Lower Thames Crossing

Route Consultation Response – PBA Preliminary Review

On behalf of **Thurrock Council**

Project Ref: 37652 | V1.0 | Date: March 2016

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1 Executive Summary

1.1.1 This report has been prepared in response to Highways England's 2016 route consultation for the Lower Thames Crossing on behalf of Thurrock Council. It is a position paper setting out our reservations over the approach to determining a preferred route for the following reasons:

- The traffic movement data on which the appraisal partly relies is historic (2001 demand data). It does not satisfy the DfT's own requirements to base assessment on more recent data and there is no clear headway between the options considered and the preferred scheme in terms of the costs and benefits of each option.
- The route option locations A and C fulfil substantially different strategic functions, and location C is likely to be less effective in improving the wider resilience of the Strategic Road Network than location A.
- Traffic forecasts suggest that only 14% of traffic is attracted to the new route from the existing crossing, so the scheme has limited benefits in terms of one of its core objectives to 'relieve the congested Dartford Crossing and approach roads'.
- The environmental harm that would be caused by the scheme has not been fully assessed or quantified, (including impacts on health and amenity), and it has not been demonstrated that these will be out-weighed by any predicted economic or transport benefits.
- If route 1 (previously option A) is to be re-introduced to the next stage of consultation, a full and 'like for like' assessment should be provided taking the above issues into account, and the consultation timescale should be extended.
- There is a lack of information needed to make an informed decision over any route. The strategic case tests have not been met, particularly regarding the rationale for the scheme; and the public interest 'compelling case' required for CPO has not yet been met.
- The preferred scheme is potentially in conflict with and would have a significant impact on Thurrock's strategic growth plan.
- The preferred scheme could prejudice the delivery of the much needed A13 upgrades that are already planned and essential to jobs growth and Ports expansion in Thurrock.

1.1.2 These points are expanded upon in this summary below and their rationale further substantiated in subsequent sections of this report:

The traffic movement data on which the appraisal relies is historic (2001 demand data). It does not satisfy the DfT's own requirements to base assessment on more recent data and there is no clear headway between the options considered and the preferred scheme.

1.1.3 The data upon which the scheme relies is unreliable at best in assessing potential scheme benefits. In addition, the inclusion of a significant new strategic transport connection into the network cannot be simply assessed by using existing trips matrices and applying growth to these based on existing development plans. The strategic nature of the scheme means that development plans will naturally respond to, and reflect the new connection. These effects could be significant and have not been taken into account.

1.1.4 In economic assessment terms, the BCR summary shows that there is limited difference between the location C routes.

In addition, a fixed crossing toll has been assumed in testing and comparing options. This is over-simplistic and could artificially increase the BCR of the HE preferred option, and significantly alter the environmental effects.

The route locations A and C fulfil substantially different strategic functions, and location C is likely to be less effective in improving the wider resilience of the Strategic Road Network than location A.

1.1.5 HE's flow analysis shows that the two location options A and C would fulfil a substantially different strategic role. Option A would provide direct relief for the M25 corridor across the River Thames at Dartford, and increase the resilience of the wider network. Option C would fulfil this function much less effectively, whilst providing a more attractive route for traffic between Kent and the Channel ports, and destinations to the north of the River Thames.

1.1.6 Fig 4.14 of the Volume 5 (shown in Section 3 of this report) appendices shows that Route 1 is more resilient than route 3 with both a smaller reduction in flows and greater overall crossing flows. HE asserts that route 1 does not meet the network resilience objective based on a spurious suggestion that:

'Route 1 provides additional crossing resilience but will not improve the resilience of the wider road network. In the event, for example, that one of the crossing structures had to close, as recently happened to the Forth Bridge, it is reasonable to assume that either the existing tunnels or new bridge would remain open to traffic. Higher flows in the A282 corridor increase dependency on this key arterial route and does not increase network resilience, as would be the case with an alternative crossing location. Route 1 increases the dependency on the A282 corridor but with much higher traffic flows. Therefore Route 1 would not meet the scheme objectives particularly in terms of network resilience.'

1.1.7 This extends the argument well beyond the identified study area, and brings into question the lack of wider network improvements that would serve a similar purpose (such as widening of approach routes on the A282 corridor).

Traffic forecasts suggest that only 14% of traffic is attracted to the new route from the existing crossing, so the scheme has limited benefits in terms of one of its core objectives to 'relieve the congested Dartford Crossing and approach roads.

1.1.8 The proportion of users of Route 1 (Location A) which would be of direct relief to the existing crossing is significantly higher than for Routes 2, 3 and 4 (the Location C routes).

'The main users of Routes 2, 3 and 4 are people travelling between Kent/ Channel Ports and the M25/ East Anglia and that there is minimal diversion of northbound and southbound traffic to the new crossing from the M25.' , Para 4.5.8, SAR Vol 5.

1.1.9 The effectiveness of Location C in relieving pressure on the Dartford Crossing will therefore be significantly lower than for Location A, even if it fulfils other strategic transport or economic objectives.

The environmental harm that would be caused by the scheme has not been fully assessed or quantified, (including impacts on health and amenity), and it has not been demonstrated that these would be out-weighed by any predicted economic or transport benefits.

1.1.10 HE notes that the scheme has significant impacts on:

- greenbelt land
- landscape character
- scheduled ancient monuments
- listed buildings
- conservation areas
- functionally linked land and wildlife sites
- Mardyke floodplain
- Biodiversity

1.1.11 These impacts should be considered for all options prior to selection of a preferred option and most certainly prior to the removal of option A from the consultation.

If route 1 (previously option A) is to be re-introduced to the next stage of consultation, a full and 'like for like' assessment should be provided taking the above issues into account, and the consultation timescale should be extended.

1.1.12 An informed decision over route options, especially taking into account the retention of option A, cannot be made until the comparative extent of environmental, economic and transport impacts has been assessed, taking into account the different strategic functions of location A and location C options and concerns about the data and method on which assessment to date has been based.

There is a lack of information needed to make an informed decision over any route. The strategic case tests have not been met, particularly regarding the rationale for the scheme; and the public interest 'compelling case' required for CPO has not yet been met.

1.1.13 The work on detailed route options is premature given that the strategic planning case has not been agreed and the required stages in reaching this point have not been properly assessed or developed.

