Technical Note 02: Relief to Rowstock Scheme Review

Site: Abingdon Road, Milton
Prepared by: CM
Approved by: JR
Date: 2nd August 2023

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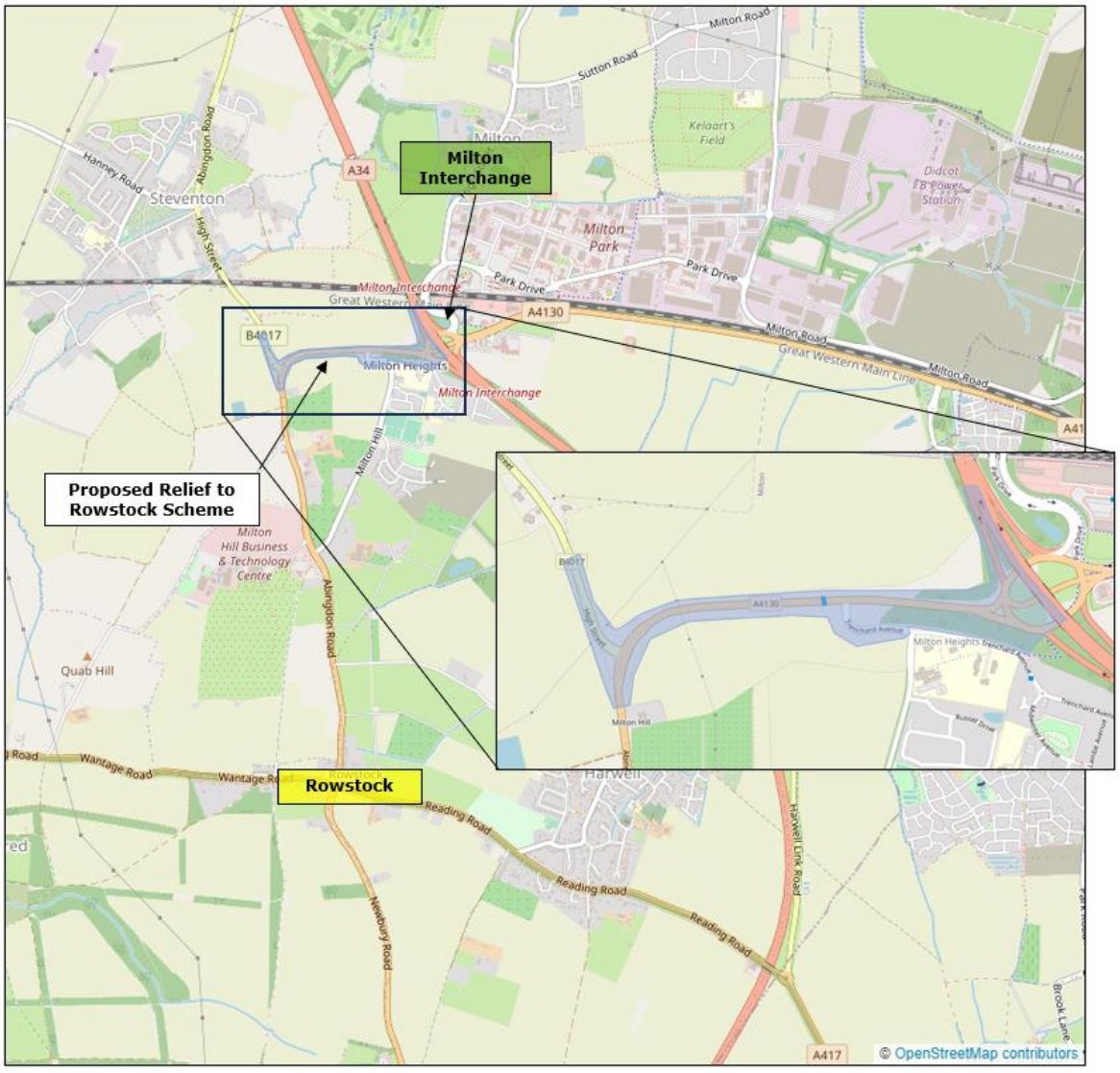
1.0 Introduction

Context

1.1 This technical note is prepared on behalf of local residents and provides an initial, high level review of what is referred to as the "Relief to Rowstock Scheme" (RRS). The RRS is being promoted by Oxfordshire County Council (OCC). The location of the RRS is illustrated on the plan below.



1.2 As can be seen, the RRS connects to the A34 at the Milton Interchange and ends just south of High Street, some 2km north of Rowstock.

Data sources

1.3 A freedom of information request (FOI) was issued to OCC on 31st March 2023 seeking information regarding the RRS and a response received from OCC some 5 weeks later on 3rd May 2023. A copy of the information requested and response is provided at **Appendix A**.

1.4 This technical note is prepared having regard to the FOI response and in particular the following documents provided by OCC:

- Extracts from a report entitled *"Relief to Rowstock, A4130/B4017 Junction (Steventon Lights)"* prepared for OCC by AECOM. The full report has not been provided; and
- *"Technical Note (TNA01)"* prepared for OCC by AECOM.

1.5 This latter technical note and the extracts of the former report ("the AECOM Work") are provided at **Appendix B**.

1.6 OCC has confirmed that the RRS options have been designed in accordance with the Design Manual for Roads and Bridges (DMRB) guidance with no departures from standards.

1.7 OCC has further confirmed that a *"high-level safety review"* of the RRS options has been undertaken. However this has not been made available.

RRS Options

1.8 The FOI request revealed no assessment work that considered the RRS as a single, complete scheme. Instead, as presented in the documentation, the RRS is not a "scheme" but rather the umbrella title for what are two, isolated traffic signal junction projects combined with a variety of walking, cycling and public transport interventions.

1.9 Reading through the AECOM Work, it is understood that the options for the RRS, presented in a piecemeal manner, are as follows:

Steventon Lights:

- Option 01: Upgrading existing Steventon Lights signal junction + 40
- Option 02: Similar to Option 01 but with minor design changes.
- Option 03: Similar to Option 02 with in-line Toucan crossings.

Trenchard Avenue

- Option 04: A4130 WIDENING DESIGN
- Option 02: A4130 WIDENING DESIGN WITH BUS PRIORITY MEASURES

1.10 No report has been provided that assesses the RRS as a single entity. No report has been provided that explains the purpose of the RRS.

Scope of Technical Note

1.11 This technical note considers first in **Section 2** the approach to and output of the model assessments undertaken followed in **Section 3** by a review of the design parameters and principles. A summary, conclusion and recommendations is provided at **Section 4**.

2.0 Modelling

2.1 As noted above, no report has been provided that assesses the RRS as a whole. Instead the AECOM Work assesses features within the RRS in isolation and without any context of the wider transport network. This

approach is inappropriate and wholly inadequate given that queues are forecast on the Abingdon Road link between the two junction which exceed the available storage capacity.

2.2 The junctions are located approximately 400 metres from one another, providing storage for circa 70 passenger car units (PCUs) between the two. Queues of up to 268.4 PCUs are forecast on the western approach to the Trenchard Avenue junction with the inclusion of the bus lane, far exceeding the available storage. Queues of this magnitude would impede the operation of the High Street junction to the west and failure to account for this interaction renders the presented modelling unreliable.

2.3 There is no assessment of how these two junction operate together notwithstanding that the assessment work provided demonstrates that the queues and delays arising at each junction would interfere with the operation of both junctions. Neither is there an assessment of how these two junction would operate cumulatively with the existing, adjacent A34 Milton Interchange again notwithstanding the obvious inter-dependency of these three junctions.

2.4 The assessment work therefore fails to provide a reliable indication of how the RRS will impact on the movement of traffic along the A4130 between Steventon High Street and the A34. This is a fundamental and fatal failing in the assessment work.

3.0 Design Review

Context

3.1 Fundamental elements of successful transport infrastructure design are that:

- There are clear and definite functional parameters which the infrastructure intervention needs to meet; and
- The design interfaces seamlessly with the existing transport network and movement demand in order to influence and improve a journey as a whole and not just at the point of intervention.

3.2 In the case of the RRS, OCC has stated that the aims and objectives of the RRS are:

Objectives

1) *To support planned growth in housing and employment in the region while following the policies set out in Local Transport and Connectivity Plan (LTCP).*
2) *To reduce congestion for private vehicles.*
3) *To improve safety for all road users.*
4) *To provide suitable infrastructure and encourage use of all active travel modes.*
5) *To facilitate and incentivise the use of public transport as an alternative to private car travel by improving bus journey time reliability.*
6) *To minimise the impact on the landscape and provide a betterment to the local environment.*

3.3 These are not referred to in the OCC assessment work provided which appears to have been undertaken in a vacuum.

3.4 Importantly, the assessment work provided by OCC clearly shows that there is a direct conflict between objective 2 and 6 and objectives 4 and 5 because the work concludes that if public transport is expressly catered for in the RRS, the resulting severe delay and congestion would adversely impact objectives 2 and 6.

3.5 As a consequence, there needs to be a multi-criteria assessment framework which places relative weights on delivering against competing objectives. This would enable the relative merits of differing options to be

determined against a common base. In the absence of this, the drawings provided are merely speculative arrangements of what could be achieved within the space available and are entirely nebulus.

3.6 Turning to the sustainable travel infrastructure options considered, this appears to have been bolted on as an afterthought in an attempt to "greenwash" what is otherwise a wholly traffic based scheme. The documentation and assessment work provided describes two, standalone traffic signal junction schemes which are entirely isolated from the surrounding, existing transport environment. No consideration is given to where public transport is travelling to and from. No consideration is given to where active travel modes are travelling to and from. Neither is any consideration given to how these sustainable modes will be catered for once they have exited the RRS. which fails to provide any context for how it is intended to integrate into the existing movement environment.

3.7 As presented, in terms of sustainable travel and encouraging mode shift, the RRS appears to be wholly otiose as it neither connects to or is connected to any other sustainable travel infrastructure.

Facilities for Cyclists

3.8 Most cycling facilities are proposed in the form of three metre wide shared use routes, including a one metre buffer from the carriageway. This satisfies the requirements of LTN1/20 assuming that pedestrian and cycle flows do not exceed 300 per hour. No evidence of current or anticipated pedestrian or cycle flows is provided.

3.9 It should be noted that there are locations where the proposed facilities do not meet the standard set out above. A 2.5 metre wide shared use route is proposed adjacent to High Street, falling short of the three metre requirement set out in LTN1/20.

3.10 It is noted that no Advanced Stop Lines (ASLs) are included in the proposals. It is stated:

"Minor amendments were carried out to the Steventon Lights Option 01 junction option by removing the Advanced Stop Lines (ASL) for cyclists. This was carried out as it was deemed unacceptable for cyclists to be on the carriageway due to the speed limit being above 30mph."

3.11 This statement is fundamentally untenable. There is no restriction on use of the carriageway by cyclists in this location. While current design guidance advises that on-carriageway provision would exclude most potential users in this situation it must be recognised that the proposed shared facilities do not from part of a continuous network. The fact remains that cyclists currently use the carriageway and will likely continue to do so rather than diverting onto a relatively short section of shared use path before being forced to re-join the carriageway again. The fact that cyclists will be approaching the junction on-carriageway clearly indicates that they will likely be comfortable negotiating the junction and are unlikely to consider the off-carriageway alternative as an attractive option due to the additional delay associated with it.

3.12 While the inclusion of off-carriageway cycle facilities is welcomed, particularly in that it may encourage the wider uptake of cycling, it does not absolve the designer of their responsibility to consider the safety of cyclists within the carriageway in locations where access is not restricted (i.e. the road in question is not subject to motorway regulations).

Visibility

3.13 Of particular concern is the interaction of the scheme with Tollgate, a property located east of Abingdon Road, approximately 100 metres south of the High Street junction. As illustrated on drawing 2211083-04, included at **Appendix C**, A visibility splay of two by 94 metres is currently achievable looking north from the access. This figure aligns closely with the one step below desirable minimum figure for a 40mph design speed. The proposals reduce this figure to circa 77 metres, which falls below the on step below desirable minimum standard. The desirable minimum for a 40mph design speed is 120 metres.

3.14 With respect to visibility from priority junctions and direct accesses the DRMB states:

"Unobstructed visibility shall be provided at all priority junctions and direct accesses by a visibility splay formed between the following three points, as illustrated in Figure 3.4:

- *a point W corresponding to the intersection point between the minor road centreline and the major road edge of carriageway;*
- *a point X setback along the minor road centreline measured from the continuation of the line of the nearside edge of the running carriageway of the major road; and,*
- *a point Y on the major road nearside edge of carriageway, corresponding to the desirable minimum SSD for the speed of the major road measured along the edge of the major road carriageway from point W."*

3.15 The use of the word 'shall' indicates a requirement of the Overseeing Organisation and that these requirements can only be modified the use of departures or, in limited situations, relaxations. There is no provision for relaxations in this instance.

3.16 Based on the above, it is clear that the visibility currently available from this access falls below the desirable minimum standard and would require a departure to be agreed. Further, it can be seen that the proposals lead to a material reduction in the available visibility beyond the one step below the minimum desirable threshold, requiring a further departure to be agreed. There is no evidence that the safety implications of these changes have been considered.

3.17 Given that the access in question is not even included in the scheme drawings, it seems improbable that any meaningful "safety review" has been undertaken.

Lane Widths

3.18 Lane widths range from 3.0 - 3.65 metres at both junctions. These widths are generally in line with the requirements set out in the DMRB, which stipulate that new signalised junctions should provide lane widths of 3.65 metres while modifications at existing junctions allow for widths as low as 2.5 metres in some situations.

3.19 DMRB Link design requires standard lane widths of 3.65m with widening of 0.3m for a road with a radius between 90m and 150m which is the case between Trenchard Avenue and Steventon Lights. This equates to a total lane width requirement of 3.95m which clearly is not being provided in the RRS. This would require a departure from standards.

3.20 There is a grey area in defining the interface between the "link" lane width and "junction" lane width guidance. In the hierarchy of design guidance in DMRB however, normal practice is that Link design is considered first and then the more detailed junction design. It is also noteworthy that OCC has assessed the RRS as a series of discrete junction alterations connected by highway link alterations rather than a single system. This is as expected having regard to normal practice and the link design lane width guidance of 3.65m (3.95m on the bend) should therefore apply between the junctions.

3.21 Notwithstanding the above, there are several other considerations to account for, including the requirements of LTN1/20 and the swept paths of the largest vehicles likely to travel through the junction. With regards to the latter, it is noted that the road already accommodates in excess of 700 HGV movements per day, which can be considered as a material design consideration.

3.22 Provision is in place of a total of six metres for a bus lane and adjacent traffic lane leaves very little margin for error on the part of drivers. This is particularly true on bends, where additional width is typically required. No swept path analysis is provided and there is no evidence that interactions between buses and large vehicles and the associated safety implications have been considered.

3.23 The bus lane is likely to be attractive to cyclists given that it would provide a degree of segregation from traffic while avoiding leave the carriageway, negotiate a crossing and then re-join the carriageway later. The presence of cyclists in the bus lane must therefore be considered. LTN1/20 states:

"Where cyclists are using bus lanes, the lane should be at least 4m wide, and preferably 4.5m, to enable buses to pass cyclists with sufficient room. Bus lanes less than 4m in width are not recommended and widths between 3.2m and 3.9m wide should not be used."

3.24 The design of the proposed bus lane should be revised to comply with this guidance or justification provided as to why the current scheme is considered acceptable. As set out previously, the scheme does not include a continuous off-carriageway cycle route that extends to south along Abingdon Road or along High Street. It is unreasonable to assume that all cyclists will choose to leave the carriageway, potentially navigate multiple crossing points before re-joining the carriageway.

4.0 Summary, Conclusions and Recommendations

Summary

4.1 This technical note is prepared on behalf of local residents and provides an initial, high level review of what is referred to as the "Relief to Rowstock Scheme" (RRS). The RRS is being promoted by Oxfordshire County Council (OCC).

4.2 This technical note is prepared having regard to the documents provided by OCC however OCC have failed to provide a "*high-level safety review"* of the RRS options which is claimed to be have been undertaken.

4.3 OCC has confirmed that the RRS options have been designed in accordance with the Design Manual for Roads and Bridges (DMRB) guidance with no departures from standards.

4.4 A review of the documents has identified 3 different options for the Steventon Lights and 2 different options for the Trenchard Avenue junction. This equates to a potential 6 different options although it is noted that nowhere in the documentation provided are these options set out.

Conclusions

4.5 Based on the analysis of the documentation provided the following conclusions have been reached.

Conclusion 1 – lack of clarity regarding function of the RRS

4.6 Nowhere in the documentation provided has it been possible to ascertain what the intended function of the RRS is or what outcomes are sought form the scheme. Being some 2km remote of Rowstock, it cannot possibly be that the RRS is intended to relieve Rowstock as the scheme's name implies.

4.7 There is a wide range of public transport priority and cycle infrastructure options tested with the conclusions of the AECOM Work being that these will adversely affect the operation of the highway.

4.8 In the absence of a clear statement regarding the expected function and required outcomes of the RSS, it is impossible to come to any conclusion regarding the relative merits of the 6 potential options.

Conclusion 2 – inappropriate operational assessment

4.9 OCC has assessed the RRS as a series of discrete, isolated highway interventions. Given the proximity of the Steventon Junction, Trenchard Junction and Milton Interchange, this approach to assessing performance is entirely inadequate. Any and all results from the assessment work provided are entirely otiose as they fail to consider the obvious inter-dependency of these three junctions, which need to be viewed as a single traffic entity.

Conclusion 3 – compliance with DMRB

4.10 There are several aspects of the design which fails to meet the requirements of DMRB including the failure to design for the types of traffic (HGVs for example) using the route as well as failure to provide adequate visibility splays. This will be detrimental to the operational capacity and safety of the RRS.

4.11 It is noted that OCC claim to have undertaken a high level safety review. No details of this are provided and it is unknown if this "review" meets the terms of reference of a Stage 1 Road Safety Audit which includes identification of any safety matters that have a bearing upon land take, licence or easement.

Recommendations

4.12 **Recommendation 1:** OCC needs to provide clear terms of reference for what the expected function and outcomes of the RSS should be.

4.13 **Recommendation 2:** The RRS needs to be assessed as a single traffic system which also includes the Milton Interchange. Having regard to the high probability of blocking back between junctions and the interaction of multi-modal travel, this would be best achieved using micro-simulation modelling software.

4.14 **Recommendation 3:** The designs needs to be re-visited to ensure that it meets the design guidance set out in DMRB after which a stage 1 Road Safety Audit should be undertaken in accordance with GG119

Appendix A

FOI Request

John Russell

From: FOI - E&E <FOI-E&E@Oxfordshire.gov.uk>
Sent: 03 May 2023 19:22
To: John Russell
Cc: FOI - E&E; FOI Team
Subject: 21332 EIR Response
Attachments: R2R-ACM-HGN-ZZ_ZZ_ZZ_ZZ-RP-TR-0001_Rev7 Steventon Lights only.pdf; R2R-ACM-HGN-ZZ_ZZ_ZZ_P2-RP-TR-0001_RevE.pdf

Our reference: 21332 EIR

Dear Mr Russell,

Thank you for your request of 31 March 2023 in which you asked for the following information, please find our response to your questions below in bold:

With regards to the Relief to Rowstock scheme (RRS) please can you provide me with the following information:

1) *The aims and objectives of the RRS*

Objectives

1. ***To support planned growth in housing and employment in the region while following the policies set out in Local Transport and Connectivity Plan (LTCP).***
2. ***To reduce congestion for private vehicles.***
3. ***To improve safety for all road users.***
4. ***To provide suitable infrastructure and encourage use of all active travel modes.***
5. ***To facilitate and incentivise the use of public transport as an alternative to private car travel by improving bus journey time reliability.***
6. ***To minimise the impact on the landscape and provide a betterment to the local environment.***

Other policies such as the VoWH local plan part two police 17 and those set out within the Local Transport and Connectivity Plan.

2) *details of highway capacity and modelling undertaken to demonstrates that the RRS meets the aims and objectives. To include traffic modelling and forecasting calculations and / or reports.*

Please see attached the phase one report.

3) *confirmation of design standards being applied to the RRS together with any and all departures from standards*

Design have been developed in accordance with the Design Manual for Roads and Bridges (DMRB) standards, along with the following:
• The Traffic Signs Regulations and General Directions (TSRGD) 2016 and Traffic Signs Manual
• Local Transport Note (LTN) 1/20 Cycle Infrastructure Design
Currently there are no known Departure from Standards, but as the design moves into the next stages more information will be available and departures from standards may be required.

