

# **A12 Chelmsford to A120 widening scheme**

**TR010060**

## **6.3 ENVIRONMENTAL STATEMENT APPENDIX 3.2 MALDON ROAD AND HATFIELD PEVEREL BYPASS TECHNICAL REPORT**

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## Infrastructure Planning

### Planning Act 2008

# **A12 Chelmsford to A120 widening scheme**

## **Development Consent Order 202[ ]**

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### **ENVIRONMENTAL STATEMENT**

#### **APPENDIX 3.2 MALDON ROAD AND HATFIELD PEVEREL BYPASS TECHNICAL REPORT**

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## CONTENTS

<b>1</b>	<b>Executive summary .....</b>	<b>5</b>
<b>2</b>	<b>Introduction .....</b>	<b>6</b>
<b>3</b>	<b>History of the area.....</b>	<b>7</b>
3.1	Statement of Common Ground: North Heybridge Garden Suburb (January 2015).....	7
3.2	Essex Highways Route Based Strategy Study (2017) .....	7
3.3	Engagement with Essex County Council and other Local Planning Authorities .....	8
3.4	Position statement letter (December 2021).....	9
3.5	Junction 21 design development.....	10
3.6	Essex County Council 'requirements' letter.....	10
<b>4</b>	<b>Maldon Road mini roundabout assessment .....</b>	<b>11</b>
4.2	Existing mini roundabout microsimulation .....	11
4.3	Initial junction improvement options study.....	14
4.4	DCO junction improvement options study .....	19
4.5	Other considerations / options .....	23
4.6	Conclusion of Maldon Road mini roundabout assessment .....	23
<b>5</b>	<b>Maldon Road bypass design concept .....</b>	<b>24</b>
<b>6</b>	<b>Discipline assessment of bypass options .....</b>	<b>28</b>
6.2	Highways .....	29
6.3	Structures.....	30
6.4	Traffic.....	30
6.5	Operational safety.....	30
6.6	Drainage .....	30
6.7	WCH .....	30
6.8	Environment.....	30
6.9	Flood risk .....	32
6.10	Construction and traffic management .....	32
6.11	Planning and land .....	32
6.12	Stakeholder.....	32
6.13	Cost .....	33
6.14	Conclusion of discipline assessment of bypass options.....	33
<b>7</b>	<b>Recommended bypass option scoring .....</b>	<b>34</b>
7.2	Scoring.....	34
7.3	1a & 1b) Supporting economic growth .....	36

7.4	2a & 2b) A safe and serviceable network.....	36
7.5	3a & 3b) A more free-flowing network.....	37
7.6	4a) An improved environment – people .....	37
7.7	4b) An improved environment – place .....	37
7.8	5a) & 5b) A more accessible and integrated network.....	38
7.9	6a) Customer satisfaction – improved customer satisfaction .....	38
7.10	6b) Customer satisfaction – improved scheme profile .....	38
7.11	7a) Traffic and economic value for money – benefits.....	38
7.12	7b) Traffic and economic value for money – cost.....	38
7.13	8a) Deliverability/construction - carbon .....	39
7.14	8b) Deliverability/construction – highways geometry .....	39
7.15	8c) Deliverability/construction – construction challenge.....	39
7.16	8d) Deliverability/construction - drainage challenge and flood risk.....	39
7.17	8e) Deliverability/construction – structures challenge .....	39
7.18	8e) Deliverability/construction - planning and land challenge .....	40
7.19	Conclusion of recommended bypass option scoring.....	40
<b>8</b>	<b>Compatibility of J21 with a future bypass.....</b>	<b>41</b>
8.2	J21 design concept.....	41
8.3	Maldon Road bypass design assumptions.....	41
8.4	Traffic modelling.....	42
8.5	Operational performance .....	42
8.6	Conclusion of J21 compatibility.....	45
<b>9</b>	<b>Recoding of Maldon Road mini roundabout.....</b>	<b>46</b>
9.2	Assessment of Maldon Road mini roundabout using updated traffic model.....	46
<b>10</b>	<b>Conclusion.....</b>	<b>50</b>

## LIST OF PLATES

Plate 4.1 Vissim model results for 2042 'Do Minimum' and 'Do Something' scenarios, including LOS analysis and vehicle delays (in seconds) and queues (in meters) .....	12
Plate 4.2 Vissim model results for 2042 AM peak showing average queue lengths not with scheme ('Do Something') and without scheme ('Do Minimum') .....	13
Plate 4.3 Vissim model results for 2042 PM peak showing average queue lengths not with scheme ('Do Something') and without scheme ('Do Minimum') .....	14
Plate 4.4 DS-50B Option Layout. Signalised junction with two lanes for 50m on all approaches and pedestrian provision .....	17
Plate 4.5 DS-30B Option Layout. Signalised junction with two lanes for 30m on all approaches and pedestrian provision .....	18
Plate 4.6 DS-50D 'Option E' Layout. Signalised junction with two lanes for 50m on two approaches and pedestrian provision .....	21
Plate 4.7 DS-50C layout. Signalised junction with two lanes for 50m on two approaches and no pedestrian provision on Maldon Road.....	22
Plate 5.1 Sketch highlighting the three corridors for a bypass investigated .....	24
Plate 5.2 A sketch showing the bypass options investigated. The colour of the text box being the colour of the alignment option .....	27
Plate 8.1 Vissim model visualisation of J21 with bypass in place .....	43
Plate 9.1 Vissim model results for 2042 'Do Minimum' and 'Do Something' scenarios, including LOS analysis and vehicle delays (in seconds) and queues (in meters) based on new coding.....	47
Plate 9.2 Vissim model results based on new coding for 2042 AM peak showing average queue lengths with scheme ('Do Something') and without scheme ('Do Minimum') .....	48
Plate 9.3 Vissim model results based on new coding for 2042 AM peak showing average queue lengths with scheme ('Do Something') and without scheme ('Do Minimum') .....	49

## LIST OF TABLES

Table 3.1 Previous engagement and workshop dates where junction 21 was discussed with ECC and other LPAs .....	8
Table 4.1 Level of service key .....	11
Table 4.2 Maldon Road mini roundabout overall junction LOS analysis and average queues .....	12
Table 4.3 Summary of Vissim model LOS analysis results, for a range of potential mitigation options at the Maldon Road mini roundabout .....	15
Table 4.4 Summary of Vissim model LOS analysis results, for the refined range of potential mitigation options at the Maldon Road mini roundabout.....	19
Table 6.1 Discipline scoring guide .....	28
Table 6.2 Maldon Road bypass options discipline scoring assessment results .....	29

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Table 7.1 Maldon Road bypass option 2B against the current Do Something (DS) baseline discipline scoring assessment results. ....	35
Table 8.1 Level of service key .....	43
Table 8.2 Microsimulation LOS analysis (AM Peak) .....	44
Table 8.3 Microsimulation LOS analysis (PM Peak) .....	44
Table 9.1 Maldon Road mini roundabout overall junction LOS analysis and average queues .....	47

# 1 Executive summary

- 1.1.1 This Technical Report has been produced to record work that has been carried out regarding the Maldon Road/The Street mini roundabout in Hatfield Peverel and surrounding area as part of the local roads strategy for the Project Control Framework (PCF) Stage 3 on the A12 Chelmsford to A120 Widening Scheme.
- 1.1.2 This report captures and summarises the information contained within various existing technical notes produced documenting work undertaken within the above area
- 1.1.3 This report documents the traffic assessment and the projected change in traffic as the information has evolved, options for mitigation reflecting that traffic information and improvement of the operation of the existing Maldon Road/The Street mini roundabout for the projected change in traffic forecasted to occur as a result of the A12 Chelmsford to A120 Widening Scheme's implementation, and the design principles underpinning these options.
- 1.1.4 This report compares several potential bypass options, as requested by Essex County Council, as an alternative route from J21 to Maldon. The report has then identified the preferred option and assesses it in greater detail and compared against the existing arrangement of the mini roundabout
- 1.1.5 This report then compares the greatest performing potential bypass against the proposed scheme's current position to not provide improvements to the existing mini roundabout. This comparison builds upon previous investigations undertaken into this bypass, contained within earlier technical notes. A detailed traffic assessment of the impact of a potential bypass is presented.
- 1.1.6 The report includes an assessment of J21 and the compatibility of a future bypass with the current design proposals, including the impact on the performance of the current J21 because of a bypass.
- 1.1.7 The report then describes how the modelling of the existing mini roundabout modelling was audited, which resulted in the updating of some of the assumptions including the 'priority rules' of the junction operation. Based on these updated assumptions, the report provides a summary of how this junction is forecasted to perform against the Do Minimum scenario (where the proposed scheme is not constructed), and the Do Something scenario (where the proposed scheme is construction without any mitigation or improvement is carried forward).

## 2 Introduction

- 2.1.1 As part of the A12 scheme, we have proposed to consolidate junctions 20a, 20b and 21 into one all movement junction at junction 21. The Hatfield Peverel existing mini roundabout at the B1019 Maldon Road junction with the B1137 The Street has traffic capacity issues, with existing development putting pressure on the junction. In the design year of 2042, the junction is projected to have a Level of Service (LOS) E (see Table 4.1 for LOS key), which will be the case with or without the A12 scheme in place. It is however acknowledged that the scheme does change how traffic uses the junction.
- 2.1.2 There has been a long-standing historical campaign locally for the creation of a Maldon Road bypass to the east of Hatfield Peverel. The bypass link would connect the new Junction 21 southern dumbbell to Maldon Road further south via a new link road. This link road would bypass a short section of Maldon Road within Hatfield Peverel, as well as the Maldon Road junction with the B1137 and The Street. It is assumed that a Maldon Road bypass would relieve congestion on the existing Maldon Road, and the junction itself.
- 2.1.3 The purpose of this technical report is to present the results of assessments undertaken on a wide range of mitigation and improvement options for the junction. The report also presents the results an options assessment for a potential Hatfield Peverel bypass, funded outside of the scheme, and a scoring of the best performing bypass against the current proposals.



### 3 History of the area

#### 3.1 Statement of Common Ground: North Heybridge Garden Suburb (January 2015)

3.1.1 A Statement of Common Ground on highways matters has been signed by Maldon District Council (MDC), Braintree District Council (BDC) and Essex County Council (ECC), with agreement in principle on the following:

- Proposed growth in the Local Plan will exasperate existing levels of congestion at the B1019/B1137 junction (Maldon Road mini roundabout).
- ECC, MDC and BDC will continue to work in partnership to identify appropriate highway solutions to reduce congestion at the junction.
- All parties will work together to seek to reduce the amount of traffic using the B1019 (Maldon Road) through projects which encourage the use of sustainable transport options.
- All parties will work together to promote future strategic highway improvements to provide an effective long-term solution to relieve congestion at the junction.
- *‘Such upgrades will improve the reliability of the A12 and ensure that the local issues identified at the B1019/B1137 junction will be minimised. Maldon District Council (MDC) will seek to work with Braintree District Council (BDC), Essex County Council (ECC), the Highways Authority, the Southeast Local Enterprise Partnership, and Central Government to raise awareness and seek funding towards possible long-term solutions to this existing issue, considering future strategic growth in adjoining districts.’*

#### 3.2 Essex Highways Route Based Strategy Study (2017)

3.2.1 The Maldon Road mini roundabout has also been subject to previous studies carried out by Essex Highways as part of the Route Based Strategy Study (2017). The study comprises of identifying the existing issues and problems on the route and where appropriate in the immediately surrounding study area.

3.2.2 The study recommended a bypass to be progressed to Stage 2 as a long-term solution to relieve the B1019/B1137 The Street junction, however there is no evidence to suggest that further work has been carried out on this solution.

3.2.3 The study acknowledged that regarding improvements to the existing Maldon Road mini roundabout *‘Though not impossible, significant improvements would require the purchase of private land and/or demolition of property, therefore posing challenges with public acceptability and the extra costs associated with compulsory purchase orders and accommodation works.’*

3.2.4 Regarding the Maldon Rd bypass the study notes '*However, this option also poses significant challenges for Deliverability, Feasibility and Affordability, such as:*

- *Environmental issues of constructing new road through farmland / greenspace / environmentally sensitive land around Hatfield Peverel.*
- *Public acceptability very likely to be an issue.*
- *Potentially may induce more journeys due to improved journey time reliability and accessibility. Technical challenge of connecting bypass to A12, especially as it is currently being widened at this section.*
- *Large cost for such a project and funding source.'*

### 3.3 Engagement with Essex County Council and other Local Planning Authorities

3.3.1 Throughout the design stages there has been extensive engagement with ECC and other local planning authorities on the junction 21 proposals. A summary of some of this engagement can be found in Table 3.1 below.

