

# Lower Thames Crossing

## 9.190 Post-event submissions, including written submission of oral comments, for ISH13

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# 1 Introduction

Please note: this document contains National Highways' (the Applicant's) oral summary of evidence and post-hearing comments on submissions made by others at Issue Specific Hearing 13 (ISH13) held on 27 November 2023.

Where the comment is a post-hearing comment submitted by the Applicant, this is indicated. This document uses the headings for each item in the agenda published for ISH13 [[EV-087A](#)] by the Examining Authority.

## 1.1 Welcome, introductions, arrangements for the Hearing

- 1.1.1 National Highways (the Applicant), which is promoting the A122 Lower Thames Crossing (the Project), was represented at Issue Specific Hearing 13 (ISH13) by Mr Andrew Tait KC (AT).
- 1.1.2 The following persons were also introduced to the Examining Authority (ExA):
  - a. Mustafa Latif-Aramesh, Partner, BDB Pitmans (MLA)
  - b. Dr Tim Wright, Head of Consents, Lower Thames Crossing (TW)
  - c. Prof Helen Bowkett, Transport Modelling and Economic Appraisal Lead, Lower Thames project (HB)
  - d. Graham Stevenson, Transport Planning Lead, Lower Thames Crossing (GS)

## 2 Purpose of the Issue Specific Hearing

2.1.1 The Applicant made no submissions on this agenda item.

## 3 Final Positions on Port Access and Blue Bell Hill

### 3.1 Orsett Cock

**Agenda Item 3(a)(i) With reference to [REP5-084], to what extent were the inputs into the latest VISSIM modelling (version 3.6) agreed beforehand?**

- 3.1.1 The ExA summarised the previous traffic modelling submissions since ISH10 as follows:
- a. A joint workshop was held to discuss the development of the Orsett Cock VISSIM model
  - b. Changes were made to the model by the Applicant to produce the version 3.6 model, submitted at Deadline 6a
  - c. The version 3.6 model incorporated changes requested by Thurrock Council (TC), with the exception of the position preferred by TC with regard to driver behaviour, and the weave length.
- 3.1.2 TW confirmed that the ExA's characterisation of the chronology of events in relation to VISSIM modelling was correct. TW noted that there were three matters of disagreement relating to the further VISSIM model of Orsett Cock junction to be prepared as set out in the Joint Position Statement: Orsett Cock Junction [REP5-084].
- 3.1.3 Firstly, driver behaviour. Thurrock Council (TC) proposed that the driver behaviour be characterised as "urban(motorised)". The Applicant did not agree and maintains that the "urban(merge)" behaviour is appropriate.
- 3.1.4 Secondly, design of the merge between traffic coming off the A13 onto the Orsett Cock roundabout, and the traffic coming off the A122 Lower Thames Crossing onto the Orsett Cock roundabout. TW noted that TC represented that merge should be 90m, however, the Applicant has identified in localised traffic modelling that it should be approximately 200m. TW noted that the Applicant had received the 3.6T model from TC in the evening of Friday 24 November, and so had not completed a full review. However, it is the Applicant's understanding that the longer merge had been included within the 3.6T model prepared by TC.
- 3.1.5 Finally, TW noted that there had not been an absolute conclusion reached in the discussion on the use of vehicle activated signal timings versus fixed timing signals. TW clarified for the ExA that the Applicant considered that, given the nature of the interchange, fixed timing signals were better suited.

**Agenda Item 3(a)(ii) what does the version 3.6 modelling [REP6A-004 –8] tell us about the likely traffic effects at Orsett Cock?**

- 3.1.6 TW in response to a query by the ExA confirmed that the 200m merge is fully deliverable within the limits of deviation.

- 3.1.7 **Post Hearing Note:** Information demonstrating that the longer merge would be in accordance with the plans is set out in response to Hearing Action Point 1 at Section A.2 of Annex A of this document.
- 3.1.8 TW then went on to discuss driver behaviour. TW, in rebuttal to the assertion from TC that a different driver behaviour had been used in the ‘Do Minimum’ and ‘Do Something’ scenarios, confirmed that the Applicant used the same driver behaviour in both scenarios.
- 3.1.9 TW then proceeded to make a further submission on driver behaviour.
- 3.1.10 Driver behaviour characterises how the driver interacts with other drivers on the highway. The urban(motorised) behaviour would characterise a driver who would seek larger gaps in traffic prior to changing lanes or pulling out into traffic. The urban(merge) behaviour would reflect the behaviour of a driver more used to movement in a high traffic situation. The 3.6 model uses urban(merge) behaviour in both the Do Minimum and Do Something model. This is different to the baseline model, where urban(motorised) behaviour was used, but the introduction of the additional lane and the signals in the recent improvements works mean that the more co-operative lane change behaviour associated with the urban(merge) parameters is appropriate. TW noted the result of this behaviour is higher deceleration parameters and shorter safety distances which are common and appropriate coding for links with traffic signals to reflect vehicles accepting smaller gaps for lane change when approaching stop lines.
- 3.1.11 The Applicant submitted that, considering the nature of the highway network in this area, drivers are likely to take full advantage of gaps in traffic, and so the urban merge behaviour would better characterise the local drivers. Typically, a modeller should align the driver behaviour within the model to the behaviour that is seen on site. TW noted this was the same approach used by the teams who undertook the localised traffic modelling, for key junctions modelled for the Silvertown Tunnel, and for junction 30 of the M25.
- 3.1.12 **Post Hearing Note:** Further examples of where different driver parameters have been used in VISSIM, including the urban(merge) behaviour, are provided at Section A.10 of Annex A of this document.
- 3.1.13 TW refuted TC’s position outlined in their Deadline 7 submission that the Applicant accepts there is an unacceptable adverse impact on congestion at Orsett Cock junction, and as a result has inserted a new requirement to mitigate the impact.
- 3.1.14 TW noted that it had always been acknowledged by the Applicant that there would need to be modifications made at Orsett Cock which is why it was included into the Works Plans [\[REP7-038\]](#) and Schedule 1 of the draft Development Consent Order [\[REP7-090\]](#). TW noted that Requirement 18 secures those modifications, but the Applicant does not accept that the effects are unacceptable. Rather, it is the Applicant’s position that there are a series of requirements that deal with a variety of matters which are not considered to be unacceptable but are appropriately handled through a requirement. TC has mistakenly inferred that inclusion of a requirement means the Applicant has accepted there are unacceptable impacts.

### Agenda Item 3(a)(iii) Does the version 3.6 modelling affect the Applicant's earlier work on journey times to/from the Ports?

- 3.1.15 In response to the ExA's query as to whether the outputs of the 3.6 modelling were consistent with the Applicant's expectations, TW confirmed that the 3.6 model is similar to version 1 and version 2 modelling and has not changed the Applicant's position.
- 3.1.16 TW in response to the submissions of TC noted that the Applicant and TC agree that the following factors are fundamental to the behaviour of the model: the lane allocation on the roundabout, and associated allowed movement between lanes, the driver behaviour and the Pegasus crossing. The Applicant does not agree with the characterisation outlined by TC for lane change behaviour. TW detailed the position and how it evolved over time.
- 3.1.17 **Post Hearing Note:** At this juncture, TW spoke to the schematic diagram detailing the nearside or inside lane and the offside or outside lane of Orsett Cock roundabout. This diagram is provided in response the Hearing Action Point 3, at Section A.3 of Annex A of this document. Further information on lane merges, including the diagrams presented at the hearing, are included as Appendix A.2 of Annex A of this document, with a further description of the Applicant's position provided at Section A.5 of the same Annex.
- 3.1.18 In the 'Do Minimum' v1 and v2 models, traffic on the southbound carriageway of the roundabout was allowed in the nearside and middle lanes to leave via the Brentwood Road exit to the south. TC had advised the Applicant that in the 'Do Minimum', they would like traffic taking this exit to be limited only to the nearside lane; the Applicant did so to reach agreement with TC (documented as item 3 in Joint Position Statement: Orsett Cock junction [[REP5-084](#)]). This change was made to the version 3.6 'Do Minimum' model to limit traffic to the nearside lane despite the Applicant considering that it was best to include both the nearside and middle lane which had been reflected in v1 and v2. TW noted this exit would be managed through road markings.
- 3.1.19 TW then spoke to a series of diagrams, initially the diagram provided at page 14 of [[REP6A-006](#)], then to a series of diagrams showing different lane allocations, including Figure 3.3 of TC's submission Thurrock Council Comments on Traffic Modelling (D6A) [[REP6a-013](#)]. In terms of the TC characterisation of the lane allocation on the roundabout, whereby TC state that the Applicant allows traffic from all three lanes on the roundabout to exit onto the south Brentwood Road, the Applicant disagrees, and its model does not allow this to happen, and this manoeuvre is restricted to the two outer lanes – the middle lane and the offside lane. In the Applicant's model it is possible for vehicles to change lanes on the roundabout from the offside lane into the middle lane that can move onto Brentwood Road. In reference to TC's described position that the Project takes traffic from all three lanes and allows it all to leave the roundabout concurrently to exit via Brentwood Road South, TW confirmed the Applicant's view that this is not appropriate and is not what the Applicant's model shows.
- 3.1.20 TW explained that, in the Applicant's model, traffic from the nearside lane can only exit out onto the A1013 east; and that traffic coming off onto Brentwood Road south is travelling down the offside lane or middle lane. However, a vehicle can make a movement from the offside lane into the middle lane.



- 3.1.21 TW noted what was provided in the v1 and v2 Do Minimum scenarios, and represented in the 3.6T model, is traffic coming down the nearside lane and the middle lane to come off Brentwood Road, and it is not possible to get from the offside lane to Brentwood Road.
- 3.1.22 TW emphasised the importance of this as the impacts of the restrictions proposed by TC go beyond the performance of traffic exiting the roundabout. Movements are restricted for other people right the way across the roundabout attempting to come through. TW explained how if a vehicle was to come from the A13 eastbound and sought to leave by Brentwood Road to the south, the natural movement would be to take the offside lane, travel around the roundabout and then move to the middle lane of the roundabout, changing carriageway as they travel southbound over the A13, to get into the correct lane to leave the Brentwood Road south connection. Such a movement is prohibited by the coding in TC's 3.6T model which the Applicant considers generates further consequences on the performance of the roundabout. The Applicant submits that the manoeuvre is safe and realistic, and to prohibit that movement in the way TC have proposed in their 3.6 model substantially restricts how traffic can use the roundabout, in a way that is not realistic. Therefore, the Applicant disagrees with the proposition on lane allocations put forward by TC.
- 3.1.23 TW then responded to the assertion by TC that the 'Do Minimum' scenario is not realistic because as highway authority, it would put in a Pegasus crossing. The Applicant submitted that the 'Do Minimum' scenario should represent the condition of the network as it currently exists. TW noted that the Applicant is not aware of any firm plans for a crossing to be delivered to Rectory Road, and therefore, does not consider it appropriate to include it in the Do Minimum model. However, it is included in the 'Do Something' model as it is included in the Project's programme of works.
- 3.1.24 TW rebutted TC's assertion that there were other changes between the version 2 model and the version 3.6 model, as had been set out in Table B3.1 of Thurrock Council Comments on Traffic Modelling (D6A) [\[REP6a-013\]](#). The Applicant has not changed model parameters between the version 1 and version 2 model submissions and version 3.6. The only change that has been made is the addition of the Rectory Road Pegasus crossing, and the modification to the Do Minimum lane allocation as set out below.
- 3.1.25 As noted previously, lane allocation on the circulatory was amended in the Do Minimum model to reduce the areas of disagreement between the Applicant and TC. Noting that this change requested by TC led to worse performance in the version 3.6 Do Minimum than in earlier versions of the model, in terms of the performance of the Do Minimum model, version 2 would better reflect the reality of the Do Minimum scenario and that appears to generally be agreed upon between the Applicant and TC.
- 3.1.26 TW then detailed what the 3.6 modelling reveals in terms of journey times between the Do Minimum and Do Something scenarios for Orsett Cock. TW noted that the specific journey times were not on hand and will be provided in writing as part of the Deadline 8 submissions.
- 3.1.27 TW submitted on the 2030 position and the relative delays, with reference to the plot set out in the Applicant's Local Traffic Modelling, Appendix C Forecasting Report in relation to Orsett Cock. TW spoke to plates 4.3 and 4.8 of the

Forecasting Report [\[REP6A-006\]](#). These show the relative delays to traffic on the approaches to Orsett Cock roundabout. TW noted it was important to understand the relative delay is relative to the total time spent travelling but can be used as a proxy for queues. It can be seen that there are relative delays in both the Do Minimum and Do Something models, but in specific reference to the Do Something scenario, the extent of road on which these relative delays are observed is limited, and as shown in Table 4.2 and 4.3 of the same report, so are associated queues.

- 3.1.28 These queues, which it should be remembered are only present to this extent during the peak hours, are limited in their physical extent and so do not present a safety concern.
- 3.1.29 While there is increased traffic on the roundabout which could lead to a concern about severance due to the current uncontrolled crossings, the proposed traffic lights identified in the Localised Traffic Modelling Appendix C - Orsett Cock Forecasting report [\[REP6A-006\]](#), secured by Requirement 18, along with provision on Rectory Road secured through Design Principle S11.14 [\[REP7-140\]](#), would provide for non-motorised users, enhancing the current provision. TW noted there is also betterment in the 2030 PM at Rectory Road and the A128; while there are queues on the combined link from the A13 and the Project leading to the roundabout, this traffic is contained to slip roads and therefore the Applicant does not consider there to be a safety concern at the location.
- 3.1.30 TW explained that the Localised Traffic Modelling Appendix C - Orsett Cock Forecasting report [\[REP6A-006\]](#) demonstrates betterment in terms of traffic, but the benefits go beyond that given the physical provision at Rectory Road for walkers, cyclists and horse riders.
- 3.1.31 TW further noted that there would be no queuing onto the main line on the A13; however, TW submitted that if that was to occur, the Applicant does not consider it to result in an unacceptable safety risk (as detailed in previous submissions (the Wider Network Impacts Position Paper [\[REP6-092\]](#)). TW submitted there is a reduction in journey speeds along the A13 itself, which is an impact more apparent in the Lower Thames Area Model (LTAM) than the VISSIM model. Overall, however, the VISSIM model clearly sets out an effect in terms of delay on the roundabout which is not severe.
- 3.1.32 TW then detailed the delays in 2045 at Orsett Cock roundabout. There are more substantial relative delays on the approaches to the roundabout, which occur between the Do Minimum and Do Something scenarios with some changes. Queues are increased on the A128 in the AM, and on the on the approach from the A13 eastbound and the Project road in the PM. This impact has always been acknowledged by the Applicant, is contained within the slip roads, is only present to this extent during the peak and reduces in the inter-peak periods. TW noted the modelling does not show queuing back onto the A13 or Project mainlines. Therefore, the Applicant considers the increase in queues to be reflective of the time of day and the relatively conservative model assumptions.
- 3.1.33 Overall the Applicant does not consider there to be severe effects on the Orsett Cock roundabout at 2045.

