1 INTRODUCTION

1.1 INTRODUCTION

1.1.1 Velocity Transport Planning (VTP) has been appointed by Firethorn Trust (the Applicant) to provide highways and transport planning advice for an outline planning application relating to the development of up to 530 dwellings on land which forms part of the North West Bicester Eco Town development (Policy Bicester 1 of the adopted CDC Local Plan), located in Oxfordshire.

1.1.2 The Application Site falls within the administrative area of Cherwell District Council (CDC) and within the authority of Oxfordshire County Council (OCC(, in their capacity as the local highway authority.

1.1.3 The proposed development description for the outline planning application, planning reference: 21/01630/OUT, is as follows:

> *"Outline planning application for up to 530 residential dwellings (within Use Class C3), open space provision, access, drainage and all associated works and operations including but not limited to demolition, earthworks, and engineering operations, with the details of appearance, landscaping, layout and scale reserved for later determination."*

1.1.4 This Technical Note – TN011 "A4095 Junction Modelling – Further Assessment", has been prepared to respond to the latest objection received from Oxfordshire County Council (OCC) on 06th September 2022, which states as follows:

> "*The traffic congestion impact of the development prior to the construction of the A4095 realignment would be severe. The assessment of the impact of the proposed interim (mini roundabout) traffic mitigation scheme is not reliable, and the scheme is unlikely to provide any significant benefit*."

1.2 PLANNING CONTEXT

1.2.1 Since the planning application was validated by Cherwell District Council (CDC) in May 2021, and it was announced in November 2021 that the funding for the consented highway improvement scheme referred to as the A4095 Strategic Link Road (SLR) would be reallocated towards other strategic infrastructure schemes by the Future Oxfordshire Partnership, a number of objections have been raised by OCC in relation to the potential impact of the proposed development traffic at the existing junction of the A4095 Howes Lane/Bucknell Road priority junction prior to the implementation of the A4095 SLR.

1.2.2 The key concern raised with regards to the potential impact of the proposed development traffic at the A4095 Howes Lane/Bucknell Road junction within OCC's objection dated 11th May 2022 related to a potential "**severe**" congestion impact on the A4095 Lords Lane approach. This objection stated as follows:

> "*The application seeks to bring forward the full development ahead of the A4095 diversion. The traffic assessment provided shows that this would have a severe congestion impact on the local network, and the proposed mitigation would make queueing worse on Lords Lane*."

1.2.3 In response to OCC's specific objection with respect to the "**severe**" congestion impact on the A4095 Lords Lane approach, VTP prepared – TN008 "A4095 Junction Modelling Rev B", which set out to provide an 'interim mitigation scheme' in the form of a mini-roundabout to replace the existing constrained priority junction arrangement.

1.2.4 TN008 Rev B also set out a proposed methodology to calibrate the traffic flows at the existing junction to ensure that the output data from the junction modelling software (PICADY) more accurately represented the extent of queues that were observed to be generated on this approach at the existing junction as part of the traffic surveys that were undertaken in July 2022.

1.2.5 Whilst it is considered that TN008 Rev B addressed OCC's specific concern in relation to the "**severe**" congestion impact on the A4095 Lords Lane approach, OCC raised an alternative objection in response to TN008 Rev B on 6th September 2022. This objection stated as follows:

> *"The traffic congestion impact of the development prior to the construction of the A4095 realignment would be severe. The assessment of the impact of the proposed interim (mini roundabout) traffic mitigation scheme is not reliable, and the scheme is unlikely to provide any significant benefit."*

1.2.6 Specifically, the OCC objection stated the following with regards to the junction modelling and the method of calibration undertaken within TN008 Rev B:

> *"An updated version of Technical Note 8 has been submitted 'A4095 Junction Modelling Rev B'. We have concluded that the PICADY modelled 2026 scenarios of the existing junction arrangement which allows for calibration by reducing demand flows on Bucknell Road north by 14%, is a reasonable prediction of traffic conditions at the junction of Lords Lane/Bucknell Road/Howes Lane.*
>
> *This calibrated output shows that in 2026 the junction will already be operating over capacity; however the addition of the development traffic would significantly increase queuing and delay. In the am peak, the delay per vehicle on Howes Lane would reach over 13 minutes, which is double what it would be without the development. In the pm peak the delay per vehicle would increase over the period to 17 minutes, compared to about 10 minutes without the development. The Highway Authority considers this to be a severe impact on the traffic network, and therefore it cannot support the development being brought forward ahead of the A4095 realignment, which is required key infrastructure for NW Bicester."*

1.2.7 Having addressed OCC's specific concern in relation to a "**severe**" congestion impact, which relates to the extent of queueing vehicles on the A4095 Lords Lane approach raised in the objection dated 11th May 2022, the next objection from OCC shifted the measure of "**severity**" from concerns over the extent of queuing, to concerns over the amount of driver delay that might be perceived.

1.3 CALIBRATION

1.3.1 Whilst OCC had originally stated that they did not consider that the methodology adopted to calibrate the northern approach to the junction was considered acceptable, as set out within TN008 Rev B, following an independent review of the calibration methodology by Stantec (appointed on behalf of OCC), the latest OCC response from September 2022 states that the methodology of reducing traffic at the junction is an acceptable approach to calibration.

1.3.2 Whilst TN008 Rev B did reference a 14% calibration factor, paragraph 2.6.14 of TN008 Rev B did clarify that this was considered to be a 'robust' factor and that to accurately calibrate this arm, the traffic flows could be reduced further, in fact, by as much as 40-50%. In addition, this methodology of calibration was only applied to the northern approach to the junction, rather than the full junction, to address the specific concern raised by OCC in relation to queuing on the northern approach.

1.3.3 TN011 has therefore been prepared to ensure that an appropriate calibration of both the northern and southern approaches to the junction are considered, in line with the methodology that has been agreed upon with OCC, following consultation with an independent consultant.

1.3.4 It is worth noting that following further consideration and liaison with OCC after the submission of TN008 Rev B, it is not proposed to consider the mini-roundabout scheme further. It is acknowledged that what little benefit might be achieved by the introduction of this interim mitigation measure, it would not deliver significant benefits in terms of the operation of the local highway network prior to the implementation of the A4095 SLR. In fact, the temporary disruption to the local highway network caused by constructing this interim mitigation measure could be considered to outweigh any potential benefit.

1.4 REPORT PURPOSE

1.4.1 TN011 seeks to present the technical information to respond to the latest OCC comments in order to address the reason for objection that relates to the impact of the proposed Firethorn development on the A4095 Howes Lane/Bucknell Road junction prior to the implementation of the A4095 SLR.

1.4.2 Specifically, TN011 will focus on the appropriate calibration of the existing A4095 Howes Lane/Bucknell Road junction and the impact of the proposed development on the existing arrangement in the absence of the A4095 SLR.

1.4.3 Following this Introduction, this TN is structured as follows:

- **Section 2**: A4095 Junction Assessment; and
- **Section 3**: Conclusions.