**Table 3.1 Previous engagement and workshop dates where junction 21 was discussed with ECC and other LPAs**

Date	Workshop name	J21 Proposals
30/05/2017	ECC Consultation Response meeting	General link roads discussed
30/05/2017	Maldon District Council	Discussed
07/07/2017	Members Forum	Discussed
11/07/2017	Economic Forum	Discussed
01/08/2017	Colchester and Maldon Community Forum	Discussed
03/08/2017	Braintree and Chelmsford Community Forum	Discussed
11/05/2020	Maldon District Council	Discussed
21/07/2020	Junction Workshop	Discussed
25/08/2020	West Community Forum	Discussed
16/11/2020	Hatfield Peverel	Discussed
18/11/2020	Witham Town Council	Discussed
24/11/2020	Local Roads Workshop	Discussed
01/12/2020	NMU Workshop	Discussed
04/12/2020	NMU Workshop	Discussed
17/12/2020	Boreham Parish Council	Discussed

Date	Workshop name	J21 Proposals
04/03/2021	Junction Workshop	Discussed
08/03/2021	Members Forum	Discussed
31/03/2021	Hatfield Peverel	Discussed
11/05/2021	Junction Workshop	Discussed
29/09/2021	Supplementary Consultation Workshop	Discussed
30/09/2021	Hatfield Peverel	Discussed
07/10/2021	Members Forum	Discussed
21/10/2021	Boreham Parish Council	Discussed
10/12/2021	ECC Traffic Workshop	Discussed
25/02/2022	ECC Traffic Workshop	Discussed
10/03/2022	Hatfield Peverel	Discussed
20/04/2022	ECC Statement of Common Ground (SoCG)	Discussed
11/05/2022	Joint National Highways ECC Scheme Visit	Discussed
12/05/2022	ECC SoCG	Discussed
18/05/2022	Maldon District Council	Discussed
01/06/2022	ECC SoCG	Discussed

### 3.4 Position statement letter (December 2021)

3.4.1 Following engagement sessions, the A12 project issued to ECC in the form of a position statement letter, on December 23, 2021. This letter outlined the work that had been undertaken on the mini roundabout junction, and confirmed the feedback that was provide to the project from Essex County Council at a workshop on 29 of September that the project should:

- Freeze further design work on interventions at Maldon Road and The Street with the position being that no acceptable solution has been found to mitigate the impacts arising from the A12 scheme.
- Continue with work to confirm that a future Maldon Road Link could tie into the southern dumbbell of the new junction 21 if it came forward in the future.
- Enter open discussions with the council about potential funding contributions to a future Maldon Link Road.
- Seek to formally agree the approach with the council and document this accordingly
- Consider how we might assist in your discussions with the Department for Transport for funding a future Maldon Road Link

### **3.5 Junction 21 design development**

- 3.5.1 A holistic options appraisal for the proposed position for the new J21 and the closure of the existing J20a, J20b and J21 was undertaken. The proposed J21 seeks to combine the traffic movements served by these three closed junctions into one junction that will be constructed to modern safety standards and is fit for purpose. It is recognised that the A12 often conveys both long-distance and short-distance journeys and one of the objectives of the Proposed Scheme as part of the Road Investment Strategy is to ensure the 'right traffic is on the right roads' and discourage its use for shorter journeys without unnecessarily increasing pressure on the local road network.
- 3.5.2 The current proposal for junction 21 which has been presented at supplementary consultation, considered feedback received as part of the initial statutory consultation. In the current junction 21 proposals, traffic accesses the junction from Hatfield Peverel, via the Wellington Road bridge replacement.
- 3.5.3 As the proposed Junction 21 is the consolidation of the existing junctions 20a, J20b and J21, a physical linkage is deemed to be required between Hatfield Peverel, Witham South and the A12 itself. To remove a proposed Junction 21 from the scheme would encourage traffic to drive through Hatfield Peverel, Witham and Boreham to reach the widened A12. Whilst this scenario has not been modelled using traffic forecasting software, this is expected to put additional pressure on both the proposed junction 19 and junction 22, as well as other local road junctions which would see an increase in traffic without a proposed Junction 21.

### **3.6 Essex County Council 'requirements' letter**

- 3.6.1 On 31 March 2022, a letter listing Essex County Council's requirements which reflected the county council's position on the proposed final scheme.
- 3.6.2 As part of these requirements, Essex County Council advocated for provision, within the scheme, for a new link road connecting the new southern Junction 21 dumbbell roundabout to the B1019 at an appropriate point.
- 3.6.3 Within these requirements, Essex County Council acknowledged that although the junction is already operating overcapacity, that the A12 scheme will make it materially worse, and as described later in the report, agree that no acceptable solution to locally improving the junction itself could be found.


## 4 Maldon Road mini roundabout assessment

- 4.1.1 Extensive traffic analysis of the Hatfield Peverel existing mini roundabout at the B1019 Maldon Road junction with the B1137 The Street has been undertaken using both a strategic traffic model (in SATURN modelling software) and a microsimulation model of the junctions (in Vissim modelling software). The strategic model has been used to understand the overall level of traffic flow and the change in traffic routing due the scheme, while the microsimulation model has been used to give a more detailed assessment of how well key junctions operate.
- 4.1.2 Traffic models have been produced for the following scenarios:
- Base – 2017 flows, existing A12 and local roads in place
  - Do Minimum (DM) – 2042 with no A12 scheme in place
  - Do Something (DS) – 2042 with the A12 scheme in place

### 4.2 Existing mini roundabout microsimulation

- 4.2.1 As a result of a desktop study comparing the traffic flows in the Base (2017), 'Do Minimum (2042)' and 'Do Something (2042)' scenarios the impact on Maldon Road mini roundabout was investigated in further detail in Microsimulation using Vissim. These results all assume the existing layout of the mini roundabout remains with no intervention.
- 4.2.2 The LOS was assessed for both the Maldon Road mini roundabout junction as a whole with results presented in Table 4.2 below, as well as on each of the respective arms approaching the junction with results presented in Plate 4.1 below.
- 4.2.3 The LOS defines how well it is operating based on the amount of time lost based on delays, queuing, and journey times. The LOS is assigned a letter from A to F as detailed in Table 4.1.

**Table 4.1 Level of service key**

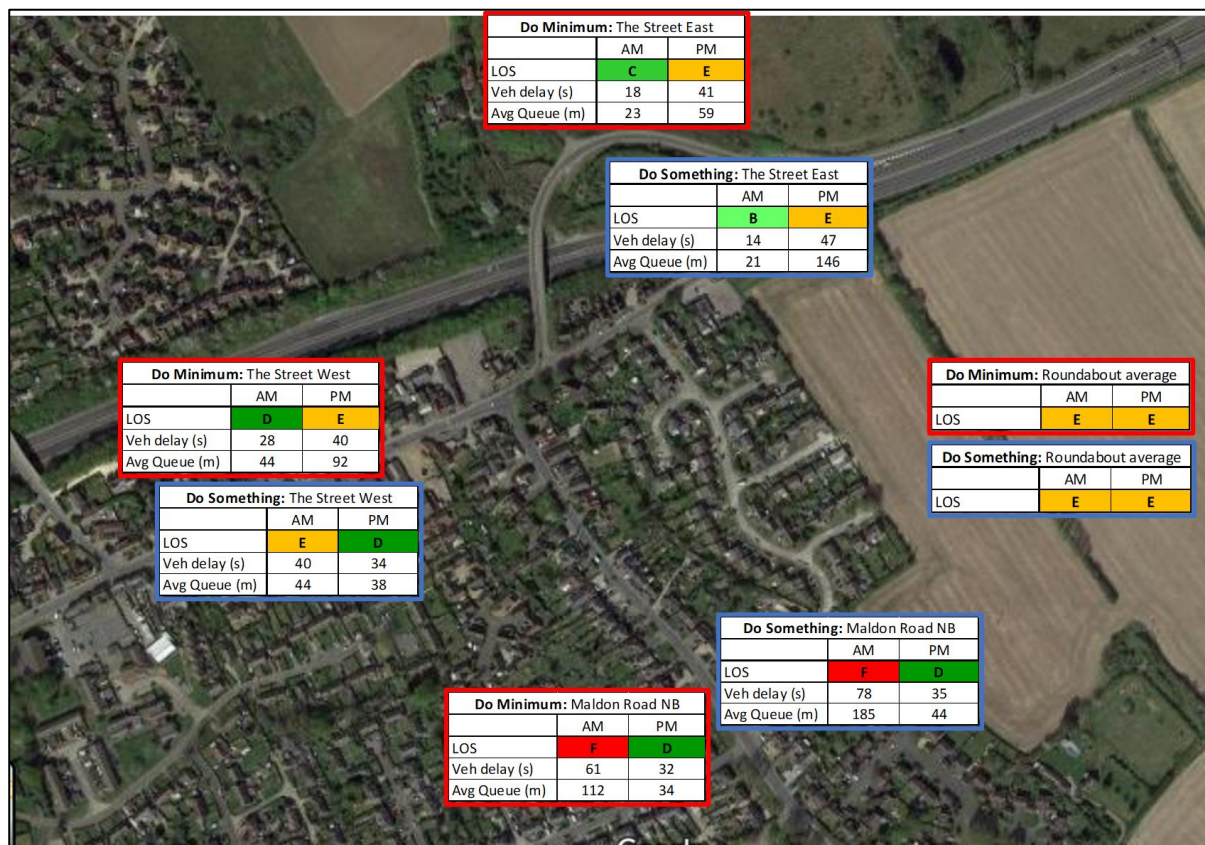
Level of Service for None Signal Junctions		
<b>LOS A</b>	loss time < 10 seconds	<b>Best operating conditions</b>  <b>Worst operating conditions</b>
<b>LOS B</b>	loss time > 10 to 15 seconds	
<b>LOS C</b>	loss time > 15 to 25 seconds	
<b>LOS D</b>	loss time > 25 to 35 seconds	
<b>LOS E</b>	loss time > 35 to 50 seconds	
<b>LOS F</b>	loss time > 50 seconds	

- 4.2.4 The LOS results and queues for the AM and PM peak are presented in Table 4.2.



**Table 4.2 Maldon Road mini roundabout overall junction LOS analysis and average queues**

Model	LOS	Veh. Delay (seconds)	Av. Queue (m)		
			Maldon Road approach (NB)	The St Western Approach (EB from Hatfield. Peverel)	The St Eastern Approach (WB from J21)
Base (2017) AM	LOS D	26	53	14	27
DM (2042) AM	LOS E	36	112	44	23
DS (2042) AM	LOS E	45	185	44	21
Base (2017) PM	LOS C	23	19	42	11
DM (2042) PM	LOS E	38	34	92	59
DS (2042) PM	LOS E	40	44	38	146

**Plate 4.1 Vissim model results for 2042 ‘Do Minimum’ and ‘Do Something’ scenarios, including LOS analysis and vehicle delays (in seconds) and queues (in meters)**

**Average Queue Lengths (m) – AM**

**Key:**

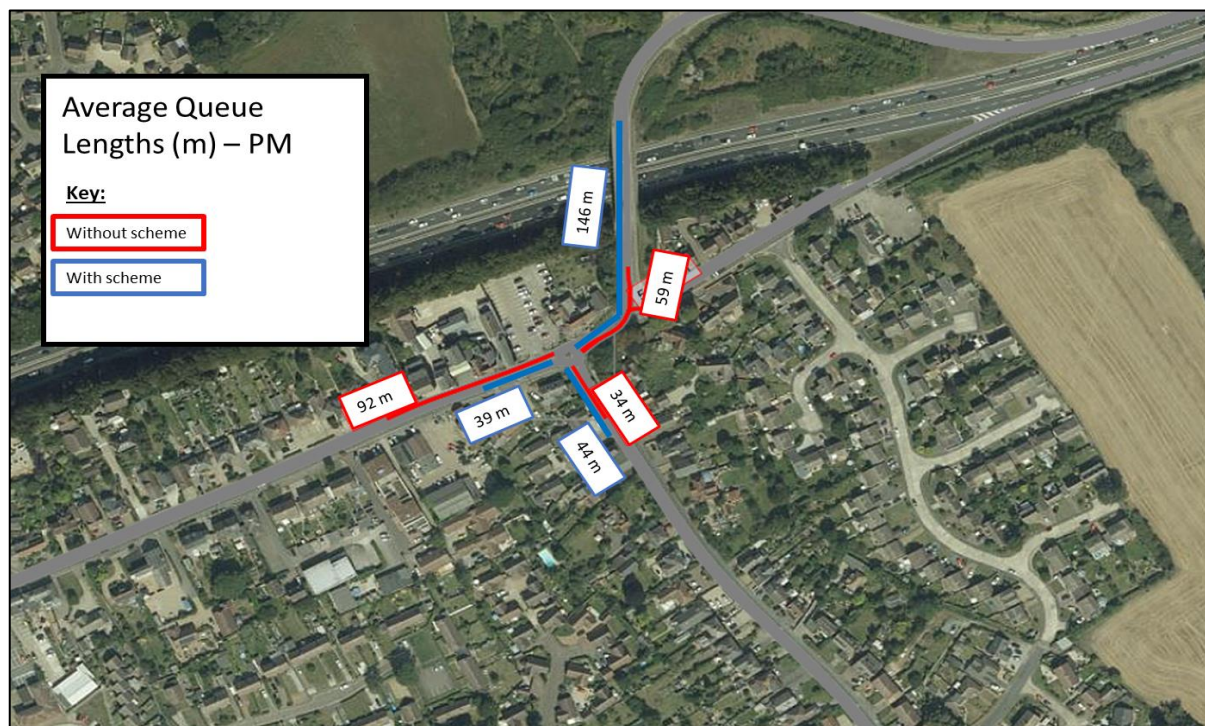
- Without scheme (Red)
- With scheme (Blue)

