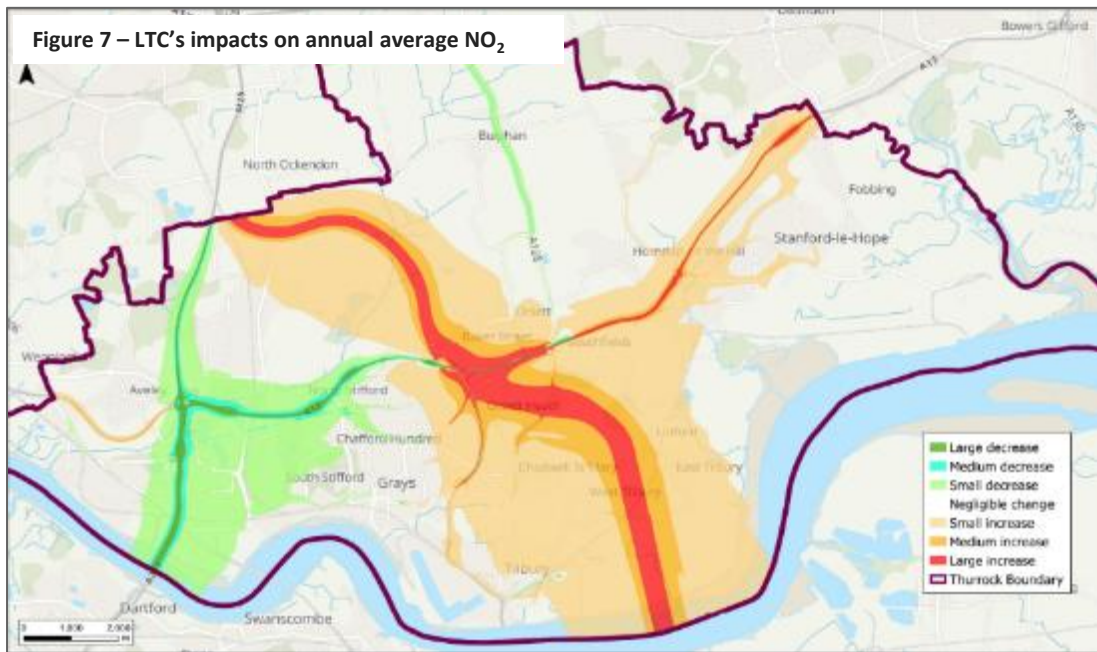
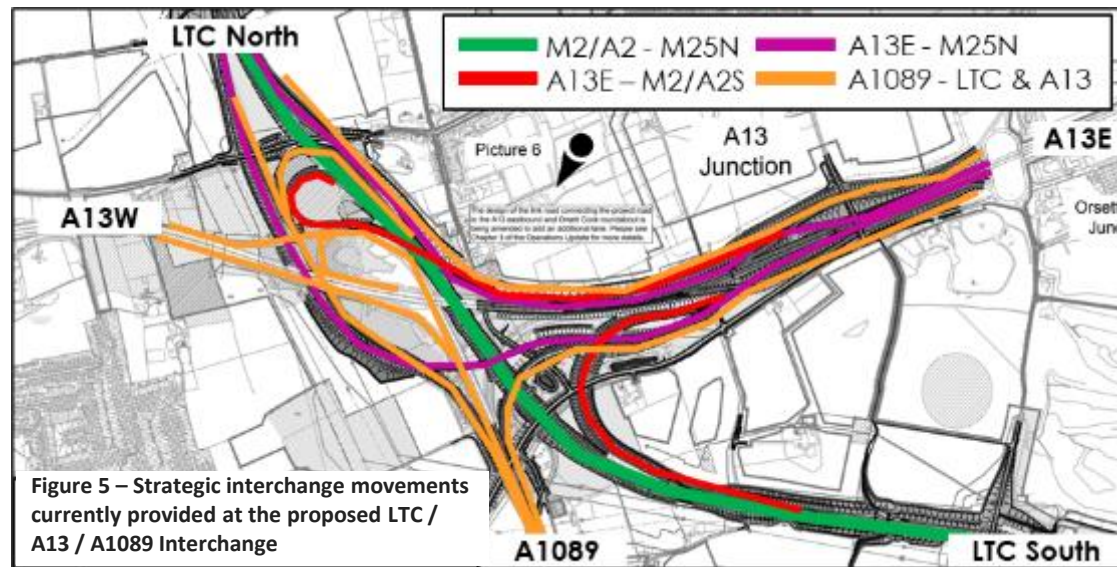


# LTC: Scale of Local Harm in Thurrock

As noted above, some of the Council’s concerns regarding the current LTC scheme configuration have focused on the scale, complexity and convoluted nature of LTC / A13 / A1089 interchange, the indirect connections it provides between the LTC, the Ports and the local area and its impacts on the local highway network, particularly at key local junctions such as Orsett Cock, The Manorway and Asda Roundabout. **Figure 5** shows the current interchange proposed as part of the LTC scheme and the strategic connections or links it accommodates.

It is also the Council’s view that the scale and significance of the adverse local impacts of the current LTC scheme on Thurrock, particularly around the LTC/A13/A1089 interchange, and the consequential harm relating to land take and property, severance, traffic delay, safety and congestion, health, air quality, noise, accessibility and the economy means that there is a significant burden of proof resting with NH to demonstrate that a full range of alternative options have been thoroughly assessed in justifying the currently proposed scheme design.

Some examples of the significance of these local impacts that have been highlighted by the Council are shown in **Figure 6** which shows the scale of the LTC /A13/A1089 Interchange Footprint (approximately 112ha) and **Figure 7** which shows LTC’s impacts on air quality (annual average NO2).





## Lack of Adequate Alternative Options Appraisal by National Highways

Since the Statutory Consultation in December 2018, the Council has continually raised its concerns about the lack of adequate options appraisal by NH in identifying the preferred LTC scheme configuration along the selected route alignment. Despite these concerns being debated since that time, NH has not provided substantive evidence of any testing of the alternative LTC scheme configurations proposed by the Council.

In July 2018 NH published its *'Approach to Design, Construction and Operation'*. Whilst this document provided some commentary about the decisions made regarding scheme design and its evolution, there is no supporting appraisal or modelling work. In March 2020, June / July 2021 and again in December 2021, the Council requested evidence of the alternative options tested and appraised by NH to determine the DCO configuration. Over that period the Council regularly proposed a number of potential alternative scheme configurations for testing and assessment by National Highways alongside information on the council's emerging local plan growth sites, so that alternatives could be assessed considering the future growth context.

In December 2021 NH finally agreed to model a limited number of alternative LTC configuration options proposed by the Council using their Lower Thames Area Model (LTAM) (a strategic transport model). The options tested are described in greater detail in Section 2.

It was agreed at the time of scoping the alternative options for LTAM model runs that these would be initial tests, and that an iterative approach would be needed to refine alternatives on the basis of the evidence provided by the model outcomes. It was highlighted by the Council that tests to incorporate Local Plan and port growth would be needed, as well as refinements to include road space reallocation for alternative modes as part of the A1089/TLR route to assess the potential to manage demand for car use on local roads and limit through traffic through the urban area. This is a normal part of an iterative approach to scheme development. NH have not undertaken any further option modelling (aside from re-running the modelling of CTL4 to correctly reflect Council's intended option specification) including undertaking model runs with emerging local plan growth sites factored in.

Only cordoned version of the LTAM models (covering the Thurrock area only), and some limited data from the full LTAM models of the alternative option traffic model runs, have been shared with the Council for review (at the end of May 2022). This has limited the Council's ability to assess these alternatives.

Whilst NH presented the Council with some high level findings from their model runs a full assessment of these alternative LTC configuration options (in line with DfT Transport Analysis Guidance - TAG) including an appraisal of their impacts against the scheme objectives and other performance criteria e.g. economic, management, financial and commercial, has not been provided. The council has therefore undertaken its own strategic assessment of these options based on the limited information it has available.

### Purpose of Report

The remaining sections of this report presents the:

- some of the potential alternative LTC/A13/A1089 interchange configurations in Thurrock that could be delivered (alongside the Tilbury Link Road) which have identified by the Council for further strategic modelling and assessment;
- key performance information and a strategic assessment of these alternative options prepared by the Council; and
- summary findings, conclusions and recommended further work.

## 2. Thurrock Council's Alternative Options







# Alternative LTC Options with Tilbury Link Road and Revised LTC/A13 Interchange

## Tilbury Link Road

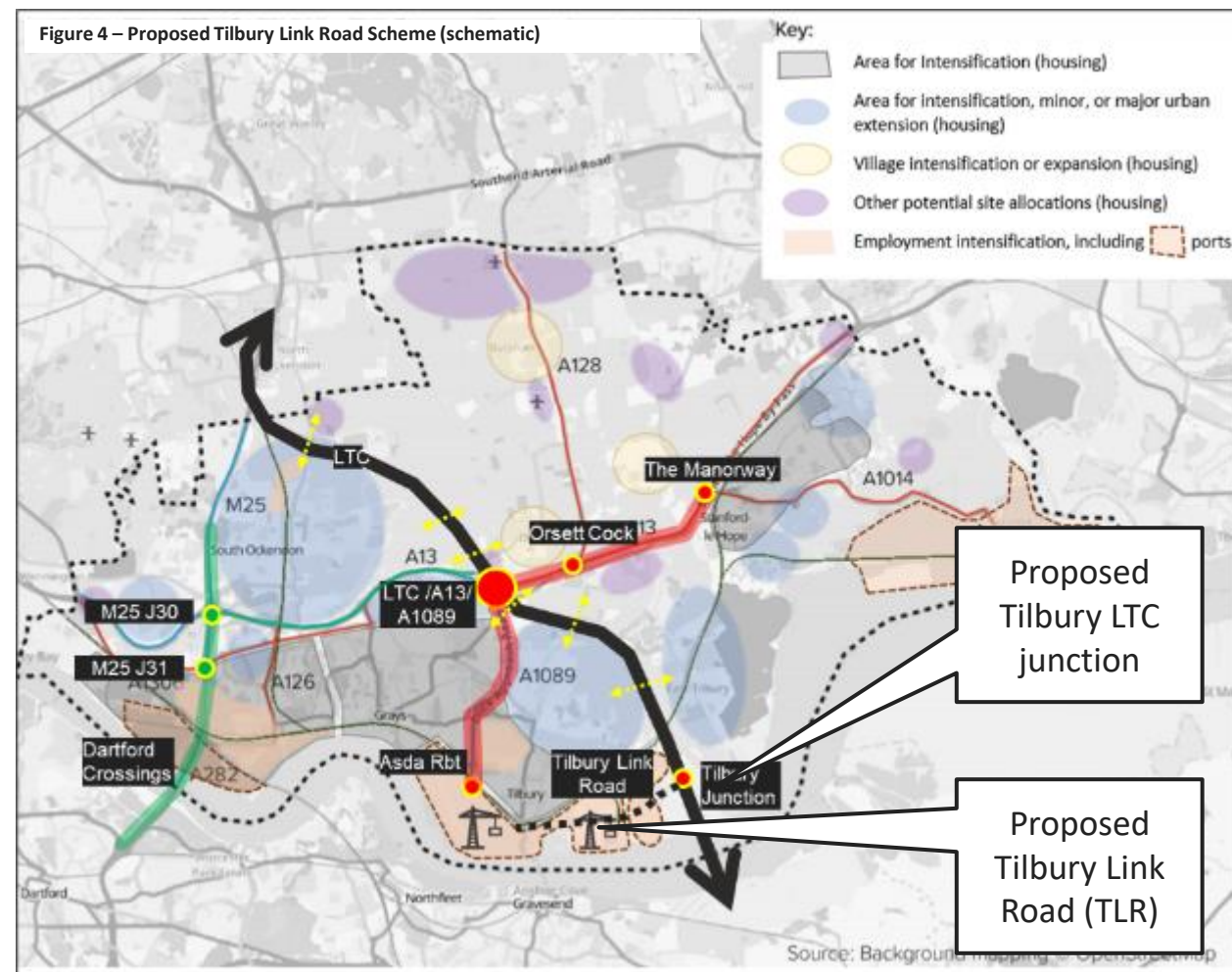
The Tilbury Link Road (TLR) is a scheme that would connect the LTC to the A1089 and provide access and improved connectivity to the Port of Tilbury (PoT) and the wider Tilbury area – see **Figure 4**. The Council has consistently held the view that, should the scheme proceed, the TLR should form an integral part of the LTC scheme. The scheme will be vital to delivering the additional movement capacity and improved connectivity from the Strategic Road Network (SRN) required to enable Thames Freeport access and growth (a key part of Government policy) and Local Plan development aspirations in the Thurrock area.

Inclusion of the TLR in the LTC scheme would also potentially enable alternative configurations of the LTC/A13/A1089 interchange to be delivered that would reduce local impacts and harm relating to land take, traffic delay, visual intrusion, health, air quality, noise etc.

In response to engagement with Thurrock Council and the Port of Tilbury, NH is now proposing to include an additional junction on the LTC at Tilbury. It is proposed that this junction would initially only provide operational access to NH facilities. However, NH has indicated that the junction could provide access to the TLR that could be delivered separately in the future. However, the Council’s view is that the TLR should be delivered as part of the current scheme DCO. Without the inclusion of the TLR within the DCO, there are no guarantees that this would be provided at a later date, and any benefits associated with it cannot be attributed to the provision of the Tilbury LTC junction alone.

## Potential Alternative LTC Configuration Options with the Tilbury Link Road

The Council requested that NH assess a number of alternative LTC configuration options that include the TLR, and with revised connections at the LTC/A13/A1089 interchange, to assess whether an option exists that strikes a more reasonable balance between the provision of strategic and local connectivity whilst also reducing the scheme’s land take, environmental impacts on local communities and negative impacts on some local roads and junctions (particularly at A13 Orsett Cock and the A1089 Asda Rbts).





## Alternative LTC Options with Tilbury Link Road and Revised LTC/A13 Interchange

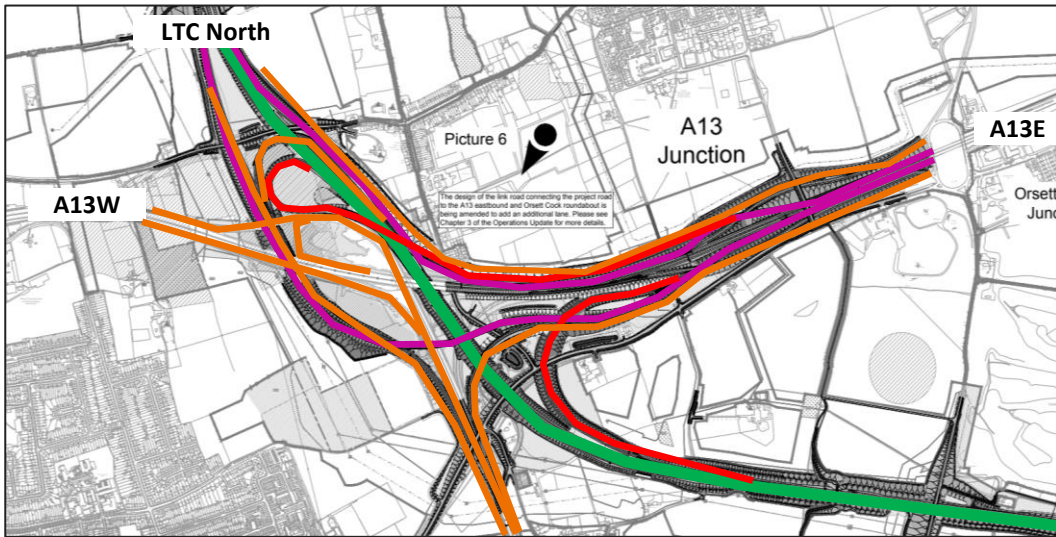
In December 2021 NH finally agreed to testing a limited number of alternative options proposed by the Council using their LTAM strategic transport model. LTAM Cordon models for Thurrock and some limited data from the full LTAM model data from the initial traffic model runs were shared with the Council for review at the end of May 2022. The core LTC only scheme and alternative options tested in the LTAM model are described in **Table 1** along with some key network and transport demand assumptions. The revised LTC/A13 interchange connections included in each option are shown in **Figure 8**.

Table 1 – Alternative Option Model Tests and Assumptions Agreed with NH

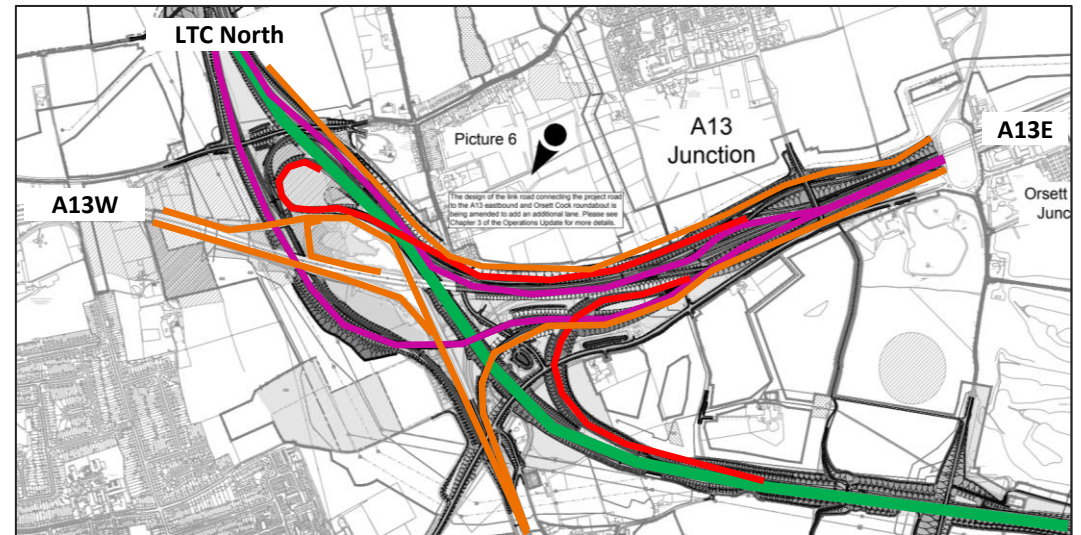
ID	Scenario Name / Description	Transport Schemes Included in Scenario ✓= Yes ✗ = No					South Ockendon Junction / Link	Assessment Year
		LTC Scheme		TLR Scheme				
		New LTC/A13 Junction	Asda Rdt Imprvmts	E. Tilbury Junction	TLR Link	Fort Rd Connectivity		
CS67	LTC Scheme Only	✓ With new A13 Orsett Cock to A1089 link	✗ Current Layout	✗	✗	✗	2030	
CTL1	LTC Scheme and Tilbury Link Road	✓ With new Orsett Cock to A1089 link	✗ Current Layout	✓ NH Half Cloverleaf	✓ Single CW	✓	✗	2030
CTL2	Alternative LTC Scheme and Tilbury Link Road with <b>No LTC/A13/A1089 Junction</b>	✗ Existing A13/A1089 Junction only	✗ Current Layout	✓ NH Half Cloverleaf	✓ Single CW	✓	✗	2030
CTL3	Alternative LTC Scheme and Tilbury Link Road with revised LTC/A13/A1089 Junction: <ul style="list-style-type: none"> <li>no direct connections between A1089 and LTC (North and South)</li> </ul>	✓ Removing A1089 to LTC North and LTC South	✗ Current Layout	✓ NH Half Cloverleaf	✓ Single CW	✓	✗	2030
CTL5	Alternative LTC Scheme and Tilbury Link Road with revised LTC/A13/A1089 Junction: <ul style="list-style-type: none"> <li>no direct connections between A1089 and LTC North / LTC South</li> <li>no direct connections between A13 East and LTC North</li> </ul>	✓ Removing A1089 to LTC North and A13 East to/from LTC North	✗ Current Layout	✓ NH Half Cloverleaf	✓ Single CW	✓	✗	2030

Note: Option CTL4 was tested in LTAM only removing the A13 East to LTC North Link. The Council's intention for this option was to remove the link in both directions. NH undertook an updated test of this option in the full LTAM model and presented these results to the council in December 2022 with an ID of CTL5. The results of CTL5 from the Thurrock cordon model run are presented in this report.

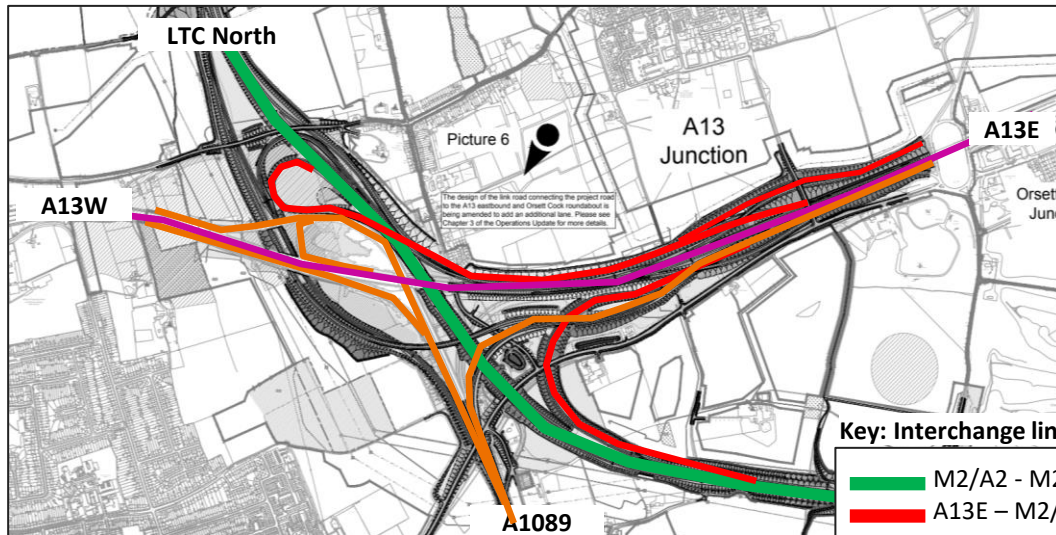
LTC plus Tilbury Link Road (TLR) Only (CTL1)  
 LTC/A13: Retain currently proposed LTC / A13 / A1089 Interchange



LTC plus TLR (CTL3)  
 LTC/A13: Remove Direct A1089 Links to LTC Only



LTC plus TLR (CTL5)  
 LTC/A13: Remove Direct A1089 Links to LTC and Remove A13E to/from LTC North Links



LTC plus TLR (CTL2)  
 LTC/A13: Completely Remove LTC / A13 / A1089 Interchange

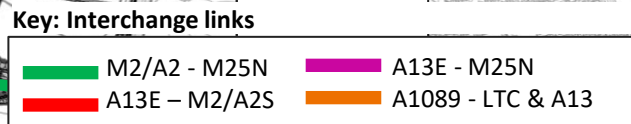
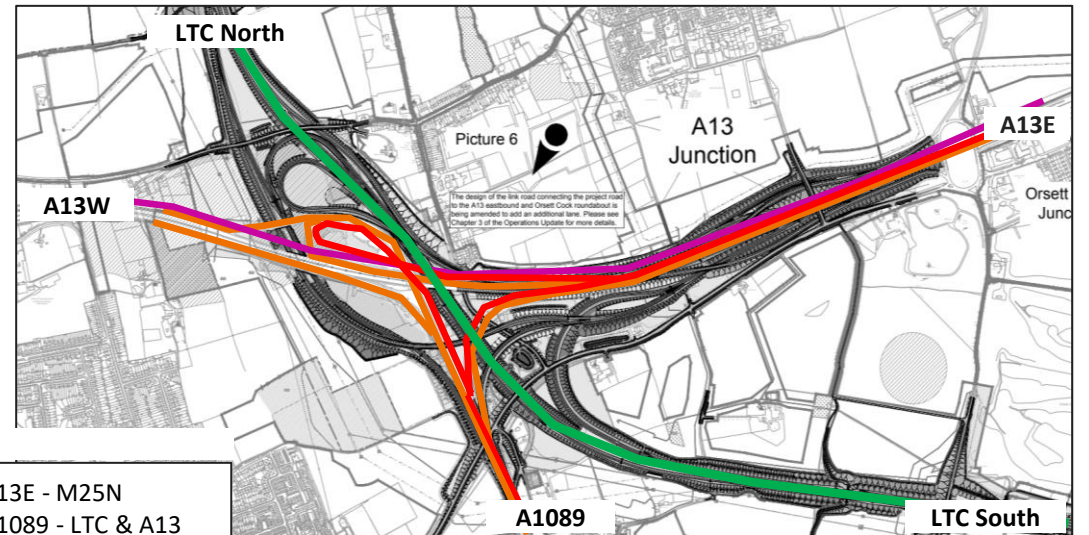


Figure 8 – Alternative LTC / A13 / A1089 Interchange Connectivity Options

### 3. Approach to Strategic Assessment



# Strategic Assessment of Alternative Options

To undertake the strategic option assessment a simple framework has been developed and used based on the Department for Transport's (DfT) Early Assessment and Sifting Tool (EAST). EAST is a decision support tool that has been developed to help summarise and present evidence on options in a clear and consistent format.

In line with EAST each option has been assessed against the scheme's strategic objectives and also consideration of performance against the economic, management, financial and commercial issues as shown in **Table 2**. The metrics and network performance data extracted from the LTAM cordon models and used to inform the option appraisal are also shown in **Table 2**. The appraisal focuses on options and their performance and impacts north of the river.

Table 2 – Alternative Option Appraisal Framework and Option Performance Data

Objective / Assessment Criteria		LTAM Cordon Model Evidence / Option Performance Data
STRATEGIC	Relief at the Dartford Crossing and approaches Improve resilience of Thames crossings & MRN	<ul style="list-style-type: none"> <li>• <b>River Crossings</b> (All Vehicles and HGVs)</li> <li>• <b>Dartford River Crossings</b> – Peak Hour % Reduction (All Vehicles and HGVs)</li> </ul>
	Improve safety	<ul style="list-style-type: none"> <li>• <b>Vehicle km</b> (Thurrock LTAM Cordon)</li> </ul>
	Support regional economic growth	<p><u>Regional</u></p> <ul style="list-style-type: none"> <li>• <b>Journey Times</b> e.g Port of Tilbury to/from M25N &amp; to/from M2 J1, A13East (LG Port) to/from M25N, M2 J1 to/from M25N</li> <li>• <b>SRN/MRN link performance</b> - flow, V/C (@ M25, A13, A1089, TLR)</li> <li>• <b>SRN/MRN junction performance</b> – demand, V/C, delay (@ M25 J30, J31, A1089 Asda, A13/A126, A13/A1012, TLR junction)</li> </ul>
	Support local economic growth and development	<p><u>Local</u></p> <ul style="list-style-type: none"> <li>• <b>MRN/LRN link performance</b> – flow, V/C @ A1012, A1013, A1014 Manorway, Arterial Rd North, A1012, Brentwood Rd</li> <li>• <b>MRN/LRN junction performance</b> – flow, V/C, delay @ A13 Orsett, Manorway, A1012 North Stifford, Marshfoot, A1013 Daneshole Rbt, Fort Rd/TLR</li> <li>• <b>Local Journey Times</b> (Public Transport Routes – A1013 JT, London Rd (Grays))</li> </ul>
ECONOMIC	Network Performance	<ul style="list-style-type: none"> <li>• <b>Total modelled travel time, over capacity queues, average speed</b> (LTAM global and Thurrock cordon stats)</li> </ul>
	Carbon emissions	<ul style="list-style-type: none"> <li>• <b>Total Modelled vehicle km, total trips, average trip distance, CO2 Emissions</b> (LTAM global and Thurrock cordon stats)</li> </ul>
	Socio-distributional impacts	<ul style="list-style-type: none"> <li>• <b>Journey Times from Ports to Labour Markets</b></li> </ul>
	Local environment and wellbeing – air quality, noise, visual	<ul style="list-style-type: none"> <li>• <b>PM10 and NO2 emissions</b> (LTAM cordon wide)</li> <li>• <b>LRN traffic flows on selected links</b> to show impacts on local communities (@ Chadwell (Brentwood Rd), East Tilbury (Buckingham Hill Rd, Muckingford Rd), Orsett Village (Rectory Rd), Tilbury (St Chads Rd), Grays (London Rd))</li> </ul>
MGMT	Impact on implementation time period	<ul style="list-style-type: none"> <li>• Likely impact on consent and construction timescale (description)</li> </ul>
	Public and stakeholder acceptability	<ul style="list-style-type: none"> <li>• Public views / regional and local stakeholder views (description)</li> </ul>
FINANCIAL		<ul style="list-style-type: none"> <li>• VfM and Affordability - Opportunity to reduce scheme design scope and cost (description)</li> </ul>
COMMERCIAL		<ul style="list-style-type: none"> <li>• Flexibility opportunities / Income generation / funding opportunities provided (description)</li> </ul>

# Assessing Alternative Options

Figures 9 and 10 indicate the strategic and local junctions and links used to inform the strategic assessment of option impacts on the network and its performance.

Figure 9 – Strategic Links and Junction Assessed

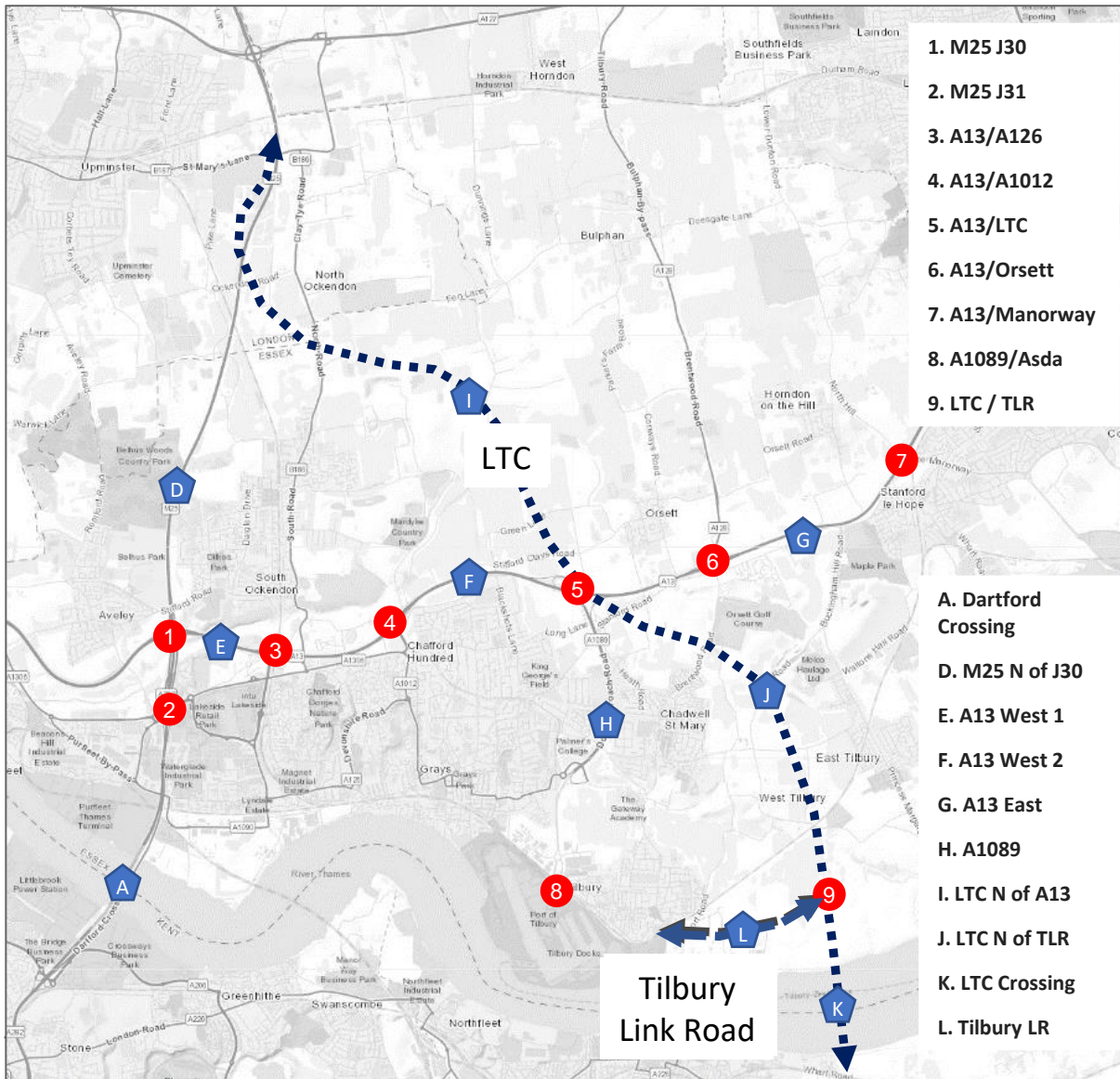
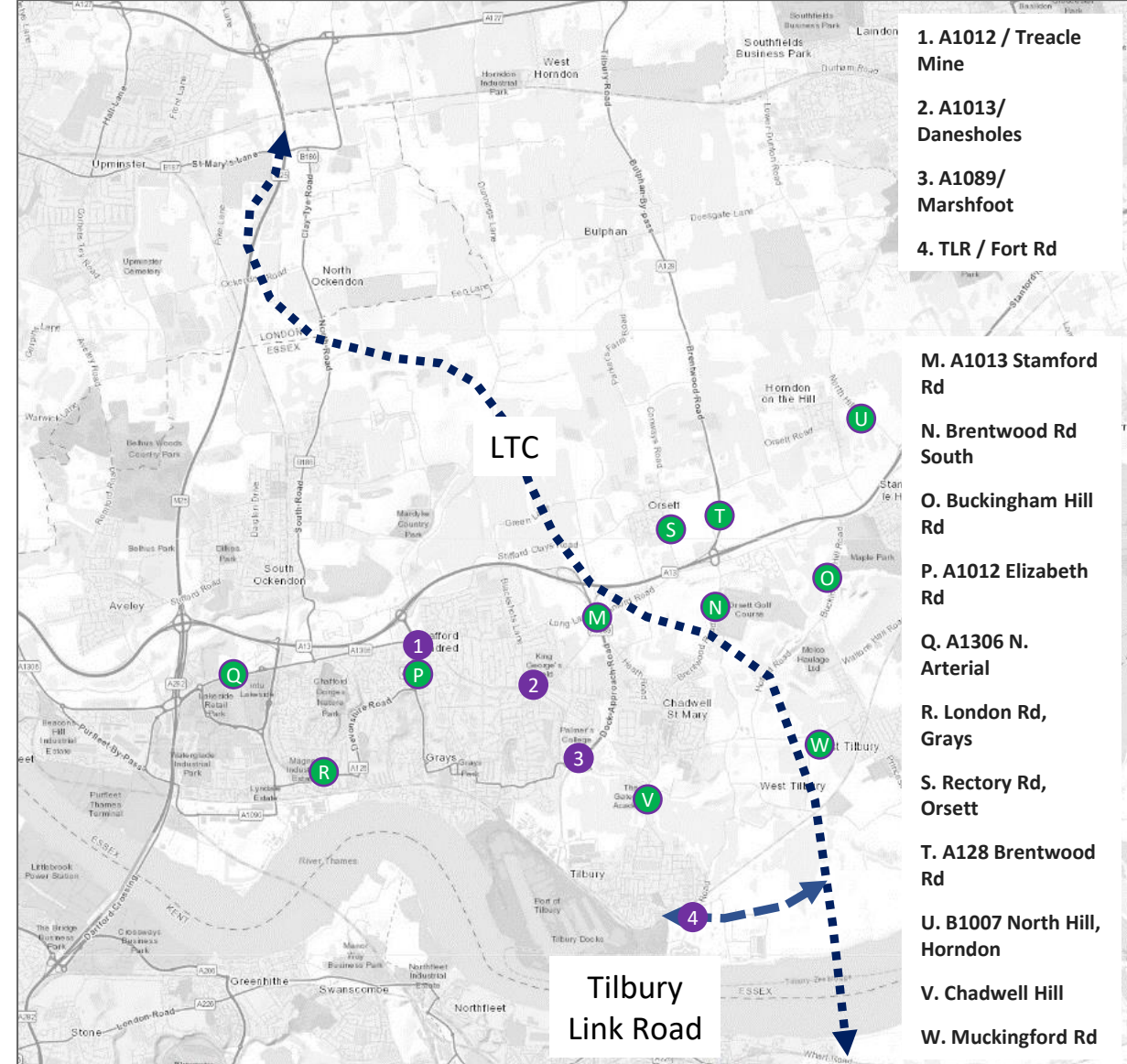


Figure 10 – Local Links and Junction assessed





# Assessing Alternative Options

Each alternative highway configuration option has been assessed against the strategic objectives and also some initial consideration of performance against the economic, management, financial and commercial issues and given a score out of 7:



**Very Good:** excellent fit with objective / benefit



**Good:** good fit with objective / benefit



**Slight Positive:** slight or moderate fit with objective / benefit



**Neutral / No Change**



**Slight Negative:** slight or low fit with objective / disbenefit



**Poor:** Poor fit with objective / disbenefit



**Very Poor:** Very poor fit with objective / disbenefit

An example summary option appraisal table is provided as **Table 3**. All options have been assessed and scored against a forecast do minimum scenario (the no LTC scheme scenario). Model information for this do-minimum scenario has also provided by National Highways.