- 3.1.34 TW noted that it was important to consider the Applicant's position overall, that while there would be delays and queues at this junction, albeit at 2030 there is a substantial level of betterment between the Do Minimum and Do Something. This betterment needs to be seen in the context of the overall flows across the area. The Applicant considers this takes one towards the use of the strategic model in understanding the overall impacts on journey times and flows.
- 3.1.35 The purpose of transport modelling is to consider how travel across the area would change as a result of an intervention, to determine the performance of the highway network, and to allow for the assessment of adverse impacts and benefits and disbenefits. The key question that needs to be considered is whether the differing models lead to uncertainty in the decision that needs to be made, and if so, what the consequences of such uncertainty might be.
- 3.1.36 While there has been discussion about the differing assessments arising from the Orsett Cock modelling exercise, adverse impact disbenefits have been identified across the network through the use of the LTAM. The Localised Modelling, including that at Orsett Cock, Pitsea, Five Bells, and Manorway all identify similar impacts, albeit the different models represent these differently.
- 3.1.37 Specifically in relation to Orsett Cock, information has been provided which includes the delays at Orsett Cock taken from VISSIM model 3.6 and inserts them into the LTAM. This exercise demonstrated that the divergence between the VISSIM and the LTAM model-runs at this location did not lead to a significant change in the wider movements across the traffic model. While there are differences between the core LTAM model and the manipulated LTAM model submitted as Appendix N of Localised Traffic Modelling [[REP6A-004](#)], they are relatively limited in scale. That indicates that any uncertainty over variation in forecast outcomes based on the different model outputs relating to the performance function of Orsett Cock roundabout would not lead to a fundamental change in the way traffic flows, even including onto the next locations on the network, Manorway Roundabout or the M25 junction 30. Therefore, the VISSIM model does not lead one to make a different conclusion.
- 3.1.38 This demonstrates that a decision made in using LTAM for its purpose as a tool to inform decision making would be robust, as the v3.6 VISSIM model output, as included in the LTAM model, does not lead to fundamentally different conclusions, rather it leads to the same overall conclusion being made.
- 3.1.39 Quite reasonably, no party has asked within the Examination for localised traffic modelling of the beneficial impacts, because there must be proportionality in the work undertaken, but the focus on the adverse impacts should not mean that the balance of considerations across the network loses sight of the beneficial impacts.
- 3.1.40 TW in response to TC's suggestion that the Applicant seeks for LTAM to be the sole consideration, noted that the assessment of the variety of environmental consequences and benefits requires the use of a strategic transport model. TW submitted that those considerations cannot be informed by a localised transport model. However, that does not make the VISSIM model irrelevant. TW highlighted that VISSIM is informative regarding the operation of a single junction, that it has informed the discussion for Requirement 18, and that localised traffic modelling will continue to inform the detailed design of the

Project. So, while LTAM is not the sole consideration, the strategic model remains the primary basis for determination.

- 3.1.41 In response to IP submissions on relevant considerations generally, TW noted that the broader consideration of the Project needs to consider the benefits of the Project. Such benefits are reflected in economic analysis and journey times, and there is also a requirement for consideration of environmental assessment, all of which is reliant on the LTAM.
- 3.1.42 To conclude, it is the Applicant's position that there is nothing in the localised traffic modelling to cast doubt over the LTAM in terms of reliability or robustness. AT bookended the submission by noting that [\[REP6A-004\]](#) details the history of provision of material about VISSIM at A.5.3 and 5.4. AT noted that the provision of that material to TC preceded the submission of the application.
- 3.1.43 The exercise that the Applicant has undertaken for Orsett Cock provides a focus for consideration of the strategic and localised traffic modelling, and it has been shown that while there is useful information from VISSIM, LTAM remains the only tool for the broader decision. The economic analysis and the environmental assessment is reliant on LTAM, and nothing discussed in the modelling has cast shadow on LTAM; that is why the Applicant's position is that LTAM is sufficiently robust.
- 3.1.44 TW acknowledged the ExA is seeking to understand journey time benefits that are represented in the manipulated LTAM run. TW noted that because the manipulated LTAM run does not account for a balanced assessment of delays at each junction, it does not provide a suitable tool for this assessment, rather a thought experiment test in consideration of what the model would show, and as such is an unbalanced model as has been set out previously.
- 3.1.45 Nevertheless, even using the manipulated LTAM that arbitrarily includes the delays at Orsett Cock, there remain substantial journey time benefits to traffic to and from the Ports as shown in Appendix N. Narrowing down the question, by eliminating all journey times which still see a reduction in journey times as a result of the Project, focussing on 2030, and only looking at where journey time forecasts increase:
- a. On journeys specifically between the Port of Tilbury and London Gateway which in the core scenario increase in duration by between one and four minutes, these increase by approximately two minutes to between three and six minutes additional time overall, on baseline journey times of approximately 13 to 14 minutes.
  - b. From Port of Tilbury to Basildon, which in the core scenario increases in duration by one minute in the PM, sees a journey time that is forecast to increase by a little less than 20 seconds.
- 3.1.46 Referencing back to the principle of this exercise, which the Applicant considers to be unbalanced due to the approach, the Applicant does not consider this to be a reasonable, or even worst-case, forecast because it takes all of the delays at Orsett Cock and implements them without considering the re-balancing of flows on the network. However, even accounting for that, the actual effect is relatively limited and the Project will still deliver substantial benefits to the ports.

- 3.1.47 The Applicant agreed to provide an update of journey times represented in Annex A of Comments on WRs Appendix E - Ports [\[REP2-050\]](#). **Post hearing note:** This is provided at Annex A.7 of this document.
- 3.1.48 TW agreed with TC that there is a trap to fall into comparing the manipulated LTAM Do Something to the Do Minimum. It is the Applicant's view that the manipulated LTAM provides a sense check on the sensitivity of the modelling to those variables but it is neither a robust nor appropriate alternative.

### **Agenda Item 3(iv) What, if any, impact does the version 3.6 modelling have on the Scheme's BCR and Environmental Assessments?**

- 3.1.49 The Applicant's position is that it is not appropriate to use the manipulated LTAM to support assessment of a benefit-cost ratio (BCR) or an environmental assessment. The Applicant has undertaken a high level review of how these delays would affect the BCR but does not accept the validity of the exercise undertaken by TC.
- 3.1.50 The review of TC's assessment revealed a number of arithmetic errors and further issues presented in the calculations. These issues will be detailed further in the Deadline 8 submissions, however, TW provided a general overview of them.
- 3.1.51 **Post Hearing Note:** Further detail on the assessments is provided in Section A.8 of Annex A of this document.
- 3.1.52 Firstly, in two locations, TC has effectively double-counted the disbenefits in two locations by multiplying peak hour figures by two before applying the combined expansion and annualisation factor that was already included from factor to go from the peak hour to peak period; secondly by adding together the values for 2030 and 2045 but not dividing by two when calculating an annual average value. The resulting effect being a quadrupling of disbenefit.
- 3.1.53 The second issue is that TC should have compared the difference in time between a VISSIM 'Do Minimum' and 'Do Something' model against the difference in times between a SATURN 'Do Minimum' and 'Do Something',
- 3.1.54 To summarise, the Applicant does not agree with the £100 million disbenefit assessed by TC. Rather, it is submitted it will actually be a £15.8 million disbenefit against a net journey-time savings benefit of over £2 billion as reported in Table 11.2, Appendix D of the Combined Modelling Appraisal Report detailed at [\[APP-526\]](#). TW concluded that this does not lead to a discernible change in the BCR which would remain at 1.22.
- 3.1.55 TW concluded the Applicant submissions but responded to TC's further submissions on the convergence of VISSIM and LTAM. Overall, including the application of delays at a single junction would lead to an unbalanced model which would not represent likely effects. Rather it would represent an unreasonable worst case because of the focus on certain local movements without accounting for the effect on the overall highways network.

### **Agenda Item 3(v) How do the revised LTAM outputs differ from those presented in the Transport Assessment and what are the potential impacts at Orsett Village?**

- 3.1.56 TW provided an overview of the sensitivity testing undertaken in relation to Orsett Cock village and responded to some preliminary points raised by the IPs on impacts on Orsett Cock village. As a point of clarity it is not traffic from the Project that is displaced into the village, rather traffic going through Orsett village is travelling north-south along the A128. This is the traffic being displaced across to Rectory Road.
- 3.1.57 TW noted that the Applicant had not undertaken a full review of the transport assessment findings in relation to the manipulated LTAM due to the caution that comparing a manipulated Do Something scenario with a standard Do Minimum is not appropriate.
- 3.1.58 In order to understand the impacts, it is necessary to understand what the model is compared to, when determining the effects of the Project. The manipulated LTAM assessments provided to date have been compared to the core LTAM Do Something scenario, however, to compare the manipulated LTAM run incorporating the delays to the core Do Something scenario is unrepresentative, as such a scenario would not account for the unbalanced model effect that would arise because of the delays that would also be seen at Orsett Cock in the VISSIM Do Minimum model.
- 3.1.59 A more appropriate comparison would be to understand how the delays in the Do Minimum affect traffic flows in Orsett village, by preparing a manipulated Do Minimum LTAM run, for comparison purposes. On a direct comparison of the manipulated LTAM with delays, and the Do Something without delays, as presented in Appendix N of Localised Traffic Modelling [REP6A-004], the additional delays at Orsett Cock lead to a reduction in the amount of traffic using the roundabout, and an increase in the number of vehicles choosing instead to travel through Orsett village, using Rectory Road. This was noted by Thurrock Council in their submission at Deadline 6a.
- 3.1.60 However, pursuing the thought exercise of how inclusion of the Do Minimum VISSIM delays into the strategic model would also affect traffic flows through the village, the queues on the approaches to the roundabout in the Do Minimum VISSIM would also lead to changes, and as such it is likely that much of the change in traffic seen in the figures in Appendix N of Localised Traffic Modelling [REP6A-004] relates to the VISSIM model representation of the roundabout, and would be seen in a manipulated Do Minimum scenario. A comparison of the manipulated Do Something scenario with that manipulated Do Minimum would show a much lesser change, and it is highly likely that the beneficial effects arising from the Project, seen in the Core Scenario LTAM modelling, would be repeated in that comparison. It is likely that a substantial proportion of the queuing is a result of the VISSIM modelling, and given the improvements on the A128 and Rectory Road seen in the Do Something model, it is likely that the Project would actually lead to a reduction in the flows through Orsett village.
- 3.1.61 In summary, the Applicant does not accept the submission that there would be increased adverse impacts in Orsett village in the manipulated 'Do Something'; rather, the core scenario shows that there are substantial benefits and where

there are adverse impacts on links in Orsett village they are limited to less than 100 PCUs.

- 3.1.62 TW then commented on the sensitivity analysis. There are sensitivity analyses on Rectory Road in [REP6A-006] which purely focus on the 3.6 Model. The Rectory Road sensitivity analyses submitted in [REP6A-006] show that in both Do Minimum and Do Something in 2030 there are impacts associated with the balance of traffic between the A128 and Rectory Road. If the flows on Rectory Road were reduced to the 2016 flows then there is only a small impact on Orsett Cock. If all traffic is removed from Rectory Road then there is a larger impact on Orsett Cock, especially on the length of queues on Brentwood Road. However, it is not for the Applicant to design a junction that accommodates a scheme for the closure of Rectory Road to all traffic, that is far from certain to be implemented. Any proposed changes to Rectory Road are not sufficiently certain to be included in the network, according to the TAG criteria.

### **Agenda Item vi The Applicant's response to Thurrock Council's 3.6T model run [REP6A-013] will be sought. Are there any significant issues that emerge from this?**

- 3.1.63 TW noted that the Applicant has undertaken a review of the 3.6T model results [REP6A-013], including the video [REP6A-014]. There are a number of questions relating to these submissions. The Applicant had requested a copy of the VISSIM model supporting TC's submissions which was only provided after hours on Friday 24 November 2023, therefore the Applicant had not had the opportunity to review the VISSIM model.
- 3.1.64 Referring specifically to the report, there seem to be some erroneous entries in the results tables, for example in Table 3.4 the average delay in seconds, and the mean maximum queue in metres, are identical for A13 west, Rectory Road, and Stanford Road east. While this may be possible, TW noted that this needed to be checked.
- 3.1.65 The video in particular raises a number of questions.
- 3.1.66 TW noted that there is not a Do Minimum version of the video, and notwithstanding the discussion on Rectory Road, it is likely that a Do Minimum model, with similar behaviours coded in, would also show significant queues. For example, Table 3.3 of the Thurrock Council submission at 6a reports mean maximum queues of 1.3 to 1.4km on Brentwood Road, Rectory Road and Stanford Road in the Do Minimum 3.6T model. TW stated that this is reflective of the behaviour chosen for the model.
- 3.1.67 TW noted that the Applicant considers it paramount that modelling such as this requires a realistic representation of the behaviours that would actually be seen on the road. TW spoke to two screenshots from the video to illustrate key issues the Applicant has identified with the model.
- 3.1.68 In reference to the screengrab timestamped at 19 seconds, TW identified an issue on the western side of the roundabout. TW highlighted the substantial queue of traffic on the A13 EB and A122 off-slip, which are all trying to get into the left-hand lane, partly due to lane allocation and partly due to the extreme caution of moving into the left-hand lane. The vehicles in this instance are stationary, waiting for a gap to move into the left lane, which results in traffic

being backed up on the three lanes for a period of time. The Applicant considers this to be neither realistic nor representative of what would actually occur with the traffic holding back at that location.

- 3.1.69 TW then directed attention to a screenshot timestamped at 47 seconds which shows the Project northbound. TW highlighted a blue car which is trying to merge into the left-hand lane but remains stationary for approximately 10 seconds.
- 3.1.70 Overall, the Applicant submits that the driver behaviour demonstrated in both instances are timid and are not illustrative of a collaborative behaviour where vehicles would typically signal and merge. It is because of this timid behaviour that the impacts on the road network are shown. Therefore, the Applicant considers that TC has chosen a level of cautiousness on the road that is neither representative nor appropriate for the highway in this location.
- 3.1.71 The Applicant will come back further on this point in the Deadline 8 Submissions. **Post hearing note:** The Applicant has provided further commentary in Annex A.5 and Annex A.10 of this document.

### **Agenda Item 3(vii) Whether Requirement 18 of the dDCO is capable of securing the necessary level of mitigation at Orsett Cock or should the approaches set out in the draft Requirements proposed by POTLL [REP6-163] et al be more appropriate**

- 3.1.72 In response to the ExA's query on the timing of implementation of works secured by Requirement 18, TW submitted in respect of the localised traffic modelling identified, that it would be beneficial for the works to be undertaken at the pre-construction stage and delivered for 2030.
- 3.1.73 MLA then detailed the drafting of the requirement as it relates to monitoring and how it is appropriate. MLA noted that Requirement 18 was amended at Deadline 7 ([[REP7-090](#)]), notably the Requirement 18(2)(a) requires that the scheme must be informed by appropriate preconstruction monitoring, therefore the scheme itself would be based on monitoring. MLA noted the amendment was made in response to submissions from the Port of Tilbury London Limited that the measures which the Project must include are those which are reasonably necessary not just to minimise the traffic flows on the roundabout but to optimise the performance of the roundabout beyond reducing the impacts from the Project itself.
- 3.1.74 MLA noted that another key amendment made to Requirement 18 at Deadline 7 was to secure monitoring for operation beyond the delivery of the Project per Requirement 18(3).
- 3.1.75 To summarise, Requirement 18 secures monitoring before the Project is prepared, requires a scheme which not just minimises the traffic impacts of the Project but optimises the roundabout and subsequently secures operational monitoring. MLA directed the ExA to Table 7.1 of [[REP7-190](#)] which details the key differences between the requirement proposed by the Port of Tilbury London Limited and the requirement proposed by the Applicant, and how the Applicant responded to those differences.