Location	Without scheme (m)	With scheme (m)
Top Left Junction	44	44
Top Right Junction	23	22
Bottom Left Junction	111	185

0 100 m



**Plate 4.3 Vissim model results for 2042 PM peak showing average queue lengths not with scheme ('Do Something') and without scheme ('Do Minimum')**



## 4.3 Initial junction improvement options study

- 4.3.1 Initially, a significant number of options for improvement of the junction to an acceptable LOS in the design year 2042 'Do Something' scenario were investigated, to mitigate the increased traffic flow due to the A12 scheme. All options presented below were investigated in detail in Microsimulation using Vissim to assess the traffic flows in the 'Do Something (2042)' scenario. A summary of the results of these assessments is presented below in Table 4.3.
- 4.3.2 It should be noted that at the time of these initial assessments, the Junction 21 layout was as presented at Statutory Consultation, that is, with the main local access road along The Street, and Wellington Road as a WCH only route. As discussed in Section 4.4 below, these options were then further investigated and reviewed with the DCO SATURN flows, and the current supplementary consultation and DCO Junction 21 layout.
- 4.3.3 The LOS defines how well it is operating based on the amount of time lost based on delays, queuing, and journey times. The LOS is assigned a letter from A to F as detailed in Table 4.1.

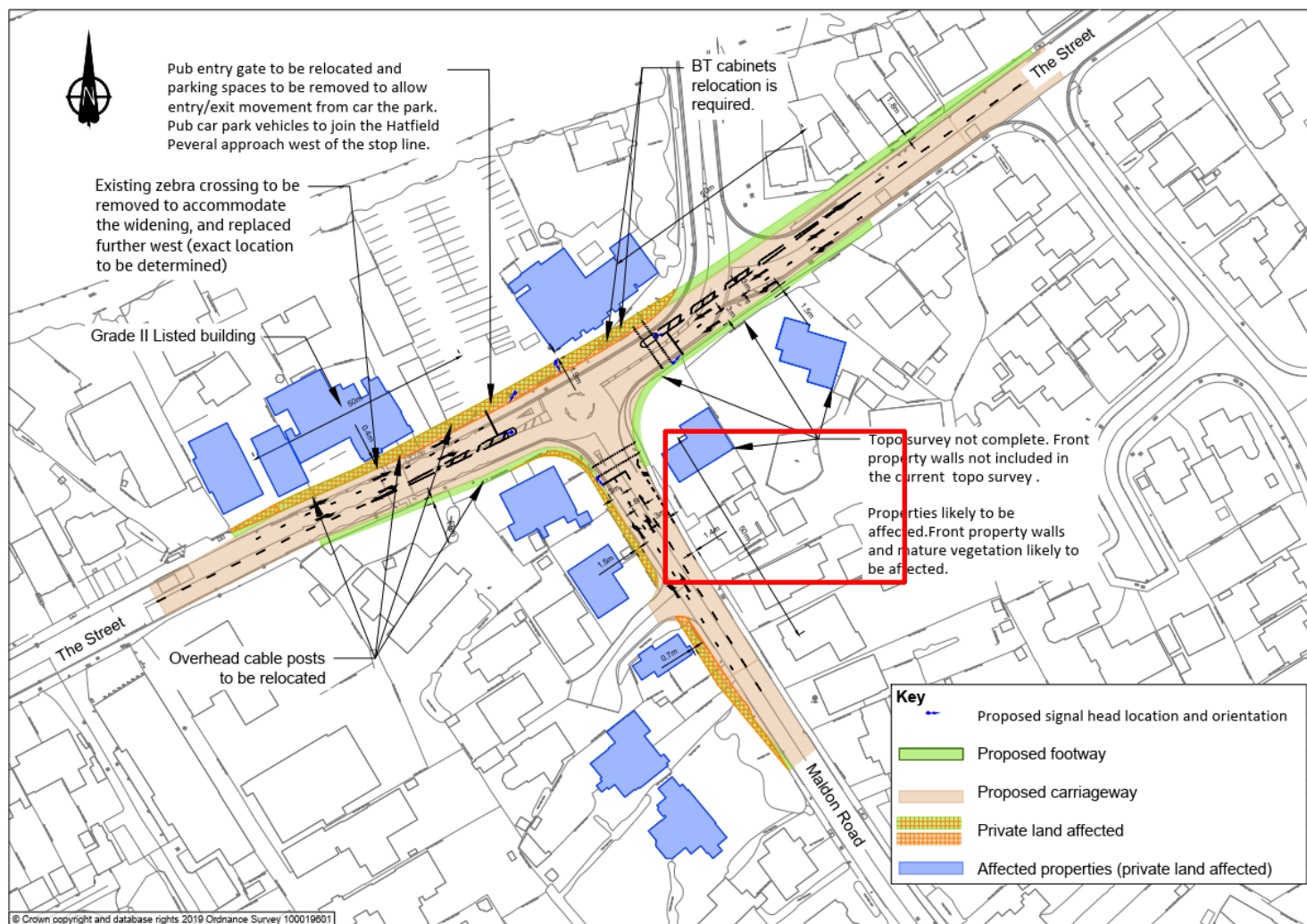


**Table 4.3 Summary of Vissim model LOS analysis results, for a range of potential mitigation options at the Maldon Road mini roundabout**

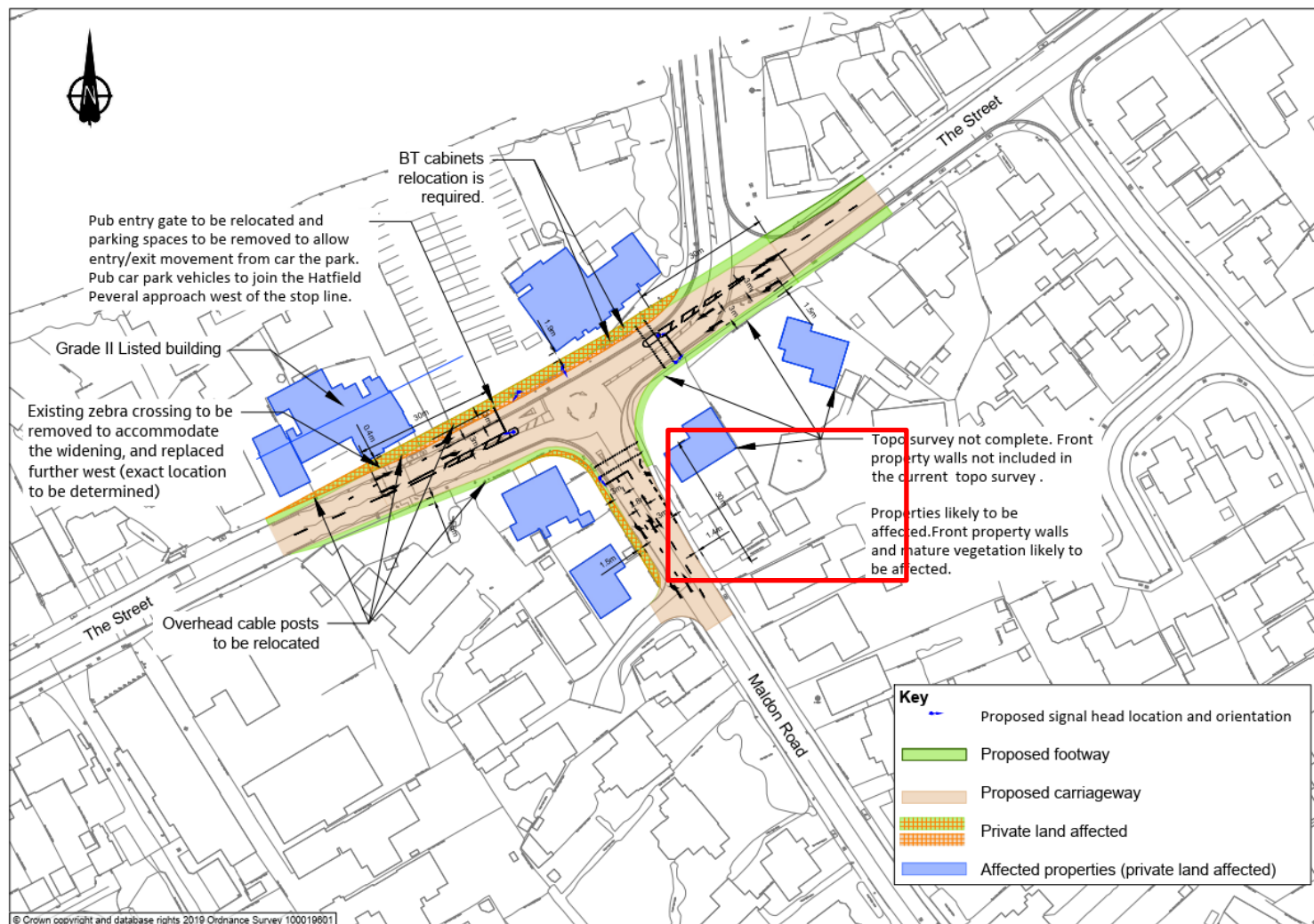
Junction Layout / Option and Reference		AM Peak LOS 2042 DS	PM Peak LOS 2042 DS	Description
DS	Existing Layout	LOS E	LOS E	2042 - The existing layout, as described above in Section 4.2.
DS2	Signalised Layout	LOS F	LOS F	2042 - A signalised layout, with single lane approaches.
DS-50A	Signalised Layout, 50m 2 lanes	LOS B	LOS C	2042 - Signalised layout with two lanes over 50m on all approaches.
DS-50B	Signalised Layout, 50m 2 lanes, WCH crossings	LOS D	LOS D	2042 - Signalised layout with two lanes over 50m on all approaches, and signalised pedestrian crossings on two arms.
DS-30A	Signalised Layout, 30m 2 lanes	LOS C	LOS C	2042 - Signalised layout with two lanes over 30m on all approaches.
DS-30B	Signalised Layout, 30m 2 lanes, WCH crossings	LOS F	LOS F	2042 - Signalised layout with two lanes over 30m on all approaches, and signalised pedestrian crossings on two arms.
DS-BT	Banned Turns	LOS F	LOS F	2042 – Simple priority junction (non-signalised) with banned turns into The Street Western Arm
DS-BT50A	Signalised Layout, 50m 2 lanes, banned turns	LOS B	LOS B	2042 - Signalised layout with two lanes over 50m on The Street eastern arm approach, with banned turns into The Street Western Arm
DS-BT50B	Signalised Layout, 50m 2 lanes, banned turns, WCH crossings	LOS C	LOS C	2042 - Signalised layout with two lanes over 50m on The Street eastern arm approach, and signalised pedestrian crossings on two arms, with banned turns into The Street Western Arm
DS9-BT30A	Signalised Layout, 30m 2 lanes, banned turns	LOS B	LOS B	2042 - Signalised layout with two lanes over 30m on The Street eastern arm approach, with banned turns into The Street Western Arm
DS-BT30B	Signalised Layout, 30m 2 lanes, banned turns, WCH Crossings	LOS C	LOS C	2042 - Signalised layout with two lanes over 30m on The Street eastern arm approach, and signalised pedestrian crossings on two arms, with banned turns into The Street, Eastern Arm

- 4.3.4 All initial acceptable solutions in terms of LOS involve signalling the junction and providing two lanes on approach on three arms. To accommodate two lanes on approach as well as absolute minimum acceptable footway widths past signal poles, significant third-party land take is required. In addition, it requires clearance of existing mature trees with TRO, and on The Street western arm, may have negative effects on a listed building. Concept layouts of these options are presented below in Plate 4.4, and presented to stakeholders including Essex County Council.
- 4.3.5 Although banned turns (banning the right turn into Maldon Road from The Street western arm, left turn out of Maldon Road into The Street) were investigated as a potential option, it would mean that traffic including heavy goods vehicles (HGVs) would be diverted onto Church Road and New Road, residential streets which are unsuited for an increase in traffic or HGVs. Due to this and any options involving banned turns also requiring signalisation and two lanes on approach with associated negative effects, it was therefore considered not feasible.
- 4.3.6 In summary:
- Providing 50m of two-lane approaches in all arms and no controlled pedestrian crossing provision provides an acceptable level of service (LOS B & C), although has significant implications (cost, land, utilities, environmental, social etc.).
  - Providing 30m of two-lane approaches in all arms and no pedestrian crossing provision provides an acceptable level of service (LOS C), although also has significant implications (cost, land, utilities, environmental, social etc.).
  - Providing 50m of two-lane approaches with integrated pedestrian crossing provision provides an acceptable level of service (LOS D), although also has significant implications (cost, land, utilities, environmental, social etc.).
  - Providing 30m of two-lane approaches in all arms with integrated pedestrian crossing provides unacceptable level of service (LOS F).
  - Banning turns improves the junction LOS to an acceptable level (LOS B) but is likely to have unacceptable consequences to the local residential streets.
  - Any other possible layouts which do not ban turns but where the traffic still passes through the junction, will still be limited by the junction capacity, and will likely require two lanes on approach to any signals, with the implications noted above.