1.1.14 HE has mapped out the stages it has apparently gone through in reaching this stage of the process as summarised in their Figure 2.2 of the 'Identification and Description of Shortlisted Routes'.

1.1.15 It is not clear that due weight has been applied to the many environmental constraints in reaching the routes for consultation. Nor is it clear that the potential impact on a European site of nature conservation has been ruled out for location C, or that is has been demonstrated that there are Imperative Reasons of Over-riding Public Importance (IROPI) why the project should go ahead, or that there are no reasonable alternatives.

1.1.16 No consideration has been given to the integration of alternative modes within the scheme, or the way in which the scheme could support the sustainable travel and land use integration

objectives, as required by the National Planning Policy Framework, and the National Networks-National Policy Statement.

1.1.17 In the absence of any spatial specificity in the NN-NPS or in Highways England's Delivery Plan, the outcome of this consultation would therefore have the effect of establishing a national policy position in favour of this specific scheme without full and proper justification.

1.1.18 Whilst the scheme is not at the CPO stage yet, potentially affected properties/residents have been notified that their land may be affected. One of the key tests for CPO is that there are no practicable alternative solutions to the scheme proposed. In this case, it is clear that a number of alternatives do still exist, and that HE is some considerable way from demonstrating a compelling case for a single route option.

The preferred scheme is potentially in conflict with and would have a significant impact on Thurrock's Strategic Growth Plans.

1.1.19 In the earlier route options assessment process, Route B was rejected due to 'limited public support, the potential impact on local development plans and limited transport benefits'. (SAR Vol 1, Exec Summary, 3.1.4)

1.1.20 However, the HE preferred scheme also has significant impact on Thurrock's local development plans by potentially affecting schemes designed to support economic growth in Thurrock and beyond. HE claim that the routes have *'the potential to unlock opportunities for housing and jobs'* (4.3.2, Vol 7), but this has not been demonstrated.

The preferred scheme could prejudice the delivery of the much needed A13 upgrades that are already planned and essential to delivering jobs growth and Ports expansion in Thurrock.

1.1.21 Plans to upgrade the A13 to dual 3 lane standard between the A1014 and A128 are well advanced and a formal funding decision is awaited. Delays in the delivery of this upgrade could have a negative economic impact on the area, but Thurrock has not been given any assurances by HE or Government that the LTC proposals will not affect delivery or timing of the A13 upgrade.

2 Introduction

2.1 Background

2.1.1 Highways England is consulting on proposals for a new road crossing of the River Thames connecting Kent and Essex for the primary purpose of reducing congestion at the existing Dartford Crossing. Highways England intend for this scheme to support Government objectives for improved transport links and economic growth, and hope that it will facilitate the development of new jobs and homes in the region.

2.1.2 In 2014, the government commissioned Highways England to identify and assess options for a new road crossing at Location A and Location C with the aim of identifying a proposed solution.

2.1.3 Highways England's Lower Thames Crossing Route Consultation 2016 Summary Booklet details the process which has been followed, and the considerations given in shortlisting potential solutions for Location A and Location C and has subsequently identified Location C, Route 3 as the preferred route and the proposed scheme to be taken forward.

2.1.4 Highways England is currently undertaking a Route Consultation in order to give stakeholders the opportunity to review the route selection process and associated consultation documents, and provide responses to these.

2.2 Purpose of this Report

2.2.1 This report has been prepared on behalf of Thurrock Council, in support of its response to Highways England's Lower Thames Crossing Route Consultation 2016. It is a position paper setting out the technical detail underpinning reservations relating to the approach to determining a preferred route, in relation to the strategic impacts fundamental to Thurrock Council's future development plans, and in response to the Transport and Economic, and Environmental appraisals presented by Highways England as part of the Route Consultation.

2.3 Aims and Objectives of the Lower Thames Crossing

2.3.1 Highways England has set out the economic, transport, and community and environment objectives for the scheme in Table 2.1 of the Consultation 'Summary Business Case'. The objectives, developed with the Department for Transport (DfT), include the following:

Economic:

- 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

Transport:

- 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

Community and Environment:

- To minimise adverse impacts on health and environment

2.3.2 This report considers the HE appraisal in the context of these objectives.

2.4 Structure of this Report

2.4.1 This report is structured as follows:

- Section 3: Traffic and Economics Appraisal
- Section 4: Environmental Impact Appraisal
- Section 5: Strategic Impact Appraisal

3 Traffic and Economics Appraisal

3.1 Introduction

3.1.1 This Section sets out the technical response to the modelling and economic appraisal work that has been undertaken to inform the Route Consultation for the Lower Thames Crossing (LTC).

3.1.2 To inform the review of the modelling undertaken for the LTC route options, the following Reports have been referred to;

i. Review of Lower Thames Crossing Capacity Options: Model Status Report, AECOM, May 2012

ii. Review of Lower Thames Crossing Options: Model Capability Report, AECOM, April 2013

iii. Review of Lower Thames Crossing Options: Final Review Report, AECOM, April 2013

iv. Lower Thames Crossing Consultation, Fact Sheet – Traffic Modelling, Highways England 2016

v. Pre-Consultation Scheme Assessment Report Volume 5: Traffic and Economics Appraisal, Highways England 2016

vi. Pre-Consultation Scheme Assessment Report Volume 5: Traffic and Economics Appraisal, Section 13: Appendices, Highways England 2016

3.2 Traffic Modelling Approach

3.2.1 The model used for the testing of options to inform this consultation is the LTC v2 model. This model has been derived from the LTC v1 model, which in turn is developed from an existing M25 Model. The M25 Model consists of a Highway Assignment Model, developed in SATURN by Hyder Consulting and a M25 Variable Demand Model, developed in EMME by AECOM.

3.2.2 The LTC v2 model appears to be updated forecasts that are based upon the same base year model as the LTC v1 model. The Model Status Report and Model Capability Report discussed below relate to the LTC base year model update, therefore this pertains to both v1 and v2.

Model Status Report

3.2.3 A full review of these models, concentrating on the core area of influence of the LTC, was undertaken by AECOM and is reported in the Model Status Report (i). The M25 Highway Model incorporates travel demand data derived from the 2001 London Area Travel Survey (LATS) data and 2004 traffic count data. The model has been developed to represent AM peak (0800-0900), Inter Peak (Average hour 1000-1600) and PM peak (1700-1800). A forecast model exists for 2009.