4) *timescales for delivery*

Construction March 2024
Completion and open to public March 2025

5) *details of funding sources*

City Deal (LEP)
Housing and Growth Deal
S106

6) *cost benefit analysis and / or any other analysis undertaken to demonstrates that the RRS represents value for money for the public purse.*

The Rowstock project is part of a package of transport measures across the Science Vale area aim to support the housing growth in the areas of Wantage, Grove and Didcot and the employments growth at the sites of Harwell Campus and Milton Park. When biding for funding a package was assessed which included Harwell Campus access upgrade (Thompson Avenue scheme - complete), Harwell Link Rd (complete), Featherbed and Steventon Lights junction and Rowstock Junction. The economic case was carried out on the package rather than an individual scheme as the package is required to support the growth. The analysis done for the City Deal showed that the cost benefit analysis had a BCR or 10.4. The Department for Transport (DfT) seeks bids of a BCR of 2.0 and above deeming these high value for money.

7) *any and all road safety audits and / or assessments undertaken for the RRS.*

A high-level safety review was undertaken in April 2021 as part of the development of the designs for the scheme options and included within the OAR. No safety audit has been undertaken to date but will form part of the next stage of work

The Council has redacted the following information from the disclosure:

1. **The names, addresses and contact details of some third parties who are not Council staff.**

The Council considers that this information is exempt from disclosure under regulation13 of the Environmental Information Regulations 2004. Regulation 13 provides that information shall not be disclosed where it constitutes the personal data of someone other than the applicant and that disclosure would satisfy one of the following three conditions:

1. disclosure would contravene any of the data protection principles, or would do so if the exemptions in section 24(1) of the Data Protection Act 2018 (manual unstructured data held by public authorities) were disregarded or,

2. disclosure would contravene Article 21 of the GDPR (general processing: right to object to processing), or section 99 of the Data Protection Act 2018 (intelligence services processing: right to object to processing).

3. on a request under Article 15(1) of the GDPR (general processing: right of access by the data subject) for access to personal data, the information would be withheld in reliance on provision made by or under section 15, 16 or 26 of, or Schedule 2, 3 or 4 to, the Data Protection Act 2018, on a request under section 45(1)(b) of that Act (law enforcement processing: right of access by the data subject), the information would be withheld in reliance on subsection (4) of that section, or on a request under section 94(1)(b) of that Act (intelligence services processing: rights of access by the data subject), the information would be withheld in reliance on a provision of Chapter 6 of Part 4 of that Act.

In this case, the relevant condition is the first condition. Specifically, the council considers that the first data protection principle would be breached; namely, that disclosure of the redacted information would not be fair for the following reasons:

1. **The reasonable expectations of the data subjects and the nature of the information itself leads the Council to conclude that the data subjects could not reasonably expect that this information would be disclosed,**
2. **Neither this, nor similar information has been released into the public domain by the data subjects or anyone else; and**
3. **That the legitimate interests in the public having access to this information do not outweigh the interests in preserving the rights and freedoms of the data subjects.**

In reaching this decision, the Council noted that the following consequences may occur if this information was disclosed:

1. **The data subject would not expect this information to be released.**

In light of the above, the Council considers it justified to uphold this exemption by applying redactions to the disclosure.

Internal review

If you are dissatisfied with the service or response to your request, you can ask for an internal review as follows:

- Contact the Freedom of Information team in Customers and Organisational Development foi@oxfordshire.gov.uk
- Write to the Freedom of Information team at the FREEPOST address:

  Freedom of Information Team
  Oxfordshire County Council
  FREEPOST RTLL-ECKS-GLUA
  Oxford OX1 1YA

If you remain dissatisfied with the handling of your request or complaint, you have a right to appeal to the Information Commissioner at:
The Information Commissioner's Office,
Wycliffe House,
Water Lane,
Wilmslow,
Cheshire,

Appendix B

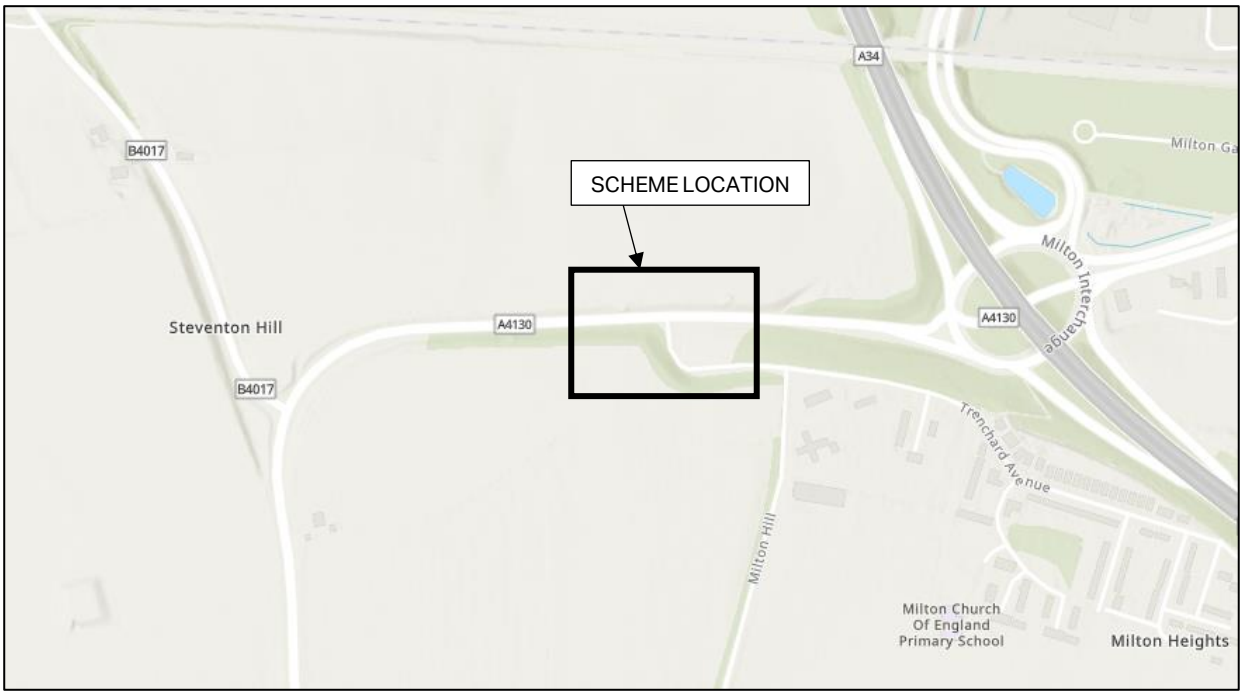
AECOM Work

Project:	Relief to Rowstock	**Job No:**	60637406
Client:	Oxfordshire County Council	**Revision:**	E
Subject:	Trenchard Avenue – Vehicular Traffic Modelling		
Prepared by:		**Date:**	07/01/2022
Checked by:		**Date:**	07/01/2022
Approved by:		**Date:**	10/01/2022

1. Introduction

1.1 AECOM have been commissioned by Oxfordshire County Council (OCC) to undertake macrosimulation modelling to test the performance of the junction option proposed for A4130/Trenchard Avenue. The site location is shown in **Figure 1**.

Figure 1: Site Location - Source: AECOM Maps



1.2 Following review of the Developer's Trenchard Avenue design as part of the optioneering and feasibility work undertaken by AECOM, it has been agreed by OCC that design improvements are required to address identified safety concerns. As a result, a proposed design as has been developed for further consideration and modelling, as covered in this technical note.

1.3 OCC have agreed to deliver the junction upgrades as part of the A4130 widening scheme, with the developer contributing agreed funds to the junction improvements.

1.4 Trenchard Avenue currently forms an unsignalised T-junction with A4130. The speed limit on Trenchard Avenue is 30mph whereas on A4130 it is currently 40mph. The proposals for the junction include signalising the existing junction and incorporating non-motorised users (NMUs) facilities. The existing speed limit on Trenchard Avenue will be maintained as existing.

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1.5 The objective of Part 2 of the Relief to Rowstock Study (A4130 Widening) is to deliver a feasibility design for proposed widening of the A4130 between Steventon Lights and Milton interchange in order to improve the vehicular capacity of the link. As part of the design, and to facilitate the planned developments at Trenchard Avenue, an upgrade in the form of signalisation of the junction has been proposed.

1.6 This technical note (TNA01) summarises the production and results of the vehicular traffic modelling for the proposed option at Trenchard Avenue/A4130.

1.7 LinSig v3.2.40 software has been used for carrying out the macrosimulation modelling. The future year 2024 AM, Interpeak (IP) and PM and 2034 AM, IP and PM peaks have been modelled in this study.

1.8 The junction has been reviewed in isolation, with impacts of any upstream and downstream junctions not being considered in the modelling.

2. Assumptions

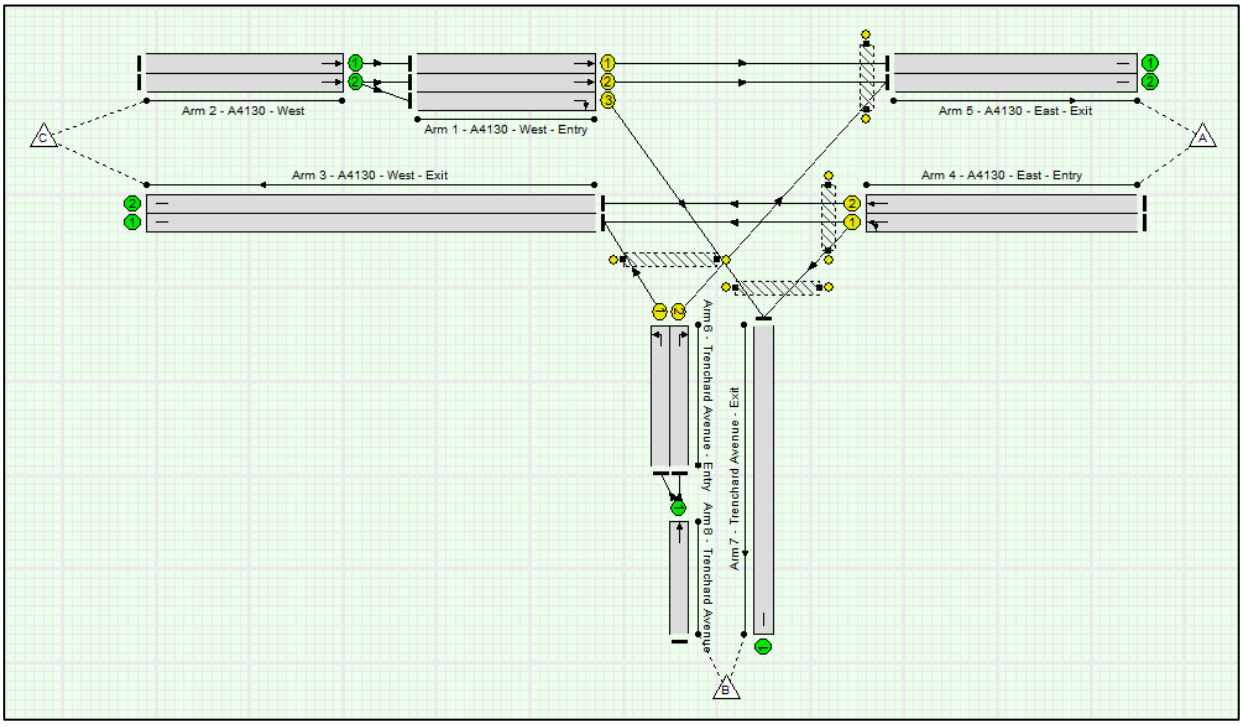
2.1 The following assumptions have been incorporated within the vehicular traffic modelling:

1. Traffic Flows: Traffic flows have been obtained from strategic modelling outputs by SYSTRA. The flows obtained cover AM, IP, and PM peaks for the years 2024 and 2034.
2. Saturation Flows: Saturation flows have been calculated using RR67. This method calculates saturation flow using the geometric parameters from the design proposals. The following design has been used in the traffic modelling, drawing reference: "R2R-ACM-HGN-ZZ_ZZ_ZZ_P2-M2-CH-0006".
3. Base Model: No base modelling has been carried out for the junction
4. Cruise Time: A cruise time of 64 kph has been used in the LinSig modelling for the internal links on A4130.
5. Milton Interchange: It is worth mentioning that traffic flow conditions at Milton Interchange have not been considered in this modelling. Vehicles queueing back from Milton Interchange can have a significant negative impact on the performance of the A4130/Trenchard Junction. The junction modelling in this study is aimed at testing the performance of the proposals in isolation only.

3. Trenchard Avenue Modelling

3.1 This chapter contains the necessary information about the model building and results obtained for the junction. The network layout is shown below in **Figure 2**.

Figure 2: Network Layout



Traffic Flows:

3.2 Traffic flows for the junction have been supplied by SYSTRA for AM, IP, and PM peaks for 2024 and 2034. The flows have been provided in the classification of Cars, Light Goods Vehicle (LGV), Medium Goods Vehicle (MGV), Heavy Goods Vehicle (HGV) and Buses. They have been converted into PCUs using the factors shown below in **Table 1**.

Table 1: PCU Conversion Factors - Source: TfL Modelling Guidelines v3

PCU Factors	
Vehicle Type	**PCU Value**
Cars	1
LGV	1
MGV	1.5
HGV	2.3
Buses	2

3.3 The traffic flows for the junction have been shown below in **Tables 2** to **7**.

Table 2: 2024 AM Peak (08:00-09:00) Flows

2024 AM Peak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	81	756	**837**
Trenchard Avenue	174	0	60	**234**
A4130 (W)	1,016	25	0	**1,041**
Total	**1,190**	**106**	**816**	**2,112**

Table 3: 2024 Interpeak (12:00-13:00) Flows

2024 Interpeak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	73	681	**754**
Trenchard Avenue	89	0	33	**122**
A4130 (W)	721	30	0	**751**
Total	**810**	**103**	**714**	**1,627**

Table 4: 2024 PM Peak (17:00-18:00) Flows

2024 PM Peak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	114	1,027	**1,141**
Trenchard Avenue	66	0	53	**119**
A4130 (W)	759	51	0	**810**
Total	**825**	**165**	**1,080**	**2,070**

Table 5: 2034 AM Peak (08:00-09:00) Flows

2034 AM Peak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	89	765	**854**
Trenchard Avenue	228	0	67	**295**
A4130 (W)	1391	36	0	**1,427**
Total	**1,619**	**125**	**832**	**2,576**

Table 6: 2034 Interpeak (12:00-13:00) Flows

2034 Interpeak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	96	727	**823**
Trenchard Avenue	125	0	31	**156**
A4130 (W)	951	37	0	**988**
Total	**1,076**	**133**	**758**	**1,967**

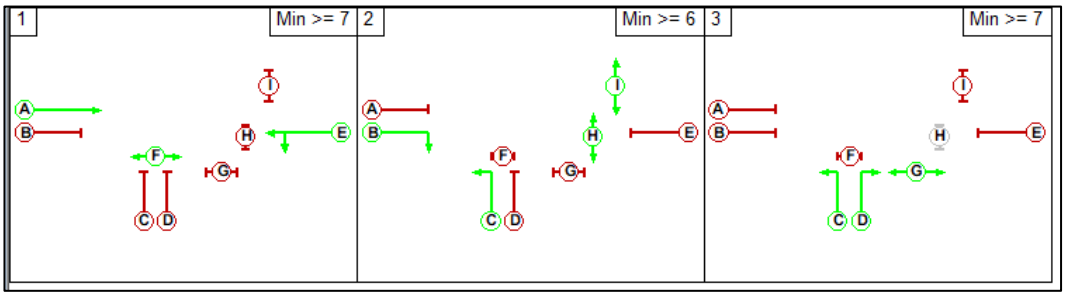
Table 7: 2034 PM Peak (17:00-18:00) Flows

2034 PM Peak Flows				
O/D	A4130 (E)	Trenchard Avenue	A4130 (W)	**Total**
A4130 (E)	0	156	902	**1,058**
Trenchard Avenue	103	0	54	**157**
A4130 (W)	942	62	0	**1004**
Total	**1,045**	**218**	**956**	**2,219**

Staging and Phasing:

3.4 The staging and phasing defined for the junction is shown in **Figure 3** below.

Figure 3: Proposed Staging and Phasing



3.5 The letters depict the movements in the junction. The junction is proposed to be operated under a 3-stage arrangement. The first stage consists of the east and west movements on A4130 running in parallel with the pedestrian crossing on Trenchard Avenue entry arm. The second stage consists of the left turning movement out of Trenchard Avenue running concurrently with the right turning movement from A4130 and the pedestrian crossings located on A4130 (E) arm. The final stage will operate with allowing all the movements from Trenchard Avenue running in parallel with the pedestrian crossing located on Trenchard Avenue exit arm.

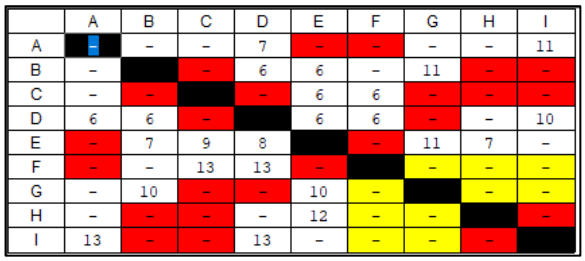
3.6 All the Toucan crossings have been proposed to be "walk with" having been assigned no dedicated stage.

Intergreens:

3.7 Traffic Signs Manual (TSM) Chapter 6 classifies high speed roads where the 85th percentile of the approach speeds at a junction is 35 mph or above. The convention is to extend the intergreens by an additional 1 second for turning and 2 seconds for ahead movements on high speed roads with MOVA control. The increase in the measured intergreens has been undertaken in this study as the proposed speed limit is 40mph.

3.8 The intergreens extracted for the junction from the design drawing has been shown below in **Figure 4**.

Figure 4: Measured Intergreens (s)



	A	B	C	D	E	F	G	H	I
A	–	–	–	7	–	–	–	–	11
B	–		–	6	6	–	11	–	–
C	–	–		–	6	6	–	–	–
D	6	6	–		6	6	–	–	10
E	–	7	9	8		–	11	7	–
F	–	–	13	13	–		–	–	–
G	–	10	–	–	10	–		–	–
H	–	–	–	–	12	–	–		–
I	13	–	–	13	–	–	–	–	

Modelling Results:

3.9 The following results outputs have been obtained for the junction:

- Practical Reserve Capacity (PRC) (%): Practical Reserve Capacity is a measure of how much additional vehicles could pass through a junction whilst maintaining a maximum Degree of Saturation (DoS) of 90% on all lanes.
- Total Traffic Delay (PCU-Hr): Total Traffic Delay is the delay associated with all lanes in a junction.
- Degree of Saturation (DoS) (%): This is defined as the ratio of Flow to Capacity for the Lane.
- Mean Maximum Queue (MMQ) (PCU): It represents the maximum queue within a typical cycle averaged over all the cycles within the modelled time period. 1 PCU = 5.75m

3.10 The network summary results for the junction have been shown below in **Table 8**.

Table 8: Network Summary Results - 2024 and 2034

Network Summary Results			
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	90	63.4	14.34
2024 Interpeak		124.3	8.73
2024 PM Peak		57.4	11.26
2034 AM Peak		22.6	19.81
2034 Interpeak		62.8	14.34
2034 PM Peak		64.5	12.83

3.11 The results shown in **Table 8** suggests that the junction is predicted to be comfortably within capacity against the tested 90s cycle time. The PRC for all scenarios is positive indicating spare capacity with the worst-case scenario of 2034 AM peak still reporting a 22.6% spare capacity.

3.12 A 90s cycle time has been tested as it is deemed to be the maximum acceptable industry standard cycle time for a junction containing pedestrian crossings.