2 A4095 JUNCTION ASSESSMENT

2.1 PREVIOUS MODELLING

2.1.1 For completeness, the results of the junction modelling for the A4095 Howes Lane/Bucknell Road junction with calibration factors (14%) applied to the A4095 Lords Lane approach from the north, as presented within TN008 Rev B, are presented below in **Table 2-1**.

Table 2-1: A4095 Howes Lane/Bucknell Road - Existing Priority Junction (with 14% Calibration on Lords Road)

SCENARIO	ARM	AM PEAK (08:00-09:00)			PM PEAK (17:00-18:00)		
		QUEUE	DELAY (s)	RFC	QUEUE	DELAY (s)	RFC
Observed 2022	Howes Lane (Left Turn)	2.5	19.65	0.7	35.1	161.92	1.06
	Howes Lane (Right Turn)	0.3	41.86	0.24	0.2	15.47	0.17
	Bucknell Road N (Right Turn)	101.9	480.37	1.23	5.9	29.13	0.83

2.1.2 The traffic data for the observed 2022 scenario is based upon the additional traffic surveys undertaken on Wednesday, 6th July 2022, which has been deemed by OCC as representative of the typical junction operation.

2.1.3 It is noted that even with the 14% factor applied, the RFC (relative flow to capacity) on the Bucknell Road movement still exceeds 1.0. As stated within TN008 Rev B, an RFC exceeding 1.0 is not theoretically possible within an observed traffic survey, where traffic is observed to still be passing through the junction. However, it was also stated that the queue could be calibrated further to the point where the modelled queues more accurately represent the observed queue.

2.1.4 A robust method of calibration was initially set out within TN008 Rev B as OCC were hesitant on the calibration methodology, so only a 14% factor of reduction in traffic on the northern approach was applied. However, following the review of the calibration methodology by Stantec and OCC, the principle of the methodology was agreed to be acceptable.

2.1.5 As stated within TN008 Rev B, it is considered that the model is not accurately accounting for driver behaviour and the unique operation of the junction, whereby the dominant movements often do not act as if they have priority and are focused on vehicles turning right onto the A4095 Howes Lane from Bucknell Road (north) and left from the A4095 Howes Lane onto Bucknell Road (north) - as opposed to the north to south movement along Bucknell Road, as would typically be expected at a priority junction along the major arm.

2.1.6 This is due to the PICADY model assuming that the priority streams (movements north to south along Bucknell Road) have uninterrupted priority and suffer no delay due to the presence of the other streams. However, observations at this existing junction undertaken during the July traffic surveys identify that some vehicles approaching the junction from the south along Bucknell Road actually give way to vehicles turning right from Bucknell Road (north) to the A4095 Howes Lane.

2.1.7 On that basis, it is proposed to calibrate the A4095 Bucknell Road (from the north), and the A4095 Howes

Lane (from the south) approaches to the point where the output data from the junction modelling software of the July 2022 traffic data more closely represents the observed and actual operation of the junction, as was recorded in video surveys and through on-site observations.

2.2 BTM DATA

2.2.1 Following a recent virtual meeting with OCC on 27th October 2022, it is noted that since the submission of TN008 Rev B, the BTM 2026 Reference Case Data has been amended to reflect the latest updates set out within the CDC Annual Monitoring Report (AMR) dated December 2021.

2.2.2 The assessments contained within TN011 utilise the latest version of the BTM 2026 Reference Case that was provided by OCC on 2nd November 2022.

2.2.3 Whilst a full review of the 2026 Uncertainty Logs has not been undertaken in detail, there are a couple of large-scale schemes that are identified as delivering a substantial amount of development prior to the implementation of the A4095 SLR, that are not considered to be completed by 2026. A few of these are summarised below:

- Res 104 – Bicester 2 (Graven Hill):
    - The BTM identifies 1,571 dwellings to be completed by 2026
    - The Uncertainly Logs identify that these figures are based on the 2017 AMR and not the 2021 AMR
    - A review of Appendix 2 of the 2021 AMR identifies that only 846 dwellings are predicted to be completed by 2026, which is 725 dwellings less than has been included within the 2026 BTM assessment
- Res 111 – SE Bicester (12) (Wretchwick Green):
    - The BTM identifies 1,175 dwellings to be completed by 2026
    - Appendix 2 of the 2021 AMR identifies that only 150 dwellings are predicted to be completed by 2026, which is 1,025 dwellings less than has been included within the 2026 BTM assessment

2.2.4 Whilst the above is only referencing 2 strategic housing schemes, it is clear that the 2026 BTM is overestimating the level of development that is expected to be completed by 2026 in accordance with the 2021 AMR. This equates to a combined over estimation of 1,750 dwellings. Further detailed review of the 2026 BTM uncertainty Logs is expected to find even more discrepancies.

2.2.5 In short, the overestimation of the above identified 1,750 dwellings, would more than cover the full Firethorn development of 530 dwellings coming forward prior to the implementation of the A4095 SLR, that are not considered by Cherwell's latest Housing Delivery Monitor to be completed by 2026.

2.2.6 Whilst it is acknowledged that the traffic flows derived from the BTM SATURN Model are considered to be appropriately redistributed along the highway network in the local area of Cherwell, VTP maintains that some of the identified development that is considered to be completed by 2026 would not realistically be delivered within the identified timescale. This will result in a distorted level of traffic being included within the 2026 BTM data.

2.3 REVISED JUNCTION MODELLING

2.3.1 The justification behind the calibration methodology is detailed within section 2.5 and section 2.6 of TN008 Rev B and summarised within the introduction of this Technical Note.

2.3.2 It is noted that OCC has accepted the principle of the calibration methodology of applying calibration factors to traffic flows in order to calibrate the junction within their latest consultation response dated 6th September 2022.

2.3.3 The traffic queue at the Bucknell Road approach from the north was observed in the July 2022 traffic surveys as being between the A4095/Trefoil Drive junction and the termination point of the shared pedestrian/cycle link on the A4095 Bucknell Road, equivalent to approximately 170m queue or approximately 29 PCUs. However, even at this point, the queue did not form a static queue and instead formed a "sliver queue" which is a vehicle queue that is constantly moving at a slow, but generally consistent speed.

2.3.4 In order to accurately calibrate the Bucknell Road approach from the north to the point where the modelled queues reflect the observed queues, a calibration factor of 28% is required, which will supersede the 14% calibration factor identified within TN008 Rev B, which has been identified as being a 'robust' factor, rather than an 'accurate' factor.

2.3.5 With respect to the A4095 Howes Lane (left turn) approach, without calibration this arm is predicted to experience a queue of 35.1 PCUs in the PM peak, with an RFC of 1.06. The maximum observed queue for this junction during the PM peak was around 18 PCUs, which would extend to the point prior to the junction with the Avonbury Business Park. However, it is noted that the queue was not stationary and, again, formed a "sliver queue", whereby vehicles slowly roll up to the give-way line.