3.2.4 Section 3 of the Model Status Report provides a review of the suitability of the M25 Model zoning system and concludes that:

> *'The M25 Model zones are broadly suitable for the assessment of the longer-term crossing capacity options in the Dartford area. They do need some limited refinement however.*

The M25 Model zones are broadly consistent with 2001 Census geography; this should be retained in any modification to the zone system, providing consistency with other data sources, not least planning data.

There are a number of zones in the vicinity of the Dartford Crossing that have been identified as requiring disaggregation, on the basis of the density of trips to/from these zones and because the routeing choices of trips from these zones will be uncertain when the various capacity options are evaluated.

Two zones in Norfolk/Cambridgeshire have been identified for disaggregation on the basis of the pattern of demand using the existing Dartford Crossing. Trips originating/destinating to the west of these zones have a viable routeing alternative around the western side of the M25.

In disaggregating the model zones we will draw, where suitable, on data available from local models. Should the data be unsuitable the alternative approaches we will adopt, in order of preference, are:

• Use of the NAOMI prior matrices (which were constructed at a finer level of detail before aggregating to the M25 Model zone system; and

• Where these finer zones are not consistent with our requirements use of planning data (residential postcodes to indicate population distribution and, if available, Valuation Office data to indicate employment distribution).'

3.2.5 Section 4 provides a review of the M25 Model network detail and concludes that;

'Overall, the M25 Model provides a sound basis that can be enhanced in order to ensure that it is suitable for assessing the impacts of proposed capacity enhancement schemes in the Lower Thames area. The broad network coverage and extent of the simulation network is good, with all major routes covered.'

3.2.6 Section 5 provides some analysis of traffic flow validation within the study area. This identifies that the model poorly validates in all three time periods, with less than 50% of counts in the AM peak and PM peak meeting the flow and GEH validation criteria and only just over 50% in the Inter Peak. This highlights the need for the model to be updated and revalidated to be seen as a satisfactory tool for testing LTC options.

3.2.7 Section 9 sets out the recommended approach to calibrating the model and recommends the use of the 2009 forecast model as a starting point for the update.

Model Capability Report

3.2.8 The actual process for updating the model is described in the Model Capability Report (ii). This work was undertaken by AECOM. As stated in Section 3.1:

'The existing M25 Model has a base year of 2004, and its demand data were derived from 2001 LATS roadside interview surveys and traffic counts, with the matrix uplifted to 2004 levels using matrix estimation techniques.

These data used to develop the model are therefore aging, beyond the age recommended in WebTAG and should therefore be enhanced where possible, within available data, resource and time constraints.'

3.2.9 Network updates were undertaken to provide a better representation of links and junctions within the study area and used TfL's East London Highway Assignment Model (ELHAM) and Medway Traffic Model (MTM) to provide network enhancements in areas covered by those models.

3.2.10 The demand data used the 2009 M25 Forecasts as the starting point, with enhancements using trip ends from the Thames Gateway South Essex (TGSE) and M25/Naomi matrix build to disaggregate zones where more detail was required. The TGSE demand matrices were also used to provide movements within South Essex, replacing the M25 model forecasts.

3.2.11 It should be noted that the TGSE model was developed using 2001 LATS data, along with additional RSI's undertaken in 2006. The age of this data is still a concern.

3.2.12 Freight movements across the Thames are a key consideration in this work. Paragraph 3.3.2 notes that the M25 Model base year freight matrices have been retained in the model update.

3.2.13 Whilst TGSE was used to improve the local movements in South Essex and provide greater confidence in localised movements in this part of the model, paragraph 3.3.7 and 3.3.8 highlight the concern with localised movements in north Kent:

'Of particular relevance to the LTCM, there remains particular uncertainty in the unobserved demand within the LATS sectors in north Kent; no local data were available to enhance the LTCM in this part of the model.

These uncertainties in the demand data should be borne in mind in when using the LTCM in forecasting mode; effects upon local demand, especially south of the river, should be treated with caution'.

3.2.14 Section 3.4 details the count data used for the update of the model and the source of this data. This data is a mixture of 2009 data from TRADS, DfT count sites and ELHAM, along with 2005 data from the Kent Thameside Model and 2006 data from TGSE. Paragraph 3.4.2 states that the *'traffic count data available for the study is of varying age and quality'* as can be seen from the dates the surveys were undertaken. Whilst the TRADS database provided more up to data for the M25 and ELHAM data from 2009 has also been used, the data in south Essex and north Kent is older and may potentially be an issue.

3.2.15 Section 3.5 discusses the journey time data. Again the M25 TRADS/HATRIS data and ELHAM data are from 2009, but data for south Essex and north Kent comes from 2006 and 2005 respectively.

3.2.16 Sections 4 to 6 of detail the actual processes and results of the model development, calibration and validation. Paragraph 6.10.6 acknowledges that there *are 'some significant links which do not meet the WebTAG criteria, being the A128 on the TGSE East-West Screenline, the A13 on the TGSE Outer Screenline the A2 on the KTS Gravesend East Screenline and the A20 on the ELHAM Boundary South Screenline.'*

3.2.17 The overall conclusion on the model update is provided in paragraph 6.10.7;

'It is therefore suggested that, with reference to the screenlines used in the calibration constraint process, the model represents a reasonably accurate representation of traffic flows within the Study Area and is suitable for use as scheme identification and sifting tool. The model calibration can be deemed as fit-for-purpose for assessing the strategic road network and the significant links within the study area, although further scrutiny of effects on more local routes will be required, and the known weaknesses in the demand matrices also taken into account.'

3.2.18 Section 9.4 discusses the suitability of the model for appraisal purposes and details the key uncertainties in the assessment of economic benefits as (Para. 9.4.2);

'• the ageing source of demand data used, particularly for trips starting or finishing in North Kent along the south side of the Thames; in this regard initial actions should based analysis to review the proportion of benefits derived from these trips; and

• representation of delays (southbound in the morning and northbound in the evening) were comparatively poor in the base year validation, and the representation of capacity and delays with the free-flow operation will be critical to understanding the time savings provided by additional crossing capacity.'