**Plate 4.4 DS-50B Option Layout. Signalised junction with two lanes for 50m on all approaches and pedestrian provision**



**Plate 4.5 DS-30B Option Layout. Signalised junction with two lanes for 30m on all approaches and pedestrian provision**





## 4.4 DCO junction improvement options study

- 4.4.1 Following the redesign of Junction 21 to include the northern link road as presented at supplementary consultation, the options described in Section 4.3 above were reviewed and further refined into a single preferred option for mitigation. As before the traffic flows in the 'Do Something (2042)' scenario were used, now with the latest SATURN DCO flows.
- 4.4.2 The previous options were refined to check whether leaving a single lane on approach on The Street arm would produce acceptable results, given the expected reduced land take impact.

**Table 4.4 Summary of Vissim model LOS analysis results, for the refined range of potential mitigation options at the Maldon Road mini roundabout**

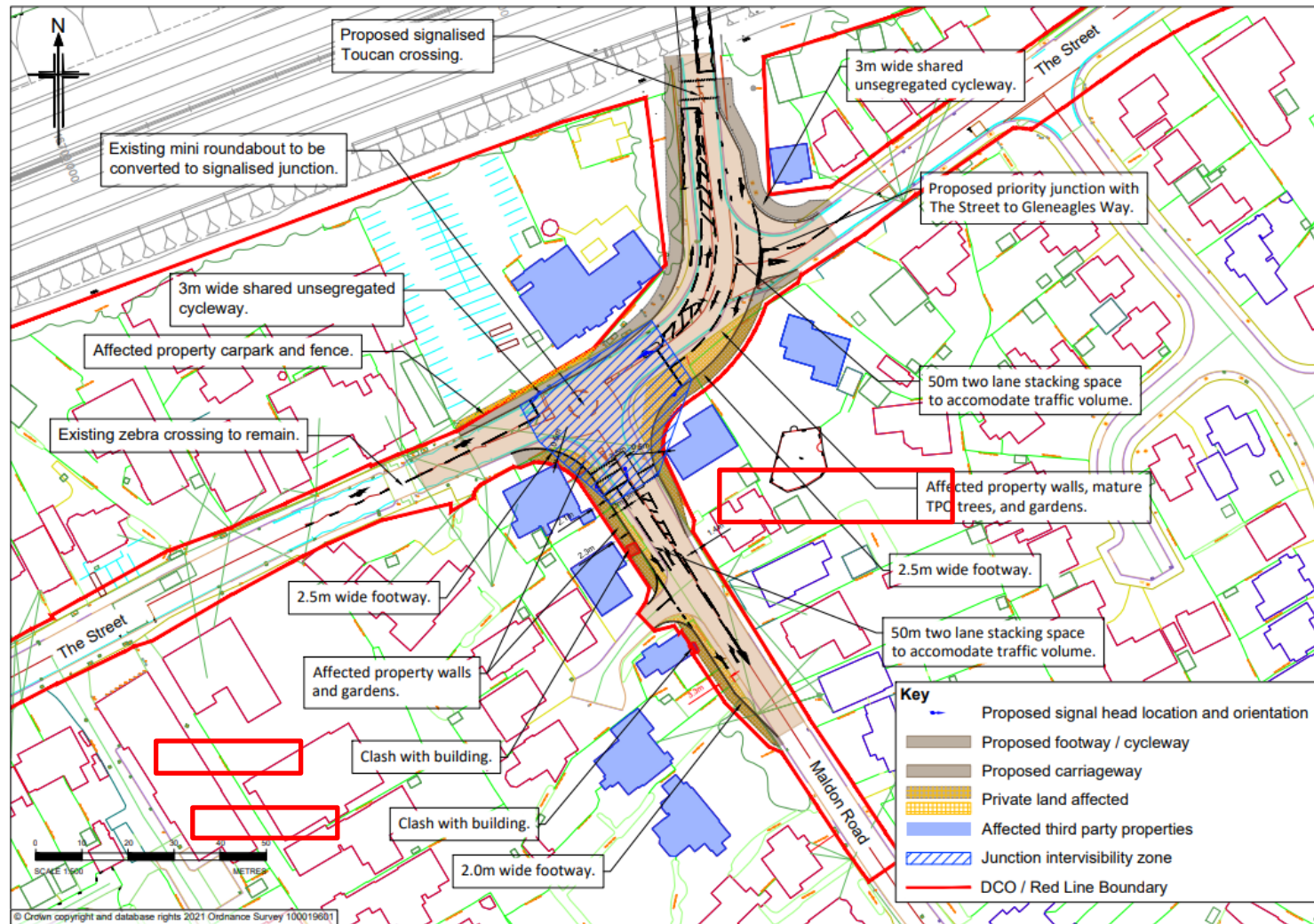
Junction Layout / Option and Reference		AM Peak LOS 2042 DS	PM Peak LOS 2042 DS	Description
DS	Existing Layout	LOS E	LOS E	2042 - The existing layout, as described above in Section 4.2.
DS2	Signalised Layout	LOS F	LOS F	2042 - A signalised layout, with single lane approaches.
DS-30C	Signalised Layout, 30m 2 lanes, single lane The Street Western Arm	LOS E	LOS D	2042 - Signalised layout with two lanes over 30m on the Maldon Road and The Street eastern arm only. The Street eastern arm to remain as single lane on approach.
DS-50C	Signalised Layout, 50m 2 lanes, single lane The Street Western Arm	LOS C	LOS C	2042 - Signalised layout with two lanes over 50m on the Maldon Road and The Street eastern arm only. The Street eastern arm to remain as single lane on approach.
DS-50D (Option E)	Signalised Layout, 50m 2 lanes, single lane The Street Western Arm, pedestrian provision	LOS D	LOS D	2042 - Signalised layout with two lanes over 50m on the Maldon Road and The Street eastern arm only. The Street eastern arm to remain as single lane on approach. Pedestrian provision on the Maldon Road arm, and on the Wellington Bridge approach.

- 4.4.3 The Vissim assessment utilising the SATURN DCO flows with the current junction 21 layout confirms that the existing junction with no mitigation ('Do Something') results in a poor LOS E.
- 4.4.4 Simply converting the existing mini-roundabout arrangement to a signalised junction without providing additional lanes on approach (DS2) has been forecasted to exacerbate the overall performance of the junction. This is because the existing roundabout operation is not dominated by any particular

flow direction so there would be no benefit to changing this from a priority arrangement to a controlled arrangement without providing additional queuing capacity. By extension, any local improvements to increase the performance of the existing junction would require additional lanes on the approach to traffic signals.

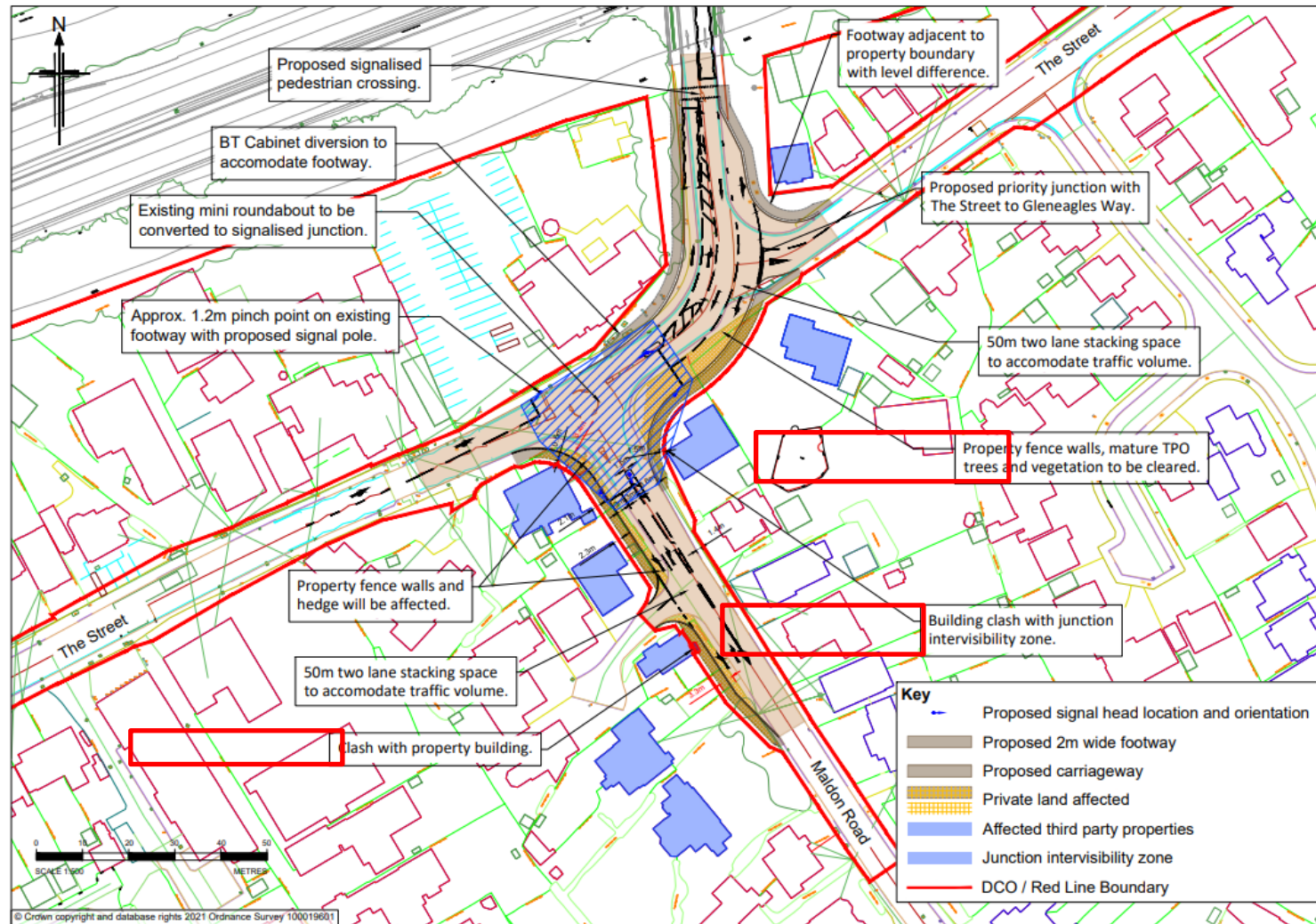
- 4.4.5 The signalised junction, 30m two-lane approach on Maldon and The Street eastern arm only option ('DS-30C') offers some improvement when compared to the 'Do Minimum' (without A12 scheme scenario). In traffic only terms, it is a 'nil detriment' on the poor performing existing junction, although the A12 scheme does have a detrimental effect on Maldon Road and the junction 21 connector arm.
- 4.4.6 However, for this option the overall the junction still performs poorly in the design year 2042, with a LOS E in the morning peak, meaning that this is not a long-term solution which is worth the significant negative impacts it would have on land-take and the environment.
- 4.4.7 Although the DS-50C option provides a better LOS, it does not include any pedestrian provision at the junction, which was not considered feasible. Therefore, the DS-50D option is considered the only feasible option for mitigation at the junction, in terms of acceptable traffic performance and pedestrian provision. As for all widening options at the junction, this option does have significant adverse effects on third party land, the environment, and the character of the area.
- 4.4.8 The DS-50D option (also known as Option E) has been presented to Essex County Council, where very negative feedback was received. A layout of the option can be seen below in Plate 4.6.
- 4.4.9 All widening options that address the traffic capacity problems at the junction have similar negative effects. There is a loss of TPO trees and impact on the character of the streetscape which are significant adverse effects that cannot be mitigated. There is very little if any space to replant large species and would take decades to reach the maturity of some of those lost. All widening options require significant land take from surrounding properties.
- 4.4.10 Regarding public perception of an intervention such as the DS-50D option, it should be noted that although the signalised junction performs better than the 2042 'Do Minimum' scenario, that 'Do Minimum' is not a real scenario that the local community have experienced. It is a prediction of what would happen by 2042 if there were no intervention in the junction at all. Residents of Hatfield Peverel may not see the direct benefits of this junction, as it still performs at the same LOS D as the base scenario. In effect, residents would see a large new junction in the centre of the village, and the associated negative environmental and social effects, which performs at the same LOS as it does now.