2.3.6 In order to accurately calibrate the A4095 Howes Lane (left turn) approach to reflect the observed queue of 18 PCUs, a calibration factor of 6% is required to be applied.

2.3.7 Utilising the revised calibration factors noted above, the revised junction modelling for the A4095 Howes Lane/Bucknell Road junction is presented in **Table 2-2**.

Table 2-2: A4095 Howes Lane/Bucknell Road - Existing Priority Junction (with Calibration on both approaches)

	ARM	AM PEAK				PM PEAK			
		QUEUE	DELAY	RFC	LOS	QUEUE	DELAY	RFC	LOS
Observed 2022	Howes Lane (Left Turn)	1.9	15.84	0.64	C	18.2	95.68	0.99	F
	Howes Lane (Right Turn)	0.1	19.27	0.12	C	0.2	13.1	0.14	B
	Bucknell Road N (Right Turn)	28.3	126.72	1.03	F	2.8	17.15	0.70	C
BTM 2026	Howes Lane (Left Turn)	13.6	84.5	0.97	F	78.8	405.06	1.21	F
	Howes Lane (Right Turn)	0.1	18.98	0.06	C	0	16.51	0.04	C
	Bucknell Road N (Right Turn)	20.8	112.42	1.00	F	9.2	44.3	0.89	E

2.3.8 The calibrated model for the existing junction shows that the queues on the Bucknell Road right turn movement from the north will experience a queue of 28.3 PCUS, with an RFC of 1.03.

2.3.9 Using the calibration factors, it is noted that the traffic flows identified from the latest version of the BTM 2026 scenario on the A4095 Howes Lane (left turn) approach has an RFC well above 1.0 in the PM, with a queue of 78.8 PCUs and a delay of 405 seconds (over six minutes). It is also noted that the Level of Service (LOS) is already the lowest level possible, being identified as an 'F – Forced or Breakdown Flows' LOS.

2.3.10 For completeness, the LOS factors presented within the Junctions 10 User Guide are shown within **Figure 2-1**.

Figure 2-1: Level of Service Summary

A = Free flow
B = Reasonably free flow
C = Stable flow
D = Approaching unstable flow
E = Unstable flow
F = Forced or breakdown flow

2.4 PROPOSED DEVELOPMENT DISTRIBUTION

2.4.1 It is acknowledged that within all the assessments undertaken to date, the distribution of the proposed development traffic has been based on the information agreed with OCC as part of scoping discussions to inform the original Transport Assessment that was submitted as part of the planning application.

2.4.2 This distribution profile was based on the SGR1 Home Farm Application (18/00484/OUT), which was specifically identified by OCC as being the appropriate distribution profile for the proposed development traffic in the future year of 2031, i.e. with the completed A4095 SLR.

2.4.3 The distribution profile within the Transport Assessment assumed that 53.5% of all the traffic associated with the proposed development would travel towards the M40 via the western side of Bicester. However, this distribution profile was agreed based on a future 2031 scenario whereby the A4095 SLR works would have been implemented and in place, thus creating adequate capacity for this additional traffic in this area – thereby attracting traffic from the proposed development.

2.4.4 However, based on the calibrated BTM 2026 model, it is noted that the modelled output of this junction identifies that it is already operating at capacity, with an 'F' level of service. On that basis, it is unlikely that a consistent amount of traffic from the proposed development would travel along the local network to the junction in question, particularly if it is already experiencing significant levels of delay and is already over capacity.

2.4.5 This is a similar approach to a 'dynamic' distribution of traffic, as utilised within the BTM Model, whereby vehicles are reassigned and redistributed from areas of congestion into areas where there is more capacity.

2.4.6 In this instance, it is considered reasonable to assume that residents from the proposed development would utilise alternative routes that are available to them, with more capacity and a shorter driving time, rather than driving into an area that is already over capacity. Residents could instead travel along Banbury Road through the centre of Bicester or around the A4095 along the eastern perimeter of Bicester. Any residents needing to reach the strategic road network at the M40 could also travel north from the proposed development along the B4100.

2.4.7 Therefore, in the 2026 interim scenario prior to the implementation of the A4095 SLR, it is considered

appropriate to adjust the distribution of traffic from the proposed development that would travel to this area, as the junction is likely to already be over capacity with the introduction of the 2026 BTM traffic flows.

2.4.8 On this basis, a distribution of 30% to this location from the proposed development has been identified, given that the calibrated base model suggests that the junction is already over capacity so traffic from the proposed development is unlikely to use this route.

2.4.9 Revised traffic flow diagrams for the proposed development are included in **ATTACHMENT A**.

2.5 JUNCTION MODELLING

2.5.1 The revised junction modelling that accounts for the additional traffic associated with the proposed development, including the BTM 2026 scenario for comparison, is presented within **Table 2-3**.

Table 2-3: A4095 Howes Lane/Bucknell Road – Proposed Development Impact (with Calibration on Bucknell Road and Howes Lane)

ARM		AM PEAK				PM PEAK			
		QUEUE	DELAY	RFC	LOS	QUEUE	DELAY	RFC	LOS
BTM 2026	Howes Lane (Left Turn)	13.6	84.5	0.97	F	78.8	405.06	1.21	F
	Howes Lane (Right Turn)	0.1	18.98	0.06	C	0.1	16.51	0.04	C
	Bucknell Road N (Right Turn)	20.8	112.42	1.00	F	9.2	44.3	0.89	E
BTM 2026 + Proposed Dev	Howes Lane (Left Turn)	19.1	110.73	1.00	F	109.3	578.13	1.28	F
	Howes Lane (Right Turn)	0.1	22.45	0.08	C	0.1	17.43	0.04	C
	Bucknell Road N (Right Turn)	40.7	198.68	1.09	F	12.7	60.13	0.93	F

2.5.2 The assessment shows that with the revised distribution of proposed development traffic, there is a marginal increase in RFC. However, with respect to delay (the parameter identified by OCC in determining severity within the September objection) the greatest increase on the northern approach is in the PM with an 86 second increase in delay. On A4095 Howes Lane approach from the south, there is a 173 second increase in the PM.

2.5.3 A copy of the revised junction modelling outputs is included at **ATTACHMENT B**.

2.6 SEVERITY INTERPRETATION

2.6.1 Paragraph 111 of the National Planning Policy Framework (NPPF) states as follows:

> "*Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe*."

2.6.2 However, the NPPF does not define "**severe**". As such, it is considered that where the residual cumulative traffic impact is considered to be "**severe**" by a decision maker, the decision maker will need to define the extent of severity specific to the particular concern.

SEVERE QUEING

2.6.3 OCC's objection dated 11th May 2022 considered that if the identified queuing on the A4095 Lords Lane approach from the north extended back as far as the existing roundabout junction of the A4095 Lords Lane/B4100/Banbury Road as a result of adding the additional traffic associated with the proposed development, this would be considered to be a "**severe**" impact.