Table 3 – Example Summary Appraisal Table

## LTC plus Tilbury Link Road Scheme (CTL01) - Summary Appraisal

Objectives and Assessment Criteria	Score	Description / Commentary	
STRATEGIC	Relief at the Dartford Crossing/M25 approaches	✓✓	Scheme provides relief at Dartford / M25 - adding TLR to the LTC scheme further reduces traffic using Dartford.
	Improve resilience of Thames crossings and SRN / MRN	✓✓✓	Providing TLR as part of the scheme further reduces demand on M25, A13 and A1089 corridors which is likely to further improve SRN/MRN resilience of the network and improve the reliability of access and journey times to the ports at Tilbury and London Gateway.
	Improve safety	✗	Overall this option increases total vehicle km driven and will result in increases in accidents on local and strategic roads. Complex LTC/A13 junction remains with associated collision risks.
	Support regional economic growth	✓✓✓	Adding TLR to LTC provides a direct and fast connection from LTC to Port of Tilbury. TLR reduces demand along the A13 and A1089 corridors, including critically at Drott Cook, Manway and Aids Batts (compared to the LTC scenario) freeing up capacity to support nationally and regionally significant Freeport Growth. It provides additional journey time savings for Port of Tilbury traffic wanting to cross the River.
	Support local economic growth	✓✓	Provides additional local network capacity and improved connectivity to the Tilbury growth area. Reduces demand on A13 and A1089 supporting future port and local plan growth across Thurrock. Provides some relief to roads in areas to the south of the A13 West of LTC and the Lakeside Basin area supporting local growth.
ECONOMIC	Road network performance	✓✓	The area wide modelled network performance statistics show slight additional benefits arising from the TLR including reduced queues and improved vehicle speeds. Option further improves strategic journey times for users across the area compared to LTC only. The scheme has a beneficial impact compared to LTC on the performance of key junctions (M25 J30, M25 J31A13 Orsett Cook and A1089 Aids Batts).
	Carbon emissions	✗✗✗	As with LTC only option and significantly increases cross-river vehicle trips, increases vehicle travel distance across the region and locally and embed high carbon use into the future. Embedded carbon arising from scheme construction will be very high.
	Socio-distributional impacts	✓✓	Provides improved journey times between deprived areas of Tilbury and North Kent improving opportunities access to employment. TLR enables delivery of cross-river public transport connectivity that would improve access opportunities for all.
	Local environment and wellbeing – air quality, noise, visual, land take	✗✗	Option reduces LTC's negative local road impacts particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary) and Buckingham Hill Road (Unford) and along the A1089 corridor. However, overall increase in trips and vehicle km on Thurrock roads will still result in more emissions and noise. The land take, severance and visual impacts and effects associated with the scheme will be very high, particularly around the LTC/A13 junction. There will be additional land take and environmental impacts associated with delivery of TLR.
MANAGEMENT	Consent/construction time period		9 – 11 years – longer consent and construction period as TLR has not been included in scheme scope
	Public and stakeholder acceptability	✓	Additional port and business stakeholder support associated with inclusion of TLR and its benefits. Helps address some local residents concerns regarding traffic and environmental impacts associated with LTC only scheme.
FINANCIAL			LTC scheme cost = £B.5bn. Additional TLR scheme cost = £B.2bn (Local Road)
COMMERCIAL			TLR provides additional capacity, resilience and flexibility within scheme design to support future growth opportunities. Current Tilbury junction provides limited capacity for future Tilbury Link Road and port / local plan growth. Opportunities for developer and Freeport funding.

## 4. Strategic Assessment of Options - Summary Findings and Recommended Next Steps





# Strategic Assessment of Options – Summary of Findings

## Introduction

Thurrock Council remains very concerned that the proposed LTC scheme configuration and its forecast impacts on the road network will leave the area facing significant challenges that risks constraining Freeport and future Local Plan growth. It is also the Council's view that the scale of adverse local harm forecast to arise as a direct result of LTC - relating to land take and property, severance, traffic delay, safety and congestion, health, air quality, noise, accessibility and the economy - means that there is a significant burden of proof resting with NH to demonstrate that a full range of alternative options have been thoroughly assessed in justifying the currently proposed scheme design.

The Council has long held the view that alternative configurations of the LTC scheme including the Tilbury Link Road and reducing connectivity at the LTC / A13 / A1089 interchange could represent a better solution for the region and Thurrock and should have been assessed further by NH. In December 2021 NH finally agreed to testing a limited number of potential alternative LTC configurations. A review of these model runs has been completed and evidence and data from those models has provided a basis for a strategic assessment of the LTC only scheme and the alternative LTC highway configurations. This section of this report provides:

- a high-level summary of some of the performance metrics extracted from the LTAM model runs and findings for each option.
- a summary table outlining the overall strategic option appraisal.
- summary findings and recommended next steps are also presented.

## Appendices

Further detailed information on each option is also included in **Appendix A1** which includes:

1. Tables **A1-1** and **A1-2** presenting a comparison of a fuller set of performance metrics (AM peak) extracted from the LTAM model runs for all options (compared against the NH core LTC scheme and the NH do-minimum (no LTC) scenarios).
2. Option Performance 'Dashboards' for the NH Do Minimum (no LTC), the core LTC scheme and each alternative option providing a summary of the network performance and impacts (vs LTC Only and vs DM).
3. Summary Appraisal Tables prepared for the do minimum, core LTC scheme and each alternative option.

**Appendix A2** provides AM and peak delay plots for all options.

**Appendix A3** provides further information on the approximated land take associated with each different configuration of the LTC/A13/A1089 interchange which has been used in considering the relative scale of local visual and physical environmental impact of each LTC/A13/A1089 junction configuration option.

## Summary of Key Performance Metrics

Key performance metrics extracted from the LTAM model runs for the AM and PM peak hours are presented in **Tables 4 and 5**. These key performance metrics indicate that:

- All options are forecast to provide traffic relief at the Dartford Crossing and the M25 approaches to Dartford (which seems to be NH's primary scheme objective) and there are relatively small percentage differences between the impact of LTC and each option in reducing traffic at the Dartford Crossings (-10% to -13% in AM peak) (Note: with LTC these benefits are forecast to be quickly eroded within 15 years of opening)
- The options and the amount of connectivity provided at the LTC/A13 junction do have more significant impacts on traffic flows on the M25 North (-11% to -18% in AM peak), A13 West of LTC (-6% to -16%), A13 East of LTC (0% - to + 15%) and A1089 (-12% to +20%) and also on traffic flows at (and the performance of) major junctions such as M25 J30, A13 Orsett Cock and A1089 Asda Roundabouts
- All option models forecast significant increases in total river crossings (+38% to +47% in AM peak)
- All options have a similar impacts on overall LTAM global network performance statistics e.g. Over Capacity Queues, Total Travel Time, Average Speed, Total Travel Distance. There is more significant variation in impact on Thurrock's local road network performance statistics.

*Note: The LTAM forecasts presented and used in the option assessment must be seen in the context of LTAM's limitations, particularly related to the age of the base model, limited base year model validation against local traffic conditions, uncertainty regarding modelled forecasts given impacts of COVID, Brexit etc on travel behaviours, the suitability of the strategic LTAM for realistic assessments of major and complex junction performance (LTAM has been demonstrated to significantly underestimate forecast delays and queuing at the A13 Orsett Cock junction in comparison to Vissim modelling).*



# Option Assessment Summary – Key Performance Metrics (AM Peak Hour vs Do Minimum)

Table 4– AM Peak Option Performance Key Metrics

			Do Min		LTC Only		LTC with TLR		LTC with TLR, no direct access to LTC from A1089		LTC with Tilbury Link, no direct access to LTC from A1089 or A13 Eto/from LTC North		LTC with TLR but no LTC/A13/A1089 junction	
			DM	CS67	Diff vs DM	CTL01	Diff vs DM	CTL03	Diff vs DM	CTL05	Diff vs DM	CTL02	Diff vs DM	
Relief at the Dartford Crossing	Traffic Flow (2-way Vehicles)	Total River Crossings	12,149	17,447	↑ 44%	17,806	↑ 47%	17,753	↑ 46%	17,855	↑ 47%	16,804	↑ 38%	
		Total Dartford Crossings	12,149	10,701	● -12%	10,615	● -13%	10,624	● -13%	10,614	● -13%	10,946	● -10%	
Support Regional Economic Growth	Average Journey Times (mins)	M2 J1 to M25N	34.8	24.1	● -31%	24.1	● -31%	23.9	● -31%	23.7	● -32%	23.8	● -32%	
		Chelmsford to M2 J1	75.2	57.7	● -23%	57.4	● -24%	57.9	● -23%	57.8	● -23%	62.6	● -17%	
		Port of Tilbury to M25 North of J28	34.7	31.3	● -10%	30.1	● -13%	31.1	● -10%	31.4	● -10%	33.2	● -4%	
		Port of Tilbury to M2 J1	39.9	24.7	● -38%	19.3	● -52%	20.4	● -49%	20.6	● -49%	23.6	● -41%	
		A13 East (LG Port) to M25N	24.9	21.6	● -13%	21.5	● -14%	21.7	● -13%	24.2	● -3%	24.4	● -2%	
	Traffic Flow (2-way pcu)	M25 North of J30	13,901	11,407	● -18%	11,392	● -18%	11,873	● -15%	12,349	● -11%	11,930	● -14%	
		A13 East of LTC	9,637	10,976	● 14%	10,964	● 14%	11,046	● 15%	10,767	● 12%	9,652	● 0.2%	
		A13 West of LTC (1)	12,720	10,898	● -14%	10,735	● -16%	11,031	● -13%	11,658	● -8%	12,008	● -6%	
		A1089	4,427	5,309	● 20%	4,632	● 5%	3,941	● -11%	3,883	● -12%	4,352	● -2%	
		LTC North of A13	-	6,436	-	6,180	-	5,770	-	4,515	-	5,248	-	
		LTC South of A13	-	8,012	-	7,164	-	7,289	-	7,490	-	5,248	-	
	SRN Junction Max V/C (%)	M25 J30	92	79	● -13	78	● -14	90	● -2	93	● 1	94	● 2	
		A1089 Asda Rbt	101	103	● 2	96	● -5	100	● -1	99	● -2	107	● 6	
	SRN Junction Total Flow (pcu)	M25 J30	9,298	8,363	● -10%	8,200	● -12%	8,559	● -8%	9,011	● -3%	9,051	● -3%	
A1089 Asda Rbt		4,518	4,583	● 1%	4,226	● -7%	4,193	● -7%	4,163	● -8%	4,454	● -1%		
Support Local Economic Growth	Junction Max V/C (%)	A13 Orsett Cock	71	87	● 16	80	● 9	83	● 12	93	● 22	86	● 15	
		A13 The Manorway	95	97	● 2	97	● 2	97	● 2	97	● 2	96	● 1	
	Junction Total Flow (pcu)	A13 Orsett Cock	4,804	5,262	● 10%	4,774	● -1%	4,791	● -0.3%	4,741	● -1%	4,396	● -9%	
A13 The Manorway		5,420	5,857	● 8%	5,826	● 8%	5,872	● 8%	5,687	● 5%	5,384	● -1%		
Network Performance	Over Capacity Queues	LTAM Area	16,078	15,743	● -2%	15,673	● -3%	15,660	● -3%	15,717	● -2%	15,656	● -3%	
		Thurrock Only	849	642	● -24%	585	● -31%	579	● -42%	578	● -32%	732	● -14%	
	Total Travel Time	LTAM Area	263,969	264,041	● 0%	263,853	● 0%	263,908	● 0.0%	264,047	● 0%	263,933	● 0%	
		Thurrock Only	17,741	18,297	● 3%	18,063	● 2%	18,231	● 3%	17,835	● 1%	18,344	● 3%	
Average Speed	LTAM Area	50.8	51	● 1%	51	● 1%	51	● 1%	51.3	● 1%	51	● 1%		
	Thurrock Only	56.3	62	● 10%	63	● 11%	62	● 9%	62	● 9%	61	● 8%		
Carbon Emissions	Total Travel Distance (veh km)	13,418,735	13,556,121	● 1%	13,551,653	● 1%	13,551,077	● 1%	13,549,116	● 1%	13,522,097	● 1%		
	Average Trip Length (km)	13.93	14.98	● 7.5%	14.85	● 6.6%	14.84	● 6.5%	14.59	● 4.7%	14.72	● 5.7%		
Local Environment and Wellbeing	Travel distance (veh.km)	999,171	1,135,257	● 14%	1,129,469	● 13%	1,127,903	● 13%	1,097,145	● 10%	1,110,408	● 11%		



# Option Assessment Summary – Key Performance Metrics (PM Peak Hour vs Do Minimum)

Table 5 – PM Peak Option Performance Key Metrics

			Do Min		LTC Only		LTC with TLR		LTC run with TLR, no direct access to LTC from A1089		Main LTC run with Tilbury Link, no direct access to LTC from A1089 or A13 E to LTC North		LTC with TLR but no LTC/A13/A1089 junction	
			DM	CS67	Diff vs DM	CTL01	Diff vs DM	CTL03	Diff vs DM	CTL05	Diff vs DM	CTL02	Diff vs DM	
Relief at the Dartford Crossing	Traffic Flow (2-way Vehicles)	Total River Crossings	12,378	17,332	↑ 40%	17,847.0	↑ 44.2%	17,835	↑ 44%	17,897	↑ 45%	16,358	↑ 32%	
		Total Dartford Crossings	12,378	10,324	● -17%	10,233	● -17%	10,240	● -17%	10,219	● -17%	10,700	● -14%	
Support Regional Economic Growth	Average Journey Times (mins)	M2 J1 to M25N	32.5	23.4	● -28%	23.4	● -28%	23.3	● -28%	23.2	● -29%	23.0	● -29%	
		Chelmsford to M2 J1	69.3	54.2	● -22%	54.1	● -22%	54.2	● -22%	54.3	● -22%	59.0	● -15%	
		Port of Tilbury to M25 North of J28	30.4	27.1	● -11%	28.0	● -8%	29.0	● -4%	29.0	● -4%	30.6	● 1%	
		Port of Tilbury to M2 J1	36.8	22.2	● -40%	19.1	● -48.2%	20.0	● -46%	20.0	● -46%	24.1	● -35%	
		A13 East (LG Port) to M25N	25.0	21.5	● -14%	21.4	● -14%	21.7	● -13%	23.2	● -7%	24.8	● -1%	
	Link Flow (2-way pcu)	M25 North of J30	13,366	10,475	● -22%	10,457	● -22%	10,782	● -19%	11,238	● -16%	11,039	● -17%	
		A13 East of LTC	9,251	11,301	● 22%	11,290	● 22%	11,323	● 22%	10,938	● 18%	9,629	● 4.1%	
		A13 West of LTC (1)	13,463	11,964	● -11%	11,848	● -12%	12,116	● -10%	12,565	● -7%	12,959	● -4%	
		A1089	4,133	4,991	● 21%	4,201	● 2%	3,681	● -11%	3,628	● -12%	4,504	● 9%	
		LTC North of A13	-	5,964	-	6,000	-	5,280	-	3,968	-	4,433	-	
	SRN Junction Max V/C (%)	M25 J30	98	93	● -5	91	● -7	100	● 2	101	● 3	101	● 3	
		A1089 Asda Rbt	91	103	● 12	78	● -13	69	● -22	67	● -24	96	● 5	
	SRN Junction Flow (pcu)	M25 J30	10,586	9,577	● -10%	9,469	● -11%	9,665	● -9%	10,125	● -4%	10,404	● -2%	
		A1089 Asda Rbt	4,223	4,452	● 5%	3,769	● -11%	3,736	● -12%	3,689	● -13%	4,613	● 9%	
Support Local Economic Growth	Junction Max V/C (%)	A13 Orsett Cock	66	88	● 22	87	● 21	88	● 22	94	● 28	95	● 29	
		A13 The Manorway	76	88	● 12	88	● 12	87	● 11	88	● 12	88	● 12	
	Local Junction Total Flow (pcu)	A13 Orsett Cock	4,801	5,687	● 19%	5,159	● 7%	5,124	● 7%	4,684	● -2%	4,542	● -5%	
		A13 The Manorway	5,962	6,141	● 3%	6,095	● 2%	6,145	● 3%	6,097	● 2%	5,914	● -1%	
Network Performance	Over Capacity Queues	LTAM Area	14,711	14,365	● -2%	14,367	● -2%	14,372	● -2%	14,434	● -2%	14,518	● -1%	
		Thurrock Only	282	164	● -42%	158	● -44%	166	● -41%	203	● -28%	366	● 30%	
	Total Travel Time	LTAM Area	269,055	269,519	● 0.2%	269,443	● 0.1%	269,553	● 0.2%	269,660	● 0.2%	269,456	● 0.1%	
		Thurrock Only	17,043	17,945	● 5%	17,844	● 5%	17,898	● 5%	17,645	● 4%	18,023	● 6%	
	Average Speed (km/hr)	LTAM Area	50.1	50.6	● 1.0%	50.6	● 1%	50.5	● 1%	50.5	● 1%	50.4	● 1%	
Thurrock Only		58.2	62.9	● 8%	62.9	● 8%	62.5	● 7%	61.6	● 6%	60.5	● 4%		
Carbon Emissions	Travel Distance (Veh km)	13,482,946	13,630,943	● 1%	13,627,334	● 1%	13,623,117	● 1%	13,618,660	● 1%	13,585,880	● 1%		
	Average Trip Length (km)	13.32	14.35	● 7.7%	14.20	● 6.6%	14.17	● 6.4%	13.94	● 4.7%	14.05	● 5.5%		
Local Environment and	Travel distance (veh.km)	991,365	1,128,439	● 14%	1,122,604	● 13%	1,118,259	● 13%	1,086,112	● 10%	1,090,401	● 10%		

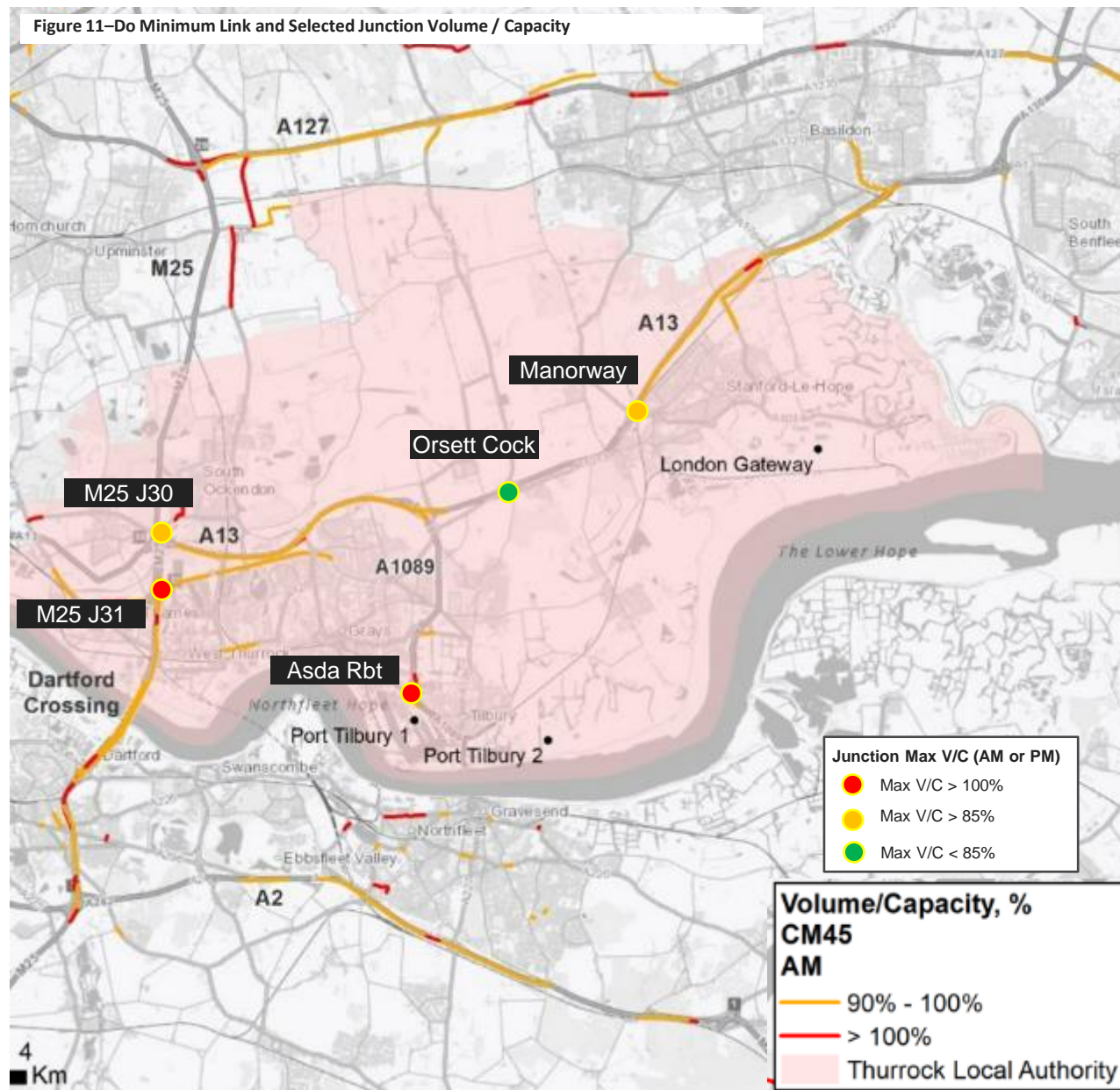


# Option Assessment Summary – 2030 Do Minimum Conditions

## Forecast Do-Minimum Network Performance in Thurrock

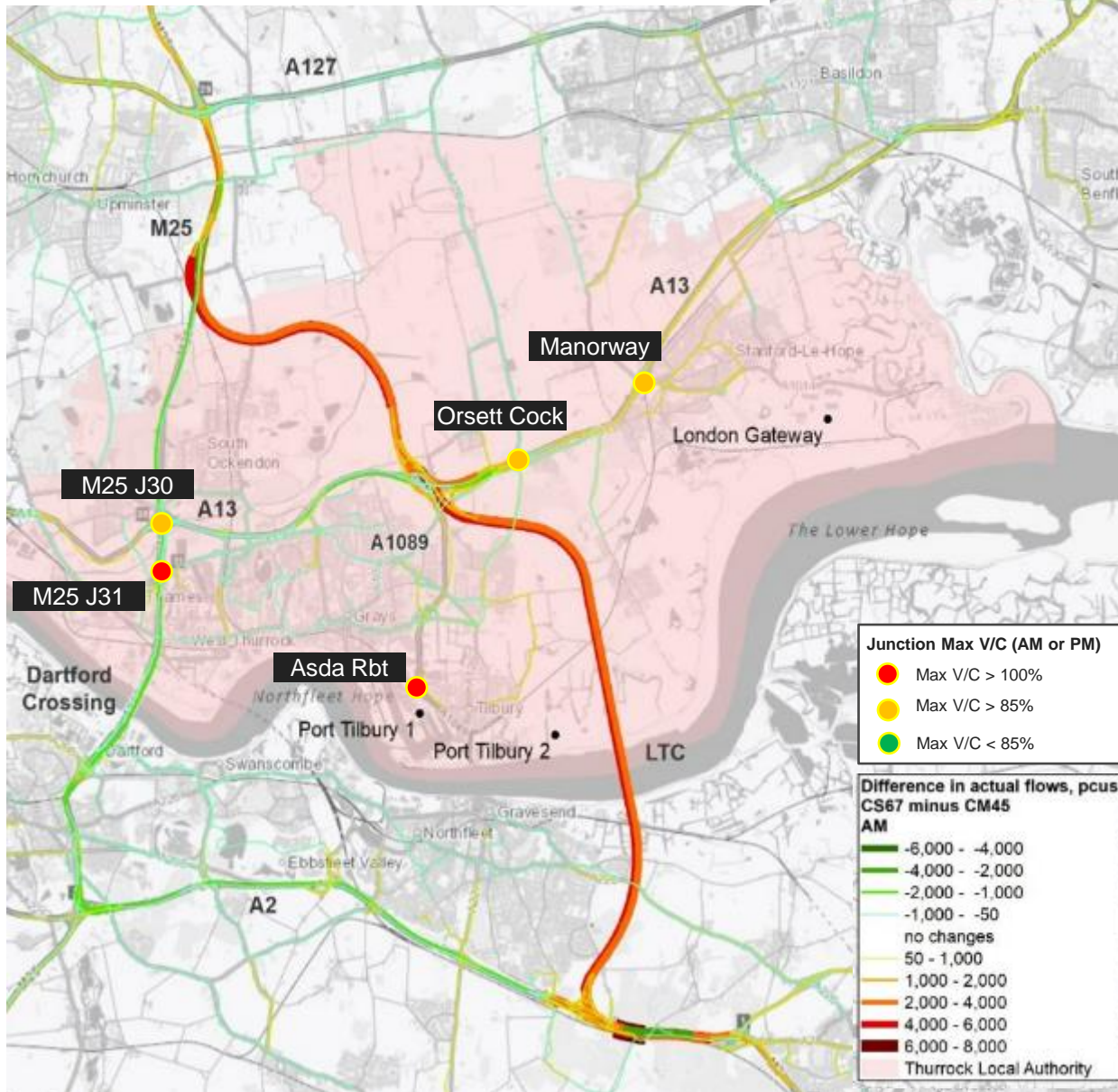
When assessing the modelled performance of the proposed LTC scheme and the alternative options it is important to consider the NH 2030 'Do-Minimum' forecast conditions against which the LTC only and the alternative are being compared. In summary NH LTAM model forecasts the following network conditions:

- The Dartford crossing and its approaches are forecast to be very close to or above their capacity in the peak periods.
- M25 Junction 30 and M25 Junction 31 also have movements that are close to or above their capacity.
- The A13 corridor west of the A1089 is forecast to be close to its capacity. The A13 corridor around Stamford-le-Hope and London Gateway is also forecast to be close to or above capacity. The A13 Manorway junction is forecast to have movements with a V/C close to 100% in the AM peak.
- A1089 corridor forecast to operate mostly within its capacity although there are movements at the Asda Rdbt that will have a maximum Volume / Capacity Ratio (V/C) of greater than 100%.
- The A1306 Northern Arterial Road West and London Road, Grays are forecast to operate over their capacity and with delays, along with Marshfoot Road. There are also 30-60 second link delays on various roads across the Lakeside Basin area, Chadwell Hill and in Corringham.
- Overall network performance statistics will likely be negatively impacted by congestion and delays at the Dartford Crossings and its approaches and along the A13, creating delays, lower speeds and queuing.



