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 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."

- 1.1.3 Further information was submitted to CDC in November 2021, which included updated ES Chapters, a Technical Note (TN003) responding to the respective consultation responses that related to highway matters, including an assessment of the Suitability of the Elmsbrook Spine Road (TN004), and an assessment of the Grampian Condition (TN005) relative to the delivery of the A4095 Strategic Link Road (SLR). OCC provided a further consultation response to the additional information dated the 05th of January 2022.
- 1.1.4 This response has been prepared to address the four reasons for objection raised by OCC in their latest consultation response, as well as to provide additional information relative to highway matters.

1.2 OCC CONSULTATION RESPONSE

- 1.2.1 The four highway reasons for objection raised by OCC are as follows:
 - 1. The assessment of the impact of the development in the absence of the A4095 diversion/Strategic Link Road is not sound and therefore it is not possible to predict the traffic impact of this proposal.
 - 2. The development as proposed would have an unacceptable congestion impact on the junction of Charlotte Ave/B4100 in its current form.
 - 3. The assessment of the traffic impact on Elmsbrook Spine Road does not take into account the suitability of narrow parts of the road for the volume of traffic.
 - 4. There is insufficient commitment to provide pedestrian/cycle connections through to adjacent sites, in order to maximise opportunities for sustainable travel.
- 1.2.2 In addition to the four reasons for objection, a number of other highways matters were included within the OCC consultation response, which are summarised as follows:
 - Updated drawings are required for Accesses A + C;
 - The proposed construction access to the eastern parcel would require a temporary speed restriction to 30mph to ensure adequate visibility splays can be achieved; and
 - The proposed construction access to the western parcel would require traffic regulation orders to restrict parking provision within the existing layby.



2 VTP RESPONSE TO OCC REASONS FOR OBJECTION

2.1 INTRODUCTION

2.1.1 The four reasons for objection raised by OCC are summarised within this Technical Note. The following paragraphs seek to address each of these reasons for objection to satisfy OCC that the appropriate measures can be taken or have been considered for these reasons for objection to be removed.

2.2 REASON 1 – ASSESSMENT OF IMPACT IN THE ABSENCE OF THE A4095 SLR

- 2.2.1 VTP has prepared a standalone Technical Note 006 A4095 Interim Improvement, which addresses the concerns raised by OCC, and this Technical Note should be considered in association with this response. TN006 is included at **ATTACHMENT A**.
- 2.2.2 The summary and conclusions of TN006 are set out below for ease of reference:

"It is generally accepted that the committed A4095 Strategic Highway Improvements are required to alleviate pressure at the A4095 Howes Lane / Bucknell Road junction and across the local network.

However, the proposed mini-roundabout mitigation scheme seeks to provide an interim mitigation solution whilst the details of the delivery and funding for the A4095 Strategic Highway Improvements are agreed.

In conclusion, the proposed mitigation scheme and mini-roundabout arrangement provides a significant improvement from the existing arrangement, mitigating both the impact of the Proposed Development and improving the junction in a number of ways, including traffic capacity, road safety, access for HGVs and pedestrian and cyclist amenity."

2.3 REASON 2 – THE DEVELOPMENT WOULD HAVE AN UNACCEPTABLE IMPACT ON THE EXISTING JUNCTION OF CHARLOTTE AVENUE WITH THE B4100

- 2.3.1 The technical work provided within the supporting evidence which has been submitted to date acknowledges that traffic flows predicted to be generated by the Proposed Development and those associated with the adjacent Hallam Land Development, which is the subject of a current planning application (Planning Ref 21/04275/OUT), would have an adverse impact on the operation of the existing priority junction of Charlotte Avenue with the B4100.
- 2.3.2 OCC has requested that a financial contribution of £47,289 be included within a Section 106 Agreement, which would be associated with the signalisation of this junction. This is considered to be an appropriate means of mitigating the traffic impact at this junction as a result of the implementation of the Proposed Development and that associated with the Hallam Land proposals.
- 2.3.3 The Applicant has not disputed this contribution. As such, it is considered that the mitigation to address the impact of the proposed development at this junction has been identified and agreed upon.

2.4 REASON 3 – THE ASSESSMENT OF TRAFFIC IMPACTS ON ELMSBROOK SPINE ROAD

2.4.1 VTP prepared TN004 – Spine Road Assessment, which was included with the November 2021 submission of further information for consultation. This Technical Note considered the suitability of the Elmsbrook Spine



Road along Charlotte Avenue at the point where the existing bridge is provided between the Gagle Brook Primary School and the Eco Business Centre.

- 2.4.2 However, following further discussion with OCC, it is evident that there is still a concern regarding the suitability of the narrow section of the Elmsbrook Spine Road to the north of the Gagle Brook Primary School, where the existing width of the road is identified as being 4.1m in places.
- 2.4.3 VTP Drawing 4600-1100-T-070 Rev A Elmsbrook Spine Road Assessment (a copy of which is included at ATTACHMENT B) has been prepared to identify the existing dimensions along this section of the Spine Road, and it is clear that there are a number of locations where the existing width is reduced to as little as 4.1m. In addition, this plan shows that there are currently a total of 52 dwellings, 99 car parking spaces, and 14 garages associated with the existing Elmsbrook scheme currently accessed via this section of the Elmsbrook Spine Road. In addition to the residential dwellings, access is currently accommodated for refuse vehicles, buses using the Elmsbrook Spine Road, and any other heavy goods vehicle activity that has been permitted for the Elmsbrook development (i.e. emergency vehicles, removals vans, deliveries, etc).
- 2.4.4 It is acknowledged that the Elmsbrook Spine Road is not currently an adopted highway, but a signed S38 Agreement between A2Dominion (the developer of Elmsbrook) and OCC was entered into and signed on the 09th of July 2014 as part of the discharge of Condition 60 of the Elmsbrook Planning Consent (Planning Ref 10/01780/HYBRID). As such, it is considered that the provision of this road in its current form is acceptable to OCC to accommodate the level and mix of traffic expected along this route.
- 2.4.5 To identify what this level of traffic impact might be, a first principles approach has been adopted in line with the agreed methodology, including trip rates, a spilt of 70/30 for private/affordable housing, and a 40% mode share associated with car trips, as was set out within the Transport Assessment that supports the Firethorn outline planning application. This methodology was set out again in TN004 Spine Road Assessment, which was submitted in November 2021.
- 2.4.6 The total person trips for all modes (adjusted to reflect the CDC desire for 40% car use) are presented in **Table 2-1** for the 52 existing Elmsbrook dwellings, the 69 proposed Firethorn dwellings on the western parcel, and the 138 proposed Firethorn dwellings on the eastern parcel that are all expected to utilise this part of the Spine Road. The busiest hour is identified as being the AM peak hour, but total daily flows have also been identified for the respective development parcels.

Method of	Adjusted	52 Dv	vellings	ngs 69 Dwellings		138 D\	wellings	259 Dv	wellings
Travel	Split	AM	AADT	AM	AADT	AM	AADT	AM	AADT
Driver	40%	28	211	37	279	75	557	140	1,050
Passenger	13.1%	9	69	12	91	24	183	46	344
Rail (walk)	4.7%	3	25	4	33	9	66	17	123
Rail (other)	4.7%	3	25	4	33	9	66	17	123
Bus (walk)	9.1%	6	48	8	63	17	127	32	238
Cycle	7.2%	5	38	7	50	13	100	25	189
Walk	19.4%	14	102	18	135	36	271	68	510
Other	1.8%	1	9	2	13	3	25	6	47
Total	100.0%	70	527	93	697	186	1,394	351	2,625

Table 2-1: Two-Way Total Person Trips Along the Elmsbrook Spine Road (North of Gagle Brook School)

2.4.7

In order to establish if the carriageway width of 4.1m is suitable to accommodate two-way traffic flows of as much as 140 cars and a maximum of say 4 HGV movements (2 one-way bus movements and 1 two-way refuse vehicle movement), consideration has been given to the information presented at Table 4-1 of TN004, which identified the capacity of carriageways of varying widths, as set out in DMRB TA 77/99. For

clarity, a 4.1m carriageway was identified as being suitable to accommodate a maximum of 482 one-way flows (60% of two-way flow) and 804 two-way flows over an hour.

- 2.4.8 As the evidence presented in **Table 2-1** identifies that a maximum of 140 two-way cars + 4 two-way HGV movements (assumed) would be expected when the full Firethorn Development is occupied and shares the use of this stretch of the Elmsbrook Spine Road with the existing Elmsbrook development, it is clear that a narrow carriageway width of 4.1m for limited sections of the Elmsbrook Spine Road to the north of the Gagle Brook Primary School, would be suitable.
- 2.4.9 The above stands to reason as the layout of the existing Elmsbrook Spine Road will prevent any through traffic due to the bus gate to the north of the access junctions to the Firethorn development, meaning that all of the traffic that utilises this portion of the Spine Road will be local traffic only. In addition, there is not expected to be any additional HGV movements than those that are already utilising this section of the Spine Road as there are no commercial uses accessed, the same bus services will use the route as can currently be accommodated, and no additional refuse vehicles will be required as a single refuse vehicle is considered acceptable to service the existing and proposed dwellings along this route. As such, the only increase in traffic flows will be car drivers associated with the proposed Firethorn development.
- 2.4.10 With respect to cyclists using this stretch of the Elmsbrook Spine Road, assuming that 50% of rail users might walk and 50% might cycle or be a passenger in a car to the nearby railway station(s), a total two-way hourly cycle demand of 42 cyclists (17 rail + 25 cycle) will use this stretch of the carriageway. This level of cycle use is considered to be acceptable as on-carriageway in accordance with LTN 1/20. This leaves the footway provision available for use by pedestrians only, and it could accommodate vulnerable cyclists, such as primary school children cycling to the Gagle Brook Primary School.

2.5 REASON 4 – THERE IS INSUFFICIENT COMMITMENT TO PROVIDE SUITABLE PED/CYCLE LINKS TO THE ADJACENT SITES

- 2.5.1 The Illustrative Masterplan (Rev C) that was submitted with the planning application (copy enclosed at **ATTACHMENT C**) identified a number of pedestrian and cycle links from the application site to the adjacent sites and the public highway. Some of these links were referenced as being *"potential pedestrian connections"*, and some were identified on the Illustrative Masterplan but not referenced as being a pedestrian or cycle connection at all.
- 2.5.2 Whilst the Illustrative Masterplan is only a representation of what might be delivered on the Application Site, it has informed the Access & Movement Parameter Plan, which has been updated in order to reflect the pedestrian/cycle connections that are being committed to. The Access & Movement Parameter Plan (Rev M) is included within **ATTACHMENT C**.
- 2.5.3 Item 11 of the "Detailed Comments" provided by OCC in the response dated the 05th of January 2022 noted that a contribution towards the proposed ped/cycle connection to the nearby Hallam Land development via a footbridge over the watercourse to the south of the western parcel, is accepted. However, OCC has requested that further details be provided for this proposed footbridge, including the location and a cost associated with this footbridge in order that a financial contribution (25%) can be identified within the associated Section 106 Agreement should the application be granted planning permission.
- 2.5.4 Based on this request for further details of the footbridge, a topographical survey of the watercourse was commissioned and VTP Drawing 4600-1100-T-059 Rev A has been prepared to show the proposed layout, cross-section, and details of how this footbridge could be delivered.



- 2.5.5 The design of this footbridge is identified as being in the order of 8.0m in length to cross the identified watercourse and 4.0m in width, to accommodate both pedestrians and cyclists. Beaver Bridges has been contacted to provide details of a potential footbridge and have included a cost estimate by email dated the 22nd of March 2022 for the installation of this footbridge. This cost estimate would be subject to further considerations as details of the ground conditions, the cost of materials, and labour would still need to be clarified at the detailed design stage. However, a review of the costs provided within the email quotation could be considered to be robust at a total cost of £70,000 + VAT. Based on a 25% contribution that would be considered reasonable to be committed to by the Applicant, a Section 106 Contribution of £17,500 would be required.
- **2.5.6** The full details of the VTP Drawing, the Beaver Bridge brochure for a polybridge, and the cost estimate dated the 22nd of March 2022, are included at **ATTACHMENT D**.



3 VTP RESPONSE TO ADDITIONAL OCC COMMENTS

3.1 INTRODUCTION

3.1.1 Having addressed the four reasons for OCC's objections in the previous section of this TN, this section seeks to address the additional comments made by OCC within their consultation response dated the 05th of January 2022.

3.2 UPDATED DRAWINGS FOR SITE ACCESSES A & C

- **3.2.1** OCC requested that an updated Site Access Plan be presented for Site Access A to the eastern parcel, which would identify the required works to deliver this access arrangement if Site Access B to the western parcel south of the bus gate were to be excluded.
- 3.2.2 VTP Drawing 4600-1100-T-040 Rev A presents this arrangement and identifies that there will be a need to realign the existing kerb on the western side of the Spine Road in order to facilitate the swept path of a large refuse vehicle as it turns right towards the access road to the eastern parcel. Suitable visibility splays and footway provisions are identified on the updated VTP Drawing, a copy of which is included at ATTACHMENT B.
- **3.2.3** For completeness, VTP Drawing 4600-1100-T-041 Rev A presents the combined site access arrangements for Site Access A & B, which includes details of the swept path assessment for a large refuse vehicle accessing the western parcel, visibility splays, and footway provisions. A copy of this updated Site Access arrangement is included at **ATTACHMENT B**.
- 3.2.4 In addition to the details for Site Access A, OCC requested further details be provided at Site Access C to identify any land that might need to be identified for adoption to provide improved visibility for drivers utilising this access, as well as identifying an acceptable stopping sight distance (SSD) for drivers approaching the junction from the north via Braeburn Avenue.
- 3.2.5 VTP Drawing 4600-1100-T-042 Rev A presents the visibility splays for this site access junction, including details of the appropriate SSD for drivers approaching the junction from Braeburn Avenue. An area of grass verge is identified for adoption, which would ensure that adequate visibility can be provided at this junction. A copy of this updated Site Access arrangement is included at **ATTACHMENT B**.