- 3.1.76 TW then responded to the ExA's query as to whether a more wide-ranging mitigation scheme for Orsett Cock as proposed by TC would be precluded from the current drafting of Requirement 18. TW submitted that due to TC's proposal being underdeveloped and limited to only a few drawings it would be difficult to determine if the scheme would be deliverable. However, TW emphasised that if the engineering design sat within the environmental and land use controls, the drafting of Requirement 18 would not preclude delivery if it was the appropriate solution.
- 3.1.77 MLA noted that in the spirit of discussion on a collaborative approach it is worth summarising where all parties agree on Requirement 18. MLA submitted that no party considers the wording too restrictive to deliver solutions but the key area of outstanding disagreement revolves around measurable thresholds and objectives for the Project to be approved by the Secretary of State. The Applicant's issue with the wording jointly presented by the IPs is that the language of 'material worsening' does not get the parties any closer to an objective outcome. There has been no definable or certain definition provided for 'material worsening' provided.
- 3.1.78 Rather, what the Applicant has done because of the potential for impacts, is to attempt to define the outcome, i.e the minimisation of delays for traffic on the roundabout, and provide optimisation. The issue is a matter of judgement and what the requirement secures is preconstruction monitoring, consultation with DP World London Gateway, the Port of Tilbury London Limited and TC which enables them to understand what is being proposed and to make representations on that proposal. In turn, the Project is then submitted to the Secretary of State to make a judgement on whether what is proposed does minimise delays and contain what is reasonably necessary to optimise the roundabout.
- 3.1.79 MLA responded to the submissions of the Port of Tilbury London Limited which sought a process for the approval of the Project. MLA noted that as the draft requirement is within Schedule 2, all other paragraphs of Schedule 2, Part 2 apply. MLA highlighted two key paragraphs, firstly paragraph 22 which specifically sets out how consultation is carried out, how regard is had to representations and how that is then presented to the Secretary of State.
- 3.1.80 MLA then noted that Part 2 of Schedule 2 secures via paragraph 21 that the Secretary of State may request information. In response to DP World's concern to ensure that the Secretary of State has sufficient information to make a judgement, MLA noted that the above two mechanisms firstly allow DP World to state in their representations that further information is needed for the Secretary of State to make a decision. This representation would be presented to the Secretary of State who then under paragraph 21 has a mechanism to ensure further information is provided.
- 3.1.81 MLA in response to the submissions of TC emphasised that there is nothing in the requirement that restricts the Project to merely the delivery of signalisation. It has been specifically developed to ensure a number of different appropriate measures could be delivered.
- 3.1.82 MLA noted that while 'optimisation' may be different for different parties, the same argument could be posited for material worsening. In light of that, the

Applicant has attempted to look for wording that is helpful in giving the Secretary of State enough information to make a judgement.

- 3.1.83 MLA highlighted that the drafting of Requirement 18 is substantially based on Requirement 14 of the M25 Junction 28 Order. The approach of providing reasonably practicable measures was endorsed by the Secretary of State. MLA noted that the Applicant has evolved that wording to provide more assurance by reference to ‘reasonably necessary’ measures.
- 3.1.84 MLA then responded to the submissions of Port of Tilbury London Limited and the reference to materially new and materially different. While the phrase materially different is widely used and understood in Environmental Impact Assessment, ‘material worsening’ in respect to traffic impacts does not have the same level of developed understanding or definition. MLA then further reassured the Port of Tilbury London Limited that Requirement 18 was amended to secure operational and preconstruction monitoring and the Applicant considers that providing monitoring over and above that, would duplicate what is already secured through Requirement 14.
- 3.1.85 AT concluded submissions on this agenda item in response to the discussion of a potential summit on Requirement 18, that the Applicant would continue discussions on the Requirement and seek a flexible approach. However, he emphasised that at this juncture for the reasons set out above, the Applicant considers the current drafting to be wholly appropriate and robust.
- 3.1.86 Post-written submissions: These are contained within Annex A and include:
- a. Section A.2: Hearing Action Point 1: Orsett Cock – Additional weave length and General Arrangement Plans
  - b. Section A.3 Hearing Action Point 3: Orsett Cock – roundabout route and lane name convention
  - c. Section A.4 Hearing Action Point 4: Orsett Cock – Roundabout route modelling assumptions
  - d. Section A.5 Hearing Action Point 5: Orsett Cock – Model 3.6T
  - e. Section A.6 Hearing Action Point 7: Thames Freeport (Ports and Thurrock Council): Collaborative development of draft Requirement 18
  - f. Section A.7 Update to Port journey times shown in Comments on WRs Appendix E – Ports [REP2-050] to provide journey times from the “manipulated” LTAM run
  - g. Section A.8 Applicant’s comments on Thurrock Council’s economic appraisal calculations using VISSIM outputs
  - h. Section A.9 National Highways Spatial Planning – applications with forecast impact on Blue Bell Hill corridor
  - i. Section A.10 VISSIM driver behaviour

## 3.2 Agenda Item 3(b) Southern Issues: Bluebell Hill

**Agenda Item 3(b)(I) The Applicant and KCC are to be asked whether a smaller improvement scheme could be implemented at Blue Bell Hill should the Local Large Majors (LLM) scheme fail to come forward?**

- 3.2.1 On the question of whether small-scale mitigation could be delivered at Blue Bell Hill, TW noted the Applicant agrees with KCC that Blue Bell Hill is an integrated scheme and as a result it would not be sensible to bring forward smaller elements in light of what is an issue related to local growth and the local plan.
- 3.2.2 In response to the ExA's query on funding for the development of the scheme, TW noted that the Blue Bell Hill scheme is proposed to develop out of the local plan and address existing issues. TW noted that KCC advised in the hearing that two thirds of the funding for the Outline Business Case is already being provided by the Department for Transport.

## Glossary

Term	Abbreviation	Explanation
<b>A122</b>		The new A122 trunk road to be constructed as part of the Lower Thames Crossing project, including links, as defined in Part 2, Schedule 5 (Classification of Roads) in the draft DCO (Application Document 3.1)
<b>A122 Lower Thames Crossing</b>	<b>Project</b>	A proposed new crossing of the Thames Estuary linking the county of Kent with the county of Essex, at or east of the existing Dartford Crossing.
<b>A122 Lower Thames Crossing/M25 junction</b>		New junction with north-facing slip roads on the M25 between M25 junctions 29 and 30, near North Ockendon.
<b>A13/A1089/A122 Lower Thames Crossing junction</b>		Alteration of the existing junction between the A13 and the A1089, and construction of a new junction between the A122 Lower Thames Crossing and the A13 and A1089, comprising the following link roads: <ul style="list-style-type: none"> <li>• Improved A13 westbound to A122 Lower Thames Crossing southbound</li> <li>• Improved A13 westbound to A122 Lower Thames Crossing northbound</li> <li>• Improved A13 westbound to A1089 southbound</li> <li>• A122 Lower Thames Crossing southbound to improved A13 eastbound and Orsett Cock roundabout</li> <li>• A122 Lower Thames Crossing northbound to improved A13 eastbound and Orsett Cock roundabout</li> <li>• Orsett Cock roundabout to the improved A13 westbound</li> <li>• Improved A13 eastbound to Orsett Cock roundabout</li> <li>• Improved A1089 northbound to A122 Lower Thames Crossing northbound</li> <li>• Improved A1089 northbound to A122 Lower Thames Crossing southbound</li> </ul>
<b>A2</b>		A major road in south-east England, connecting London with the English Channel port of Dover in Kent.
<b>Application Document</b>		In the context of the Project, a document submitted to the Planning Inspectorate as part of the application for development consent.
<b>Construction</b>		Activity on and/or offsite required to implement the Project. The construction phase is considered to commence with the first activity on site (e.g. creation of site access), and ends with demobilisation.
<b>Design Manual for Roads and Bridges</b>	<b>DMRB</b>	A comprehensive manual containing requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, the Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. For the A122 Lower Thames Crossing the Overseeing Organisation is National Highways.
<b>Development Consent Order</b>	<b>DCO</b>	Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.

Term	Abbreviation	Explanation
<b>Development Consent Order application</b>	<b>DCO application</b>	The Project Application Documents, collectively known as the 'DCO application'.
<b>Environmental Statement</b>	<b>ES</b>	A document produced to support an application for development consent that is subject to Environmental Impact Assessment (EIA), which sets out the likely impacts on the environment arising from the proposed development.
<b>Highways England</b>		Former name of National Highways.
<b>M2 junction 1</b>		The M2 will be widened from three lanes to four in both directions through M2 junction 1.
<b>M2/A2/Lower Thames Crossing junction</b>		New junction proposed as part of the Project to the east of Gravesend between the A2 and the new A122 Lower Thames Crossing with connections to the M2.
<b>M25 junction 29</b>		Improvement works to M25 junction 29 and to the M25 north of junction 29. The M25 through junction 29 will be widened from three lanes to four in both directions with hard shoulders.
<b>National Highways</b>		A UK government-owned company with responsibility for managing the motorways and major roads in England. Formerly known as Highways England.
<b>National Planning Policy Framework</b>	<b>NPPF</b>	A framework published in March 2012 by the UK's Department of Communities and Local Government, consolidating previously issued documents called Planning Policy Statements (PPS) and Planning Practice Guidance Notes (PPG) for use in England. The NPPF was updated in February 2019 and again in July 2021 by the Ministry of Housing, Communities and Local Government.
<b>National Policy Statement</b>	<b>NPS</b>	Set out UK government policy on different types of national infrastructure development, including energy, transport, water and waste. There are 12 NPS, providing the framework within which Examining Authorities make their recommendations to the Secretary of State.
<b>National Policy Statement for National Networks</b>	<b>NPSNN</b>	Sets out the need for, and Government's policies to deliver, development of Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for promoters of NSIPs on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.
<b>Nationally Significant Infrastructure Project</b>	<b>NSIP</b>	Major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc that require a development consent under the Planning Act 2008.
<b>North Portal</b>		The North Portal (northern tunnel entrance) would be located to the west of East Tilbury. Emergency access and vehicle turn-around facilities would be provided at the tunnel portal. The tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.
<b>Operation</b>		Describes the operational phase of a completed development and is considered to commence at the end of the construction phase, after demobilisation.

Term	Abbreviation	Explanation
<b>Order Limits</b>		The outermost extent of the Project, indicated on the Plans by a red line. This is the Limit of Land to be Acquired or Used (LLAU) by the Project. This is the area in which the DCO would apply.
<b>Planning Act 2008</b>		The primary legislation that establishes the legal framework for applying for, examining and determining Development Consent Order applications for Nationally Significant Infrastructure Projects.
<b>Project road</b>		The new A122 trunk road, the improved A2 trunk road, and the improved M25 and M2 special roads, as defined in Parts 1 and 2, Schedule 5 (Classification of Roads) in the draft DCO (Application Document 3.1).
<b>Project route</b>		The horizontal and vertical alignment taken by the Project road.
<b>South Portal</b>		The South Portal of the Project (southern tunnel entrance) would be located to the south-east of the village of Chalk. Emergency access and vehicle turn-around facilities would be provided at the tunnel portal. The tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.
<b>The tunnel</b>		Proposed 4.25km (2.5 miles) road tunnel beneath the River Thames, comprising two bores, one for northbound traffic and one for southbound traffic. Cross-passages connecting each bore would be provided for emergency incident response and tunnel user evacuation. Tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations. Emergency access and vehicle turn-around facilities would also be provided at the tunnel portals.

# Annexes

## Annex A Post-hearing submissions on Agenda Item 3 Final Positions on Port Access and Bluebell Hill

### A.1 Introduction

A.1.1 This Annex provides the post-hearing submissions and response to hearing actions from ISH13 [EV-087G] Agenda Item 3: Final Positions on Port Access and Bluebell Hill on 27 November 2023 for the A122 Lower Thames Crossing (the Project).

### A.2 Hearing Action Point 1: Orsett Cock – Additional weave length and General Arrangement Plans

A.2.1 Hearing Action Point 1 requests '*Please submit a drawing demonstrating the proposition that relevant additional weave length can be provided without a requirement for additional land and within the limits of deviation. Please provide an amendment to the General Arrangement Plans Vol C [REP7-028/029] to show this change. Thurrock Council may comment at D9.*'

A.2.2 In response to this Action Point, the Applicant has prepared two drawings (which can be found at Appendix A.1 to this Annex) showing the amended weaving section on the approach to Orsett Cock roundabout presented as follows:

- a. Plate A.1.1 – Land use, demonstrating that the amendment can be accommodated within the permanent land-take (pink land) and Order Limit Boundary
- b. Plate A.1.2 – Limits of deviation (LOD), demonstrating that the amendment can be accommodated within the LOD

A.2.3 As demonstrated in the above-referenced drawings, the Applicant confirms that this amendment can be accommodated within the flexibility of the DCO and therefore the Applicant does not consider it necessary to update the General Arrangement Plans. The Applicant would note that Requirement 18 secures measures at the detailed design stage which would minimise the traffic delays arising from the operation of the Project, and also optimises the performance of the roundabout.