# Core LTC Scheme (CS67): Summary of Benefits and Impacts

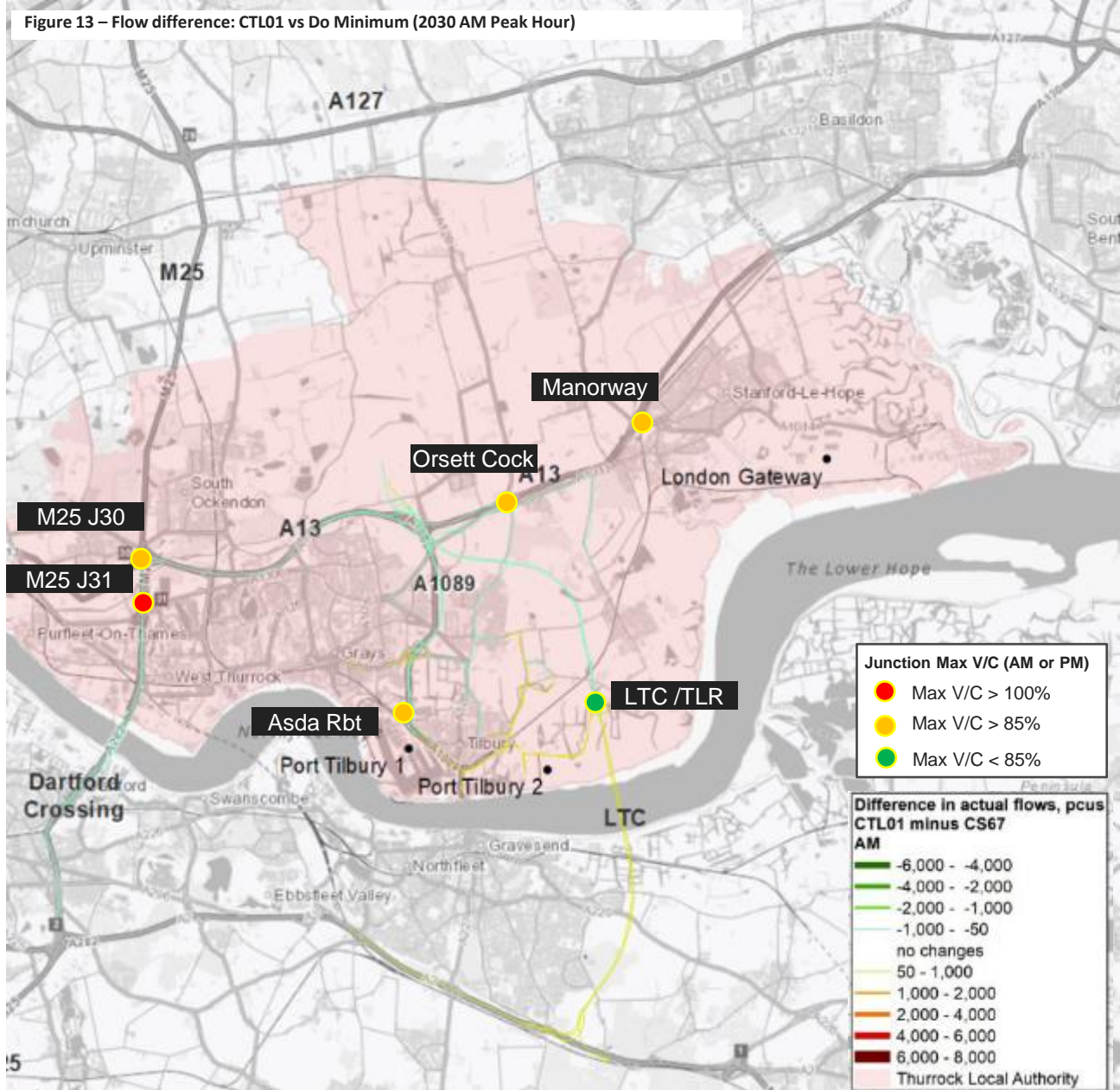
Figure 12 – Flow difference: LTC Only vs Do Minimum (2030 AM Peak Hour)



Some of the main modelled network performance benefits and impacts of the core LTC scheme (compared to the NH DM scenario) forecasts at opening are summarised in Figure 12 and below:

- ✓ delivers some strategic network performance benefits:
  - reduces traffic using Dartford Crossings (-12%) and on M25 North of J30 (-18%) (although these benefits are quickly eroded within 15 years)
  - reduces traffic at M25 J30 (-10%) and improves performance particularly in AM peak
  - reduces traffic on A13 west of LTC (-14%)
- ✓ good regional journey time savings are forecast - M2 J1 to M25 North of J28 (-31%), Chelmsford to M2 J1 (-23%), Port of Tilbury to M25 North of J28 (-10%), Port of Tilbury to M2 J1 (-38%), A13 East (LG Port to M25 North of J28 (-13%)
- ✓ local road network benefits in Thurrock:
  - -24% over-capacity queues
  - 10% increase in average vehicle speeds
  - reduces traffic on local roads south of A13 west / Lakeside basin area
- ✗ results in significant growth in cross river trips (5,300 trips or 44%) (and high demand on LTC)
- ✗ increases traffic on A13 east of LTC (+14%) including at critical junctions - Orsett Cock (+10%), Manorway (+8%) impact negatively on their performance and capacity to support future growth
- ✗ a large increase in traffic is forecast on A1089 (+20%) and a small increase at the A1089 Asda Rdbt (+1%). Average delays at Asda Rbt increases (+47%) and max V/C is >100%.
- ✗ poor junction performance still forecast at M25 J30 (PM), A1089 Asda Roundabout, Orsett Cock, Manorway junctions which would still require mitigation / improvements
- ✗ a number of local roads are forecast to see increases in traffic, including Brentwood Rd (PM peak) (Chadwell St Mary), Buckingham Hill Rd (Linford), Rectory Rd (Orsett) and Southend Rd (Corryingham).
- ✗ total travel distance by all vehicles across Thurrock is forecast to increase (+14%)
- ✗ average vehicle trip length across the LTAM modelled area is forecast to increase (+7.5%)
- ✗ increases in carbon (+10%), NOx (+6%) and PM10 (6%) emissions in Thurrock are forecast
- ✗ very limited opportunities for cross river public transport connectivity via LTC (or local public transport connections from Thurrock onto LTC) to support Freeport and Local Plan growth

# LTC plus Tilbury Link Road Option (CTL01): Summary of Benefits and Impacts

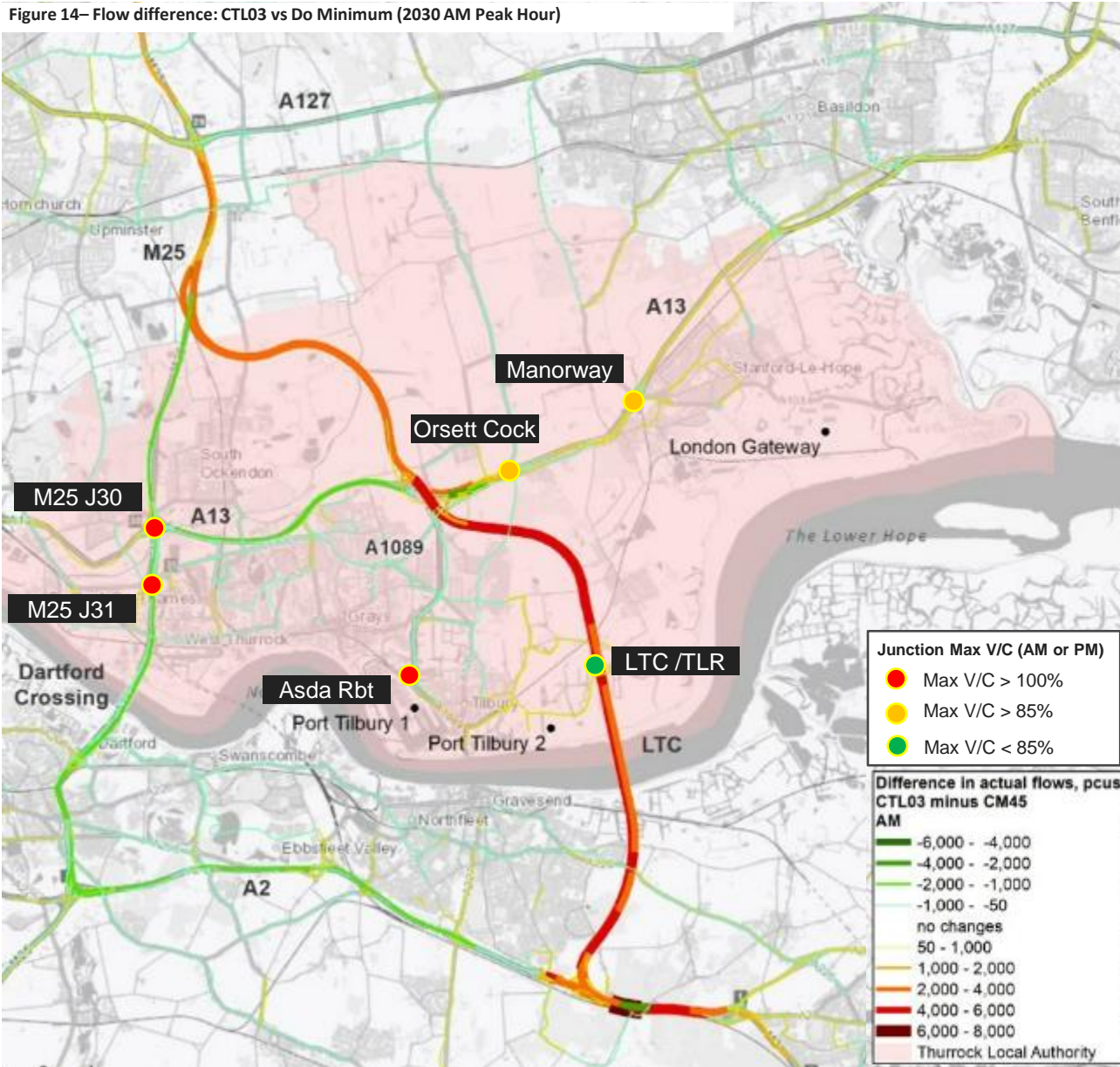


The strategic traffic flow and network impacts of this option compared to the DM are similar to the core LTC scheme (and are shown in Appendix 1 - p40). Critically adding the TLR provides incremental benefits compared to the LTC only scenario – it delivers additional network performance benefits and helps reduce some of the constraints and negative local impacts associated with the LTC scheme proposed by NH. Figure 13 and the bullets below highlights these additional benefit and impacts of an LTC scheme that includes the TLR **compared to the LTC only scenario (unless stated)**:

- ✓ strategic network benefits:
  - slight further reduction in vehicles using Dartford (-1%)
  - reduces traffic along the A13 West of LTC (-2%) and A1089 corridors (-13%)
- ✓ beneficial impacts at critical local junctions:
  - reduces traffic volumes at Orsett Cock (-9%), Manorway (-1%), Asda Rdbt (-8%)
  - reduces average delay at Orsett Cock (-10%) and Asda Rdbt (-76%)
  - reduce Max V/C at Asda Rbt below 100%
- ✓ provides some additional regional and local journey time savings compared to LTC, particularly for Port of Tilbury traffic crossing the River (to/from M2 J1) (-22%)
- ✓ local network benefits in Thurrock:
  - -9% over-capacity queues
  - -0.5% total travel distance by all vehicles
  - -1.3% total travel time
  - + 1% increase in average vehicle speeds
- ✓ reduces some of the negative traffic, safety and environmental impacts of LTC on local roads and communities, particularly in Chadwell St Mary and Linford
- ✓ slightly reduces forecast carbon (-1%), NOX (-1%) and PM10 (-2%) emissions in Thurrock
- ✓ TLR unlocks opportunities for cross river public transport connectivity (or local public transport connections from Thurrock onto LTC) to support Freeport and Local Plan growth
- ✗ compared to DM still results in significant growth in cross river trips (5,600 trips or +47%)
- ✗ poor junction performance still forecast at A1089 Asda Roundabout (AM), Orsett Cock (PM), The Manorway which could still require mitigation / improvements
- ✗ compared to DM still increases traffic on A13 east of LTC (+14%)
- ✗ compared to DM still significantly increases vehicle distance travelled (13%), average vehicle trip length (6.6%), carbon (9%), NOX (4%) and PM10 (2%) emissions in Thurrock
- ✗ additional land take, costs and environmental impacts associated with delivery of TLR

# TLR and No Direct Access to LTC from A1089 (CTL03): Summary of Benefits and Impacts

Figure 14- Flow difference: CTL03 vs Do Minimum (2030 AM Peak Hour)



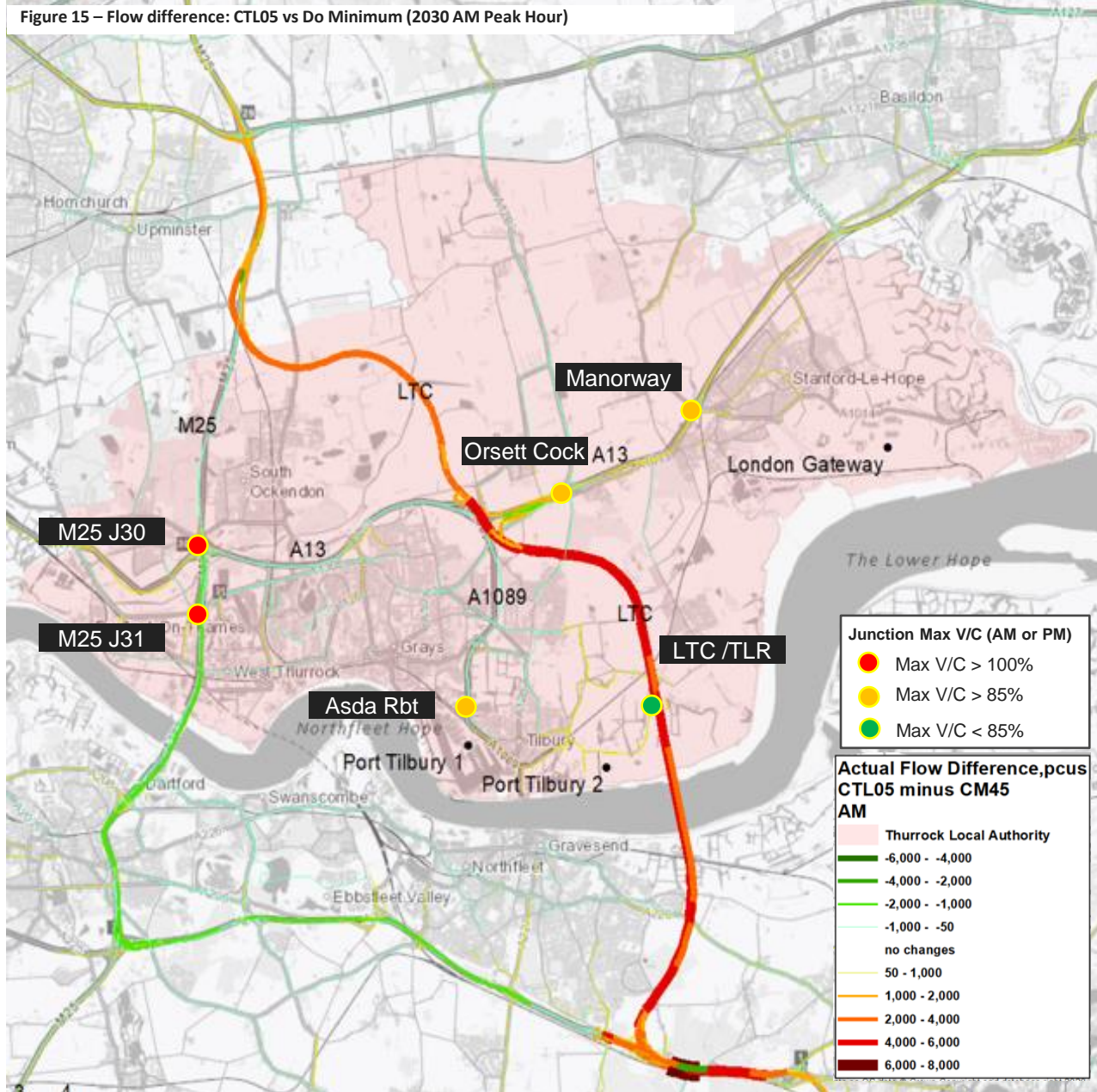
Some of the main modelled benefits and impacts of this option (compared to the DM scenario) are summarised in **Figure 14** and below:

- ✓ strategic network benefits:
  - still provides relief at Dartford Crossings (-10%) and M25 North of J30 (-15%)
  - still reduces traffic at M25 J30 (-8%)
  - still reduces traffic on A13 west of LTC (-13%)
  - reduces traffic on A1089 corridor (-11%) including at Asda Rbt (-7%)
- ✓ good regional journey time savings are forecast (comparable to LTC) - M2 J1 to M25 North of J28 (-31%), Chelmsford to M2 J1 (-23%), Port of Tilbury to M25 North of J28 (-10%), Port of Tilbury to M2 J1 (-49%), A13 East (LG Port to M25 North of J28 (-13%) and the inclusion of TLR provides additional savings, particularly for Port of Tilbury traffic crossing the River (to/from M2 J1)
- ✓ slight reduction in traffic at A13 Orsett Cock (-0.5%)
- ✓ local network benefits in Thurrock vs DM:
  - -42% over-capacity queues
  - 9% increase in average vehicle speeds
- ✓ TLR unlocks opportunities for cross river public transport connectivity via LTC (or local public transport connections from Thurrock onto LTC) to support Freeport and Local Plan growth
- ✓ slightly reduced LTC/A13 junction land take and local environmental impacts
- ✗ still results in significant growth in cross river trips (5,500 trips or +46%)
- ✗ poor junction performance forecast at M25 J30 (PM), A1089 Asda Roundabout (AM), Orsett Cock, Manorway which would still require mitigation / improvements
- ✗ still increases traffic on A13 east of LTC (+15%)
- ✗ still significantly increases vehicle distance travelled (13%), average vehicle trip length (7.5%), carbon (9%), NOx (5%) and PM10 (3%) emissions in Thurrock
- ✗ additional land take, costs and environmental impacts associated with delivery of TLR

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated

# TLR and No Direct Access to LTC from A1089 or A13 East to LTC North (CTL05): Summary of Benefits and Impacts

Figure 15 – Flow difference: CTL05 vs Do Minimum (2030 AM Peak Hour)



Some of the main modelled benefits and impacts of this option (compared to the DM scenario) are summarised in Figure 15 and below:

- ✓ strategic network benefits:
  - still provides relief at Dartford Crossings (-13%) and M25 North of J30 (-11%)
  - still reduces traffic on A13 west of LTC (-8%)
  - reduces traffic on A1089 corridor (-12%) including at Asda Rbt (-8%)
- ✓ good strategic journey time savings provided, particularly between M25 North - M2 J1 and Chelmsford/PoT - M2 J1 M2 J1 to M25 North of J28 (-32%), Chelmsford to M2 J1 (-23%), Port of Tilbury to M25 North of J28 (-10%), Port of Tilbury to M2 J1 (-49%), A13 East (LG Port to M25 North of J28 (-3%) and the inclusion of TLR provides additional savings, particularly for Port of Tilbury traffic crossing the River (to/from M2 J1)
- ✓ slightly reduces LTC's traffic impact on A13 east of LTC including traffic flow at Orsett Cock (-1%)
- ✓ local network benefits in Thurrock vs DM:
  - -32% over-capacity queues (+2% in PM)
  - 9% increase in average vehicle speeds
- ✓ TLR unlocks opportunities for cross river public transport connectivity via LTC (or local public transport connections from Thurrock onto LTC) to support Freeport and Local Plan growth
- ✓ significantly reduced LTC/A13 junction land take and local environmental impacts
- ✗ still results in significant growth in cross river trips (5,700 trips or +47%)
- ✗ reduces journey time savings from London Gateway (A13 East) to M25 North
- ✗ reduced relief at M25 J30 and poor junction performance forecast at M25 J30, A1089 Asda Roundabout, Orsett Cock, Manorway junctions which would still require mitigation / improvements
- ✗ still increases in traffic on A13 east of LTC (+12%)
- ✗ still significantly increases vehicle distance travelled (10%), average vehicle trip length (4.7%), carbon (9%), NOx (5%) and PM10 (3%) emissions in Thurrock
- ✗ additional land take, costs and environmental impacts associated with delivery of TLR

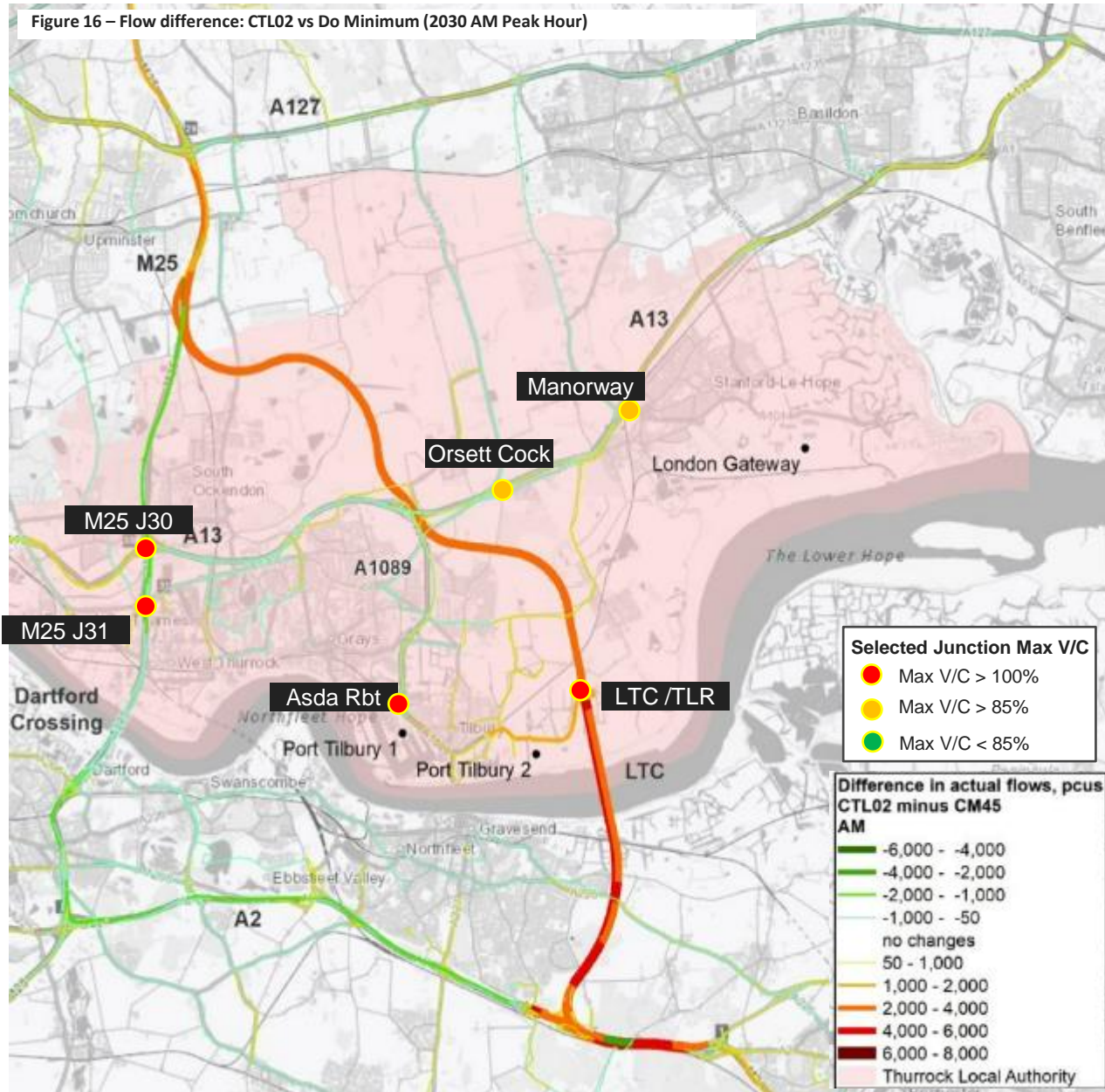
Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated





# LTC Plus TLR and Remove LTC/A13/A1089 Interchange (CTL02): Summary of Benefits and Impacts

Figure 16 – Flow difference: CTL02 vs Do Minimum (2030 AM Peak Hour)



Some of the main modelled benefits and impacts of this option (**compared to the DM scenario**) are summarised in Figure 16 and below:

- ✓ reduces scale of growth **(+38%)** in cross river trips compared to LTC only **(+47%)**
- ✓ strategic network benefits:
  - still provides relief at Dartford Crossings **(-10%)** and M25 North of J30 **(-14%)**
  - still reduces traffic on A13 west of LTC **(-6%)**
- ✓ provides strategic journey time savings, particularly between M25 North - M2 J1 **(-32%)**, Chelmsford to M2 J1 **(-17%)** and Port of Tilbury to M2 J1 **(-41%)**
- ✓ reduces scheme traffic impact on A13 east of LTC incl. at critical junctions - Orsett Cock **(-9%)**, Manorway **(-1%)**
- ✓ local network benefits in Thurrock vs DM:
  - **-14%** over-capacity queues
  - **8%** increase in average vehicle speeds
- ✓ TLR unlocks opportunities for cross river public transport connectivity via LTC (or local public transport connections from Thurrock onto LTC) to support Freeport and Local Plan growth
- ✓ significantly reduced LTC/A13 junction land take and local environmental impacts
- ✗ reduced journey time savings from Ports (Tilbury and LG) compared to LTC scheme – Port of Tilbury to M25 North and A13 East / LG to M25 North – but still provides savings
- ✗ reduced relief at M25 J30 & poor performance forecast at M25 J30, A1089 Asda Roundabout, Orsett Cock and Manorway and LTC/TLR junctions which would still require mitigation
- ✗ some strategic traffic is routing to TLR via local roads(Buckingham Hill, Muckingford Rd, Fort Rd) requiring restrictions or mitigation
- ✗ local network performance deteriorates in PM - 30% increase in over capacity queues
- ✗ still significantly increases vehicle distance travelled **(11%)**, average vehicle trip length **(5.7%)**, carbon **(9%)**, NOx **(5%)** and PM10 **(4%)** emissions in Thurrock
- ✗ additional land take, costs and environmental impacts associated with delivery of TLR



# Alternative LTC Highway Configuration Options - Summary of Initial Strategic Option Appraisal

Case and Objectives		NH Do Minimum Scenario / No LTC	LTC Only LTC/A13: No Change (CS67)	LTC + TLR LTC/A13: No Change (CTL01)	LTC + TLR LTC/A13 : No Direct Connections from A1089 to LTC (CTL03)	LTC + TLR LTC/A13: No Direct Connections from A1089 to LTC AND A13E to/from LTC North (CTL05)	LTC + TLR LTC / A13: Remove all Interchange (CTL02)
STRATEGIC	Relief at the Dartford Crossing and M25 approaches	✗ ✗	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	Improve resilience of Thames crossings and SRN / MRN	✗ ✗	✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓
	Improve safety	✗	✗	✗	✗	–	–
	Support regional economic growth	✗ ✗	✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓
	Support sustainable local economic growth	✗ ✗	–	✓ ✓	✓ ✓	✓ ✓	✓ ✓
ECONOMIC	Road network performance	✗ ✗	✓	✓ ✓	✓ ✓	✓ ✓	✓
	Carbon emissions	✗	✗ ✗ ✗	✗ ✗ ✗	✗ ✗ ✗	✗ ✗	✗ ✗
	Socio-distributional impacts	✗	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	Local environment and wellbeing – air quality, noise, visual, land take	✗	✗ ✗ ✗	✗ ✗	✗ ✗	✗	✗
MANAGEMENT	Consent and construction time period	-	8 – 10 years	9 – 11 years	< 8 – 10 years	< 8 – 10 years	< 8 to 10 years
	Public and stakeholder acceptability	✗ ✗	–	✓	✓	–	–
FINANCIAL		-	LTC = £8.5bn	LTC = £8.5bn TLR = £0.2m–£0.3bn	LTC < £8.5bn TLR = £0.2m–0.3bn	LTC << £8.5bn TLR £0.2–£0.3bn	LTC << £8.5bn TLR = £0.2m–£0.3bn
COMMERCIAL		-		TLR funding opportunities from Freeport and developers			



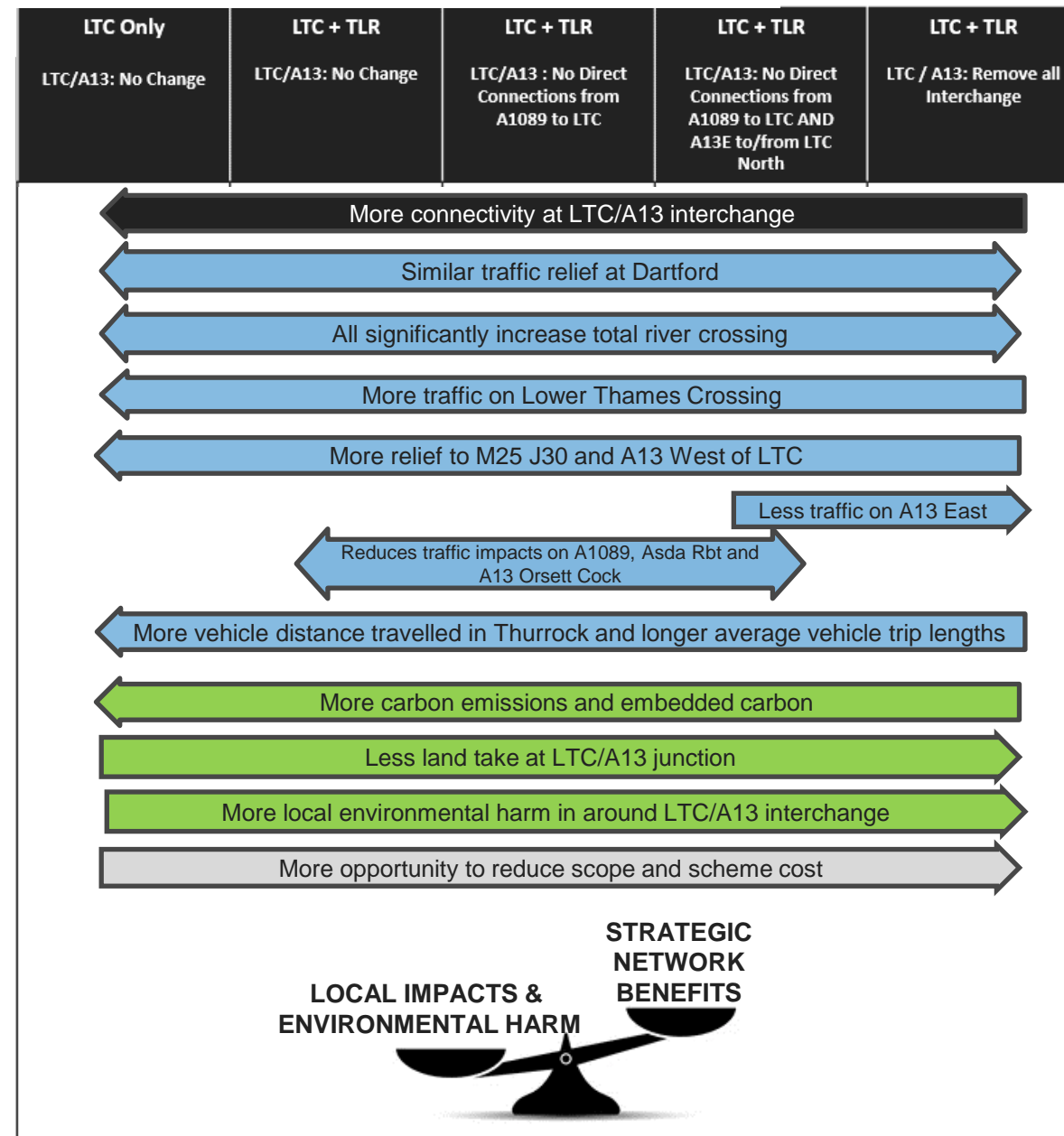
# Summary Findings

## Alternative Option Trade Offs

A review and assessment of the current scheme and alternative options demonstrates that:

- The current LTC scheme and all alternative options are forecast to provide a similar scale of traffic relief at the Dartford Crossing and on the M25 approaches to Dartford (Note: with LTC these benefits are forecast to be quickly eroded within 15 years of opening).
- LTC and all the alternative options will all significantly increase total river crossings.
- LTC and all options have a similar impacts on overall LTAM global (area wide) network performance statistics, offering slight improvements over the Do Minimum scenario e.g. Over Capacity Queues, Total Travel Time, Average Speed, Total Travel Distance.
- The forecast impacts of LTC and the alternative options on the 'Thurrock only' road network performance statistics varied more between the options. The addition of the TLR provides overall local road network performance benefits compared to the LTC only scenario. The tests show that re-configuration of the LTC/A13 junction could help reduce the current scheme's impacts at critical local junctions e.g. A1089 Asda Rbt, A13 Orsett Cock and on local roads
- The alternative LTC highway configurations in Thurrock with the TLR, and the different strategic connectivity provided at the LTC/A13/A1089 interchange, result in some clear trade offs between a range of scheme outcomes and impacts. Some of the key trade offs between benefits and outcomes are shown in **Figure 17**. It is clear that the alternative LTC highway configurations in Thurrock including TLR alongside a re-configured LTC/A13 junction could therefore help re-balance the scheme outcomes and impacts – still providing strategic benefits whilst reducing scale of local impacts and harm within Thurrock – and should be considered further.

Figure 17 – Outcome Trade Offs between Options



# Summary of Assessment Findings

## Core LTC Scheme (CS67)

The core LTC scheme, including an LTC/A13 junction that offers multiple strategic connections, is primarily focused on providing benefits on the strategic road network - by reducing demand at the Dartford Crossings, M25, A13 West and at M25 J30 and maximising use of the LTC itself. It does provide some relief to the Dartford Crossing and M25 approaches at opening and also reduces demand on the A13 (west of LTC), however, these benefits are forecast to be substantially eroded within 15 years.

The additional cross-river capacity provided by LTC induces many more cross-river vehicle trips, results in more vehicle distance travelled and will embed high carbon car travel in Thurrock and the region. This will have air quality and carbon emission disbenefits across Thurrock and the wider area.

The scheme generates significant increases in traffic generated on the A13 (east of LTC) and A1089 using up critical network capacity, It also provides indirect and congested connections to the ports. Forecast congestion at scheme opening at the A1089 Asda Roundabout, Orsett Cock and The Manorway junctions would need to be addressed. As a result of these issues the scheme risks constraining future Freeport, local plan growth and the council's ability to promote sustainable travel. The local impacts of the current LTC scheme configuration on Thurrock, particularly around the LTC/A13/A1089 interchange, will be very high relating to land take and property impacts, severance, air quality, noise and health and would result in unacceptable local impacts and harm to Thurrock's communities and environment.

## LTC + Tilbury Link Road (CTL01)

Adding the TLR to the LTC scheme provides some clear additional benefits and helps reduce some of the constraints and negative local impacts associated with the scheme currently proposed by NH. It provides a more direct connection between LTC and the Tilbury area and adds local network capacity unlocking improvements in both strategic and local network performance. It provides some slight additional relief to the Dartford crossings and M25, reduces demand along the A13 and A1089 corridors and critically reduces the negative impacts of the scheme at the Orsett Cock and Asda Roundabouts.

TLR also provides additional journey time savings for Port of Tilbury traffic wanting to cross the River and unlocks opportunities for direct and fast cross river public transport connectivity via LTC. All would support more, and sustainable, local and regional growth. TLR also helps reduce the negative traffic and environmental impacts of the LTC only scheme on local roads and communities in Chadwell St Mary and Linford. The reduction in traffic on the A1089 would also improve air quality and reduce noise impacts in Tilbury.