3.3 TEMPORARY SPEED RESTRICTION FOR THE EASTERN CONSTRUCTION ACCESS

- 3.3.1 It is acknowledged that the existing speed limit along the B4100 in the vicinity of the proposed temporary construction access to the eastern parcel is 40mph. In accordance with DMRB, this would require a junction visibility splay of 2.4m x 90.0m. VTP Drawing 4600-1100-T-011 Rev F, a copy of which is included at **ATTACHMENT B**, identifies that this visibility can be achieved towards the east, but due to the existing drainage ditch located to the immediate west of the proposed temporary access, the visibility splay is compromised.
- 3.3.2 As set out in the response from OCC, should the speed limit along this stretch of the B4100 be reduced to 30mph, this would require visibility splays of 2.4m x 70.0m, which are shown to be achievable on the updated Proposed Construction Access plan.
- 3.3.3 In order to change the speed limit from 40mph to 30mph, a change to the existing Traffic Regulation Order

March 2022

(TRO) will need to be agreed with OCC. It is acknowledged that if this TRO were to be required for more than 18 months, then the TRO would need to be permanent in nature and subject to further consultation once planning consent is granted for the Firethorn scheme and following further detailed design. However, subject to confirmation from the developer that might build out the proposed eastern parcel of development, if the temporary construction access is only required for a period of up to 18 months, it is expected that a Temporary TRO could be implemented by OCC to accommodate the construction phase and the lifespan of this temporary junction.

3.4 TRAFFIC REGULATION ORDER(S) FOR THE WESTERN CONSTRUCTION ACCESS

- 3.4.1 The temporary construction access to the western parcel is presented on VTP Drawing 4600-1100-T-027 Rev B, a copy of which is included at **ATTACHMENT B**.
- 3.4.2 As this temporary access is proposed to be taken directly from the existing layby on the B4100, which currently has no parking constraints or restrictions and is acknowledged to be regularly used by large HGVs, there will be a need to ensure that the appropriate TROs are implemented to restrict vehicle parking within this layby.
- 3.4.3 It is considered that the full extent of the parking restrictions, and other aspects of detailed design, including the extent of impact on the existing vegetation, a crossing of the drainage ditch, and any further impact on the infrastructure within this layby, can be agreed upon and identified in full as part of the detailed design.



4 SUMMARY & CONCLUSIONS

4.1 OVERVIEW

- 4.1.1 VTP has been appointed by the Firethorn Trust 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.
- 4.1.2 Following submission of the planning application in early 2021, consultation responses were received from OCC and CDC, which resulted in further information being submitted in November 2021. This Technical Note has been prepared to respond to the further consultation comments from OCC dated the 05th of January 2022.
- 4.1.3 In summary, the OCC response identified four highways' reasons for objection to the proposals, as well as a request for further clarification on a number of other aspects.

4.2 RESPONSE TO OCC REASONS FOR OBJECTION

- **4.2.1** Objection Reason 1 states that "the assessment of the impact of the development in the absence of the A4095 diversion/Strategic Link Road is not sound and therefore it is not possible to predict the traffic impact of this proposal."
- 4.2.2 The A4095 Strategic Highway Improvement scheme is recognised as being the appropriate form of permanent mitigation to accommodate the predicted level of traffic impact associated with all of the allocated development set out within the adopted CDC Local Plan. The application site forms part of the allocated development within the CDC Local Plan, as referenced in Policy Bicester 1.
- 4.2.3 At the time that the original planning application was validated in May 2021, and at the later date of November 2021, when further information was submitted in response to the original comments from OCC and CDC, the funding of the permitted A4095 Strategic Link Road was agreed and in place. It is accepted that an appropriate level of financial contribution towards the permitted A4095 Strategic Link Road will be identified and set out within the Section 106 Agreement to be associated with the application, but these details have not yet been provided by OCC. This is acknowledged within the OCC consultation response.
- 4.2.4 Notwithstanding the above, OCC's Future Oxford Partnership (formerly the Oxfordshire Growth Board) decided to reallocate the agreed funds for the permitted A4095 Strategic Highway Improvement scheme, subsequent to the additional information being submitted in relation to the outline planning application.
- 4.2.5 In order to address the potential impact of the traffic associated with the application site for a limited period on a key part of the local highway network that will ultimately benefit from the implementation of the A4095 Strategic Highways Improvements once the funding for this has been agreed upon, a temporary Interim Improvement Scheme has been developed in the form of a mini-roundabout junction to replace the existing priority junction at the A4095 Howes Lane / Bucknell Road junction.
- 4.2.6 The details of the technical work to support this proposed Interim Improvement Scheme are set out within a standalone Technical Note that is included within this response to OCC. The conclusions are that even with the increased level of vehicular activity through the junction of the A4095 Howes Lane / Bucknell Road, the mini-roundabout option would result in improved performance of the junction, less delay to drivers using this junction and improved highway safety measures. As such, it is considered that Objection Reason 1 has been addressed.



- 4.2.7 Objection Reason 2 states that "the development as proposed would have an unacceptable congestion impact on the junction of Charlotte Ave/B4100 in its current form". This has been acknowledged in all of the supporting evidence submitted to date, and the original Transport Assessment identified a traffic signal scheme at this junction that would mitigate not only the impact of the traffic associated with the Proposed Development but also the considerable levels of traffic predicted to be generated by the adjacent Hallam Land development, which is now the subject of a live planning application (Planning Ref 21/04275/OUT).
- **4.2.8** This improvement scheme has been acknowledged by OCC as a request for a financial contribution of £47,289 is included within the consultations response(s) received from OCC to date. As such, it is considered that Objection Reason 2 has been addressed.
- 4.2.9 Objection Reason 3 states that "the assessment of the traffic impact on the Elmsbrook Spine Road does not take into account the suitability of narrow parts of the road for the volume of traffic." This Technical Note identifies what the cumulative levels of traffic that might utilise this stretch of the Elmsbrook Spine Road might be once the Firethorn scheme is fully occupied.
- 4.2.10 It is considered that the overall level of traffic flows, the nature of the traffic that would be expected to utilise the Spine Road, including large HGVs, and the pedestrian and cycle activity along this route, can all be accommodated in accordance with thresholds calculated from DMRB TA 77/99. As such, it is considered that Objection Reason 3 has been addressed.
- 4.2.11 Objection Reason 4 states that "there is insufficient commitment to provide pedestrian/cycle connections through to adjacent sites, in order to maximise opportunities for sustainable travel." An updated Access & Movement Parameter Plan has been prepared to provide the locations of the pedestrian/cycle connections that the outline application is committed to delivering.
- 4.2.12 It is worth noting that all of the identified locations for connections to adjacent sites are subject to the internal highway network being adopted for the Elmsbrook development, and the other adjacent sites not only obtaining successful planning consent(s), but the internal links tying up with those proposed by the Firethorn application. A single connection point to the adopted highway is identified from the eastern parcel to the B4100 that will lead to a new pedestrian crossing facility to the St Laurence Church.
- 4.2.13 In addition to the identified pedestrian/cycle connection points, a link is proposed to the adjacent Hallam Land development, which will need to include the provision of a new footbridge that will cross an existing watercourse. This Technical Note includes the details of this proposed footbridge, including drawings and a cost estimate for these proposed works. It is considered reasonable for a contribution of 25% of the cost of these works to be included within the Section 106 Agreement, which is identified as being in the order of £17,500. As such, it is considered that Objection Reason 4 has been addressed.

4.3 **RESPONSE TO FURTHER OCC COMMENTS**

- 4.3.1 In addition to the four reasons for objection, OCC requested further details be provided for Site Access A & C, as well as commenting on the need for temporary changes to Traffic Regulation Orders to accommodate both the construction accesses to the eastern and western parcels.
- 4.3.2 This Technical Note provides the updated drawings and a commitment to progress the Traffic Regulation Order(s), subject to successful planning permission being granted and further detailed design work.



ATTACHMENT A

TN006 – A4095 INTERIM IMPROVEMENT MITIGATION

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 Councy Council (OCC), which are 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."

1.2 PLANNING CONTEXT

- 1.2.1 The outline planning application was originally validated by CDC on the 06th of May 2021. A response to the outline planning application was received from OCC on the 06th of July 2021 and from CDC on the 21st of September 2021, with the third page of the CDC letter covering matters related to transport. It is noted that paragraph four of the CDC transport comments referred to the potential need for a Grampian Condition to restrict the level of development prior to the implementation of the A4095 Strategic Highway Improvement scheme, which was consented by CDC on the 21st of August 2021 (Planning Ref 14/01968/F).
- 1.2.2 In response to the comments from both OCC and CDC, a VTP produced a Technical Note (TN) in November 2021, titled 'Grampian Condition Review' TN005, which was submitted as part of the wider response to the consultation comments received. The TN005 referred to previous consultant work at the A4095 Howes Lane / Bucknell Road junction, which determined the level of development that could come forward in the area prior to the implementation of the A4095 Strategic Highway Improvements, as permitted.
- **1.2.3** Further details on the historical and planning context of the A4095 Strategic Highway Improvements are detailed within the VTP 'Grampian Condition Review' TN005.
- **1.2.4** Following the planning consultation on the additional documentation submitted in November 2021, further comments on the technical work were received within an OCC response dated the 05th of January 2022.
- 1.2.5 With respect to the A4095 and assessments within TN005, the OCC response stated:

"OCC considers that the methodology is now too old to be reliable as it made use of out-dated scenarios of the Bicester Transport Model, which did not include local plan development at Heyford. A further assessment should be carried out using a revised reference case of the BTM which is currently being developed in relation to another project. The consideration of severity of impact should take into account the strategic function of the A4095 around Bicester."

- 1.2.6 In addition to the feedback received from OCC, it is also now understood that the previously agreed funding and timescales for the delivery of the A4095 Strategic Highway Improvements are uncertain. This information was only made public after the submission of further information to CDC for consideration in November 2021.
- 1.2.7 On that basis, the response from OCC in relation to the assessment of the A4095 Howes Lane / Bucknall Road junction is very relevant as the timescales for the implementation of the A4095 Strategic Highway Improvements has less certainty. This is primarily due to the fact that it is expected that the funds for the A4095 Strategic Highway Improvements, which has been agreed to be the appropriate mitigation for all of the allocated development identified within the CDC Local Plan, are to be provided through contributions from developers seeking to deliver schemes within the allocated North West Bicester Masterplan.
- 1.2.8 The withdrawal (or reallocation) of the funding for the A4095 Strategic Highway Improvements by OCC has created a scenario whereby development opportunities are considered to be restrained as the key strategic mitigation can no longer be provided to "unlock" development, which in turn would have provided an opportunity for the cost of the A4095 Strategic Highway Improvements to be "clawed back" by these developments through the respective Section 106 Obligations.
- 1.2.9 VTP and the Applicant have engaged in a series of discussions with CDC and OCC with a view to agreeing on how best to accommodate the 530 dwellings associated with the Firethorn Scheme prior to the implementation of the A4095 Strategic Highway Improvements on the surrounding local highway network.
- 1.2.10 To this extent, a temporary or interim mitigation scheme has been developed at the A4095 Howes Lane / Bucknell Road junction, which seeks to provide an interim improvement to a critical part of the local highway network that would be permanently alleviated by the implementation of the A4095 Strategic Highway Improvements, whilst the mechanisms for funding the A4095 Strategic Highway Improvements are ongoing and agreed with all relevant stakeholders.
- 1.2.11 The suitability of the interim mitigation scheme will be tested using the latest 2026 'Reference Case' traffic flow outputs from the Bicester Transport Model (BTM) that have been obtained from OCC and assume the A4095 Strategic Highway Improvements are not in place.
- **1.2.12** Within recent discussions with OCC, it was agreed that the latest BTM 2026 Reference Case flows are the most appropriate to assess the suitability of the proposed interim mitigation scheme.
- **1.2.13** In addition to the data received from the BTM, a series of traffic surveys were undertaken the week commencing the 31st of January 2022 to understand the existing operation of the junction and local area.
- 1.2.14 It is regarded that whilst the proposals are for an interim mitigation scheme, the scheme could potentially be permanently implemented by OCC once the A4095 Strategic Highway Improvements are delivered. The proposed mitigation scheme aims to implement a wider array of improvements rather than focusing solely on capacity, so provides residual benefits to the local transport network.
- 1.2.15 It is generally accepted that the permitted A4095 Strategic Highway Improvements are required to alleviate pressure at the A4095 Howes Lane / Bucknell Road junction and across the wider local highway network that is to be associated with the development traffic expected to be generated by the allocated sites included within the adopted CDC Local Plan. However, the proposed interim improvement scheme seeks to provide a mitigation solution that will accommodate the impact of all of the traffic associated with the 530 dwellings of the Proposed Development prior to the implementation of the A4095 Strategic Highway Improvements.



1.3 REPORT PURPOSE AND STRUCTURE

1.3.1 This TN seeks to present the technical information for the proposed interim mitigation scheme to demonstrate that the proposals provide an improvement from the existing arrangement, i.e. a priority junction, using the latest traffic flows obtained from the BTM that have been provided by OCC.

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

- Existing Junction Operation;
- Proposed Mitigation; and
- Summary and Conclusions.



2 EXISTING JUNCTION OPERATION

2.1 METHODOLOGY

- 2.1.1 The operation of the existing priority junction will be assessed using the interim BTM 2026 Reference Case traffic flows that have been provided by OCC.
- 2.1.2 Modelling will be undertaken using the industry standard software, Junctions 10. Modelling measurements will be obtained using AutoCAD measurements of a topographical survey of the junction.
- 2.1.3 Junctions 10 assesses the capacity of a junction through Ratio of Flow to Capacity (RFC), with a junction being deemed to reach practical capacity when it reaches 0.85. However, in more congested scenarios, an RFC value of 1.0 is deemed to be the theoretical limit of acceptable operation. An RFC value below 0.85 generally means the junction will operate with additional capacity.
- 2.1.4 'Queue' refers to the number of Passenger Car Units (PCUs) that may be queueing at each arm, with one PCU generally equating to one car or an effective length of 5.75m per PCU. 'Junction Delay' refers to the total time delay in seconds that drivers will face whilst passing through the junction.
- 2.1.5 Development traffic flows for the Proposed Development that are considered to pass through the junction are consistent with the traffic flows and distribution presented within the Transport Assessment (TA) that was submitted in support of the outline planning application and as agreed with OCC.
- 2.1.6 For completeness, a copy of the existing junction parameters is presented on VTP Drawing 4600-1100-T-062 Rev A, a copy of which is included at **ATTACHMENT A. A** copy of the Junctions 10 Output files for the existing priority junction arrangement are contained at **ATTACHMENT B**.
- 2.1.7 The following scenarios will be assessed:
 - BTM Base 2026 (Reference Case); and
 - BTM Base 2026 + Proposed Development Scenarios
- 2.1.8 Traffic flow diagrams for both scenarios are included at ATTACHMENT C.