2.6.4 Whilst not specifically identified by OCC, a similar approach could be considered to be reasonable, whereby if the identified queuing on the A4095 Howes Lane approach from the south were to extend back as far as the existing roundabout junction of the A4095 Howes Lane/B4030/Middleton Stoney Road/Vendee Drive as a result of adding the additional traffic associated with the proposed development, this would be considered to be a "**severe**" impact.

2.6.5 A review of the results presented within **Table 2-3** above, identifies that with respect to the A4095 Lords Lane approach (identified as Bucknell Road), the maximum AM queue in the 2026 BTM + Proposed Development scenario is identified as being 40.7 PCUs and 12.7 PCUs in the PM. Given that the measure of a PCU is identified as being 5.75m in length, the maximum length of the predicted queue in the AM would be approximately 234m and approximately 73m in the PM. The existing A4095 Lords Lane/B4100/Banbury Road roundabout junction is located approximately 1,150m from the A4095 Howes Lane/Banbury Road junction and it is therefore clear that there would not be a "**severe**" residual cumulative impact on the A4095 Lords Lane approach from the north.

2.6.6 A review of the results presented within **Table 2-3** above, identifies that with respect to the A4095 Howes Lane approach, the maximum queue is identified as being 19.1 PCUs in the AM and 109.3 PCUs in the PM. As such, the maximum length of the predicted queue in the AM would be approximately 110m and approximately 628m in the PM. The existing A4095 Howes Lane/B4030/Middleton Stoney Road/Vendee Drive roundabout junction is located approximately 1,400m from the A4095 Howes Lane/Banbury Road junction and it is therefore clear that there would not be a "**severe**" residual cumulative impact on the A4095 Howes Lane approach from the south.

SEVERE DRIVER DELAY

2.6.7 It is acknowledged that there is limited literature or research on what constitutes a "**severe**" amount of additional driver delay with respect to the impact of a development, particularly when the junction is already at capacity within the existing and base scenarios.

2.6.8 It is also considered that driver delay poses less severe highways impacts than other metrics, such as queueing, as additional driver delay just means that drivers will have to wait longer and increases the likelihood that drivers would take an alternative route. In comparison, extensive queues could block back through junctions and result in highway safety concerns downstream.

2.6.9 To determine the magnitude of this impact and change in delay, reference is made to the Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (GEART, 1993), which identifies general thresholds for determining environmental impacts associated with transport within paragraphs 3.16 to 3.19.

2.6.10 Whilst these thresholds are not directly related to driver delay, there are no other thresholds available within the surrounding literature that specifically relate to driver delay. In the absence of any other thresholds being available, it is proposed to apply the GEART thresholds to the assessment of driver delay within this TN.

2.6.11 For completeness, the proposed driver delay thresholds are provided in **Table 2-4**.

Table 2-4: Driver Delay Thresholds

IMPACT	MAGNITUDE OF IMPACT/THRESHOLD			
	NEGLIGIBLE	**SLIGHT**	**MODERATE**	**SUBSTANTIAL**
Driver Delay	Average vehicle delay changes of less than 30%	Average vehicle delay changes between 30% to 60%	Average vehicle delay changes between 60% to 90%.	Average vehicle delay changes of more than 90%.

2.6.12 Using the above parameters to identify delay, it could be interpreted that a "**substantial**" threshold for delay constitutes as a "**severe**" highways impact. However, it is noted that there is a risk when applying percentage increases in terms of driver delay. An example might be an existing driver delay of only 2 seconds, which might increase to 4 seconds when traffic from a proposed development is introduced, which would amount to an increase of 100%. This would be a "**substantial**" increase, but not necessarily result in a "**severe**" residual cumulative impact.

2.6.13 Based on the above, it is considered that the measure of severity in terms of driver delay is not considered to be a reasonable approach to assess the impact of a proposed development. This would be consistent with the fact that the IEMA Guidelines do not identify any thresholds in this regard. However, OCC in their capacity as the decision maker with respect to highway matters, have stated that the impact in terms of driver delay is considered to be "**severe**" without identifying a threshold. As such, it is requested that OCC review the proposed thresholds and confirm agreement with the proposed methodology set out within this Technical Note.

2.6.14 **Table 2-5** presents a summary of the impact of the additional traffic associated with the proposed development when added to the BTM Base 2026 scenario with reference to the thresholds for driver delay identified above.

Table 2-5: Proposed Development Delay Summary

MOVEMENT	AM PEAK (CHANGE IN DELAY)	PM PEAK (CHANGE IN DELAY)
Howes Lane (Left Turn)	**Slight: 31%** (+26 seconds)	**Slight: 43%** (+173 seconds)
Howes Lane (Right Turn)	**Negligible: 18%** (+4 seconds)	**Negligible: 6%** (+1 second)
Bucknell Road N (Right Turn)	**Moderate: 77%** (+86 seconds)	**Slight: 36%** (+16 seconds)

2.6.15 The assessment suggests that across the majority of the approaches, the impact of the proposed development on driver delay would be negligible to slight. The greatest increase in driver delay is on the Bucknell Road (right turn) in the AM peak, with a moderate increase in driver delay.

2.6.16 Based on the above, it is considered that there not be a "**severe**" residual cumulative impact on driver delay on either the northern or southern approach to the existing junction arrangement of the A4095 Howes Lane/Bucknell Road.

3 CONCLUSIONS

3.1 OVERVIEW

3.1.1 Velocity Transport Planning (VTP) has been appointed by Firethorn Trust (The Applicant) to provide highways and transport planning advice for an outline planning application relating to the development of up to 530 dwellings on land which forms part of the North West Bicester Eco Town development, located in Oxfordshire.

3.1.2 This Technical Note (TN011) has been prepared to respond to objections from OCC in relation to the impact of the proposed development on the A4095 Howes Lane/Bucknell Road junction, in the absence of the A4095 Strategic Highway Improvements, also referred to as the A4095 Strategic Link Road (SLR).

3.1.3 Specifically, the latest OCC response identified that the proposed development would result in a "**severe**" residual cumulative impact in terms of driver delay at this junction.

3.2 CALIBRATION

3.2.1 It is noted that the methodology of calibrating the junction, whereby traffic flows were reduced to reflect the observed queues and unique operation of the junction, has been accepted by OCC.

3.2.2 However, the previous assessments undertook a robust approach towards calibration and only calibrated the northern approach, rather than the full junction.

3.2.3 This revised assessment has built on the calibration methodology adopted previously to calibrate the full junction. Revised calibration factors of 28% to the A4095 Lords Lane (Bucknell Road) approach from the north, and 6% to the A4095 Howes Lane approach from the south have been utilised.

3.3 PROPOSED DEVELOPMENT DISTRIBUTION

3.3.1 To date, all assessments of the proposed development have been undertaken on a traffic distribution profile that assumes that the A4095 SLR improvements are in place and there is not already significant delay at the A4095 Howes Lane/Bucknell Road junction.

3.3.2 Therefore, as part of this revised assessment of the interim scenario whereby the A4095 SLR has not been implemented by 2026, the distribution of the proposed development traffic has been adjusted to reflect that this junction would already be at capacity and subject to delays, meaning residents from the proposed development would be more likely to use alternative routes that are not subject to this level of delay.