However, the local impacts of this alternative scheme configuration on Thurrock, particularly around the LTC/A13/A1089 interchange, would remain high relating to land take and property impacts, severance, air quality, noise and health. There would also be additional land take, costs and environmental impacts associated with delivery of TLR. As with the LTC only scenario, the additional cross river capacity provided by this option is forecast to attract significantly more cross-river vehicle trips and more vehicle distance travelled, with associated air quality and carbon emission disbenefits across Thurrock and the wider area.

## TLR and No Direct Access to LTC from A1089 (CTL03)

This option has very similar strategic and local impacts to the LTC plus Tilbury Link Road (CTL01) scenario. The inclusion of TLR in this scenario brings benefits as summarised above. The removal of the direct links from the A1089 to the LTC at the LTC/A13 interchange would significantly further reduce traffic demand on A1089 and at the Asda Roundabout that would provide more movement capacity for growth in the Tilbury area and at the Port. It would, however, slightly reduce the strategic network benefits of this scenario (compared to the LTC only and LTC plus TLR scenarios), increasing traffic on M25 North of J30, A13 West of LTC and at M25 J30 (and result in poorer forecast junction performance at M25 J30, particularly in the PM peak).

The removal of the A1089 links to LTC would only slightly reduce land take and the local environmental impacts of this option configuration on Thurrock around the LTC/A13/A1089 interchange would remain high. However, given the marginal strategic benefits provided by these links (if the TLR is in place) their removal and associated cost saving could free up project funding for the TLR or more cost effective and targeted junction mitigation measures to reduce scheme impacts and poor junction performance forecast, particularly at A13 Orsett Cock, A1089 Asda Rdbt or M25 J30.



## Summary of Assessment Findings

### TLR and No Direct Access to LTC from A1089 or A13 East to/from LTC North (CTL05)

This option removes more of the strategic connectivity at the LTC/A13/A1089 interchanges which starts to alter the spatial distribution of traffic flows and balance between strategic and local scheme benefits and impacts. It still provides strategic benefits, providing relief to the Dartford Crossings, M25 approaches and A13 Corridor (west of LTC). It also significantly reduces traffic demand on A1089 and at Asda Roundabout that would provide more local movement capacity and connectivity to support growth in the Tilbury area and at the Port of Tilbury.

Traffic on the A13 (east of LTC) including at Orsett Cock is reduced slightly compared to the LTC only scenario. However, forecast congestion at the M25 J30, A1089 Asda Roundabout, Orsett Cock and The Manorway junction (as with LTC) would still need to be addressed and could constrain local growth without mitigation and the delivery of supporting sustainable transport to promote more public transport use and active travel across the area and region. The reduced design scope at the LTC/A13 interchange and associated cost saving could free up project funding for the TLR, more cost effective and targeted mitigation measures to reduce this option's wider network impacts and supporting sustainable transport measures across the area.

The removal of multiple links at the LTC/A13 Interchange would significantly reduce land take and the local environmental impacts of this option configuration on Thurrock. It could also significantly reduce embedded carbon and scheme costs. Demand on LTC North and South of the A13 is forecast to be reduced which would also help reduce local air quality and noise along the route through Thurrock. A significant forecast reduction in traffic on the A1089 would also improve air quality and reduce noise impacts in Tilbury.

As with the LTC only scenario the additional cross river capacity provided by this option is forecast to attract significantly more cross-river vehicle trips and more vehicle distance travelled, with associated air quality and carbon emission disbenefits across Thurrock and the wider area which would again need mitigation by the delivery of a supporting sustainable transport and demand management measures. However, compared to LTC this option could reduce local traffic and environmental impacts by reducing total travel distance by vehicles across Thurrock. Average vehicle trip lengths are also reduced compared to the core LTC scheme.

### LTC Plus TLR and Remove LTC/A13/A1089 Interchange (CTL02)

This option has the most significant effects on the spatial distribution of traffic flows and in changing the balance between strategic and local benefits and impacts (compared to the effects of LTC only scheme). Like all of the options it does still provide strategic benefits compared to the Do Minimum scenario, providing relief (albeit reduced) to the Dartford Crossings, M25 approaches and A13 Corridor (west of LTC/Thurrock). Removing direct connectivity from the A13 East to/from LTC South dampens down the induced growth in cross river traffic and significantly reduces traffic on the A13 east of LTC/Thurrock, including at the Orsett Cock junction, potentially providing more capacity for future growth in the East of Thurrock.

However, this option does result in strategic traffic from the A13 East to/from LTC routing via A1089 and the TLR which could potentially constrain growth in the Tilbury Port area. Congestion and delays at key junctions including at the M25 J30, LTC/TLR, A1089 Asda Rbt, Orsett Cock and the Manorway would again require improvements or they could constrain local growth without mitigation and the delivery of a supporting sustainable transport measures to promote more public transport use and active travel.

There is also significant traffic routing from the Manorway and through local roads (Buckingham Hill Rd, Muckingford Rd and Fort Rd) to access TLR/LTC which would need restricting (to prevent significant negative local traffic and environmental impacts). Overall network performance statistics (particularly over capacity queues) for Thurrock in the PM also significantly deteriorate compared to the do-minimum.

The removal of all of the proposed new links to and from LTC at the LTC/A13 interchange would significantly reduce land take and the local environmental impacts of this option configuration on Thurrock. It could also significantly reduce embedded carbon and scheme costs. Demand on all of the LTC route is reduced which would also help reduce local air quality and noise along the route through Thurrock. However, as with the LTC only scenario the additional cross river capacity provided by this option means it is still forecast to attract significantly more cross-river vehicle trips and more vehicle distance travelled, with associated air quality and carbon emission disbenefits across Thurrock and the wider area which would again need mitigation by the delivery of supporting sustainable transport and demand management measures.

The reduction in demand on LTC also offers opportunities to reduce the scale of LTC, to increase Value for Money or to include dedicated road space for cross river public transport. The reduced design scope at the LTC/A13 interchange and associated cost saving could free up project funding for the TLR, more cost effective and targeted mitigation measures to reduce this option's wider network impacts and support sustainable transport measures.



## Conclusions

Thurrock Council has long held the view that alternative configurations of the LTC scheme (including the Tilbury Link Road and reducing connectivity at the LTC/A13/A1089 interchange) could potentially provide a better solution for the region, better support local growth aspirations whilst reducing the significant adverse local harm LTC will create in Thurrock. Despite representations from the Council, NH have not provided evidence that these alternative options have been fully assessed.

In December 2021, NH finally agreed to testing a limited number of these potential alternative LTC configurations for the Council. Only cordoned version of the LTAM models (covering the Thurrock area only) and some limited data from the full LTAM model from the alternative option traffic model runs were shared with the Council for review, limiting the Council's ability to assess these alternatives.

Whilst NH presented the Council with some high level findings from their model runs a full assessment of these alternative LTC configuration options has not been provided by NH. The council has therefore undertaken its own strategic assessment of the LTC scheme and these alternative options (based on the limited information it has available). This strategic assessment highlights that:

- The current LTC scheme is forecast to provide some initial relief to the Dartford Crossing and M25 approaches at opening and also reduces demand on the A13 (west of LTC). However, the additional cross-river capacity provided by LTC is also predicted to induce many more cross-river vehicle trips, more vehicle distance travelled and will embed high carbon car travel in Thurrock and the region. This will have air quality, carbon emission and health disbenefits across Thurrock and the wider area. LTC's current configuration will also provide indirect and congested connectivity to the ports and Thurrock area. This risks constraining future Freeport, local plan growth and the Council's ability to promote sustainable travel. The local impacts of the current LTC scheme configuration on Thurrock will be very high relating to land take and property impacts, severance, air quality, noise and health and result in significant harm to Thurrock's communities and environment.
- The alternative LTC highway configurations identified by Thurrock, including the TLR alongside a re-configured LTC/A13 junction, could help re-balance the LTC's outcomes and impacts, still providing strategic and local benefits whilst reducing scale of local impacts and harm within Thurrock.

- Option CTL01 (that adds the Tilbury Link Road to the LTC scheme) would deliver additional benefits to an LTC only configuration – see **table 6** for a summary of CTL01 benefits.
- Option CTL03 (that adds the TLR and only removes the A1089 links to LTC) to is not likely to provide sufficient further benefits or a large reduction in local harm compared to CTL01. It is not recommended that this option should be assessed further .
- Option CTL02 (that provides TLR and completely removes all connectivity to/from LTC at the LTC/A13/A1089) would dramatically reduce the physical scale of the LTC/A13 interchange and its associated local environmental impacts and harm in Thurrock. However, this option is forecast to route traffic through Tilbury (via A1089 and the TLR) and on local roads in West and East Tilbury potentially constraining growth and impacting on local communities. It is also forecast to have significant negative impacts on Thurrock's road network performance and could require junction improvements to M25 J30, LTC/TLR, A1089 Asda Rbt, Orsett Cock and the Manorway. At this stage it is not recommended that this option should be assessed further.
- Option CTL05 (that includes the TLR and reconfigures the LTC/A13/A1089 interchange to provide no Direct Access to LTC from A1089 or A13 East to/from LTC North) would again enable the physical scale of the LTC/A13 interchange and its associated local environmental impacts and harm in Thurrock to be significantly reduced whilst still providing strategic road network benefits at the Dartford Crossings, M25 approaches and A13 Corridor (west of LTC). CTL05 is forecast to significantly reduces traffic demand on A1089 and at Asda Roundabout, that alongside the benefits of the TLR, would provide more local movement capacity and connectivity to support growth in the Tilbury area and at the Port of Tilbury. Supporting improvements could be required at the M25 J30, A1089 Asda Roundabout, Orsett Cock and The Manorway (as with the LTC scheme).
- Overall, it is concluded that LTC highway configuration options CTL01 and CTL05 have good additional benefits in comparison to the current LTC scheme and these options should be developed and assessed further. The main benefits of these options in comparison to the LTC are summarised in **Table 6**.
- These options should be developed and assessed as part of an 'integrated alternative option' including a package of supporting sustainable transport and behaviour change/demand management measures to promote more public transport use and active travel across the area. These will be essential to help address the carbon emissions, local air quality and environmental disbenefits associated with all these LTC highway configuration options and to ensure sustainable port and local growth aspirations can be delivered.



## Recommendations

- (1) Further work should be completed by National Highways to assess the alternative LTC highway configuration options CTL01 and CTL05 as they could better support local sustainable growth, reduce local harm whilst maintaining strategic benefits.
- (2) Further assessment of these alternative options should include more work to consider:
  - the operational benefits of these alternative LTC highway configurations (CTL01 and CTL05) on the performance of critical local junctions such as Orsett Cock, The Manorway and Asda Roundabout using microsimulation models
  - the scale of decarbonisation, air quality and other local environmental impacts and benefits associated with a major reconfiguration of the LTC/A13/A1089 interchange.
  - the cost saving opportunities potentially associated with a major reconfiguration of the LTC/A13/A1089 interchange (which could be used to fund wider network improvements and supporting sustainable transport measures across the area)
  - the impacts of emerging major local plan sites and transport infrastructure e.g. South Ockendon Junction and Link, East Tilbury Rail Overbridge and how well LTC and alternative option support emerging sustainable local growth ambitions.
- (3) These alternative highway configurations should also be assessed as part of an ‘integrated alternative option’ packages for Thurrock and the wider region (see **Figure 18**) that includes:
  - Bus / Rapid Transit Network improvements.
  - Active travel network improvements.
  - Junction improvements / upgrades including at M25 J30, A1089 Asda Roundabout, Orsett Cock and The Manorway.
  - Traffic management / restrictions / modal filters to protect local communities.
  - Variable user charges to manage demand on the river crossings.
- (4) Further work is also required to assess an alternative ‘No-LTC crossing’ or ‘Do-Minimum’ scenarios with enhanced public transport, greater demand management e.g. variable charging/tolls, active travel and targeted junction/highway improvements.



# Summary of Main Benefits of Options CTL01 and CTL04 Compared to Current LTC Scheme

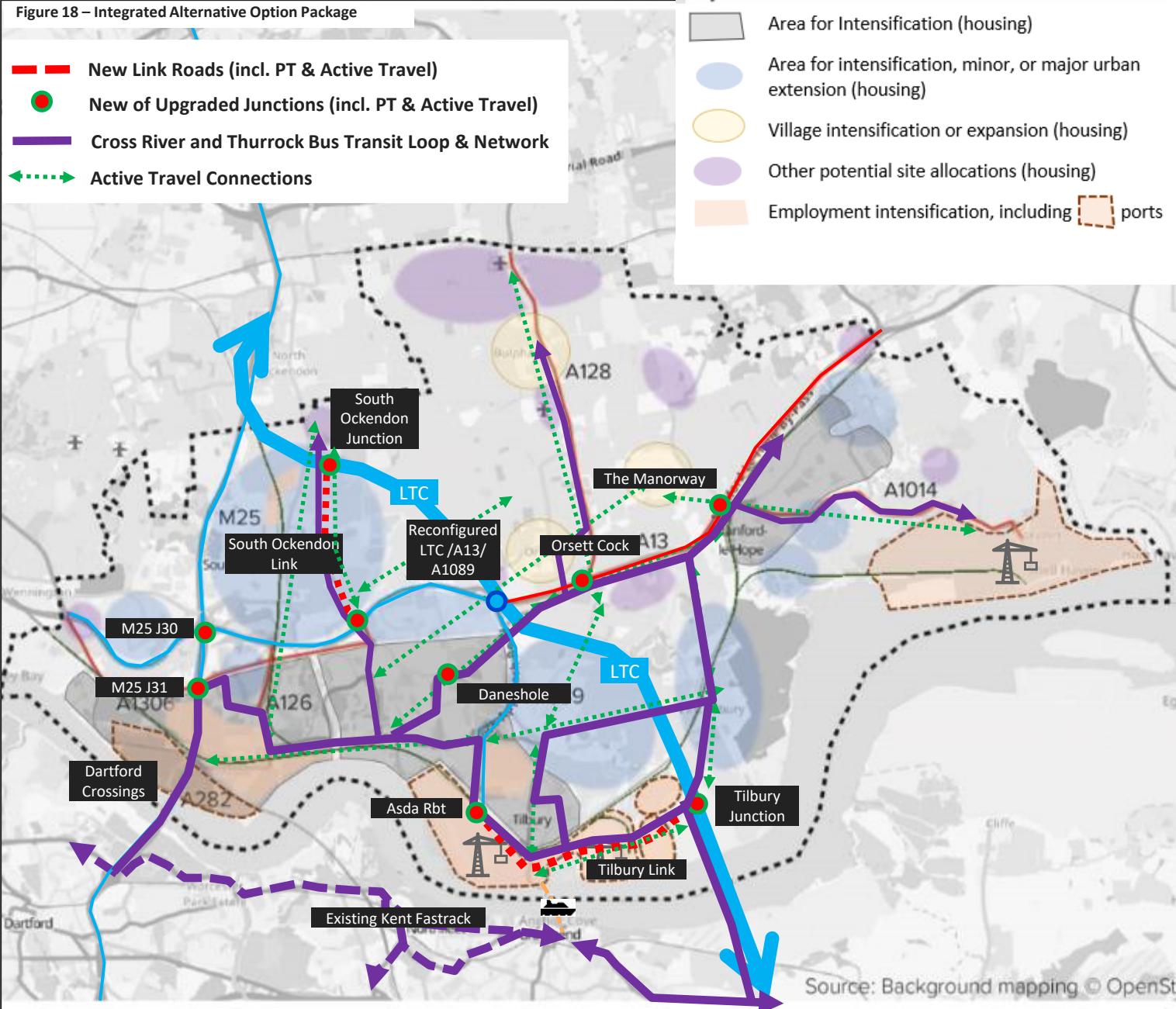
Table 6: CTL01 and CTL04 - Additional Benefits, Reduced Harm, VfM Opportunities

<p>LTC + Tilbury Link Road LTC/A13 Interchange: No Change  (Option CTL01)</p>	<p>LTC + Tilbury Link Road LTC/A13 Interchange: Remove Direct Connections from A1089 to LTC <u>AND</u> from A13E to/from LTC North (Option CTL05)</p>
<p>This option would better support sustainable Freeport and Local Plan growth, reduce local harm in Thurrock and provide better value for money by:</p> <ul style="list-style-type: none"> <li>• providing more direct connections between LTC and Port of Tilbury</li> <li>• unlocking opportunities for faster cross river and local public transport connections via the Tilbury Link Road and LTC</li> <li>• providing additional journey times savings across the area, particularly for trips between Tilbury and areas south of the river</li> <li>• improving the scheme’s strategic road network benefits by providing additional relief to the Dartford crossings, at M25 Junctions 30 and 31, on the A13 West of LTC and on the A1089 including at the Asda Roundabout</li> <li>• reducing LTC’s negative impact on the Local Road Network including on A13 Corridor (East of LTC) and at the A13 Orsett Cock junction</li> <li>• mitigating the negative impacts of LTC on local communities particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary), Rectory Rd (Orsett) and Buckingham Hill Road (Linford).</li> </ul>	<p>This option would better support sustainable Freeport and Local Plan growth, reduce local harm in Thurrock and provide better value for money by:</p> <ul style="list-style-type: none"> <li>• providing a more direct connection between LTC and the Port of Tilbury</li> <li>• unlocking opportunities for faster cross river local public transport connections via the Tilbury Link Road and LTC</li> <li>• still delivering strategic road network benefits - providing relief to the Dartford Crossings, on M25 approaches, on A13 Corridor (west of LTC) and significantly reducing traffic demand on A1089 and at Asda Roundabout</li> <li>• reducing some of LTC’s negative local traffic and environmental impacts – the total distance travelled by all vehicles across Thurrock is reduced by 3%-4% compared to the current LTC scheme (average vehicle trip lengths across are also reduced)</li> <li>• reducing the negative impacts of LTC local communities, particularly by reducing traffic on Brentwood Road, Chadwell Hill (Chadwell St Mary), Muckingford Rd and Buckingham Hill Road (Linford)</li> <li>• reducing the LTC/A13 interchange footprint and significantly reducing LTC’s land take and local environmental impacts in Thurrock</li> <li>• reducing the embedded carbon associated with the scheme</li> <li>• reducing local air quality and noise impacts along the route of LTC through Thurrock as a result of reduced traffic flow on LTC and also along the A1089 in Tilbury</li> <li>• providing an opportunity to reduce scheme costs (associated with the LTC/A13 interchange) and freeing up project funding for the TLR and targeted measures to mitigate wider network impacts and support sustainable transport measures</li> <li>• reducing construction impact and timescales (associated with the LTC/A13 interchange)</li> </ul>



# Potential Alternative Integrated Option Package

Figure 18 – Integrated Alternative Option Package



Source: Background mapping © OpenSt

# Appendix A1. Option Model Data Tables, Dashboards and Appraisal Tables



# Alternatives vs Core LTC Scheme - Summary of Model Data

(2030 Forecast Year – AM Peak Hour)

Table A1-1: Summary of Alternatives Network Performance Data vs LTC Core Scheme

Objective	Metric (units)		LTC Only	LTC with Tilbury Link Road		LTC res with TLR, no direct access to LTC from A1089		LTC with Tilbury Link, no direct access to LTC from A1089 or A13 E to LTC North		LTC with TLR but no LTC/A13/A1089 junction		
			CS67	CTL01	% Diff vs LTC Only	CTL03	% Diff vs LTC Only	CTL05	% Diff vs LTC Only	CTL02	% Diff vs LTC Only	
Relief at the Dartford Crossing	Traffic Flow (2-way)	Total River Crossings (veh)	17,447	17,806	2%	17,753	2%	17,855	2%	16,804	-3.7%	
		Total Dartford Crossings (veh)	10,701	10,615	-1%	10,624	-1%	10,614	-1%	10,346	2.3%	
Support Regional Economic Growth	Average Journey Times (mins)	M2 J1 to M25N	24.1	24.1	-0.1%	23.3	-1%	23.7	-2%	23.8	-1%	
		Chelmsford to M2 J1	57.7	57.4	-1%	57.9	0.2%	57.8	0.1%	62.6	8%	
		Port of Tilbury to M25 North of J28	31.3	30.1	-4%	31.1	-1%	31.4	0.4%	33.2	6%	
		Port of Tilbury to M2 J1	24.7	19.3	-22%	20.4	-17%	20.6	-17%	23.6	-4%	
		A13 East (LG Port) to M25N	21.6	21.5	-0.3%	21.7	1%	24.2	12%	24.4	13%	
	Link Flow (2-way pcu)	M25 North of J30	11,407	11,392	-0.1%	11,873	4%	12,349	8%	11,300	5%	
		A13 East of LTC	10,376	10,364	-0.1%	11,046	1%	10,767	-2%	9,652	-12%	
		A13 West of LTC (1)	10,898	10,735	-2%	11,031	1%	11,658	7%	12,008	10%	
		A1089	5,309	4,632	-13%	3,941	-26%	3,883	-27%	4,352	-18%	
		Tilbury Link Road	-	1,636	-	1,809	-	1,845	-	2,367	-	
		LTC North of A13	6,436	6,180	-4%	5,770	-10%	4,515	-30%	5,248	-19%	
	SRN Junction Total Flow (pcu)	LTC South of A13	8,012	7,164	-11%	7,289	-9%	7,490	-7%	5,248	-35%	
		M25 J30	8,363	8,200	-2%	8,559	2%	9,011	8%	9,051	8%	
		A13/A126	1,714	1,719	0.3%	1,687	-2%	1,661	-3%	1,643	-4%	
		A1089 Asda Rbt	4,589	4,226	-8%	4,193	-9%	4,163	-9%	4,454	-3%	
Tilbury LTC Junction	-	1,636	-	1,809	-	1,845	-	2,527	-			
Support Local Economic Growth	Average Journey Times (mins)	A1013 Stamford-le-Hope to Grays	18.1	17.7	-2%	17.8	-1%	17.9	-1%	17.9	-1%	
		Grays to Ockendon	17.3	17.3	0.0%	17.4	0.3%	19.9	15%	17.2	-1%	
		Purfleet to East Tilbury (via Chadwell)	21.5	21.3	-1%	21.3	-1%	21.5	0.2%	21.9	2%	
	Link Flow (pcu 2-way)	A1013 Stamford Rd	1,674	1,592	-5%	1,542	-8%	1,509	-10%	1,705	2%	
		Brentwood Road (South)	343	781	-17%	800	-15%	753	-20%	853	-10%	
		Buckingham Hill Rd	301	707	-22%	839	-7%	743	-18%	1,105	23%	
		A1012	1,360	1,335	-2%	1,325	-3%	1,322	-3%	1,283	-6%	
		A1013 Arterial Road, North Stifford	1,685	1,659	-2%	1,638	-1%	1,736	3%	1,826	8%	
	Local Junction Total Flow (pcu)	A13 Orsett Cock	5,262	4,774	-9%	4,791	-9%	4,741	-10%	4,396	-17%	
		A13 The Manorway	5,857	5,826	-1%	5,872	0.3%	5,687	-3%	5,384	-8%	
		A1013 Daneshole	3,024	2,939	-3%	2,792	-8%	2,888	-5%	3,059	1%	
	Network Performance	Over Capacity Queues	LTAM Area	15,743	15,673	-0.4%	15,660	-1%	15,717	-0.2%	15,656	-1%
			Thurrock Only	642	585	-9%	579	-10%	578	-10%	732	14%
		Travel Time	LTAM Area	264,041	263,853	-0.1%	263,908	-0.1%	264,047	0%	263,933	0.0%
			Thurrock Only	18,297	18,063	-1%	18,231	-0.4%	17,835	-2.5%	18,344	0.3%
Average Speed		LTAM Area	51	51	0.2%	51	0.0%	51	0.0%	51	-0.2%	
		Thurrock Only	62	63	1%	62	-0.2%	62	-0.8%	61	-2%	
Carbon Emissions	Total Travel Distance (LTAM Area) (veh.km)		13,556,121	13,551,653	0.0%	13,551,077	0%	13,549,116	-0.1%	13,522,097	-0.3%	
	Average Trip Length (LTAM Area) (veh.km)		14.98	14.85	-1%	14.84	-1%	14.59	-3%	14.72	-2%	
	CO2 Emissions (Thurrock)		88,221	87,376	-1%	87,526	-1%	85,319	-4%	87,071	-1%	
Local Environment and Wellbeing	PM10 Emissions (Thurrock) (kg)		6.2	6.06	-2%	6.1	-1%	6	-3%	6.2	0.2%	
	NOX Emissions (Thurrock) (kg)		1,591	1,571	-1%	1,583	-1%	1,544	-3%	1,583	-1%	
	Link Flow (2-way)	Rectory Rd (Orsett Village)	386	360	-7%	410	6%	409	6%	333	-14%	
		Chadwell Hill (Chadwell St Mary)	381	315	-7%	767	-22%	782	-20%	960	-2%	
		London Rd, Grays	1,571	1,557	-1%	1,573	0.1%	1,579	1%	1,622	3%	
	Travel distance (Thurrock) (veh.km)		1,135,257	1,129,469	-1%	1,127,903	-1%	1,097,145	-3%	1,110,408	-2%	



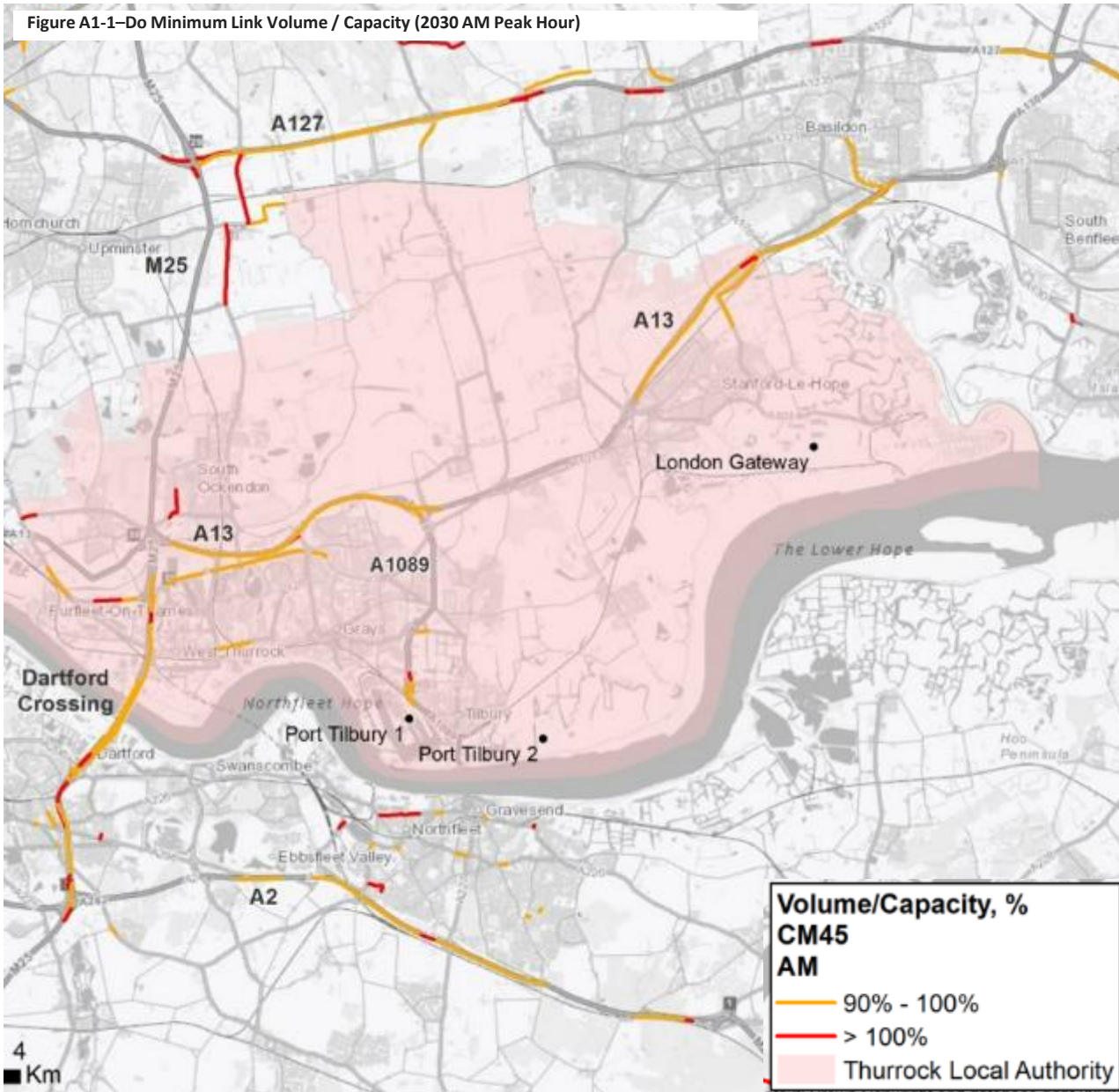
# Alternatives vs Do Minimum - Summary of Model Data

(2030 Forecast Year – AM Peak Hour)

Table A1-2: Summary of Alternatives Network Performance Data vs NH DM Forecasts

Objective	Metric (units)		LTC Only	LTC with TLR		LTC run with TLR, no direct access to LTC from A1089		Main LTC run with Tilbury Link, no direct access to LTC from A1089 or A13 E to LTC North		LTC with TLR but no LTC/A13/A1089 junction		
			CS67	CTL01	% Diff vs LTC Only	CTL03	% Diff vs LTC Only	CTL05	% Diff vs DM	CTL02	% Diff vs LTC Only	
Relief at the Dartford Crossing	Traffic Flow (2-way Veh)	Total River Crossings (2-way)	17,332	17,847	3%	17,835	3%	17,897	3%	16,358	-5.6%	
		Total Dartford Crossings (2 way)	10,324	10,233	-1%	10,240	-1%	10,219	-1%	10,700	4%	
Support Regional Economic Growth	Average Journey Times (mins)	M2 J1 to M25N	23.4	23.4	0.0%	23.3	-0.4%	23.2	-1%	23.0	-2%	
		Chelmsford to M2 J1	54.2	54.1	0.0%	54.2	0.1%	54.3	0.3%	59.0	9%	
		Port of Tilbury to M25 North of J28	27.1	28.0	3%	29.0	7%	29.0	7%	30.6	13%	
		Port of Tilbury to M2 J1	22.2	19.1	-14%	20.0	-10%	20.0	-10%	24.1	9%	
		A13 East (LG Port) to M25N	21.5	21.4	-0.3%	21.7	1%	23.2	8%	24.8	15%	
	Traffic Flow (2-way pcu)	M25 North of J30	10,475	10,457	-0.2%	10,782	3%	11,238	7%	11,033	5%	
		A13 East of LTC	11,301	11,290	-0.1%	11,323	0.2%	10,938	-3%	9,629	-15%	
		A13 West of LTC (1)	11,964	11,848	-1%	12,116	1%	12,565	5%	12,353	8%	
		A1089	4,391	4,201	-16%	3,681	-26%	3,628	-27%	4,504	10%	
		Tilbury Link Road	-	1,793	-	1,963	-	2,035	-	2,434	-	
		LTC North of A13	5,964	6,000	1%	5,280	-12%	3,968	-34%	4,433	-26%	
	SRN Junction Total Flow (pcu)	LTC South of A13	7,935	6,946	-13%	7,007	-12%	7,301	-8%	4,433	-44%	
		M25 J30	3,577	3,463	-1%	3,665	0.3%	10,125	6%	10,404	3%	
		A13/A126	1,929	1,938	0.4%	1,887	-2%	1,880	-3%	1,900	-2%	
A1089 Asda Rbt		4,452	3,763	-15%	3,736	-16%	3,689	-17%	4,613	4%		
Support Local Economic Growth	Average Journey Times (mins)	Tilbury LTC Junction	-	1,793	-	1,963	-	2,035	-	2,682	-	
		M25 J30	18.7	18.3	-2%	18.4	-1.8%	18.3	-2%	18.4	-2%	
		Grays to Ockendon	19.3	19.2	-0.1%	19.4	0.80%	19.5	1%	19.6	2%	
	Link Flow (pcu 2-way)	Purfleet to East Tilbury (via Chadwell)	22.8	22.7	-0.4%	22.8	0.00%	23.0	1%	23.3	2%	
		A1013 Stamford Rd	1,847	1,817	-2%	1,812	-2%	1,784	-3%	1,913	4%	
		Brentwood Road (South)	1,230	1,061	-14%	1,090	-11%	903	-27%	936	-24%	
		Buckingham Hill Rd	1,031	834	-19%	839	-19%	779	-24%	1,025	-1%	
		A1012	1,653	1,658	0.3%	1,651	0%	1,612	-3%	1,538	-7%	
	Local Junction Total Flow (pcu)	A1013 Arterial Road, North Stifford	1,879	1,878	-0.1%	1,835	1%	1,839	1%	1,909	2%	
		A13 Orsett Cock	5,687	5,159	-9%	5,124	-10%	4,684	-18%	4,542	-20%	
		A13 The Manorway	6,141	6,095	-1%	6,145	0.1%	6,097	-1%	5,914	-4%	
	Network Performance	Over Capacity Queues	A1013 Daneshole	3,351	3,278	-2%	3,155	-6%	3,255	-3%	3,397	1%
			LTAM Area	14,365	14,367	0.0%	14,372	0.1%	14,434	1%	14,518	1%
Travel Time		Thurrock Only	164	158	-4%	166	1%	203	24%	366	123%	
		LTAM Area	263,519	263,443	0.0%	263,553	0.0%	263,660	0.1%	263,456	0.0%	
Average Speed (km/hr)		Thurrock Only	17,945	17,844	-1%	17,898	-0.3%	17,645	-2%	18,023	0.4%	
		LTAM Area	50.6	50.6	0.0%	50.5	-0.2%	50.5	-0.2%	50.4	-0.4%	
Carbon Emissions	Travel Distance	Thurrock Only	62.9	62.9	0.0%	62.5	-0.6%	62	-2%	60.5	-4%	
		LTAM Area	13,630,943	13,627,334	0.0%	13,623,117	-0.1%	13,618,660	-	13,585,880	-0.3%	
	Average Trip Length (LTAM Area) (veh.km)	14.35	14.20	-1%	14.17	-1%	13.94	-3%	14.05	-2%		
Local Environment and Wellbeing	C02 Emissions	Thurrock Only	87,536	87,092	-1%	86,840	-1%	84,811	-3%	85,703	-2%	
	PM10 Emissions (kg)	Thurrock Only	6.2	6.18	-1%	6.2	-1%	6	-2%	6.2	-0.2%	
		NOX Emissions (kg)	Thurrock Only	1,609	1,602	-0.4%	1,600	-1%	1,568	-3%	1,592	-1%
	Link Flow (2-way)	Rectory Rd (Orsett Village)	367	361	0%	396	8%	481	31%	341	-7%	
		Chadwell Hill (Chadwell St Mary)	374	843	0%	798	-18%	751	-23%	856	-12%	
		London Rd, Grays	2,122	2,113	0.0%	2,123	0.1%	2,146	1%	2,188	3%	
	Travel distance (veh.km)	Thurrock Only	1,128,439	1,122,604	-1%	1,118,259	-1%	1,086,112	-4%	1,090,401	-3%	

# National Highways Do Minimum Scenario (CM45) – Road Network Performance (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Performance

**Dartford Crossings and M25 Approaches:** Dartford crossing demand is forecast to be 12,150 vehicles (2-way). The crossing and its approaches are forecast to be close to or above their capacity in the peak periods. The M25 J30 and M25 J31 also have movements that are close to or above their theoretical capacity

**A13 Corridor:** The A13 corridor west of the A1089 is forecast to be close to its capacity. The A13 corridor around Stamford-le-Hope and London Gateway is also forecast to be close to or above capacity. The A13 Manorway junction is forecast to have movements with a V/C close to 100% in the AM peak

**A1089 Corridor:** This corridor is forecast to operate mostly within its capacity although there are movements at the Asda Rdbt that will have V/C > 100%.