2.2 EXISTING JUNCTION MODELLING

2.2.1 The results of the PICADY modelling for the existing junction arrangement using the BTM 2026 Reference Case flows are provided in **Table 2-1**.

Table 2-1: A4095 Howes Lane / Bucknell Road - Existing Junction Operation (BTM Flows)

SCENARIO	ARM	AN	1 PEAK (08:00-(09:00)	PM PEAK (17:00-18:00)		
		QUEUE	RFC	JUNCTION DELAY (s)	QUEUE	RFC	JUNCTION DELAY (s)
	Howes Lane (Left Turn)	29.9	1.17		112.1	1.29	
BTM Base 2026	Howes Lane (Right Turn)	6.3	999,999	490.10	0.1	0.08	200.45
	Bucknell Road N (Right Turn)	193.0	1.40		6.3	0.76	



SCENARIO	ARM	AM PEAK (08:00-09:00)			PM PEAK (17:00-18:00)		
		QUEUE	RFC	JUNCTION DELAY (s)	QUEUE	RFC	JUNCTION DELAY (s)
BTM Base	Howes Lane (Left Turn)	70.6	1.26	 375,579 	194.8	1.44	_
2026 + Proposed Development	Howes Lane (Right Turn)	12.6	999,999		0.1	0.08	346.12
	Bucknell Road N (Right Turn)	340.9	1.62		6.6	0.76	

2.2.2 It is noted that the junction modelling suggests that the junction will operate significantly over capacity in the BTM Base 2026 future scenario, even without any traffic associated with the Proposed Development. The results show significant levels of junction delay and an RFC well above the theoretical maximum capacity of 1.0 in the AM peak. In the PM peak, the left turn from Howes Lane experiences a queue of 112 PCUs and an RFC of 1.29. It must be acknowledged that based on the results presented in **Table 2-1**, the existing priority junction arrangement will fail in the near future (certainly earlier than 2026) if no mitigation is proposed to alleviate the level of traffic growth that is expected on the local highway network, even without any further development.

- 2.2.3 The junction performance deteriorates further with the addition of traffic flows associated with the Proposed Development, although it is noted that the junction is already well over capacity in the BTM Base 2026 scenario.
- 2.2.4 As the traffic flows within the BTM 2026 Reference Case scenario are considered to be predicted flows, which have not been derived from observed traffic surveys, it is not possible to calibrate the junction with the BTM flows to ensure that the model is appropriately reflecting the real-life performance of the junction.
- 2.2.5 In order to provide a comparison to the BTM data and modelling above, the observed traffic flows obtained by VTP for the period during the week commencing the 31st of January 2022 will be used as a benchmark to present and compare against the current conditions at the junction.

2.3 OBSERVED TRAFFIC DATA

- **2.3.1** A series of traffic surveys were undertaken during the week commencing the 31st of January 2022. The timings for the surveys were agreed as acceptable with OCC prior to the surveys being undertaken.
- 2.3.2 The surveys incorporated manual classified counts (MCC) at the existing A4095 Howes Lane / Bucknell Road junction, which also included queue length surveys and video data. The MCC, queue length, and video data also included the A4095 Lords Lane / Bucknell Road roundabout, located to the immediate north of the existing priority junction and just to the north of the railway bridge that crosses the link between the two junctions.
- 2.3.3 In addition to this, an automatic traffic counter (ATC) was placed on the A4095 Howes Lane approximately 190m to the west of the A4095 Howes Lane / Bucknell Road junction for the period of one week to capture both vehicle speeds and total vehicle flows.
- 2.3.4 Further video cameras were placed around the existing junction to capture the length of any existing vehicle queues along the A4095 both to the east and west of the A4095 Howes Lane / Bucknell Road junction, capturing the potential for any queues that may be blocking the A4095 Howes Lane / Shakespeare Drive



signal junction and the A4095 Lords Lane / Trefoil Drive priority junction.

- 2.3.5 For completeness, traffic flow diagrams for the Observed 2022 data are included at **ATTACHMENT C**.
- 2.3.6 A copy of the full traffic survey data is included at **ATTACHMENT D**, with the video evidence available upon request.

2.4 TRAFFIC SURVEY OBSERVATIONS

2.4.1 The following key observations were made through reviewing the observed traffic survey data and the videos.

DOMINANT FLOWS

- 2.4.2 The dominant flow at the junction was observed to be vehicles turning right from Bucknell Road (north) into the A4095 Howes Lane in the AM peak hour and vehicles turning left from the A4095 Howes Lane into Bucknell Road (north) in the PM peak hour, with these movements equating to 75% of the total flow at this junction.
- 2.4.3 The overall junction peak was identified as being 08:00-09:00 for the AM peak and 17:00-18:00 for the PM peak.

BUCKNELL ROAD

- 2.4.4 It was observed that the right turn movement from Bucknell Road (north) onto the A4095 Howes Lane was almost always queueing. However, the queues generally dissipated quickly and formed 'slither' queues, where vehicles slowly rolled whilst waiting for a gap to turn onto the A4095 Howes Lane.
- 2.4.5 During the morning peak hours, it was observed that vehicles queue back through the A4095 Lords Lane / Bucknell Road roundabout and this queue extended beyond the junction of the A4095 Lords Lane / Trefoil Drive junction, with a peak queue of 12 vehicles counted east of the A4095 Lords Lane / Trefoil Drive junction between 08:25 to 08:35. This would equate to a queue of approximately 300m (or 53 PCUs, assuming one car is 5.75m in length) at the A4095 Howes Lane / Bucknell Road priority junction for vehicles waiting to turn right onto the A4095 Howes Lane.

A4095 HOWES LANE

- 2.4.6 Similarly, there was typically always a queue observed along the A4095 Howes Lane left turn lane, although again, this formed a 'slither' queue rather than the vehicles being left stationary. The maximum observed queue was a total of 24 vehicles or approximately 135m from the junction.
- 2.4.7 At no point did the queues block past the A4095 Howes Lane / Shakespeare Drive signal junction.

DRIVER POSITION

2.4.8 With respect to driver position, it is noted that most vehicles turning right from Bucknell Road (north) onto the A4095 Howes Lane significantly overrun the centre line into the right turn lane on the A4095 Howes Lane. This causes conflict for any large vehicles turning right from Bucknell Road if a vehicle is waiting to turn right from the A4095 Howes Lane, to travel south along Bucknell Road (south).

HEAVY GOODS VEHICLES

2.4.9 In relation to Heavy Goods Vehicles (HGV), Figure 2-1 presents a snapshot from the morning peak hour and



shows a large HGV turning left onto Bucknell Road (north) from the A4095 Howes Lane, which swings over the opposing side of the carriageway and causes the oncoming vehicle travelling southbound on Bucknell Road to give way.

2.4.10 When two HGVs attempt to pass, this is only possible where a vehicle is not waiting in the right turn lane on the A4095 Howes Lane. This movement also requires the two HGVs to give way to each other. The HGV turning left from the A4095 Howes Lane again swings over into the southbound lane of Bucknell Road, causing the vehicles to give way, as shown on the extract from the morning peak hour in **Figure 2-2**.



Figure 2-1: HGV turning left from A4095 Howes Lane

Figure 2-2: HGVs attempting to pass simultaneously at junction



PEDESTRIANS AND CYCLISTS

2.4.11

Very few pedestrians were observed using the junction, with less than 10 pedestrians observed across each peak hour. It is noted that no pedestrians were observed crossing the junction from the east of Bucknell

Velocity Transport Planning Limited Project No 4600 / 1100 Doc No TN006 v0.1



Road to the west, with all of the demand identified along Bucknell Road in a north-south direction. It was observed that the majority of pedestrians travel southbound in the AM peak and northbound in the PM peak. It is acknowledged that a Bridleway (129/9/10) is provided to the north of the A4095 Howes Lane

2.4.12 With respect to cyclists, there were few very observed using the junction. A total of 3 cyclists were recorded using the junction across both the AM and PM peak hours. Across the duration of the survey, a total of 35 two-way cyclist trips were recorded.

2.5 JUNCTION MODELLING

2.5.1 Whilst it is acknowledged that OCC specifically requested an assessment of the BTM 2026 Reference Case scenario, a capacity assessment of the observed 2022 flows using Junctions 10 is provided within Table 2-2. Aside from the use of the observed 2022 traffic flows, the methodology is otherwise as presented within Section 2.1 of this TN.

SCENARIO	ARM	АМ РЕАК (08:00-09:00)			PM PEAK (17:00-18:00)			
		QUEUE	RFC	JUNCTION DELAY (s)	QUEUE	RFC	JUNCTION DELAY (s)	
	Howes Lane (Left Turn)	8.5	0.93		4.1	0.80		
Observed 2022	Howes Lane (Right Turn)	1.4	0.62	412.85	0.1	0.08	11.02	
	Bucknell Road N (Right Turn)	165.0	1.33		0.6	0.29		

Table 2-2: A4095 Howes Lane / Bucknell Road - Existing Junction Operation (Observed 2022 Flows)

2.5.2 The modelling assessment of the observed flows suggests the junction operates above capacity in the AM peak, with the RFC on Bucknell Road (north) exceeding 1.0 and the A4095 Howes Lane approach nearing full capacity. In the PM, the junction operates with some spare capacity, with only the A4095 Howes Lane (Left Turn) movement close to capacity with an RFC of 0.80.

CALIBRATION AND COMPARISON

- 2.5.3 It is noted that due to the limitations within the PICADY module of Junctions 10, it is not possible to calibrate the model precisely using queues or adjustments. However, it is acknowledged that the Observed 2022 model in the AM peak does capture significant queuing on Bucknell Road (north) with vehicles waiting to turn right, which was observed within the video data. However, the queue as modelled (165 PCUs) significantly exceeds the queue that was observed (53 PCUs) in the surveys.
- 2.5.4 In comparison to the BTM Base 2026 assessment presented within **Table 2-1**, the results of the observed modelling generally align and are consistent with what the BTM data would suggest. Across each of the arms and both peak hours, the RFCs and queues increase proportionally in the BTM Base 2026 scenario as would be expected to reflect the increase in traffic flows associated with additional development and background strategic growth.
- 2.5.5 On that basis, it is considered that the junction models are appropriately representing the current observed conditions at the junction (as far as is practicably possible within limitations of the software) and that the results of the BTM 2026 Reference Case scenarios are appropriate to compare to any proposed mitigation scheme.



3 PROPOSED MITIGATION STRATEGY

3.1 MITIGATION SCHEME

- **3.1.1** To mitigate the impact of the traffic associated with heb 530 dwellings of the Proposed Development at the junction and improve the operation of the existing A4095 Howes Lane / Bucknell Road priority junction, a mitigation scheme in the form of a proposed mini-roundabout arrangement has been developed.
- **3.1.2** The proposed mini-roundabout design has been developed in accordance with the requirements of the Design Manual for Roads and Bridges (DMRB) CD 116 Revision 2 'Geometric Design of Roundabouts'.
- **3.1.3** A plan showing the proposed arrangement of the mini-roundabout is included at **ATTACHMENT E**, and an extract of the General Arrangement is presented below in **Figure 3-1**.

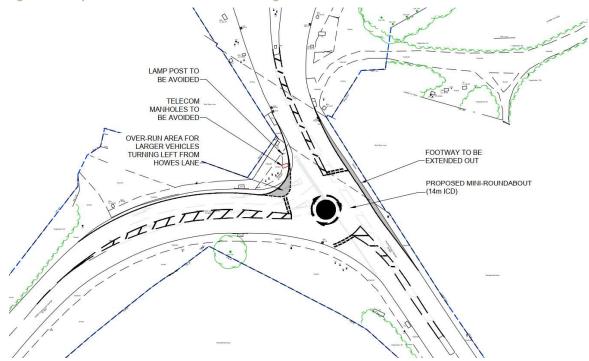


Figure 3-1: Proposed Mini-roundabout General Arrangement

3.1.4 The proposed plans at **ATTACHMENT E** also include a design review of the proposed mini-roundabout arrangement with respect to the Stopping Sight Distance (SSD) and Visibility parameters as set out within DMRB, as well as swept path analysis.

3.2 DEPARTURES FROM STANDARDS

3.2.1 The desirable minimum SSD for roads with a design speed of 50kph (30mph), which both the A4095 Howes Lane and Bucknell Road are identified as, should be 70m (Table 2.10 of CD 109). Whilst the SSD for both the A4095 Howes Lane and the Bucknell Road northbound approaches can be achieved, the SSD for the southbound approach is identified as being in the order of 37m. This is less than "one step below desirable minimum" for a 30mph road, but it must be acknowledged that with the introduction of the give way line for the proposed mini-roundabout, vehicle speeds approaching from the north will be considerably lower than the design speed of 30mph.



- 3.2.2 It is also noted that due to the dominance of flows for vehicles turning right from Bucknell Road (north) onto the A4095 Howes Lane, this movement was observed to be queueing during the video surveys, again strengthening the case that vehicles are not approaching speeds of 30mph at present.
- 3.2.3 The visibility splay from the southbound Bucknell Road give way line at the proposed mini-roundabout junction identifies an 'F' distance of less than the recommended 9.0m (paragraph 5.24 of CD 116). Whilst an 'F' distance of 4.5m is achievable in accordance with CD 116, the projected flows on the southbound arm of Bucknell Road (north) exceed the suggested threshold of 300 vehicles per hour.
- **3.2.4** To compensate for the shortfall in the 'F' distance, appropriate signage will be implemented in accordance with the Traffic Signs Regulations and General Directions (TSRGD) to ensure drivers can see approaching vehicles without encroaching past the give way line.