3.13 The detailed results for the junction have been shown below in **Tables 9** and **10**.

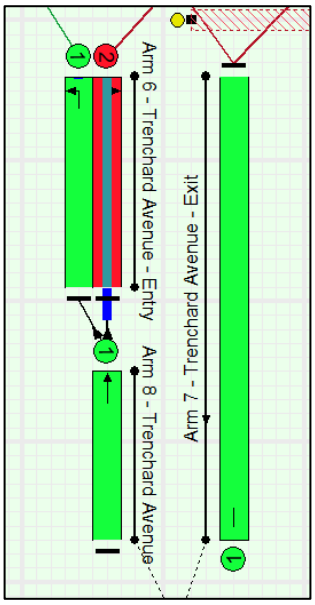
Table 9: 2024 Modelling Results

Detailed Results for Trenchard Avenue Junction Modelling				
Scenario	**Arm**	**Lane**	**Degree of Saturation (%)**	**Mean Maximum Queue (MMQ) (PCU)**
2024 AM Peak	A4130 (W)	Nearside	53.7	9.2
		Middle	55.1	10.2
		Offside	9.7	0.6
	Trenchard Avenue	Nearside	8.3	0.9
		Offside	52.3	4.5
	A4130 (E)	Nearside	47.7	7.5
		Offside	49.9	8.6
2024 Interpeak	A4130 (W)	Nearside	33.6	5.3
		Middle	35.2	5.9
		Offside	11.6	0.7
	Trenchard Avenue	Nearside	5.2	0.5
		Offside	40.1	2.4
	A4130 (E)	Nearside	37.8	5.8
		Offside	39.9	6.8
2024 PM Peak	A4130 (W)	Nearside	33.9	5.3
		Middle	35.5	6
		Offside	19.7	1.3
	Trenchard Avenue	Nearside	8.9	0.9
		Offside	37.2	1.8
	A4130 (E)	Nearside	55.3	9.8
		Offside	57.2	11.3
where 1 PCU = 5.75m				

3.14 **Table 9** shows results for 2024 modelling of Trenchard Avenue junction. It can be seen that for all scenarios in 2024 the junction operates within capacity with the highest DoS of 53.6% recorded on the offside lane A4130 (E) which also results in a queue of 11.3 PCU. This queue of 65m is not expected to block back onto the Milton Interchange which is situated approximately 300m to the east of the junction.

3.15 The queue predicted on Trenchard Avenue Offside lane of 4.5 PCU (25.8m) is higher than the physical lane length of 3.5 PCU (20.1m). This queue has the potential to block back on to the signal lane entry and cause lane starvation for the nearside lane. This has been shown in **Figure 5** below.

Figure 5: Queue formation at Trenchard Avenue - 2024 AM Peak



3.16 **Figure 5** shows the queue formation at Trenchard Avenue. The bar outside the lane is displaying the queue extending beyond the link length.

Table 10: 2034 Modelling Results

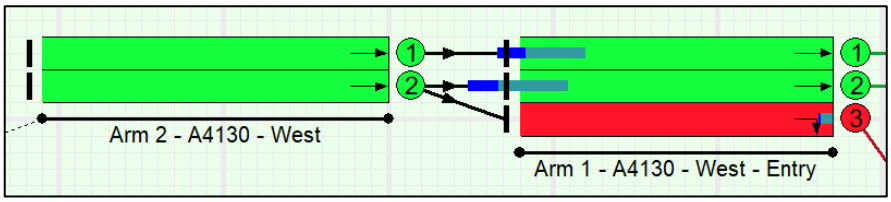
Detailed Results for Trenchard Avenue Junction Modelling				
Scenario	**Arm**	**Lane**	**Degree of Saturation (%)**	**Mean Maximum Queue (MMQ) (PCU)**
2034 AM Peak	A4130 (W)	Nearside	72.1	14.6
		Middle	73.3	15.9
		Offside	13.9	0.9
	Trenchard Avenue	Nearside	9.5	1.1
		Offside	73.4	6.7
	A4130 (E)	Nearside	47.5	7.5
		Offside	49.6	8.6
2034 Interpeak	A4130 (W)	Nearside	53.4	9.1
		Middle	55.3	10.3
		Offside	9.7	0.6
	Trenchard Avenue	Nearside	8.3	0.9
		Offside	52.3	4.5
	A4130 (E)	Nearside	47.6	7.5
		Offside	50	8.6
2034 PM Peak	A4130 (W)	Nearside	43.2	7.2
		Middle	44.7	8.1
		Offside	24	1.5
	Trenchard Avenue	Nearside	8.8	0.9
		Offside	51.6	3
	A4130 (E)	Nearside	52.4	8.9
		Offside	54.7	10.4

3.17 **Table 10** shows results for 2034 modelling of Trenchard Avenue junction. It can be seen that the junction is predicted to be within capacity for all the 2034 scenarios. The highest DoS is reported by Trenchard Avenue Offside arm of 73.4%.

3.18 Similarly, to the 2024 AM peak, Trenchard Avenue Offside links report queues extending longer than their physical lengths in 2034 AM & IPs.

3.19 A4130 (W) reports an MMQ of 15.9PCU (92m) long on the Middle lane and 14.6 PCU (84m) on the Nearside lane. The queue has the potential to starve the Offside lane of traffic at the section where two entry lanes widen into three approximately 68m to the west of the stopline. The queue is not expected to block back on to the A4130/High Street junction which is located approximately 400m to the west. The queue formation has been shown in **Figure 6** below.

Figure 6: Queue formation at A4130 (W) - 2034 AM Peak



3.20 A highest queue of 10.4 PCU (60m) predicted on A4130 (E) is not expected to block back on to Milton Interchange which is situated approximately 300m to the east of the junction.

4. Summary and Conclusions

4.1 This technical note contains the vehicular traffic modelling carried out for the proposed signal junction option at Abingdon, Oxford. The existing unsignalised A4130/Trenchard Avenue junction is proposed to be converted into a signal junction. The junction will be widened to accommodate extra traffic lanes.

4.2 The traffic modelling has been carried out for the AM, Interpeak and PM peaks for 2024 and 2034 in LinSig v3.2.40.

4.3 The modelling results suggest that the junction will be within capacity against the tested scenarios. The junction will have considerable capacity when tested against the predicted flows. The worst-case scenario of 2034 AM peak still reports a 22.6% spare capacity.

4.4 It is worth noting that the junction has been tested against a 90s cycle time which is considered as the desirable maximum for junctions with NMU facilities.

4.5 The cycle time was optimised using LinSig's "Cycle Time Optimisation View" to determine the cycle time at which the junction performs at capacity. This is expected to reduce the waiting times at the crossing as well as not incurring heavy delays on general traffic. This method of operation is expected at a junction under MOVA control. The junction will perform at capacity for the following optimised cycle times shown in **Table 11**.

Table 11: Network Summary Results "Optimised Cycle Times" - 2024 and 2034

Network Summary Results			
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	59	1.3	24.91
2024 Interpeak	59	12.1	14.22
2024 PM Peak	66	0.2	19.54
2034 AM Peak	70	1.3	26.37
2034 Interpeak	59	1.1	24.95
2034 PM Peak	65	3.5	19.91

4.6 The LinSig modelling has considered a worst-case scenario with 100% Toucan demand, fixed time cycles, maximum intergreens and fixed stage sequences. Any lack of Toucan demand and NMU detection methods will result in a lower interstage time which will result in the vehicular movements getting more green time consequently improving the overall performance of the junction.

4.7 The efficiency of the junction can be further improved by applying MOVA operation of signals which can efficiently react to the changing travel patterns of vehicular traffic.

5. Trenchard Avenue - Redesign

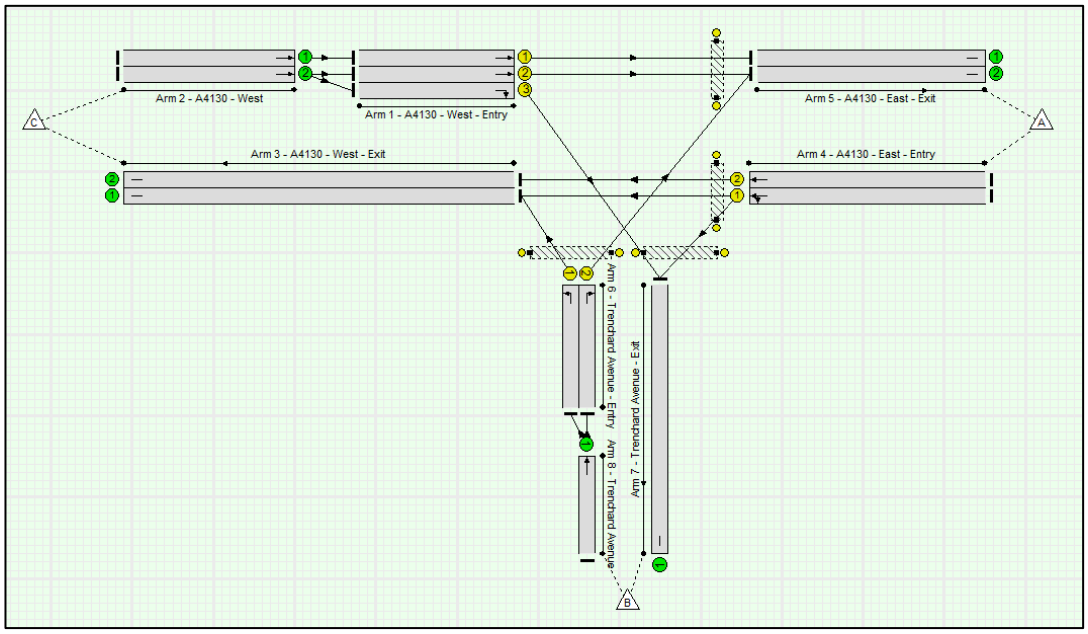
5.1 Following review of the original design, AECOM were instructed by OCC to provide in-line crossings at the proposed Toucan crossings on A4130 (East) and Trenchard Avenue to comply with LTN 1/20 guidelines. Very minor changes in the lane widths at Trenchard Avenue have also been resulted with the updated layout.

5.2 Additional modelling has been carried out to test the performance of the junction under the updated layout. The design has been attached in **Appendix A**.

5.3 The assumptions undertaken for the original study are still valid for the modelling carried out for the redesign. The traffic flows, staging and phasing information also remains similar to the original modelling.

5.4 The updated LinSig network layout is shown below in **Figure 7**.

Figure 7: Network Layout



5.5 The changes in the layout has resulted in a slight difference in the measured intergreens. They have been shown below in **Figure 8**.

Figure 8: Measured Intergreens (s)

	A	B	C	D	E	F	G	H	I
A		–	–	7	–	–	–	–	11
B	–		–	6	6	–	11	–	–
C	–	–		–	6	6	–	–	–
D	7	6	–		6	6	–	–	11
E	–	7	9	8		–	11	7	–
F	–	–	12	12	–		–	–	–
G	–	10	–	–	10	–		–	–
H	–	–	–	–	12	–	–		–
I	12	–	–	12	–	–	–	–	

Modelling Results:

5.6 The network summary results for the junction have been shown below in **Table 12**.

Table 12: Network Summary Results - 2024 and 2034

Network Summary Results			
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	90	63.4	14.12
2024 Interpeak		125.8	8.58
2024 PM Peak		57.4	11.33
2034 AM Peak		22.8	19.58
2034 Interpeak		62.8	14.12
2034 PM Peak		68.3	12.58

5.7 Due to minor changes in the design layout. the results shown in **Table 12** suggests that the junction is predicted to be comfortably within capacity against the tested 90s cycle time. The PRC for all scenarios is positive indicating spare capacity with the worst-case scenario of 2034 AM peak still reporting a 22.8% spare capacity.

5.8 Similarly, to the earlier option, a 90s cycle time has been tested as it is deemed to be the maximum acceptable industry standard cycle time for a junction containing pedestrian crossings.

5.9 The detailed results for the junction have been shown below in **Tables 13** and **14**.

Table 13: 2024 Modelling Results

Detailed Results for Trenchard Avenue Junction Modelling				
Scenario	**Arm**	**Lane**	**Degree of Saturation (%)**	**Mean Maximum Queue (MMQ) (PCU)**
2024 AM Peak	A4130 (W)	Nearside	53.7	9.2
		Middle	55.1	10.2
		Offside	9.7	0.6
	Trenchard Avenue	Nearside	8.6	0.9
		Offside	51.9	4.5
	A4130 (E)	Nearside	46.5	7.3
		Offside	48.7	8.4
2024 Interpeak	A4130 (W)	Nearside	33.6	5.3
		Middle	35.2	5.9
		Offside	11.6	0.7
	Trenchard Avenue	Nearside	5.4	0.6
		Offside	39.9	2.4
	A4130 (E)	Nearside	37	5.7
		Offside	39	6.6
2024 PM Peak	A4130 (W)	Nearside	34.6	5.4
		Middle	36.2	6.2
		Offside	19.7	1.3
	Trenchard Avenue	Nearside	9	0.9
		Offside	32.8	1.8
	A4130 (E)	Nearside	55.3	9.8
		Offside	57.2	11.3
where 1 PCU = 5.75m				

5.10 **Table 9** shows results for 2024 modelling of Trenchard Avenue junction. It can be seen that for all scenarios in 2024 the junction operates within capacity with the highest DoS of 57.2% recorded on the offside lane A4130 (E) which also results in a queue of 11.3 PCU. This queue of 65m is not expected to block back onto the Milton Interchange which is situated approximately 300m to the east of the junction.

5.11 Similarly, to **paragraph 3.5** ad **Figure 5** above, the queue predicted on Trenchard Avenue Offside lane (4.5 PCU) has the potential to block back and starve the nearside lane of any traffic.

Table 14: 2034 Modelling Results

Detailed Results for Trenchard Avenue Junction Modelling				
Scenario	**Arm**	**Lane**	**Degree of Saturation (%)**	**Mean Maximum Queue (MMQ) (PCU)**
2034 AM Peak	A4130 (W)	Nearside	72.1	14.6
		Middle	73.3	15.9
		Offside	13.9	0.9
	Trenchard Avenue	Nearside	9.8	1.1
		Offside	72.9	6.7
	A4130 (E)	Nearside	46.3	7.3
		Offside	48.4	8.4
2034 Interpeak	A4130 (W)	Nearside	53.4	9.1
		Middle	55.3	10.3
		Offside	9.7	0.6
	Trenchard Avenue	Nearside	8.6	0.9
		Offside	51.9	4.5
	A4130 (E)	Nearside	46.3	7.2
		Offside	48.8	8.4
2034 PM Peak	A4130 (W)	Nearside	43.2	7.2
		Middle	44.7	8.1
		Offside	24	1.5
	Trenchard Avenue	Nearside	9.2	0.9
		Offside	51.2	3
	A4130 (E)	Nearside	51.3	8.7
		Offside	53.5	10.2

5.12 **Table 14** shows results for 2034 modelling of Trenchard Avenue junction. It can be seen that the junction is predicted to be within capacity for all the 2034 scenarios. The highest DoS is reported by A4130 (W) middle arm of 73.3%.

5.13 Trenchard Avenue Offside links report queues extending longer than their physical lengths in 2034 AM & IP scenarios. The concerns raised previously in **paragraph 3.19** and **Figure 6** about the queue formation on A4130 (W) still remains with the updated layout.

5.14 The queue formations on both A4130 (E) and A4130 (W) are not expected to block back on to Milton Interchange which is situated approximately 300m to the east of the junction and A4130/High Street junction which is located approximately 400m to the west of the junction.

Summary and Conclusions

5.15 The modelling results for the updated layout suggest that the junction will be within capacity against the tested scenarios. The junction will have considerable capacity when tested against the predicted flows. The worst-case scenario of 2034 AM peak still reports a 22.8% spare capacity.

5.16 The cycle time was optimised using LinSig's "Cycle Time Optimisation View" to determine the cycle time at which the junction performs at capacity. The junction will perform at capacity for the following optimised cycle times shown in **Table 15**.

Table 15: Network Summary Results "Optimised Cycle Times" - 2024 and 2034

Network Summary Results			
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	60	1.6	23.83
2024 Interpeak	59	12.1	14.60
2024 PM Peak	66	0.2	19.75
2034 AM Peak	70	1.5	25.89
2034 Interpeak	59	1.2	23.86
2034 PM Peak	65	3.5	20.29

5.17 The LinSig modelling has considered a worst-case scenario with 100% Toucan demand, fixed time cycles, maximum intergreens and fixed stage sequences. Any lack of Toucan demand and NMU detection methods will result in a lower interstage time which will result in the vehicular movements getting more green time consequently improving the overall performance of the junction.

5.18 The efficiency of the junction can be further improved by applying MOVA operation of signals which can efficiently react to the changing travel patterns of vehicular traffic.

6. Addendum A

Additional Pedestrian Phasing

6.1 In December 2021, AECOM undertook further modelling of the Trenchard Avenue junction, as part of the wider Relief to Rowstock project. This additional modelling was based upon the Trenchard Avenue redesign, the results of which are given in Section 5 of this report.

6.2 Since the original design and modelling was carried out, a revision to the highway design being considered includes the provision of a new bus lane on A4130 Abingdon Road between Steventon Lights and Trenchard Avenue. This layout has not previously been modelled, and as such AECOM have been asked to undertake two modelling tasks.

6.3 The first task will examine how the existing junction design operates with the pedestrian phases being called every other cycle (to mimic a 50% demand), and also to remove the pedestrian phases altogether (0% demand). These will then be compared with the original staging arrangement, which had the pedestrian phases being called each cycle (100% demand).

6.4 The second task is to undertake modelling on the new bus lane will be provided at the junction for buses travelling northbound. This modelling will also be tested using the same demand-dependency options outlined in paragraph 6.3 above.

6.5 For the purpose of this Addendum, the revised model showing Pedestrian Dependency only is based upon the original layout, as shown on drawing R2R-ACM-HGN-ZZ_ZZ_ZZ_P2-DR-CH-0006; and the model including the Bus Lane as Option 2, based upon the revised layout outlined on drawing R2R-ACM-HGN-ZZ_ZZ_ZZ_P2-DR-CH-0009.

6.6 Traffic Flow data in the revised model remains the same as in the previous modelling. However, following the aforementioned changes to the highway design, signal timings and associated modelling criteria have been reviewed and amended as necessary. Intergreen timings have not been amended in this modelling work.

6.7 For the results of the original (100% dependency) modelling, please refer to **Tables 12, 13 and 14** in Section 5 of this report.

6.8 Practical Reserve Capacity (PRC) is a measure of how much additional traffic could pass through a junction whilst maintaining a maximum Degree of Saturation (DoS) of 90% on all lanes. Total Traffic Delay is the delay associated with all lanes in a junction.

6.9 The summary results for the additional pedestrian dependency modelled junction have been shown below in **Table 16**.

Table 16: Detailed Results for Trenchard Avenue Junction Modelling Additional Pedestrian Dependency

		50% Pedestrians		0% Pedestrians	
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	60	32.2	13.94	55.1	10.78
2024 Interpeak	59	70.6	10.14	115.1	7.05
2024 PM Peak	66	34.7	14.56	52.7	9.70
2034 AM Peak	70	13.3	18.70	24.7	14.88
2034 Interpeak	60	31.0	16.10	38.6	11.59
2034 PM Peak	65	41.3	15.97	60.2	10.89

6.10 **Table 16** indicates that the junction will operate within capacity during all peak periods in both horizon years.

6.11 The summary results for the junction have been shown below in **Table 17 and Table 18**. The same cycle times have been used in both models for comparison reasons.