**Area Wide Network Performance:** NH forecasts suggest that overall network performance will be negatively impacted by congestion and delays at the Dartford Crossings and its approaches and along the A13, creating longer and more unreliable journey times.

## Local Network Modelled Performance

**Thurrock Network Performance:** The A1306 Northern Arterial Road West and London Road, Grays are forecast to operate over their capacity and with delays, along with Marshfoot Road. There are also 30-60 second link delays on various roads across the Lakeside Basin area, Chadwell Hill and in Corringham.

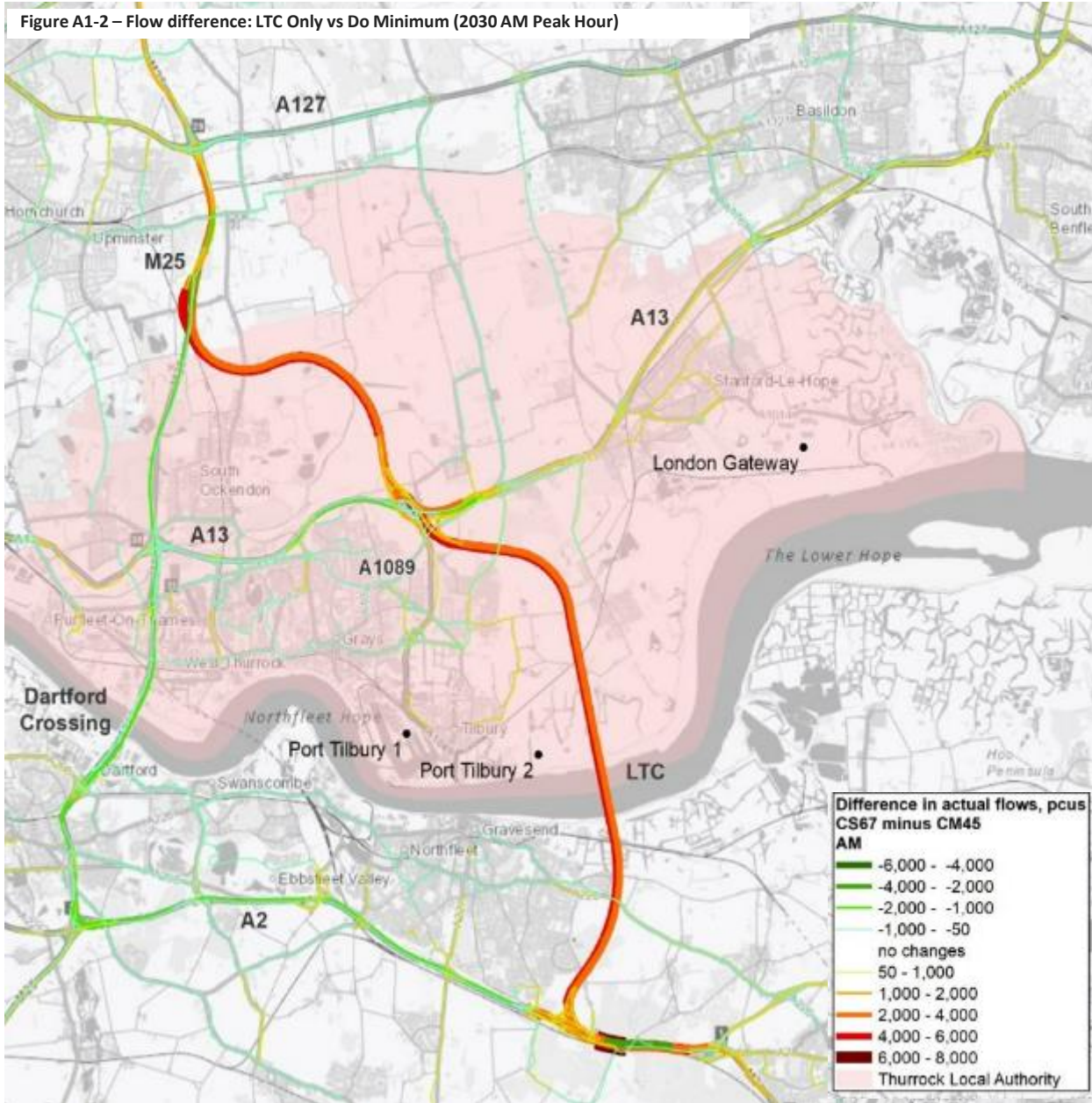
*Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated*



# National Highway's Do Minimum Scenario (CM45) - Summary Appraisal Table

Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25 approaches	✘ ✘	National Highway's modelled Do Minimum scenario shows Dartford and M25 approaches with V/C at or above capacity (based on LTAM assumed traffic growth forecasts).
	Improve resilience of Thames crossings and SRN / MRN	✘ ✘	Incidents at Dartford would increasingly have a negative impact on strategic road network performance – journey times and reliability. Limited alternative route options during incidents will continue to result in traffic re-routing through local road network and also impacting on its performance. Climate change will likely result in more QE2 bridge closures due to more frequent adverse weather.
	Improve safety	✘	Forecast growth in traffic and vehicle km driven will likely result in more in accidents on the road network
	Support regional economic growth	✘ ✘	Poor cross river private vehicle connectivity with limited alternative public transport options will continue to limit regional economic growth. Forecast delays and congestion at Dartford and on the M25 limit cross river connectivity, create longer car and HGV journey times and result in poor journey time reliability also constraining wider economic growth for the region through improved business productivity, more employment, taxes etc.
	Support sustainable local economic growth	✘ ✘	Forecast delays, congestion, poor road network resilience along A13 and A1089 corridors and at key junctions such as M25 J30, M25 J31, A13 The Manorway, A1089 Asda Rdbt with constrain emerging local plan growth. Poor access and connectivity to Ports will limit Freeport growth. Assumes continued limited investment in local public transport and active travel, also constraining improved access by those modes to support sustainable local growth.
ECONOMIC	Road network performance	✘ ✘	NH forecasts suggest that overall strategic and local network performance will be negatively impacted by congestion and delays at the Dartford Crossings and its approaches and along the A13, creating longer and more unreliable journey times.
	Carbon emissions	✘	Despite EV uptake will result in degree of operational decarbonisation, however, forecast traffic growth means this will not be sufficient to meet net zero targets.
	Socio-distributional impacts	✘	Poor cross river connectivity will continue to constrain access from deprived areas in Thurrock to employment opportunities across the region and limit ability to promote Levelling Up policy agenda. Limited local and cross river public transport services and the impact of poor strategic and local road network performance on services
	Local environment and wellbeing – air quality, noise, visual, land take	✘	Assumed car based regional and local transport network will have associated negative local air quality, noise and health disbenefits across Thurrock exacerbated by forecast growth.
MANAGEMENT	Consent/construction time period		n/a – no scheme
	Public and stakeholder acceptability	✘ ✘	Public and stakeholders will find poor regional and local transport network performance and associated social, environmental, health and economic effects unacceptable. Lack of proposed investment would not be acceptable to Ports, other major employers, investors, LAs, regional bodies
FINANCIAL			No scheme
COMMERCIAL			Poor transport network performance and limited capacity and connectivity will constrain Freeport, development and economic investment.

# Core LTC Scheme (CS67) – Road Network Performance and Impacts (vs Do Minimum Scenario)



## Strategic and Regional Network Modelled Impacts

**Cross River Demand:** total cross river vehicle trips are forecast to significantly as a result of the scheme (by **5,300** vehicles - a **44%** increase). This is largely as a result of trip re-distribution across the area (people changing their trip O-Ds). Lower Thames Crossing demand is forecast to be 6,700 vehicles (2-way) (including 850 HGVs)

**Dartford Crossings and M25 Approaches:** at opening the scheme provides some initial relief reducing vehicles using Dartford by **12%** in AM (peak hour) and **17%** in PM (although this is benefit is quickly eroded by 2045). Reduces traffic on M25 North (**-18%**) and at M25 J30 by **10%** and M25 J31 by **7%**.

**A13 Corridor:** reduces traffic on A13 West of LTC (**-14%**) and its junctions, including a reduction of **11%** at the A13/A126. Increases in traffic flow are forecast on A13 East of LTC (**+14%**) and A13 junctions, particularly at Orsett Cock junction (**+10%**) but also Manorway (**+8%**). Significant increases in average delay are also forecast at Orsett Cock and Manorway.

**A1089 Corridor:** a significant increase in traffic is forecast on A1089 (**+20%**) and a small increase at the A1089 Asda Rdbt (**+1%**). Average delay at Asda Rbt increase. Max V/C @ A1089 Asda increases (**103%**) (AM and PM).

**Strategic Journey Times:** journey times across a range of routes are improved, including to the ports.

**Area Wide Network Performance:** LTC delivers slight overall network performance benefits - over-capacity queues are forecast to reduce by **2%** and average speeds to increase by **1%** across the LTAM model area. There is a **1%** increase total travel distance forecast by all vehicles .

## Local Network Modelled Impacts

**Thurrock Network Performance:** Total travel distance by all vehicles across Thurrock is forecast to increase by **14%**. Total travel time across Thurrock increases by **3%**. Average vehicle speeds on roads in Thurrock increase by **10%** and over capacity queues reduce by **24%**.

**Local roads and communities:** a number of local roads are forecast to see increases in traffic, including Brentwood Road (PM peak) (Chadwell St Mary), Buckingham Hill Road (Linford), Rectory Rd (Orsett) and Southend Road (Corringham). Some local roads in the Lakeside Basin area to the south of A13 West see a reduction in traffic.

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated

# Core LTC Scheme (CS67) - Summary Appraisal Table

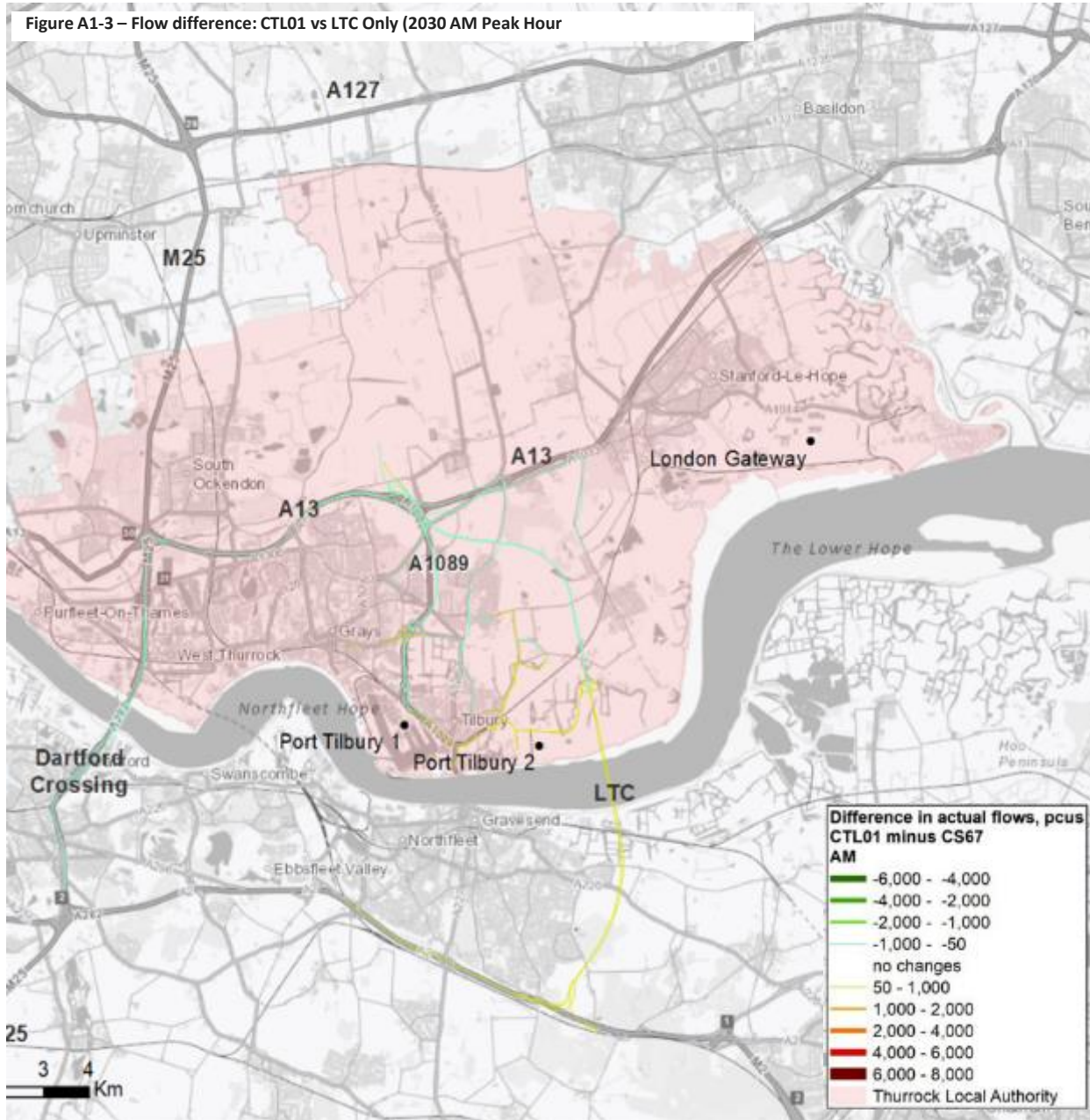
Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25	✓✓	At opening the LTC scheme provides some initial relief reducing traffic using the Dartford Crossings and its M25 approaches (although this benefit is eroded by 2045).
	Improve resilience of Thames crossings and SRN / MRN	✓✓	LTC provides additional cross river capacity and an alternative route for traffic when incidents occur at the Dartford crossings, although the network resilience benefits of the scheme have not yet been modelled and demonstrated. Reduced demand on M25 and A13 West of LTC may improve SRN/MRN resilience but increased demand on A13 East of LTC and on A1089 risks reducing the resilience of the network in that area and impact on the reliability of access and journey times to the ports at Tilbury and London Gateway. Reduces max V/C at M25 J30.
	Improve safety	✗	Increases in vehicle km driven will likely result in more in accidents on the road network. Complex LTC/A13 junction creates high risk of collisions.
	Support regional economic growth	✓✓	The scheme will provide additional cross river capacity and connectivity providing congestion relief at Dartford and on the M25. NH forecast this provide significant wider economic benefits for the region through improved business productivity, more employment, taxes etc. Strategic journey times are improved. Any benefit may be time limited as induced traffic will quickly erode this benefit.
	Support sustainable local economic growth	–	Whilst some local business will derive some benefit from LTC and the relief it provides at Dartford/M25 its configuration results in poor and indirect connectivity to the ports, it significantly increases traffic using the A13 (east of LTC) and A1089 which will use up network capacity and constraining future port and local plan growth. Provides some relief to roads in areas to the south of the A13 West of LTC and the Lakeside Basin. Constrains opportunities for improving public transport connectivity (incl. cross river via LTC) and to support port and Local Plan growth
ECONOMIC	Road network performance	✓✓	Scheme is forecast to provide some limited relief to Dartford crossings and M25 and to improve strategic journey times for users across the area. The area wide modelled network performance statistics show slight benefits arising from reduced queues and improved vehicle speeds. The scheme improves performance at M25 J30 but has a negative impact on key local junctions (A13 Orsett Cock, A13 Manorway and A1089 Asda Rbt)
	Carbon emissions	✗✗✗	Scheme operation will significantly increases cross-river vehicle trips, increase vehicle travel distance across the region and embed high carbon car use into the future. Embedded carbon arising from scheme construction will be very high.
	Socio-distributional impacts	✓	Improved journey times will provide improved access and vehicle journey times to employment opportunities including for those in deprived areas.
	Local environment and wellbeing – air quality, noise, visual, land take	✗✗✗	Increased trips and vehicle travel distance on Thurrock roads will result in more harmful emissions and noise. Some local roads and communities will experience increases in traffic flow, although some roads in areas to the south of the A13 West and the Lakeside Basin area will see a reduction. The land take, severance and visual impacts and environmental effects associated with the scheme will be high, particularly around the LTC/A13 junction. The scheme will take up a significant amount of local green belt. The detrimental impacts on residents health, wellbeing and quality of life will be high.
MANAGEMENT	Consent/construction time period		8 – 10 years
	Public and stakeholder acceptability	–	Public, political and stakeholder views on the scheme are mixed. Some employers and car drivers remain supportive of the need to address congestion at the Dartford Crossings and on the M25. Local residents and politician have serious concerns about the scheme's local impacts
FINANCIAL			LTC scheme construction cost = £8.5bn
COMMERCIAL			LTC/Tilbury junction provides limited capacity for future TLR and port/local plan growth that would unlock developer and other funding.





# LTC plus Tilbury Link Road (CTL01) – Road Network Performance and Impacts (vs Core LTC Scenario)

Figure A1-3 – Flow difference: CTL01 vs LTC Only (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River:** the TLR results in slight increase (+2%) in vehicles crossing the river compared to the LTC only scenario as trips between Tilbury and North Kent are faster. Demand on the LTC crossing is forecast to be 7,200 vehicles (2-way) an increase of 450 vehicles (+7%).

**Dartford and M25 Approaches:** adding TLR to the LTC scheme further reduces traffic using Dartford crossings by 1% in both the AM and PM peaks. It reduces traffic at M25 J30 by a further 2% and at M25 J31 by a further 1%.

**A13 Corridor:** TLR further reduces traffic on A13 West of LTC (by 2%) and its junctions. It reduces LTC’s impact on the A13 East, in particular the increases in traffic seen with LTC at Orsett Cock junction are reduced (-9%) helping reduce delays (-10%).

**A1089:** reduces traffic using A1089 (-13%) and Asda Rdbt (-8%). Reduces average delay at Asda Rbt (-76%).

**Strategic Journey Times:** provides slight additional journey times savings across the area. Inclusion of TLR significantly improves journey time saving between Port of Tilbury and M2 J1 (-22%).

**Area Wide Network Performance:** introduction of the TLR provides some slight additional network wide benefits reducing over-capacity queues by 0.5% and increasing average speeds 0.2% across the LTAM model area. There is a no change in total vehicular travel distance.

## Local Network Modelled Impacts

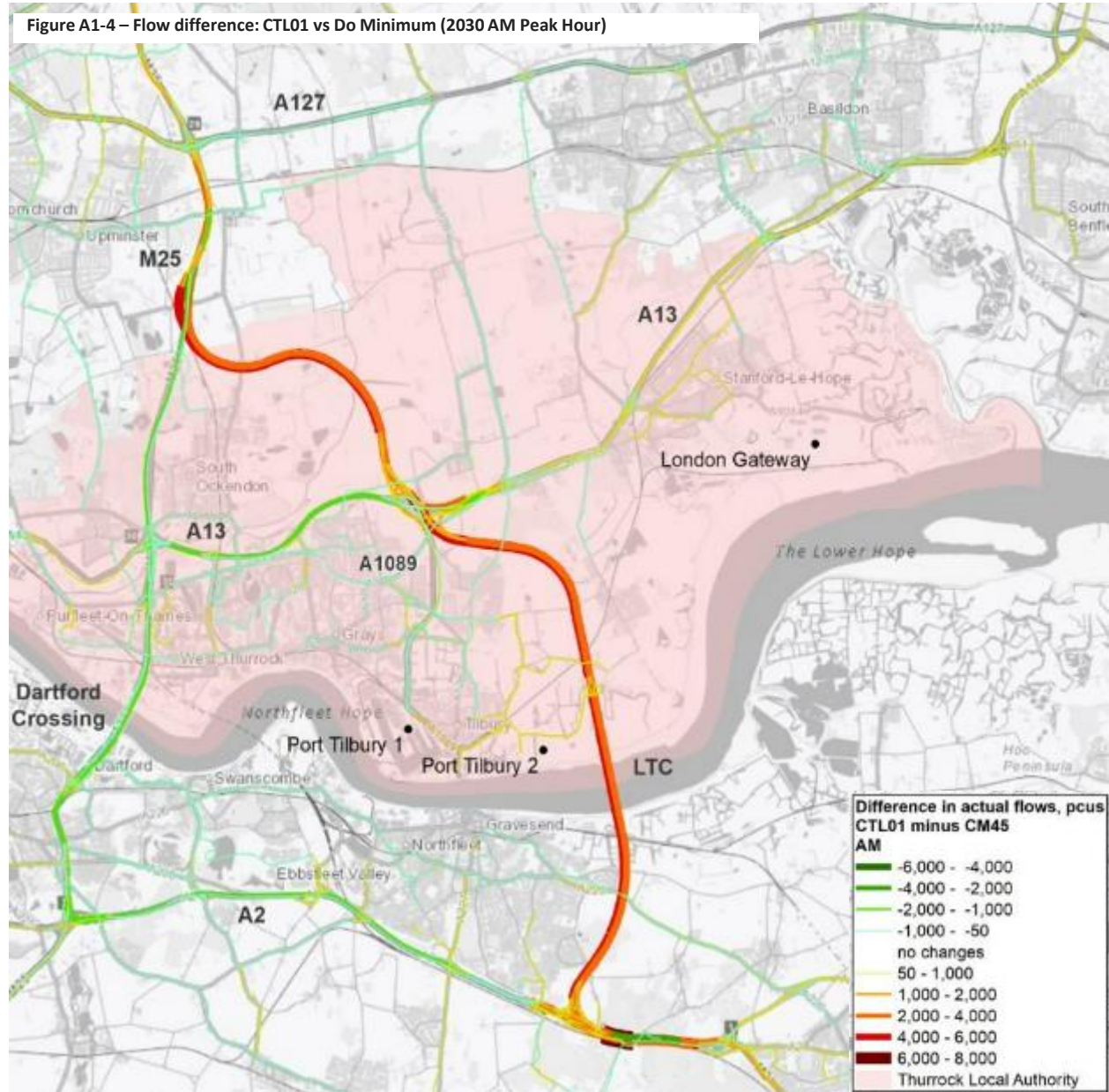
**Thurrock Network Performance:** TLR provides local benefits reducing total travel distance by all vehicles across Thurrock by 0.5% and total travel time by 1.3%. Average vehicle speeds on roads in Thurrock increase by 1% and over capacity queues reduce by 9% compared to the LTC only scenario.

**Local roads and communities:** TLR reduces the negative impacts of the current LTC scheme on local roads particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary), Rectory Rd (Orsett) and Buckingham Hill Road (Linford).

*Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated*

# LTC plus Tilbury Link Road (CTL01) – Road Network Performance and Impacts (vs Do Minimum Scenario)

Figure A1-4 – Flow difference: CTL01 vs Do Minimum (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River Demand:** as with the LTC only option total cross river vehicle trips increase significantly - by **5,660 (+47%)** vehicles. The introduction of the TLR increases trips between Tilbury and Kent.

**Dartford Crossings and M25 Approaches:** this option still reduces traffic using Dartford by **13%** in AM (peak hour) and **17%** in PM. It reduces traffic at M25 North (**-18%**), M25 J30 (**-12%**) & M25 J31 (**-7%**).

**A13 Corridor:** reduces traffic on A13 West of LTC (**16%**) and its junctions. There are still increases in flow on A13 East of LTC (**+14%**) and also at the Manorway junction (**+8%**). However, traffic at the Orsett Cock Junction is reduced slightly compared to the DM scenario (**-1%**).

**A1089:** there are small increases in traffic still forecast on A1089 (**+5%**) although at the Asda Rdbt a reduction in traffic is forecast compared to the DM (**-7%**) and average delay is also reduced.

**Strategic Journey Times:** journey times across a range of routes are provided, including to and from the ports. Journey time savings between the Port of Tilbury and M2 J1 are significant as a result of the TLR (**-52%**)

**Area Wide Network Performance:** This option also delivers some slight network performance benefits - over-capacity queues are forecast to reduce by **3%** and average speeds to increase by **1%** across the LTAM model area. There is a **1%** increase total travel distance by all vehicles across the Lower Thames area.

## Local Network Modelled Impacts

**Thurrock Network Performance:** compared to the do minimum scenario total travel distance by all vehicles across Thurrock increases by **13%**. Total travel time increases by **2%**. Average vehicle speeds on roads in Thurrock increase by **11%** and over capacity queues reduce by **31%**.

**Local roads and communities:** local roads such as Brentwood Road (Chadwell St Mary), Buckingham Hill Road (Linford) see a reduction in traffic as a result of this option. Roads in the Lakeside Basin area to the south of A13 West still see a reduction in traffic. There is still an increase in traffic forecast on Rectory Rd and in the Corringham area. An increase in traffic in the West Tilbury area is forecast as a result of traffic accessing the TLR.

**Tilbury Link Road and Junction:** carries a total of 1,680 pcu (2-way) of which **24%** is Port of Tilbury traffic. The LTC/Tilbury junction operates within capacity under this option.

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated

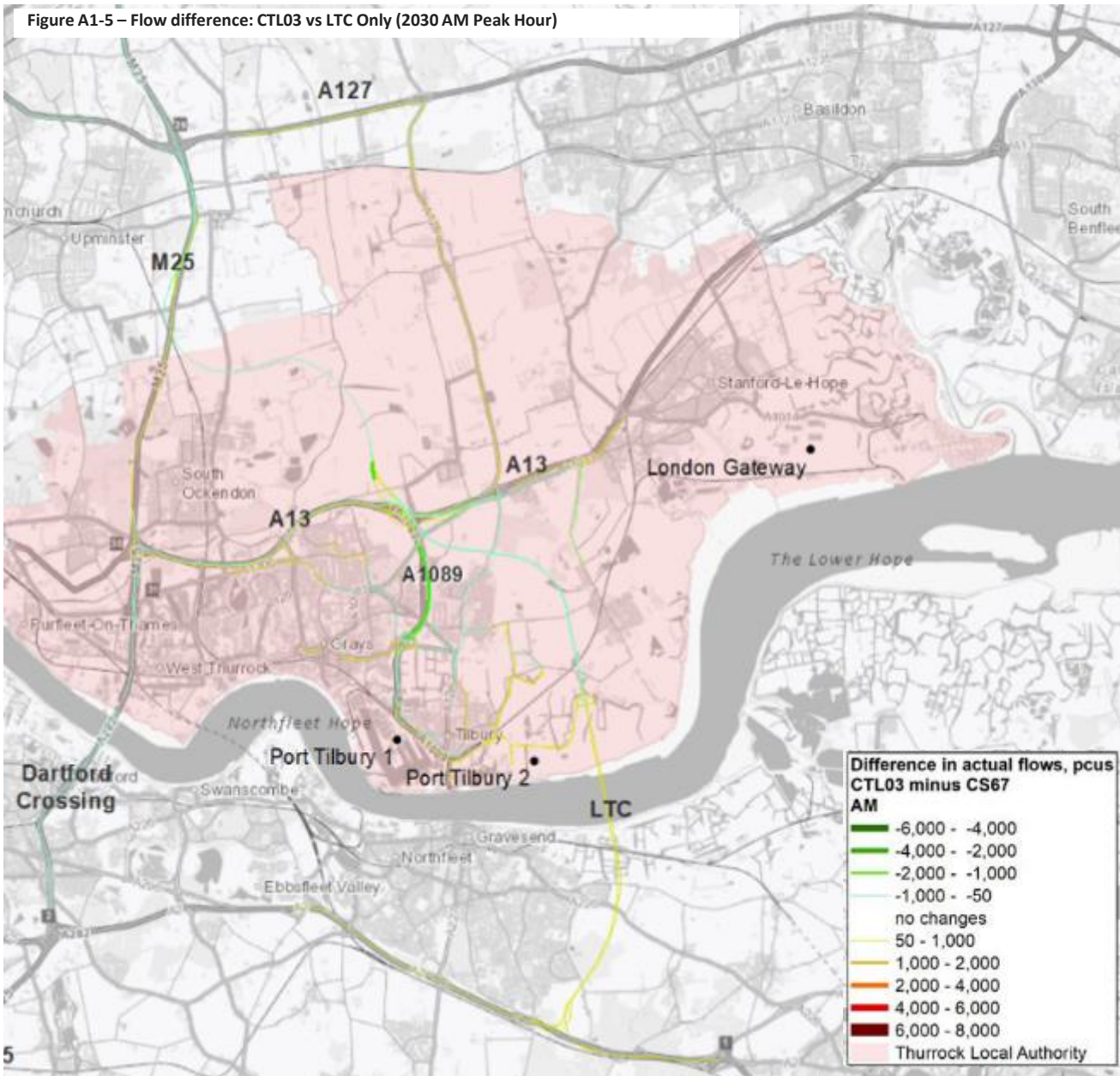
# LTC plus Tilbury Link Road Scheme (CTL01) - Summary Appraisal

Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25	✓✓	Scheme provides relief at Dartford / M25 - adding TLR to the LTC scheme further reduces traffic using Dartford.
	Improve resilience of Thames crossings and SRN / MRN	✓✓✓	Providing TLR as part of the scheme further reduces demand on M25, A13 and A1089 corridors which is likely to further improve SRN/MRN resilience of the network and improve the reliability of access/journey times to ports at Tilbury and London Gateway. Reduces max V/C at M25 J30.
	Improve safety	✗	Overall this option increases total vehicle km driven and will result in increases in accidents on local and strategic roads. Complex LTC/A13 junction remains with associated collision risks.
	Support regional economic growth	✓✓✓	Adding TLR to LTC provides a direct and fast connection from LTC to Port of Tilbury. TLR reduces demand along the A13 and A1089 corridors, including critically at Orsett Cock, Manorway and Asda Rdbts (compared to the LTC scenario) freeing up capacity to support nationally and regionally significant Freeport Growth. It provides additional journey time savings for Port of Tilbury traffic wanting to cross the River.
	Support sustainable local economic growth	✓✓	Provides additional local network capacity and improved connectivity to the Tilbury growth area. Reduces demand on A13 West, A13 East @ Orsett Cock and A1089 supporting future port and local plan growth across Thurrock. Provides some relief to roads in areas to the south of the A13 West of LTC and the Lakeside Basin area. TLR provides opportunities for cross river public transport connectivity via LTC and to support Port/LP growth.
ECONOMIC	Road network performance	✓✓	The area wide modelled network performance statistics show slight additional benefits arising from the TLR including reduced queues and improved vehicle speeds. Option further improves strategic journey times for users across the area compared to LTC only. The scheme has a beneficial impact compared to LTC on the performance of key strategic and local junctions (M25 J30, M25 J31A13 Orsett Cock and A1089 Asda Rbt)
	Carbon emissions	✗✗✗	As with LTC only option will significantly increase cross-river vehicle trips, increase vehicle travel distance across the region and locally and embed high carbon car use into the future. Embedded carbon arising from scheme construction will be very high.
	Socio-distributional impacts	✓✓	Provides improved journey times between deprived areas of Tilbury and North Kent improving opportunities access to employment. TLR enables delivery of cross river public transport connectivity that would improve access opportunities for all.
	Local environment and wellbeing – air quality, noise, visual, land take	✗✗	Option reduces LTC's negative local road impacts particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary) and Buckingham Hill Road (Linford) and along the A1089 corridor. However, overall increase in trips and vehicle km on Thurrock roads will still result in more emissions and noise. The land take, severance and visual impacts and effects associated with the scheme will be very high, particularly around the LTC/A13 junction. There will be additional land take and environmental impacts associated with delivery of TLR.
MANAGEMENT	Consent/construction time period		9 – 11 years – longer consent and construction period as TLR has not been included in scheme scope
	Public and stakeholder acceptability	✓	Additional port and business stakeholder support associated with inclusion of TLR and its benefits. Helps address some local residents concerns regarding traffic and environmental impacts associated with LTC only scheme.
FINANCIAL			LTC scheme cost = £8.5bn. Additional TLR scheme cost = £0.2bn (Local Road)
COMMERCIAL			TLR provides additional capacity, resilience and flexibility within scheme design to support future growth opportunities. Current Tilbury junction provides limited capacity for future Tilbury Link Road and port / local plan growth. Opportunities for developer and Freeport funding.