3.3 ROAD SAFETY

- In terms of road safety, it is noted that the collision data purchased from OCC for the latest five-year period (01/01/2016 31/12/2021) suggests that there were no recorded collisions at the junction with the existing layout. For completeness, a copy of the collision data is included at ATTACHMENT F.
- **3.3.2** With respect to the road safety implications of the proposed mini-roundabout scheme, it is acknowledged that the Department for Transport (DfT) 'Mini-roundabouts: Good Practice Guidance' (2011) document states within paragraph 2.5:

"Mini-roundabouts are most commonly introduced as an accident remedial measure:

- to reduce the number of accidents at a junction. For 3-arm sites, the mean accident rate for mini-roundabouts is similar to that of priority T-junctions and about 30% less than for signalled junctions.
- to reduce the severity of accidents at a junction. The severity of accidents (percentage of fatal and serious accidents to all injury accidents) at 3-arm mini-roundabout sites is lower than at 3-arm signalled junctions and considerably lower than at 30 mph T-junctions."
- **3.3.3** The DfT extract suggests that in road safety and collision terms, the proposed mini-roundabout arrangement would be comparable in terms of the number of accidents to the existing priority junction arrangement and would result in fewer accidents than a traffic signal arrangement.
- 3.3.4 In addition, the DfT extract suggests that the proposed mini-roundabout arrangement would reduce the severity of any accidents that do occur from both the existing priority arrangement and any potential traffic signal junction scheme.
- **3.3.5** It can therefore be regarded that the proposed mitigation scheme in the form of a mini-roundabout junction provides a road safety improvement from the existing priority junction arrangement.

ROAD SAFETY AUDIT

- 3.3.6 In order to ensure that the proposed mini-roundabout scheme is appropriate in terms of road safety, a Stage
 1 Road Safety Audit (RSA) has been undertaken by an independent auditor and in accordance with GG119 requirements.
- 3.3.7 An associated Designer's Response has been prepared, which responds to the comments raised within the Stage 1 RSA. For completeness, a copy of the Stage 1 RSA and accompanying Designer's Response is included



at ATTACHMENT G.

- 3.3.8 In summary, the majority of the points raised within the Stage 1 RSA will be addressed at the Detailed Design stage, subject to the proposals being considered acceptable. It is noted that concerns were raised within the Stage 1 RSA regarding the existing pedestrian provision and crossing visibility on Bucknell Road (north), although it is noted that this is an existing constraint and improvements to this issue could be incorporated at the Detailed Design stage of the proposal.
- 3.3.9 In parallel to the Stage 1 RSA being produced, the approach lane width on the A4095 Howes Lane arm was reduced to ensure that it is treated as a single lane approach by traffic rather than a two-lane approach. However, this change is not considered material to the comments received within the Stage 1 RSA or the Designer's Response.
- 3.3.10 In addition to the Stage 1 RSA of the proposed mini-roundabout arrangement, an additional road safety audit was undertaken regarding the principle of converting the existing priority junction. This additional road safety audit is also provided at **ATTACHMENT H**.
- 3.3.11 In conclusion, the auditor stated the following within paragraphs 4.2.4 to 4.2.5:

"With the absence of strong evidence to rule out the conversion of the junction to a miniroundabout, there are some benefits in such a conversion, and these are associated with traffic capacity improvements and introducing priority for right turning movements from Bucknell Road, which would assist in capacity improvement and play a part in reducing potential junction blocking at the Lords Lane roundabout, which would in turn reduce the likelihood of collisions associated with such junction blocking.

Overall, the conversion of the existing T-junction would provide positive impacts in terms of traffic capacity, to enable a level of residential development to be implemented. Any adverse effects that may be associated with such a conversion are questionable and appear to be able to be mitigated by a 'best practice' design of the three armed mini-roundabout."

3.4 VULNERABLE ROAD USERS

- 3.4.1 With respect to pedestrians, it is acknowledged that there is little existing demand, with less than 10 pedestrians observed across each peak hour. The vast majority of the pedestrian demand was along the eastern footway of Bucknell Road. No pedestrians were observed crossing Bucknell Road (under the railway bridge) or at any of the arms at the junction.
- 3.4.2 Nevertheless, the proposals seek to improve pedestrian provision at the junction by increasing the width of the footway along the eastern side of Bucknell Road. This provides an improvement along the link with the greatest level of pedestrian demand.
- 3.4.3 In addition, for any pedestrians that may wish to cross the A4095 Howes Lane at the existing uncontrolled crossing, which is located approximately 15m to the west of the existing give way line, the proposals reduce the number of lanes that pedestrians would need to cross from three to two, meaning pedestrians have more opportunities to cross the road and less lanes of traffic to negotiate. This is arguably an improvement in safety terms for pedestrians.
- 3.4.4 In relation to cyclists and mini-roundabouts, paragraphs 10.7.33 to 10.7.35 of Local Transport Note (LTN) 1/20 states:



"Mini-roundabouts can work well for cycling in a mixed traffic environment (see Section 4.2) when traffic speeds and volumes are low and can provide an alternative to priority junctions since traffic on all arms is required to give way

...They should be designed to reduce speeds at the junction using tight geometry, with single lane approaches and exits so that cyclists and motor vehicles pass through the roundabout in a single stream (see Figure 10.46). To be comfortable for cycling, the inscribed circle diameter should not be greater than 15.0m"

- **3.4.5** Whilst it is acknowledged that the traffic volumes through the junction are considered to be high, in response to the suggestion of LTN 1/20, the proposed mini-roundabout arrangement has single lane approaches on all arms, and the ICD is less than 15m.
- **3.4.6** It is therefore considered that the proposed mitigation scheme thereby provides an improvement for both pedestrians and cyclists from the existing arrangement.

3.5 **OPERATIONAL FLOWS**

- 3.5.1 It is noted that at present, two HGVs cannot pass simultaneously and any HGV turning left from the A4095 Howes Lane onto Bucknell Road (north) swings over the centreline into the opposing southbound lane of Bucknell Road (north), causing the southbound vehicle to give way to the HGV.
- 3.5.2 The proposed mitigation scheme seeks to revise the north western kerb line of the junction and provide an increased entry radius for vehicles turning left from the A4095 Howes Lane onto Bucknell Road (north). It is anticipated that this area will be hatched and identified as a vehicle overrun area to reduce maintenance.
- 3.5.3 With respect to HGVs, swept path analysis has been undertaken of the proposed mitigation scheme showing that vehicles up to a 16.5m max articulated vehicle can now pass through the junction without the need to cross over the reconfigured central hatched area of Bucknell Road (north) and into the lane of oncoming traffic. It is noted that this is not possible at present without significant incursion into the opposing lane.
- 3.5.4 In addition, two 12m rigid vehicles can now pass simultaneously through the junction, as well as other HGVs and a car. An extract of this movement is included in Figure 3-2, and a full copy is provided at ATTACHMENT E.
- **3.5.5** The proposed mitigation scheme, therefore, provides operational improvements from the existing arrangement by allowing easier movement of vehicles, particularly HGVs, through the junction without incursion into the opposing lanes.



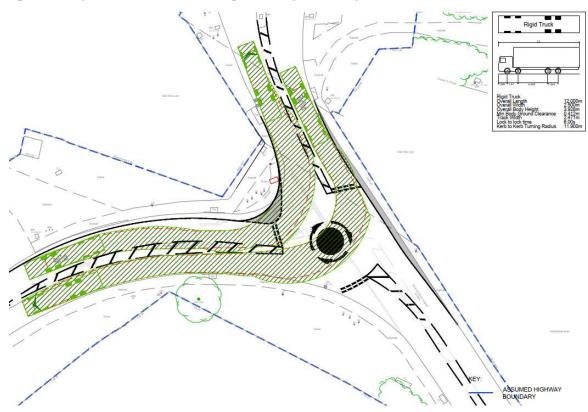


Figure 3-2: Proposed Mini-roundabout Arrangement Swept Path Analysis

3.6 JUNCTION CAPACITY

- 3.6.1 An assessment of the proposed mitigation scheme using the BTM 2026 Reference Case flows is provided in Table 3-1.
- 3.6.2 The junction modelling parameters for the proposed mini-roundabout arrangement are provided within ATTACHMENT I, with a copy of the Junctions 10 output files included at ATTACHMENT J.
- **3.6.3** Aside from the junction geometry, the methodology is otherwise as per the methodology discussed within Section 2.1 of this TN.

SCENARIO	ARM	АМ РЕАК (08:00-09:00)			PM PEAK (17:00-18:00)			
		QUEUE	RFC	JUNCTION DELAY (s)	QUEUE	RFC	JUNCTION DELAY (s)	
	Bucknell Road (south)	4.5	0.82		1.9	0.64	_	
BTM Base 2026	A4095 Howes Lane	3.5	0.77	132	55.8	1.12	350	
	Bucknell Road (North)	68.1	1.13		153.8	1.27		
BTM Base 2026 + Proposed Development	Bucknell Road (south)	5	0.84	- 200	1.9	0.63	- 527	
	A4095 Howes Lane	4.9	0.83	- 309 -	105.7	1.25	- 527	

Table 3-1: A4095 Howes Lane / Bucknell Road - Proposed Mitigation Scheme (BTM Flows)

Velocity Transport Planning Limited Project No 4600 / 1100 Doc No TN006 v0.1



SCENARIO	ARM	АМ	PEAK (08:00-	09:00)	PM PEAK (17:00-18:00)		
		QUEUE	RFC	JUNCTION DELAY (s)	QUEUE	RFC	JUNCTION DELAY (s)
	Bucknell Road (North)	149.5	1.27		208.4	1.34	

- 3.6.4 The results of the junction modelling for the proposed mitigation scheme suggests that in the AM peak, the Bucknell Road (north) approach will have an RFC of 1.13, which rises to an RFC of 1.27 with the addition of the traffic associated with the Proposed Development. The total delay at the junction increases from 132 seconds in the BTM Base 2026 scenario to 309 seconds with the addition of the traffic associated with the Proposed Development.
- 3.6.5 In the PM peak, the RFC on both the A4095 Howes Lane and Bucknell Road (north) approaches both exceed an RFC of 1.0, with a respective RFC of 1.12 and 1.27 in the BTM Base 2026 scenario. With the addition of the traffic associated with the Proposed Development, this increases to an RFC of 1.25 and 1.34, respectively. The total delay at the junction increases from 350 seconds to 527 seconds with the addition of the traffic associated with the Proposed Development.

3.7 MODELLING INTERPRETATION

3.7.1 A comparison of the junction modelling undertaken using the BTM 2026 Reference Case flows with both the existing priority junction arrangement and the proposed mitigation scheme in the form of a mini-roundabout, is discussed below.

AM PEAK HOUR

- 3.7.2 In the BTM Base 2026 scenario for the existing priority junction arrangement, a queue on the A4095 Howes Lane reaches a maximum of 30 PCUs (approximately 172.5m) and an RFC of 1.32 (excluding Howes Lane right turn). The queue on Bucknell Road is estimated to reach 193 PCUs (approximately 1,109.75m) with an RFC of 1.40. In terms of total delay, the modelling suggests a delay of 490 seconds across the junction, suggesting drivers would experience significant levels of delay.
- 3.7.3 With the proposed mini-roundabout mitigation scheme in the BTM Base 2026 + Proposed Development scenario, the queue on the A4095 Howes Lane reduces to approximately 5 PCUs (approximately 28.75m) with an RFC of 0.83. On Bucknell Road, the queue reduces to 150 PCUs (approximately 862.5m) with an RFC of 1.27. In terms of total delay, this would reduce to 309 seconds.
- 3.7.4 In summary, across the AM peak hour, the results of the junction modelling suggest that the proposed mitigation scheme achieves a nil detriment position, mitigating both the impact of the Proposed Development and providing a significant improvement from the BTM Base 2026 Scenario when considered in the context of the existing priority junction.

PM PEAK HOUR

3.7.5 In the BTM Base 2026 scenario for the existing priority junction arrangement, a queue on the A4095 Howes Lane reaches a maximum of 112 PCUs (approximately 644m) an RFC of 1.29. There is estimated to be a queue of 6 PCUs (approximately 34.5m) on Bucknell Road, with an RFC of 0.83. Across the junction, there will be a total delay of 200 seconds.



- **3.7.6** In the BTM Base 2026 + Proposed Development scenario for the existing junction arrangement, there is a queue of 195 vehicles (approximately 1,121.25m) on the A4095 Howes Lane, with an RFC of 1.44. The total junction delay reaches 346 seconds.
- 3.7.7 With the proposed mini-roundabout mitigation scheme in the BTM Base 2026 + Proposed Development scenario, the queues on the A4095 Howes Lane reduce to 105 PCUs (approximately 603.75m), with an RFC of 1.25. It is noted that the mitigation scheme results in an increase on Bucknell Road, with a queue of 208 PCUs (approximately 1,196.0m) and an RFC of 1.34.
- **3.7.8** Whilst the proposed mitigation scheme does not deliver a true nil detriment position in the PM peak, it does provide a significant improvement in the queueing along the A4095 Howes Lane, reducing the queue by approximately 90 PCUs (approximately 517.5m).
- **3.7.9** It is considered that this provides a significant improvement in the PM as it reduces the impact of queueing on the A4095 Howes Lane and reduces the likelihood of any queueing back through the A4095 / Shakespeare Drive signal junction, which could otherwise lead to potential road safety concerns.