3.2.19 It should also be noted that since the 2001 demand data was collected and even since the 2009 model was produced, a number of significant schemes have been implemented on the M25, which may have had an impact on strategic routing and flows. These include;

i. Introduction of freeflow tolls (Dartcharge) at Dartford Crossing – November 2014

ii. M25 Junction 23 to 27 Smart Motorways scheme – November 2014

iii. M25 junction 5 to 7 Smart Motorways scheme – Spring 2014

In addition, significant improvements to routes such as the A130 to the east of Thurrock, that were not in place at the time of the data collection, may have some bearing on the viability and benefits of options that have been previously rejected, such as route D.

3.3 Pre Consultation Scheme Assessment Report – Traffic and Economics Appraisal

3.3.1 The Traffic and Economics Appraisal (Volume 5 of the Scheme Assessment Report) sets out the modelling methodology used for the testing of the short listed route options (Option A and Options C, with variants of latter). A revised set of forecast models, LTC v2, have been produced, but these have still been developed from the LTC v1 base year model.

3.3.2 The traffic appraisal methodology is discussed in Section 3 and results of the modelling, including traffic flows and journey time outputs, are reported in Section 4. Whilst the modelling is considered to not be adequate for the reasons set out in 4.2 below, the methodology for appraising the traffic routes and outputs of it appear reasonable.

3.3.3 Traffic forecasts suggest that traffic on the existing Dartford crossing is only reduced by 14% with the Option C variants, so the scheme has limited benefits in terms of one of its core objectives to 'relieve the congested Dartford Crossing and approach roads'.

3.3.4 The shift in traffic from the existing route to options at Location C, showing a 14% reduction at Dartford in 2025 and 7% in 2041, indicates that all capacity created at the existing crossing may be taken up relatively quickly and the Dartford Crossing will experience similar problems seen today, in terms of congestion. The numbers shown for the future years should also be considered in the context of recent post opening reports produced for the M25 Junctions 5 to 7 and Junctions 23 to 27 Smart Motorways projects. For example the Junction 23 to 27 scheme saw an increase in traffic of 10%, which is far greater than elsewhere on the M25 or in the South East. There is however, no evidence of how this compares with predicted traffic numbers used in the appraisal of these schemes.

3.3.5 Although the report states that the fundamental problem at the crossing is that traffic demand in certain periods exceeds the crossing capacity, there is also an issue of operational resilience. A test has been carried out by HE to examine the impact of a northbound tunnel closure in the inter peak period. Figure 4.14 (page 37) shows the projected vehicle flows per hour in 2025. This appears to indicate that Route 1 offers the greatest resilience, as the drop

in flow with an incident is smaller than Route 3 and the flow with Route 1 is actually higher than Route 3.

3.3.6 In terms of an overall network resilience argument, it is also noteworthy that the case relies on the fact that route 3 starts it's 'diversion' at M25 J29 to the north and at J2 to the south. A 'like for like' resilience test should therefore include an option that provides 'on line' widening of the M25 beyond these junctions on the approaches to the Dartford crossing. This would have the effect of route 1 being even more resilient than is already presented by HE in their tests.

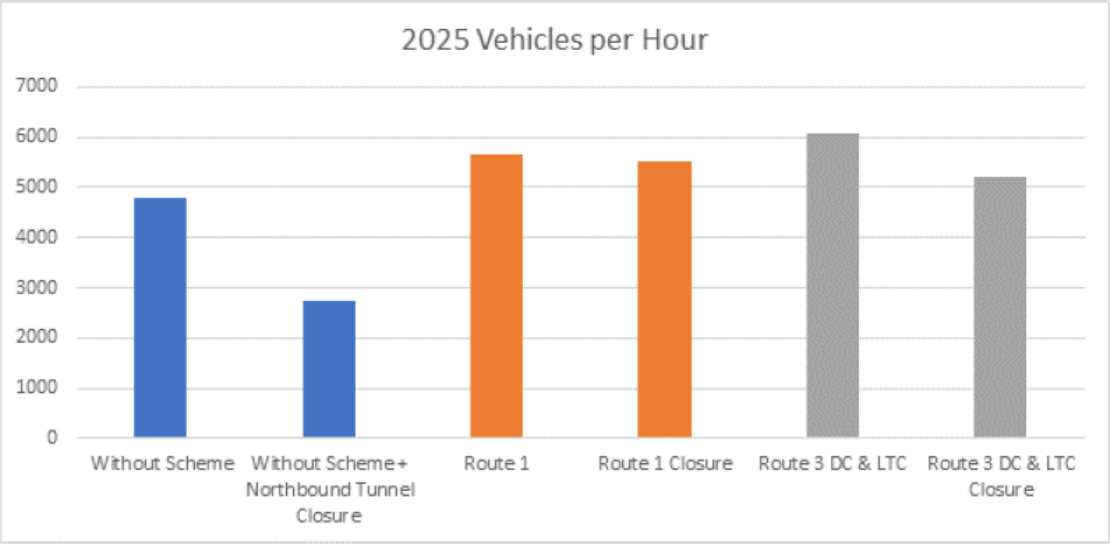


FIGURE 4.14 - OFF-PEAK CROSSING FLOWS WITH AND WITHOUT A CLOSURE OF ONE OF THE DARTFORD TUNNELS IN 2025

3.3.7 The traffic modelling results presented also assume that a fixed and equal crossing toll would be applied to both routes. Whilst some sensitivity tests appear to have been run in the model, these have not been taken through the full economic analysis stage that is required to properly compare options and outcomes.

3.3.8 The setting of variable toll values could have a significant impact on overall traffic movements. This could in turn lead to substantially different outputs in terms of cost benefit ratios and environmental effects. For example, a lower relative charge on route C might significantly increase the volumes of traffic on the route leading to much more widespread impacts and a different cost/benefit ratio. A range of reasonably foreseeable scenarios should be undertaken in informing decision making.

3.4 Summary of Modelling Issues

3.4.1 The key issues identified within the traffic modelling and appraisal are;

iv. Age of data – whilst it is recognised that the modelling approach is based on minimising the cost of new data collection and the methodology used appears to be robust, this does not cover the fact that the basis for the modelling work is data from 2001, and even the 2009 update is reliant on models using data from 2001 and 2006 in the case of the TGSE model to update key elements of the area of the model i.e. south Essex. This would cause concern as to the validity of the traffic outputs used within the economic appraisal and subsequently used to determine which options are taken forward for this consultation.

v. Data in north Kent – The model development reporting highlights this as a key area of weakness within the modelling as there was no more recent data available to update trip

make patterns in this area. This again is a cause for concern as to the validity of the traffic outputs used for the economic appraisal.

vi. A number of significant highways improvement schemes have been implemented since the model data was collected, and these will have had some impact on routeing, flows and journey times.

vii. Traffic relief on the existing Dartford Crossing with Option C variants, is shown to be relatively small, with 14% transfer of flows in 2025 and only 7% in 2041.

viii. Option A seems to show better resilience to incidents than Option 3 variants.