### A.3 Hearing Action Point 3: Orsett Cock – roundabout route and lane name convention (diagram)

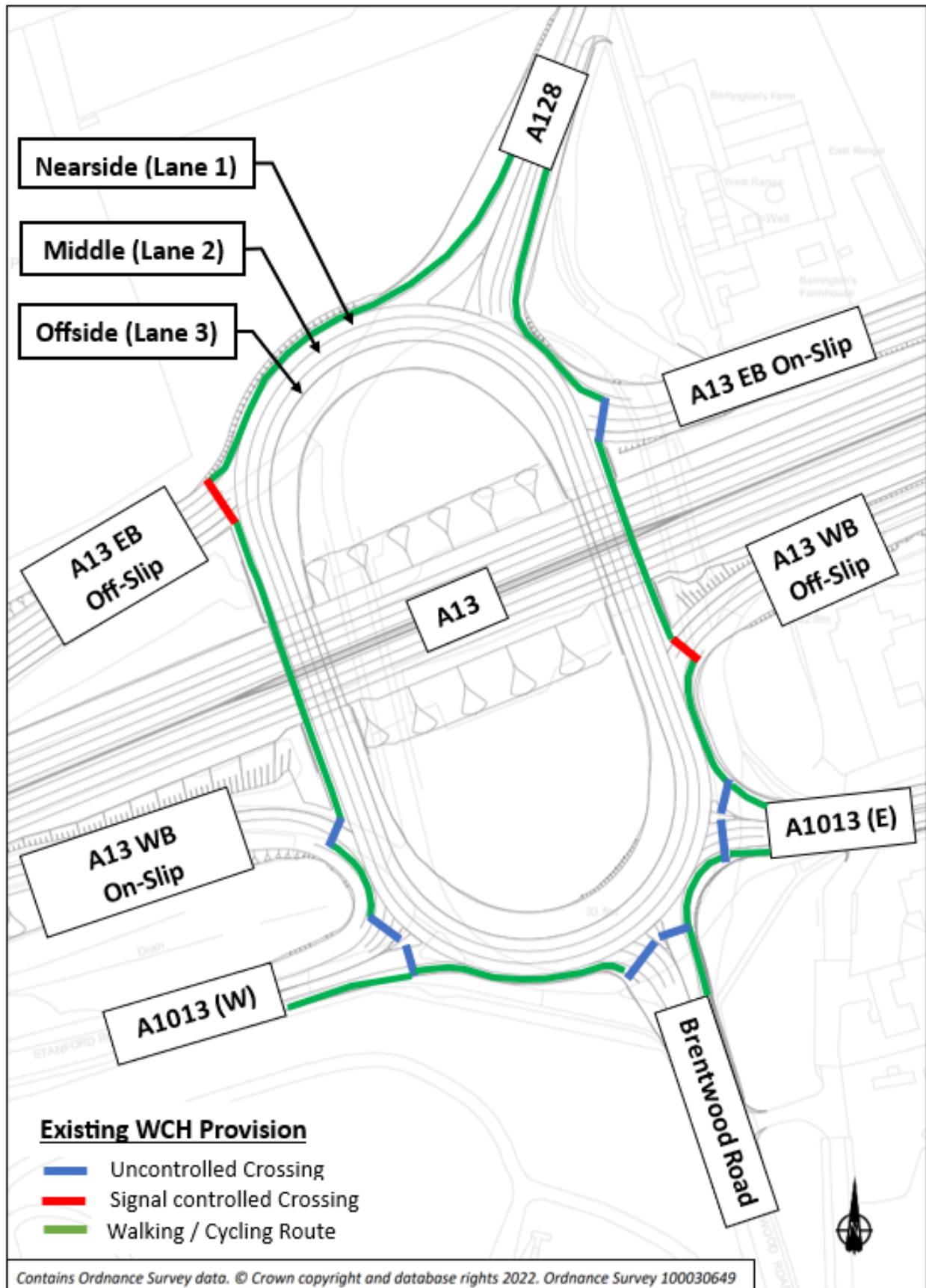
A.3.1 Hearing Action Point 3 requests '*Please provide an intersection route and lane diagram or diagrams, with the individual lanes and the entrance and exit routes and paths named – consistently with the approach taken in analysing model*



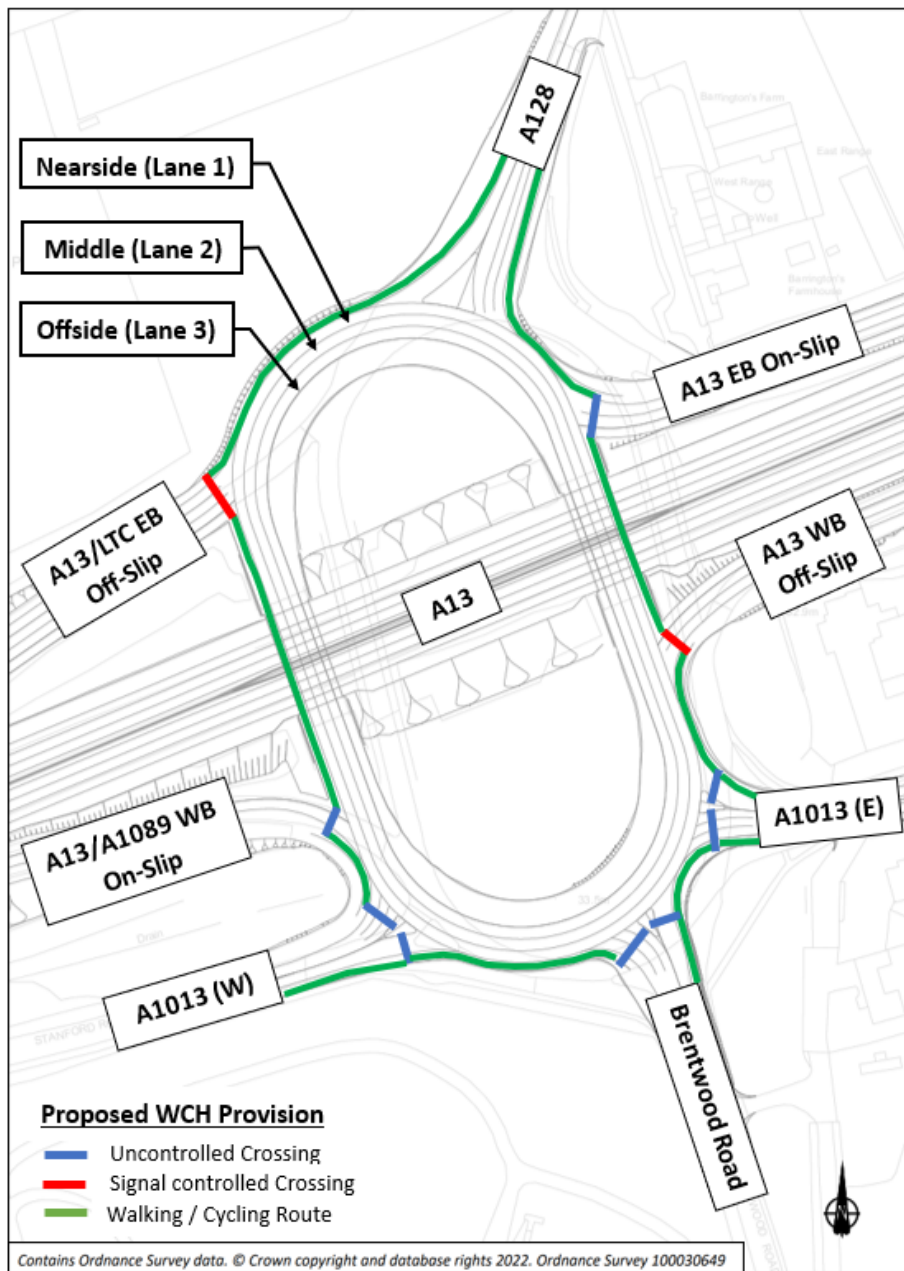
*outputs. Please include WCH provision in the response to this action. Other IPs referring to Orsett Cock are requested to adopt these usages in responding submissions at D9.'*

- A.3.2 To support the submissions associated with the Orsett Cock junction, Plates Plate A.1 and Plate A.2 have been prepared to show the following features of the junction for the Existing and Proposed layouts respectively:
- a. Naming convention for key entrance and exit points
  - b. Naming convention for the lanes within the roundabout
  - c. Walking cycling and horse riding (WCH) provision including crossings at this location
- A.3.3 Wider WCH provision in the area both in the existing situation and with the Project are shown in Supplementary Walking, Cycling and Horse Riding (WCH) Maps (Volume A) [\[REP2-072\]](#), Supplementary Walking, Cycling and Horse Riding (WCH) Maps (Volume B) [\[REP2-073\]](#) and Supplementary Walking, Cycling and Horse Riding (WCH) Maps (Volume C) [\[REP2-074\]](#).
- A.3.4 For simplicity, lane markings and traffic signals are not shown in Plates Plate A.1 or Plate A.2.

### Plate A.1 Existing Orsett Cock junction route and lane name convention diagram



**Plate A.2 Proposed Orsett Cock junction route and lane name convention diagram**



**A.4 Hearing Action Point 4: Orsett Cock – Roundabout route modelling assumptions**

A.4.1 Hearing Action Point 4 requests 'Please use versions of the diagrams referred to in Action 3 to illustrate the differences between Applicant v3.6 modelling and the Thurrock Council v3.6T modelling assumptions. Further to discussion at ISH13, this should be taken as an opportunity to explain the modelling that is already before the ExA, but not to amend it. Thurrock Council may comment in responding submissions at D9.'

A.4.2 The Applicant has prepared a series of diagrams associated with the 3-lane circulatory carriageway from A13/LTC EB offslip to Brentwood Road to illustrate

the differences between the Applicant's v3.6 VISSIM modelling and Thurrock Council's v3.6T modelling in Appendix A.2 to this Annex.

- A.4.3 Following Thurrock Council's audit of the v1 DM model and within their Deadline 3 submission, Appendix E, Annex 5, Item 3 [\[REP3-207\]](#) Thurrock Council requested that the Applicant's DM model be amended for traffic to Brentwood Road to only use the nearside lane, as shown in Plate A.2.1 of Appendix A.2 to this Annex. The Applicant made this change to the DM model in v3 (v3.6) in October 2023.
- A.4.4 The Applicant considers that it is likely that upon reviewing the v3.6 DM model Thurrock Council realised that allowing traffic to Brentwood Road to only use the nearside lane, as they requested the Applicant to amend in the v3.6 DM model after their audit, makes the DM perform worse. Utilising this information, the Applicant understands that the Council amended the lane designations in their v3.6T DM model so that traffic to Brentwood Road can use the nearside and middle lanes to exit to Brentwood Road. This can be seen in Plate A.2.2 of Appendix A.2 to this Annex.
- A.4.5 In the Applicant's v3.6 DS model, which include the introduction of traffic signals at the A128 and Brentwood Road approaches, the Applicant coded the lane designation for traffic to Brentwood Road to use the middle lane and the offside lanes. It should be noted that if traffic to Brentwood Road in the offside lane cannot change lane before the A13 WB off-slip traffic signals because of queuing traffic in the middle lane, the lane change (for traffic in the offside lane to the middle lane) happens in the space after crossing the stop line at the A13 WB off-slip and the A1013 (E) arm. This can be seen in Plate A.2.3 of Appendix A.2 to this Annex. The Applicant refutes Thurrock Council's comment that there are 3 lanes merging into a single lane at the Brentwood Road exit and that any merging of traffic occurs at the location the Council is showing in their Deadline 6A submission (Submission of comments by Local Highway Authorities, Ports and other IPs engaged in traffic and transportation topics relating to traffic modelling and intended to be heard at ISH13 on 27 November 2023 [\[REP6A-013\]](#)) in paragraph 3.1.16 in Figure 3.3. This can be seen in Plate A.2.3 of Appendix A.2 to this Annex.
- A.4.6 Thurrock Council has adopted the same lane designations in their v3.6T DS model as their v3.6T DM model. This can be seen in Plate A.2.5 of Appendix A.2 to this Annex.

## A.5 Hearing Action Point 6: Orsett Cock – Model 3.6T

- A.5.1 Hearing Action Point 6 requests '*Provide commentary as to whether, in the Applicant's view, model 3.6T reflects realistic driver behaviour. Thurrock Council may respond at D9*'.

- A.5.2 The Applicant has carried out a review of Thurrock Council’s v3.6T VISSIM model, which they provided to the Applicant on 24 November 2023. This review took place after ISH13.
- A.5.3 The Council reported that they used the Applicant’s v3.6 model and made a number of changes to create v3.6T. These changes are described in the Council’s Deadline 6A submission (Submission of comments by Local Highway Authorities, Ports and other IPs engaged in traffic and transportation topics relating to traffic modelling and intended to be heard at ISH13 on 27 November 2023 [[REP6A-013](#)]) and are not repeated here.
- A.5.4 The following are the key changes that the Council made in the v3.6T model that resulted in longer delays and queues at the Orsett Cock junction:
- a. Use of the more conservative Urban (motorised) driving behaviour on links around the circulatory
  - b. Allocating the nearside lane and middle lane on the southbound circulatory for traffic travelling to Brentwood Road instead of the offside and middle lanes
  - c. Increase of lane change distance from 100m to 150m on the exit to Brentwood Road
- A.5.5 In addition to the Council creating the v3.6T model, the Council submitted some further comments on the Applicant’s v3.6 model. As noted by the Applicant at ISH13, some of these comments relate to the approach taken to the implementation of the agreed positions, but the majority relate to aspects in the model that were in both the version 1 and version 2 models, dating back to September 2022 model submissions, and as such comprise new submissions on positions that the Applicant considered to be agreed matters.

### **Driver behaviour on the circulatory**

- A.5.6 The Applicant has provided its commentary relating to driver behaviour within Section A.10 of this document, which includes a number of examples of where other projects have also amended the default driver behaviour in order to ensure that the VISSIM modelling reflects realistic traffic behaviours.

### **Lane allocation on southbound circulatory**

- A.5.7 Please refer to paragraph A.4.3 and paragraph A.4.4 for details of the DM models (Applicant v3.6 and Thurrock Council v3.6T) lane allocations.
- A.5.8 The improvement proposed by the Applicant in their v3.6 DS model is to allow traffic towards Brentwood Road from the A13/A122 EB off-slip to use both the middle and offside lanes on the northern section of the circulatory by the A128 entry, then merging into the middle lane on the southbound overbridge on

approach to the stop line by the A13 WB off-slip. This is shown in Plate A.2.3 of Appendix A.2 to this Annex. The southbound nearside lane is designated only for traffic to A1013 (E).

- A.5.9 The lane change distance for the Brentwood Road exit has been set up so that vehicles in the offside lane change to the middle lane after the signals at the A128 entry (approximately 200m from the Brentwood Road exit). The set up of the model does allow some vehicles to use the offside lane at the signals by the A13 WB off-slip, which in reality would happen when vehicles struggle to move into the middle lane (due to queues in the middle lane) before the signals. It is considered unrealistic for vehicles on the offside lane to stop on the overbridge and wait for the lane change during a red signal as these vehicles would tend to continue slowly in the offside lane up to the stop line at the signals and attempt to change lane when the signals turn green.
- A.5.10 The Council's v3.6T DS modelling uses the nearside lane and middle lane on the southbound circulatory to Brentwood Road. Given there is also a large volume of traffic traveling to A1013 (E) that can only use the nearside lane, the majority of traffic to Brentwood Road is forced to use the middle lane only before the traffic signals by the A13 WB off-slip. More vehicles on the offside lane will have to stop and wait before the stop line to change into the middle lane, thus greatly reducing the throughput of that stop line. This is shown in Plate A.2.4 of Appendix A.2 to this Annex.
- A.5.11 The Applicant therefore refutes the lane allocation change for the reasons set out above.

### **Increase of lane change distance from 100m to 150m on the exit to Brentwood Road**

- A.5.12 At the Brentwood Road exit, the Applicant reduced the lane change distance to 100m in version 2 (v2.4) of the model and did not change it in the v3.6 model. This was to allow vehicles on that movement to use the offside lane at the traffic signals on the circulatory by the A128. Those vehicles will change lane soon after the traffic signals as the 'Applies per lane change' parameter has been set active, which gives a distance of 200m for vehicles on the circulatory offside lane to change lanes (the function 'applies per lane' when activated doubles the lane change distance as vehicles on the offside lane will need to change lane twice to get to the nearside lane for the exit).
- A.5.13 The lane change distance of 150m applied in the Council's v3.6T model with the 'Applies per lane change' function activated means most vehicles to Brentwood Road change to the middle lane before the traffic signals on the northern circulatory by the A128. This puts more traffic queueing in the middle lane and causes traffic blocking back to the A13/A122 EB off-slip and northbound overbridge.