SEVERITY THRESHOLDS

- 3.7.10 Specific reference is made to the severity thresholds referred to in the 2014 memorandum produced by Hyder Consulting in relation to the planning application for 'Application 1' (Planning Ref 14/01384/OUT). Within the memorandum, OCC identified the "severe" trigger point as the point where vehicles would queue back and block the A4095 / Shakespeare Drive Signal junction.
- 3.7.11 It is acknowledged that queues could impact the A4095 / Bucknell Road roundabout, with the historic assessments undertaken regarding a 10-vehicle queue on Bucknell Road as the maximum acceptable queue, which may partially queue into and through the existing roundabout junction of the A4095 Lords Lane / Bucknell Road.
- 3.7.12 It is also noted that across the modelling undertaken for both the existing arrangement and the proposed mitigation scheme, the queues on Bucknell Road typically exceed 10-vehicles in most scenarios assessed. In addition, this is occurring at present and was observed within the traffic surveys, with queues observed past the junction of the A4095 Lords Lane / Trefoil Drive in the AM peak, which is identified as being approximately 145m from the junction with the A4095 Howes Lane, or approximately 25-vehicles.
- 3.7.13 However, given the nature of roundabouts and the observed existing junction operation, it is considered that these queues form 'sliver queues' and still allow traffic to move slowly through the junction. It is regarded that queues at this junction would therefore not present as much of a safety concern as any queues at the A4095 / Shakespeare Drive signal junction, as drivers would just wait to give way.
- **3.7.14** From a review of the geometry along the A4095 Howes Lane, it is considered that the key tipping point is reached when the queue exceeds 390m or is the equivalent to a queue of 65 PCUs, which would cause vehicles to block back and queue through the A4095 / Shakespeare Drive signal junction.
- 3.7.15 In relation to the existing arrangement, the queues on the A4095 Howes Lane exceed 65 PCUs in the BTM Base 2026 PM peak. Whilst this was not observed to be taking place at present, it is likely this could occur with the predicted additional traffic growth.
- 3.7.16 However, with the implementation of the proposed mitigation scheme, the queueing on the A4095 Howes Lane only exceeds 65 PCUs in the PM peak of the BTM Base 2026 + Proposed Development scenario. Nonetheless, this still presents a reduction of 90 PCUs from the BTM Base 2026 Scenario with the existing



arrangement in the PM peak, which would take place regardless of the Proposed Development coming forward or any mitigation being delivered.

3.7.17 On that basis, it is considered that the proposed interim improvement scheme in the form of a miniroundabout associated with the Proposed Development provides a material improvement on the A4095 Howes Lane using the severity thresholds previously identified by OCC.

3.8 DELIVERY

3.8.1 Subject to a successful planning consent being granted, the Applicant would commit to funding the delivery of the proposed interim improvement mitigation scheme by way of a Section 278 agreement, which would enable the Proposed Development to come forward with no restrictions on the number of units that could be delivered prior to the A4095 Strategic Highway Improvements being implemented.



4 CONCLUSIONS

4.1 OVERVIEW

- 4.1.1 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.
- 4.1.2 Following submission of the planning application, consultation responses were received from OCC and CDC, which resulted in further assessment of the A4095 Howes Lane / Bucknell Road junction.
- 4.1.3 In addition to the feedback received from OCC, it is also now understood that the funding and timescales for the delivery of the permitted A4095 Strategic Highway Improvements (Planning Ref 14/01968/F) are uncertain.
- 4.1.4 The purpose of this Technical Note is to identify the current and predicted operation of the existing priority junction arrangement of the A4095 Howes Lane / Bucknell Road junction, compared with the predicted operation of a proposed interim improvement to this junction in the form of a mini-roundabout that could be delivered by The Applicant prior to the implementation of the A4095 Strategic Highway Improvement.
- 4.1.5 The junction modelling was undertaken using the latest version of the BTM 2026 Reference Case traffic flows that were provided by OCC.

4.2 EXISTING JUNCTION

- 4.2.1 The modelling for the existing priority junction arrangement suggests that the junction will operate significantly over capacity in the BTM Base 2026 future scenario, with significant levels of junction delay and an RFC well above the theoretical maximum capacity of 1.0 in the AM peak. In the PM peak, the left turn from Howes Lane experiences a queue of 112 PCUs and an RFC of 1.29.
- 4.2.2 The junction performance deteriorates further with the addition of the traffic associated with the Proposed Development, although it is noted that the junction is already well over capacity in the BTM Base 2026 scenario.
- 4.2.3 As an exercise to determine whether the BTM 2026 Reference Case flows were reasonable, traffic surveys were undertaken during the week commencing the 31st of January 2022.
- 4.2.4 A series of key observations from the surveys were made at the existing junction, including:
 - The dominant flows at the junction are vehicles turning right from Bucknell Road (north) into the A4095 Howes Lane and vehicles turning left onto Bucknell Road (north) from the A4095 Howes Lane, with these movements equating to 75% of the total flow at this junction;
 - Most vehicles turning right from Bucknell Road (north) into the A4095 Howes Lane significantly overrun the centre line of the right turn lane on the A4095 Howes Lane. This causes conflict for any large vehicles turning right from Bucknell Road (north) if a vehicle is waiting to turn right from the A4095 Howes Lane to travel south along Bucknell Road (south);
 - HGVs turning left from the A4095 Howes Lane swing over the central hatching of Bucknell Road (north) into the opposing side of the carriageway and require southbound vehicles to give way;



- Vehicles turning right from Bucknell Road (north) onto the A4095 Howes Lane were observed to queue through the A4095 Lords Lane / Bucknell Road roundabout and queue back past the junction of the A4095 Lords Lane / Trefoil Drive in some instances;
- Queues were observed on the A4095 Howes Lane approach throughout the survey, with the vast majority of vehicles waiting to turn left onto Bucknell Road (north). However, the observed queues did not extend back as far as the junction of the A4095 Howes Lane / Shakespeare Drive signal junction; and
- Pedestrian and cyclist demand through the junction was very low, with no pedestrians observed crossing the junction at all over the survey period.
- 4.2.5 Using the observed flows from 2022, the existing junction arrangement was again modelled to ensure that the future BTM Base 2026 future scenario flows were reasonable in relation to what is taking place at present.
- 4.2.6 In summary, it is considered that the junction models are appropriately representing the current observed conditions at the junction (as far as is practicably possible within the limitations of the software) and that the results of the BTM 2026 Reference Case scenarios are appropriate to compare to any proposed mitigation scheme.

4.3 PROPOSED MITIGATION SCHEME

- 4.3.1 To mitigate the impact of the traffic associated with the Proposed Development at the junction and improve the operation of the existing A4095 Howes Lane / Bucknell Road priority junction, an interim mitigation scheme in the form of a proposed mini-roundabout arrangement has been developed.
- 4.3.2 The proposed mini-roundabout scheme has been designed in accordance with the requirements of the Design Manual for Roads and Bridges (DMRB) CD 116 Revision 2 'Geometric Design of Roundabouts'
- **4.3.3** The general arrangement of the proposed mini-roundabout is presented on the VTP drawing included at **ATTACHMENT E** and offers the following improvements from the existing priority junction arrangement:
 - Improved provision for pedestrians, cyclists and other road users by reducing speeds and the number of lanes of traffic that need to be crossed;
 - Improvements of the operational flows of HGVs, with two HGVs now able to pass simultaneously, as well as the reinforcement of appropriate driver position;
 - Improvements in road safety, with research suggesting mini-roundabouts reduce the severity of collisions when compared to priority junctions; and
 - Improvements in junction capacity, with the proposed mitigation scheme providing a nil detriment position in the AM peak and improving overall junction performance, whilst significantly reducing the queues on the A4095 Howes Lane in the PM peak.
- 4.3.4 Crucially, the proposed mitigation scheme reduces queueing back on the A4095 Howes Lane back through the A4095 Howes Lane / Shakespeare Drive signal junction, which is predicted to happen in the BTM Base 2026 year PM peak irrespective of whether the Proposed Development comes forward or not.
- 4.3.5 A Stage 1 Road Safety Audit and accompanying Designer's Response is included at **ATTACHMENT G**. In addition, the independent auditor has provided a Road Safety Assessment that compares the existing priority junction arrangement with the proposed mini-roundabout junction arrangement, which concludes



that the conversion of the existing priority junction to the proposed mini-roundabout junction would be positive.

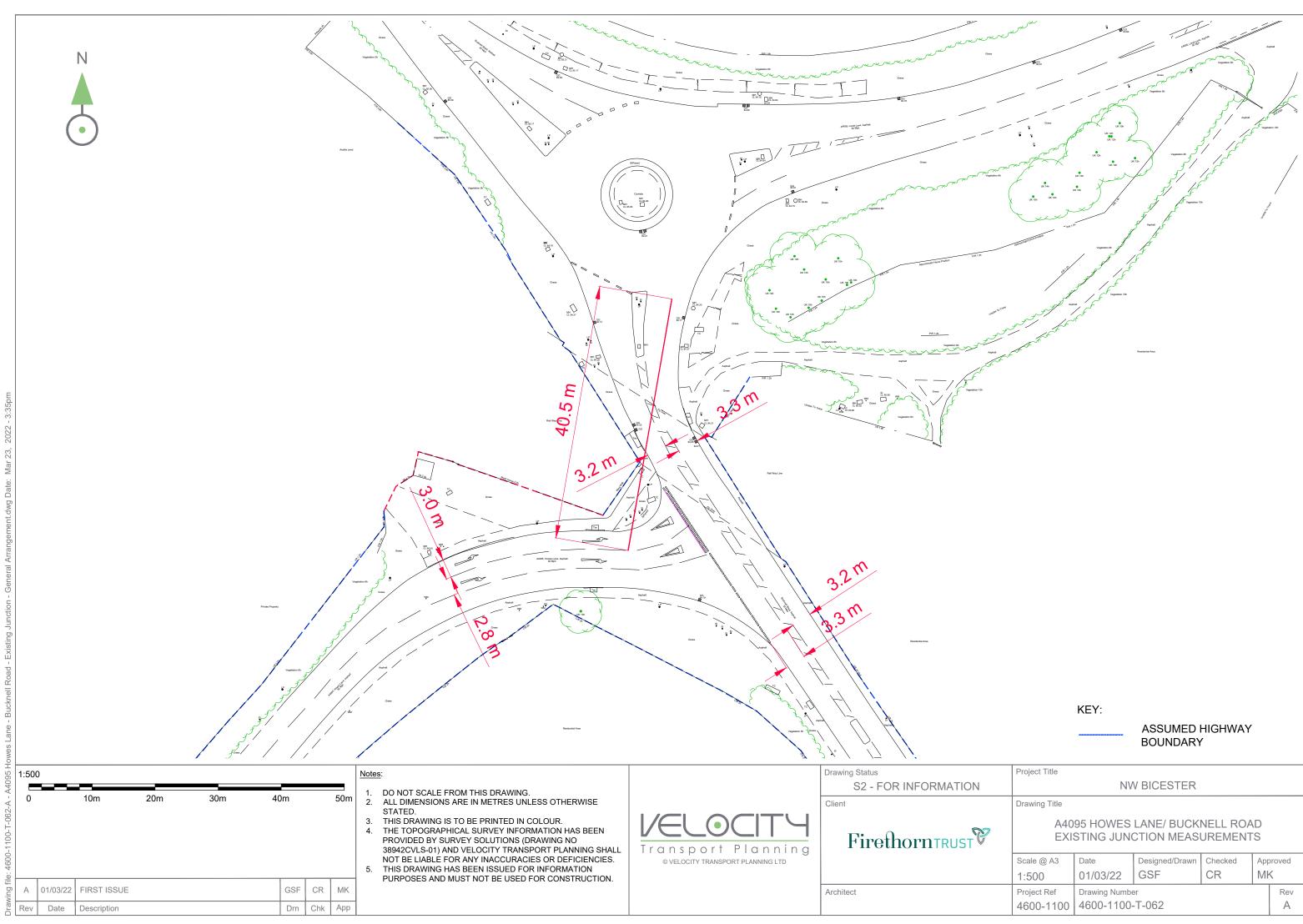
4.4 SUMMARY AND CONCLUSIONS

- 4.4.1 It is generally accepted that the committed A4095 Strategic Highway Improvements are 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 included within the adopted CDC Local Plan.
- 4.4.2 However, the proposed mini-roundabout mitigation scheme seeks to provide an interim mitigation solution that will accommodate the full level of development associated with the 530 dwellings prior to the implementation of the A4095 Strategic Highway Improvements.
- 4.4.3 In conclusion, the proposed mitigation scheme and mini-roundabout arrangement provide a significant improvement from the existing arrangement, mitigating both the impact of the Proposed Development and improving the junction in a number of ways, including traffic capacity, road safety, access for HGVs and pedestrian and cyclist amenity.



ATTACHMENT A

EXISTING PRIORITY JUNCTION PARAMETERS



ш

Project Title									
	NW BICESTER								
Drawing Title									
A4095 HOWES LANE/ BUCKNELL ROAD EXISTING JUNCTION MEASUREMENTS									
Scale @ A3	Date	Designed/Drawn	Checked	Арр	proved				
1:500	01/03/22	GSF	CR	Mł	<				
Project Ref 4600-1100	Drawing Number 4600-1100-T-062								

ATTACHMENT B

EXISTING PRIORITY JUNCTION – JUNCTIONS 10 OUTPUT FILES

Junctions 10						
PICADY 10 - Priority Intersection Module						
Version: 10.0.3.1598 © Copyright TRL Software Limited, 2021						
	For sales and distribution information, program advice and maintenance, contact TRL Software: +44 (0)1344 379777 software@trl.co.uk trlsoftware.com					
The	The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution					

Filename: 2022.03.14 - NW BICESTER - HOWES LANE (Existing).j10 Path: P:\Firethorn Trust_4600\1100 - NW Bicester\Analysis\Modelling\Picady\BTM 2026 FLOWS Report generation date: 23/03/2022 16:09:06

»BTM Base 2026, AM

»BTM Base 2026, PM »BTM 2026 + Proposed Dev, AM »BTM 2026 + Proposed Dev, PM »OBS 2022, AM »OBS 2022, PM

Summary of junction performance

			A	M					PM			
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)
						BTM Base 20	26					
Stream B-C		29.9	199.32	1.17	F			112.1	600.80	1.29	F	
Stream B-A	D1	6.3	2239.45	9999999999.00	F	490.10	D2	0.1	22.86	0.08	С	200.45
Stream C-AB	1	193.0	893.76	1.40	F			6.3	15.61	0.76	С	
		BTM 2026 + Proposed Dev										
Stream B-C		70.6	501.13	1.26	F			194.8	999.20	1.44	F	346.12
Stream B-A	D3	12.6	59999940.00	9999999999.00	F	375579.06	D4	0.1	24.40	0.08	С	
Stream C-AB		340.9	1621.48	1.62	F			6.6	15.02	0.76	С	
						OBS 2022						
Stream B-C		8.5	55.41	0.93	F			4.1	27.03	0.80	D	
Stream B-A	D5	1.4	217.34	0.62	F	412.85	D6	0.1	11.28	0.08	В	11.02
Stream C-AB	1	165.0	730.60	1.33	F			0.6	6.49	0.29	Α	i l

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.