3.4.2 Given the above it is considered that there is enough uncertainty within the modelling to indicate that rejecting Location A on modelling grounds alone would be either insufficient or premature (i.e. the options should be re-appraised following updated modelling).

3.4.3 It is recognised that a new model is in development which is to be used for any subsequent Development Consent Order (DCO) application. This model would be a more suitable tool to undertake further tests of Option A and Option C and to assist in making a more informed and robust decision on such an important highway scheme.

3.4.4 Transport Economics Appraisal

3.4.5 There is a considerable amount of commentary on the transport appraisal which has been undertaken, however much of this is at a fairly high level and it is difficult to reach a definitive view on the robustness of the findings without access to the detail supporting the analysis and the range of assumptions used.

3.4.6 Highways England's assessment of the scheme uses two benefit to cost ratios (BCRs) for each option – an Initial BCR, which excludes Wider Economic Benefits and Reliability impacts, and an Adjusted BCR, which includes Wider Economic Benefits and Reliability impacts. There is typically only a 0.1 – 0.3 difference between like for like BCR figures, eg Routes 2, 3 and 4 have an initial BCR of 2.2, 2.3 and 2.1 respectively (upper end) and an adjusted BCR of 3.3, 3.4 and 3.1 (upper end). There is therefore no clear headway between the options considered and the preferred scheme in terms of the costs and benefits of each option. Route 3 has the slightly higher BCR and there are differences for all routes depending on whether there are eastern or western links in Kent. The "benefits" in the BCR are substantially made of the journey time savings arising from traffic using the new route. Given there are significant questions over the accuracy of the traffic modelling and the likely level of benefits, then until more accurate data is available concerning contemporary journey patterns and tangible benefits where there is some degree of confidence, identifying a preference for a particular route is clearly premature.

3.4.7 The key question is around the benefit cost ratios (BCR) arrived at and used to determine the relative performance of the options and the value for money they deliver. In particular, there are questions to be answered around the individual components driving the adjusted BCR.

3.4.8 The adjusted BCR for the R1 option is 2.3 / 2.1 (depending on whether it is bridge or bored tunnel). These compare with figures of between 3.3 to 3.9 for the R2 options (depending on WSL or ESL and bridge, bored tunnel or immersed tube tunnel). The table below setting out the BCRs is taken from the Pre-Consultation Scheme Assessment Report Volume 5: Traffic and Economics Appraisal.

PVB (£bn) 2010 prices	R1	R2 WSL	R2 ESL	R3 WSL	R3 ESL	R4 WSL	R4 ESL
Crossing type	BR	BT	BT	BT	BT	BT	BT
PVB (excl WEBs & Reliability) (£bn)	1.995	3.483	3.745	3.300	3.856	3.353	3.837
PVC (£bn)	1.222	1.370	1.464	1.354	1.447	1.548	1.649
NPV (£bn)	0.773	2.114	2.280	1.947	2.409	1.805	2.188
Initial BCR	1.6	2.5	2.6	2.4	2.7	2.2	2.3
WEBs (£bn)	0.737	1.264	1.626	1.353	1.677	1.678	1.735
Reliability (£bn)	0.135	0.142	0.146	0.143	0.147	0.146	0.150
Adjusted BCR	2.3	3.6	3.8	3.5	3.9	3.3	3.5

3.4.9 The differences in the BCRs are essentially down to two key elements; these are journey time savings and wider economic benefits (WEBs). The travel time savings for R2 options are £1bn greater in present value terms and WEBs are around £0.5bn to £0.6bn greater. For the former there is little evidence why. This does seem odd given the figures presented about how many users actually switch, the time savings the existing users will get, and the origin – destination data of those using the existing crossing.

3.4.10 On the WEBs analysis the appraisal suggests greater agglomeration benefits associated with R2, but again without a detailed explanation as to why. It is difficult to see why these benefits would be so much greater under the R2 options versus R1. The appraisal refers to the use of a Spatial Computable General Equilibrium (SCGE) model (1.2.4 of Volume 5: Traffic and Economic Appraisal), but there is no explanation of how this has been applied and what the economic impacts are under the different options.

3.4.11 In conclusion, further evidence and detail is required to fully understand the robustness of the findings as well as the accuracy and reliability of the conclusions of the relative value for money associated with the different options.

4 Environmental Impact Appraisal

4.1 Introduction

4.1.1 This Section sets out the technical response to the environmental appraisal work that has been undertaken to inform the consultation on the Lower Thames Crossing Options.

4.2 Environmental Appraisal

4.2.1 The following table below summarises the findings of the Environmental Appraisal results set out in Section 7 of the Pre-Consultation Scheme Assessment Report, Environmental Appraisal (Volume 6), for the preferred option Route 3 (Option C – Bored Tunnel and Easter Southern Link) and Route 1 (Option A). Commentary on these findings is provided on the key environmental issues below.

Topic	Route 1 (Option A)	Route 3 (Option C) – Bored Tunnel / Eastern Southern Link (ESL)
Landscape / Townscape	Potential effect on Mardyke Valley Setting. Mitigated by bored tunnel option.	North of River Thames - Affects greenbelt land. Loss of Landscape features such as woodland including from Thorndon Park Grade II* Registered Park and Garden Crossing - Minor effect from Bored Tunnel Eastern Southern Link (ESL) - Greater intrusion into the Kent Downs AONB than Western Southern Link at the A2/M2 junction
Historic Environment	No significant effects	Directly affects a scheduled monument and 2 Grade II Listed Buildings. Crossing - No significant effects of a bored tunnel ESL – Potential settings effects on listed buildings and Shorne Conservation Area
Biodiversity	Possible indirect impacts on qualifying species associated with Ramsar / SPA e.g. through loss of functionally linked land and collision risk with a bridge. Directly affects functionally linked land, 4 local wildlife sites and 3 areas of ancient woodland	North of River Thames – Directly affects functionally linked land and 3 local wildlife sites Crossing - Direct effect on local wildlife site. Possible impact on qualifying species associated with Ramsar / SPA e.g. through loss of functionally linked land ESL – Direct loss of habitat from and fragmentation of the woodland within the Great Crabbles Wood SSSI. Direct loss of 2 areas of ancient woodland and Court Wood LWS