Table 17: Detailed Results for Trenchard Avenue Junction Modelling, Horizon Year 2024

Detailed Results for Trenchard Avenue Junction Modelling Pedestrian Dependency								
Scenario	**Arm**	**Lane**	**100% Pedestrians**		**50% Pedestrians**		**0% Pedestrians**	
			DoS (%)	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**
2024 AM Peak	A4130 (W)	Nearside	86.3	10.5	67.1	8.6	56.5	6.9
		Middle	88.6	11.9	67.7	9.3	60.3	7.6
		Offside	6.4	0.4	7.7	0.5	7.7	0.4
	Trenchard Avenue	Nearside	6.8	0.5	9.4	0.9	10.3	0.7
		Offside	57.7	3.3	61.1	4.3	64.9	3.6
	A4130 (E)	Nearside	80.5	8.1	55.9	6.8	46.2	5.0
		Offside	84.3	9.6	56.6	7.5	48.9	5.8
2024 Interpeak	A4130 (W)	Nearside	63.3	5.7	48.8	5.4	42.1	4.3
		Middle	66.3	6.5	50.0	5.9	44.2	4.8
		Offside	7.6	0.4	9.1	0.5	9.1	0.5
		Nearside	3.7	0.3	5.1	0.5	5.6	0.4

	Trenchard Avenue	Offside	29.0	1.5	30.7	1.9	32.7	1.6
	A4130 (E)	Nearside	76.1	6.8	51.8	5.7	42.5	4.3
		Offside	80.3	8.1	52.6	6.3	45.1	5.1
2024 PM Peak	A4130 (W)	Nearside	51.9	5.7	43.2	5.6	38.5	4.5
		Middle	54.3	6.5	44.0	6.1	40.3	5.1
		Offside	14.5	0.9	17.4	1.1	17.4	0.9
	Trenchard Avenue	Nearside	6.6	0.6	9.2	1.0	10.1	0.7
		Offside	24.1	1.2	25.5	1.7	27.1	1.3
	A4130 (E)	Nearside	86.9	12.3	66.2	12.5	56.9	7.5
		Offside	89.8	14.6	66.4	13.7	59.1	8.6

where 1 PCU = 5.75m *100% = Pedestrian phase called every cycle*

DOS= Degree of Saturation *50% = Pedestrian phase called every other cycle*

MMQ= Mean Maximum Queue *0% = Pedestrian phase not called*

Table 18: Detailed Results for Trenchard Avenue Junction Modelling, Horizon Year 2034

Detailed Results for Trenchard Avenue Junction Modelling Option 3-A								
Scenario	**Arm**	**Lane**	**100% Pedestrians**		**50% Pedestrians**		**0% Pedestrians**	
			DoS (%)	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**
2034 AM Peak	A4130 (W)	Nearside	87.2	15.0	74.2	16.8	67.2	10.6
		Middle	88.7	16.7	74.2	17.9	68.5	11.8
		Offside	10.8	0.7	13.0	0.9	13.0	0.7
	Trenchard Avenue	Nearside	8.8	0.8	12.3	1.4	13.5	1.0
		Offside	88.2	7.4	93.4	10.6	99.3	11.5
	A4130 (E)	Nearside	57.6	6.9	45.8	6.9	39.8	5.0
		Offside	60.2	8.0	46.3	7.7	42.0	5.8
2034 Interpeak	A4130 (W)	Nearside	85.9	10.3	67.5	8.6	58.5	6.9
		Middle	88.9	12.1	67.7	9.3	60.3	7.6
		Offside	6.4	0.4	7.7	0.5	7.7	0.4

	Trenchard Avenue	Nearside	6.8	0.5	9.4	0.9	10.3	0.7
		Offside	57.7	3.3	61.1	4.3	64.9	3.6
	A4130 (E)	Nearside	80.3	8.0	55.9	6.8	46.2	5.0
		Offside	84.5	9.7	56.6	7.5	48.9	5.8
2034 PM Peak	A4130 (W)	Nearside	66.7	7.8	55.2	7.4	48.9	6.1
		Middle	69.0	8.8	55.4	7.9	50.6	6.7
		Offside	17.3	1.0	20.8	1.4	20.8	1.1
	Trenchard Avenue	Nearside	6.6	0.5	9.2	1.0	10.1	0.7
		Offside	37.0	2.0	39.2	2.6	41.6	2.1
	A4130 (E)	Nearside	83.3	10.6	63.0	10.8	53.7	6.7
		Offside	86.9	12.7	63.1	12.0	56.2	7.9

where 1 PCU = 5.75m *100% = Pedestrian phase called every cycle*

DOS= Degree of Saturation *50% = Pedestrian phase called every other cycle*

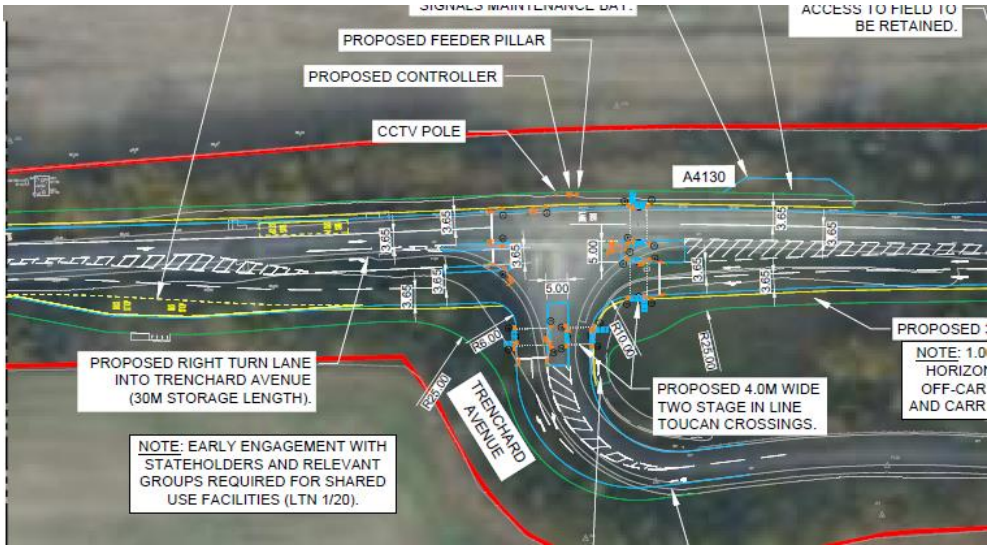
MMQ= Mean Maximum Queue *0% = Pedestrian phase not called*

6.12 **Tables 17 and 18** indicates that the junction is predicted to be within capacity for all peaks, for both 2024 and 2034. Although the modelling has highlighted that the MMQ exceeds the storage capacity on the A4130(W) approach and Trenchard Avenue in the AM and Interpeak peak period, this is more a limitation of the LINSIG model link length and in reality, there is enough storage space on this approach.

Bus Lane

6.13 As mentioned above, a further model was produced to include the proposed introduction of a bus lane between Steventon Lights and Trenchard Avenue, and on the northbound approach to Steventon Lights. The proposed design is shown in **Figure 9** below.

Figure 9: Trenchard Avenue – Bus Priority - Junction Layout Drawing



6.14 The Linsig model was amended by adjusting the nearside to only show minimal traffic flow with the remaining traffic reallocated to the middle lane on the approach and exit lanes on the A4130 Abingdon Road. This would leave on the approach one lane for right turning traffic, a lane for bus priority and a single lane for the ahead traffic movement. The eastbound exit would see one of the exit lanes converted into a bus priority lane while the remaining lane would be for all other traffic.

6.15 The summary results for the Option 2 modelled junction have been shown below in **Table 19**.

Table 19: Detailed Results for Trenchard Avenue Junction Modelling, Bus Priority Horizon Year 2024

		100% Pedestrian		50% Pedestrian		0% Pedestrian	
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**	**PRC (%)**	**Delay (PCU/Hr)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM	100	4.0	17.21	12.8	14.04	19.5	11.85
2024 IP	80	24.1	10.38	40.9	10.38	18.3	8.49
2024 PM	180	33	12.51	47.2	10.10	27.4	10.00
2034 AM	140	-12.6	50.41	-58.3	260.04	-8.0	30.16
2034 IP	96	2.7	17.61	7.5	14.95	18.5	11.95
2034 PM	96	13.0	14.57	18.3	12.47	34.3	10.03

6.16 The summary results for the junction have been shown below in **Table 20 and Table 21**.

6.17 For this part of the modelling part of the model road network was amended to account for the inclusion of a bus lane on the A4130. This option has also been tested as above with the pedestrian stages being called in every signal cycle, every other signal cycle and not at all (representing the removal of the pedestrian phases).

6.18 Cycle times may vary in each model to provide the optimal junction operation timings.

Table 20: Detailed Results for Trenchard Avenue Junction Modelling, Bus Priority Horizon Year 2024

Detailed Results for Trenchard Avenue Junction Modelling Bus Priority								
Scenario	**Arm**	**Lane**	**100% Pedestrian**		**50% Pedestrians**		**0% Pedestrians**	
			DoS (%)	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**
2024 AM Peak	A4130 (W)	Nearside	0.9	0.1	0.8	0.1	0.8	0.1
		Middle	84.7	25.9	79.8	24.6	75.3	21.1
		Offside	10.7	0.7	12.9	0.7	16.1	0.7
	Trenchard Avenue	Nearside	11.0	1.2	14.2	1.4	15.7	1.4
		Offside	86.6	7.4	78.7	6.5	72.1	5.9
	A4130 (E)	Nearside	39.0	7.5	33.8	6.2	33.2	5.9
		Offside	37.3	6.5	35.5	7.1	31.2	5.0
2024 Interpeak	A4130 (W)	Nearside	1.1	0.1	1.0	0.1	1.1	0.1
		Middle	72.5	13.9	63.9	16.9	76.1	11.2
		Offside	10.3	0.6	12.4	0.9	11.4	0.5
	Trenchard Avenue	Nearside	5.0	0.5	6.9	0.9	6.2	0.4
		Offside	39.4	2.2	41.7	3.1	32.7	1.6
	A4130 (E)	Nearside	43.6	6.6	35.1	5.4	39.3	4.1
		Offside	41.3	5.6	35.7	6.0	41.8	4.8
2024 PM Peak	A4130 (W)	Nearside	1.0	0.1	0.9	0.1	1.0	0.1
		Middle	67.7	14.8	61.1	14.5	70.7	11.8
		Offside	19.7	1.3	23.7	1.4	21.7	1.0
	Trenchard Avenue	Nearside	9.0	0.9	12.5	1.1	27.1	1.3
		Offside	32.8	1.8	34.8	1.8	11.1	0.8

	A4130 (E)	Nearside	55.3	9.8	47.7	9.4	53.4	7.1
		Offside	57.2	11.3	49.6	10.8	55.7	8.1

where 1 PCU = 5.75m *100% = Pedestrian phase called every cycle*

DOS= Degree of Saturation *50% = Pedestrian phase called every other cycle*

MMQ= Mean Maximum Queue *0% = Pedestrian phase not called*

Table 21: Detailed Results for Trenchard Avenue Junction Modelling, Bus Priority Horizon Year 2034

Detailed Results for Trenchard Avenue Junction Modelling Bus Priority								
Scenario	**Arm**	**Lane**	**100% Pedestrian**		**50% Pedestrians**		**0% Pedestrians**	
			DoS (%)	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**	**DoS (%)**	**MMQ (PCU)**
2034 AM Peak	A4130 (W)	Nearside	0.8	0.1	1.1	0.1	0.7	0.1
		Middle	101.3	78.1	142.5	268.4	96.5	52.5
		Offside	21.7	1.4	13.0	0.7	27.9	1.3
	Trenchard Avenue	Nearside	14.5	2.0	12.3	1.0	19.4	2.0
		Offside	99.3	15.9	93.4	9.2	97.2	13.6
	A4130 (E)	Nearside	32.7	7.4	44.9	6.5	29.9	5.4
		Offside	34.2	8.6	47.2	7.6	31.7	6.4
2034 Interpeak	A4130 (W)	Nearside	0.9	0.1	0.9	0.1	0.8	0.1
		Middle	89.8	28.4	83.7	25.1	75.9	20.6
		Offside	10.3	0.6	11.6	0.7	15.5	0.7
	Trenchard Avenue	Nearside	10.5	1.1	13.6	1.3	15.8	1.4
		Offside	83.1	6.7	82.0	6.3	75.5	6.0
	A4130 (E)	Nearside	38.6	6.5	35.4	6.2	31.4	4.9
		Offside	40.6	7.6	37.3	7.1	33.4	5.8
2034 PM Peak	A4130 (W)	Nearside	0.9	0.1	0.9	0.1	0.8	0.1
		Middle	84.9	24.8	76.1	21.2	67.0	16.0
		Offside	25.6	1.7	28.8	1.7	38.4	1.9
		Nearside	9.8	1.0	12.8	1.1	16.5	1.3

	Trenchard Avenue	Offside	54.7	3.2	54.3	3.1	61.5	3.4
	A4130 (E)	Nearside	48.3	8.6	44.3	8.4	38.1	6.0
		Offside	50.3	10.1	46.4	9.9	61.5	3.4
where 1 PCU = 5.75m				*100% = Pedestrian phase called every cycle*				
DOS= Degree of Saturation				*50% = Pedestrian phase called every other cycle*				
MMQ= Mean Maximum Queue				*0% = Pedestrian phase not called*				

6.19 **Table 20** indicates that the junction is predicted to be within capacity for all peaks, in the 2024 horizon year. However, the A4130 western approach ahead traffic movement is predicted to exceed its storage capacity in the AM, Interpeak and PM peak periods. Furthermore, Trenchard Avenue is also predicted to exceed its storage capacity during the AM peak. However as mentioned above there is storage available on both the A4130 and Trenchard Avenue and the reason it that the MMQ has been highlighted is due to model limitations in calculating storage capacity over multiple links.

6.20 **Table 21** shows the results for the 2034 horizon year modelling which show similar results to the 2024 horizon year modelling**.** With queuing issues on the A4130(w) in the AM, Interpeak and PM peak and on Trenchard Avenue in the AM and Interpeak periods. These issues are more pronounced in the 2034 modelling and would indicate a significant increase in vehicle queues between the two horizon years, which might have an impact on upstream junctions.

6.21 In summary, if the bus lane proposal was implemented, the results indicate that the junction would be operating over capacity and would experience significant queues for the majority of the day. It is for this reason that the bus lane option would not be recommended.

6.22 Further efforts were made to optimise the cycle timings at Trenchard Avenue (under the pedestrians being called every scenario) to improve the PRC and Delay values at the junction where possible. The results for this summary can be viewed below in **Table 22.**

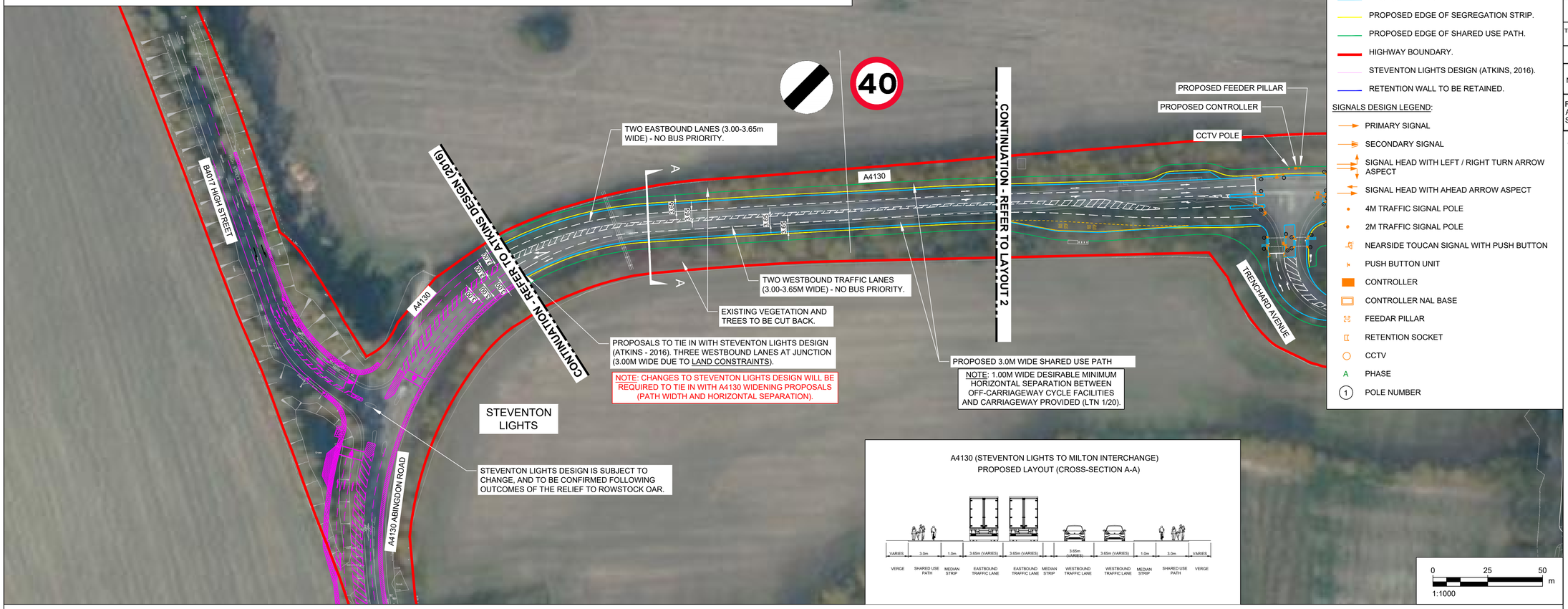
Table 22: Detailed Results for Trenchard Avenue Junction Modelling, Bus Priority Horizon Years 2024 and 2034

Network Summary Results			
Scenario	**Cycle Time (s)**	**PRC (%)**	**Delay (PCU/Hr)**
2024 AM Peak	93	0.6	18.69
2024 Interpeak	69	1.1	13.97
2024 PM Peak	71	0.0	19.06
2034 AM Peak	140	-12.6	50.41
2034 Interpeak	94	0.9	18.05
2034 PM Peak	85	1.2	17.35

6.23 In summary, **Table 22** shows that positive improvements to the junction operation can be observed in the horizon year 2024. Similar results are observed in the 2034 peak, except for the AM peak where it is not possible to gain a positive result using a reasonable cycle time**.** It is for this reason that the bus lane option would not be recommended.

7. Appendix A – Design Drawings

OPTION 4: WIDENING IN BOTH DIRECTIONS AND TRENCHARD AVENUE JUNCTION IMPROVEMENTS - LAYOUT A



LEGEND:

- PROPOSED KERB.
- PROPOSED EDGE OF SEGREGATION STRIP.
- PROPOSED EDGE OF SHARED USE PATH.
- HIGHWAY BOUNDARY.
- STEVENTON LIGHTS DESIGN (ATKINS, 2016).
- RETENTION WALL TO BE RETAINED.

SIGNALS DESIGN LEGEND:

- PRIMARY SIGNAL
- SECONDARY SIGNAL
- SIGNAL HEAD WITH LEFT / RIGHT TURN ARROW ASPECT
- SIGNAL HEAD WITH AHEAD ARROW ASPECT
- 4M TRAFFIC SIGNAL POLE
- 2M TRAFFIC SIGNAL POLE
- NEARSIDE TOUCAN SIGNAL WITH PUSH BUTTON
- PUSH BUTTON UNIT
- CONTROLLER
- CONTROLLER NAL BASE
- FEEDAR PILLAR
- RETENTION SOCKET
- CCTV
- A PHASE
- (1) POLE NUMBER

A4130 (STEVENTON LIGHTS TO MILTON INTERCHANGE)
PROPOSED LAYOUT (CROSS-SECTION A-A)

0 25 50 m
1:1000

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EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

FEASIBILITY DRAWING
NO CONSTRUCTION RISKS TO NOTE IN CURRENT REVISION

FOR MAINTENANCE / OPERATION / DECOMMISSIONING AND DEMOLITION RISKS SEE PROJECT HEALTH AND SAFETY FILE.

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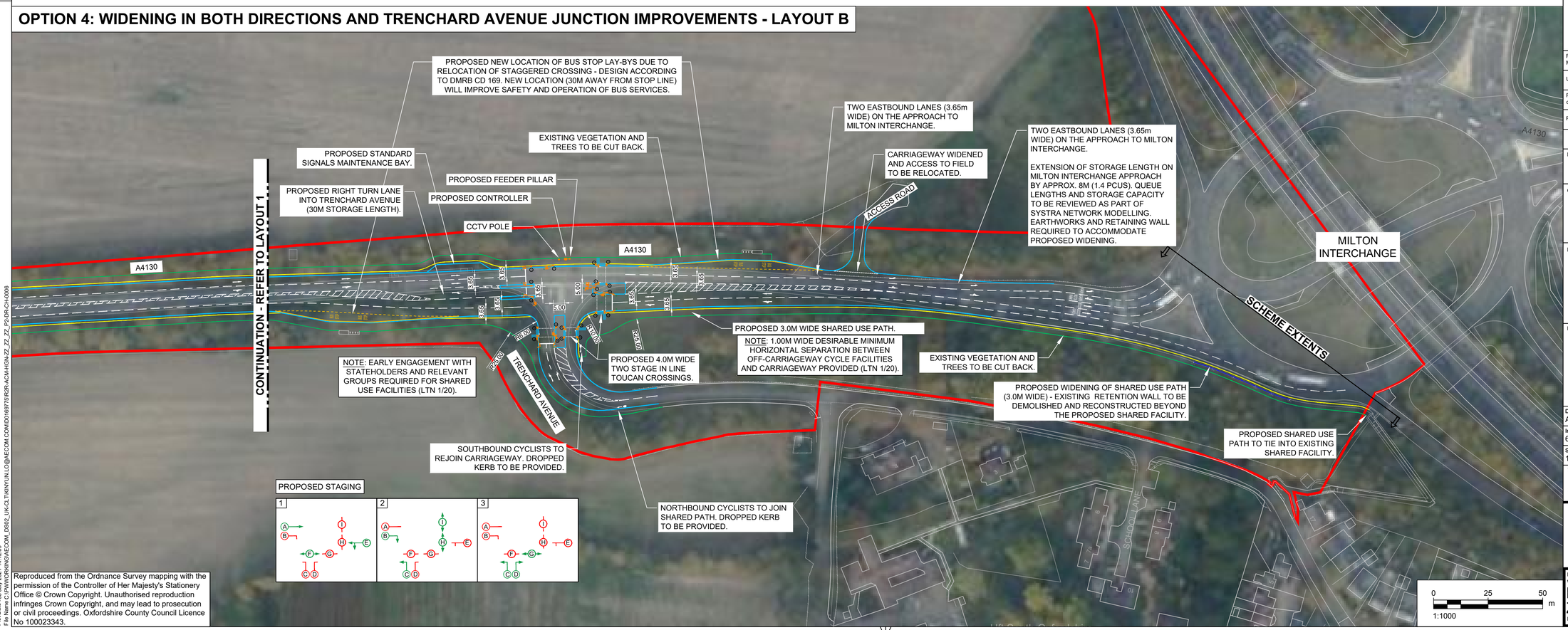
5. REFERENCE SHALL BE MADE TO THE JUNCTION MODELLING TECHNICAL NOTE FOR CAPACITY ASSESSMENT.
6. THIS DRAWING HAS BEEN DEVELOPED BY AECOM BASED ON PREVIOUS DESIGNS, INCLUDING PROPOSALS AT STEVENTON LIGHTS PROVIDED BY OCC.
7. DRAWING IS BASED ON ORDNANCE SURVEY MAPPING AND HIGHWAY BOUNDARY PLANS PROVIDED BY OCC IN AUGUST 2020.
8. ALL ITEMS IN GREY ARE EXISTING UNLESS MENTIONED OTHERWISE.