File summary

File Descrip	tion
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		490.10	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	490.10	F

Arms

Arms

Arm	Name	Description	Arm type
Α	untitled		Major
в	untitled		Minor
с	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)	
С	6.40			250.0	~	1.00	
Geon	Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.						

Minor Arm Geometry

Arr	Minor arm type	Lane Width (Left) (m)	Lane Width (Right) (m)	Visibility to left (m)	Visibility to right (m)
в	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



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 (%)
Α		✓	470	100.000
в		✓	539	100.000
с		✓	915	100.000

Origin-Destination Data

Demand	(PCU/hr)

	То					
		Α	в	С		
_	Α	0	174	296		
From	в	13	0	526		
	С	180	735	0		

Veh	icle	Mix	
Heavy	Vehicl	le Percen	tages
		То	1

	То					
		Α	в	С		
_	Α	0	10	10		
From	в	10	0	10		
	С	10	10	0		

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.17	199.32	29.9	F
B-A	99999999999.00	2239.45	6.3	F
C-AB	1.40	893.76	193.0	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	396	694	0.571	390	1.4	12.828	В
B-A	10	289	0.034	10	0.0	14.180	В
C-AB	662	744	0.890	632	7.4	31.579	D
C-A	27			27			
A-B	131			131			
A-C	223			223			

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	473	674	0.701	469	2.4	18.879	С
B-A	12	218	0.054	12	0.1	19.222	С
C-AB	823	751	1.096	732	30.0	106.545	F
C-A	0			0			
ΑB	156			156			
AC	266			266			

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	579	638	0.907	560	7.1	43.036	E
B-A	14	102	0.140	14	0.2	44.610	E
C-AB	1007	718	1.402	717	102.6	344.260	F
C-A	0			0			
A-B	192			192			
A-C	326			326			

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	579	496	1.167	488	29.9	156.451	F
B-A	14	2	8.227	1	3.4	2239.448	F
C-AB	1007	718	1.402	718	174.9	690.814	F
C-A	0			0			
ΑB	192			192			
A-C	326			326			

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	473	513	0.922	506	21.5	199.317	F
B-A	12	0	9999999999.000	0	6.3	1448.059	F
C-AB	823	751	1.096	750	193.0	893.761	F
C-A	0			0			
A-B	156			156			
A-C	266			266			

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	396	525	0.755	466	4.1	84.937	F
B-A	10	22	0.455	18	4.2	1074.123	F
C-AB	662	744	0.890	747	171.6	892.302	F
C-A	27			27			
ΑB	131			131			
A-C	223			223			



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		200.45	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	200.45	F

Traffic Demand

Demand Set Details

П	D	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D	2	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 (%)
Α		~	504	100.000
в		✓	764	100.000
С		✓	1036	100.000

Origin-Destination Data

Demand (PCU/hr)

			0	
		A	в	С
From	Α	0	178	326
	в	13	0	751
	С	646	390	0



Heavy Vehicle Percentages

		То				
		A	в	С		
_	Α	0	10	10		
From	в	10	0	10		
	с	10	10	0		



Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.29	600.80	112.1	F
B-A	0.08	22.86	0.1	С
C-AB	0.76	15.61	6.3	С
C-A				
ΑB				
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	565	687	0.823	548	4.3	25.930	D
B-A	10	323	0.030	10	0.0	12.623	В
C-AB	412	863	0.477	407	1.4	8.631	A
C-A	368			368			
ΑB	134			134			
A-C	245			245			

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	675	668	1.011	633	14.9	71.691	F
B-A	12	267	0.044	12	0.0	15.483	С
C-AB	562	954	0.589	558	2.4	10.070	В
C-A	369			369			
ΑB	160			160			
A-C	293			293			

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	827	639	1.294	637	62.5	234.281	F
B-A	14	191	0.075	14	0.1	22.336	С
C-AB	848	1119	0.757	834	6.0	14.205	В
C-A	293			293			
ΑB	196			196			
A-C	359			359			

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	827	639	1.294	638	109.6	489.225	F
B-A	14	188	0.076	14	0.1	22.861	С
C-AB	848	1119	0.757	846	6.3	15.611	С
C-A	293			293			
A-B	196			196			
A-C	359			359			

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	675	668	1.011	665	112.1	600.801	F
B-A	12	262	0.045	12	0.1	15.841	С
C-AB	562	954	0.589	577	2.7	11.133	В
C-A	369			369			
ΑB	160			160			
A-C	293			293			

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	565	687	0.823	680	83.3	518.085	F
B-A	10	320	0.031	10	0.0	12.772	В
C-AB	412	863	0.477	417	1.5	9.037	A
C-A	368			368			
ΑB	134			134			
A-C	245			245			

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		375579.06	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	375579.06	F

Traffic Demand

Demand Set Details

10	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D	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 (%)	
Α		~	470	100.000	
в		✓	581	100.000	
с		√	1031	100.000	

Origin-Destination Data

Demand (PCU/hr)



Vehicle Mix

Heavy Vehicle Percentages





Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.26	501.13	70.6	F
B-A	99999999999.00	59999940.00	12.6	F
C-AB	1.62	1621.48	340.9	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	428	693	0.617	421	1.7	14.226	В
B-A	10	255	0.038	10	0.0	59999940.000	F
C-AB	776	753	1.030	704	18.1	59.066	F
C-A	0			0			
ΑB	131			131			
AC	223			223			

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	511	671	0.761	505	3.2	22.961	С
B-A	12	162	0.072	12	0.1	59999940.000	F
C-AB	927	731	1.268	727	68.0	228.615	F
C-A	0			0			
A-B	156			156			
A-C	266			266			

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	625	496	1.260	488	37.6	169.202	F
B-A	14	0	9999999999.000	0	3.7	59999940.000	F
C-AB	1135	699	1.623	699	177.1	640.395	F
C-A	0			0			
A-B	192			192			
A-C	326			326			

08:30 - 08:45

s	tream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
	B-C	625	496	1.260	495	70.0	402.286	F
	B-A	14	0	9999999999.000	0	7.2	59999940.000	F
	C-AB	1135	699	1.623	699	286.1	1200.002	F
	C-A	0			0			
	AВ	192			192			
	A-C	326			326			

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	511	513	0.996	508	70.6	501.128	F
B-A	12	0	9999999999.000	0	10.2	59999940.000	F
C-AB	927	731	1.268	731	335.1	1517.975	F
C-A	0			0			
ΑB	156			156			
AC	266			266			

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	428	525	0.815	517	48.4	417.042	F
B-A	10	0	9999999999.000	0	12.6	59999940.000	F
C-AB	776	753	1.030	753	340.9	1621.479	F
C-A	0			0			
ΑB	131			131			
A-C	223			223			

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		346.12	F

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	346.12	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)

A	m Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1	A	~	504	100.000
E	3	√	850	100.000
0		√	1093	100.000

Origin-Destination Data

Demand (PCU/hr)

		То					
		A	в	С			
F	Α	0	178	326			
From	в	13	0	837			
	С	703	390	0			



Heavy Vehicle Percentages

		То					
		A	в	С			
_	Α	0	10	10			
From	в	10	0	10			
	С	10	10	0			



Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.44	999.20	194.8	F
B-A	0.08	24.40	0.1	С
C-AB	0.76	15.02	6.6	С
C-A				
ΑB				
AC				

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	630	687	0.917	600	7.6	37.521	E
B-A	10	316	0.031	10	0.0	12.927	В
C-AB	423	885	0.477	417	1.4	8.420	A
C-A	400			400			
ΑB	134			134			
AC	245			245			

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	752	668	1.127	656	31.6	125.981	F
B-A	12	259	0.045	12	0.1	16.035	С
C-AB	581	986	0.589	577	2.5	9.754	А
C-A	402			402			
ΑB	160			160			
A-C	293			293			

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	922	638	1.444	638	102.6	391.276	F
B-A	14	180	0.079	14	0.1	23.781	С
C-AB	885	1168	0.757	870	6.2	13.650	В
C-A	319			319			
ΑB	196			196			
A-C	359			359			

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	922	638	1.445	638	173.5	772.101	F
B-A	14	177	0.081	14	0.1	24.396	С
C-AB	885	1168	0.757	883	6.6	15.021	С
C-A	319			319			
ΑB	196			196			
A-C	359			359			

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	752	667	1.128	667	194.8	999.195	F
B-A	12	253	0.046	12	0.1	16.434	С
C-AB	581	986	0.589	596	2.8	10.801	В
C-A	402			402			
A-B	160			160			
A-C	293			293			

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	630	687	0.917	683	181.6	992.150	F
B-A	10	313	0.031	10	0.0	13.086	В
C-AB	423	885	0.477	428	1.5	8.821	A
C-A	400			400			
ΑB	134			134			
A-C	245			245			

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		412.85	F

Junction Network

Driving side Lighting		Network delay (s)	Network LOS	
Left	Normal/unknown	412.85	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 (%)	
Α		~	251	100.000	
в		✓	540	100.000	
С		√	943	100.000	

Origin-Destination Data

Demand (PCU/hr)

	То				
		A	в	С	
F	Α	0	84	167	
From	в	29	0	511	
	С	169	774	0	

Vehicle Mix

Heavy Vehicle Percentages





Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.93	55.41	8.5	F
B-A	0.62	217.34	1.4	F
C-AB	1.33	730.60	165.0	F
C-A				
ΑB				
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	385	724	0.532	380	1.2	11.366	В
B-A	22	312	0.070	22	0.1	13.593	В
C-AB	681	780	0.874	654	6.7	28.474	D
C-A	29			29			
ΑB	63			63			
A-C	126			126			

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	459	708	0.649	456	1.9	15.537	С
B-A	26	247	0.106	26	0.1	17.913	С
C-AB	848	800	1.059	774	25.0	87.230	F
C-A	0			0			
A-B	76			76			
A-C	150			150			

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	563	675	0.833	552	4.6	29.768	D
B-A	32	144	0.222	31	0.3	35.055	E
C-AB	1038	784	1.325	782	89.2	274.638	F
C-A	0			0			
A-B	92			92			
A-C	184			184			

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	563	605	0.930	547	8.5	55.406	F
B-A	32	54	0.595	28	1.2	143.388	F
C-AB	1038	784	1.325	783	153.0	560.822	F
C-A	0			0			
A-B	92			92			
AC	184			184			

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	459	595	0.772	476	4.2	36.763	E
B-A	26	42	0.620	25	1.4	217.341	F
C-AB	848	800	1.059	800	165.0	730.598	F
C-A	0			0			
A-B	76			76			
A-C	150			150			

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	385	675	0.570	395	1.5	14.679	В
B-A	22	81	0.268	26	0.4	74.357	F
C-AB	681	780	0.874	784	139.3	713.452	F
C-A	29			29			
ΑB	63			63			
A-C	126			126			



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		11.02	В

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS						
Left	Normal/unknown	11.02	В						

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)
ſ	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 (%)	
Α		~	174	100.000	
в		✓	550	100.000	
С		√	709	100.000	

Origin-Destination Data

Demand (PCU/hr)

	То				
From		A	в	С	
	Α	0	44	130	
	в	28	0	522	
	С	536	173	0	



Heavy Vehicle Percentages

	То				
		A	в	С	
_	Α	0	10	10	
From	в	10	0	10	
	С	10	10	0	



Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.80	27.03	4.1	D
B-A	0.08	11.28	0.1	В
C-AB	0.29	6.49	0.6	A
C-A				
ΑB				
AC				

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	393	740	0.531	388	1.2	11.121	В
B-A	21	452	0.047	21	0.1	9.179	А
C-AB	147	772	0.191	146	0.3	6.314	A
C-A	386			386			
ΑB	33			33			
AC	98			98			

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	469	731	0.642	467	1.9	14.829	В
B-A	25	422	0.060	25	0.1	9.964	А
C-AB	185	803	0.230	184	0.4	6.404	А
C-A	453			453			
ΑB	40			40			
A-C	117			117			

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	575	718	0.800	567	3.9	24.881	С
B-A	31	382	0.081	31	0.1	11.266	В
C-AB	245	855	0.286	244	0.6	6.479	A
C-A	536			536			
ΑB	48			48			
A-C	143			143			

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	575	718	0.800	574	4.1	27.033	D
B-A	31	382	0.081	31	0.1	11.279	В
C-AB	245	855	0.286	244	0.6	6.494	А
C-A	536			536			
A-B	48			48			
A-C	143			143			

17:45 - 18:00

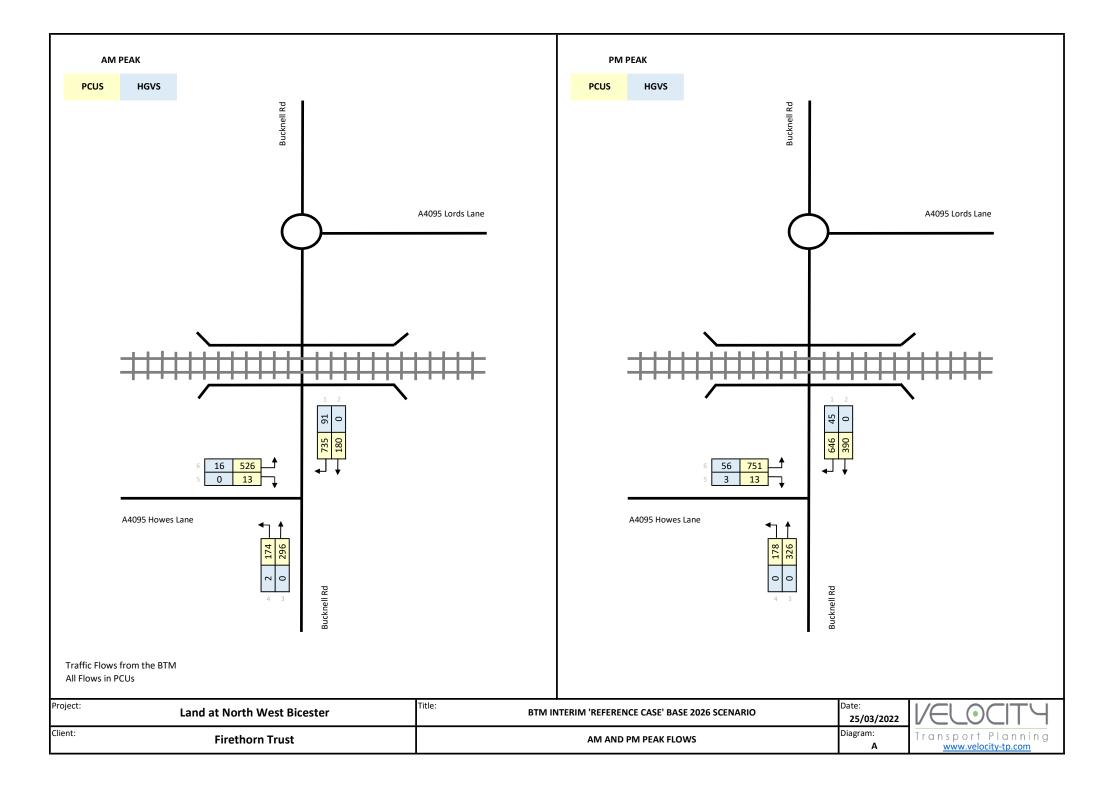
Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	469	731	0.642	477	2.1	16.109	С
B-A	25	422	0.060	25	0.1	9.982	А
C-AB	185	803	0.230	185	0.4	6.428	А
C-A	453			453			
ΑB	40			40			
A-C	117			117			