3.4 DEVELOPMENT IMPACT AND SEVERITY

3.4.1 An updated junction modelling assessment of the impact of the proposed development has been undertaken in the interim period of 2026 prior to the implementation of the A4095 SLR, using the revised calibration factors and revised development traffic distribution.

3.4.2 The assessment shows that with the revised distribution of proposed development traffic, there is a marginal increase in RFC at the existing junction arrangement. However, with respect to driver delay (the parameter identified by OCC in determining severity) the greatest increase on Bucknell Road is in the PM with an 86 second increase in delay, which equates to a "**moderate**" increase in line with the proposed methodology set out within this TN. On the A4095 Howes Lane approach from the south, there is a 173 second increase in the PM, which equates to a "**slight**" increase.

3.4.3 It is acknowledged that there is limited literature or research on what constitutes as a "**severe**" amount of additional driver delay with respect to the impact of a development, particularly when the junction is already at capacity within the existing and base scenarios.

3.4.4 In addition, it is noted that the queues predicted in the BTM 2026 + Proposed Development scenario do not block back and queue into the junctions downstream that are considered to reflect the extent at which a "**severe**" residual cumulative impact would be reached.

3.4.5 The greatest impact is identified on the A4095 Howes Lane approach from the south, which is expected to experience a queue of 109.3 PCUs or approximately 628m. As it is considered that the measure of severity with regards to queuing on this approach would be a queue that extended back as far as the existing A4095 Howes Lane/B4030/Middleton Stoney Road/Vendee Drive roundabout junction, which is located approximately 1,400m from the A4095 Howes Lane/Bucknell Road junction, it is considered that the impact in terms of queuing would not be "**severe**".

3.4.6 On that basis, the revised junction modelling undertaken suggests that the impact of the proposed development does not result in a "**severe**" impact at the A4095 Howes Lane/Bucknell Road junction in terms of either queueing or driver delay, above what would already be taking place within the BTM 2026.

3.5 SUMMARY AND CONCLUSIONS

3.5.1 It is generally accepted that the permitted and partially constructed A4095 SLR is required to alleviate pressure at the A4095 Howes Lane/Bucknell Road junction and across the local highway network to address the cumulative impact of the traffic associated with the allocated sites identified within the adopted CDC Local Plan.

3.5.2 Nonetheless, the assessments undertaken within this TN have demonstrated that whilst the proposed Firethorn development does impact the operation of the A4095 Howes Lane/Bucknell Road junction, the residual cumulative impact on the existing junction arrangement are not considered to be "**severe**".

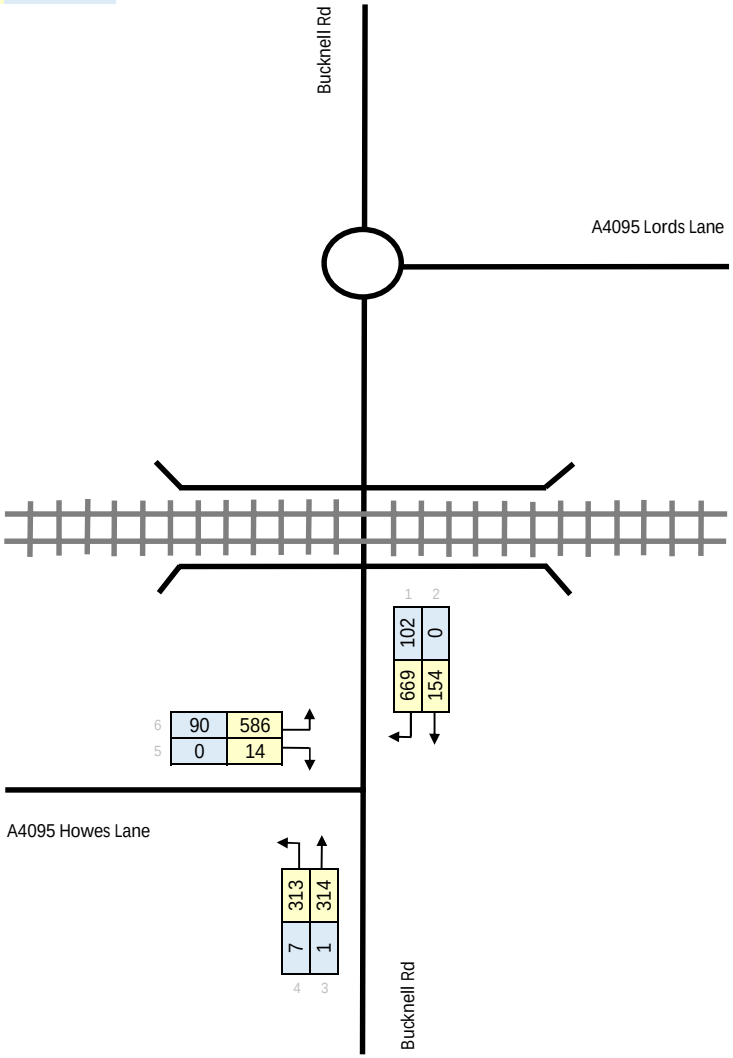
3.5.3 On that basis, the proposed development is considered to be in accordance with paragraph 111 of the National Planning Policy Framework (NPPF) and there is therefore no highways grounds to prevent or refuse this proposed development.