# TLR and No Direct Access to LTC from A1089 (CTL03) – Performance and Impacts (vs Core LTC Scenario)

Figure A1-5 – Flow difference: CTL03 vs LTC Only (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River:** this option results in a slight increase (+2%) in vehicles crossing the river compared to the LTC only scenario as trips between Tilbury and North Kent are faster as a result of the inclusion of the TLR. Demand on the LTC crossing is increased by 6%.

**Dartford and M25 Approaches:** by adding TLR to the LTC scheme this option further reduces traffic using Dartford crossings by 1% in AM and 1% in PM. Removing direct access from A1089 to LTC routes more traffic via A13/M25 this slightly increases traffic (+2%) and average delays (+5%) at M25 J30 compared to the LTC only scheme. M25 J31 traffic flow is unchanged.

**A13 Corridor:** Removing direct access from A1089 to LTC slightly increases traffic on A13 West of LTC (1%). This option slightly increases flow on A13 East (1%) but the inclusion of TLR reduces LTC’s negative impacts at Orsett Cock junction reducing traffic (-9%) and delays (-10%) compared to the LTC only scenario.

**A1089 Corridor:** removing the direct links to LTC significantly reduces traffic using A1089 (-26%) and at Asda Rdbt (-9%). Average delays at Asda Rbt are reduced by 60% compared to LTC only.

**Strategic Journey Times:** provides similar journey times savings on routes across the area as core LTC scheme. Inclusion of TLR significantly improves journey time saving between Port of Tilbury and M2 J1 (-17%).

**Area Wide Network Performance:** the introduction of the TLR provides some slight additional network wide benefits reducing over-capacity queues by 0.5%. Average speeds are unchanged across the LTAM model area. There is a no change in total vehicular travel distance.

## Local Network Modelled Impacts

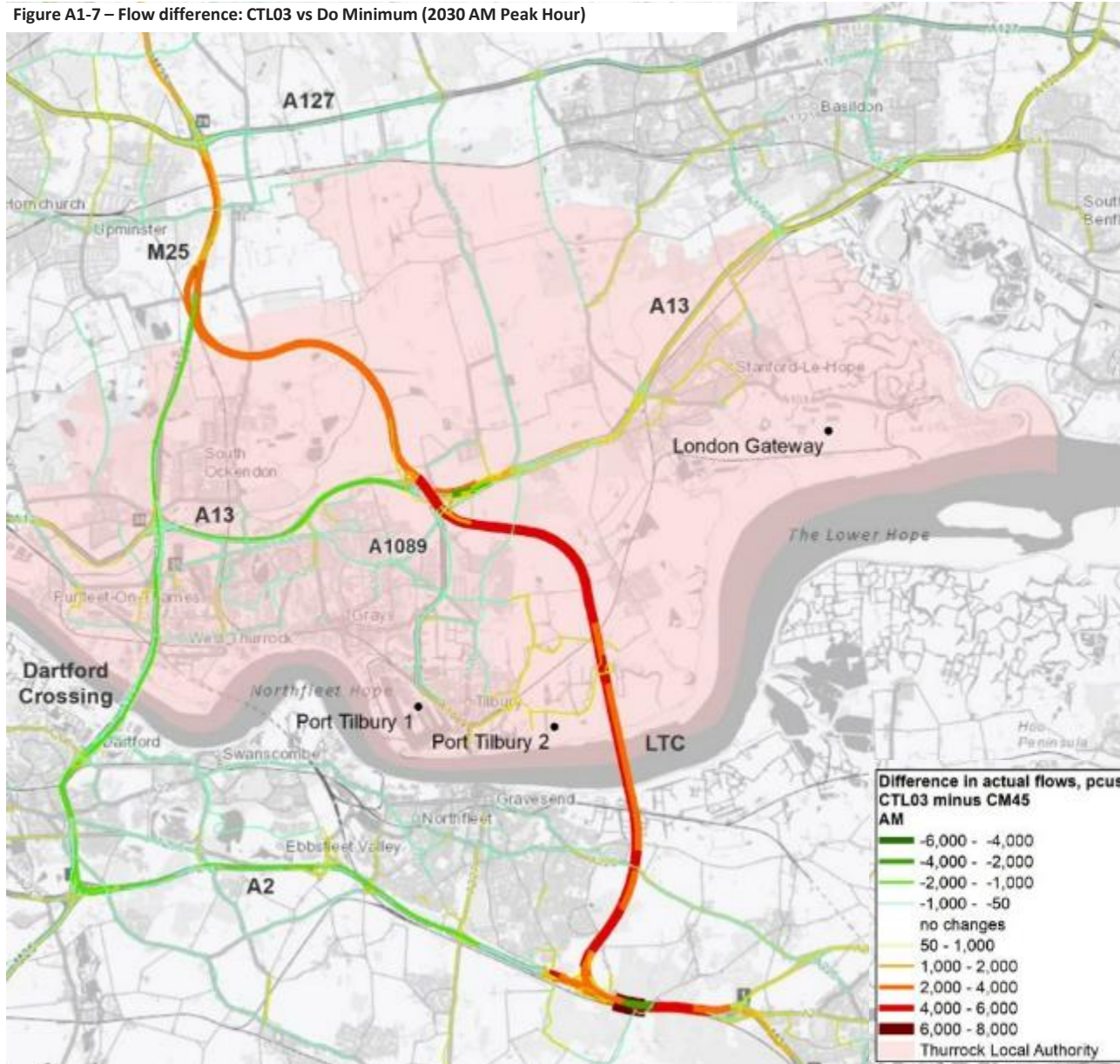
**Thurrock Network Performance:** this option reduces total travel distance by all vehicles across Thurrock by 0.6% and total travel time by 0.5%. Average vehicle speeds on roads in Thurrock reduce very slightly but over capacity queues reduce by 10% in the AM peak.

**Local roads and communities:** this option removes the negative impacts of the current LTC scheme on local roads particularly by reducing traffic on Brentwood Road, Chadwell Hill and Marshfoot (Chadwell St Mary) and Buckingham Hill Road (Linford). It does slightly increase traffic on Rectory Rd compared to the LTC only scenario.

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated

# TLR and No Direct Access to LTC from A1089 (CTL03) – Performance and Impacts (vs Do Minimum Scenario)

Figure A1-7 – Flow difference: CTL03 vs Do Minimum (2030 AM Peak Hour)



## Strategic and Regional Modelled Impacts

**Cross River Demand:** similar to the LTC plus TLR option total cross river trips are forecast to increase - by **5,675 (47%)**. The introduction of the TLR increases trip between Tilbury and Kent.

**Dartford Crossings and M25 Approaches:** this option still reduces traffic using Dartford by **13%** in AM (peak hour) and **17%** in PM. Reduces demand on M25 north by **15%** at M25 J30 by **8%** and M25 J31 by **7%**. The max V/C at M25 J30 junction increases to **100%** (PM peak only)

**A13 Corridor:** reduces traffic on A13 West of LTC (**-13%**) and its junctions. Increases flow on A13 East of LTC significantly (**+15%**) and also at the Manorway junction (**+8%**). However, traffic at the Orsett Cock Junction is reduced very slightly compared to the DM scenario (**-0.3%**).

**A1089 Corridor:** reductions in traffic compared to the DM are forecast on A1089 (**-11%**) and at the Asda Rdbt (**-7%**). Average delays at Asda Rbt are reduced by **41%**.

**Strategic Journey Times:** journey times across a range of routes are improved, including to and from the ports. Port of Tilbury to M25 North journey time savings are slightly reduced (PM). Inclusion of TLR Provides additional journey time savings for Port of Tilbury traffic wanting to cross the River.

**Area Wide Network Performance:** this option also delivers some slight network performance benefits - over-capacity queues are forecast to reduce by **3%** and average speeds to increase by **1%** across the LTAM model area. There is a **1%** increase total travel distance by all vehicles across the region.

## Local Network Modelled Impacts

**Thurrock Network Performance:** compared to the do minimum scenario total travel distance by all vehicles across Thurrock increases by **11%**. Total travel time increases by **3%**. Average vehicle speeds on roads in Thurrock increase by **9%** and over capacity queues reduce by **42%**.

**Local roads and communities:** local roads such as Stamford Rd and Brentwood Road (Chadwell St Mary) see a reduction in traffic. Rectory Rd (Orsett) and Southend Road (Corringham) see an increase in traffic compared to the DM as a result of this option. An increase in traffic in the West Tilbury area is forecast as a result of traffic accessing the TLR. Roads in the Lakeside Basin area to the south of A13 West still see a reduction in traffic.

**Tilbury Link Road and Junction:** carries a total of 1,800 pcu (2-way) of which **22%** is Port of Tilbury traffic. The LTC/Tilbury junction is forecast in LTAM to operate within capacity.

*Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated*

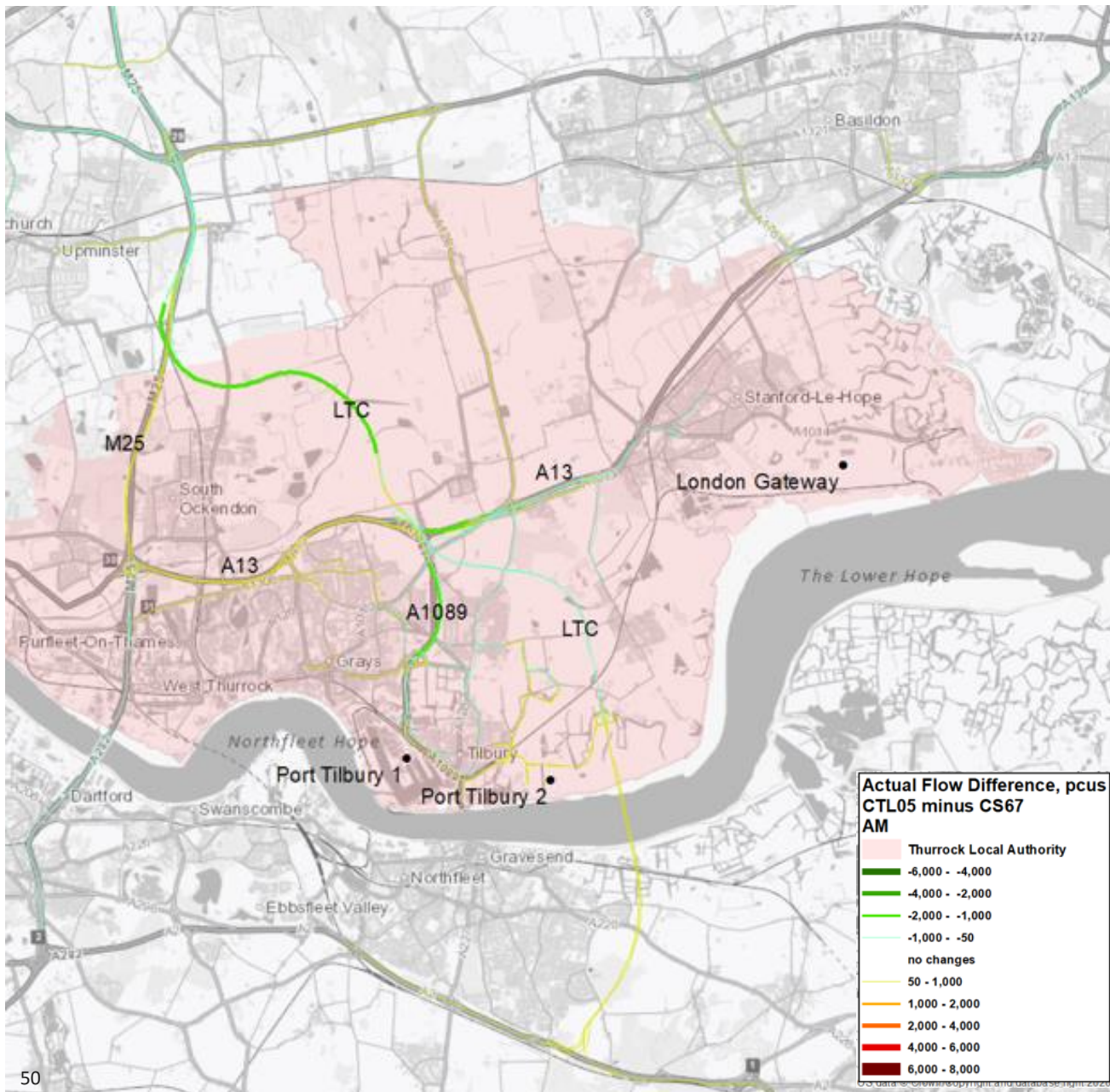
## TLR and No Direct Access to LTC from A1089 (CTL03) - Summary Appraisal

Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25	✓✓	Scheme provides relief at Dartford / M25 - adding TLR to the LTC scheme further reduces traffic using Dartford.
	Improve resilience of Thames crossings and SRN / MRN	✓✓	Providing TLR provides additional resilience benefits (see CTL01 assessment). Removing direct access from A1089 to LTC slightly increases traffic on A13 West of LTC and at M25 J30 which may slightly reduce resilience.
	Improve safety	✗	Overall this option increases total vehicle km driven and will result in increases in accidents on local and strategic roads. Slightly reduces complexity LTC/A13 junction but collision risks remain high.
	Support regional economic growth	✓✓✓	Adding TLR to LTC provides a direct and fast connection from LTC to Port of Tilbury. Journey time benefits similar to LTC plus TLR option (CTL01), although Port of Tilbury to M25 North journey time savings are reduced. Provides additional JT savings for Port of Tilbury traffic crossing River.
	Support sustainable local economic growth	✓✓	Provides additional local network capacity and improved connectivity to the Tilbury growth area. Reduces demand on A13 West and A1089 corridors supporting future port and local plan growth across Thurrock. Provides some relief to roads in areas to the south of the A13 West of LTC and the Lakeside Basin area. TLR provides opportunities for cross river public transport connectivity via LTC and to support Port/LP growth.
ECONOMIC	Road network performance	✓✓	Scheme is still forecast to provide some relief to Dartford / M25 and to improve strategic journey times for users across the area. The area wide modelled network performance statistics still show slight benefits arising from reduced queues and improved vehicle speeds. The scheme has a beneficial impact compared to LTC on the performance of key local junctions (A13 Orsett Cock and A1089 Asda Rbt). Increased traffic at M25 J30 results in deterioration in performance compared to the LTC only scenario.
	Carbon emissions	✗✗✗	As with LTC only option will significantly increase cross-river vehicle trips, increase vehicle travel distance across the region and locally and embed high carbon car use into the future. Embedded carbon arising from scheme construction will be very high.
	Socio-distributional impacts	✓✓	Provides improved journey times between deprived areas of Tilbury and North Kent improving opportunities access to employment. TLR enables delivery of cross river public transport connectivity that would improve access opportunities for all.
	Local environment and wellbeing – air quality, noise, visual, land take	✗✗	Option reduces LTC's negative local road impacts particularly by reducing traffic on Brentwood Road, Chadwell Hill and Buckingham Hill Road (Linford) and significantly along the A1089 corridor. However, overall increase in trips and vehicle km on Thurrock roads will still result in more emissions and noise. The land take, severance and visual impacts and effects associated with the scheme will be very high, particularly around the LTC/A13 junction. There will be additional land take and environmental impacts associated with delivery of TLR.
MANAGEMENT	Consent/construction time period		9 – 11 years – longer consent and construction period as TLR has not been included in scheme scope. programme saving opportunities from not having to deliver some links at LTC/A13 interchange.
	Public and stakeholder acceptability	✓	Additional port and business stakeholder support associated with inclusion of TLR and its benefits. Helps address some local residents concerns regarding traffic and environmental impacts associated with LTC only scheme. Some stakeholder concerns at loss of A1089 links.
FINANCIAL			LTC scheme cost <£8.5bn as opportunity to remove some costs associated with LTC/A13 interchange. Additional TLR scheme cost – £0.2bn.
COMMERCIAL			TLR provides additional capacity, resilience and flexibility within scheme design to support future growth opportunities. Current Tilbury junction provides limited capacity for future Tilbury Link Road and port / local plan growth. Opportunities for developer and Freeport funding.



# TLR and No Direct Access to LTC from A1089 or A13 East to LTC North (CTL05) – Performance (vs Core LTC Scenario)

Figure A1-8– Flow difference: CTL05 vs LTC Only (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River:** this option results in a slight increase (+2%) in vehicles crossing the river compared to the LTC only scenario as trips between Tilbury and North Kent are faster. Demand on the LTC crossing increases by 7%.

**Dartford and M25 Approaches:** by adding the TLR to the LTC scheme this option further reduces traffic using Dartford crossings by 1% in AM and 1% in PM. However, removing direct access from A1089 to LTC and from A13 East to/from LTC North routes significantly more traffic via A13 West and the M25. This increases traffic (+8%) and average delays (+10%) at M25 J30 compared to the LTC only scheme. M25 J31 traffic flow is unchanged.

**A13 Corridor:** The connectivity removed at the LTC/A13/A1089 interchange increases traffic on A13 West of LTC (+7%). This option slightly reduces flow on A13 East (-2%) and reduces LTC’s negative impacts at Orsett Cock junction reducing traffic flow (-10%) compared to the LTC only scenario. It also reduces traffic flow at The Manorway junction (-3%) and slightly improved junction performance.

**A1089 Corridor:** by removing the direct links to LTC significantly reduces traffic using A1089 (-27%) and at Asda Rdbt (-9%). Average delays at Asda Rbt are reduced by 64% compared to the LTC only scenario.

**Strategic Journey Times:** similar journey time savings compared to core LTC scheme. Including TLR provides some additional journey times savings between Port of Tilbury and M2 J1 (-17%). Loss of LTC-A13 junction connectivity reduces the journey time savings provided by core LTC scheme between A13 East and M25 North.

**Area Wide Network Performance:** this option has very slight additional network wide benefits reducing over-capacity queues by 0.2%. Average speeds are unchanged and there is a no change in total vehicular travel distance across the LTAM model area. .

## Local Network Modelled Impacts

**Thurrock Network Performance:** This option reduces local impacts by reducing total travel distance by all vehicles across Thurrock by 3% compared to LTC. There is also a 2.5% reduction in total vehicle travel time compared to LTC. Average vehicle speeds on roads in Thurrock reduce very slightly by 0.8% and over capacity queues reduce by 10% compared to the LTC only scenario.

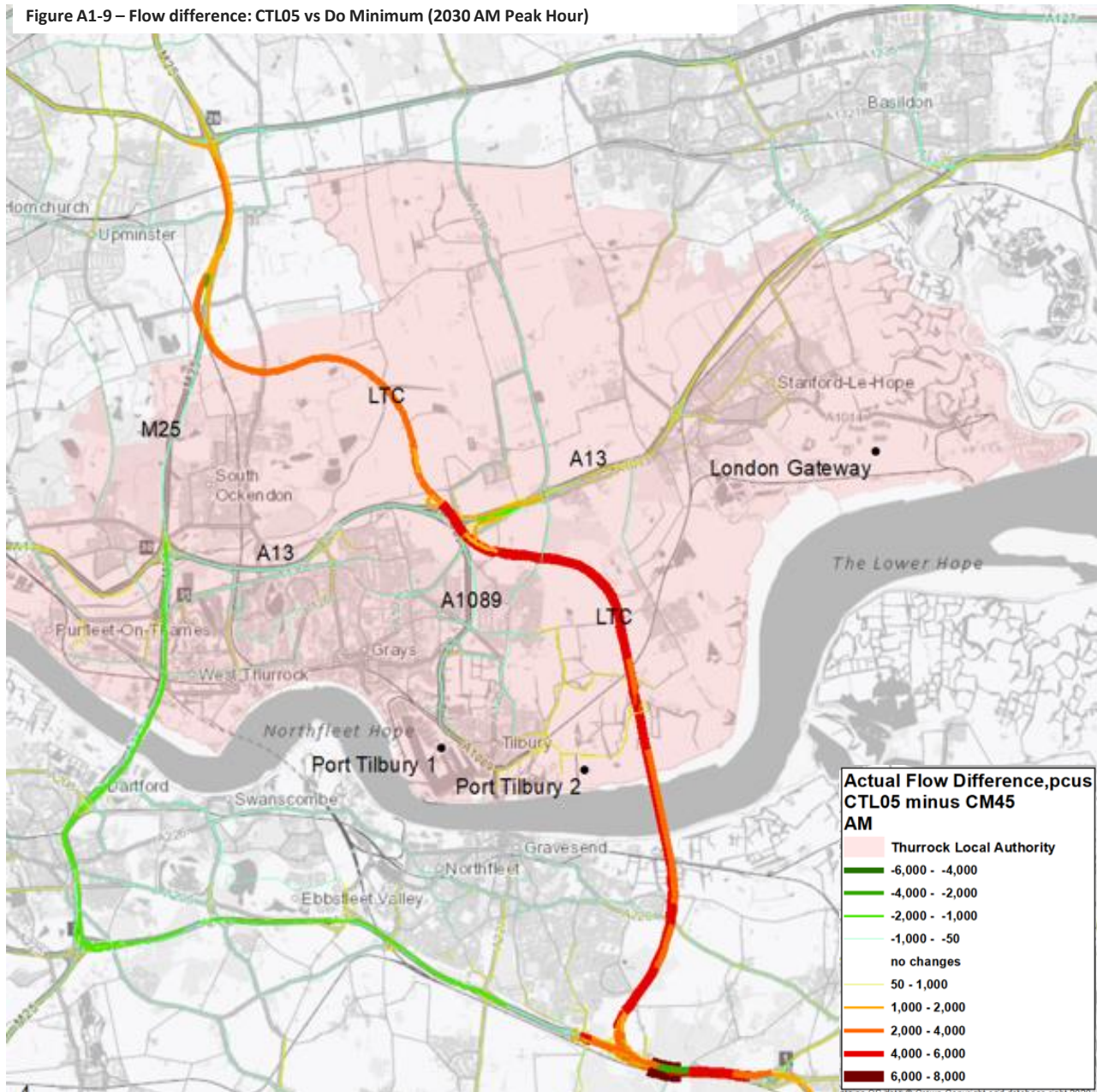
**Local roads and communities:** TLR reduces the negative impacts of the current LTC scheme on some local roads particularly by reducing traffic on A1013 Stamford Rd, Brentwood Road (South), Chadwell Hill (Chadwell St Mary), Muckingford Rd and Buckingham Hill Road (Linford).

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated



# TLR and No Direct Access to LTC from A1089 or A13East to LTC North (CTL05) – Performance (vs Do Minimum Scenario)

Figure A1-9 – Flow difference: CTL05 vs Do Minimum (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River Demand:** similar to the LTC plus TLR option (CTL01) total cross river trips are forecast to increase - by **5,700 (47%)**. The introduction of the TLR increases trips between Tilbury and Kent.

**Dartford Crossings and M25 Approaches:** this option still reduces traffic using Dartford by **13%** in AM (peak hour) and **17%** in PM. Reduces demand on M25 north by **11%** and at M25 J30 by **3%** and M25 J31 by **6%**. The max V/C at M25 J30 junction increases to **>100%** (PM peak only).

**A13 Corridor:** reduces traffic on A13 West of LTC (**-8%**) and its junctions. Increases flow on A13 East of LTC (**+12%**), including at The Manorway junction (**+5%**). However, traffic at the Orsett Cock Junction is reduced very slightly compared to the DM scenario (**-1%**).

**A1089 Corridor:** reductions in 2-way traffic flow compared to the DM are forecast on A1089 (**-12%**) and at the Asda Rdbt (**-8%**). Average delays at Asda Rbt are reduced by **64%**.

**Strategic Journey Times:** journey times across a range of routes are improved, including to and from the ports. Port of Tilbury to M25 North journey time savings are reduced. Inclusion of TLR in scheme provides good additional journey time savings for Port of Tilbury traffic wanting to cross the River.

**Area Wide Network Performance:** this option also delivers some slight network performance benefits - over-capacity queues are forecast to reduce by 2% and average speeds to increase by 1% across the LTAM model area. There is a 1% increase total travel distance by all vehicles across the region.

## Local Network Modelled Impacts

**Thurrock Network Performance:** compared to the do minimum scenario total travel distance by all vehicles across Thurrock increases by **10%**. Total travel time by vehicles across Thurrock increases by **1%**. Average vehicle speeds on roads in Thurrock increase by **9%** and over capacity queues reduce by **32%**.

**Local roads and communities:** local roads such as Stamford Rd, Brentwood Road (Chadwell St Mary) and Buckingham Hill Rd see a reduction in traffic. Rectory Rd (Orsett) and Southend Road (Corringham) see an increase in traffic compared to the DM as a result of this option. An increase in traffic in the West Tilbury area is forecast as a result of traffic accessing the TLR. Roads in the Lakeside Basin area to the south of A13 West still see a reduction in traffic.

**Tilbury Link Road and Junction:** carries a total of 1,845 pcu (2-way) of which 22% is Port of Tilbury traffic. The LTC/Tilbury junction operates within capacity (Max V/C 68%) in LTAM under this option.

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated





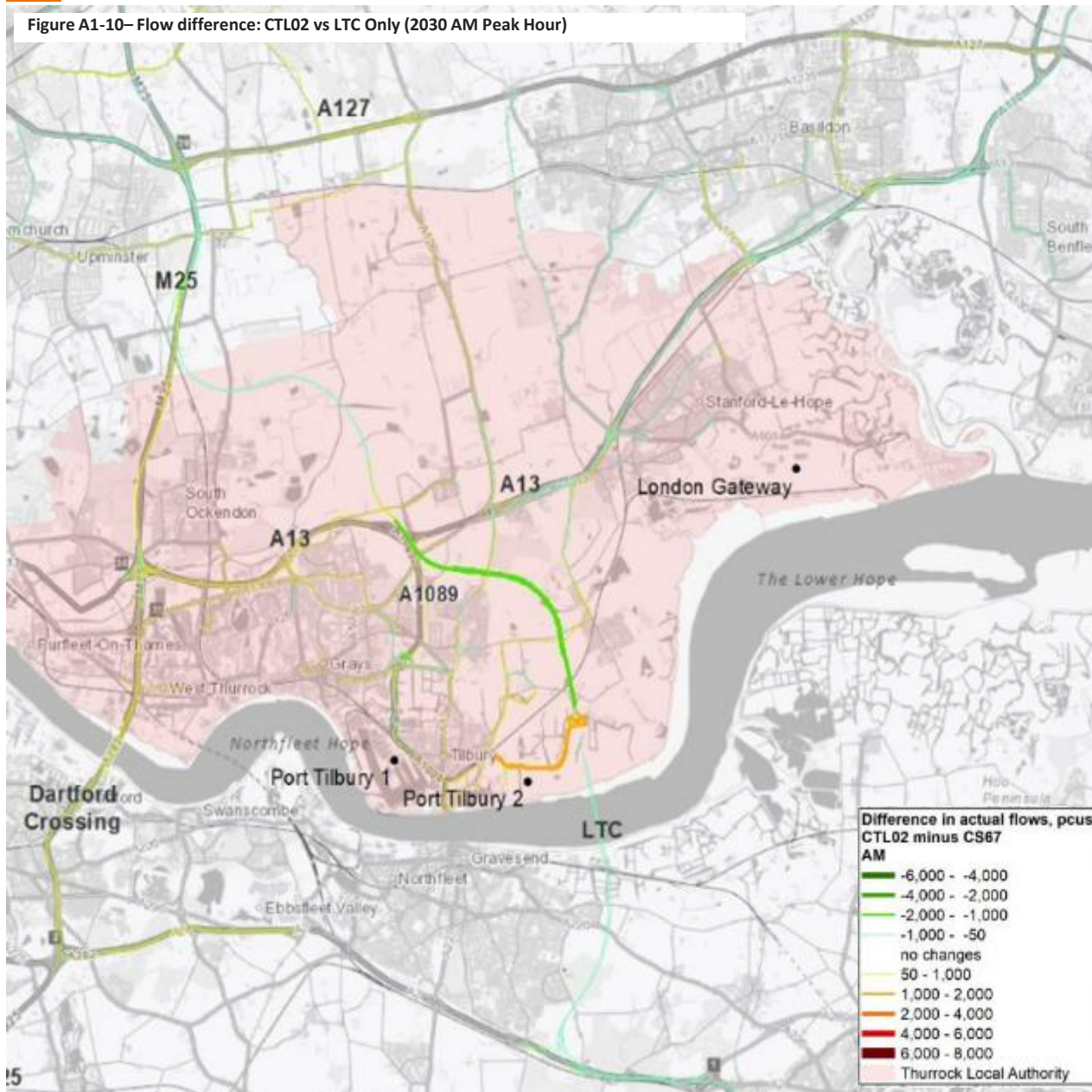
# TLR and No Direct Access to LTC from A1089 or A13 East to LTC North (CTL05) - Summary Appraisal

Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25		This option still provides relief at Dartford / M25 but reducing the LTC/ A13/A1089 connections slightly reduces the scale of traffic reduction.
	Improve resilience of Thames crossings and SRN / MRN		Reducing connectivity @ interchange at LTC /A13 reduces the number of alternative routes across the strategic network. Also increases traffic on A13 West of LTC and at M25 J30 which may reduce resilience.
	Improve safety		Reducing scale and complexity of LTC/A13 interchange reduces risk of collisions. Still increases total vehicle km driven resulting in more accidents (but reduced vehicle km in Thurrock driven compared to core LTC scheme).
	Support regional economic growth		Adding TLR to LTC provides a direct and fast connection from LTC to Port of Tilbury. Port of Tilbury to M25 North and A13 East/London Gateway Port to M25 North journey time savings are reduced. Provides additional journey time savings for Port of Tilbury traffic wanting to cross the River. Impact at M25 J30 could constrain growth without supporting mitigation / sustainable transport strategy to promote more regional/cross river PT.
	Support sustainable local economic growth		TLR provides additional local network capacity and better connectivity to the Tilbury growth area. Reduces demand on A13 West, A13 East @ Orsett Cock and A1089 (incl. @ Asda Rbt) supporting future port and local plan growth across Thurrock. Provides some relief to roads in areas to the south of the A13 West of LTC and the Lakeside Basin area. TLR provides opportunities for cross river public transport connectivity via LTC and to support Port/LP growth.
ECONOMIC	Road network performance		Scheme is still forecast to provide some relief to Dartford / M25 and to improve strategic journey times for users across the area. The area wide modelled network performance statistics still show slight benefits arising from reduced queues and improved vehicle speeds. In the AM and PM peak over capacity reduce in Thurrock. The scheme has a beneficial impact compared to LTC on the performance of A1089 Asda Rbt. Increased traffic at M25 J30 results in deterioration in performance compared to the LTC only scenario.
	Carbon emissions		As with LTC only option will significantly increases cross-river vehicle trips, increase vehicle travel distance across the region and locally and embed high carbon car use into the future. Significantly reduced scale of LTC/A13 interchange infrastructure will reduce embedded carbon arising from scheme construction (adding TLR will offset benefit).
	Socio-distributional impacts		Provides improved journey times between deprived areas of Tilbury and North Kent improving opportunities access to employment. TLR provides opportunity to deliver cross river public transport connectivity that would improve access opportunities for all.
	Local environment and wellbeing – air quality, noise, visual, land take		The land take, severance and visual impacts and effects associated with the scheme will be significantly reduced around the LTC/A13 junction. Option also reduces some of LTC’s negative local road impacts particularly by reducing traffic on Brentwood Road, Buckingham Hill Rd and Chadwell Hill and significantly along the A1089 corridor. Overall increase in trips and vehicle km on Thurrock roads will still result in more emissions and noise. However, this reduces total travel distance by all vehicles across Thurrock by 3% compared to LTC reducing its environmental impacts. There will be additional land take and environmental impacts associated with TLR.
MANAGEMENT	Consent/construction time period		< 8 – 10 years – longer consent and construction period as TLR but significant programme saving opportunities from reduced LTC/A13 scope.
	Public and stakeholder acceptability		Additional port and business stakeholder support associated with inclusion of TLR. Helps address local community concerns regarding scale and impacts of LTC / A13 interchange. May be some stakeholder concern regarding loss of LTC/A13 connectivity.
FINANCIAL			LTC scheme cost << £8.5bn as opportunity to remove significant costs associated with LTC/A13 interchange. Additional TLR scheme cost = £0.2bn
COMMERCIAL			TLR provides additional capacity, resilience and flexibility within scheme design to support future growth opportunities. Tilbury junction provides limited capacity for future Tilbury Link Road and port / local plan growth. Opportunity for developer and Freeport funding.