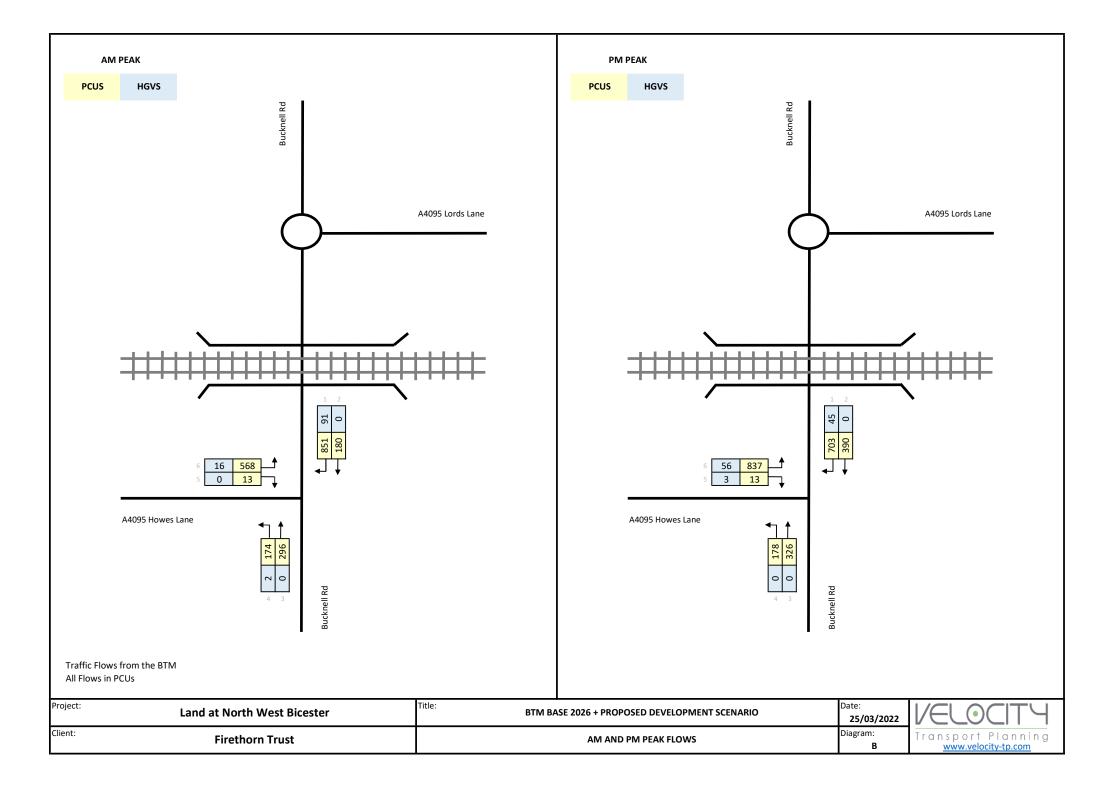
18:00 - 18:15

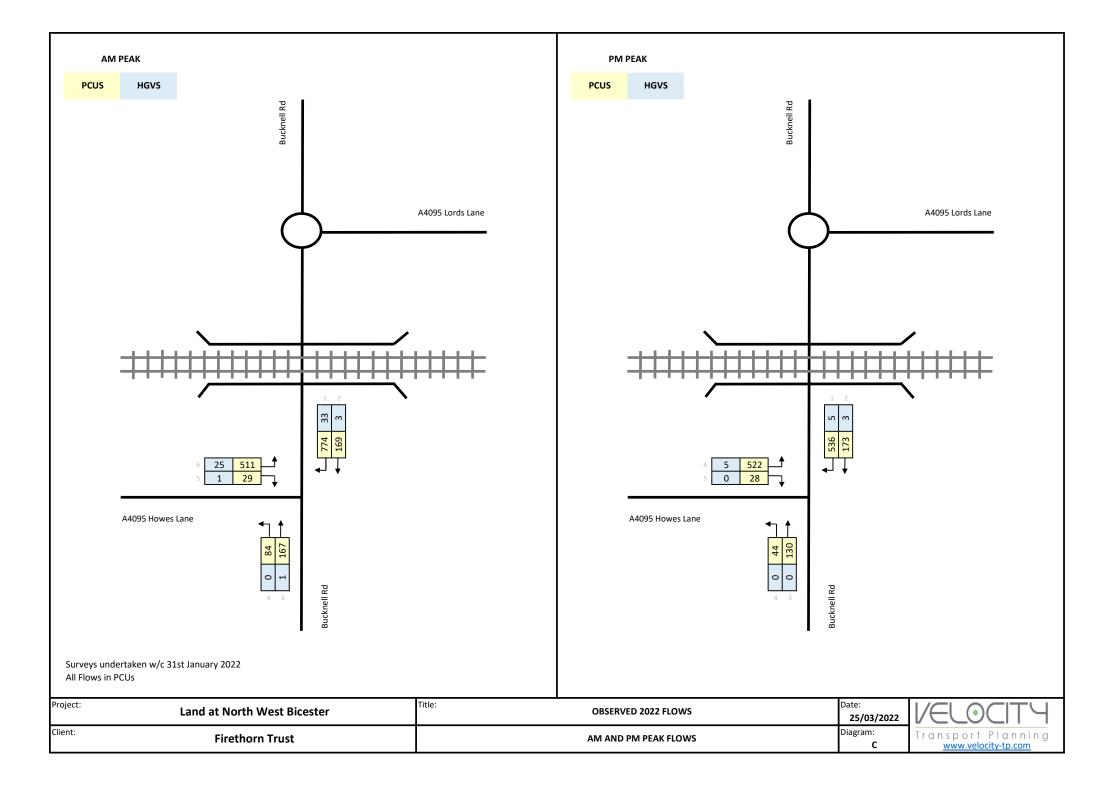
Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	393	739	0.531	396	1.3	11.636	В
B-A	21	451	0.047	21	0.1	9.203	A
C-AB	147	772	0.191	148	0.3	6.345	A
C-A	386			386			
ΑB	33			33			
A-C	98			98			

ATTACHMENT C

TRAFFIC FLOW DIAGRAMS







ATTACHMENT D

TRAFFIC SURVEY DATA



Job 567 Howes Lane

CLASSIFIED TURNING COUNTS Wednesday 02nd February 2022 Site 2 - Howes Lane / Bucknell Road

For Velocity TP



CLASSIFIED TURNING COUNTS

STUDY NAME	Job 567 Howes Lane
SITE LOCATION	Site 2 - Howes Lane / Bucknell Road
DATE	Wednesday 02nd February 2022
TIME PERIOD	12 hours (07:00-19:00)
WEATHER	
COMMENTS	
DETAILS OF ARMS	ARM A: Bucknell Road (North)
	ARM B: Bucknell Road (South)
	ARM C: Howes Lane
	ARM D: Unnamed Road