Topic	Route 1 (Option A)	Route 3 (Option C) – Bored Tunnel / Eastern Southern Link (ESL)
Water Environment	Affects Mardyke as a result of multiple crossings. Direct effect on Thames recommended Marine Conservation Zone (rMCZ) with a bridge	North of River Thames - Affects Mardyke floodplain Crossing – No significant effect with bored tunnel ESL – No significant effect
Air Quality	80 month construction period – air quality likely to worsen during this period and there would be additional exceedances of EU standards for NO_2 There would be worsening of air quality at some properties compared with the Without Scheme situation, including new exceedances of EU standards for NO_2	North of River Thames – All properties predicted to exceed or are at risk of exceeding the AQSO adjacent to the A282 would experience an improvement in air quality compared to the Without Scheme situation. Properties within the vicinity of route 3 would not experience exceedances as predicted to be well within EU limits in the With Scheme scenario.
Noise	Small overall noise disbenefit compared with Without Scheme scenario. There would be greater effects for a bridge than a tunnel once operational	North of River Thames – Overall noise benefit with route 3 compared with the Without Scheme scenario. Properties within the vicinity of the route would experience an increase in noise as a result of new traffic or increases in traffic on some existing roads, this would be offset by reductions in traffic on other roads, e.g. A282 and the A2 Crossing – Reduced effects for a tunnel than a bridge once operational ESL – Route 3 has more of a benefit with the WSL compared to the ESL
Community Facilities	There could be direct effects on small areas of Mardyke Woods and Davy Down Riverside Park, footpaths, local cycle routes and Sustrans National Cycle Route Networks and a small area of Open Access Land. The existing Queen Elizabeth II cycle pick up point would need to be relocated further north	North of River Thames – Direct effect on an area of Open Access Land and the westernmost edge of Orsett Golf Course, footpaths, bridleways and local cycle routes Crossing – Unlikely to be any direct effects ESL – Direct effect on Great Crabbies Wood, The Warren Wood and Cole Wood (the latter two forming part of Court Wood LWS), footpaths, a Sustrans National Cycle Network route, a local cycle route and a local trail are all potentially affected.

Table 5.2.1 – Environmental Appraisal Results presented by HE

4.2.2 The Lower Thames Crossing environmental appraisal concludes that: -

"on the basis of the appraisal results and subsequent advice from Counsel (**not appended to Volume 6**) *it was concluded that of the three crossing types under consideration, a bored tunnel, both at [Option] A and [Option] C would be the least damaging options in terms of impacts on European Sites. However, a crossing at [Option] A would perform poorly against a number of the scheme objectives* (**no reference to these – but presume this is referring to DfT's Transport Business Case Guidance and Summary Business Case**) *and could therefore not be taken forward and be considered a viable alternative."*

4.2.3 However based purely on the findings of the environmental appraisal process undertaken, it is clear that for all environmental topics other than air quality and noise, Route 1 / Option A could be considered to be the preferred option, or at the very least a credible and real alternative to be given significant weight, particularly in terms of Habitats Regulations Assessment, for example, as described below.

4.3 Biodiversity – Habitats Regulations Assessment

4.3.1 The Habitats Directive is implemented in England and Wales by the Conservation of Habitats and Species Regulations, 2010. Unless the competent authority of a Member State, having regard to the conservation objectives for which an EU nature conservation site is designated, is able clearly to ascertain that a plan or project will not adversely affect the integrity of the site, it may not grant consent for that project. The standard of evidence is extremely high to make a finding of no significant effects; there must be no reasonable scientific doubt as to the absence of such an effect.

4.3.2 If the Competent Authority wishes still to authorise a project in the knowledge that there will be significant effects on the integrity of a European site, then they must demonstrate that there are Imperative Reasons of Over-riding Public Importance (IROPI) why the project should go ahead, and that there are no reasonable alternative solutions. There is no statutory definition of alternative solutions, but this is interpreted as other solutions that could achieve the objectives of the plan or project. Hence, a "do nothing" option would not need to be considered.

4.3.3 Highways England's HRA Screening Matrix for the long list of options identified a likelihood of impact on the Thames Estuary and Marshes SPA and Ramsar, but goes no further than identifying that the risk exists (associated with Options A and C, but not Option C variant) and that this site should be screened in for Habitats Regulations Assessment. No further development of this assessment has been provided. This is in line with DMRB guidance for work at this stage, but it should be noted that the DMRB guidance on HRA has not recently been updated in light of relevant case law.

4.3.4 It is likely (though not certain without further analysis) that Option C (which could have direct impacts on the SAC) would have a greater chance of a significant effect on the integrity of the Thames Estuary and Marshes SPA and Ramsar than Option A (which lies outside the SAC and would not require any direct land take from the European site.) Option C also has a greater risk of significant impact on the SAC than Option C variant, which is 12km away, although C variant has a potential for indirect impacts on North Downs Woodland SAC which is not affected by the other options.

4.3.5 In a situation where a significant effect on the European site cannot be ruled out, the scheme proponent should consider whether there are other ways of achieving the scheme objectives which avoid or reduce the nature conservation impact (the alternatives test). Thus in proposing Option C as the preferred route at this stage, Highways England failed to fully appreciate the Habitats Regulations Assessment issues associated with this choice. Options A and C variant would fulfill the broad objectives of the scheme (albeit that they may perform more poorly on *some* criteria than Highways England's preferred scheme). Therefore the preferred scheme potentially could not pass the "alternatives" test of the Habitats Regulations Assessment. This would pose a significant risk to the possibility of consenting the scheme and should be addressed in more detail at this early stage in scheme development. In order to

reject Option A, for example, as a reasonable alternative it would need to fail to meet one or more of the scheme objectives, not just fail to meet them as well as Option C.

4.3.6 Any such failure to meet scheme objectives for Option A is not clearly demonstrated in the Scheme Assessment Report, and any assertion from Highways England that Option A fails to meet the scheme objectives would be undermined by the re-introduction of Option A into the consultation.