ATTACHMENT A

TRAFFIC FLOW DIAGRAMS

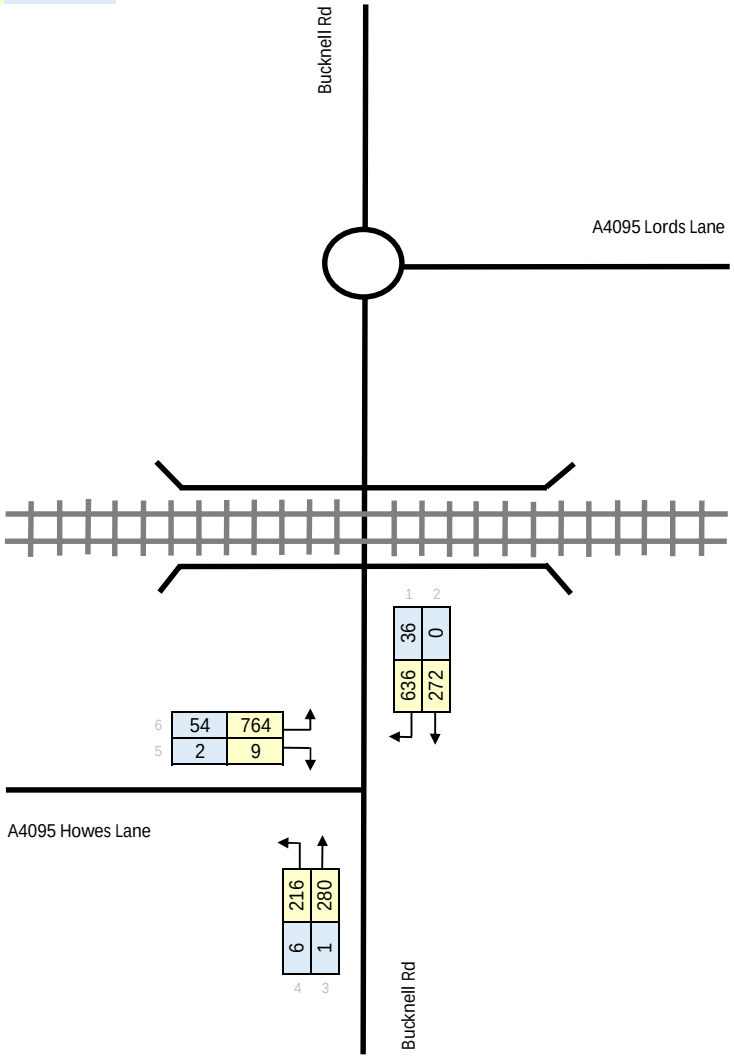
AM PEAK

PCUS	HGVS



PM PEAK

PCUS	HGVS

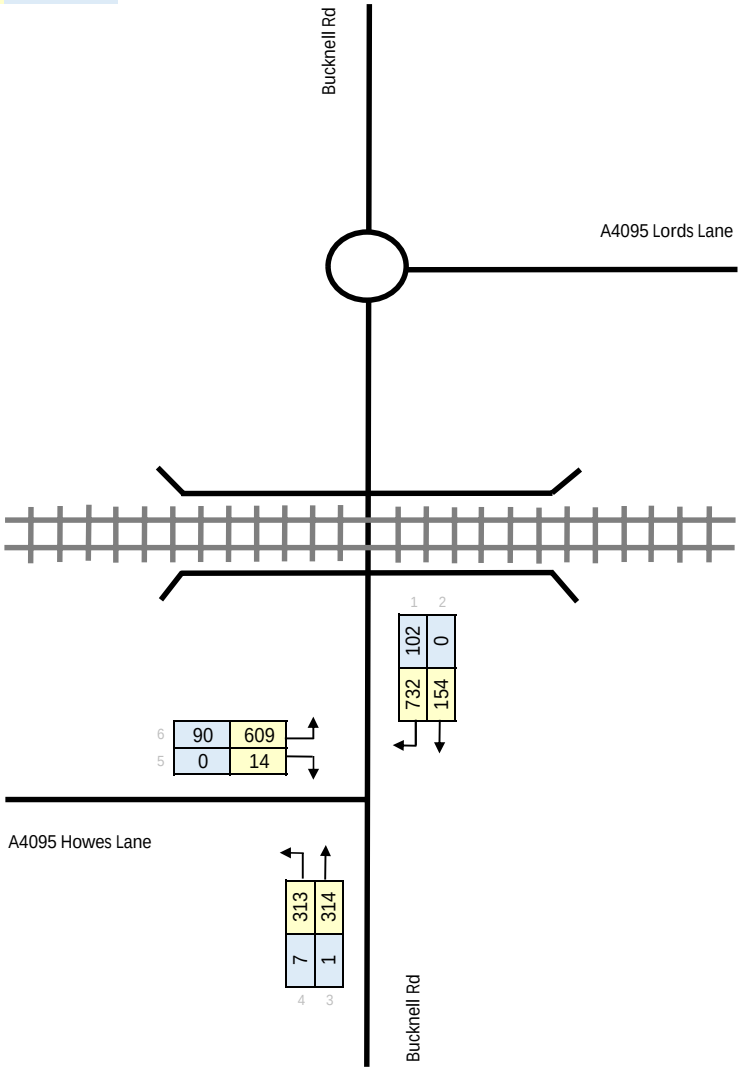


Traffic Flows from the BTM
All Flows in PCUs

Project: Land at North West Bicester	Title: BTM INTERIM 'REFERENCE CASE' BASE 2026 SCENARIO	Date: 07/11/2022	VELOCITY Transport Planning www.velocity-tp.com
Client: Firethorn Trust	AM AND PM PEAK FLOWS	Diagram: A	

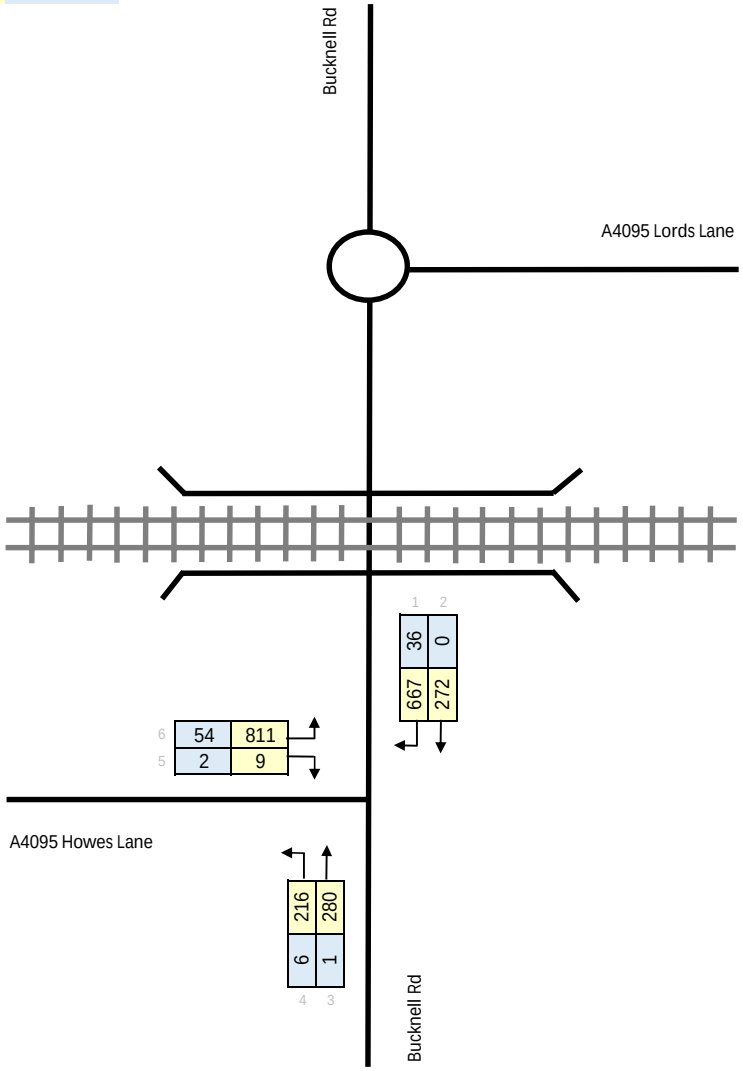
AM PEAK

PCUS	HGVS



PM PEAK

PCUS	HGVS



Traffic Flows from the BTM
All Flows in PCUs

Project:	Land at North West Bicester	Title:	BTM BASE 2026 + PROPOSED DEVELOPMENT SCENARIO	Date:	07/11/2022
Client:	Firethorn Trust		AM AND PM PEAK FLOWS	Diagram:	B