**Plate 4.6 DS-50D 'Option E' Layout. Signalised junction with two lanes for 50m on two approaches and pedestrian provision**





**Plate 4.7 DS-50C layout. Signalised junction with two lanes for 50m on two approaches and no pedestrian provision on Maldon Road**





## **4.5 Other considerations / options**

- 4.5.1 As well as various options to increase the capacity of the existing Maldon Road mini roundabout, a high-level assessment of introducing localised delay at the proposed Junction 21 was considered.
- 4.5.2 The proposed junction 21 is expected to operate under a priority arrangement, that is, without any signal control. The addition of signal control to hold back traffic from reaching the Maldon Road mini roundabout from the east would not meet the proposed scheme's strategic objective of improving journey time savings across the route, and as queuing lengths are not expected to reach any upstream junctions at of mini roundabout, any saving of queuing time would only be perceived by the driver. Extremely long periods of inter-green time without any perception of conflict from other drivers using the roundabout may cause drivers to injudiciously disobey the red signal and join the roundabout as they feel as though there is no chance of conflict thus increasing the risk of collisions. The additional installation and operation cost of providing traffic signals at junction 21 where there is no capacity need to do so would also need to be justified.

## **4.6 Conclusion of Maldon Road mini roundabout assessment**

- 4.6.1 This section provides a narrative of how the proposed A12 widening scheme is expected to change how traffic approaches and leaves the existing Maldon Road mini-roundabout, and how this affects the performance of this junction
- 4.6.2 A number of local capacity improvements were assessed based on how they affected property, listed buildings, the environment and the performance of junctions, with DS-50D-Option E being selected as the best-performing option. In September 2021 this option was presented to the local authority including Essex County Council.
- 4.6.3 Due to the impact to property, listed buildings and the environment, there was strong opposition from the local planning authorities and Essex County Council to this proposal. As such it was agreed not to take it further forward. In December 2021 the project wrote to Essex County Council to formalise that position, and to confirm the feedback that was received at the September meeting.

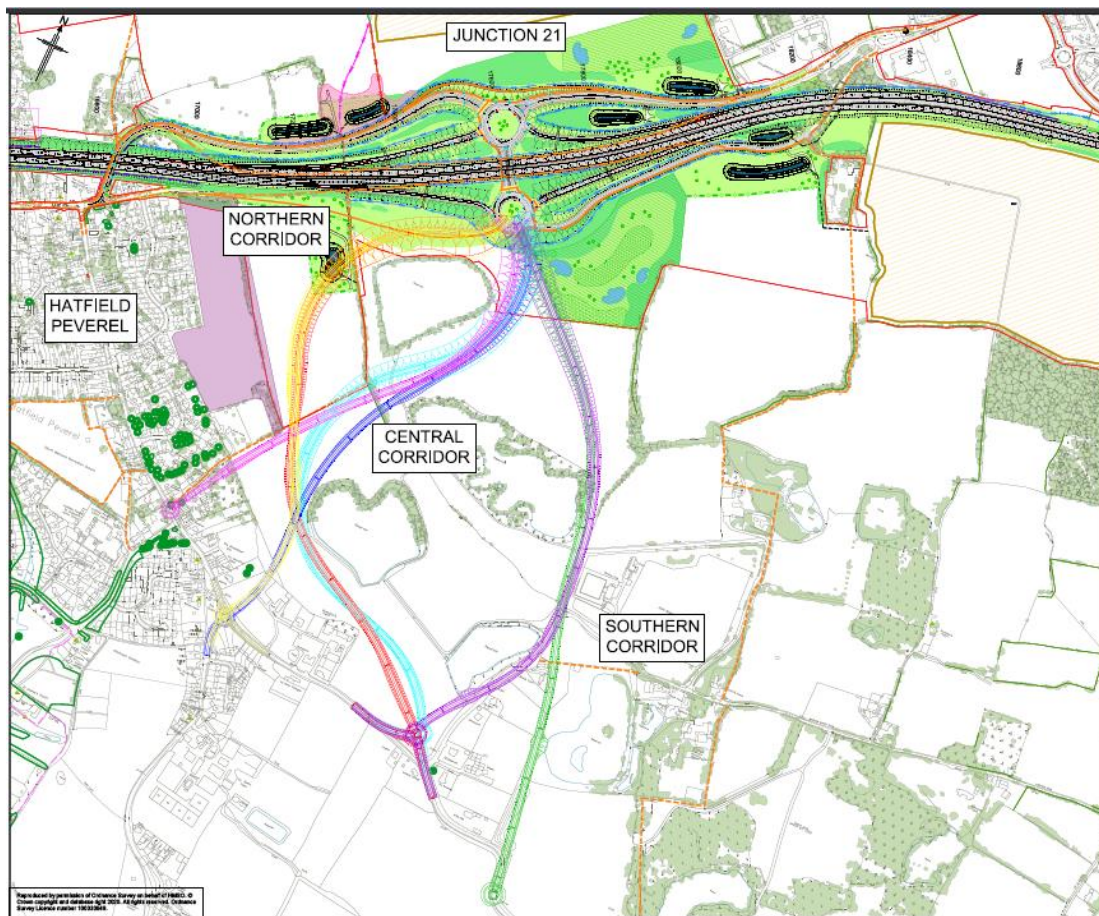
## 5 Maldon Road bypass design concept

- 5.1.1 The project team undertook an assessment of the impact of a potential bypass linking into the southern roundabout of J21 from an appropriate point of the existing B1019. To score a potential bypass against the scheme proposals, a high-level investigation into a preferred bypass route was undertaken. This investigation considered proposals by ECC as part of the Essex Highways Route Based Strategy Study (2017), as well as several other options.
- 5.1.2 All the options investigated are compatible with the proposed junction 21, however they would require modification of the southern dumbbell roundabout for the tie in, and the Latneys Kennels minor access road connection. It should be noted that while many permutations of a possible bypass route are available, the exact route if it were to be developed further would not change the outcome of this technical note.

The following options were investigated for a potential bypass corridor:

- Option 1A and 1B – Northern Corridor
- Option 2A, 2B and 2C – Central Corridor
- Option 3A and 3B – Southern Corridor

**Plate 5.1 Sketch highlighting the three corridors for a bypass investigated**



### 5.1.3 Design assumptions common to all options are as follows:

- A rural single carriageway road cross section is provided with 3.65m lanes, 1m hard strips in each direction, 2.5m grass verge in each direction.
- The bypass would be a Category A Essex Highways Design Guide Road.
- An 85kph design speed has been selected with an indicative 50mph speed limit. This will tie into the 40mph proposed speed limit at junction 21. The speed limit on Maldon Road varies from 30mph to national speed limit (60mph) dependent on corridor tie in location.
- Grass verges may require localised widening from what has been modelled to provide standard forward visibility.
- A 2-step relaxation from DMRB CD-109 Clause desirable minimum (510m) horizontal radii to 255m is permitted, in accordance with DMRB CD-109 Clause 4.5. This assumes that there are no coincident relaxations to stopping site distance or vertical curvature that may result in a departure from standard.
- Vertical gradient has been limited to 5%.
- Topographical survey data is not available for the full extents at the time of writing, and assumptions regarding the vertical design have been made in these areas.
- Retaining structures may be required in localised areas, specifically adjacent to the existing reservoirs.
- Potential improvements to walking, cycling and horse-riding routes in the area are likely to be enabled by the link road, however these have not been investigated in detail at this stage.

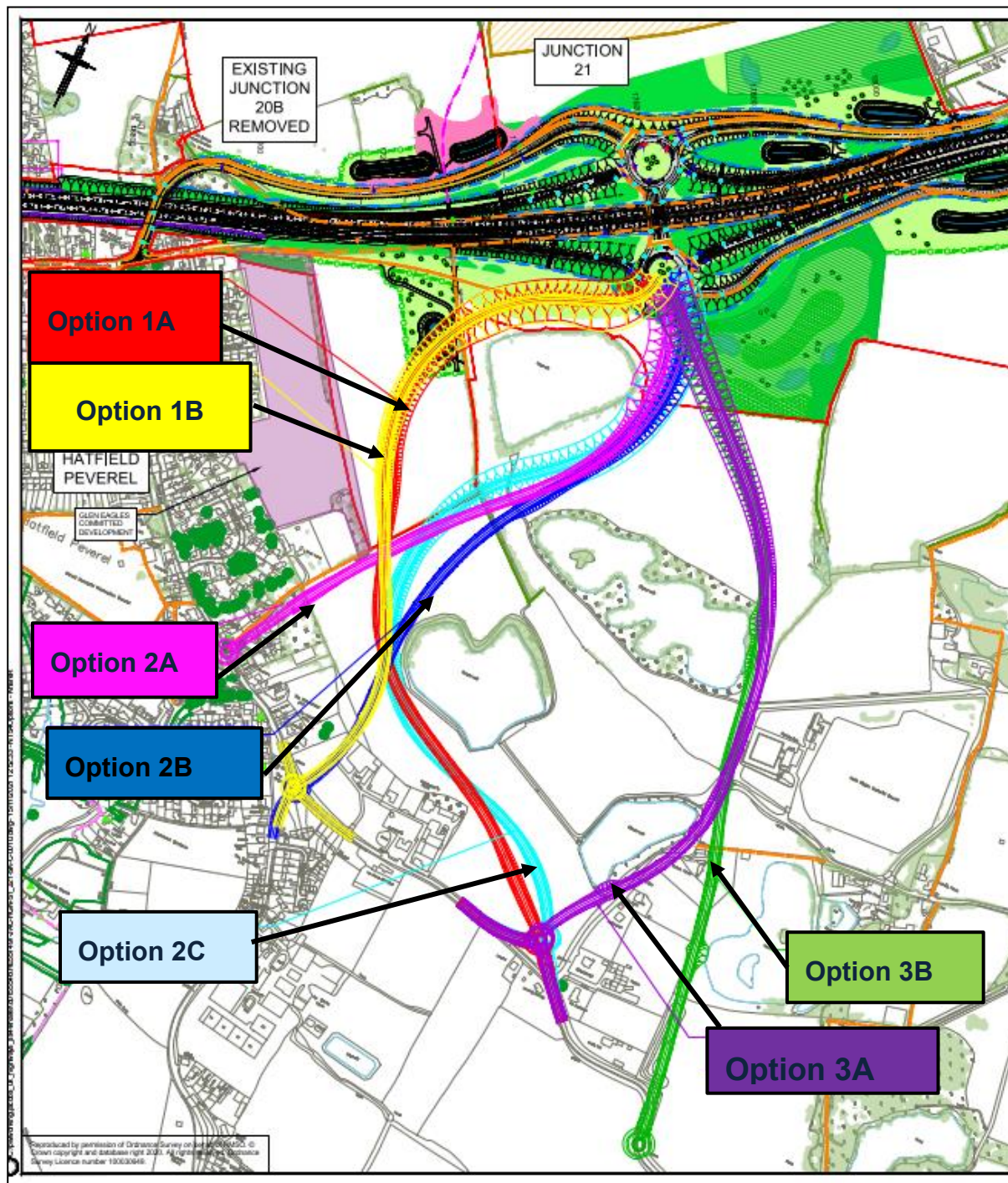
### 5.1.4 A summary of the options that were assessed is below, including the connection point and total length. An image of the options is also shown below. Note that Option 2A was recommended at an early stage to not be progressed due to impact on residential properties.