4.3.7 Whilst it is early in the scheme development process to undertake detailed Habitats Regulations Assessment analysis it needs to be recognised that, without further analysis of the likely significance of impacts of the different options on European sites, it is not possible to identify a preferred option. Making assumptions at this stage about the likely level of impact on nature conservation interests could lead to selecting a preferred option that, after further scheme development, proves to be impossible to consent. In the Scheme Assessment Report, Highways England selected Option C as the preferred scheme, and indicated that it was doing so on the basis of a balanced view of economic, technical, environmental and social factors. This analysis must however, have failed to include the HRA issue, since insufficient information was provided to make a distinction between options on this issue. In bringing Option A back into consideration, Highways England will have the same difficulty in making a valid, balanced comparison between options until further work has been carried out to fully understand the impact on the Thames Estuary and Marshes SPA and Ramsar.

4.4 Health Impact Assessment (HIA)

4.4.1 DfT and Highways England have a clearly defined set of key objectives for this scheme. One of which is titled 'Community and Environment', with the objective to minimise adverse impacts on health and the environment. There is no evidence of health being effectively considered at this stage.

4.4.2 A preliminary HIA would normally be undertaken for the preferred option as a supporting technical document for the consultation process as part of a DCO application. However even at this options appraisal stage it would have been useful to consider the scope of a HIA and provide an overview of the determinants of health and a summary of those potentially impacted on by the various options, such as that outlined in Table 5.4.2.

Table 5.4.2 Sample scoping for HIA – Lower Thames Crossing

Determinant of Health	Construction	Operation
Housing and quality design	N/A	N/A
Access to healthcare services / social	N/A – covered under accessibility / active travel	N/A – covered under accessibility / active travel
Access to open space / nature	In – Link with Biodiversity / Community	In – Link with Biodiversity / Community
Air Quality	In	In
Noise	In	In
Accessibility / Active Travel	In	In
Crime reduction / community safety	Road Traffic Safety	Road Traffic Safety
Access to healthy food	N/A	N/A
Access to work / training	In	In
Social cohesion and lifetime neighbourhoods	N/A	In

4.4.3 It is worth considering a scoping and consultation exercise at this stage. A preliminary assessment of the health impact of the Lower Thames Crossing options could then be undertaken based on the existing reports. This would allow effective consideration of potential health impacts alongside economic and environmental findings.

4.5 Listed Buildings & Archaeology

4.5.1 Route 3 north of the Thames, could directly affect two Grade II listed buildings and affect the setting of a Grade I listed building near the M25 during construction. There could be direct physical impact to the scheduled area of Orsett cropmark, as well as adverse effects on non-designated archaeological remains. Further engagement with Essex County Council would be required to effectively scope and cost the level of intrusive investigations (trenching) that would be required along the route.

4.5.2 The Eastern Southern link would also affect the setting of Grade II* and Grade II listed buildings but the exact number involved is not provided in the report. There are also potential setting effects on the Shorne Conservation Area. The appraisal report also states that construction excavations may have a physical impact on non-designated archaeological remains and experience from other developments in the area suggested such finds would be a strong possibility. Again, scope and cost implications have not been covered at this stage.

4.6 Landscape

4.6.1 Route 3 North of the Thames is a new road corridor and therefore would affect the existing landscape character of this Green Belt area between East and West Tilbury.

4.6.2 The Eastern Southern Link has a physical impact on the Kent Downs AONB due to new transport infrastructure within it, together with loss of ancient woodland that forms part of the existing landscape character. The implications of this loss are not outlined in the Environmental Appraisal document.

4.7 Air Quality and Noise

4.7.1 Only with respect to air quality and noise impacts does the Environmental Appraisal conclude that Route 3 is preferable to Route 1. Route 1 Air quality modelling clearly indicates a worsening of air quality for receptors along the A282 in Dartford. There are also additional properties along Route 1 predicted to exceed noise levels of 70dB. However, the comparative implications of noise and air quality worsening for Route 1 compared to new air quality and noise receptors along Route 3 were not effectively considered.

4.7.2 HE is comparing existing air quality / noise levels near Route 1, (where there are already a significant number of monitored exceedences of nitrogen dioxide (NO2) around the Dartford area together with high noise levels), with those associated with Route 3, effectively a new transport corridor in Green Belt. The assessment of Route 3 does recognise that attracting traffic away from the existing M25 crossing at Dartford would improve air quality and noise for some receptors along the existing route, but the relative improvement would be small, particularly given that only some 7% of traffic is diverted from that route in the long term.

4.8 Environmental Impacts Summary

4.8.1 DfT and Highways England have a clearly defined set of key objectives for this scheme, one of which is titled ‘Community and Environment’, with the objective to minimise adverse impacts on health and the environment. Volume 6: Environmental Appraisal of the Lower Thames Crossing, provides a WebTAG Environmental Impact Appraisal of the shortlisted route options together with a summary of key stakeholder engagement undertaken as part of this process. The findings of this report or any consideration of health impacts do not however appear to form part of the Summary Business Case.

4.8.2 It would therefore appear that the environmental harm that could be caused by the scheme has not been fully assessed or quantified, (including impacts on health and amenity), and it has not been demonstrated that these will be out-weighed by any predicted economic or transport benefits.

5 Strategic Impact Appraisal

5.1 Introduction

5.1.1 Section 2 of the Summary Business Case presented by Highways England as part of the Consultation sets out the strategic need for the scheme. The Strategic Case identifies the historic issues relating to congestion in the Dartford Crossing area and reiterates that a new Lower Thames Crossing was included in the National Infrastructure Plan as one of the Government's priority projects for UK infrastructure. It also notes that the *"National Policy Statement for National Networks (NPSNN) recognises the critical need to improve the national networks to address road congestion to enable safe and reliable journeys and to provide a transport network that is capable of stimulating and supporting economic growth"*.

5.1.2 In the absence of any spatial specificity in the NN-NPS or in Highways England's Delivery Plan, the outcome of this consultation would therefore have the effect of establishing a national policy position in favour of this specific scheme without full and proper justification.

5.1.3 No consideration has been given to the integration of alternative transport modes within the scheme, or the way in which the scheme could support the sustainable travel and land use integration objectives, as required by the National Planning Policy Framework, and the National Networks-National Policy Statement.