SIGNALS DESIGN NOTES:

9. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER FEASIBILITY DESIGN DRAWINGS, STANDARD DETAILS AND SPECIFICATIONS FOR THIS SCHEME.
10. ALL SIGNALS ARE TO BE ELV LED.
11. CONTROLLER TO BE ELV.
12. ALL POLES TO HAVE LOW LEVEL ACCESS.
13. RETENTION SOCKET SYSTEM TO BE USED AT ALL POLES.
14. NAL TYPE CONTROLLER BASE TO BE USED.
15. PEDESTRIAN SIGNAL TO BE NEARSIDE TOUCAN.
16. TACTILE CONE TO BE FITTED ON ALL POLES.
17. MINIMUM OF 1M BETWEEN CONTROLLER AND FEEDER PILLAR.
18. LOCATION OF CCTV POLE INDICATIVE ONLY AND TO BE AGREED BY OCC.
19. CCTV POLE TO BE HINGED OR TELESCOPIC TYPE

OPTION 4: WIDENING IN BOTH DIRECTIONS AND TRENCHARD AVENUE JUNCTION IMPROVEMENTS - LAYOUT B



0 25 50 m
1:1000

FOR INFORMATION

REVISION DETAILS	By / Check	Date	Suffix
Following Trenchard Ave Junction Modelling	ACC / KL	25/03/21	P02
Updated staging diagram	ACC / KL	12/04/21	P03
Revised design providing in - line crossing	SS / KL	06/07/21	P04
Following OCC Comments	SS / KL	06/07/21	P05

Purpose of issue
SUITABLE FOR INFORMATION

Client
County Hall
New Road
Oxford
OX1 1ND
OXFORDSHIRE COUNTY COUNCIL

Project Title
Relief to Rowstock

Drawing Title
FEASIBILITY STUDY
A4130 WIDENING
DESIGN OPTION 4

Designed	Drawn	Checked	Approved	Date
ACC	SS	KL	PN	06/07/21

Internal Project No.	Suitability
60637406	S2
Scale @ A1: 1:1000	Discipline: Civil - Highways

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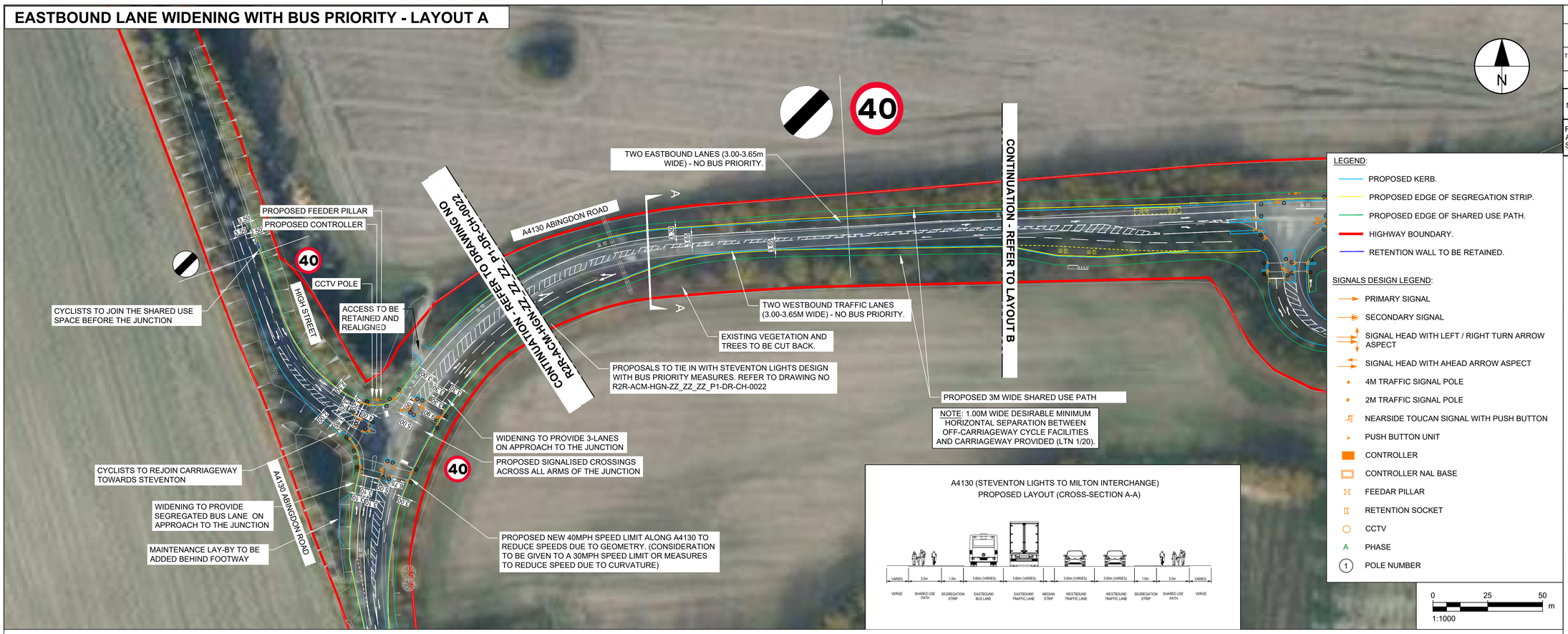
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Work Package ID | Originator | Volume | Rev
R2R | ACM | HGN | P05
ZZ_ZZ_ZZ_P2 | DR | CH | 0006
Location | Type | Role | Number

Plot Date: 06 July 2021 14:15:26
File Name: O:\OXFORD\HIGHWAYS\AECOM_DS02_UK-CLTKINYU1N1L0@AECOM.COM\D0169775\R2R-ACM-HGN_ZZ_ZZ_P2-DR-CH-0006

EASTBOUND LANE WIDENING WITH BUS PRIORITY - LAYOUT A



A4130 (STEVENTON LIGHTS TO MILTON INTERCHANGE)
PROPOSED LAYOUT (CROSS-SECTION A-A)

LEGEND:

- PROPOSED KERB.
- PROPOSED EDGE OF SEGREGATION STRIP.
- PROPOSED EDGE OF SHARED USE PATH.
- HIGHWAY BOUNDARY.
- RETENTION WALL TO BE RETAINED.

SIGNALS DESIGN LEGEND:

- PRIMARY SIGNAL
- SECONDARY SIGNAL
- SIGNAL HEAD WITH LEFT / RIGHT TURN ARROW ASPECT
- SIGNAL HEAD WITH AHEAD ARROW ASPECT
- 4M TRAFFIC SIGNAL POLE
- 2M TRAFFIC SIGNAL POLE
- NEARSIDE TOUCAN SIGNAL WITH PUSH BUTTON
- PUSH BUTTON UNIT
- CONTROLLER
- CONTROLLER NAL BASE
- FEEDAR PILLAR
- RETENTION SOCKET
- CCTV
- A PHASE
- (1) POLE NUMBER

0 25 50 m
1:1000

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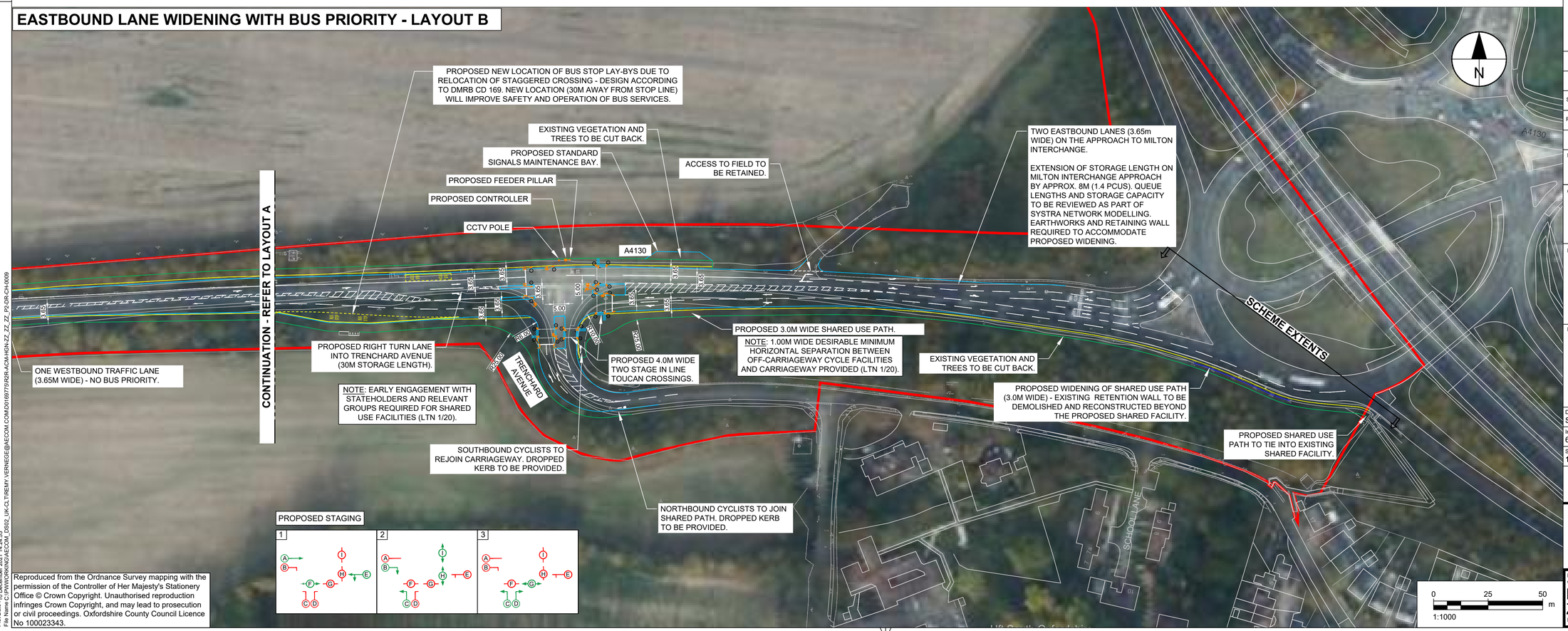
6. THIS DRAWING HAS BEEN DEVELOPED BY AECOM BASED ON PREVIOUS DESIGNS.
7. DRAWING IS BASED ON ORDNANCE SURVEY MAPPING AND HIGHWAY BOUNDARY PLANS PROVIDED BY OCC IN AUGUST 2020.
8. ALL ITEMS IN GREY ARE EXISTING UNLESS MENTIONED OTHERWISE.

EASTBOUND LANE WIDENING WITH BUS PRIORITY - LAYOUT B



PROPOSED STAGING

0 25 50 m
1:1000

FOR INFORMATION

Second Issue - Following OCC Comments	RV / KL	10/12/21	P02
First Issue - Bus Priority Measures	SS / KL	06/12/21	P01
REVISION DETAILS	By / Check	Date	Suffix

Purpose of issue
INITIAL STATUS OR WIP

Client
County Hall
New Road
Oxford
OX1 1ND
OXFORDSHIRE COUNTY COUNCIL

Project Title
Relief to Rowstock

Drawing Title
FEASIBILITY STUDY
A4130 WIDENING DESIGN
OPTION 2 WITH BUS
PRIORITY MEASURES

Designed	Drawn	Checked	Approved	Date
SS	SS	KL		

Internal Project No.	Suitability
60637406	S0
Scale @ A1	Discipline
1:1000	Civil - Highways

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Sunley House
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Drawing Number				Rev
Work Package ID	Originator	Volume		
R2R	-ACM	-HGN-		P02
ZZ_ZZ_ZZ_P2		-DR-CH-0009		
Location		Type	Role Number	

Plot Date: 10 December 2021 14:24:55
File Name: R2R-ACM-HGN-ZZ_ZZ_P2-DR-CH-0009

3. A4130/B4017 Junction (Steventon Lights)

3.1 Introduction

3.1.1 Steventon Lights junction currently comprises of the B4017 High Street forming a signalised T-junction with the A4130 Abingdon Road. The existing speed of the junction is the National Speed Limit.

3.1.2 Three proposed options for Steventon Lights have been modelled. They are:

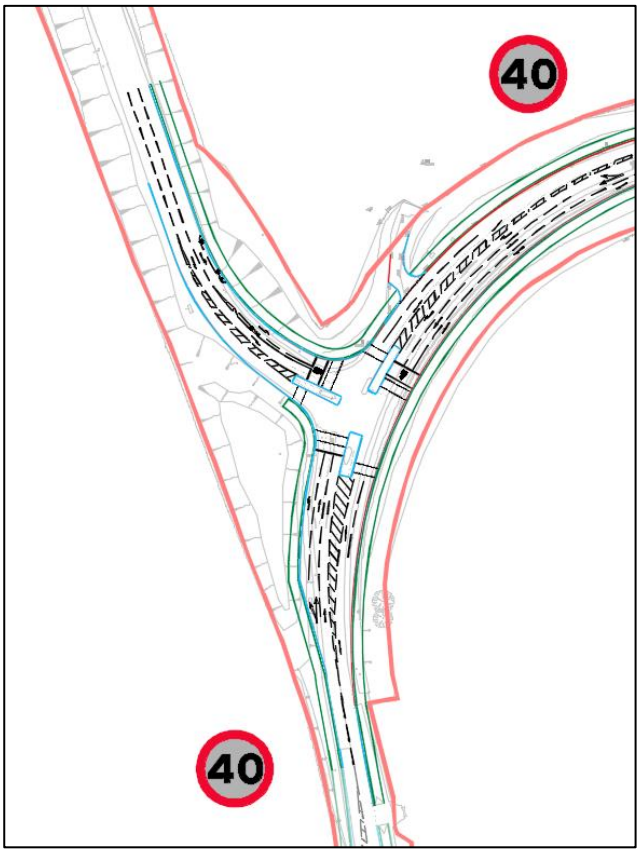
- *Option 01: Upgrading existing Steventon Lights signal junction + 40 mph speed limit*
- *Option 02: Similar to Option 01 but with minor design changes.*
- *Option 03: Similar to Option 02 with in-line Toucan crossings.*

3.2 Steventon Lights – Option 01

3.2.1 The proposals for the junction include a redesign to the existing layout of the junction and incorporating non-motorised users (NMUs) facilities. The proposals for the speed limit for the junction include introducing a 40mph zone along the A4130.

3.2.2 The proposed junction layout drawing has been shown below in Figure 2.

Figure 2: Proposed Junction Layout – Steventon Lights – Working Drawing



3.3 Assumptions:

3.3.1 The following assumptions have been incorporated within the vehicular traffic modelling for Steventon Lights:

1. Saturation Flows: Saturation flows have been calculated using RR67. This method calculates saturation flow using the geometric parameters from the design proposals. The following design has been used in the traffic modelling, drawing reference: "R2R-ACM-HGN-ZZ_ZZ_ZZ_P2-M2-CH-0008".

2. Cruise Time: A cruise time of 64 kph (40 mph) has been used in the LinSig modelling for the internal links on A4130.

3. Featherbed Lane (North) and Trenchard Avenue: It is worth mentioning that traffic flow conditions at Featherbed Lane (N) and Trenchard Avenue have not been considered in this modelling with the junction reviewed in isolation.

4. Merging Lanes: Modelling traffic merges highlights one of LinSig's key limitation. The mode of operation of the merge i.e. merging in turns cannot be modelled accurately in the software. Therefore, to replicate that traffic behaviour, a lower saturation flow (1600 PCU/Hr) is used on the merging arms as compared to the upstream arms. This, however, is merely an assumption and true traffic behaviour at the junction cannot be replicated entirely in LinSig at merging sections.

3.4 Modelling Inputs:

3.4.1 The following inputs have been defined for the traffic modelling of Steventon Lights junction.

3.4.1 Traffic Flows:

3.4.1.1 Traffic flows for the junction have been supplied by SYSTRA for AM, IP, and PM peaks for 2024 and 2034. The flows have been provided in the classification of Cars, Light Goods Vehicle (LGV), Medium Goods Vehicle (MGV), Heavy Goods Vehicle (HGV) and Buses. They have been converted into PCUs using the factors shown below in Table 1.

Table 1: PCU Conversion Factors - Source: TfL Modelling Guidelines v3

PCU Factors	
Vehicle Type	PCU Value
Cars	1
LGV	1
MGV	1.5
HGV	2.3
Buses	2

3.4.1.2 The traffic flows for the junction have been shown below from Table 2 to Table 7.

Table 2: 2024 AM Peak (08:00-09:00) Flows – Steventon Lights

2024 AM Peak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	610	203	813
A4130 Abingdon Road (S)	632	0	126	758
B4017 High Street	410	315	0	725
Total	1042	925	329	2296

Table 3: 2024 Interpeak (12:00-13:00) Flows – Steventon Lights

2024 Interpeak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	448	268	716
A4130 Abingdon Road (S)	513	0	162	675
B4017 High Street	237	146	0	383
Total	750	594	430	1774

Table 4: 2024 PM Peak (17:00-18:00) Flows – Steventon Lights

2024 PM Peak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	689	389	1078
A4130 Abingdon Road (S)	564	0	266	830
B4017 High Street	242	207	0	449
Total	806	896	655	2357

Table 5: 2034 AM Peak (08:00-09:00) Flows – Steventon Lights

2034 AM Peak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	645	188	833
A4130 Abingdon Road (S)	1028	0	136	1164
B4017 High Street	451	317	0	768
Total	1479	962	324	2765

Table 6: 2034 Interpeak (12:00-13:00) Flows – Steventon Lights

2034 Interpeak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	465	298	763
A4130 Abingdon Road (S)	707	0	234	941
B4017 High Street	284	156	0	440
Total	991	621	532	2144

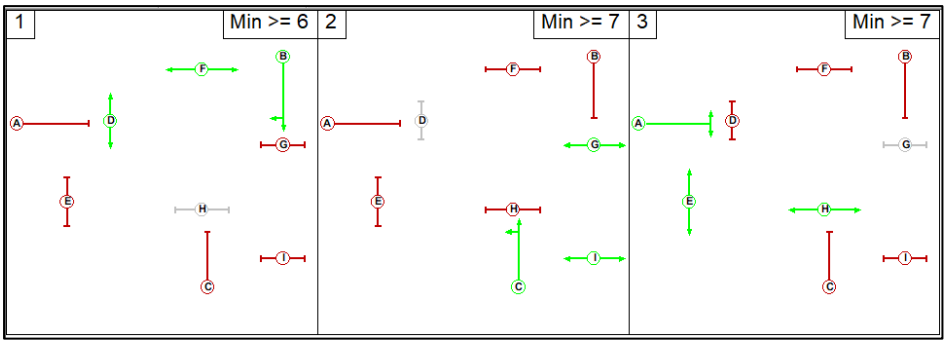
Table 7: 2034 PM Peak (17:00-18:00) Flows – Steventon Lights

2034 PM Peak Flows				
O/D	A4130 Abingdon Road (N)	A4130 Abingdon Road (S)	B4017 High Street	Total
A4130 Abingdon Road (N)	0	614	342	956
A4130 Abingdon Road (S)	706	0	287	993
B4017 High Street	296	219	0	515
Total	1002	833	629	2464

3.4.2 Staging and Phasing:

3.4.2.1 Several different staging combinations were looked at to determine the most optimised staging which results in the junction operating the most efficiently. The proposed staging and phasing defined for this option is shown in Figure 3 below.

Figure 3: Proposed Staging and Phasing – Steventon Lights – Option 01



3.4.2.2 The letters depict the movements (phases) in the junction. The junction is proposed to be operated under a 3-stage arrangement This arrangement has been defined to provide all conflicting vehicular movements with dedicated stages. Phases B and C could not be operated together as it would require right turning traffic on Phase B to gap accept against three lanes on Phase C on a high-speed road.