- Northern Corridor
  - Option1A – Connection to Maldon Rd j/w Wickham Bishop Road  
Total Length = 1340m
  - Option 1B – Connection to Maldon Rd j/w Ulting Road  
Total Length = 1130m

- Central Corridor
  - Option 2A – Connection to Maldon Rd j/w Old School Court  
Total Length = 940m  
Recommended not to be progressed due to impacts on property.
  - Option 2B – Connection to Maldon Rd j/w Ulting Road  
Total Length = 1030m
  - Option 2C – Connection to Maldon Rd j/w Wickham Bishop Road  
Total Length = 1330m
- Southern Corridor
  - Option 3A – Connection to Maldon Rd j/w Wickham Bishop Road  
Total Length = 1170m
  - Option 3B – Connection to Maldon Road to south  
Total Length = 1330m



**Plate 5.2 A sketch showing the bypass options investigated. The colour of the text box being the colour of the alignment option**



## 6 Discipline assessment of bypass options

- 6.1.1 Each option was scored against the other options by the respective design discipline lead, based on the scoring guide in the below Table 6.1. The results of this assessment are shown below in Table 6.2.
- 6.1.2 Based on this assessment option 2B is the preferred bypass option, to be scored against the current junction 21 proposals. Further notes on the reasoning behind each score are contained below.
- 6.1.3 In general, the southern corridor options 3A and 3B were not preferred due to their additional length, interface with local roads, businesses and properties, and impact on established vegetation and the local area. The northern corridor options 1A and 1B while having some benefits in being closer to the village and minimising impact on rural areas, had disbenefits in additional length, and tie in to the J21 roundabout. Option 2B was found to provide the most efficient tie in point for a bypass, providing the most benefit when compared to disbenefit.

**Table 6.1 Discipline scoring guide**

+3	Significant Impact – Significant beneficial impact
+2	Major Impact – Major beneficial impact
+1	Minor Impact – Minor beneficial impact
0	Neutral – No impact
-1	Minor Impact – Possible minor adverse impact – Not significant with mitigation
-2	Major Impact – Possible major adverse impact – Mitigation may be possible
-3	Significant Impact – Will likely have significant adverse impact – Not possible to mitigate.

**Table 6.2 Maldon Road bypass options discipline scoring assessment results**

Scoring Criteria	Option					
	Option 1A	Option 1B	Option 2B	Option 2C	Option 3A	Option 3B
Highways (geometry)	0	+1	+2	+1	-2	-2
Structures	-1	-1	-1	-1	-2	-2
Drainage (performance)	-1	-1	0	0	0	0
Traffic	+1	+1	+1	+1	+1	+1
Operational Safety	+1	+1	+1	+1	+2	+2
Walking, Cycling and Horse Riding (WCH)	+1	+1	+1	+1	+1	+1
Environment – Impact on People	-2	-2	-2	-2	-2	-2
Environment – Impact on Place	-2	-2	-2	-2	-2	-2
Flood risk	-1	-1	-1	-1	-1	-1
Construction	0	0	0	0	0	0
Traffic Management	0	0	0	0	0	0
Planning	+2	+2	+2	+2	-1	-1
Land	-3	-3	-2	-2	-1	-1
Stakeholder	+2	+1	+1	+2	-1	-1
Cost	-2	-1	-1	-2	-2	-2
<b>Total</b>	<b>-5</b>	<b>-4</b>	<b>-1</b>	<b>-2</b>	<b>-10</b>	<b>-10</b>

6.1.4 Further notes regarding the discipline assessments are in the below sections.

## 6.2 Highways

- 6.2.1 All options provide geometrically acceptable solutions; however, the southern corridor options (3A and 3B) are not preferred. These have been scored at -2 as both will require a new junction (assumed to be give way priority) with Wickham Bishop Road within a long, straight high-speed section of road.
- 6.2.2 The central corridor (2B and 2C) provides a more efficient connection to Maldon Rd, with 2b being slightly preferred due to the shorter length and preferred roundabout tie in location on Maldon Road.

- 6.2.3 All will result in some work to the junction 21 southern dumbbell roundabout to tie in, however the central corridor (option 2B and 2C) and the southern corridor (option 3A and 3B) may require some additional work to the Latneys Kennels local access road at the roundabout.

## 6.3 Structures

- 6.3.1 Options 1a, 1b, 2b & 2c all cross a watercourse and therefore require a structure to span over. Options 3a & 3b both cross two watercourses so require two structures accordingly.

## 6.4 Traffic

- 6.4.1 All options score similarly positively, as regardless of the exact tie in location on Maldon Road they would release pressure on the existing mini roundabout at the Maldon Road junction with The St. All would also serve to attract more traffic to junction 21 and the strategic network which is positive. A bypass located further southward may attract slightly more traffic, but this is not considered significant enough to differentiate the score.

## 6.5 Operational safety

- 6.5.1 All options score positively as will provide an opportunity to provide a safe bypass to modern road standard and remove traffic from the village of Hatfield Peverel where it may conflict with pedestrians and cyclists. The southern corridor options (3A and 3B) score slightly

## 6.6 Drainage

- 6.6.1 More interventions including drainage and attenuation areas which will increase land take will be required for options 2C, 3A and 3B due to the longer length of road, and therefore these are not preferred.

## 6.7 WCH

- 6.7.1 All options score similarly positively, as there will be an opportunity with a new road link to improve connectivity and walking, cycling and potentially horse-riding provision both along the bypass corridor and locally at the tie in on Maldon Road.

## 6.8 Environment

### Environment - impact on people

- 6.8.1 All bypass options would relieve traffic flows from Maldon Road and Hatfield Peverel, north of the bypass connection. There would be noise benefits to some properties along Maldon Road and within Hatfield Peverel but there would be increased noise to receptors within close proximity to the bypass connection onto Maldon Road.



- 6.8.2 From an air quality perspective, although all bypass options would relieve traffic flows along Maldon Road north of the bypass connection, modelling of the A12 proposed option without the bypass indicates that there is no risk of a breach of air quality standards. Modelling results indicate that receptors along Maldon Road would be subject to annual mean NO<sub>2</sub> concentrations of around 20ug/m<sup>3</sup> at the opening year of 2027. This level of NO<sub>2</sub> is considerably lower than the air quality objective for this pollutant of 40ug/m<sup>3</sup>.
- 6.8.3 From a visual impact perspective, there would be close views of options 1A and 1B and options 2A, 2B and 2C from residential visual receptors on the eastern edge of Hatfield Peverel and users of public rights of way east of Maldon Road. By comparison, options 3A and 3B would be further from visual receptors on the eastern edge of Hatfield Peverel and users of public rights of way east of Maldon Road. However, options 3A and 3B would intrude more into open countryside and there would likely be close views of the highway infrastructure from visual receptors located within a marginally more rural setting.
- 6.8.4 On balance, all options are scored similarly negatively at -1 for impact on people.

### **Impact on place**

- 6.8.5 All options would comprise development across greenfield land and the loss of Grade 2 agricultural land, which is defined as best and most versatile agricultural land.
- 6.8.6 The majority of the routes are outside of the current environmental survey area and so the comparison is primarily based on desk study information, supplemented by survey results where available.
- 6.8.7 None of the options would have a direct impact on designated nature conservation sites. The longer options are likely to be more damaging to landscape and ecology, particularly the southern corridor where a substantial amount of tree cover is likely to be lost, with potential impacts on habitat for protected species such as badger and bats. However, the northern options are closer to the edge of Hatfield Peverel and in a more elevated position and are therefore likely to exacerbate the adverse landscape effects at J21.
- 6.8.8 Options 2A, 2B and 2C would sever an Important Hedgerow noted for its diverse vegetation with large maiden oak trees and large ash coppice stools. Option 2A would potentially affect two trees with Tree Preservation Order status at the tie in with Maldon Road, although they could potentially be avoided through detailed design.
- 6.8.9 Options 1A, 1B, 2B and 2C would impact upon an active main badger sett identified during the A12 proposed scheme surveys. Design refinements could be possible to avoid loss of the sett, but it is likely that disturbance impacts would still need to be mitigated for given the proximity of this known sett to these proposed options. Whilst there are no known badger setts within 30m of Option 3A or Option 3B, all proposed options have the potential to impact badgers. This is due to the suitability of the landscape to support sett construction and the known pattern of setts within the vicinity indicating a likelihood of badger territories.

- 6.8.10 None of the options would have an impact on known designated or non-designated archaeological remains. However, they all include areas that haven't been evaluated for the A12 proposed scheme and there is therefore a risk that the routes could affect unknown archaeological remains. That said, evaluation of the area affected by the proposed Junction 21 did not identify significant remains and so the risk of a significant effect occurring would appear to be relatively low.
- 6.8.11 Options 1A, 1B, 2C and 3A would all introduce new highway infrastructure close to three grade II listed buildings on or near Maldon Road. This would affect the setting of all three during construction and operation of these options.
- 6.8.12 On balance, all options are scored similarly negatively at -2 for impact on place.

## 6.9 Flood risk

- 6.9.1 All options have minor negative impact for flood risk as they all cross minor watercourse 7. However, no options cross significant overland flow paths or areas of main river floodplain and have therefore been all been scored equally at -1.

## 6.10 Construction and traffic management

- 6.10.1 All options have been scored as neutral as all carriageway on embankment come down to at grade with a roundabout to the existing. Traffic management for all options is expected to be similar, as all are offline from the existing road network, and therefore do not interface directly with vehicles and pedestrians except at tie in locations.

## 6.11 Planning and land

- 6.11.1 The southern corridor (3a and 3b) is not preferred as it is a more rural location, closer to properties and businesses including the Hatfield Peverel Sports Club. The area is also more densely vegetated, much of this would need to be cleared along the corridor to accommodate the bypass.
- 6.11.2 The bypass would create natural barrier to development the further it is located from the existing settlement. The bypass being closer to the village is preferred as it will create a delimitation to the open countryside beyond. The northern and central corridor options may impact on existing Tree Protection Orders, or listed buildings, however not directly and there is space available to avoid significant impacts

## 6.12 Stakeholder

- 6.12.1 Any of the options above would be well received by the majority of the local community in Hatfield Peverel. Options 1a and 2c would fully take traffic out of Hatfield Peverel, and best reflect what is understood to be the wishes of the local community, and therefore score highest. The southern corridor options (3A and 3B) score slightly negatively, due the impact on a community asset at the Hatfield Peverel Sports Club. If it is confirmed that there is no impact on the community asset, then these scores would change to reflect that.

- 6.12.2 Options 1B and 2B score slightly positively as the existing large priority junction would be replaced by a roundabout and space appears available within the highway, with a clear path for the bypass minimising impacts to the local community. However, it is expected that there would be some challenge around why the connection is so far into the main community of Hatfield Peverel.

## **6.13 Cost**

- 6.13.1 Based on the level of design development at this stage the cost of any option has been based solely on total length, as this will affect both direct construction costs and indirect costs to enable the bypass such as land take. All have similar connections to the existing local roads network.

## **6.14 Conclusion of discipline assessment of bypass options**

- 6.14.1 An assessment was undertaken where a number of potential bypass options were scored against pre-defined criteria by a number of disciplines.
- 6.14.2 Of these potential bypasses, Option 2B was chosen as the best performing option predominately due to it providing the best highway geometry whilst not requiring a significant number of additional structures and land
- 6.14.3 Option 2B will be taken forward for comparison against the existing Maldon Road mini roundabout (current DS scenario) in Section 7 of this report

## 7 Recommended bypass option scoring

7.1.1 Following selection of the most likely preferred bypass alignment Option 2B, this was then scored against the current Do Something (DS) scenario. That is the current proposed junction 21 as part of the A12 scheme, with no large-scale mitigation at the Maldon Road mini roundabout.

7.1.2 An order of magnitude cost estimate of option 2B was undertaken by Costain. It should be noted that this was undertaken on an early-stage design and therefore appropriate risk and contingency have been added. The estimated cost for the option 2B alignment is **£14,964,000**.

- The following assumptions were used to produce this costing:
- The estimate is based at current prices with no inflation.
- A 20% contingency has been applied, due to the early-stage design.
- A 10% Risk allowance has been applied.
- A high-level lump sum has been included for utility diversions.
- A high-level assessment of lands has been included, with no allowance for hope value or other factors.
- Ecological and archaeological mitigation, surveys and licences have been excluded.
- VAT is excluded.