- A.5.14 The Applicant therefore disagrees with the Council's change of the lane change distance from 100m to 150m on the exit to Brentwood Road.

### Other changes

#### Pegasus crossing at Rectory Road,

- A.5.15 The Council have included this within the Do Minimum (DM) model. The Applicant is not aware of any committed plans to provide such a crossing, and so considers it unrealistic to include such an uncommitted change in the Do Minimum.

- A.5.16 The Applicant has included it in the Do Something (DS) models, as requested by the Council, as it is part of the Project's proposals to enhance WCH routes.

#### Coding of the pedestrian crossing.

- A.5.17 The Applicant recognises that the signal control behaviour reduces the safety distance of the vehicles around the signal stop line and up to 100m from the stop lines. The support team from PTV (the software developer) has confirmed to the Applicant that there is no error in VISSIM 2020 and that the signal control behaviour would reduce the gap acceptance times in the vicinity as well, but these can be adjusted if required. However, it is considered that any effect on the model would be small.

## A.6 Hearing Action Point 7: Thames Freeport (Ports and Thurrock Council): Collaborative development of draft Requirement 18

- A.6.1 Hearing Action Point 7 requests *'By Deadline 9, please engage to seek a further revised draft of Requirement 18 in which the objectives to be met and definitions of terms and outcomes sought to secure the proper functionality of the Orsett Cock are (as far as possible) agreed. Provide a draft that sets out all matters agreed. If necessary, provide reservations and statements of individual or group positions on matters not agreed'*.
- A.6.2 The Applicant has arranged a meeting with Thurrock Council, DP World London Gateway and Port of Tilbury London Limited to discuss Requirement 18 in relation to the Orsett Cock junction. The meeting is scheduled for 4 December 2023 and so the Applicant will provide an update as requested by the ExA on this matter at Deadline 9.

## A.7 Update to Port journey times shown in Comments on WRs Appendix E – Ports [REP2-050] to provide journey times from the “manipulated” LTAM run

- A.7.1 The Applicant has provided updated journey times, as originally set out in Tables A.3 to A.7 (inclusive) within Comments on WRs Appendix E – Ports [REP2-050], to reflect the ‘manipulated’ LTAM run which includes the delays from VISSIM as detailed in Appendix N of Localised Traffic Modelling [REP6A-004].
- A.7.2 In Table A.1 to Table A.5 as set out in this document, the journey times without the Project are from LTAM run LR\_CM49 (as previously reported in Comments on WRs Appendix E – Ports [REP2-050]) and those journey times with the Project are from LTAM run LEO\_CS34. This is the ‘manipulated’ LTAM run which includes the delays from VISSIM as detailed in Appendix N of Localised Traffic Modelling [REP6A-004].
- A.7.3 The ‘manipulated’ LTAM runs are available for the AM and PM peak hours only as the VISSIM modelling was only carried out for these time periods.
- A.7.4 All the observations on journey times provided in Comments on WRs Appendix E – Ports [REP2-050] remain true with the journey times from the ‘manipulated’ LTAM runs. For any vehicles that choose to remain using their current route, via M25 junction 30, the journey time would become quicker when the Project is built than without it. For vehicles choosing to use the Project and the Orsett Cock junction to reach the A1089, the journey times are quicker than the current route. It would always be quicker to use the Project and the Orsett Cock junction than to U-turn at the Manorway junction (route 3). This is shown in Table A.3.
- A.7.5 The comparison of travel times in Table A.4 and Table A.5 show that journeys to DP World London Gateway Port passing through M20 junction 7 and M2 junction 4 continue to have substantial time savings as a result of switching route to use the Project. For many journeys that remain on the same routes there would also be a reduction in travel times, for example, for trips passing M25 junction 3.
- A.7.6 The increase in journey times from DP World London Gateway Port to the Port of Tilbury, as these vehicles would have to use the Orsett Cock junction rather than the dedicated off-slip that exists without the Project, is still only a very slight increase in time. The journey times to and from the east also still increase slightly due to the higher volumes of traffic on the A13 east of the Project when the Project opens. Given that the majority of trips to and from London Gateway Port travel along the M25, rather than going east into Essex, the overall



reduction in travel times for vehicles travelling to/from DP World London Gateway Port would be substantial.

**Table A.1 Journey times from M25 junction 29 to the Port of Tilbury, 2030**

Time Period	Vehicle type	Without the Project	With the Project		
		Route 1: M25 J29 to Tilbury port via M25, A13 and A1089	Route 1: M25 J29 to Tilbury port via M25, A13 and A1089	Route 2: M25 J29 to Tilbury port via the Project and A1089 (Orsett Cock)	Route 3: M25 J29 to Tilbury port via the Project, A13 and A1089 (Manorway U-Turn)
		Time [min]	Time [min]	Time [min]	Time [min]
AM peak hour	Cars	19.6	18.3	18.1	26.0
	HGVs	21.0	19.7	20.3	28.5
PM peak hour	Cars	18.4	16.0	14.7	22.8
	HGVs	19.7	17.4	16.9	25.3

**Table A.2 Journey times from M25 junction 29 to the Port of Tilbury, 2045**

Time Period	Vehicle type	Without the Project	With the Project		
		Route 1: M25 J29 to Tilbury port via M25, A13 and A1089	Route 1: M25 J29 to Tilbury port via M25, A13 and A1089	Route 2: M25 J29 to Tilbury port via the Project and A1089 (Orsett Cock)	Route 3: M25 J29 to Tilbury port via the Project, A13 and A1089 (Manorway U-Turn)
		Time [min]	Time [min]	Time [min]	Time [min]
AM peak hour	Cars	19.9	17.5	17.1	27.4
	HGVs	21.2	18.9	19.3	29.9
PM peak hour	Cars	20.3	17.4	15.4	26.8
	HGVs	21.7	18.8	17.6	29.2

**Table A.3 Additional journey times for the route from the Project to A1089  
using the Manorway junction**

Year	Time period	Time difference minutes: seconds
2030	AM peak hour	07:52
	PM peak hour	08:02
2045	AM peak hour	10:18
	PM peak hour	11:21

**Table A.4 Journey times to DP World, 2030**

Origin	AM peak hour (07:00 – 08:00)			PM peak hour (17:00 – 18:00)		
	Without the Project	With the Project (same route)	With the Project (via the Project / Orsett Cock)	Without the Project	With the Project (same route)	With the Project (via the Project / Orsett Cock)
<b>Cars and LGV</b>						
M25 J28	00:21:42	-	00:18:09	00:24:40	-	00:19:45
M25 J3	00:30:51	00:24:50	-	00:32:39	00:27:20	-
M2 J4	00:54:50	-	00:28:23	00:51:17	-	00:27:44
M20 J7	00:56:15	-	00:37:14	00:50:57	-	00:34:00
A13/A1306	00:16:13	00:16:05	-	00:19:43	00:19:53	-
Tilbury	00:12:39	00:14:07	-	00:12:37	00:13:43	-
A127/A129	00:21:31	00:22:24	-	00:16:31	00:17:38	-
<b>HGV</b>						
M25 J28	00:23:42	-	00:20:38	00:26:39	-	00:22:14
M25 J3	00:32:10	00:26:08	-	00:33:57	00:28:38	-
M2 J4	00:59:17	-	00:33:08	00:55:44	-	00:32:29
M20 J7	01:01:21	-	00:41:39	00:56:03	-	00:38:25
A13/A1306	00:16:38	00:16:29	-	00:21:04	00:20:18	-
Tilbury	00:13:05	00:14:35	-	00:13:04	00:14:11	-
A127/A129	00:22:12	00:23:05	-	00:17:11	00:18:18	-

**Table A.5 Journey times from DP World, 2030**

Destination	AM peak hour (07:00 – 08:00)			PM peak hour (17:00 – 18:00)		
	Without the Project	With the Project (same route)	With the Project (via the Project / Orsett Cock)	Without the Project	With the Project (same route)	With the Project (via the Project / Orsett Cock)
<b>Cars and LGV</b>						
M25 J28	00:27:26	-	00:20:11	00:24:48	-	00:18:28
M25 J3	00:33:57	00:27:55	-	00:28:17	00:24:17	-
M2 J4	00:46:29	-	00:25:56	00:47:23	-	00:27:58
M20 J7	00:51:46	-	00:35:14	00:52:43	-	00:39:02
A13/A1306	00:20:50	00:18:15	-	00:17:43	00:16:50	-
Tilbury	00:15:44	00:16:17	-	00:11:01	00:12:12	-
A127/A129	00:17:32	00:18:09	-	00:19:16	00:22:20	-
<b>HGV</b>						
M25 J28	00:29:31	-	00:22:31	00:26:53	-	00:20:49
M25 J3	00:35:23	00:29:20	-	00:29:42	00:25:42	-
M2 J4	00:51:06	-	00:30:25	00:51:59	-	00:32:27
M20 J7	00:57:06	-	00:39:17	00:58:02	-	00:43:05
A13/A1306	00:21:12	00:18:38	-	00:18:05	00:17:13	-
Tilbury	00:16:10	00:16:52	-	00:11:27	00:12:48	-
A127/A129	00:18:11	00:18:48	-	00:19:55	00:22:59	-

## A.8 Applicant’s comments on Thurrock Council’s economic appraisal calculations using VISSIM outputs

A.8.1 Within Section 5 and Appendix E of Submission of comments by Local Highway Authorities, Ports and other Ips engaged in traffic and transportation topics relating to traffic modelling and intended to be heard at ISH13 on 27 November 2023 [REP6A-013], Thurrock Council claim that the higher forecast delays predicted by the VISSIM software package than the SATURN software package at the Orsett Cock junction have a value of £100 million at 2010 prices and values, discounted over 60 years and that this would reduce the Benefit Cost Ratio (BCR) of the Project from 1.22 to 1.17.

A.8.2 A review of this work has revealed issues both with the methodology used and its implementation.

### Calculate daily value of difference in delay

A.8.3 The Council begins with the difference in the total delay to vehicles with the Project between SATURN and VISSIM. They state that the difference in delays between the two models with the Project, in the AM peak hour and PM peak

hour is 54 and 80 hours respectively in 2030 and 169 and 297 hours in 2045. The Applicant has been unable to reproduce the delays quoted for VISSIM and believe these may be taken from Thurrock's VISSIM model of the Orsett Cock junction (Version 3.6T).

- A.8.4 These hours are then multiplied by an average value of time per vehicle per hour in 2010 prices and values of £11.84 in the AM peak hour and £11.46 in the PM peak hour to provide a daily value of the difference in delays forecast by the two software packages.

### Calculate annual value of difference in delay

- A.8.5 Tables A.6 and A.10 respectively in the Combined Modelling and Appraisal Report Appendix D: Economic Appraisal Package – Economic Appraisal Report [APP-526] provide the expansion factor to go from the one hour modelled AM peak hour to the two hour AM peak period and from the one hour modelled PM peak hour to the two hour PM peak period. These expansion factors are 1.96 for the AM and 2.02 for the PM. The annualisation factor to go from one weekday to all weekdays in the year is 253, giving a combined expansion and annualisation factor of 497 for the AM and 511 for the PM. Adding together the value of the annual delays in the AM peak period and the PM peak period gives a value of £1.3 million in 2030 and £2.2 million in 2045.

#### Error 1:

- A.8.6 The Council have, however, misread Tables A.6 and A.10 and multiplied the peak hour figures by two before then applying the combined expansion and annualisation factors, thus double counting the value of the delays.
- A.8.7 The Council have calculated the daily value in 2010 prices as £2.5 million in 2030 and £4.0 million in 2045, which is double the actual value.

### Calculate average value per year

- A.8.8 The Council have then calculated the average value per year which they present as £6.5 million.

#### Error 2:

- A.8.9 The Council added together the values for 2030 and 2045 rather than taking the average. As a result, the Council used the figure of £6.5 million per year rather than the average annual figure, which would be half that value.

### Value over 60 years

- A.8.10 The Council then took the annual figure of £6.5 million that they had calculated and using this value for each of the 60 years in the appraisal period (and discounting back to 2010 prices) gave a total value of £100 million.

A.8.11 It is not clear how the Council derived this £100 million figure as the value of £6.5 million a year discounted to 2010 is £87 million so the Applicant considers that this has been presented as rounded up to £100 million.

**Error 3:**

A.8.12 Thurrock incorrectly assessed the 60 year discounted value of £6.5 million a year over 60 years as being £100 million.

**Methodology issue: difference in benefits should be due to changes arising from the scheme alone and not confounded with changes in software between the DM and the DS**

A.8.13 The DfT's Transport Appraisal Guidance (TAG) is clear that the Benefit Cost Ratio for a scheme should be based solely on the difference made by the project. The change in benefits should be due solely to a project and not to a change in appraisal methods or software between the DM and the DS.

A.8.14 The Council should have calculated the difference in the value of the delays at the Orsett Cock junction in SATURN between the DM and the DS and compared this with the difference in the value of the delays at the junction in VISSIM between the DM and the DS.

A.8.15 The difference in delays between the DM and DS at the Orsett Cock junction in VISSIM for 2030 is 11.3 hours and 116.5 hours in the AM and PM peak hours respectively and 11.6 and 153.5 hours in 2045.

A.8.16 The difference in delays between the DM and DS at the Orsett Cock junction in SATURN for 2030 is 14.1 hours and 22.8 hours in the AM and PM peak hours respectively and 15.0 and 36.7 hours in 2045.

A.8.17 Following the method for calculating the discounted value of these delays, over 60 years using the TAG methodology (which includes the growth in the value of time over time) as implemented in DfT's TUBA software gives a value of £23.1 million when using VISSIM software and £7.3 million when using SATURN software. This gives a value of the difference from using the different software packages at the Orsett Cock junction of £15.8 million.

**Error 4:**

A.8.18 The benefits in the BCR are the difference between the DM and the DS. Accordingly, the correct variation in the value of the benefits in the BCR calculation is the comparison of the delays in SATURN between the DM and the DS with the delays in VISSIM between the DM and the DS.

## **Methodology issue: VISSIM does not allow for re-routing of traffic onto alternative routes**

### **Error 5:**

- A.8.19 Neither the Applicant's nor the Council's VISSIM models of the Orsett Cock junction allow for traffic to re-route away in response to any delays at the junction. In reality some traffic would re-route, as seen in the test presented in Appendix N of Localised Traffic Modelling [[REP6A-004](#)] where the delays in VISSIM were hard coded into the LTAM. Where traffic re-routes the total delay to the entire journey is less than the delay at the Orsett Cock junction.
- A.8.20 As the Council's model assumes traffic remains on the roundabout rather than re-routing, the total delay and the costs associated with such a delay is an overestimate. It is inappropriate to derive costs based on a difference in the DM and DS (in Thurrock Council's model) given that re-routing is not accounted for in the v3.6T model.