VELOCITY Transport Planning
www.velocity-tp.com

ATTACHMENT B

EXISTING PRIORITY JUNCTION MODELLING (CALIBRATED)

Junctions 10

PICADY 10 - Priority Intersection Module

Version: 10.0.3.1598

Filename: 2022.11.02 - NW BICESTER - HOWES LANE (Existing CALIBRATED).j10
Path: P:\Firethorn Trust_4600\1100 - NW Bicester\Analysis\Modelling\Picady\BTM 2026 FLOWS
Report generation date: 07/11/2022 12:14:54

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	BTM Base 2026									
Stream B-C	D1	13.6	84.50	0.97	F	D2	78.8	405.06	1.21	F
Stream B-A		0.1	18.98	0.06	C		0.0	16.51	0.04	C
Stream C-AB		20.8	112.42	1.00	F		9.2	44.30	0.89	E
	BTM 2026 + Proposed Dev									
Stream B-C	D3	19.1	110.73	1.00	F	D4	109.3	578.13	1.28	F
Stream B-A		0.1	22.45	0.08	C		0.0	17.43	0.04	C
Stream C-AB		40.7	198.68	1.09	F		12.7	60.13	0.93	F
	OBS 2022									
Stream B-C	D5	1.9	15.84	0.64	C	D6	18.2	95.68	0.99	F
Stream B-A		0.1	19.27	0.12	C		0.2	13.10	0.14	B
Stream C-AB		28.3	126.72	1.03	F		2.8	17.15	0.70	C

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	02/11/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	VTP\CRicci
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	BTM Base 2026	AM	ONE HOUR	07:45	09:15	15
D2	BTM Base 2026	PM	ONE HOUR	16:45	18:15	15
D3	BTM 2026 + Proposed Dev	AM	ONE HOUR	07:45	09:15	15
D4	BTM 2026 + Proposed Dev	PM	ONE HOUR	16:45	18:15	15
D5	OBS 2022	AM	ONE HOUR	07:45	09:15	15
D6	OBS 2022	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

BTM Base 2026, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		61.54	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	61.54	F

Arms

Arms

Arm	Name	Description	Arm type
A	untitled		Major
B	untitled		Minor
C	untitled		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right-turn storage	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.40			250.0	✓	1.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane Width (Left) (m)	Lane Width (Right) (m)	Visibility to left (m)	Visibility to right (m)
B	Two lanes	3.00	2.80	41	250

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	602	0.108	0.272	0.171	0.389
B-C	781	0.118	0.297	-	-
C-B	719	0.274	0.274	-	-

The slopes and intercepts shown above include custom intercept adjustments only.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	BTM Base 2026	AM	ONE HOUR	07:45	09:15	15

Generated on 07/11/2022 12:15:09 using Junctions 10 (10.0.3.1598)

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	627	100.000
B		✓	564	100.000
C		✓	593	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	313	314
	B	13	0	551
	C	111	482	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.97	84.50	13.6	F
B-A	0.06	18.98	0.1	C
C-AB	1.00	112.42	20.8	F
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	415	679	0.611	408	1.7	14.320	B
B-A	10	357	0.027	10	0.0	11.404	B
C-AB	396	643	0.615	389	1.8	15.212	C
C-A	50			50			
A-B	236			236			
A-C	236			236			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	495	658	0.753	490	3.1	22.792	C
B-A	12	306	0.038	12	0.0	13.429	B
C-AB	494	643	0.768	486	3.7	24.576	C
C-A	40			40			
A-B	281			281			
A-C	282			282			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	607	628	0.966	577	10.4	57.619	F
B-A	14	238	0.060	14	0.1	17.684	C
C-AB	653	652	1.002	609	14.7	67.538	F
C-A	0			0			
A-B	345			345			
A-C	346			346			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	607	627	0.967	594	13.6	84.501	F
B-A	14	223	0.064	14	0.1	18.982	C
C-AB	653	652	1.002	629	20.8	112.417	F
C-A	0			0			
A-B	345			345			
A-C	346			346			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	495	657	0.754	535	3.8	39.016	E
B-A	12	280	0.042	12	0.0	14.758	B
C-AB	494	643	0.768	557	4.8	62.351	F
C-A	40			40			
A-B	281			281			
A-C	282			282			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	415	678	0.611	423	1.8	15.923	C
B-A	10	350	0.028	10	0.0	11.649	B
C-AB	396	643	0.615	407	2.0	17.577	C
C-A	50			50			
A-B	236			236			
A-C	236			236			

Generated on 07/11/2022 12:15:09 using Junctions 10 (10.0.3.1598)

BTM Base 2026, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		168.54	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	168.54	F

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	BTM Base 2026	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	496	100.000
B		✓	726	100.000
C		✓	654	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	216	280
	B	8	0	718
	C	196	458	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.21	405.06	78.8	F
B-A	0.04	16.51	0.0	C
C-AB	0.89	44.30	9.2	E
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	541	697	0.776	527	3.4	21.864	C
B-A	6	368	0.016	6	0.0	10.943	B
C-AB	393	704	0.559	387	1.5	12.352	B
C-A	99			99			
A-B	163			163			
A-C	211			211			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	645	680	0.950	620	9.7	51.826	F
B-A	7	320	0.022	7	0.0	12.659	B
C-AB	498	722	0.690	494	2.8	17.178	C
C-A	89			89			
A-B	194			194			
A-C	252			252			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	791	656	1.205	650	44.8	167.792	F
B-A	9	255	0.034	9	0.0	16.050	C
C-AB	675	763	0.886	654	8.0	34.515	D
C-A	45			45			
A-B	238			238			
A-C	308			308			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	791	656	1.206	655	78.8	349.192	F
B-A	9	249	0.035	9	0.0	16.512	C
C-AB	675	763	0.886	671	9.2	44.296	E
C-A	45			45			
A-B	238			238			
A-C	308			308			

Generated on 07/11/2022 12:15:09 using Junctions 10 (10.0.3.1598)

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	645	680	0.950	670	72.6	405.059	F
B-A	7	310	0.023	7	0.0	13.085	B
C-AB	498	722	0.690	522	3.2	22.292	C
C-A	89			89			
A-B	194			194			
A-C	252			252			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	541	697	0.776	686	36.2	289.110	F
B-A	6	363	0.017	6	0.0	11.090	B
C-AB	393	704	0.559	400	1.7	13.351	B
C-A	99			99			
A-B	163			163			
A-C	211			211			

BTM 2026 + Proposed Dev, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		99.86	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	99.86	F

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	BTM 2026 + Proposed Dev	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	627	100.000
B		✓	584	100.000
C		✓	635	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	313	314
	B	13	0	571
	C	111	524	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

Generated on 07/11/2022 12:15:09 using Junctions 10 (10.0.3.1598)