# LTC Plus TLR and Remove LTC/A13/A1089 Interchange (CTL02)– Performance & Impacts (vs Core LTC Scenario)

Figure A1-10– Flow difference: CTL02 vs LTC Only (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River Demand:** this option results in approximately 650 (-3%) fewer vehicles crossing the river compared to the LTC only scenario as trips between South Essex and Kent are longer & slower. Demand on most sections of the LTC is reduced.

**Dartford and M25 Approaches:** slightly reduced relief at Dartford - traffic using Dartford crossings (compared to the LTC only) increases by 2% in AM and 4% in PM. Relief to the M25 North of Dartford is also reduced - traffic increases by 5%. M25 J30 traffic increases (+8%) & M25 J31 (+3%).

**A13 Corridor:** this option increases traffic on A13 West of LTC (10%). However, it reduces flow on A13 East (-12%) compared to the core LTC scheme. Traffic is reduced at Orsett Cock junction (-17%) and Manorway junction (-8%) helping reduce the delay increases seen with LTC.

**A1089 Corridor:** reduces traffic on A1089 (-18%), Asda Rdbt (-3%) but delays increase at Asda Rdbt.

**A128/A127:** route sees an increase in traffic due to the removal of the LTC/A13/A1089 junction.

**Strategic Journey Times:** reduces some of the journey times savings across the area compared to the LTC only scenario, Chelmsford to M2 J1 (-8%), Port of Tilbury to M25 North of J28 (-6%), A13 East to M25 North of J28 (-13%).

**Area Wide Network Performance:** this option provides slight network wide benefits compared to the LTC only option by reducing over-capacity queues by 0.5% but increases average speeds 0.2%. It also results in a slight (0.3%) reduction in total vehicular travel distance.

## Local Network Modelled Impacts

**Thurrock Network Performance:** This option reduces total travel distance by vehicles across Thurrock by 2%. Total travel time on Thurrock Roads is increased by 0.3%, average vehicle speeds decrease by 2% and over capacity queues increase by 14% in AM peak (123% in PM).

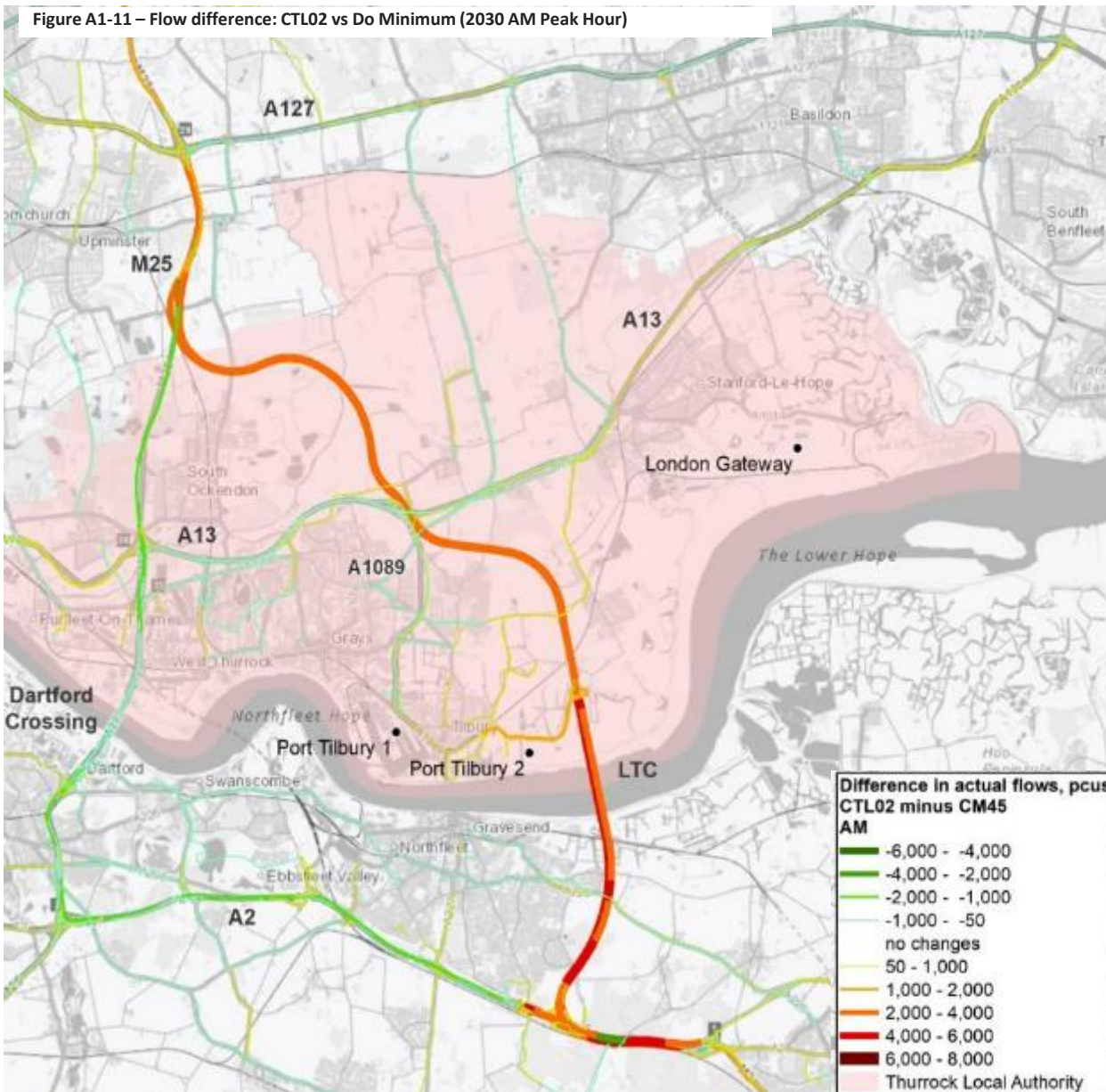
**Local roads and communities:** Buckingham Hill Road (Linford), Muckingford Road and Fort Rd see an increase in traffic flow from traffic routing between A13 and the TLR to access LTC. Roads to the south of A13 West in the Lakeside Basin see reduced scheme benefits.

Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated



# LTC Plus TLR and Remove LTC/A13/A1089 Interchange (CTL02) – Performance and Impacts (vs Do Minimum)

Figure A1-11 – Flow difference: CTL02 vs Do Minimum (2030 AM Peak Hour)



## Strategic and Regional Network Modelled Impacts

**Cross River Demand:** total cross river trips still increase - by **4,650 (+38%)** under this scenario but this is lower than the LTC only scenario. The introduction of the TLR increases trips between Tilbury and Kent but the removal of the LTC / A13 / A1089 junction reduces trips between Thurrock/Essex & Kent.

**Dartford Crossings and M25 Approaches:** this option still reduces traffic using Dartford by **10%** in AM and **14%** in PM peaks. It still reduces demand on the M25 North of Dartford (**-14%**) including at M25 J30 by **3%** and M25 J31 by **4%**. The max V/C at M25 J30 junction increases to **>100%** (PM peak only)

**A13 Corridor:** still reduces traffic on A13 West of LTC (**-6%**) and its junctions. Traffic flow on A13 East of LTC remains broadly in line with the DM, and demand reduces compared to the DM scenario at Orsett Cock junction (**-9%**) and The Manorway (**-1%**).

**A1089 Corridor:** a small reduction in traffic is forecast on A1089 (**-2%**) & Asda Rdbt (**-1%**) despite connectivity from A13 to LTC S/B being via A1089 and TLR. Delays increase at Asda Rbt due to a significant increase in S/B traffic accessing TLR & LTC. Max V/C @ A1089 Asda increases (**107%**) (AM).

**Strategic Journey Times:** journey times across a range of routes are still improved by this option, including to and from the ports.

**Area Wide Network Performance:** Option delivers some slight overall network benefits - over-capacity queues are forecast to reduce by **3%** and average speeds to increase by **1%** across the LTAM model area. There is a **1%** increase total travel distance by all vehicles.

## Local Network Modelled Impacts

**Thurrock Network Performance:** Total travel distance by all vehicles across Thurrock increases by **11%**. Total travel time increases by **3%** and average vehicle speeds on roads in Thurrock increase by **8%**. Over capacity queues reduce by **14%**. This reduction is significantly lower than the LTC only scheme – likely as a result of traffic re-routing due to loss of connectivity at the LTC/A13 interchange – incl. S/B along A1089 and via local roads to access TLR.

**Local roads and communities:** Brentwood Road (Chadwell St Mary) and Southend Road (Corringham) see significantly reduced impacts as a result of this option. Roads in the Lakeside Basin area to the south of A13 West still see a reduction in traffic.. However, Buckingham Hill Road (Linford), Muckingford Road and Fort Rd see an increase in traffic as traffic uses local routes between A13 and the TLR to access LTC.

**Tilbury Link Road and Junction:** carries a total of 2,400 pcu (2-way) of which **15%** is Port of Tilbury traffic. Junction V/C at the LTC/TLR junction is forecast to be **>100%**.

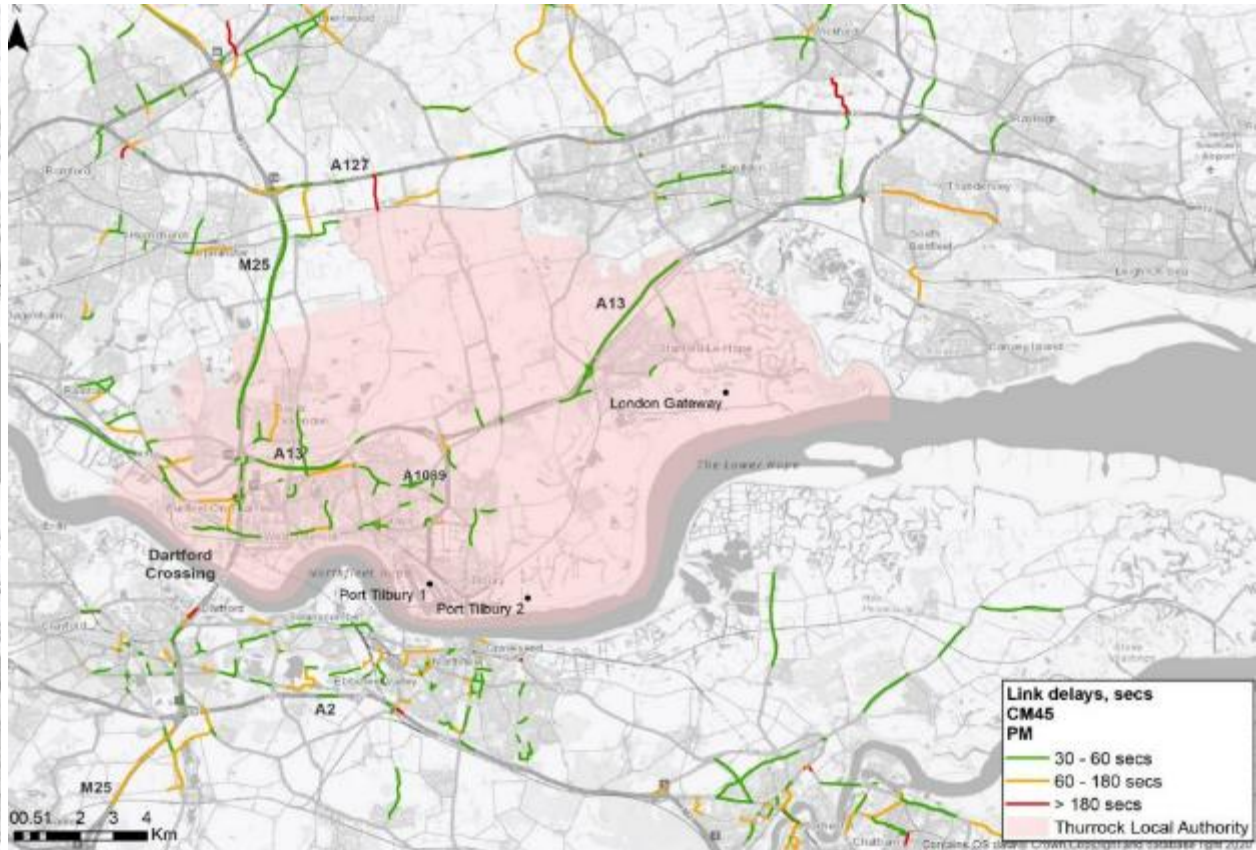
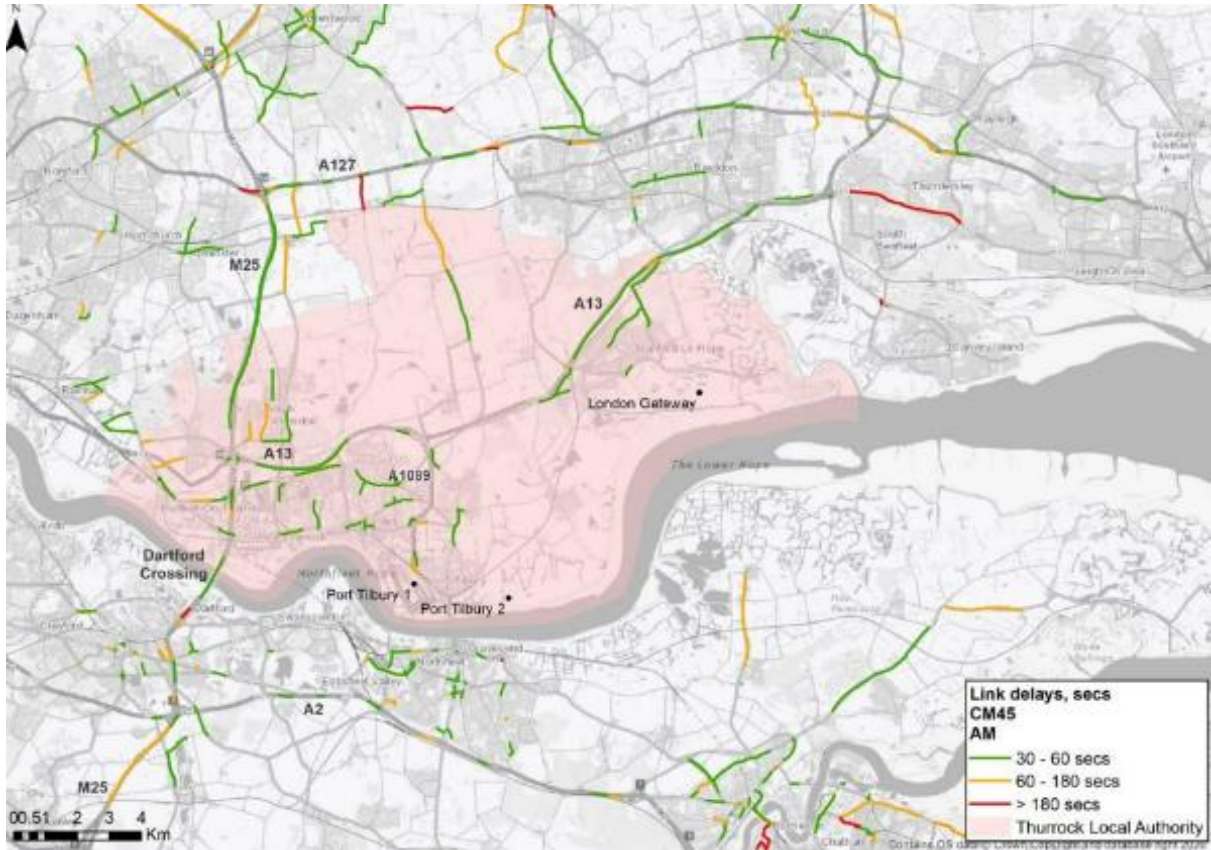
*Note: Figures quoted represent the 2030 Forecast Year - AM Peak Hour unless stated*

# LTC Plus TLR and Remove LTC/A13/A1089 Interchange (CTL02) - Summary Appraisal

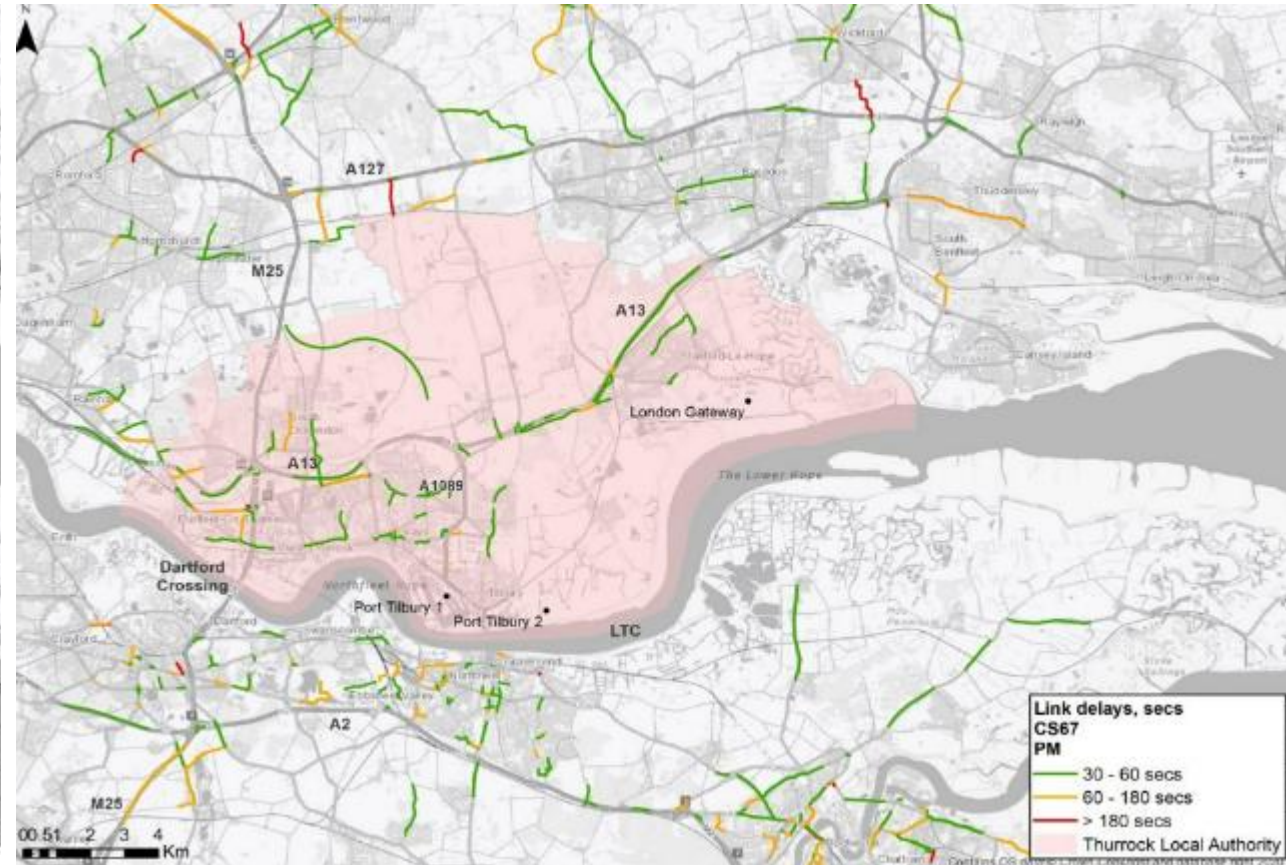
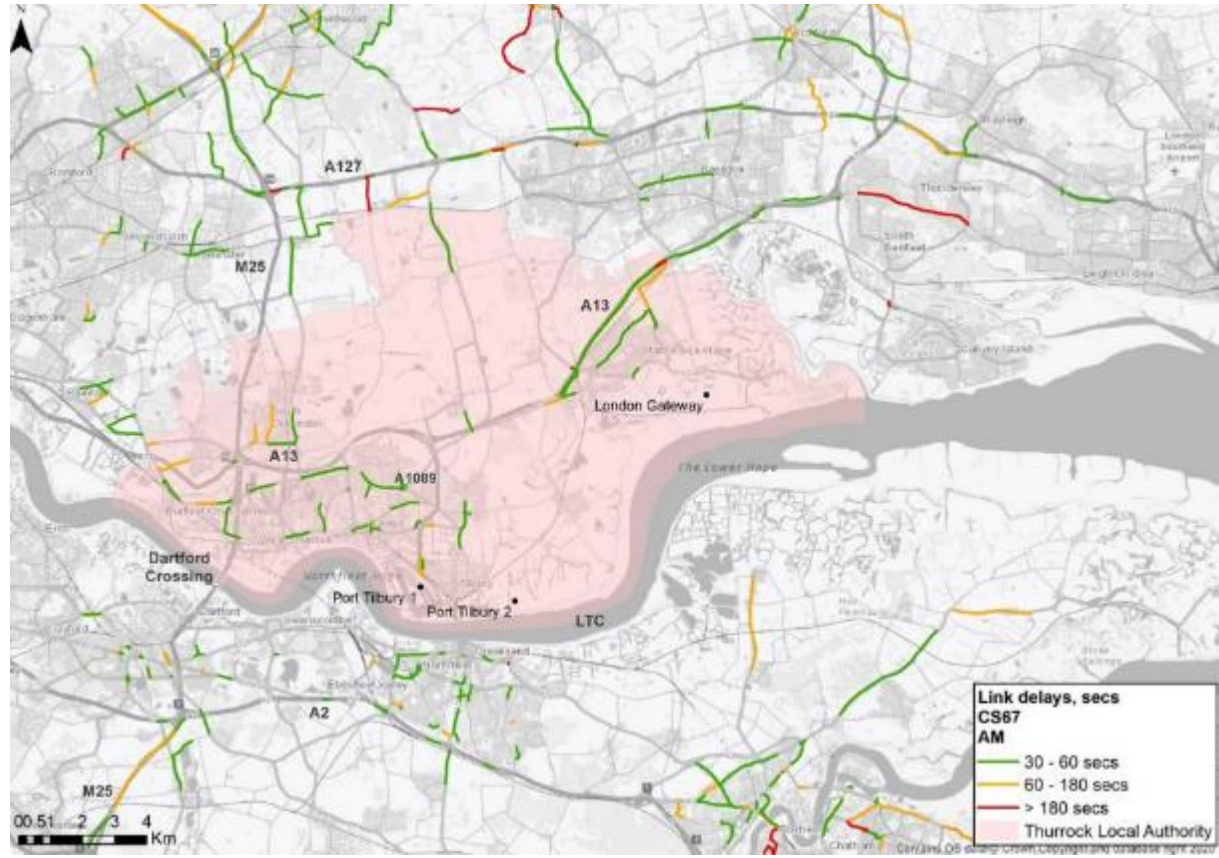
Objectives and Assessment Criteria		Score	Description / Commentary
STRATEGIC	Relief at the Dartford Crossing/M25 approaches	✓✓	This option still provides relief at Dartford / M25 but removing LTC / A13 /A1089 interchange slightly reduces the scale of traffic reduction.
	Improve resilience of Thames crossings and SRN / MRN	✓✓	Removing interchange at LTC /A13 reduces the number of alternative routes across the strategic network. Reduced impacts of this option on performance of A13 East of LTC, particularly at the A13 Orsett Cock and Manorway junctions would improve network resilience in that area. Local access to LTC would be focused via A1089 and TLR and increased delays at A1089 Asda Rbt and LTC/Tilbury Junction could impact resilience.
	Improve safety	–	Removing complex LTC/A13 interchange reduces risk of collisions. Still increases total vehicle km driven that will likely result in in more accidents.
	Support regional economic growth	✓✓	TLR provides a direct and fast connection from LTC to Port of Tilbury. Option reduces demand along the A13 East of LTC and on the A1089 corridor, including critically at Orsett Cock, Manorway freeing up capacity to support nationally and regionally significant Freeport Growth. Congestion relief to the Dartford crossing/M25 and strategic journey time savings are still provided but at a reduced level to enable wider economic growth. Impacts at strategic junctions (M25 J30, A1089 Asda Rbt, LTC/Tilbury) could constrain growth without supporting mitigation / sustainable transport strategy to promote more regional and cross river public transport use. Reduced journey time savings from Ports (Tilbury and LG) to M25 North.
	Support sustainable local economic growth	✓✓	Provides additional local network capacity and better connectivity to the Tilbury growth area. Reduces strategic traffic demand on A13 East of LTC, particularly at the A13 Orsett Cock, The Manorway junctions that will be critical to supporting Local Plan growth. Impacts at key strategic junctions (M25 J30, A1089 Asda Rbt, LTC/Tilbury) could constrain growth without supporting mitigation / sustainable local transport strategy.
ECONOMIC	Road network performance	✓	Scheme is still forecast to provide some relief to Dartford / M25 and to improve strategic journey times for users across the area. The area wide modelled network performance statistics still show slight benefits arising from reduced queues and improved vehicle speeds. In PM peak over capacity queues increase significantly in Thurrock. There are negative impacts on critical junction performance (M25 J30, A1089 Asda Rbt, LTC/Tilbury) that could require mitigation.
	Carbon emissions	✗✗	Whilst this option sees a reduced growth in cross-river vehicle trips a significant increase vehicle travel distance across the region is still forecast. Removal of the LTC/A13 interchange infrastructure will reduce embedded carbon arising from scheme construction (adding TLR will offset benefit).
	Socio-distributional impacts	✓✓	Provides improved journey times between deprived areas of Tilbury and North Kent improving opportunities access to employment. TLR provides opportunity to deliver cross river public transport connectivity that would improve access opportunities for all.
	Local environment and wellbeing – air quality, noise, visual, land take	✗	The land take, severance and visual impacts and effects associated with the scheme will be significantly reduced around the LTC/A13 junction. Option also reduces some of LTC’s negative local road impacts particularly by reducing traffic on Brentwood Road, Chadwell Hill and Rectory Rd. However, Buckingham Hill Road (Linford) sees an increase in traffic using local routes between A13 and the TLR to access LTC. Overall increase in trips and vehicle km on Thurrock roads will still result in more emissions and noise. There will be additional land take and environmental impacts associated with TLR.
MANAGEMENT	Consent/construction time period		< 8 – 10 years – longer consent and construction period as TLR but significant programme saving opportunities from not having to deliver LTC/A13.
	Public and stakeholder acceptability	–	Additional port and business stakeholder support associated with inclusion of TLR. Helps address local community concerns regarding scale and impacts of LTC / A13 interchange. May be some stakeholder concern regarding loss of LTC/A13 connectivity.
FINANCIAL			LTC scheme cost << £8.5bn as opportunity to remove significant costs associated with LTC/A13 interchange. Additional TLR scheme cost = £0.2bn
COMMERCIAL			TLR provides additional capacity, resilience and flexibility within scheme design to support future growth opportunities. Tilbury junction provides limited capacity for future Tilbury Link Road and port / local plan growth. Opportunity for developer and Freeport funding.

## Appendix A7. Delay Plots

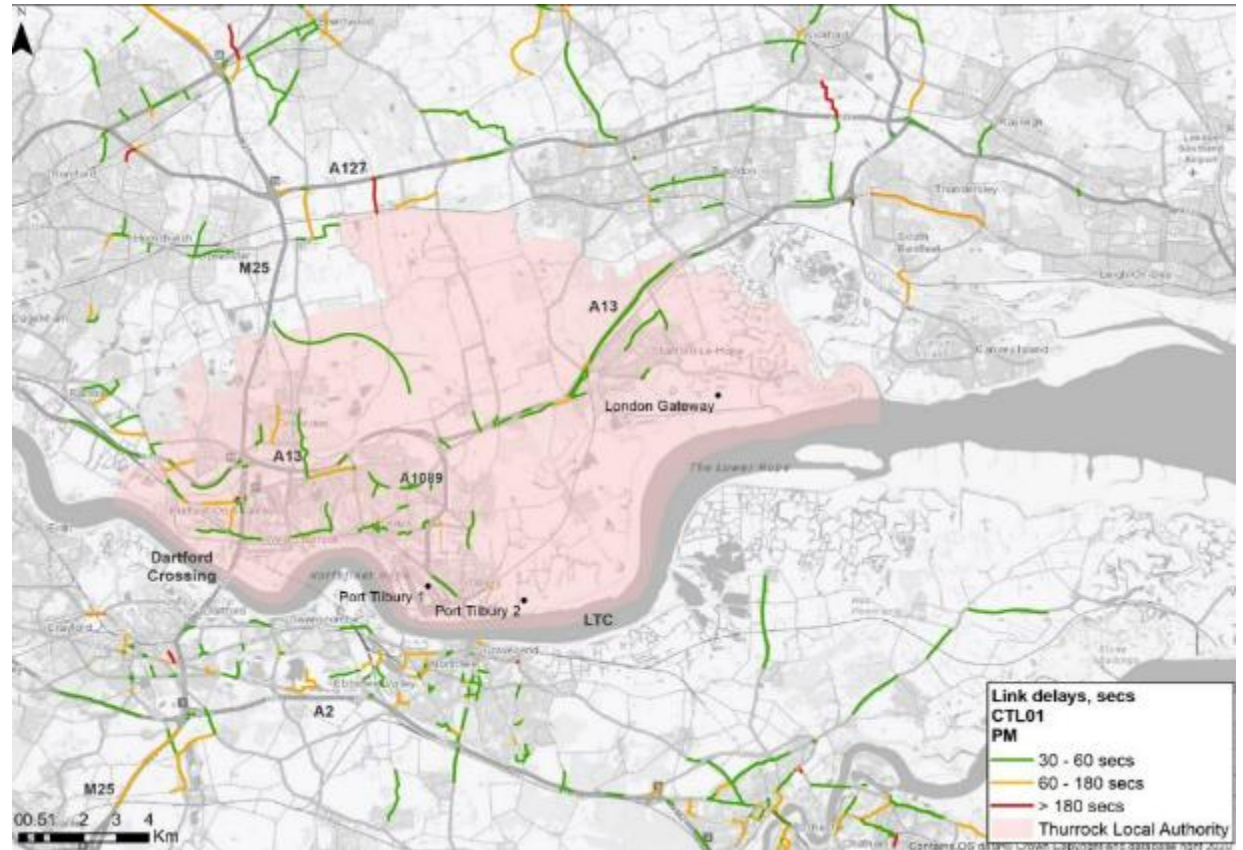
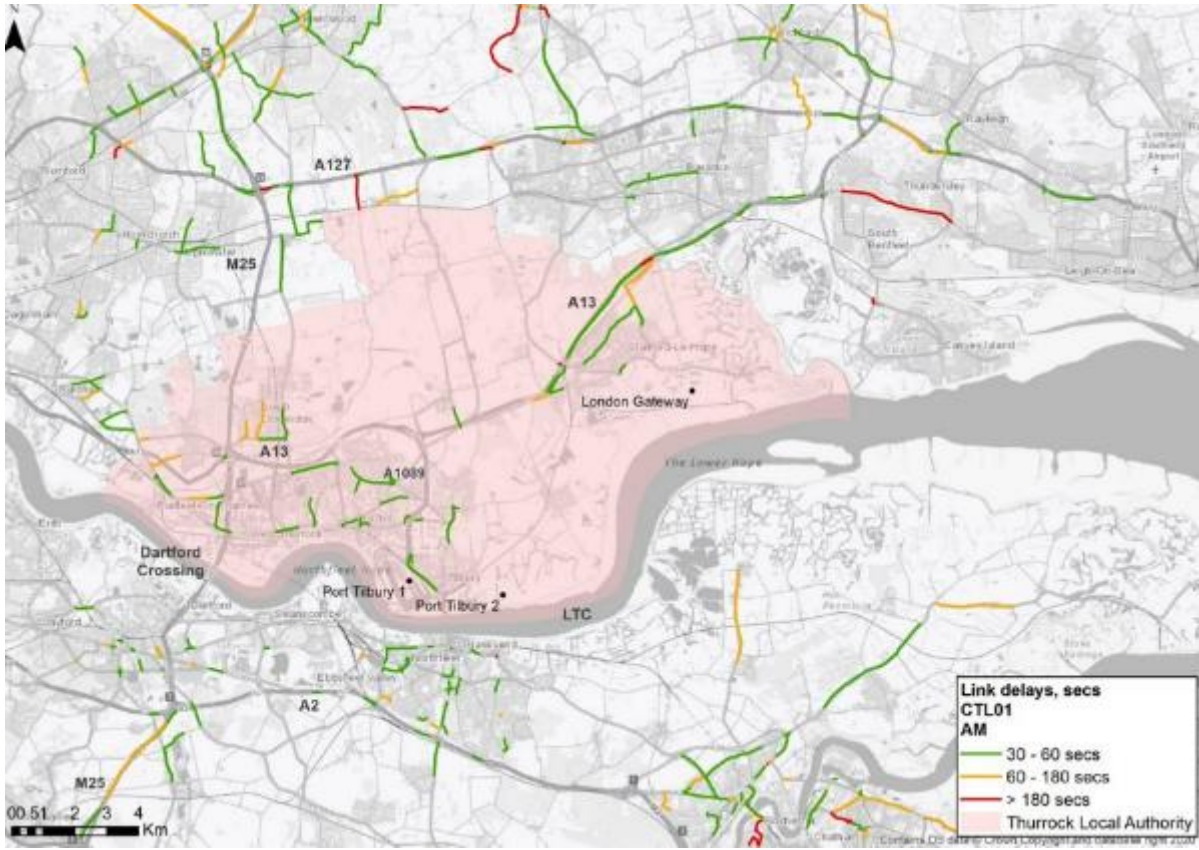
# CM45 (Do Minimum) – AM and PM Delay Plots