## **Methodology issue: does not consider change in benefits at junctions where there is a decrease in traffic, such as at M25 junction 30**

### **Error 6:**

- A.8.21 The Council have only considered the Orsett Cock junction and not other junctions where the number of trips are forecast to decrease and SATURN would have underestimated the benefits compared to VISSIM.
- A.8.22 Generally, due to the differences in the modelling technologies, particularly for heavily used junctions, the change in journey times between the DM and DS can be greater in a VISSIM model. But this accentuation of impacts also applies to junctions that are heavily used in the DM and have fewer trips in the DS, such as at M25 junction 30 where one of the benefits of the Project is the removal of many right turning trips from the A13 westbound to the M25 northbound, that would use the Project instead.
- A.8.23 When looking at the overall impact on the BCR if junctions were modelled using VISSIM rather than SATURN, consideration should be given to all junctions, including those receiving a decrease in traffic as well as those experiencing an increase.
- A.8.24 In conclusion, the impact on the BCR of assessing the impacts at the Orsett Cock junction using VISSIM software rather than SATURN is minimal. The overall value of the journey time savings is £2 billion as reported in Table 11.2 of the Combined Modelling and Appraisal Report Appendix D: Economic Appraisal Package – Economic Appraisal Report [[APP-526](#)].

- A.8.25 With the £15.8 million figure, which is an overestimate and comes from modelling at the Orsett Cock junction alone, the BCR would remain at 1.22.

## A.9 National Highways Spatial Planning – applications with forecast impact on Blue Bell Hill corridor

- A.9.1 Within Annex A.4 of Post-event submissions, including written submission of oral comments, for ISH1 [REP1-183] the Applicant set out the following which was in relation to M2 junction 1, but is applicable to how National Highways responds to applications across the country:

*'Unlike a conventional developer, National Highways operates both as the Applicant for the A122 Lower Thames Crossing and as custodian of the Strategic Road Network as set out in the Highways England: Licence (DfT, 2015). As custodian of the Strategic Road Network, National Highways must consider the provision for sufficient flexibility and future-proofing in planning the long-term development and improvement of the network (paragraph 5.6c). In some instances this requires that National Highways makes decisions relating to the availability of capacity on the network, and results in some reductions in available capacity at certain locations on the network, with potential consequences for new development in that area, in order to optimise the performance of the network overall where necessary to deliver government infrastructure priorities, such as the A122 Lower Thames Crossing.'*

- A.9.2 The Applicant has liaised with the Spatial Planning team in relation to planning applications it has recently or is considering that have a forecast impact on the Blue Bell Hill corridor (i.e. M20 junction 6 and M2 junction 3). Whilst National Highways has not recommended refusal of any developments, nor placed trip limits on any development, National Highways has recommended conditions that require works or a study contribution on a number of proposed developments including:
- a. 22/001113/OAEA Bushey Wood, Aylesford
  - b. 20/01820/OAEA Aylesford Newsprint (£50,000 contribution to studies/works)
  - c. 21/03066/OA Land South East of Tottington Farm
  - d. Innovation Park, Medway (local development order – has a monitor and management regime which may require mitigation at M2 junction 3)
- A.9.3 As the Applicant has set out in Chapter 2 of Applicant's comments on Interested Parties' submissions regarding Wider Network Impact at D7, submitted at Deadline 8 [Document Reference 9.208] in response to comments from Gravesham Borough Council, the Applicant considers that there should be a distinction between network developments that provides capacity enhancement (such as the Project) and 'ordinary' development:

*‘... in that network developments do not generate new trips that start or end at a single defined point – they add network capacity and the nature of their effects is very different in principle from new land use development which generates a fresh source of or focus for traffic onto the existing network’.*

## **A.10 VISSIM driver behaviour**

- A.10.1 The Applicant analysed and studied the VISSIM video which Thurrock Council submitted into the Examination at Deadline 6A [REP6A-014]. It is apparent from analysing the video (the VISSIM model itself was only reviewed after ISH13) that the Council restricted traffic movement on the southbound circulatory. This restriction is illustrated in Plate A.2.5 of Appendix A.2 to this Annex.
- A.10.2 One of Thurrock Council’s disagreements with the Applicant in relation to the Orsett Cock VISSIM model, is the application of the urban merge driver behaviour by the Applicant as opposed to using the default behaviour in the model.
- A.10.3 As set out at ISH13, the Applicant has used this amended driver behaviour on the circulatory as it considers that the situation is similar to a short merge section – the circulatory is made up of short weaving sections with traffic from the approaches and circulatory merging together and diverging to their destinations. Applying this driver behaviour avoids unrealistic driver behaviour but represents a more realistic way of how drivers will behave on the circulatory (similar to a short merging section).
- A.10.4 The Applicant is unclear why the Council states it is not appropriate for the circulatory where the weaving and merging sections are even shorter than the A13(W)/A122 merge (of 200m) where the Council have adopted the urban merge behaviour in their model of Orsett Cock (v3.6T).
- A.10.5 At ISH13, the Applicant made reference to two examples of other projects where the urban merge driver behaviour had been selected in lieu of the default urban motorised behaviour.
- A.10.6 The Applicant has set out further details of the Silvertown tunnel example, along with other examples of where adjustments have been made to the default driver behaviour.

### **A12 Chelmsford to A120 widening scheme**

- A.10.7 This project was the subject of a Development Consent Order, which is currently being considered by the Secretary of State. The Applicant is National Highways. The project seeks to widen the A12 with new alignments between junctions 22 and 23.



- A.10.8 VISSIM modelling was used to assess the operational performance of junctions. Separate models were developed for each junction within the study area as detailed in Transport Assessment Appendix F: Junction Modelling Technical Notes – A12 Junctions (National Highways, 2022a), including grade separated ‘dumbbell’ type roundabouts.
- A.10.9 Notably, A12 junction 19 included gyratories with three lanes or more. The Transport Assessment Appendix E: Junction Modelling Technical Notes – Overarching Vissim Modelling Methodology (National Highways, 2022b) details the overarching methodology for the VISSIM models. Section E.1.2 Driving Behaviour describes how the driving behaviours were modified from the default values, for a variety of reasons. It also details the use and application of Urban (merge) in the model, to enable ‘*quicker and more efficient lane changing behaviour*’. The relevant text is reproduced below:

*Driving Behaviour*

*Driving behaviours, which are applied to the links in the model, affect how vehicles use the network and interact with other vehicles. The following driving behaviours were included and used the models.*

*201: Urban Merge – This driving behaviour was added to enable quicker and more efficient lane changing behaviour. This driving behaviour is being used in locations where there is a lane drop exiting a junction and traffic is required to merge. The parameters for this behaviour type were taken from the example provided by PTV: “Examples Training\Merging & Weaving\Inside Merge”. This parameter is similar to 1: Urban (motorized) but with the following changes:*

- a. *Lane Change: Safety distance reduction factor is set to 0.3 (as opposed to 0.6)*
- b. *Lane Change: Cooperative lane change is selected*
- c. *Lateral: Observe adjacent lane(s) is selected’*

### **Northampton Gateway Rail Freight Interchange (M1 junctions 15 and 15a)**

- A.10.10 This project was for the development of a strategic rail freight interchange and was subject to a Development Consent Order. Development consent was granted.
- A.10.11 VISSIM modelling was used to assess impacts at M1 junction 15 (a grade separated signalised junction) and junction 15a (a grade separated priority-controlled junction). Appendix 25 – the M1 J15 & J15A VISSIM Model Local Model Validation Report (Roxhill Developments Limited, 2018) detailed the VISSIM modelling undertaken. Page 32 of the report details driver behaviour parameters used in the model. It describes how default driver parameters within

the modelling have been revised ‘to achieve a better representation of reality in the areas where merging is occurring’.

- A.10.12 A detailed breakdown of driving behaviours used for the VISSIM model is shown in Appendix C of the report, some of which are reproduced in Plate A.3. The ‘Merge’ driver behaviour type which incorporates similar lane change parameters to the Applicant’s Urban (merge) type with reduced safety distance and greater maximum deceleration for cooperative braking has been used for junction 15A to achieve better representation of reality in the areas where merging is occurring. The ‘Urban (motorised)’ behaviour was also updated at this location, using the existing behaviour type as a template, and adjusting some of the lane change parameters to encourage more aggressive lane changing.

**Plate A.3 Northampton Gateway Rail Freight Interchange VISSIM driver behaviours**

Driving Behaviour	Urban (motorized)		Right-side Rule (motorized)		Merges	
	Own	Trailing - Vehicle	Own	Trailing Vehicle	Own	Trailing Vehicle
Car following model	Wiedemann 74		Wiedemann 99		Wiedemann 99	
Look ahead distance (min,max)	0.00m, 250.00m		0.00m, 250.00m		0.00m, 250.00m	
No. of observed vehicles	4		2		2	
Maximum deceleration	-4.00 m/s <sup>2</sup>	-3.00 m/s <sup>2</sup>	-4.00 m/s <sup>2</sup>	-3.00 m/s <sup>2</sup>	-4.00 m/s <sup>2</sup>	-4.00 m/s <sup>2</sup>
-1 m/s <sup>2</sup> per distance	100.00m	100.00m	200.00m	200.00m	100.00m	100.00m
Accepted deceleration	-1.00 m/s <sup>2</sup>	-1.00 m/s <sup>2</sup>	-1.00 m/s <sup>2</sup>	-0.50 m/s <sup>2</sup>	-1.00 m/s <sup>2</sup>	-1.50 m/s <sup>2</sup>
Waiting time before diffusion	60.00s		60.00s		60.00s	
Min. Headway (front/rear)	0.50m		0.50m		0.50m	
To slower lane if collision time above	-		11.00s		-	
Safety distance reduction factor	0.60		0.60		0.10	
Maximum deceleration for cooperative braking	-3.00 m/s <sup>2</sup>		-3.00 m/s <sup>2</sup>		-9.00m/s <sup>2</sup>	
Advanced merging	N		N		Y	
Cooperative Lane Change?	N		N		Y	

### A27 Worthing and Lancing improvements

- A.10.13 A VISSIM model was developed to support National Highways’ proposed improvements to the A27 between Worthing and Lancing.
- A.10.14 The VISSIM model included changes to the default driving behaviour parameters in order to better replicate lane changing and merging behaviours at key points on the junction, including a roundabout circulatory.

- A.10.15 The VISSIM assessment report for the project detailed these revisions. An extract, taken from Table 4.1 of the report, highlighting these changes, is shown in Plate A.4.

### Plate A.4 A27 Worthing and Lancing model driver behaviour

Parameter	Adjustment made	Details of adjustment	Usage	Justification
<b>Driving Behaviour</b>				
	Urban Aggressive (created from Urban Motorised)	Interactive objects: 2 to 4 Additive part of safety distance: 2 to 1 Multiplicative part of safety distance: 3 to 1 Minimum Look Ahead Distance (m): 40 to 0	Offington Corner Circulatory Westbound exit at Sompting	Calibration change improving lane changing on circulatory Better replication of merging behaviour at congested merge
	Urban Aggressive CTA (created from Urban Motorised)	Interactive objects: 2 to 4 Additive part of safety distance: 2 to 1 Multiplicative part of safety distance: 3 to 2.5 Minimum Look Ahead Distance (m): 40 to 0	Northbound merge at Grove roundabout exit	Better replication of merging behaviour at congested merge

### Silvertown Tunnel

- A.10.16 The Silvertown Tunnel project was granted a Development Consent Order in 2018. The documents submitted to the DCO are no longer available on the PINS website; however, the Applicant can confirm that the project utilised VISSIM modelling in the DCO.
- A.10.17 Furthermore, the VISSIM modelling included driver behaviour parameters that varied from the default, and that parameters in the forecast models differed from that of the base model. The VISSIM models were accepted by Transport for London through their model audit process and utilised the Urban (merge) driver behaviour in the congested areas where merging or weaving occur.

### Epping Forest Local Plan

- A.10.18 The Epping Forest Local Plan was adopted in 2023. The Habitats Regulation Assessment report, Appendix C detailed the VISSIM modelling used in the assessment (Epping Forest District Council, 2022).
- A.10.19 The VISSIM model developed covered five junctions within the study area, including roundabouts and priority junctions. Section 3.7 of Appendix C sets out the revisions made to the default driver behaviour parameters to produce '*more realistic lane change behaviour*'. The relevant section of the report is reproduced in Plate A.5. The 'Urban Merge' driver behaviour type was used on the circulatory (link 19) of the Wake Arm roundabout and at the circulatory (links 37, 42, 43 and 44) at the Robin Hood roundabout.

## Plate A.5 Extract from Epping Forest local plan documentation re VISSIM modelling

### 3.7 Driving Behaviour

One new driving behaviour parameter set has been added to the model. This is called "Urban Merge". This is a duplicate of "Urban (motorized)" behaviour but with the minimum headway (front/rear) set to 0.30 metres. "Advanced Merging" has also been applied to assess more realistic lane change behaviour. These were coded at the following locations:

- Link 19 at Wake Arm Roundabout
- Links 37, 42, 43 and 44 at Robin Hood Roundabout

### M25 junction 28

A.10.20 Improvements to M25 junction 28 were granted a Development Consent Order in 2022. The Applicant was National Highways. The submitted Transport Assessment (National Highways, 2020) confirmed that VISSIM modelling was used in assessment of the improvements.

A.10.21 The details of the driver behaviour parameters were contained within the Local Model Validation Report, which was not submitted to the DCO; however, confirmed that non-default driver behaviour parameters were used in the modelling.

### West Eynsham Strategic Development Area

A.10.22 A VISSIM model was developed on behalf of Oxfordshire County Council to assess traffic impacts of the West Eynsham Strategic Development Area. An LMVR was produced to report on the development of the model (Wood Environment & Infrastructure Solutions UK Limited, 2019).

A.10.23 Section 3.1 of that report explicitly states that an Urban Merge driving behaviour was used in the model. The relevant part of the LMVR is reproduced in Plate A.6.

## Plate A.6 Eynsham model driver behaviour

### 3.1 Driving Parameters

The driving behaviours used in the VISSIM models are as follows:

- Urban Left-Side Rule (Motorised) - Wiedemann 74
- Urban Free Lane Selection (merge) – Wiedemann 74

Overall, the vast majority of the network links were coded using behaviour "Urban Left-Side Rule" of the mentioned above.

### Conclusion

A.10.24 There is clear industry evidence, with reference to the above projects, that there is precedent for reviewing and amending the default VISSIM driver behaviour

parameters to better reflect realistic driver behaviour, that is appropriate for the road network layout and associated factors that influence driving behaviour.

- A.10.25 The projects referenced, albeit different in their own right, have corresponding road network characteristics to the Orsett Cock junction, including short merging sections, three-lane circulatory carriageways and a mixture of signalised and priority (give-way) approaches to the roundabout.
- A.10.26 The Applicant has demonstrated that it is not uncommon in the industry to amend default VISSIM parameters and create a set of driver behaviour parameters that reflect realistic driver behaviour, such as urban merge, and use it in the model to more accurately replicate driving behaviours. Therefore, the use of the urban merge driver behaviour on the circulatory at Orsett Cock is considered appropriate and aligns with industry best practice and accepted by authorities, including for made DCOs.