3.4.2.3 The first stage consists of the southbound movement on the A4130 Abingdon Road (phase B), with pedestrian crossings on the A4130 Abingdon Road northbound exit (phase F) and B4017 High Street entry (phase D). The second stage consists of the A4130 Abingdon Road northbound movement (phase C) with pedestrian crossings located on the A4130 Abingdon Road south bound entry and exit (phases G and I). The final stage will operate The B4017 High street traffic movement (phase A), alongside the pedestrian crossing located on A4130 Abingdon Road northbound entry (phase H) and B4017 High Street exit (phase E).

3.4.2.4 Toucan crossings have been proposed to operate concurrently with other non-conflicting vehicular movements in the junction.

3.4.3 Intergreens:

3.4.3.1 The intergreens extracted from the design drawing for the junction has been shown below in Figure 4.

Figure 4: Measured Intergreens (s) – Steventon Lights – Option 01

	A	B	C	D	E	F	G	H	I
A		6	6	6	–	9	–	–	12
B	6		8	–	12	–	8	–	10
C	8	7		–	9	10	–	7	–
D	14	–	–		–	–	–	–	–
E	–	9	9	–		–	–	–	–
F	11	–	11	–	–		–	–	–
G	–	13	–	–	–	–		–	–
H	–	–	14	–	–	–	–		–
I	11	11	–	–	–	–	–	–	

3.5 Modelling Results:

3.5.1 The network summary results for the junction have been shown below in Table 8.

Table 8: Network Summary Results - 2024 and 2034 – Steventon Lights – Option 01

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	90	25.1	26.93
2024 Interpeak		73.5	17.94
2024 PM Peak		39.4	25.30
2034 AM Peak		1.9	41.67
2034 Interpeak		43	23.14
2034 PM Peak		33.9	28.11

3.5.2 The results shown in Table 8 suggests that the junction is predicted to be comfortably within capacity against the tested 90s cycle time. The PRC for all scenarios is positive indicating spare capacity with the worst-case scenario of 2034 AM peak still reporting a 1.9% spare capacity.

3.5.3 A 90s cycle time has been tested as it is deemed to be the preferred maximum acceptable industry standard cycle time for a junction containing controlled crossing facilities.

3.5.4 The detailed results for the junction have been shown below in Table 9 and Table 10.

Table 9: 2024 Modelling Results – Steventon Lights – Option 01

Detailed Results for Steventon Lights Junction Modelling				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	68.5	8
		Middle	68.7	8.1
		Offside	44.9	4.7
	A4130 Abingdon Road (S)	Nearside	32.2	2.9
		Middle	69.2	8.3
		Offside	69.2	8.3
	B4017 High Street	Nearside	72	10.3
		Offside	49.1	6.8
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	43.9	5.0
		Middle	44.3	5.0
		Offside	51.9	6.2
	A4130 Abingdon Road (S)	Nearside	37.7	3.6
		Middle	51.2	6.0
		Offside	51.0	6.0
	B4017 High Street	Nearside	50.3	5.5
		Offside	27.5	3.1
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	58.2	7.8
		Middle	58.1	7.9
		Offside	64.6	9.2
	A4130 Abingdon Road (S)	Nearside	61.8	6.7
		Middle	56.1	6.7
		Offside	56.1	6.7
	B4017 High Street	Nearside	61.6	6.2
		Offside	46.8	4.9
where 1 PCU = 5.75m				

3.5.5 Table 9 shows results for 2024 modelling of Steventon Lights junction. For all scenarios in 2024 the junction operates within capacity with the highest DoS of 69.2% recorded on the of middle lane of A4130 (S) which also results in a queue of 8.3 PCU. This queue of 48m is not expected to reach back onto Featherbed Lane (N) junction, which is situated approximately 340m to the south of the junction.

3.5.6 The predicted queues of Steventon Lights junction are reported by LinSig to be within the given lane lengths of the junction. The LinSig model does not predict of the potential reaching back of the queue to the upstream and downstream junctions.

Table 10: 2034 Modelling Results – Steventon Lights – Option 01

Detailed Results for Steventon Lights Junction Modelling				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	84.7	10.2
		Middle	84.6	10.3
		Offside	48.5	4.6
	A4130 Abingdon Road (S)	Nearside	26.7	2.8
		Middle	86.6	15.1
		Offside	86.6	15.1
	B4017 High Street	Nearside	88.3	14.0
		Offside	55.1	7.3
2034 Interpeak	A4130 Abingdon Road (N)	Nearside	49.9	5.4
		Middle	50.0	5.5
		Offside	62.9	7.5
	A4130 Abingdon Road (S)	Nearside	47.9	5.3
		Middle	62	8.5
		Offside	61.8	8.5
	B4017 High Street	Nearside	62.9	7.1
		Offside	30.7	3.3
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	60.4	7.4
		Middle	60.5	7.5
		Offside	66.2	8.6
	A4130 Abingdon Road (S)	Nearside	63.8	7.3
		Middle	67.2	8.9
		Offside	67.2	8.9
	B4017 High Street	Nearside	65.5	7.5
		Offside	43.0	4.9

3.5.7 Table 10 shows results for 2034 modelling of Steventon Lights junction. The junction is predicted to be within capacity for all the 2034 scenarios. The highest DoS is reported by B4017 Near side of 88.3%

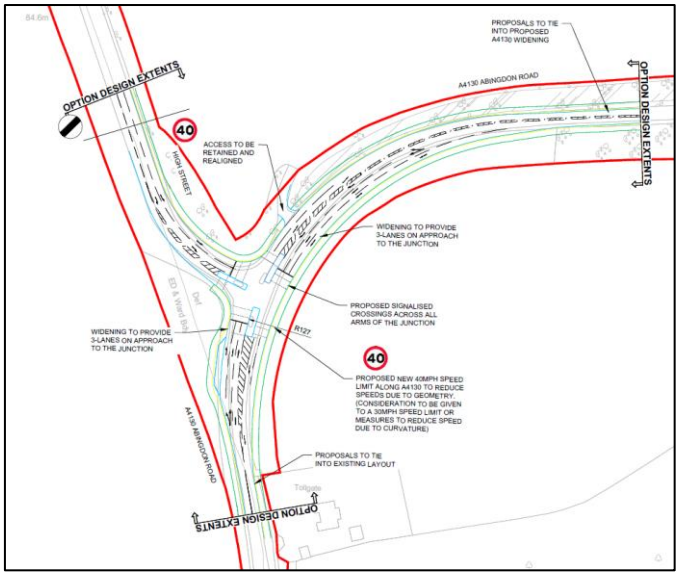
3.5.8 The predicted queue on A4130 Abingdon Road (S) displays a queue of 15.1 PCUs (87m) which extends beyond the defined link length (51m) in 2034 AM peak. This can have the potential to reach back on to the single lane entry to the south but not up to Featherbed Lane junction which is located approximately 340m to the south.

3.6 Steventon Lights – Option 02

3.6.1 Minor amendments were carried out to the Steventon Lights Option 01 junction option by removing the Advanced Stop Lines (ASL) for cyclists. This was carried out as it was deemed unacceptable for cyclists to be on the carriageway due to the speed limit being above 30mph.

3.6.2 The proposed junction layout drawing is shown below in Figure 5.

Figure 5: Steventon Lights - Option 02 - Junction Layout Drawing



3.7 Modelling Inputs:

3.7.1 The following inputs have been defined for the traffic modelling of Steventon Lights junction.

3.8 Traffic Flows:

3.8.1 The traffic flows for the junction are identical to the flows shown previously from Table 2 to Table 7 for Steventon Lights Option 01.

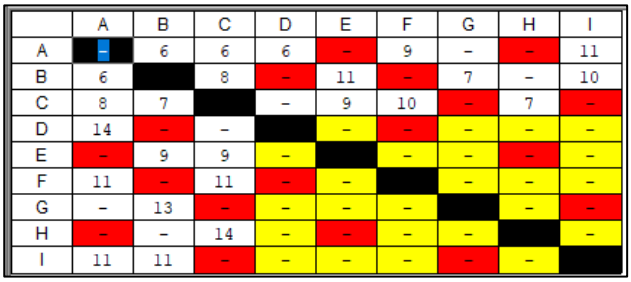
3.8.1 Staging and Phasing:

3.8.1.1 The staging and phasing defined for the junction is identical to Steventon Lights Option 01 shown in Figure 3 previously.

3.8.2 Intergreens:

3.8.2.1 The intergreens extracted from the design drawing for the junction has been shown below in Figure 6.

Figure 6: Measured Intergreens (s) – Steventon Lights Option 02



	A	B	C	D	E	F	G	H	I
A	–	6	6	6	–	9	–	–	11
B	6		8	–	11	–	7	–	10
C	8	7		–	9	10	–	7	–
D	14	–	–		–	–	–	–	–
E	–	9	9	–		–	–	–	–
F	11	–	11	–	–		–	–	–
G	–	13	–	–	–	–		–	–
H	–	–	14	–	–	–	–		–
I	11	11	–	–	–	–	–	–	

3.9 Modelling Results:

3.9.1 The network summary results for the junction have been shown below in Table 11.

Table 11: Network Summary Results - 2024 and 2034 – Steventon Lights Option 02

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	90	25.1	26.93
2024 Interpeak		73.5	17.94
2024 PM Peak		39.4	25.30
2034 AM Peak		1.9	41.67
2034 Interpeak		43	23.14
2034 PM Peak		33.9	28.11

3.9.2 The results shown in Table 11 suggests that the junction is predicted to be within capacity against the tested 90s cycle time for all of the scenarios. The PRC for all scenarios is positive indicating spare capacity. The worst-case scenario of 2034 AM Peak reports a PRC of 1.9% which indicates that the junction will be operating within capacity for the scenario.

3.9.3 The detailed results for the junction have been shown below in Table 12 and Table 13.

Table 12: 2024 Modelling Results – Steventon Lights Option 02

Detailed Results for Steventon Lights Junction Modelling - Option 02				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	68.5	8
		Middle	68.7	8.1
		Offside	44.9	4.7
	A4130 Abingdon Road (S)	Nearside	32.2	2.9
		Middle	69.2	8.3
		Offside	69.2	8.3
	B4017 High Street	Nearside	72	10.3
		Offside	49.1	6.8
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	43.9	5
		Middle	44.3	5
		Offside	51.9	6.2
	A4130 Abingdon Road (S)	Nearside	37.7	3.6
		Middle	51.2	6
		Offside	51	6
	B4017 High Street	Nearside	50.3	5.5
		Offside	27.5	3.1
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	58.2	7.8
		Middle	58.1	7.9
		Offside	64.6	9.2
	A4130 Abingdon Road (S)	Nearside	61.8	6.7
		Middle	56.1	6.7
		Offside	56.1	6.7
	B4017 High Street	Nearside	61.6	6.2
		Offside	46.8	4.9
where 1 PCU = 5.75m				

3.9.4 Table 12 shows results for 2024 modelling of Steventon Lights junction. For all scenarios in 2024 the junction operates within capacity with the highest DoS of 72% recorded on nearside lane B4017 High Street

3.9.5 The predicted queues of Steventon Lights junction are reported by LinSig to be within the given lane lengths of the junction. The queues reported on A4130 (N) and A4130 (S) do not have the potential to reach back on to Trenchard and Featherbed Lane (N) junctions.

Table 13: 2034 Modelling Results – Steventon Lights Option 02

Detailed Results for Steventon Lights Junction Modelling – Option 02				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	84.7	10.2
		Middle	84.6	10.3
		Offside	48.5	4.6
	A4130 Abingdon Road (S)	Nearside	26.7	2.8
		Middle	86.6	15.1
		Offside	86.6	15.1
	B4017 High Street	Nearside	88.3	14
		Offside	55.1	7.3
2034 Interpeak	A4130 Abingdon Road (N)	Nearside	49.9	5.4
		Middle	50	5.5
		Offside	62.9	7.5
	A4130 Abingdon Road (S)	Nearside	49.9	5.3
		Middle	62	8.5
		Offside	61.8	8.5
	B4017 High Street	Nearside	62.9	7.1
		Offside	30.7	3.3
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	60.4	7.4
		Middle	60.5	7.5
		Offside	66.2	8.6
	A4130 Abingdon Road (S)	Nearside	63.8	7.3
		Middle	67.2	8.9
		Offside	67.2	8.9
	B4017 High Street	Nearside	65.5	7.5
		Offside	43	4.9

3.9.6 Table 13 shows results for 2034 modelling of Steventon Lights junction. The junction is predicted to be within capacity for all the 2034 scenarios. The highest DoS is reported by nearside lane of B4017 of 88.3% indicating the arm to be almost at capacity.

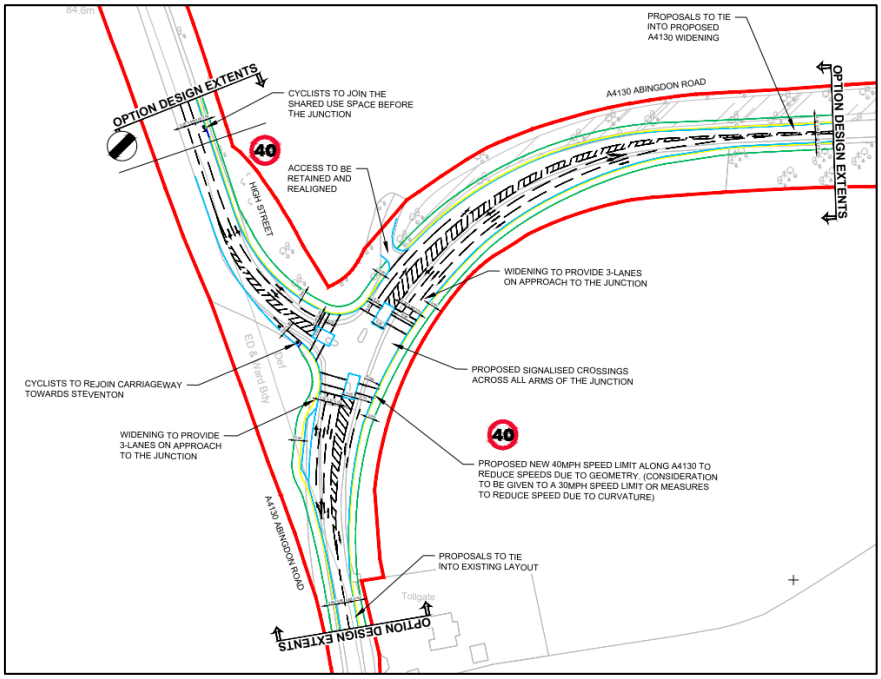
3.9.7 The predicted queue on A4130 Abingdon Road (S) displays a queue of 15.1 PCUs (87m) which extends beyond the defined link length (51m) in 2034 AM peak. This has the potential to reach back on to the single lane entry to the south but not up to Featherbed Lane junction which is located approximately 340m to the south.

3.10 Steventon Lights – Option 03 – Preferred Option

3.10.1 Minor amendments were carried out to the Steventon Lights Option 02 junction option by providing in-line Toucan crossings with a 5m island separation in the middle. This separation will result in the crossings being operated under a two-stage arrangement similar to staggered crossings.

3.10.2 The proposed junction layout is shown in Figure 7. The major changes for the junction include the amendments in the stop line locations and conversion of staggered crossings into in-line crossings. This option has been termed as "5A + 6" in the OAR report. The design drawing has been included in Appendix A, drawing reference number "R2R-ACM-HGN-ZZ_ZZ_ZZ_P1-DR-CH-0016 – Rev P01".

Figure 7: Steventon Lights - Option 03 - Junction Layout Drawing



3.11 Modelling Inputs:

3.11.1 The following inputs have been defined for the traffic modelling of Steventon Lights junction.

3.12 Traffic Flows:

3.12.1 The traffic flows for the junction are identical to the flows shown previously from Table 2 to Table 7 for Steventon Lights Option 01.

3.12.1 Staging and Phasing:

3.12.1.1 The staging and phasing defined for the junction is identical to Steventon Lights Option 01 shown in Figure 3 previously.

3.12.2 Intergreens:

3.12.2.1 The intergreens extracted from the design drawing for the junction has been shown below in Figure 8.

Figure 8: Measured Intergreens (s) – Steventon Lights Option 03

	A	B	C	D	E	F	G	H	I
A	–	6	6	6	–	8	–	–	11
B	7		9	–	12	–	7	–	11
C	10	7		–	8	11	–	7	–
D	12	–	–		–	–	–	–	–
E	–	11	11	–		–	–	–	–
F	11	–	11	–	–		–	–	–
G	–	13	–	–	–	–		–	–
H	–	–	14	–	–	–	–		–
I	12	12	–	–	–	–	–	–	

3.13 Modelling Results:

3.13.1 The network summary results for the junction have been shown below in Table 14.

Table 14: Network Summary Results - 2024 and 2034 – Steventon Lights Option 03

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	90	18.5	29.34
2024 Interpeak		64.1	18.82
2024 PM Peak		32.3	27.05
2034 AM Peak	100	0.8	48.22
2034 Interpeak	90	33.5	24.75
2034 PM Peak		25.4	29.96

3.13.2 The results shown in Table 14 suggests that the junction is predicted to be within capacity against the tested 90s cycle time for all of the scenarios barring 2034 AM peak. A cycle time of 100s was tested to be the optimised cycle time for 2034 AM peak with the junction operating at capacity. The PRC for all scenarios is positive indicating spare capacity. The worst-case scenario of 2034 AM Peak reports a PRC of 0.8% which indicates that the junction will be operating within capacity for the scenario but for a 100s cycle time.

3.13.3 The detailed results for the junction have been shown below in Table 15 and Table 16.

Table 15: 2024 Modelling Results – Steventon Lights Option 03

Detailed Results for Steventon Lights Junction Modelling - Option 03				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	75.7	8.6
		Middle	75.9	8.7
		Offside	49.6	4.9
	A4130 Abingdon Road (S)	Nearside	33.9	2.9
		Middle	72.8	8.6
		Offside	72.8	8.6
	B4017 High Street	Nearside	74.5	10.5
		Offside	50.9	6.9
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	45.8	5
		Middle	46.2	5.1
		Offside	54.1	6.3
	A4130 Abingdon Road (S)	Nearside	39.4	3.7
		Middle	53.6	6.1
		Offside	53.4	6.1
	B4017 High Street	Nearside	54.8	5.7
		Offside	30	3.2
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	60.3	8
		Middle	60.2	8.1
		Offside	66.9	9.4
	A4130 Abingdon Road (S)	Nearside	68	7.1
		Middle	61.8	7.1
		Offside	61.8	7.1
	B4017 High Street	Nearside	64.8	6.4
		Offside	49.2	5
where 1 PCU = 5.75m				

3.13.4 Table 15 shows results for 2024 modelling of Steventon Lights junction. For all scenarios in 2024 the junction operates within capacity with the highest DoS of 75.9% recorded on the central lane of A4130 Abingdon Road (N).

3.13.5 The predicted queues of Steventon Lights junction are reported by LinSig to be within the given lane lengths of the junction. The queues reported on A4130 (N) and A4130 (S) do not have the potential to reach back on to Trenchard and Featherbed Lane (N) junctions.

Table 16: 2034 Modelling Results – Steventon Lights Option 03

Detailed Results for Steventon Lights Junction Modelling – Option 03				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	89.2	12.1
		Middle	89	12.2
		Offside	51.1	5.2
	A4130 Abingdon Road (S)	Nearside	27.6	3.1
		Middle	89.3	17.4
		Offside	89.3	17.4
	B4017 High Street	Nearside	88	15.2
		Offside	54.9	8
2034 Interpeak	A4130 Abingdon Road (N)	Nearside	52.2	5.5
		Middle	52.4	5.6
		Offside	65.9	7.7
	A4130 Abingdon Road (S)	Nearside	52	5.5
		Middle	67.4	8.9
		Offside	67.2	8.9
	B4017 High Street	Nearside	65.7	7.3
		Offside	32.1	3.4
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	63	7.5
		Middle	63.1	7.6
		Offside	69.1	8.8
	A4130 Abingdon Road (S)	Nearside	66.7	7.4
		Middle	70.3	9.2
		Offside	70.3	9.2
	B4017 High Street	Nearside	71.8	8
		Offside	47.1	5.1

3.13.6 Table 16 shows results for 2034 modelling of Steventon Lights junction. The junction is predicted to be within capacity for all the 2034 scenarios. The highest DoS is reported by middle and offside lanes of A4017 of 89.3% indicating the arm to be almost at capacity.

3.13.7 The predicted queue on A4130 Abingdon Road (S) displays a queue of 17.4 PCUs (100m) which extends beyond the defined link length (51m) in 2034 AM peak. This has the potential to reach back on to the single lane entry to the south but not up to Featherbed Lane junction which is located approximately 340m to the south.