## 7.2 Scoring

7.2.1 The results of the scoring exercise are presented below in Table 7.1. Note that the baseline DS scenario is scored as neutral on all criteria, so that the bypass proposal can be scored fairly against this.

**Table 7.1 Maldon Road bypass option 2B against the current Do Something (DS) baseline discipline scoring assessment results.**

RIS Objectives	DS – Baseline No Intervention at Maldon Rd	Maldon Rd Bypass Option 2B
1) Supporting Economic Growth a) Proposed scheme supports the growth identified in Local Plans by reducing congestion related delay, improve journey time reliability and increase the overall transport capacity of the A12	0	0
1) Supporting Economic Growth b) Proposed scheme promotes specific traffic flow across the highway network	0	+2
2) A Safe and Serviceable Network a) Proposed scheme improves road user safety	0	+1
2) A Safe and Serviceable Network b) Proposed scheme improves road worker safety	0	-1
3) A More Free-Flowing Network a) Proposed scheme increases the resilience of the transport network to cope with incidents including collisions, breakdowns, maintenance and extreme weather	0	+1
3) A More Free-Flowing Network b) Proposed scheme fully understands the impacts of the other schemes and recognises other RIS schemes	0	0
4) An Improved Environment a) Improve the environmental impact of transport on communities along the existing A12	0	-1
4) An Improved Environment b) Reduce the impact of new infrastructure on the natural and built environment by design	0	-2
5) A More Accessible and Integrated Network a) Proposed scheme provides a safe WCH route between communities and seeks to address severance	0	+1
5) A More Accessible and Integrated Network b) Improve safety and effective access for public transport users	0	+1
6) Customer Satisfaction a) Improve customer satisfaction	0	+1
6) Customer Satisfaction b) Improve scheme profile	0	+3
7) Traffic & Economic Value for Money a) Economic Benefits	0	+1

RIS Objectives	DS – Baseline No Intervention at Maldon Rd	Maldon Rd Bypass Option 2B
7) Traffic & Economic Value for Money b) Cost	0	-3
8) Deliverability/Construction a) Carbon	0	-2
8) Deliverability/Construction a) Highway Geometry	0	+1
8) Deliverability/Construction b) Construction Challenge	0	-2
8) Deliverability/Construction c) Drainage Challenge & Flood Risk	0	-1
8) Deliverability/Construction d) Structures Challenge	0	-1
8) Deliverability/Construction e) Planning & Land Challenge	0	-1
<b>TOTAL</b>	<b>0</b>	<b>-2</b>

7.2.2 Further notes regarding the discipline assessments are below.

### 7.3 1a & 1b) Supporting economic growth

7.3.1 1a) In terms of affecting the traffic flow, capacity, and delays on the A12 mainline, the Maldon Road Bypass Option 2B does not provide different impact than DS and therefore has been given a score of 0.

7.3.2 Objective 1b considers the impacts on traffic flow, capacity, and delays on the local road network. The bypass option would provide traffic relief to the mini roundabout, as traffic travelling between Maldon and A12 junction 21 would divert to use the new bypass instead of Maldon Road and roads in the vicinity of Boreham for southbound onward journeys. The bypass would attract extra traffic to the sections of the B1019 south of the proposed bypass, including through Langford as well as a slight increase relative to the baseline on The Street, Hatfield Peverel. On balance, it has been given a score of +2.

### 7.4 2a & 2b) A safe and serviceable network

7.4.1 2a) A bypass scores positively regarding road user safety, as it will provide an opportunity to provide a safe bypass to modern road standard and remove traffic from the village of Hatfield Peverel where it may conflict with pedestrians and cyclists.

7.4.2 2b) In addition to road user safety, effect on workers' safety has been considered, with offsetting effects. The bypass creates a more resilient network, which makes maintenance easier, but the extent of network to maintain is higher, with the introduction of a higher speed road, resulting in a -1.



## **7.5 3a & 3b) A more free-flowing network**

- 7.5.1 Alternative route provides improved resilience for business-as-usual use, and for planned and reactive maintenance and responding to incidents such as breakdowns or collisions. For these reasons it has been given a score of +1 against 3a.
- 7.5.2 In respect of 3b, this objective considers the impact on other proposed infrastructure schemes, including those named in the government's Road Investment Strategy (RIS) such as the A120 Braintree to A12 improvement scheme. The Maldon Road Bypass Option is not expected to have a significant impact in this respect compared to DS1, and therefore has been given a score of 0.

## **7.6 4a) An improved environment – people**

- 7.6.1 Any alternative plan to divert traffic away from receptors associated with the Maldon Road junction would be likely to improve the air quality situation in Hatfield Peverel. However, given the volume and nature of the traffic on alignment Option 2B (or any proposed alternative offline alignment) it is doubtful this would lead to a significant effect. As noted in Section 6.8 of this report, NO<sub>2</sub> concentrations in and around Hatfield Peverel, with or without the bypass, are around 20µg/m<sup>3</sup>, well below the Air Quality Objective (AQO) value of 40µg/m<sup>3</sup>.
- 7.6.2 Bypass Option 2B would likely have a beneficial effect for noise for many properties within Hatfield Peverel. However, it could have an adverse impact on the rear of some properties where it joins Maldon Road.
- 7.6.3 The bypass would have potential adverse visual effects on residents to the east of Hatfield Peverel and at the junction with Maldon Road. There would be close views of the bypass from residential visual receptors on the eastern edge of Hatfield Peverel and users of public rights of way east of Maldon Road

## **7.7 4b) An improved environment – place**

- 7.7.1 Bypass Option 2B would result in the loss of Grade 2 agricultural land (i.e., best, and most versatile agricultural land). A new element of raised or at grade infrastructure in open countryside would introduce potentially adverse landscape effects. There would be severance of an Important Hedgerow, as described in Section 6.8 of this report. The option would also impact upon an active main badger sett. Design refinements could be possible to avoid loss of the sett; nevertheless, it is likely that disturbance impacts would need to be mitigated for given the proximity of the sett. There is a risk that the bypass could affect unknown archaeological remains, although as described in Section 6.8, the risk is likely to be low given the results of the archaeology evaluation undertaken for the area affected by the proposed Junction 21.

## **7.8 5a) & 5b) A more accessible and integrated network**

- 7.8.1 5a) The bypass option scores slightly positively as there will be an opportunity with a new road link to improve connectivity and walking, cycling and potentially horse-riding provision both along the bypass corridor and locally at the tie in on Maldon Road. However ongoing routes as existing or as proposed by the A12 scheme are limited.
- 7.8.2 5b) Assigning of all-purpose traffic to the bypass route will reduce traffic flow on the existing route, which would improve access to, and safe use of, public transport (walking to/from and waiting at bus stops).

## **7.9 6a) Customer satisfaction – improved customer satisfaction**

- 7.9.1 Regarding the bypass option, for customers seeking to join the A12 to and from the south at the proposed J21, the introduction of a bypass will move them off the B1019 Maldon Road sooner, onto a new piece of infrastructure. Whilst this would not be a significant length of new infrastructure, it would, on balance, provide a better experience for the customer compared to the existing Maldon Road which has a number of conflict points with residences. However, as this betterment is only experienced for a short period of an overall strategic journey, and only to those traveling to and from the south the benefit is not significant and has also been scored as +1.

## **7.10 6b) Customer satisfaction – improved scheme profile**

- 7.10.1 There has been a long campaign for the creation of a Maldon link road and support has been demonstrated in responses to the proposed scheme's consultations. While this request was not made in Essex County Council's consultation responses, it has recently changed its previous position and has requested that the project provide a bypass. While there may be some environmental as well as landowner impacts of a bypass, the support that has been expressed in consultation responses, as well as ECC's new position mean that for scheme profile a bypass is expected to provide a significant beneficial impact.

## **7.11 7a) Traffic and economic value for money – benefits**

- 7.11.1 This objective considers the economic benefits that each option would provide in terms of providing faster and more reliable journeys. A bypass option accessing A12 junction 21 will provide faster journeys for those movements as well as reducing congestion on Maldon Road. However, the overall scale of these economic benefits would be modest, and overall, a score of +1 has been given to the bypass option.

## **7.12 7b) Traffic and economic value for money – cost**

- 7.12.1 For the order of magnitude costing informing this score see paragraph 7.1.2 above. The cost of the bypass option relative to the baseline of no improvements to the existing Maldon Road or mini roundabout scores -3.



## **7.13 8a) Deliverability/construction - carbon**

- 7.13.1 This has been based solely on the additional construction required, which carries with it the embodied carbon impact of construction materials. The bypass option involves significantly more civils works and scores -2

## **7.14 8b) Deliverability/construction – highways geometry**

- 7.14.1 The bypass offers an opportunity to provide a high-quality road with minimal relaxations to current design standards and future proofed traffic capacity, while removing traffic from a local residential road with lower design speed, and a poor performing junction. Compared to the alignment of the existing Maldon Road, the bypass option scores +1. It is assumed that there is adequate space at the southern tie-in of the B1019 to provide a roundabout linking Maldon Road to a bypass in the vicinity of Ulting Lane.

## **7.15 8c) Deliverability/construction – construction challenge**

- 7.15.1 Although not a large scheme, there is a balanced score of -2 when compared to the baseline. Limited traffic management would be required in consideration of the bypass being an offline link road to a proposed roundabout. The only online section requiring traffic management is the southern tie in with Maldon Road.

## **7.16 8d) Deliverability/construction - drainage challenge and flood risk**

- 7.16.1 The drainage score is neutral, as both the existing and it is assumed the proposed road (which will be designed to current standard) have no known problems with drainage. It is assumed that the road geometry would allow for drainage by gravity avoiding pumping stations. It is also assumed that the vertical alignment at the water course crossing would maintain the minimum required vertical headroom for a new culvert crossing. Additional infrastructure with additional paved area, plus an additional watercourse crossing, means that the bypass is considered to have a -1 score in comparison to the baseline. The aggregate score for the bypass when considering Drainage and Flood Risk is -1.

## **7.17 8e) Deliverability/construction – structures challenge**

- 7.17.1 The bypass will require an underbridge or culvert over the minor watercourse 7. This structure could have some challenges during construction, for example disturbance on any habitats and species within the river environment, risk of contamination to the watercourse and need for temporary watercourse diversion. Without further investigation into the structure requirement to mitigate the flooding risks in the area, this option scores -1 with impacts expected to be able to be mitigated.

## **7.18 8e) Deliverability/construction - planning and land challenge**

- 7.18.1 From a planning perspective the Bypass would have a minor positive impact on balance. The environmental impact of loss of green field would be mitigated by the improvement on traffic flow and strategic traffic avoiding the village of Hatfield Peverel. A bypass would reduce severance (by traffic) at Wellington roundabout and has support from local communities and Stakeholders such as Essex County Council.
- 7.18.2 The bypass option has significant impacts when compared to the baseline, as it provides a new road through the countryside which will have significant land implications. The aggregate score for the bypass when considering Planning and Land Challenge is -1.

## **7.19 Conclusion of recommended bypass option scoring**

- 7.19.1 An assessment was undertaken where the most likely preferred bypass alignment Option 2B, this was then scored against the current Do Something (DS) scenario. Due, predominately to significant carbon, land, environmental and construction impacts of providing a bypass, as well as cost, the criteria score the current Do Something proposal at Junction 21 significantly higher than the Option 2B bypass.

## 8 Compatibility of J21 with a future bypass

- 8.1.1 Prior to Essex County Council revising their position in their requirements letter, the council had sought assurances that if a future bypass was to be funded outside of the A12 scheme, its provision would not be prejudiced by the A12 scheme.
- 8.1.2 This section details the study undertaken on a potential Maldon Road bypass, considering the impact it would have on the proposed junction 21 (J21).
- 8.1.3 It is assumed that a future Maldon Road bypass funded outside of the A12 scheme would relieve congestion on the existing Maldon Road, however it may also adversely impact the performance of the proposed junction 21. The proposed junction 21 to be constructed as part of the A12 scheme, will not preclude a Maldon Road bypass, but will require some further intervention to operate at an acceptable level of performance if a Maldon Road bypass is constructed.
- 8.1.4 This section details the design assumptions assumed for a potential Maldon Road bypass, the methodology adopted and findings from microsimulation traffic modelling.