5.1.4 It is anticipated that Highways England will apply for Compulsory Acquisition powers with any subsequent DCO application. This introduces additional requirements for Highways England to demonstrate a compelling case for the chosen route, for which the consideration of all potential alternatives is inherent, and therefore it is considered than the uncertainty contained within the appraisal information as outlined in this report is not sufficient to meet the tests for Compulsory Acquisition.

5.2 Impact on Committed A13 Scheme

5.2.1 Plans to upgrade the A13 to dual 3 lane standard between the A1014 and A128 are well advanced and a formal funding decision is awaited. It is not clear whether HE has taken this into account, or whether the preferred scheme will have any impact on its delivery. This upgrade is a priority scheme for the South East LEP and there is a potential risk that funding opportunities for the A13 will be missed if decisions are delayed pending a decision on LTC.

5.3 Broader Impact on Thurrock's Strategic Growth Plan

5.3.1 Whilst the need for a solution to relieve the congestion of the Dartford Crossing is recognised in National Policy terms, it appears that little consideration of relevant local development plans has been given in the Strategic Case; and moreover in the appraisal of the route options. With respect to this scheme specifically, consideration of local development plans is fundamental in deducing how this new highway might *"open up new opportunities for investment, regeneration and housing and would enable local businesses to grow and employ more people".*

5.3.2 It is not evident that any spatial planning or access considerations have gone into the route selection process, particularly with respect to the planned growth in, and location of jobs in Thurrock. HE state that the routes have *'the potential to unlock opportunities for housing and jobs'* (4.3.2, Vol 7), but this has not been demonstrated in any spatial planning context.

5.3.3 In the earlier route options assessment process, Route B was rejected due to 'limited public support, the potential impact on local development plans and limited transport benefits'. (SAR Vol 1, Exec Summary, 3.1.4)

5.3.4 However, the HE preferred scheme may also impact on Thurrock's local development plans by potentially affecting the delivery of the A13 widening which has been designed to support economic growth in Thurrock and beyond; as well as severing and blighting areas of land to the north of the river Thames from the A1089 corridor through to East Tilbury, and north of the A13. Nor does it adequately address the impact on potential development in terms of access and operation.

5.3.5 The preferred scheme is therefore potentially in conflict with Thurrock's strategic growth plan.

5.4 Impact on the Strategic Road Network

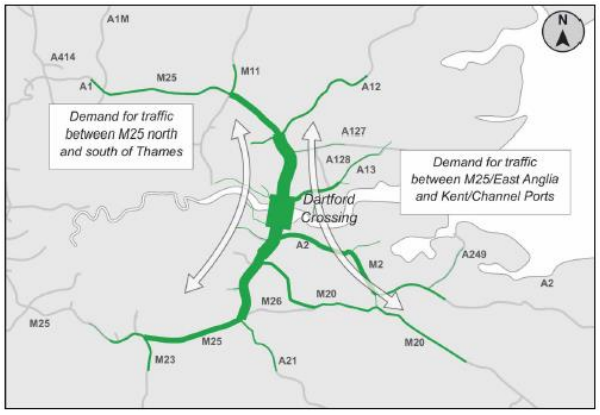
5.4.1 HE has used traffic modelling to assess the impacts and benefits of the proposals. It is evident that increasing the capacity for river crossing traffic in any location will potentially support economic growth, which is one of the core objectives of the scheme.

5.4.2 However, in its own analysis, HE reports that the proportion of users of Route 1 (Location A) which would provide direct relief to the existing crossing (a core objective) is significantly higher than that for Routes 2, 3 and 4 (the Location C routes).

'The main users of Routes 2, 3 and 4 are people travelling between Kent/ Channel Ports and the M25/ East Anglia and that there is minimal diversion of northbound and southbound traffic to the new crossing from the M25.' , Para 4.5.8, SAR Vol 5.

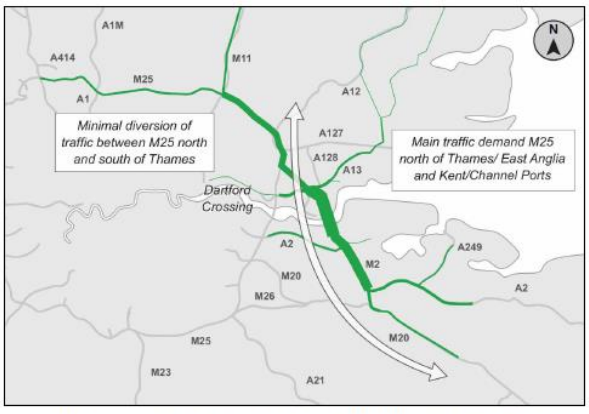
The effectiveness of Location C in relieving pressure on the Dartford Crossing will therefore be significantly lower than for Location A, even if it fulfils other strategic transport or economic objectives.

5.4.3 HE's flow analysis shows that the two location options A and C would fulfil a substantially different strategic role. Option A would provide direct relief and increased capacity for the M25 corridor across the River Thames at Dartford, and increase the resilience of the wider network. Option C would fulfil this function much less effectively, whilst providing a new and more attractive route for traffic between Kent and the Channel ports, and destinations to the north of the River Thames. Figures 4.3 and 4.4 of SAR Vol 5 show the origins and destinations of the traffic using each route and clearly demonstrate the different functions of the two options.



Green shows origins and destinations of traffic using the Dartford Crossing AM peak 2041

FIGURE 4.3 - PREDICTED USERS OF ROUTE 1



Green shows origins and destinations of traffic using the new LTC crossing AM peak 2041

FIGURE 4.4 - PREDICTED USERS OF ROUTE 2, 3 AND 4

5.4.4 The supporting information includes a "resilience" test concerning the implications of a partial closure of the northbound Dartford Crossing (SAR Volume 5, para 4.9.8). The overall traffic flow reductions as a result of such a closure are greater for location C than location A, showing that location A (route 1) actually satisfies the resilience test more effectively. This demonstrates the interdependencies between the existing and proposed location C crossing

(in the event of one of the frequent closures of the Dartford crossing). Once the new crossing is open, combined traffic levels crossing using both crossings will increase from 140,000 a day to 240,000 a day total by 2041. There is no detailed analysis or evidence of the impacts of the frequent closure of the existing crossing and the diversion of traffic; indeed it may cause worse community and environmental problems on the A2 and A13 when the diverting traffic hits bottlenecks.