## References

- Epping Forest District Council (2022). Epping Forest District Local Plan. 2022 Habitat Regulations Assessment. Accessed December 2023. <https://www.efdclocalplan.org/wp-content/uploads/2022/10/Epping-Forest-Local-Plan-HRA-October-2022.pdf>
- National Highways (2020). M25 junction 28 improvement scheme. Transport assessment report. Accessed December 2023. [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010029/TR010029-000233-TR010029\\_M25\\_j28\\_7.4\\_Transport\\_assessment\\_report.pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010029/TR010029-000233-TR010029_M25_j28_7.4_Transport_assessment_report.pdf)
- National Highways (2022a). A12 Chelmsford to A120 Widening scheme Transport Assessment Appendix F: Junction Modelling Technical Notes – A12 Junctions. Accessed December 2023. <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010060/TR010060-000372-7.2-Transport-Assessment-Appendix-F-Junction-Modelling-Technical-Notes-A12-Junctions.pdf>
- National Highways (2022b). A12 Chelmsford to A120 Widening scheme Transport Assessment Appendix E: Junction Modelling Technical Notes – Overarching Vissim Modelling Methodology. Accessed December 2023. <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010060/TR010060-000371-7.2-Transport-Assessment-Appendix-E-Junction-Modelling%20Technical-Notes-Overarching-Vissim-Modelling-Methodology.pdf>
- Roxhill Developments Limited (2018). Appendix 25 M1 J15 & J15A VISSIM Model Local Model Validation Report. Accessed December 2023. <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR050006/TR050006-000444-ES%20TR%20App%2012.1%20-%20TA%20App%2025%20-%20M1%20J15%2015a%20VISSIM%20Model%20LMVR.pdf>
- Wood Environment & Infrastructure Solutions UK Limited (2019). Eynsham Base VISSIM Model: Local Model Validation Report. Accessed December 2023. <https://www.westoxon.gov.uk/media/2cdlssl/43ynsham-base-vissim-model-local-model-validation-report.pdf>

# Appendices

Appendix A.1 Hearing Action Point 1 drawings

Plate A.1.1 Land use

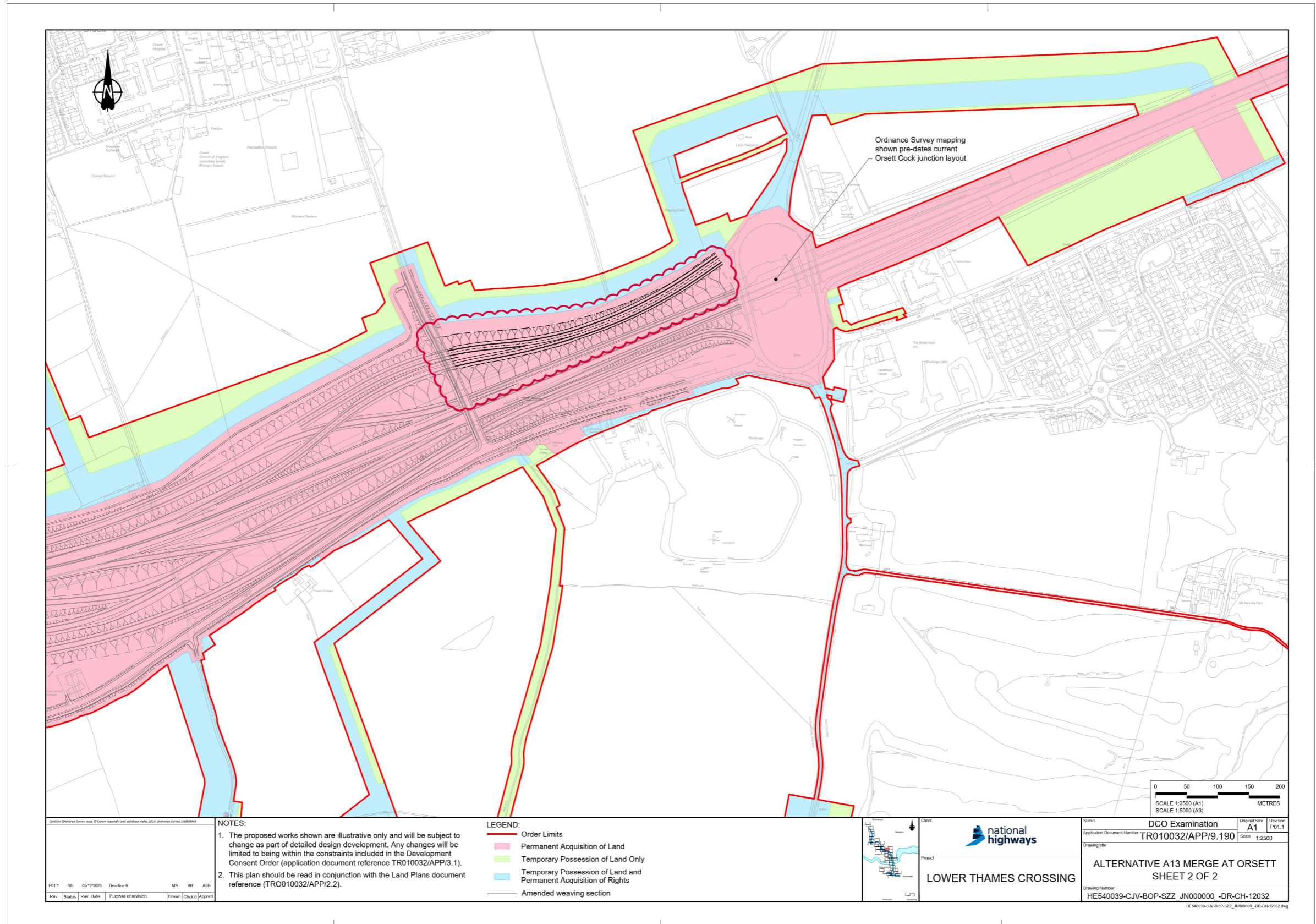
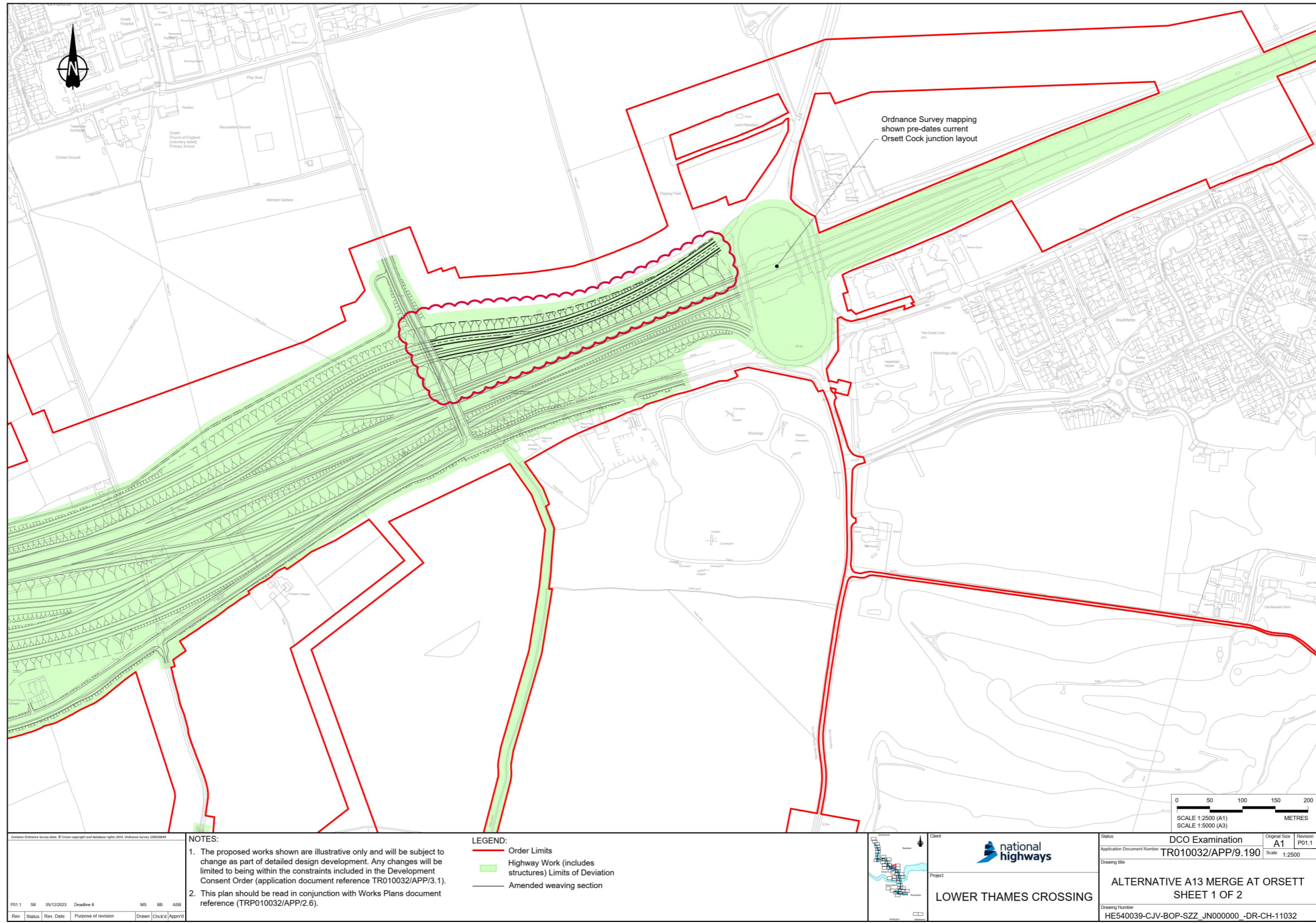




Plate A.1.2 Limits of deviation



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Rev	Status	Rev. Date	Purpose of revision	Drawn	Checked	Approved
P01.1	SR	05/12/2023	Deadline #	MS	BB	ASB

**NOTES:**

1. The proposed works shown are illustrative only and will be subject to change as part of detailed design development. Any changes will be limited to being within the constraints included in the Development Consent Order (application document reference TR010032/APP/3.1).
2. This plan should be read in conjunction with Works Plans document reference (TRP010032/APP/2.6).

**LEGEND:**

- Order Limits
- Highway Work (includes structures) Limits of Deviation
- Amended weaving section

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO Examination

Application Document Number: TR010032/APP/9.190

Drawing Title: ALTERNATIVE A13 MERGE AT ORSETT SHEET 1 OF 2

Drawing Number: HE540039-CJV-BOP-SZZ\_JN000000\_-DR-CH-11032

Original Size: A1

Revision: P01.1

Scale: 1:2500

# Appendix A.2 Hearing Action Point 4 drawings

Plate A.2.1 Applicant v3.6 DM model

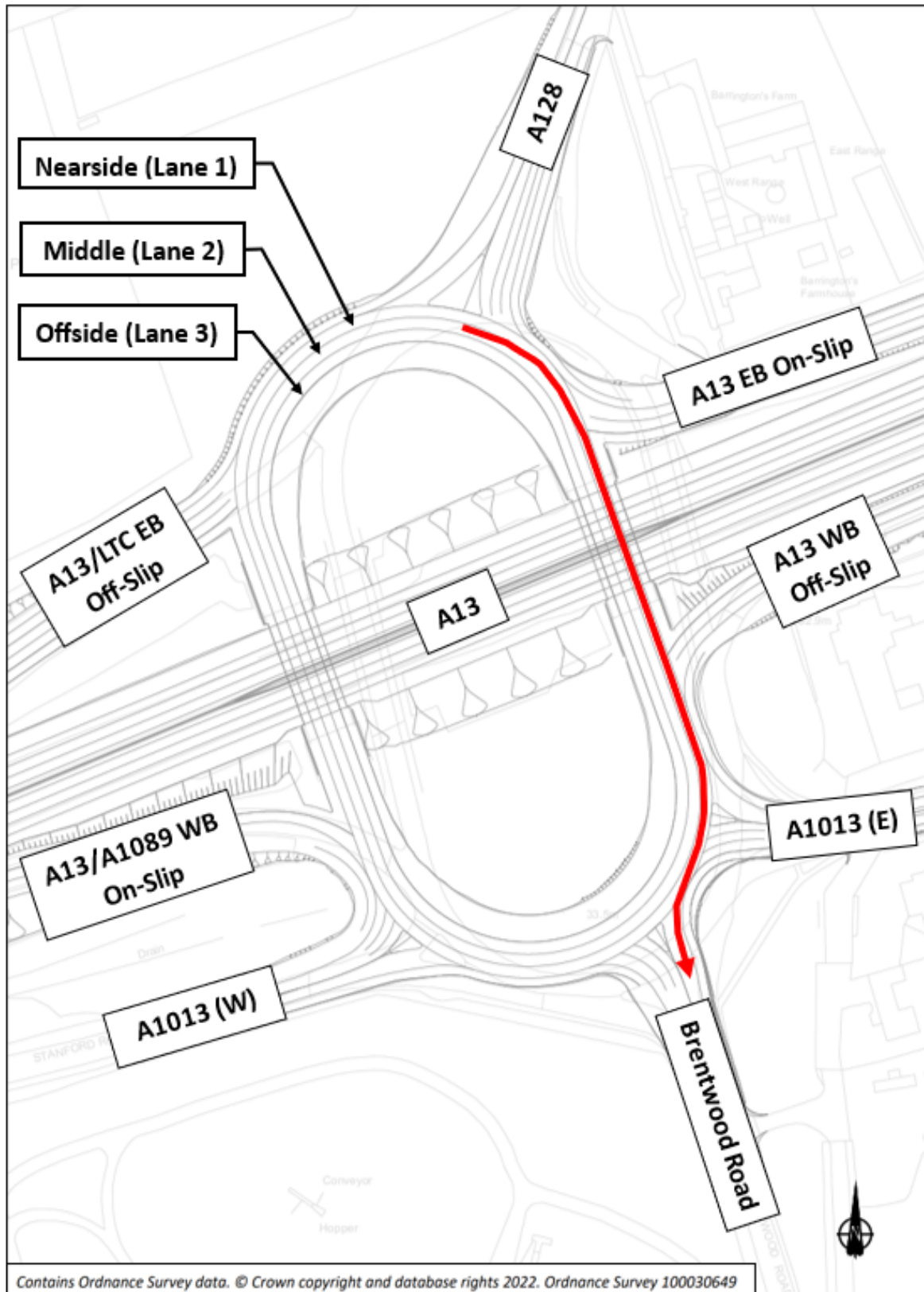
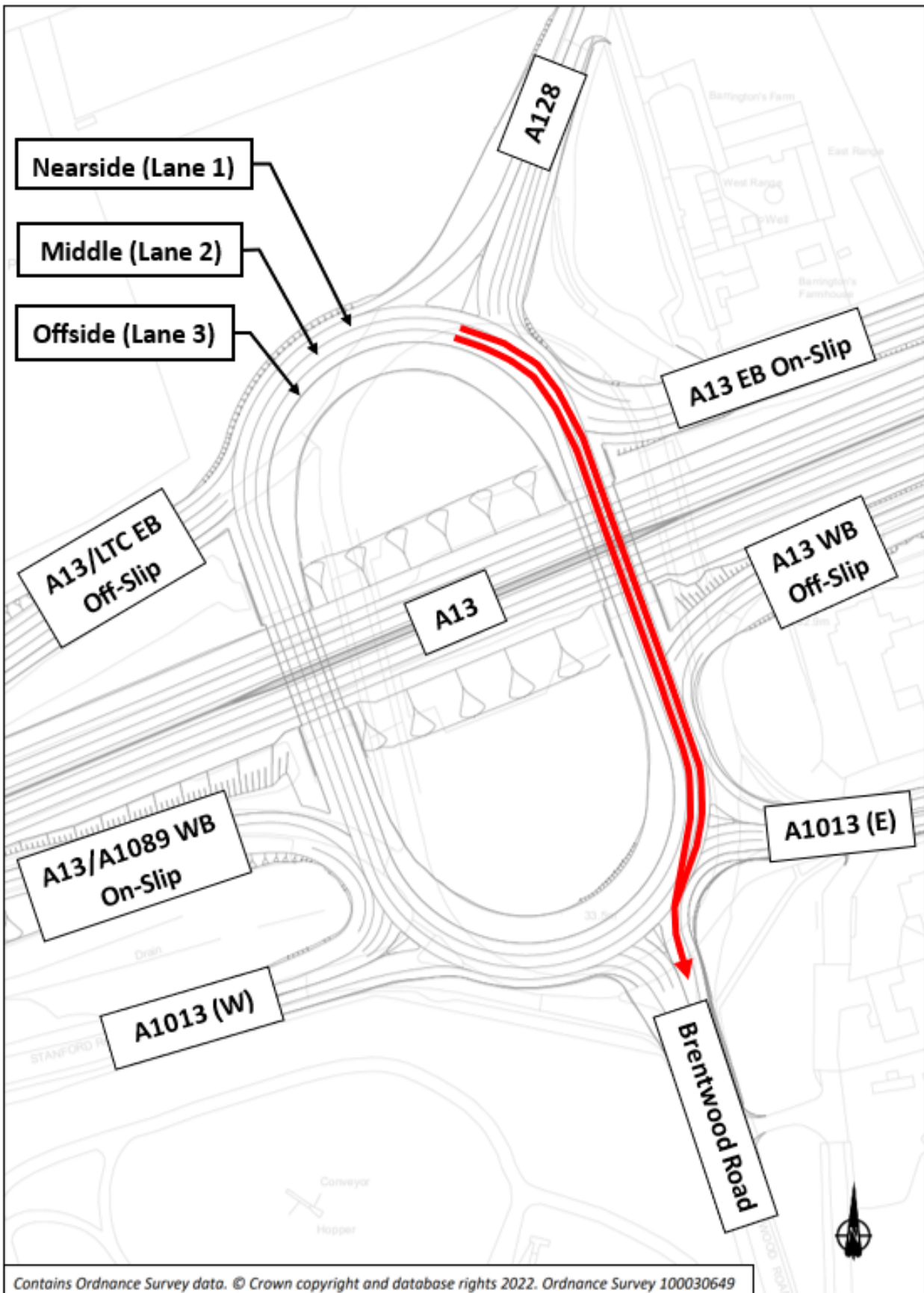