8. Summary and Conclusions

8.1 Summary

8.1.1 This report (TNR01) summarised the production and results of the vehicular traffic modelling for the proposed design options in the Rowstock area, between Didcot and Wantage in Oxfordshire. The designs for the following locations were tested as a part of the Relief to Rowstock Way scheme:

- Steventon Lights Junction
- Featherbed Lane (North)
- Featherbed Lane (South)
- Rowstock Junction
- The proposed A4185 Newbury/Western Link Road
- The proposed A417 Wantage Road/Western Link Road.

8.1.2 The vehicular traffic modelling has been carried out using traffic flows obtained from strategic modelling outputs provided by SYSTRA on 5th March 2021 and 10th March 2021. The flows obtained cover AM (08:00-09:00), IP (12:00-13:00), and PM (16:00-17:00) peaks for the years 2024 and 2034.

8.1.3 All of the options have been tested against a 90 second and 120 second cycle times. 90 seconds cycle time is considered as the desirable maximum whereas 120 second cycle time is considered as the absolute maximum cycle time for junctions with NMU facilities. The determination of the final tested cycle times depended upon the capacity of the junction.

8.1.4 It should be noted that the LinSig modelling has considered a worst-case scenario with 100% Toucan demand, fixed time cycles, maximum intergreens and fixed stage sequences. Any lack of Toucan demand and NMU detection methods will result in a lower interstage time which will result in the vehicular movements getting more green time consequently improving the overall performance of the junction.

8.1.5 As mentioned throughout the report, modelling traffic merges highlights one of LinSig's key limitation. The mode of operation of the merge i.e. merging in turns cannot be modelled accurately in the software. Therefore, in order to replicate that traffic behaviour, a lower saturation flow (1600 PCU/Hr) is used on the merging arms as compared to the upstream arms. This, however, is merely an assumption and true traffic behaviour at the junction cannot be replicated entirely in LinSig at merging sections. It is recommended that more detailed analysis in the form of microsimulation is carried out to ensure the merge sections are sufficiently long to provide enough capacity to prevent queues from blocking the vehicle discharge at the upstream signals and affect junction capacity.

8.1.6 The efficiency of all the tested signalised junctions can be potentially further improved by applying MOVA operation of signals which can efficiently react to the changing travel patterns of vehicular traffic.

8.1.7 In addition to the results above, cycle times have been optimised using the "Cycle Time Optimisation View" to determine the cycle time at which the junction performs at capacity. This is expected to reduce the waiting times at the crossing as well as not incurring heavy delays on general traffic. This method of operation is expected at a junction under MOVA control. This has been shown below in this chapter.

8.1.8 The summary and conclusions obtained from the vehicular traffic modelling for all the options have been included in this chapter.

8.2 Steventon Lights

8.2.1 Steventon Lights proposes a signalised T-junction between B4017 High Street and A4130 Abingdon Road. Three options have been tested for Steventon Lights with minor differences between them such as the removal of ASLs, relocation of stoplines and in-line Toucan crossings.

8.2.2 The modelling results for the preferred Option 3 (5A+6) "drawing reference number "R2R-ACM-HGN-ZZ_ZZ_ZZ_P1-DR-CH-0016 – Rev P01" suggests that the junction will be within capacity against the tested scenarios. The junction will have considerable capacity when tested against the predicted flows for most of the scenarios. The worst-case scenario of 2034 AM peak reports a 0.8% spare capacity for a 100s cycle time which indicates that the junction will be at capacity for the scenario. The preferred option is attached in Appendix A.

8.2.3 The junction will perform at capacity for the following optimised cycle times shown in Table 109.

Table 109: Network Summary Results "Optimised Cycle Times" - Steventon Lights Option 02

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	65	1.5	32.31
2024 Interpeak	58	23.4	17.46
2024 PM Peak	61	2.9	28.62
2034 AM Peak	100	0.8	48.22
2034 Interpeak	58	6.3	26.17
2034 PM Peak	59	0.2	34.45

8.2.4 There exist lane merges on A4130 Abingdon Road (N) of 45m and A4130 Abingdon Road (S) arm of 25m. The merging in turns behaviour would need to be re-modelled in microsimulation modelling to determine its impact on the junction performance.

10. Addendum 2

10.1 In December 2021, AECOM undertook further modelling of the Steventon Lights junction, as part of the wider Relief to Rowstock project. This additional modelling was based upon Option 3, the results of which are given in Section 3 of this report.

10.2 Since the original design and modelling was carried out, a revision to the highway design being considered includes the provision of a new bus lane on A4130 Abingdon Road between Steventon Lights and Trenchard Avenue. This layout has not previously been modelled, and as such AECOM have been asked to undertake two modelling tasks.

10.3 The first task will examine how the existing junction design operates with the pedestrian phases being called every other cycle (to mimic a 50% demand), and also to remove the pedestrian phases altogether (0% demand). These will then be compared with the original staging arrangement, which had the pedestrian phases being called each cycle (100% demand).

10.4 The second task is to undertake modelling on the new bus lane will be provided at the junction for buses travelling northbound. This modelling will also be tested using the same demand-dependency options outlined in paragraph 10.3 above.

10.5 For the purpose of this Addendum, the revised model showing Pedestrian Dependency only will be known as Option 3-A, and is based on the original Option 3 layout shown on drawing R2R-ACM-HGN-ZZ_ZZ_ZZ_P1-DR-CH-0016 – Rev P01; and the model including the Bus Lane as Option 4, based upon the revised layout outlined on drawing R2R-ACM-HGN-ZZ_ZZ_ZZ_P1-DR-CH-0022.

10.6 Traffic Flow data in the revised model remains the same as in the previous modelling. However, following the aforementioned changes to the highway design, signal timings and associated modelling criteria have been reviewed and amended as necessary. Intergreen timings have not been amended in this modelling work.

10.7 For the results of the original (100% dependency) modelling, please refer to Tables 14, 15 and 16 in Section 3 of this report.

10.8 Practical Reserve Capacity (PRC) is a measure of how much additional traffic could pass through a junction whilst maintaining a maximum Degree of Saturation (DoS) of 90% on all lanes. Total Traffic Delay is the delay associated with all lanes in a junction.

10.9 The summary results for the Option 3-A modelled junction have been shown below in Table 117. The same cycle times have been used in both models for comparison reasons.

Table 117: Summary Results – Steventon Lights Option 3-A

		50% Pedestrians		0% Pedestrians	
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	65	1.5	33.70	7.5	28.68
2024 Interpeak	58	30.9	17.62	36.5	16.29
2024 PM Peak	61	7.8	28.35	17.1	25.11
2034 AM Peak	65	0.6	48.78	2.3	44.13
2034 Interpeak	58	5.9	27.07	10.9	23.31
2034 PM Peak	61	0.2	36.54	6.6	30.47

10.10 The results in Table 117 show that, in both years 2024 and 2034, the junction will operate within capacity during all peak periods, albeit some are very close to their threshold limits.

10.11 Degree of Saturation (DoS) is used to determine the capacity of an arm, with a threshold of 90% considered as the capacity. The Mean Maximum Queue (MMQ) measures the average maximum queue experienced by any lane.

10.12 The detailed results of the junction, for year 2024, are shown in Table 118. And those for year 2034 in Table 119.

Table 118: 2024 Modelling Results – Steventon Lights Option 03-A

Detailed Results for Steventon Lights Junction Modelling - Option 03-A						
Scenario	Arm	Lane	50% Pedestrian		0% Pedestrian	
			Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	86.8	8.5	79.9	7.0
		Middle	86.8	8.4	80.2	7.1
		Offside	56.8	4.1	52.4	3.8
	A4130 Abingdon Road (S)	Nearside	40.5	2.4	38.8	2.3
		Middle	86.9	8.5	83.3	7.8
		Offside	86.9	8.5	83.3	7.8

	B4017 High Street	Nearside	88.7	10.6	83.7	9.4
		Offside	60.5	5.8	57.1	5.5
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	67.1	5.1	52.7	3.8
		Middle	66.8	5.0	52.3	3.6
		Offside	49.4	2.9	61.7	4.7
	A4130 Abingdon Road (S)	Nearside	57.6	4.0	48.5	2.8
		Middle	58.0	4.1	65.9	4.7
		Offside	68.0	5.1	65.7	4.7
	B4017 High Street	Nearside	68.8	4.7	64.8	4.4
		Offside	37.6	2.4	35.4	2.3
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	73.4	7.1	68.8	6.2
		Middle	73.7	7.0	69.1	6.3
		Offside	81.7	8.7	76.6	7.6
	A4130 Abingdon Road (S)	Nearside	72.8	5.8	76.8	5.8
		Middle	72.8	5.8	69.8	5.5
		Offside	80.2	6.2	69.8	5.5
	B4017 High Street	Nearside	83.5	6.3	75.9	5.3
		Offside	63.4	4.1	57.7	3.8
where 1 PCU = 5.75m						

Table 119: 2034 Modelling Results – Steventon Lights Option 03-A

Detailed Results for Steventon Lights Junction Modelling - Option 03-A						
Scenario	Arm	Lane	50% Pedestrian		0% Pedestrian	
			Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	89.2	12.5	84.7	11.1
		Middle	89.0	12.6	84.6	11.2
		Offside	51.1	5.4	48.5	5.1
	A4130 Abingdon Road (S)	Nearside	27.6	3.2	26.6	3.1
		Middle	89.3	17.6	86.2	16.3
		Offside	89.3	17.6	86.2	16.3

	B4017 High Street	Nearside	89.5	15.9	88.0	15.2
		Offside	55.9	8.2	54.9	8.0
2034 Interpeak	A4130 Abingdon Road (N)	Nearside	84.7	7.0	64.4	4.3
		Middle	83.3	7.7	64.3	4.3
		Offside	85.0	7.3	81.1	6.6
	A4130 Abingdon Road (S)	Nearside	64.3	4.3	59.3	4.0
		Middle	83.0	7.7	76.9	6.9
		Offside	83.3	7.7	76.9	6.9
	B4017 High Street	Nearside	84.7	7.0	77.6	5.9
		Offside	41.3	2.6	37.9	2.4
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	79.1	6.9	73.0	5.9
		Middle	79.3	3.9	73.2	6.0
		Offside	86.8	8.7	54.1	3.7
	A4130 Abingdon Road (S)	Nearside	83.7	6.9	80.2	7.2
		Middle	88.1	8.9	84.5	8.0
		Offside	88.1	8.9	84.5	8.0
	B4017 High Street	Nearside	89.8	8.3	82.3	6.8
		Offside	59.0	3.9	54.1	3.7
where 1 PCU = 5.75m						

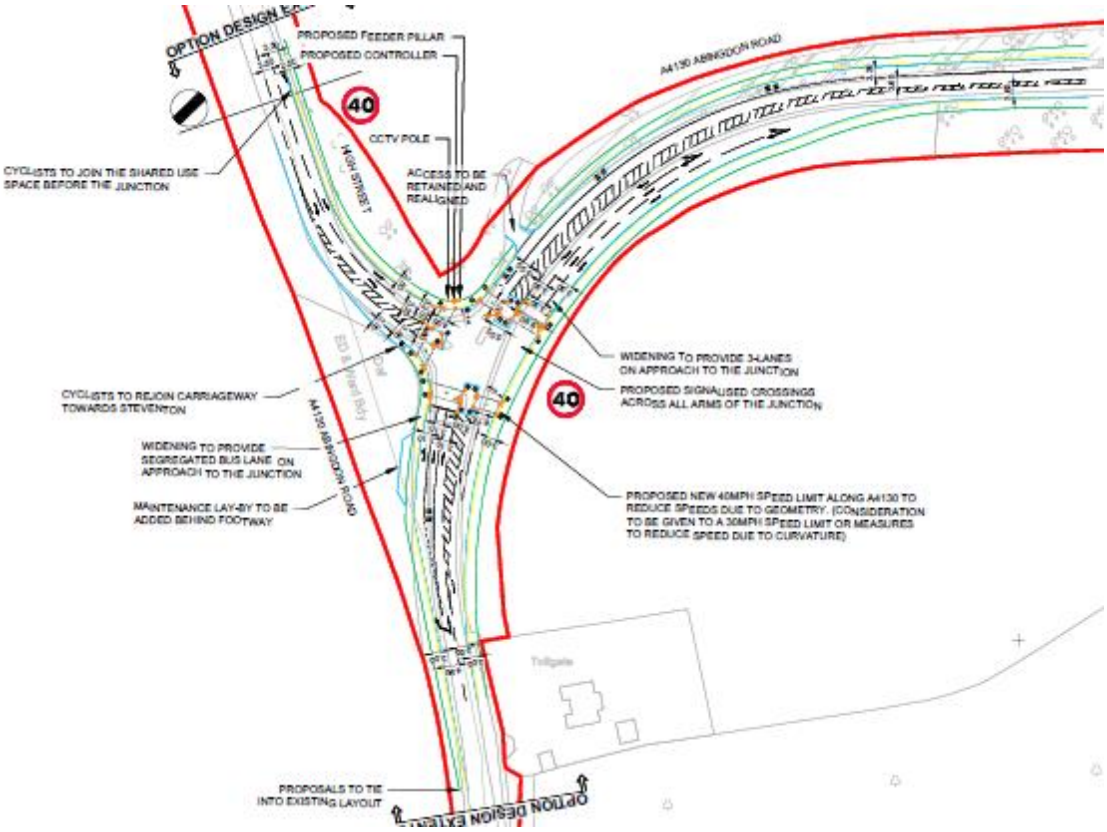
10.13 Tables 118 and 119 indicate that the junction is predicted to be within capacity for all peaks, for both 2024 and 2034, with the exception of the A4130 Abingdon Road South (northbound) approach in the 2034 AM peak, when it is shown exceeding its storage length.

Bus Lane

10.14 As mentioned above, a further model was produced to include the proposed introduction of a bus lane between Steventon Lights and Trenchard Avenue, and on the northbound approach to Steventon Lights. The proposed design is shown in Figure 31.

10.15 The Linsig model was amended by removing the middle lane from the northbound approach and northbound exit links on the A4130 Abingdon Road. In reality, this would provide one lane for left turning traffic, an ahead lane for buses only and a single lane for the ahead general traffic movement. The northbound exit would see one of the exit lanes converted into a bus lane while the remaining lane would be for all other traffic.

Figure 31: Steventon Lights - Option 04 - Junction Layout Drawing



10.16 The summary results for the Option 4 modelled junction have been shown below in Table 120.

Table 120: Summary Results – Steventon Lights Option 4

		100% Pedestrian		50% Pedestrian		0% Pedestrian	
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)	PRC (%)	Delay (PCU/Hr)	PRC (%)	Delay (PCU/Hr)
2024 AM	65	-29.8	115.34	-0.2	29.36	4.1	24.72
2024 IP	58	-33.0	62.98	-6.4	27.55	4.2	21.44
2024 PM	61	-23.7	96.90	-15.4	66.57	-8.6	42.21
2034 AM	65	-35.0	248.10	-36.7	278.19	-34.4	228.31
2034 IP	58	-83.7	169.62	-42.2	136.21	-22.5	76.99
2034 PM	59	-72.3	166.74	-37.2	155.17	-24.4	105.39

10.17 In this model, the results show that when the pedestrian phases run either 100% or 50% of the time, the junction will not be able to operate efficiently. Even at 0% demand, only the 2024 year model gives positive values, the 2034 model performing bad, especially in the AM peak.

10.18 The more detailed results of the Option 4 modelled junction are shown in Table 121 (for 2024) and Table 122 (for 2034).

Table 121: 2024 Modelling Results – Steventon Lights Option 4

Detailed Results for Steventon Lights Junction Modelling - Option 4								
Scenario	Arm	Lane	100% Pedestrian		50% Pedestrian		0% Pedestrian	
			DoS (%)	(MMQ) (PCU)	DoS (%)	(MMQ) (PCU)	DoS (%)	(MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	94.5	10.7	86.6	8.3	79.9	7.0
		Middle	94.7	10.9	86.6	8.4	80.2	7.1
		Offside	61.9	4.2	56.8	4.0	52.4	3.8
	A4130 Abingdon Road (S)	Nearside	27.4	2.0	40.5	2.4	38.8	2.3
		Middle						
		Offside	116.8	61.5	90.2	9.6	86.5	8.6
	B4017 High Street	Nearside	116.0	40.2	88.7	10.6	83.7	9.4
		Offside	79.1	7.2	60.5	5.8	57.1	5.5
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	61.8	4.1	67.9	4.6	67.9	4.4
		Middle	62.2	4.1	68.4	4.7	68.4	4.5
		Offside	73.0	5.3	80.2	6.4	80.2	6.0
	A4130 Abingdon Road (S)	Nearside	44.5	2.6	35.6	2.4	31.4	2.3
		Middle						
		Offside	119.7	54.3	95.8	15.2	84.5	10.2
	B4017 High Street	Nearside	70.7	4.7	91.5	7.8	86.4	6.5
		Offside	38.7	2.3	50.0	2.7	47.3	2.6
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	100.4	15.4	92.0	10.1	84.7	8.1
		Middle	100.2	15.3	91.8	10.1	85.0	8.2
		Offside	111.4	31.2	102.1	19.6	94.2	12.1
	A4130 Abingdon Road (S)	Nearside	61.5	4.8	57.6	4.7	54.2	4.4
		Middle						
		Offside	110.8	42.2	103.9	29.9	97.8	18.4
	B4017 High Street	Nearside	75.9	5.3	98.2	11.2	92.8	8.4
		Offside	57.7	3.8	74.6	5.0	70.5	4.5

where 1 PCU = 5.75m — *100% = Pedestrian phase called every cycle*

DOS= Degree of Saturation — *50% = Pedestrian phase called every other cycle*

MMQ= Mean Maximum Queue — *0% = Pedestrian phase not called*

Table 122: 2034 Modelling Results – Steventon Lights Option 4

Detailed Results for Steventon Lights Junction Modelling - Option 4								
Scenario	Arm	Lane	100% Pedestrian		50% Pedestrian		0% Pedestrian	
			DoS (%)	(MMQ) (PCU)	DoS (%)	(MMQ) (PCU)	DoS (%)	(MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	121.0	40.9	121.0	45.1	121.0	40.9
		Middle	120.9	41.2	120.9	45.3	111.5	31.7
		Offside	69.3	6.1	69.3	6.6	69.3	6.1
	A4130 Abingdon Road (S)	Nearside	18.8	2.5	19.1	2.7	79.7	40.8
		Middle						
		Offside	121.5	126.9	123.0	153.0	116.7	113.5
	B4017 High Street	Nearside	121.5	58.7	121.5	65.7	116.0	49.9
		Offside	75.8	9.7	75.8	11.6	72.4	9.4
2034 Interpeak	A4130 Abingdon Road (N)	Nearside	64.3	4.3	70.7	4.7	78.6	5.3
		Middle	64.4	4.3	70.9	4.8	78.7	5.3
		Offside	81.1	6.6	89.2	8.5	99.1	12.7
	A4130 Abingdon Road (S)	Nearside	64.3	4.3	49.8	3.7	42.8	3.4
		Middle						
		Offside	165.3	157.7	128.0	101.0	110.2	49.7
	B4017 High Street	Nearside	84.7	6.9	116.5	30.7	103.5	15.9
		Offside	41.3	2.5	56.8	3.1	50.5	2.8
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	86.3	7.7	95.0	11.2	95.0	10.0
		Middle	86.5	7.8	95.2	11.4	95.2	10.1
		Offside	94.7	11.1	104.2	20.6	104.2	19.1
	A4130 Abingdon Road (S)	Nearside	74.0	5.7	58.3	4.8	53.5	4.4
		Middle						
		Offside	155.0	142.9	122.1	86.9	112.0	54.5
	B4017 High Street	Nearside	89.8	8.3	123.5	39.8	109.8	22.9
		Offside	59.0	3.9	81.1	5.6	72.1	4.7

where 1 PCU = 5.75m

DOS= Degree of Saturation

MMQ= Mean Maximum Queue

100% = Pedestrian phase called every cycle

50% = Pedestrian phase called every other cycle

0% = Pedestrian phase not called

10.19 Table 121 shows that the proposed layout including the new bus lane, is predicted to be over capacity for all 2024 peak periods, when pedestrian demand is at either 100% or 50% demand. When demand is at 0%, DoS values are just within acceptable limits, but some excessive queuing is predicted on A4130 Abingdon Road South.

10.20 Table 122 shows that in year 2034, the junction is predicted to be over capacity for all peaks, regardless of pedestrian demand.

10.21 In summary, if the bus lane proposal was implemented, the results indicate that the junction would be operating over capacity and would experience significant queues for the majority of the day. Only in the year 2024, when pedestrian demand is at 0%, would the junction operate within acceptable limits. It is for this reason that the bus lane option would not be recommended.

10.22 Further efforts were made to optimise the cycle timings at Steventon Lights (under the 100% Pedestrian scenario) to improve the PRC and Delay values at the junction where possible. The results for this summary can be viewed below in Table 123.