# CS67 (LTC Only) – AM and PM Delay Plots



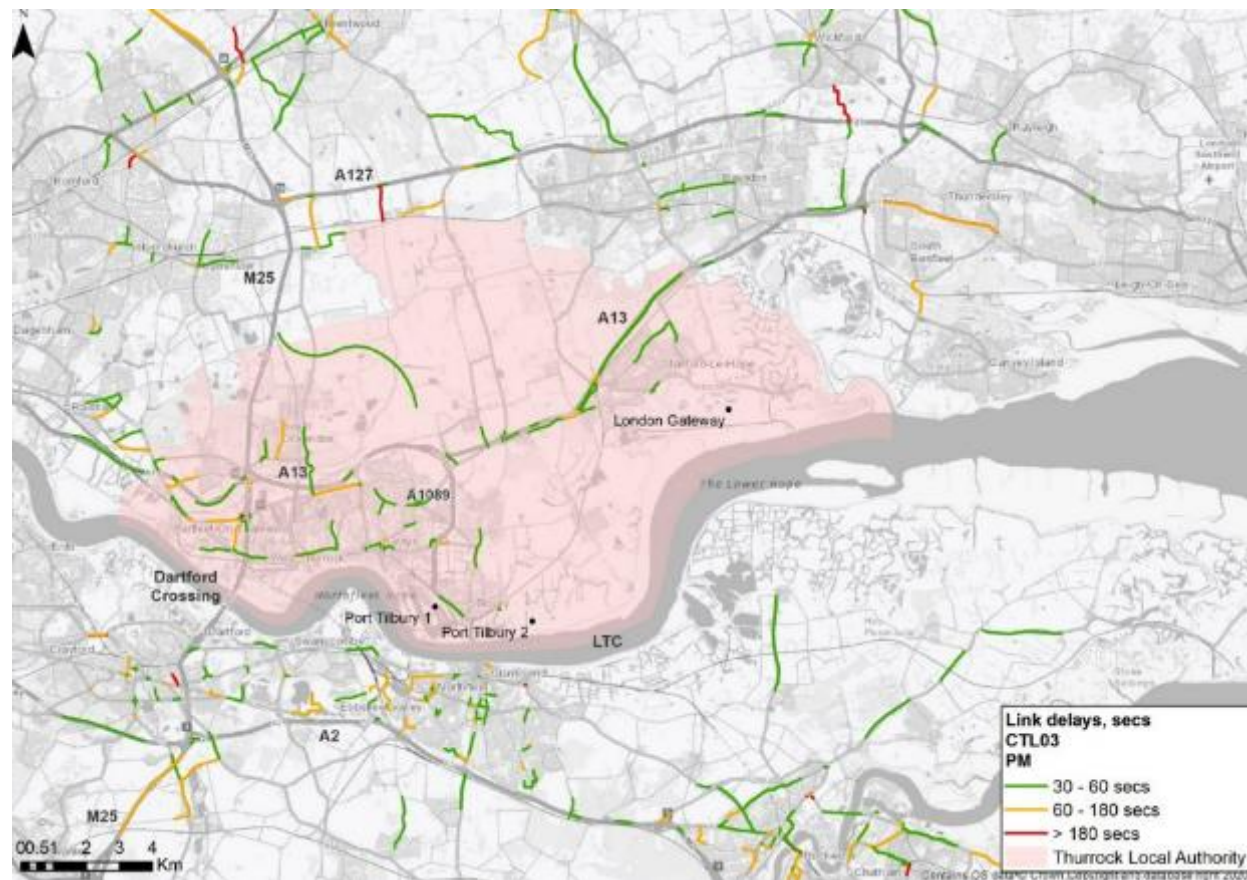
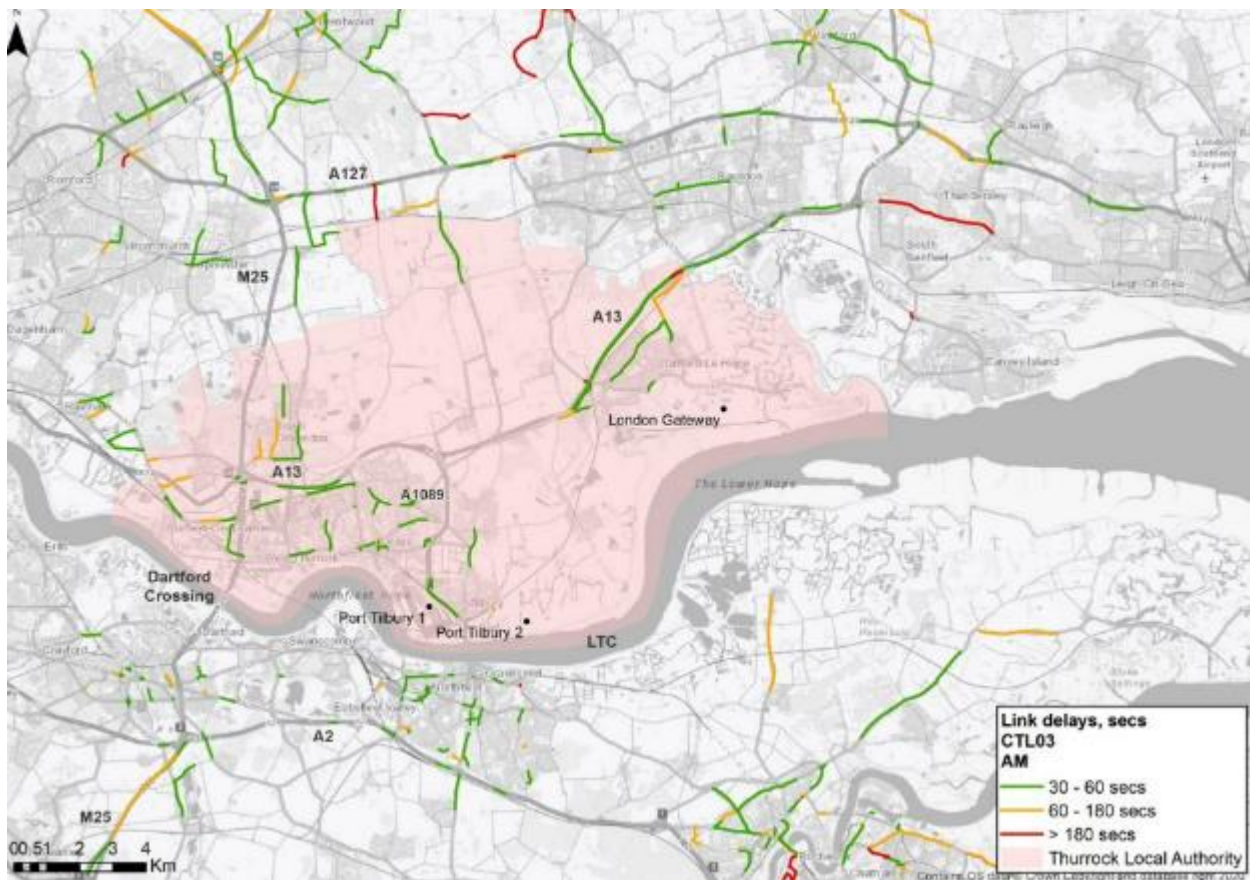
# CTL01 (LTC + TLR) – AM and PM Delay Plots





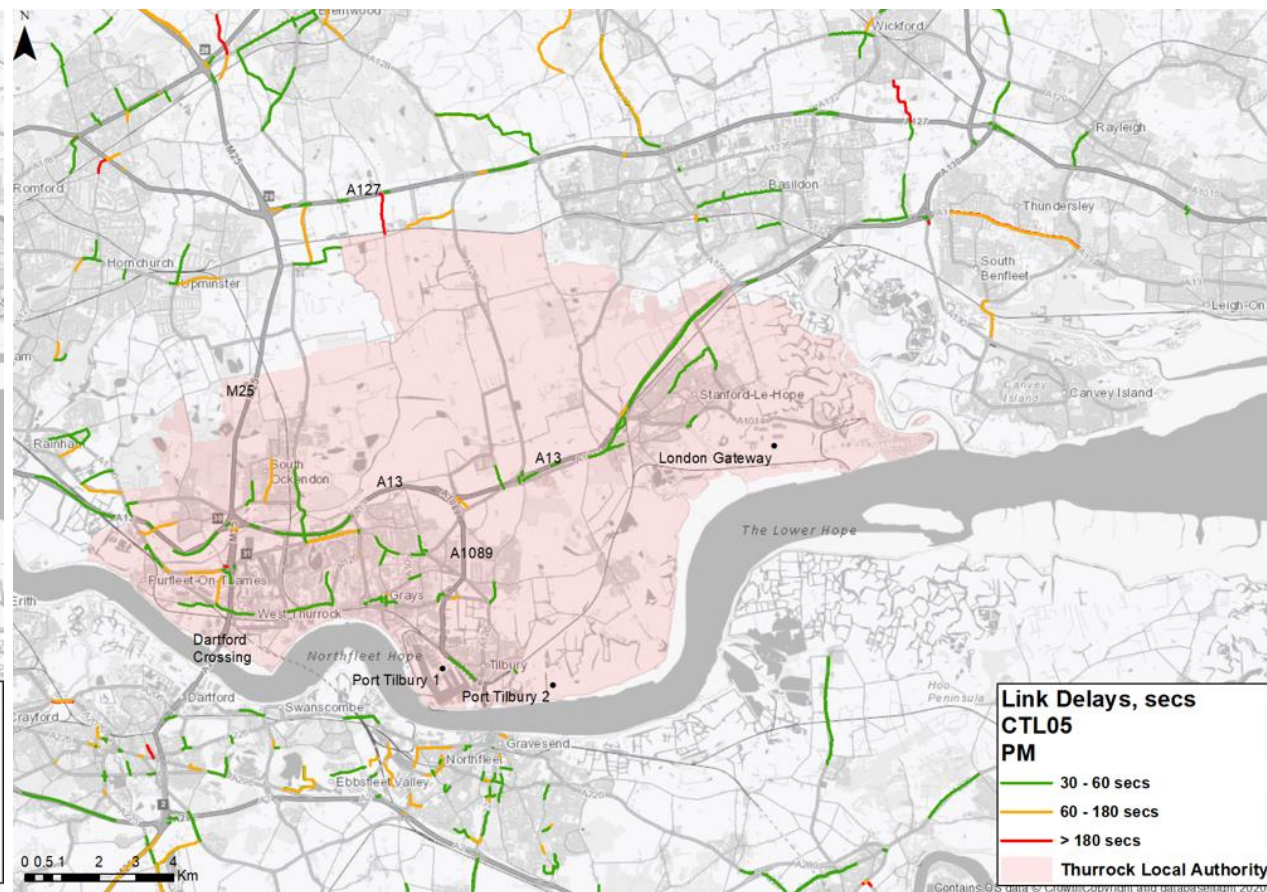
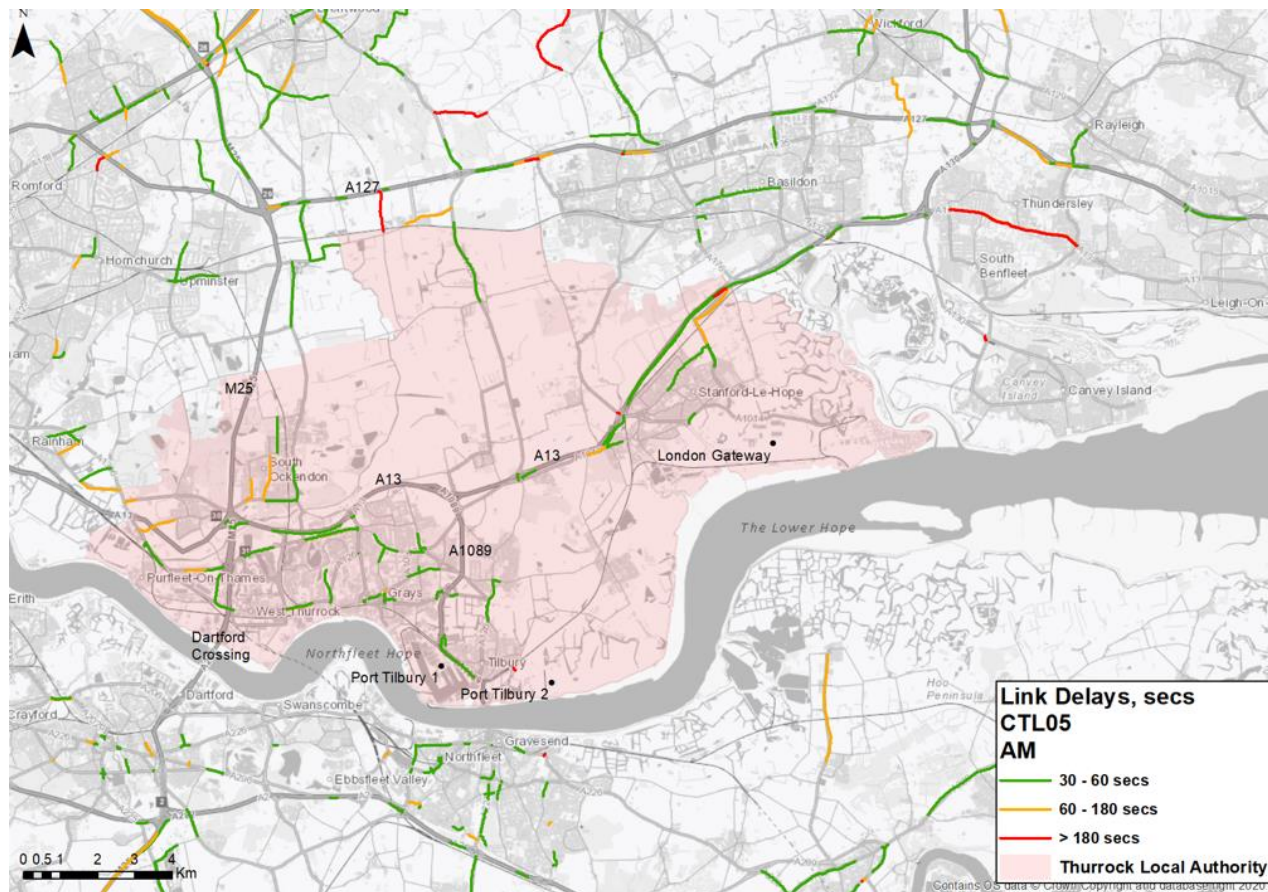


# CTL03 (LTC + TLR + No Direct Links from A1089 to LTC) – AM and PM Delay Plots



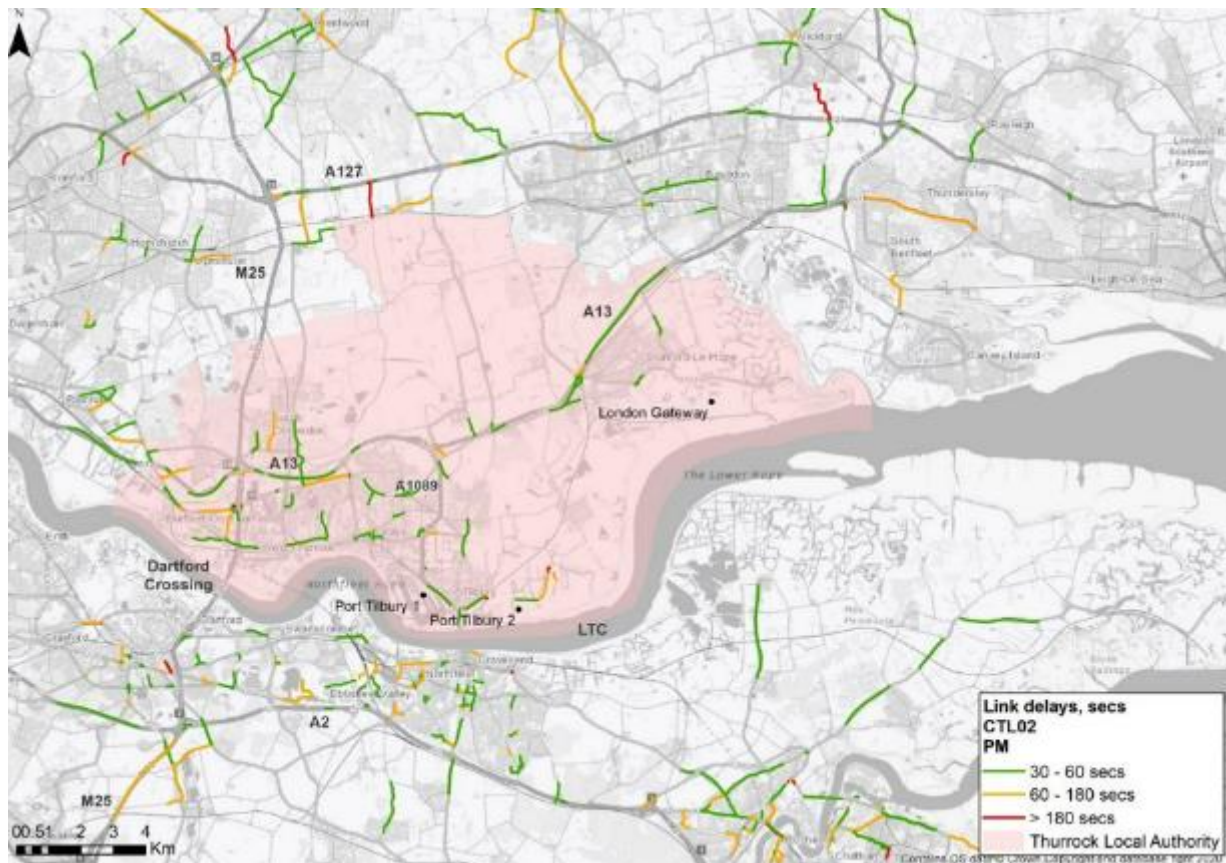
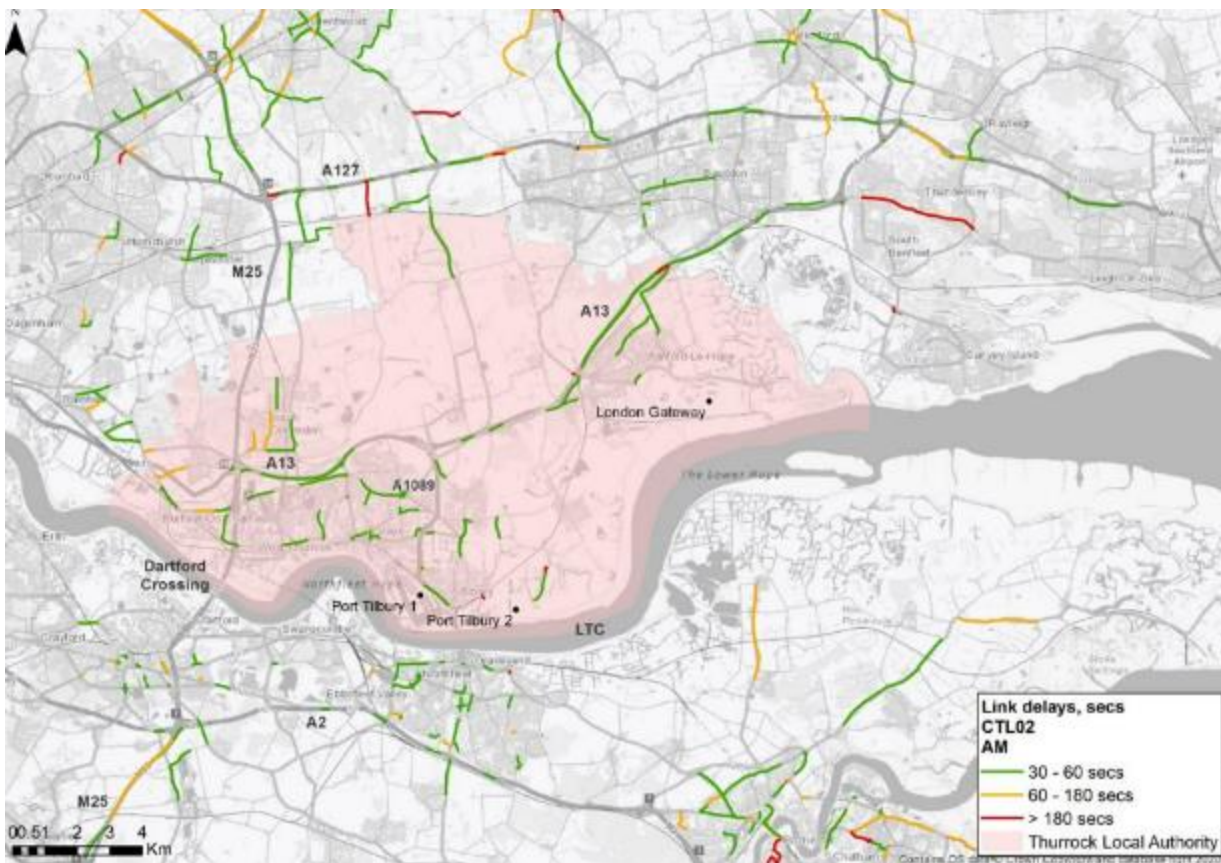


# CTL05 (TLR + No Direct Links from A1089 to LTC + No Direct Links A13 East to/from LTC North ) – AM and PM Delay Plots





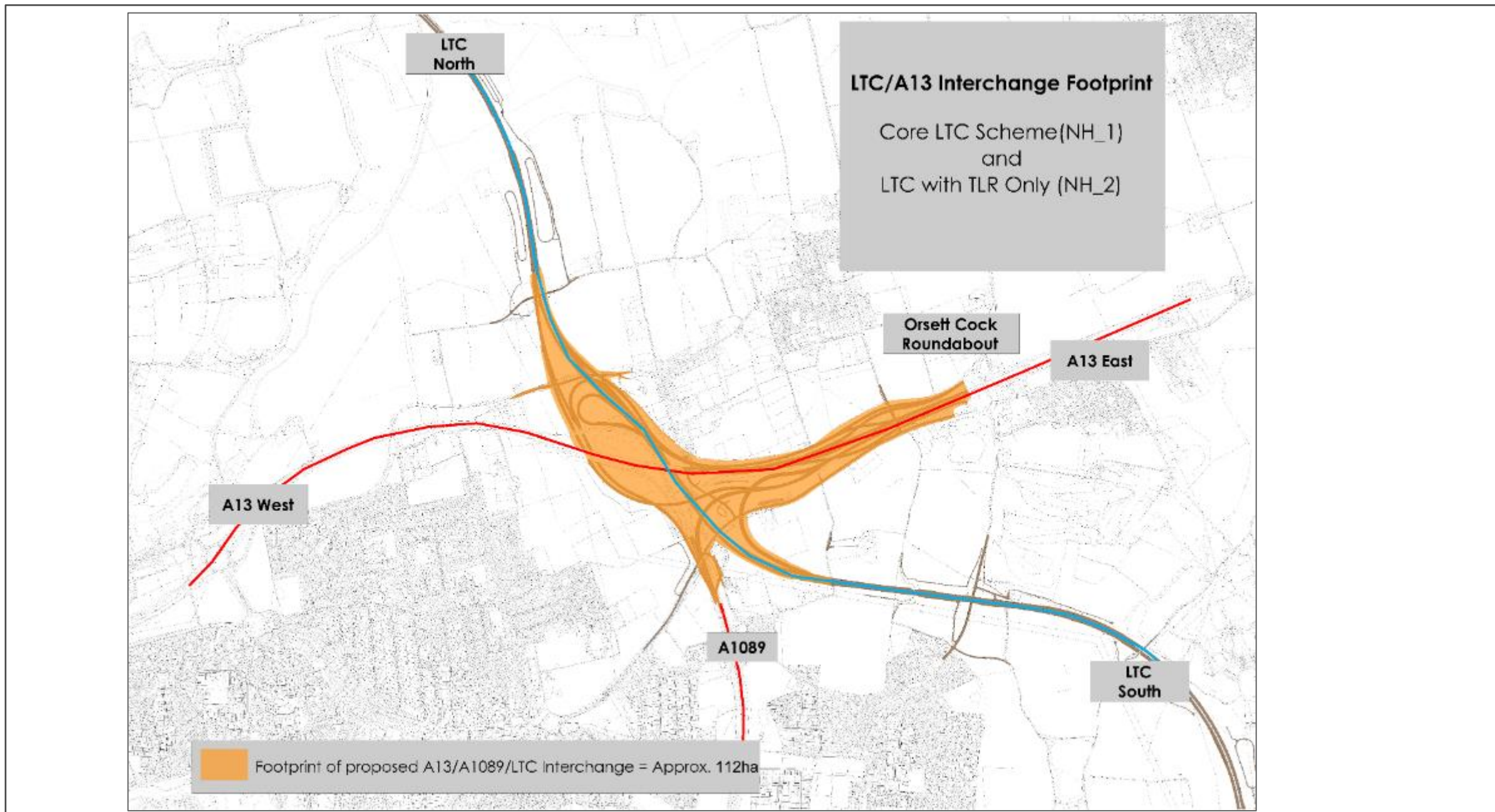
# CTL02 (TLR and No LTC/A13/A1089 Interchange)– AM and PM Delay Plots

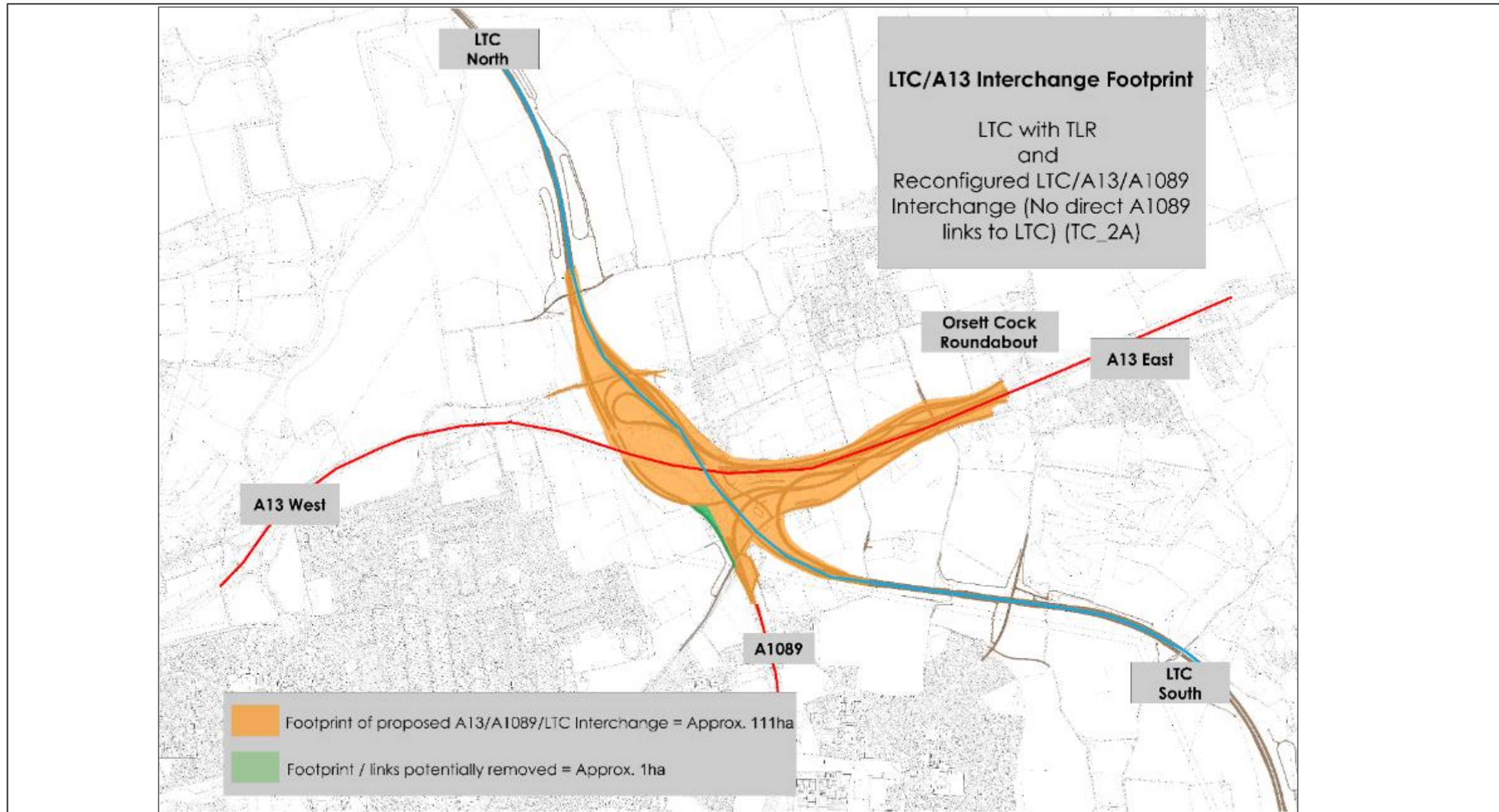


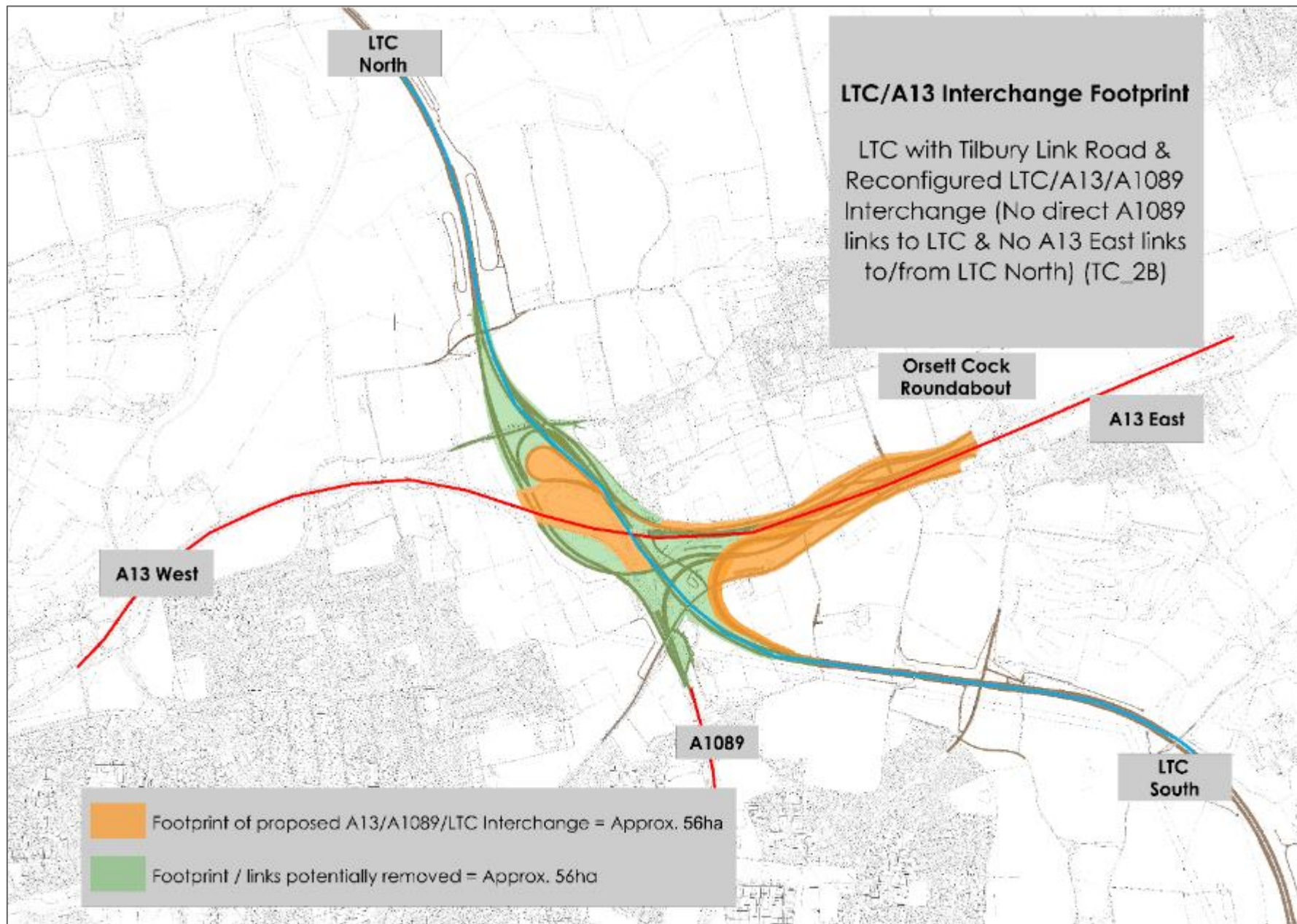
# Appendix A8. LTC / A13 / A1089 Junction Land Take



# Alternative LTC/A13 Interchange Option Land Take – CS67 and CTL1







# Alternative LTC/A13 Interchange Option Land Take – CTL02