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.00	110.73	19.1	F
B-A	0.08	22.45	0.1	C
C-AB	1.09	198.68	40.7	F
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	430	678	0.634	423	1.8	15.111	C
B-A	10	344	0.028	10	0.0	11.823	B
C-AB	433	648	0.669	424	2.3	17.201	C
C-A	45			45			
A-B	236			236			
A-C	236			236			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	513	658	0.781	507	3.5	25.132	D
B-A	12	291	0.040	12	0.0	14.164	B
C-AB	542	649	0.834	530	5.2	31.485	D
C-A	29			29			
A-B	281			281			
A-C	282			282			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	629	627	1.002	589	13.4	68.722	F
B-A	14	218	0.066	14	0.1	19.429	C
C-AB	699	642	1.089	621	24.8	102.357	F
C-A	0			0			
A-B	345			345			
A-C	346			346			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	629	626	1.005	606	19.1	110.732	F
B-A	14	191	0.075	14	0.1	22.450	C
C-AB	699	642	1.089	635	40.7	198.681	F
C-A	0			0			
A-B	345			345			
A-C	346			346			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	513	656	0.783	571	4.7	59.061	F
B-A	12	237	0.049	12	0.1	17.565	C
C-AB	542	649	0.834	657	12.0	173.157	F
C-A	29			29			
A-B	281			281			
A-C	282			282			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	430	678	0.634	441	2.0	17.346	C
B-A	10	327	0.030	10	0.0	12.484	B
C-AB	433	648	0.669	471	2.6	26.725	D
C-A	45			45			
A-B	236			236			
A-C	236			236			

BTM 2026 + Proposed Dev, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		245.55	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	245.55	F

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	BTM 2026 + Proposed Dev	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	496	100.000
B		✓	770	100.000
C		✓	676	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	216	280
	B	8	0	762
	C	196	480	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.28	578.13	109.3	F
B-A	0.04	17.43	0.0	C
C-AB	0.93	60.13	12.7	F
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	574	697	0.824	556	4.4	25.728	D
B-A	6	361	0.017	6	0.0	11.141	B
C-AB	415	707	0.586	408	1.7	13.009	B
C-A	94			94			
A-B	163			163			
A-C	211			211			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	685	680	1.008	643	14.8	70.123	F
B-A	7	312	0.023	7	0.0	12.989	B
C-AB	526	728	0.723	520	3.2	18.891	C
C-A	81			81			
A-B	194			194			
A-C	252			252			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	839	656	1.280	653	61.3	224.992	F
B-A	9	245	0.036	9	0.0	16.730	C
C-AB	716	771	0.928	687	10.5	42.394	E
C-A	29			29			
A-B	238			238			
A-C	308			308			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	839	655	1.280	655	107.3	469.035	F
B-A	9	236	0.037	9	0.0	17.430	C
C-AB	716	771	0.928	707	12.7	60.135	F
C-A	29			29			
A-B	238			238			
A-C	308			308			

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17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	685	679	1.008	677	109.3	578.131	F
B-A	7	298	0.024	7	0.0	13.640	B
C-AB	526	728	0.723	562	3.8	28.802	D
C-A	81			81			
A-B	194			194			
A-C	252			252			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	574	696	0.824	690	80.4	496.698	F
B-A	6	356	0.017	6	0.0	11.322	B
C-AB	415	707	0.586	422	1.9	14.360	B
C-A	94			94			
A-B	163			163			
A-C	211			211			

OBS 2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		66.19	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	66.19	F

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	OBS 2022	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	273	100.000
B		✓	423	100.000
C		✓	708	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	86	187
	B	25	0	398
	C	114	594	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

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Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.64	15.84	1.9	C
B-A	0.12	19.27	0.1	C
C-AB	1.03	126.72	28.3	F
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	300	722	0.415	297	0.8	9.235	A
B-A	19	368	0.051	19	0.1	11.325	B
C-AB	488	723	0.675	478	2.3	15.756	C
C-A	45			45			
A-B	65			65			
A-C	141			141			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	358	709	0.504	356	1.1	11.179	B
B-A	22	319	0.070	22	0.1	13.339	B
C-AB	604	737	0.820	594	4.8	26.575	D
C-A	32			32			
A-B	77			77			
A-C	168			168			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	438	689	0.636	435	1.8	15.394	C
B-A	28	253	0.109	27	0.1	17.545	C
C-AB	780	759	1.028	723	19.0	72.746	F
C-A	0			0			
A-B	95			95			
A-C	206			206			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	438	688	0.637	438	1.9	15.835	C
B-A	28	233	0.118	27	0.1	19.268	C
C-AB	780	759	1.028	742	28.3	126.722	F
C-A	0			0			
A-B	95			95			
A-C	206			206			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	358	707	0.506	361	1.2	11.514	B
B-A	22	282	0.080	23	0.1	15.250	C
C-AB	604	737	0.820	689	7.1	89.574	F
C-A	32			32			
A-B	77			77			
A-C	168			168			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	300	722	0.415	301	0.8	9.439	A
B-A	19	358	0.053	19	0.1	11.694	B
C-AB	488	723	0.675	505	2.6	19.688	C
C-A	45			45			
A-B	65			65			
A-C	141			141			

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OBS 2022, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Arm A Direction	Arm B Direction	Arm C Direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way	Two-way	Two-way		49.38	E

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	49.38	E

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	OBS 2022	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	181	100.000
B		✓	682	100.000
C		✓	547	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	59	122
	B	44	0	638
	C	127	420	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	10	10
	B	10	0	10
	C	10	10	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.99	95.68	18.2	F
B-A	0.14	13.10	0.2	B
C-AB	0.70	17.15	2.8	C
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	480	734	0.654	472	2.0	14.704	B
B-A	33	433	0.077	33	0.1	9.888	A
C-AB	338	729	0.464	334	1.0	9.947	A
C-A	74			74			
A-B	44			44			
A-C	92			92			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	574	724	0.792	566	3.7	24.087	C
B-A	40	399	0.099	39	0.1	11.024	B
C-AB	415	742	0.560	413	1.5	12.024	B
C-A	76			76			
A-B	53			53			
A-C	110			110			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	702	708	0.992	664	13.3	61.719	F
B-A	48	352	0.137	48	0.2	13.009	B
C-AB	532	765	0.696	528	2.7	16.520	C
C-A	70			70			
A-B	65			65			
A-C	134			134			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	702	708	0.992	683	18.2	95.680	F
B-A	48	351	0.138	48	0.2	13.101	B
C-AB	532	765	0.696	532	2.8	17.145	C
C-A	70			70			
A-B	65			65			
A-C	134			134			

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17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	574	724	0.793	627	4.9	50.989	F
B-A	40	396	0.100	40	0.1	11.124	B
C-AB	415	742	0.560	420	1.6	12.540	B
C-A	76			76			
A-B	53			53			
A-C	110			110			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	480	734	0.654	491	2.2	16.950	C
B-A	33	431	0.077	33	0.1	9.971	A
C-AB	338	729	0.464	340	1.0	10.262	B
C-A	74			74			
A-B	44			44			
A-C	92			92			

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