Table 123: 2034 Modelling Results – Optimised Cycle Time Results

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	111	0.8	42.53
2024 Interpeak	64	2.2	22.28
2024 PM Peak	78	1.2	34.49
2034 AM Peak	120	-30.3	207.43
2034 Interpeak	92	0.1	33.72
2034 PM Peak	105	0.4	42.07

10.23 In summary, Table 123 shows that positive improvements to the junction operation can be observed in the horizon year 2024. Similar results are observed in the 2034 peak, with the exception of the AM peak where it is not possible to gain a positive result. It is for this reason that the bus lane option would not be recommended.

12.5 Steventon Lights – Option 04

12.5.1 The Steventon Lights junction Option 04 has been amended to remove pedestrian/cyclist facilities from the High Street and A4130 Abingdon Road (S) approach leaving only two-stage in-line crossings on the North part of the junction. Option 04 includes a bus lane.

12.5.2 The proposed junction layout is shown in Figure 7.

Figure 40: Steventon Lights - Option 04 - Junction Layout Drawing

12.6 Modelling Inputs:

12.6.1 The following inputs have been defined for the traffic modelling of Steventon Lights junction.

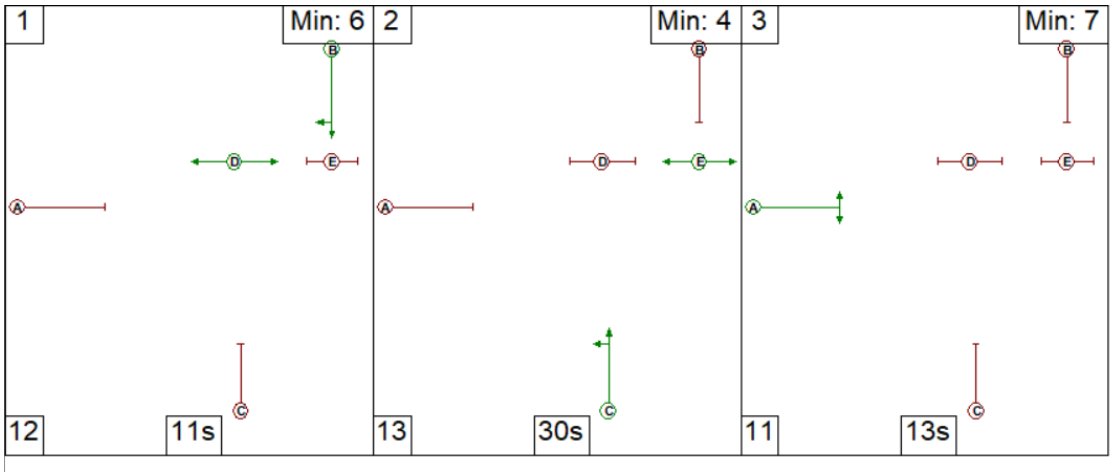
12.7 Traffic Flows:

12.7.1 The traffic flows for the junction are identical to the flows shown previously from Table 2 to Table 7 for Steventon Lights Option 01, with Bus Lane flows locked value of 10PCU.

12.7.1 Staging and Phasing:

12.7.1.1 The staging and phasing defined for the junction is shown in Figure 3 below.

Figure 41: Proposed Staging and Phasing – Steventon Lights Option 04



12.7.1.2 The letters depict the movements (phases) in the junction. This design proposes to operate the junction under a three-stage arrangement. This arrangement results in the most efficient operation of the junction.

12.7.1.3 It is proposed to operate the Toucan crossings concurrently with other non-conflicting vehicular movements within the junction.

12.7.2 Intergreens:

12.7.2.1 The intergreens extracted from the design drawing for the junction has been shown below in Figure 8.

Figure 43: Measured Intergreens (s) – Steventon Lights Option 04

	A	B	C	D	E
A	–	6	6	9	–
B	7		10	–	7
C	8	7		10	–
D	12	–	12		–
E	–	13	–	–	

12.8 Modelling Results:

12.8.1 The network summary results for the junction have been shown below in Table 14.

Table 153: Network Summary Results - 2024 and 2034 – Steventon Lights Option 04

Network Summary Results			
Scenario	Cycle Time (s)	PRC (%)	Delay (PCU/Hr)
2024 AM Peak	90	-1.1	39.56
2024 Interpeak		32.6	20.90
2024 PM Peak		12.9	31.91
2034 AM Peak		-34.6	218.20
2034 Interpeak		4.7	30.10
2034 PM Peak		1.3	39.25

12.8.2 The results shown in Table 14 suggests that the junction is predicted to be within capacity against the tested 90s cycle time for most of the scenarios, excluding 2024AM peak where PRC of -1.1% has been reported and 2034AM peak with PRC value of -34.6%. The delay of 218.0 has been shown during 2034AM peak.

12.8.3 The detailed results for the junction have been shown below in Table 154 and Table 16.

Table 1504: 2024 Modelling Results – Steventon Lights Option 04

Detailed Results for Steventon Lights Junction Modelling - Option 04				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2024 AM Peak	A4130 Abingdon Road (N)	Nearside	88.2	10.6
		Middle	88.2	10.6
		Offside	58.7	5.3
	A4130 Abingdon Road (S)	Nearside	20.9	2.4
		Middle	1.4	0.2
		Offside	89.5	18.5
	B4017 High Street	Nearside	90.9	14.1
		Offside	63	7.8
2024 Interpeak	A4130 Abingdon Road (N)	Nearside	55	5.6
		Middle	54.1	5.5
		Offside	65.2	7.0
		Nearside	25.2	3.0

	A4130 Abingdon Road (S)	Middle	1.3	0.2
		Offside	67.9	11.7
	B4017 High Street	Nearside	67.2	6.5
		Offside	37.3	3.4
2024 PM Peak	A4130 Abingdon Road (N)	Nearside	70.2	9.0
		Middle	68.4	8.7
		Offside	78.2	10.7
	A4130 Abingdon Road (S)	Nearside	44.2	5.6
		Middle	1.4	0.2
		Offside	79.7	14.4
	B4017 High Street	Nearside	77.2	7.3
		Offside	59.5	5.4
where 1 PCU = 5.75m				

12.8.4 Table 154 shows results for 2024 modelling of Steventon Lights junction. For most scenarios in 2024 the junction operates within capacity apart of 2024AM peak where Dos is reported with value of 90.9% on the B4017 High Street.

12.8.5 The predicted queues of Steventon Lights junction are reported by LinSig to be within the given lane lengths of the junction, except for the A4130 Abingdon Road (S) approach where lengths are slightly exceeded. However it is believed that this is due to the limitations of the model and in reality should be managed within the available carriageway space.

Table 151: 2034 Modelling Results – Steventon Lights Option 04

Detailed Results for Steventon Lights Junction Modelling – Option 04				
Scenario	Arm	Lane	Degree of Saturation (%)	Mean Maximum Queue (MMQ) (PCU)
2034 AM Peak	A4130 Abingdon Road (N)	Nearside	115.0	33.5
		Middle	114.6	33.0
		Offside	66.9	5.4
	A4130 Abingdon Road (S)	Nearside	18.3	2.3
		Middle	1.2	0.2
		Offside	118.8	112.9
	B4017 High Street	Nearside	121.1	56.4
		Offside	76.7	9.0
		Nearside	63.7	6.2

2034 Interpeak	A4130 Abingdon Road (N)	Middle	62.9	6.1
		Offside	81.1	9.1
	A4130 Abingdon Road (S)	Nearside	33.3	4.3
		Middle	1.2	0.2
		Offside	86.0	18.8
	B4017 High Street	Nearside	85.2	9.5
		Offside	42.2	3.8
2034 PM Peak	A4130 Abingdon Road (N)	Nearside	79.4	9.1
		Middle	78.4	8.9
		Offside	87.9	11.5
	A4130 Abingdon Road (S)	Nearside	42.1	5.6
		Middle	1.3	0.2
		Offside	88.4	19.8
	B4017 High Street	Nearside	88.8	10.5
		Offside	59.2	5.7

12.8.6 Table 16 shows results for 2034 modelling of Steventon Lights junction. The results indicate that the junction is predicted to be over-capacity on a number of lanes during the 2034AM scenario. The highest DoS is reported by nearside and middle lanes of A4130 Abingdon Road (N) with DoS of 115.0% and 114.6%; nearside lane of B4017 with DoS of 121.1% and offside lane of A4130 Abingdon Road(S) with DoS value of 118.8%.

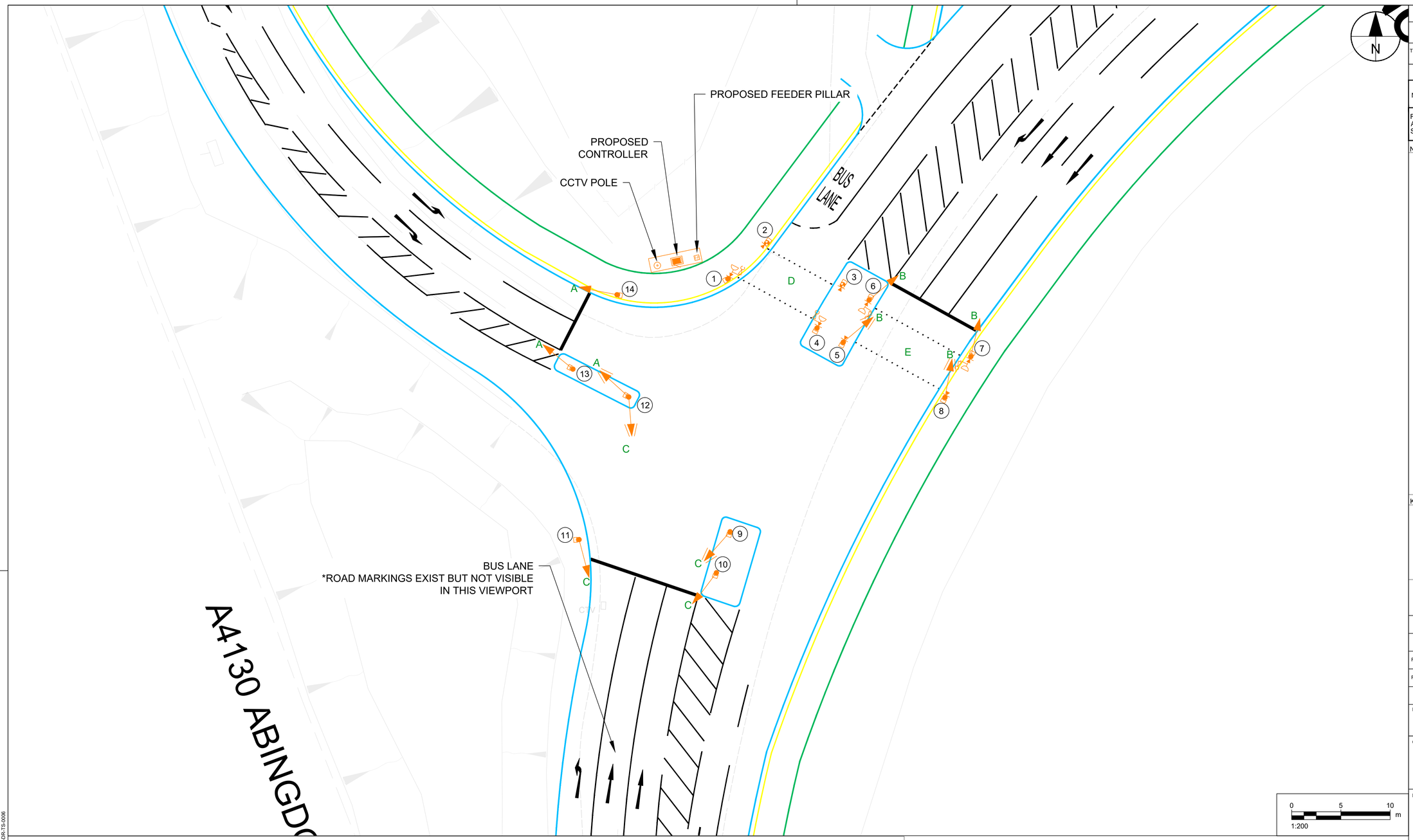
12.8.7 The predicted queue on A4130 Abingdon Road (N) displays a queue of 33.5 PCUs (192m) and 33.0 PCUs (189m) which extends beyond the defined link length (100m for nearside, 142m for middle lane) in 2034 AM peak.

12.8.8 In summary, the results predicted from the model of the Option 04 indicate over-capacity with PRC value of -1.1% during the 2024AM peak, and -34.6% during the 2034AM peak. Modelling results indicate slight queue on the A4130 Abingdon Road (S) during all scenarios and queues at numerous lanes during 2034AM peak.

12.8.9 It should be noted that, in the model, a “worst case” scenario has been assumed, with fully extended pedestrian phases being called in every cycle. In reality, a lesser pedestrian demand is expected, which may improve the capacity and minimise delays in the junction.

12.8.10 It is believed that the overall operation of the junction could be improved with the introduction of MOVA detection, by up to 13%.

Appendix A Design Drawings



0 5 10 m
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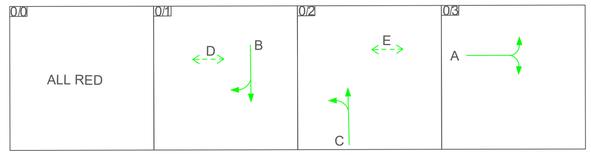
Key

- PRIMARY SIGNAL
- SECONDARY SIGNAL
- 4M TRAFFIC SIGNAL POLE
- 2M TRAFFIC SIGNAL POLE
- NEARSIDE TOUCAN SIGNAL WITH PUSHBUTTON
- PUSHBUTTON UNIT
- A — PHASE
- (1) — POLE NUMBER
- CONTROLLER
- CONTROLLER NAL BASE
- FEEDER PILLAR
- RETENTION SOCKET
- CCTV
- HARDSTANDING BASE

STAGE VIEW



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

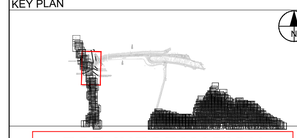
FEASIBILITY DRAWING
NO CONSTRUCTION RISKS TO NOTE IN CURRENT REVISION

FOR MAINTENANCE / OPERATION / DECOMMISSIONING AND DEMOLITION RISKS SEE PROJECT HEALTH AND SAFETY FILE.

NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER FEASIBILITY DESIGN DRAWINGS, STANDARD DETAILS AND SPECIFICATIONS FOR THIS SCHEME.
2. DO NOT SCALE FROM DRAWING.
3. ALL SIGNALS ARE TO BE ELV LED.
4. CONTROLLER TO BE ELV.
5. RETENTION SOCKET SYSTEM TO BE USED AT ALL POLES.
6. NAL TYPE CONTROLLER BASE TO BE USED.
7. PEDESTRIAN SIGNAL TO BE NEARSIDE TOUCAN.
8. TACTILE CONE TO BE FITTED ON ALL PUSHBUTTONS.
9. MINIMUM OF 1M BETWEEN CONTROLLER AND FEEDER PILLAR.
10. LOCATION OF CCTV POLE INDICATIVE ONLY AND TO BE AGREED BY OCC.
11. CCTV POLE TO BE HINGED OR TELESCOPIC TYPE.

KEY PLAN



FOR INFORMATION

REVISION DETAILS	By / Check	Date	Suffix
	/		
	/		
FEASIBILITY STUDY	SA / MS	26/07/21	P01
FOLLOWING DESIGN UPDATES	/	07/03/22	P02.2

Purpose of issue: INITIAL STATUS OR WIP

Client: County Hall, New Road, Oxford, OX1 1ND — OXFORDSHIRE COUNTY COUNCIL

Project Title: Relief to Rowstock

Drawing Title: STEVENTON LIGHTS OPTION 3 FEASIBILITY STUDY TRAFFIC SIGNALS

Designed	Drawn	Checked	Approved	Date
JC				

Internal Project No.	Suitability
60637406	S0
Scale @ A1	Discipline

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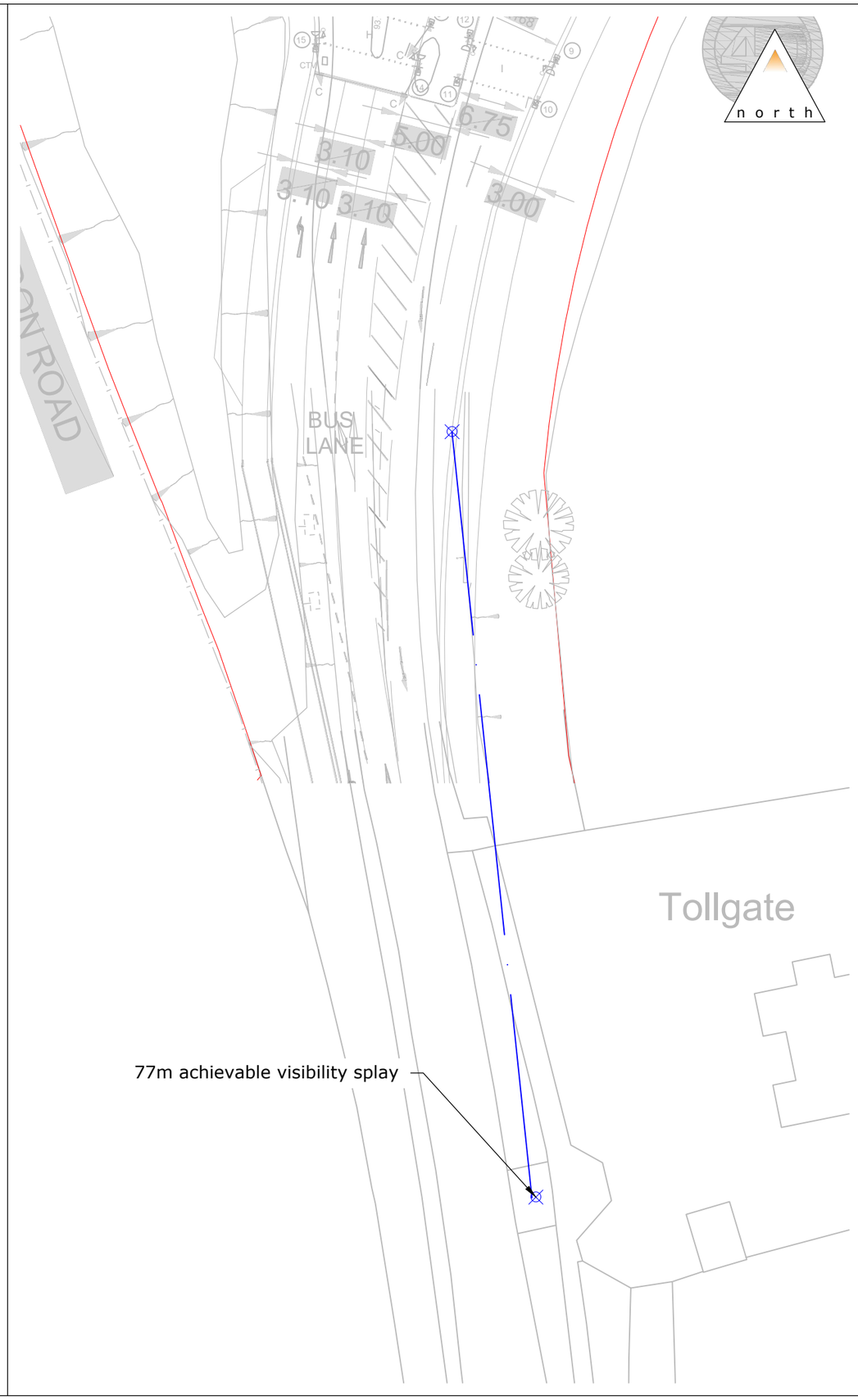
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Work Package ID	Originator	Volume	Rev
R2R	-ACM	-HSL -	P02.2
ZZ_ZZ_ZZ_P1 (Location)	-DR (Type)	-TS (Role)	-0006 (Number)

Plot Date: 09 March 2022 09:57:41
File Name: C:\Users\ACOM_DS02_UK-CL-TL\DANNA.CHWAJOL@AECOM.COM\D0169093\R2R-ACM-HSL_ZZ_ZZ_ZZ_P1-DR-TS-0006

Appendix C

Drawing 2211083-04



C:\Users\calummcgoff\OneDrive - Motion\TP Projects\rrmilt 2211083\Drawings\2211083-04.dwg

Rev:	Description:	Date:	Rev By:	Chk'd:

motion

Guildford - London - Reading
www.motion.co.uk

Project:
RRS Scheme

Title:
Visibility Splays

Client:
Carole Hooper

Drawing Status:

Scale: 1:500 (@ A3) Date:13/06/2023

Drawn: CM Checked: JR Approved: JR

Drawing: 2211083-04

Revision: -