### 8.2 J21 design concept

- 8.2.1 The proposed scheme design for junction 21, based on the proposals at Design Fix 4 (DF4) for supplementary consultation, consist of a dumbbell layout with main connector roads to Hatfield Peverel and Witham. The connector road from Hatfield Peverel consists of a single carriageway road crossing over a new Wellington Road bridge, widening to a three-lane approach to the western junction 21 dumbbell roundabout. There are two lanes on departure from the roundabout, merging to a single lane towards Hatfield Peverel. The connector road from Witham also consists of a single carriageway road, widening to two lanes on both approach and departure to the western dumbbell roundabout. The proposed junction 21 at Design Fix 4 is free flowing and hence is not signalised.

### 8.3 Maldon Road bypass design assumptions

- 8.3.1 An indicative Maldon Road bypass was tested as part of the investigation which is compatible with the latest A12 scheme design proposals. The bypass is based on Option 2B as shown in Plate 5.2, however the exact location of the bypass connection to Maldon Road and its exact route do not change the outcome of this section.
- 8.3.2 The indicative bypass connects to the existing Maldon Road corridor via a new roundabout, to the north of its junction with Wickham Bishop Road. It then bypasses Maldon Road and Hatfield Peverel, to tie into the new eastern dumbbell roundabout at the proposed junction 21. The junction 21 roundabout enables access to the A12, Witham and Hatfield Peverel. It is assumed that the bypass would consist of a single carriageway road with additional lanes on approach to the dumbbell roundabout, however the bypass and roundabout

have not been developed at time of writing in sufficient detail, in accordance with relevant design standards.

## 8.4 Traffic modelling

8.4.1 The traffic modelling was undertaken in two phases. The first phase was to test the bypass in a strategic traffic model, to understand the likely changes it would make to traffic patterns in the area. This includes predicting how much the amount of traffic using junction 21 would change. The second phase of modelling was using these new flows to test the operational performance of the bypass itself and of junction 21. It is worth noting that this assessment is a pre-feasibility study based on the National Highways strategic traffic model including valid assumptions on traffic growth at the time of publishing, and any future bypass will need to be ran against the promoter's traffic model created for this bespoke purpose.

### 8.4.2 Changes in traffic patterns

- The proposed bypass was coded into the same SATURN strategic traffic model that was used to support the A12 Chelmsford to A120 scheme for its Development Consent Order application. This model predicts flows for the year 2042. It considers predicted traffic growth between now and 2042, including from any large housing or employment sites that have already submitted planning applications. It also accounts for the predicted changes in traffic patterns caused by the A12 Chelmsford to A120 scheme itself.
- The proposed bypass as shown in Plate 8.1 was coded into the SATURN model to see how it would change traffic flows compared to those predicted with the A12 scheme in place but no bypass. A summary of the key impacts is that:
- Traffic on Maldon Road reduces significantly, as traffic transfers to the new bypass.
- Traffic using the western dumbbell reduces, as traffic using the new bypass uses the eastern dumbbell instead.
- An overall increase in the amount of traffic using junction 21, as the bypass makes travelling via junction 21 more desirable.

## 8.5 Operational performance

8.5.1 The Maldon Road bypass was tested using Vissim modelling software to investigate the impact on the proposed junction 21 (east and west dumbbell roundabouts) for the 2042 design year in the AM and PM peak. The Maldon Road roundabout at the southern end of the bypass was not assessed. The traffic flow inputs used were those described in the 'Changes in traffic patterns' section above. An image of the Vissim model for the junction with Maldon Road bypass overlaid onto the DF4 general arrangement can be seen in Plate 8.1 below.




8.5.2 The LOS was assessed for each of the respective roundabouts, which defines how well they operate based on the amount of time lost based on delays, queuing, and journey times. The LOS is assigned a letter from A to F as detailed in Table 8.1 below.

**Plate 8.1 Vissim model visualisation of J21 with bypass in place**



**Table 8.1 Level of service key**

Level of Service for Non-Signal Junctions		
LOS_A	loss time < 10 seconds	<b>Best operating conditions</b>  <b>Worst operating conditions</b>
LOS_B	loss time > 10 to 15 seconds	
LOS_C	loss time > 15 to 25 seconds	
LOS_D	loss time > 25 to 35 seconds	
LOS_E	loss time > 35 to 50 seconds	
LOS_F	loss time > 50 seconds	



8.5.3 Three scenarios were tested in Vissim, consisting of the following:

- The proposed scheme (2042) without the Maldon Road bypass.
- The proposed scheme (2042) with the Maldon Road bypass and no intervention at junction 21.
- The proposed scheme (2042) with the Maldon Road bypass and with widening at junction 21 north bound and south bound on-slips, localised to the roundabout to provide two lane A12 on-slip northbound and southbound exits at both dumbbells. The two lanes existing the roundabout are over approximately 50m.

8.5.4 The Maldon Road bypass is based on the conceptual design detailed earlier in this technical note. The results are presented in Table 8.2 and Table 8.3.

**Table 8.2 Microsimulation LOS analysis (AM Peak)**

Roundabout	LOS AM Peak		
	Without bypass	With bypass	
	DF4 J21	No J21 intervention	Widening on slip road roundabout exits
Western Dumbbell	LOS_B	LOS_B	LOS_A
Eastern Dumbbell	LOS_A	LOS_A	LOS_A

**Table 8.3 Microsimulation LOS analysis (PM Peak)**

Roundabout	LOS PM Peak		
	Without bypass	With bypass	
	DF4 J21	No J21 intervention	Widening on slip road roundabout exits
Western Dumbbell	LOS_B	LOS_F	LOS_B
Eastern Dumbbell	LOS_A	LOS_A	LOS_A

8.5.5 In the AM peak, both the western and eastern dumbbell roundabouts operate well in all scenarios, with a LOS A or B.

8.5.6 In the PM, the eastern dumbbell operates at LOS A in all scenarios. However, the western dumbbell is predicted to have serious operational problems if the bypass is built without any additional mitigation. It would have a LOS F, which represents a loss of time of more than 50 seconds. This is not considered an acceptable operational condition for the proposed junction 21.

- 8.5.7 However, with the bypass in place and widening of the junction 21 A12 slip road roundabout exits to introduce additional exit lanes on the northbound and southbound on-slips, the overall performance of junction 21 and Maldon Road bypass junction is improved to an acceptable level.

## **8.6 Conclusion of J21 compatibility**

- 8.6.1 In conclusion, the assessment undertaken suggests that the construction of a Maldon Road Bypass would adversely impact the performance of the proposed junction 21 constructed as part of the A12 scheme, were no further intervention at the junction to take place.
- 8.6.2 However, with an additional second lane on exit from the dumbbell roundabouts for both the A12 north bound and south bound on-slips, the LOS improves to an acceptable level. Considering this and so as to not prejudice future potential provision of a Maldon Road bypass, the verge platform at these slips will be widened, in order to accommodate the required localised widening of the slip roads at the roundabouts in the future. National Highways will make the required adjustments to the verge and earthworks design, in order for the slip roads to be more easily widened into the verge by Essex County Council in the event of the bypass being constructed in the future.
- 8.6.3 It should also be noted that there may also be alternative solutions to improve the performance of junction 21 without engineering intervention if a Maldon Road Bypass was constructed in the future. However, alternative solutions have not been considered or investigated as part of this study.

## 9 Recoding of Maldon Road mini roundabout

- 9.1.1 As part of the A12 scheme's application for Development Consent, a Transport Assessment report was produced. This assesses the performance of a range of junctions on the A12 and on local roads, with and without the proposed scheme in place.
- 9.1.2 The assessment of the Maldon Road / The Street junction was updated as part of this Transport Assessment. As with all junctions where Vissim was used to predict the operating condition of the junction, the Maldon Road / The Street traffic modelling was audited using Transport for London's Vissim Model Auditing Process (VMAP). As a result of this auditing process some of the assumptions in the Maldon Road / The Street model were updated, such as:
- Inclusion of buses into the model.
  - More refined disaggregation between cars & HGVs: Ensuring that the correct number of turning movements from the strategic model was transferred in the local model, rather than the preliminary assumption that the proportion of HGVs was spread equally across each turning movement.
  - Updates to the 'priority rules' (which dictate how vehicles interact with each other at the junction), to more closely follow the coding examples given in the Vissim software manual. For example, changing the minimum gap in traffic that drivers need to see before they enter the roundabout from Maldon Road, from 2.7 seconds to 2.9s (suggested default value in the Vissim manual is 3s). The junction coding was also adjusted to ensure drivers slow down more when travelling around the roundabout.
- 9.1.3 Following these updates, standard model validation checks were repeated on the base year model (i.e., the model of 2019 conditions). This confirmed that the updated base year model accurately reflected the real-life traffic delay observations taken in 2019. This allows the future-year models to be used with confidence to predict future traffic conditions with and without the proposed A12 scheme.

## 9.2 Assessment of Maldon Road mini roundabout using updated traffic model

- 9.2.1 Based on this re-coding, the process described in Section 4 of this report of comparing the LOS of the Maldon Road mini roundabout in the Do Minimum (2042) and Do Something (2042) scenarios was undertaken. As before, this was undertaken assuming the existing layout of the mini roundabout remains with no intervention. These results are shown tabulated in Table 9.1 and graphically in Plate 9.1 below.

**Table 9.1 Maldon Road mini roundabout overall junction LOS analysis and average queues**

Model	LOS	Veh. Delay (seconds)	Av. Queue (m)		
			Maldon Road approach (NB)	The St Western Approach (EB from Hatfield. Peverel)	The St Eastern Approach (WB from J21)
DM (2042) AM	LOS D	30	84	34	15
DS (2042) AM	LOS D	34	101	45	9
DM (2042) PM	LOS D	33	30	111	14
DS (2042) PM	LOS C	27	34	40	21

**Plate 9.1 Vissim model results for 2042 'Do Minimum' and 'Do Something' scenarios, including LOS analysis and vehicle delays (in seconds) and queues (in meters) based on new coding**



- 9.2.2 The projected 2042 queue lengths based on the new coding for both the 'Do Minimum' and 'Do Something' scenarios are visualised below in Plate 9.2 and Plate 9.3 for the AM and PM peak respectively. In the AM peak, queue lengths remain relatively unchanged on all three arms
- 9.2.3 In the PM peak, queue lengths are relatively unchanged on Maldon Road and the Wellington Bridge approach but are drastically reduced on The Street approach.

**Plate 9.2 Vissim model results based on new coding for 2042 AM peak showing average queue lengths with scheme ('Do Something') and without scheme ('Do Minimum')**





**Plate 9.3 Vissim model results based on new coding for 2042 AM peak showing average queue lengths with scheme ('Do Something') and without scheme ('Do Minimum')**



- 9.2.4 These results show the LOS and Average Queue Lengths Service of the Maldon Road mini roundabout in the Do Minimum (2042) and Do Something (2042) scenarios result in no discernible detriment to the operational performance of the existing junction as a result of the A12 Widening Scheme.

## 10 Conclusion

- 10.1.1 An extensive range of mitigation options at the mini roundabout were investigated, where it was found that only widening options at the junction to increase capacity perform adequately. Of these, Option DS-50D (Option E) was found to provide an acceptable medium to long term solution, and also provide acceptable pedestrian facilities. However, the significant environmental and land take effects of this option outweighing the benefits, as well as the very poor feedback received from ECC, mean that this is not seen as a feasible solution.
- 10.1.2 Several options for a bypass were investigated to determine the most preferred option to score against the current A12 junction 21 design. Following scoring option 2B was identified as the preferred bypass option. This was then scored against the current Do Something junction 21 proposals, without a bypass.
- 10.1.3 While a bypass does offer clear benefits in some respects, there are also disbenefits in creating a new link road through rural countryside. In this respect the disbenefits of a link road were found to outweigh the benefits and it is recommended that this is not included as part of the A12 scheme.
- 10.1.4 This conclusion is similar to that reached in previous studies by ECC in 2017, where they concluded that a bypass poses serious challenges to feasibility including the environmental impact on farmland, greenspace and environmentally sensitive land, and public acceptance of this impact. ECC additionally noted the technical challenge of connecting a bypass to the A12, however the A12 proposals do go some way to address this through the proposed junction 21.
- 10.1.5 Section 7 of this report demonstrated that due to recoding of the existing mini-roundabout arrangement to validate existing observed behaviour at the junction, the proposed scheme is not forecasted to affect the operation of the mini-roundabout in any discernible way. Whilst there may be merit in providing additional capacity at the mini-roundabout or providing a bypass which removes traffic wishing to join the A12 at Junction 21, this note must conclude that any local improvements to the operation to the mini-roundabout would not fall into the scope of the A12 Chelmsford to A120 Widening Scheme.
- 10.1.6 It should be noted that were ECC to determine in the future that a bypass warranted further investigation, the proposed A12 does not preclude its future inclusion as a new link into the southern dumbbell roundabout.