Plate A.2.2 Thurrock Council v3.6T DM model



### Plate A.2.3 Applicant v3.6 DS model

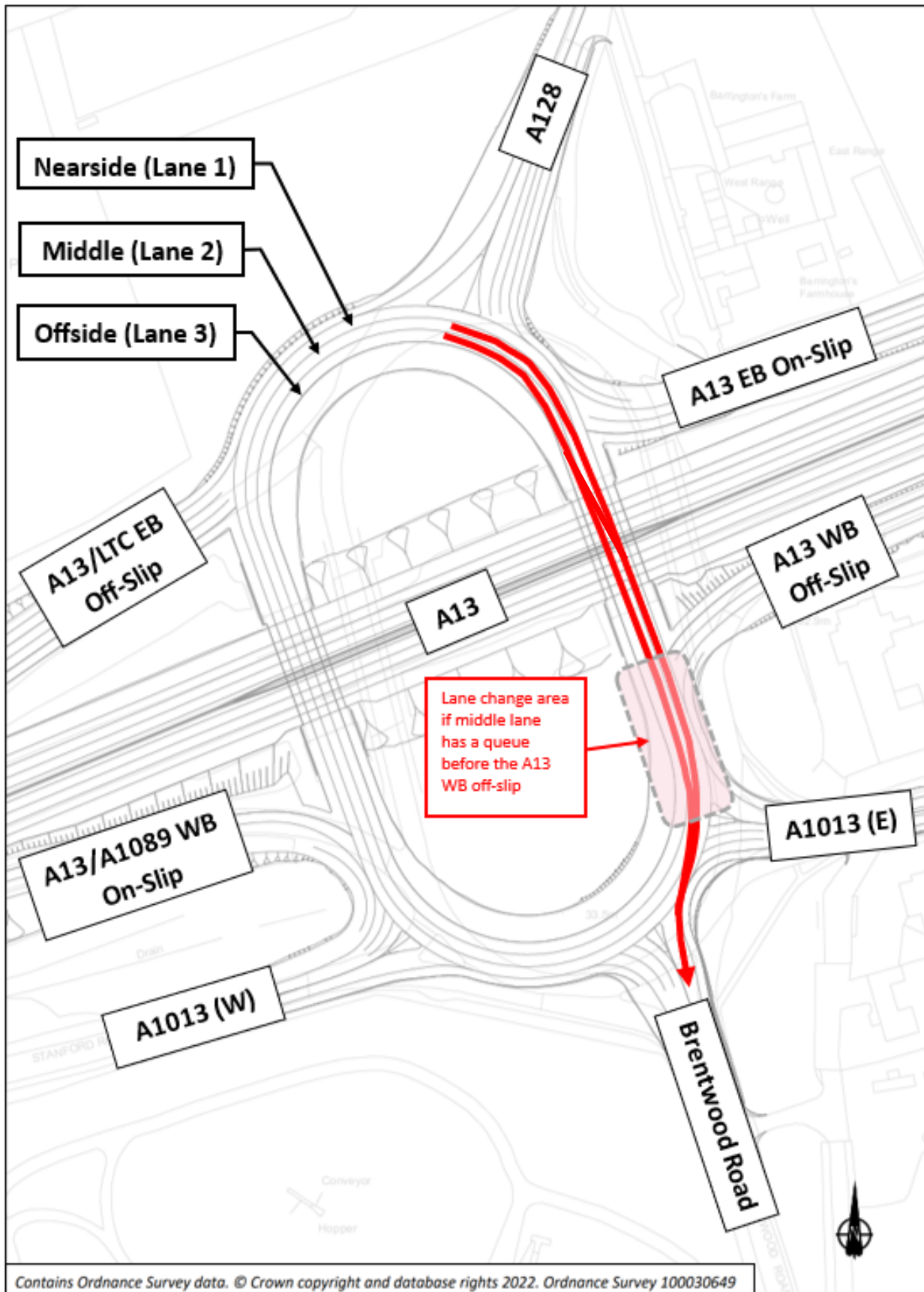
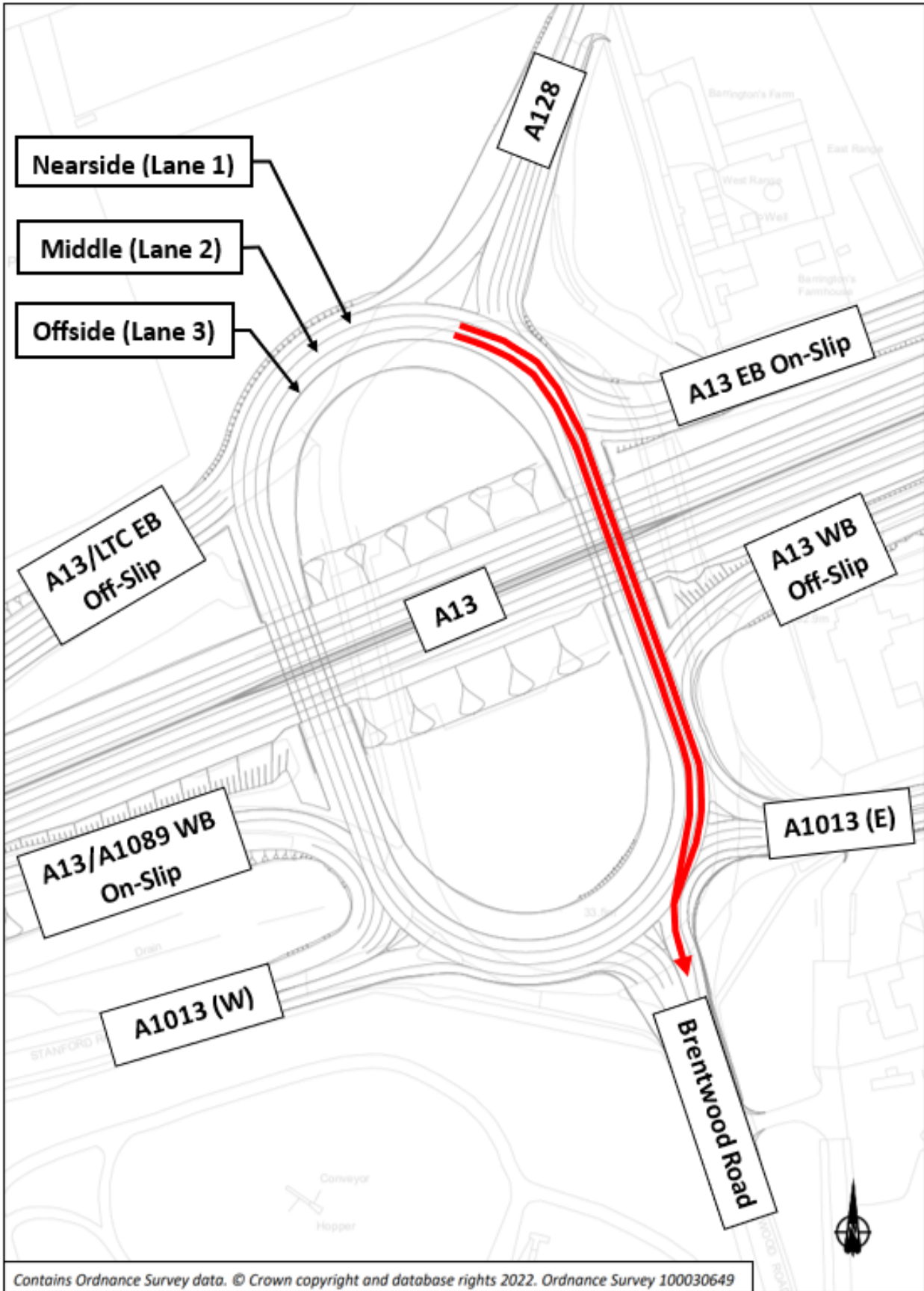
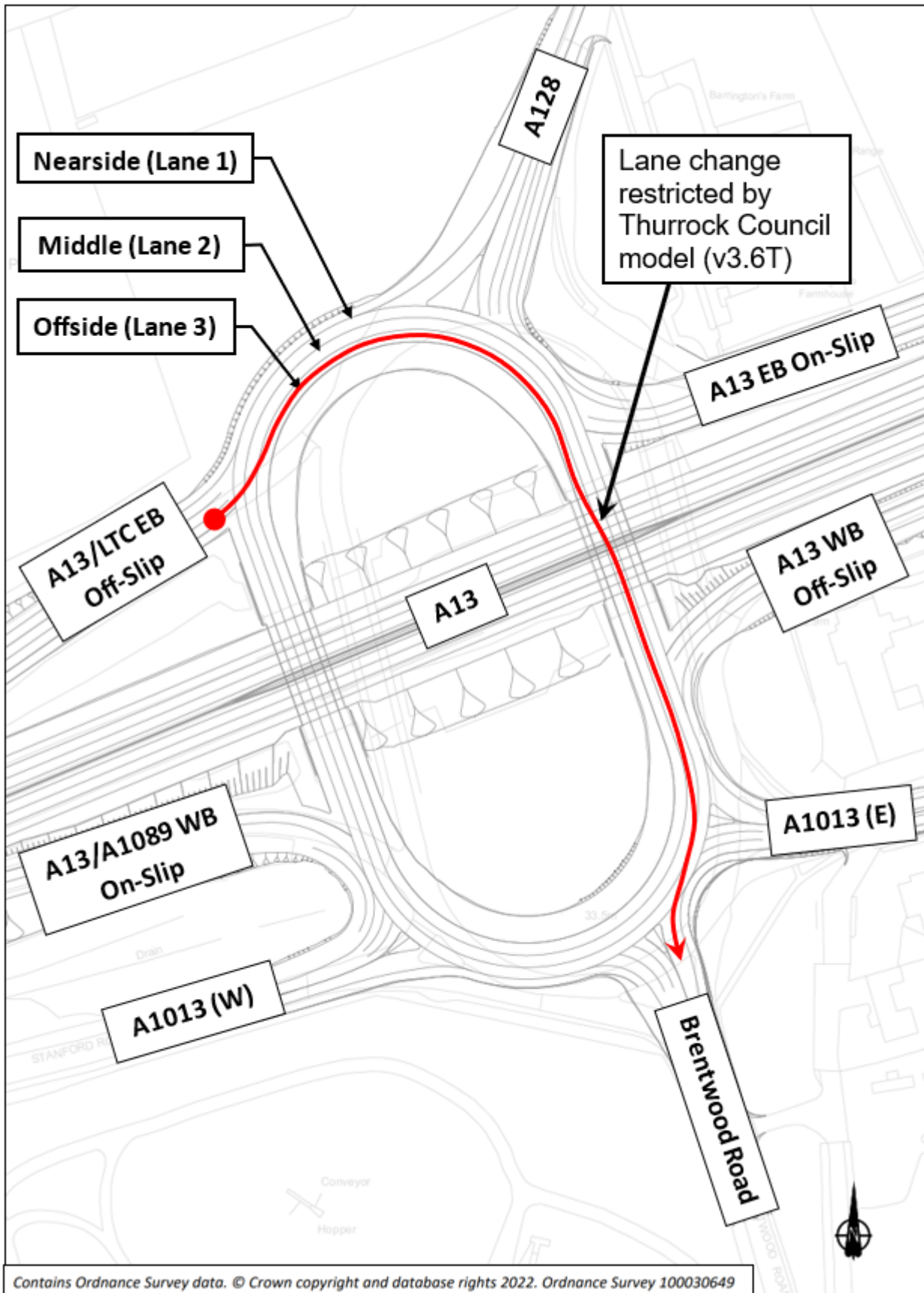


Plate A.2.4 Thurrock Council v3.6T DS model



### Plate A.2.5 Lane change restriction in Thurrock Council v3.6T DS model



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