CAMERA IMAGE



Site 2 - Howes Lane / Bucknell Road



CLASSIFIED TURNING COUNTS

Site 2 - Howes Lane / Bucknell Road

Wednesday 02nd February 2022

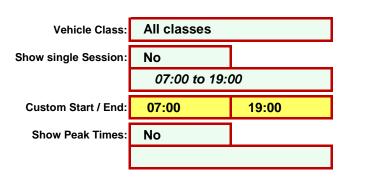
CLASSIFIED COUNTS

Site 2 - Howes Lane / Bucknell Road

Wednesday 02nd February 2022

		nell Road (North)		ARM A: Bucknell Road (North)
IE TO ARM A: Bucknell Road (North)	TO ARM B: Bucknell Road (South)	TO ARM C: Howes Lane	TO ARM D: Unnamed Road	TIME TO JUNCTION FROM JUNCTION TOTAL FLOW
CAR LGV 0GV1 0GV2 PSV MCL PCL TOTAL P	CU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU 0 50 12 0 0 0 1 1 63 63	CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OG 606 156 10 7 7 4 1 790 809 0 0	GV110GV21 PSV MCL PCL TOTAL PCU	CAR LGV 0GV10GV2 PSV MCL PCL TOTAL PCU CAR LGV 0GV10GV2 PSV MCL PCU CAR LGV 0GV10GV2 PSV 0G
	0 50 12 0 0 0 1 1 63 6 0 142 22 2 0 1 0 0 167 169	606 156 10 7 7 4 1 790 809 0 0 602 106 13 18 2 1 1 742 774 1 0		
	0 75 12 3 0 0 1 90 93 0 60 5 0 0 0 1 0 66 63			0900-1000 457 84 15 16 0 2 1 574 601 330 54 15 10 0 0 4 409 430 787 138 30 26 0 2 5 1000-1100 373 67 12 11 0 1 1 464 484 289 48 10 13 0 1 3 361 383 662 115 22 24 0 2 4
	0 82 15 1 0 0 0 1 98 99			1000-1100 373 67 12 11 0 1 1 466 269 466 269 46 17 12 0 2 1 35 0 1 33 60 353 662 115 22 24 0 2 4 1100-1200 327 88 13 13 0 0 6 441 466 298 36 7 12 0 2 1 355 373 625 124 20 25 0 2 7
	0 90 11 4 1 0 2 0 108 11			
		278 42 12 22 2 2 0 358 393 1 0		
	0 104 12 1 0 0 1 1 118 111	301 47 7 16 1 1 0 373 398 0 0		1400-1500 405 59 8 16 11 2 1 491 516 362 66 12 14 0 2 0 456 479 767 125 20 30 1 4 1
0 0 0 0 0 0 0 0	0 132 14 1 0 0 1 0 148 14	351 47 6 8 1 2 1 415 428 3 0	0 0 0 0 3 3	1500-1600 486 61 7 8 1 3 1 566 579 462 82 16 10 4 1 1 575 600 948 143 23 18 5 4 2
0 0 0 0 0 0 0 0 0	0 115 26 3 0 0 1 1 145 14	355 60 5 3 1 2 0 426 432 0 1	0 0 0 0 0 1 1	1600-1700 470 87 8 3 1 3 1 572 579 529 113 8 5 3 5 0 663 674 999 200 16 8 4 8 1 1 1700-1800 644 50 5 5 1 2 1 0 703 708 572 69 2 2 1 3 3 649 652 1216 119 7 3 3 4 3
0 0 0 0 0 0 0 0 0	0 155 13 3 0 0 0 0 171 17	489 37 2 1 2 1 0 532 536 0 0	0 0 0 0 0 0	1700-1800 644 50 5 1 2 1 0 703 708 572 69 2 2 1 3 3 649 652 1216 119 7 3 3 4 3
0 0 0 0 0 0 0 0	0 117 6 0 0 0 1 0 124 12	363 24 1 1 1 0 0 390 393 0 0	0 0 0 0 0 0	<u>1800-1900</u> 480 30 1 1 1 1 0 514 516 620 54 2 2 2 3 0 683 687 1100 84 3 3 3 4 0
0 0 0 0 0 0 0	0 1207 157 19 1 1 10 7 1395 140	4561 770 100 129 18 20 11 5598 5824 7 2	1 0 0 0 0 10 11	TOTAL 5775 929 120 130 19 30 18 7003 7237 5103 736 116 110 18 26 13 6109 6315 10878 1665 236 240 37 56 31 1
	ADM DI Duok	ell Road (South)		ARM B: Bucknell Road (South)
TO ARM A: Bucknell Road (North)	TO ARM B: Bucknell Road (South)	TO ARM C: Howes Lane	TO ARM D: Unnamed Road	TIME TO JUNCTION FROM JUNCTION TOTAL FLOW
CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL P	CU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU	CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OG		CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCU TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCU CAR LGV OGV1 OGV2 PSV MCL PCU CAR LGV OGV2 OGV2 PSV MCL PCU CAR LGV OGV2 PSV MCL PCU CAR LGV OGV2 PSV MCL PCU CAR DV OGV2 PSV MCL PCU CAR DV OGV2 PSV MCL PCU CAR DV OGV2 OGV2 PSV MCL PCU DV OGV2 PSV DV OG
00 110 18 3 1 0 0 0 132	135 0 0 0 0 0 0 0 0	42 8 2 0 0 1 1 53 54 0 0	0 0 0 0 0 0	0700-0800 152 26 5 1 0 1 1 185 188 54 15 0 0 0 1 1 1 70 70 206 41 5 1 0 2 2
0 155 10 1 0 0 0 166	167 0 0 0 0 0 0 0 0	78 6 0 0 0 1 0 85 <mark>84</mark> 0 0	0 0 0 0 0 0	0800-0900 233 16 1 0 0 1 0 251 251 162 29 3 0 1 0 0 195 198 335 45 4 0 1 1 0 0 0 195 198 335 45 4 0 1 1 0 0 0 090-1000 103 21 3 0 0 0 1 127 129 83 16 3 0 0 0 1 1 102 104 186 37 6 0 0 0 1 1
0 84 14 1 0 0 0 0 99		19 7 2 0 0 0 0 28 29 0 0	0 0 0 0 0 0	<u>0900-1000</u> 103 21 3 0 0 0 0 127 129 83 16 3 0 0 0 1 102 104 186 37 6 0 0 0 1
83 14 3 1 0 0 2 101	104 0 0 0 0 0 0 0 0		0 0 0 0 0 0	1000-1100 110 22 4 1 0 1 2 138 141 67 6 1 0 0 1 0 75 75 177 28 5 1 0 2 2
0 71 11 0 0 0 1 1 83 0 93 11 0 2 0 4 0 110			0 0 0 0 0 0	1100-1200 108 18 3 0 0 1 1 1 130 131 102 16 4 0 0 0 1 1 122 124 210 34 7 0 0 1 2 120-1300 119 15 1 2 0 4 2 141 142 101 15 7 1 0 2 0 126 130 220 30 8 3 0 6 2
0 93 11 0 2 0 4 0 110 0 76 11 4 1 0 1 0 93	110 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	26 4 1 0 0 2 31 32 0 0 29 6 3 0 0 0 38 40 0 0		1200-1300 119 15 1 2 0 4 2 141 142 101 15 7 1 0 2 0 126 130 220 30 8 3 0 6 2 1300-1400 105 17 7 1 0 1 0 131 135 99 11 1 0 0 2 2 113 113 204 28 8 1 0 3 2
0 87 15 2 0 0 0 0 104				1300-1400 105 17 / 1 0 1 0 13 3 39 99 11 1 0 2 2 1 13 13 204 20 0 1 0 3 2 1 1 0 3 2 1 14 13 10 1 1 1 13 2 1 10 1 0 3 2 1 10 1 1 1 13 2 1 10 1 0 3 2 1 10 1 1 1 13 10 1 10 1
0 134 12 3 0 0 0 0 149		45 5 0 0 0 0 0 50 50 0 0		1500-1500 179 17 3 0 0 0 0 199 201 142 18 5 0 0 2 0 167 168 321 35 8 0 0 2 0
0 101 14 0 0 1 0 0 116	117 0 0 0 0 0 0 0 0			1600-1700 124 27 0 0 1 1 1 0 153 153 138 29 5 0 0 1 2 173 175 262 56 5 0 1 2 2
0 112 18 0 0 0 0 1 130	130 0 0 0 0 0 0 0 0	23 13 0 0 1 0 37 36 0 0 40 4 0 0 0 0 44 44 0 0 23 2 0 0 0 0 25 25 0 0		1700-1800 152 22 0 0 0 0 1 174 174 178 17 3 0 0 2 0 200 200 330 39 3 0 0 2 1
0 101 9 0 0 0 0 0 110	110 0 0 0 0 0 0 0 0		0 0 0 0 0 0	1800-1900 124 11 0 0 0 0 0 135 135 135 6 0 0 0 1 0 142 141 259 17 0 0 0 1 0
1207 157 17 5 1 6 4 1393		428 70 14 0 0 4 3 516 521 0 0	0 0 0 0 0 0	TOTAL 1635 227 31 5 1 10 7 1909 1927 1382 192 35 1 1 1 13 8 1624 1638 3017 419 66 6 2 23 15
	1014 6.	lowes Lane		ARM C: Howes Lane
TO ARM A: Bucknell Road (North)	TO ARM B: Bucknell Road (South)	TO ARM C: Howes Lane	TO ARM D: Unnamed Road	TIME TO JUNCTION FROM JUNCTION TOTAL FLOW
CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL P	CU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU	CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OG	GV1 OGV2 PSV MCL PCL TOTAL PCU	CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCL TOTAL PCU CAR LGV OGV1 OGV2 PSV MCL PCU CAR DV OGV1 OGV2 PSV MCL PCU CAR DV OGV1 OGV2 PSV MCL PCU CAR DV OGV1 OGV2 PSV OGV1 OGV2 PSV OGV1 OGV2 OGV1 OGV2 PSV OGV1 OGV2 PSV OGV1
0 252 41 6 4 3 1 0 307	318 4 3 0 0 0 0 0 7		0 0 0 0 0 0	0700-0800 256 44 6 4 3 1 0 314 325 648 164 12 7 7 5 2 843 863 904 208 18 11 10 6 2
00 420 42 9 11 5 0 0 487	511 20 7 1 0 0 0 28 21	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0800-0900 440 49 10 11 5 0 0 515 539 680 112 13 18 2 2 1 827 858 1120 161 23 29 7 2 1
00 246 40 13 10 0 0 4 309	329 8 3 0 0 0 0 0 11 1	0 1 0 0 0 0 1 1 0 0	1 0 0 0 0 1 2	0900-1000 254 44 14 10 0 0 4 322 343 401 79 14 16 0 2 0 512 539 655 123 28 26 0 2 4
00 206 34 6 12 0 1 1 259	277 7 1 1 0 0 0 9 1	0 0 0 0 0 0 0 0 1 0	1 0 0 0 0 2 3	1000-1100 214 35 8 12 0 1 1 270 289 341 70 13 11 0 1 1 436 456 555 105 21 23 0 2 2
0 225 25 7 12 0 1 0 270	289 20 1 3 0 0 0 0 24 2		0 0 0 0 0 0	1100-1200 245 26 10 12 0 1 0 294 314 281 80 15 13 0 0 5 389 414 526 106 25 25 0 1 5
			1 0 0 0 0 2 3	
0 259 44 14 10 0 1 0 328	347 11 4 3 0 0 0 0 18 2			1200-1300 271 48 18 10 0 1 0 348 369 303 49 11 13 1 5 4 382 403 574 97 29 23 1 6 4
00 259 44 14 10 0 1 0 328 00 274 37 7 13 0 2 1 333	347 11 4 3 0 0 0 0 18 20	0 0 0 0 0 0 0 0 0 0		1200-1300 271 48 18 10 0 1 0 348 369 303 49 11 13 1 5 4 382 403 574 97 29 23 1 6 4 1300-1400 288 39 7 13 0 2 1 349 368 307 48 15 22 2 2 0 396 433 595 87 22 35 2 4 1 4400 576 497 597 597 597 597 597 597 597 597 597 5
10 259 44 14 10 0 1 0 328 10 274 37 7 13 0 2 1 333 10 274 51 10 14 0 2 0 351	347 11 4 3 0 0 0 0 18 20	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 1 0 0 0 0 2 3 0 0 0 0 0 0 0 0 0	1300-1400 288 39 7 13 0 2 1 349 368 307 48 15 22 2 2 0 396 433 595 87 22 35 2 4 1 1400-1500 293 53 14 14 0 2 0 376 400 343 47 10 16 1 1 0 418 444 636 100 24 30 1 3 0
10 259 44 14 10 0 1 0 328 10 274 37 7 13 0 2 1 333 10 274 51 10 14 0 2 0 351 10 274 51 10 14 0 2 0 351 10 328 70 13 10 4 1 1 426	347 11 4 3 0 0 0 0 18 20	0 0	1 0 0 0 0 2 3 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 445 470 397 52 7 8 1 2 1 467 481 735 126 24 18 5 4 2
00 259 44 14 10 0 1 0 328 00 274 37 7 13 0 2 1 333 00 274 51 10 14 0 2 0 351 00 224 51 10 14 0 2 0 351 00 328 70 13 10 4 1 1 426 00 328 70 13 5 2 5 0 544	347 11 4 3 0 0 0 0 18 22 382 14 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 0 2 2 449 10 4 4 0 0 1 0 19 2 554 23 3 2 0 0 0 1 28 2	0 0		1500-1600 338 74 17 10 4 2 1 445 470 397 52 7 8 1 2 1 447 481 755 126 24 18 5 4 2 1 1600-1700 449 101 10 5 2 5 1 572 583 378 73 5 3 1 3 0 453 469 827 174 15 8 3 8 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	347 11 4 3 0 0 0 18 22 321 41 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 16 11 373 17 2 2 0 0 0 12 2 449 10 4 4 0 0 1 0 19 2 562 23 3 2 0 0 0 1 19 2 2 562 23 4 0 0 1 2 12 </td <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>1 0 0 0 0 2 3 0 0 0 0 0 0 0 0</td> <td>1500-1600 338 74 17 10 4 2 1 4457 4617 785 128 2 1 4677 4617 785 128 2 1 4677 4617 785 128 1 3 0 4657 4617 785 128 2 1 65 1 572 583 378 73 5 3 1 3 0 4657 4697</td>	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1 0 0 0 0 2 3 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 4457 4617 785 128 2 1 4677 4617 785 128 2 1 4677 4617 785 128 1 3 0 4657 4617 785 128 2 1 65 1 572 583 378 73 5 3 1 3 0 4657 4697
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	347 11 4 3 0 0 0 0 18 2 352 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 0 0 21 22 449 10 4 4 0 0 1 0 19 22 554 23 3 2 0 0 0 1 28 22 22 2 0 0 0 1 19 22 449 10 4 4 0 0 1 1 9 22 254 23 3 2 0 0 1 1 28 22 22 23 4 0 0 2 0 28 22	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1 0 0 0 0 2 3 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 445 470 397 52 7 8 1 2 1 467 481 758 126 24 18 5 4 2 1 467 481 758 126 24 18 5 4 2 1 467 481 758 126 24 18 5 4 2 1 467 481 758 126 14 13 0 463 469 247 15 8 3 6 3 1 3 0 463 469 27 77 463 453 36 1 1 3 0 463 469 27 77 45 3 3 6 1 1 1 2 1 68 157 157 3 3 3 0 1000-1000 537 45 2 2 </th
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	347 11 4 3 0 0 0 0 16 12 373 17 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 0 19 22 440 10 4 4 0 0 0 1 19 22 262 23 3 2 0 0 0 1 10 19 22 22 2	0 0	1 0 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 4457 487 1687 187 128 4 5 4 2 1 4677 4877 </th
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	347 11 4 3 0 0 0 0 16 12 332 14 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 0 19 22 440 10 4 4 0 0 0 1 19 22 262 23 3 2 0 0 0 1 19 22 22 2<	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1 0 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 4457 481 12 1 4677 4817 758 128 24 18 5 447 4317 758 128 1 2 1 4677 4317 758 728 73 3 3 1 3 0 4657 4677 4517 758 15 35 3 1 3 0 4657 4677 45777 45777<
259 44 14 10 0 1 0 326 274 37 7 3 0 2 1 333 274 51 10 14 0 2 1 333 274 51 10 14 0 2 0 351 328 70 13 10 4 1 1 426 426 6 6 5 2 5 0 544 460 61 2 2 1 3 2 619 519 45 2 2 3 0 673 5 3889 578 97 105 17 20 9 4706	347 11 4 3 0 0 0 18 22 352 14 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 19 22 40 0 4 4 0 0 1 19 22 262 23 3 2 0 0 0 1 19 28 25 22 2.3 4 0 0 0 1 128 28 28 29	0 0	1 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 44 21 1 445 470 397 52 7 8 1 2 1 467 481 758 128 1 2 1 467 481 758 128 1 3 0 467 481 758 128 1 1 0 467 481 758 128 1 1 0 0 457 469 127 1 8 1 1 100 100 452 496 88 1 1 1 1 0 467 481 758 282 14 1 1 1 0 163 1 1 0 1 1 0 0 415 128 1 1 0 0 415 128 27 1 3 1 0 0 415 128 1 1 0 0 415 128 1 1 0 0 415 128 1 1 0 0 415
0 259 44 14 10 0 1 0 328 0 274 37 15 0 2 1 333 0 274 37 15 0 2 1 333 0 274 37 10 4 0 2 0 351 0 274 37 10 4 0 2 0 351 0 328 70 13 10 4 1 1 435 0 426 96 8 5 2 5 0 544 0 460 61 2 2 2 3 0 573 3885 578 97 105 17 20 9 4706 -	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 16 11 373 17 2 2 0 0 0 16 11 373 17 2 2 0 0 0 19 22 554 4 0 0 1 19 22 22 23 3 2 0 0 0 1 28 22 22 23 4 0 0 0 0 1 28 22 22 14 0 0 0 0 1 28 29 22 22 23 1 1 0 1	0 0	1 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 467 461 735 126 24 16 5 4 2 1 467 461 735 126 24 16 5 4 2 1 467 461 735 126 24 16 5 4 2 1 467 461 735 126 24 16 5 4 2 1 3 0 463 469 697 74 16 8 3 6 1 1 3 0 463 467 481 735 163 1 1 0 0 463 451 83 3 0 1 1 0 0 453 12 1 1 0 0 453 13 3 3 3 3 0 1 1 0 0 453 21 11 1 0 <th< td=""></th<>
0 256 44 14 10 0 1 0 328 0 274 37 7 13 0 2 1 338 0 274 37 13 0 2 1 338 0 274 37 13 0 4 0 2 0 351 0 274 37 13 0 4 1 1 456 0 328 70 13 0 4 1 1 456 0 456 2 2 1 3 2 519 544 0 573 3 3899 578 97 105 17 20 9 4706 - - 4706 - <td>347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 12 12 54 4 0 0 1 1 12 2 54 4 0 0 0 1 12 2 55 23 3 2 0 0 0 1 12 2 22 23 3 0 0 0 2 2 2 2 3 1 2 0 2<td>0 0</td><td>1 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>1500-1600 338 74 17 10 4 2 1 4457 487 487 481 73 128 24 165 4 2 1500-1700 440 10 15 2 1 57 35 3 1 3 0 467 481 73 128 168 5 487 481 73 128 168 158 3 13 1 3 0 467 481 733 128 24 18 5 4 2 1 3 0 467 481 733 128 24 18 5 3 3 1 1 1 1 1 1 1 1 0 457 461 733 3 3 0 0 0 3 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0</td></td>	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 12 12 54 4 0 0 1 1 12 2 54 4 0 0 0 1 12 2 55 23 3 2 0 0 0 1 12 2 22 23 3 0 0 0 2 2 2 2 3 1 2 0 2 <td>0 0</td> <td>1 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>1500-1600 338 74 17 10 4 2 1 4457 487 487 481 73 128 24 165 4 2 1500-1700 440 10 15 2 1 57 35 3 1 3 0 467 481 73 128 168 5 487 481 73 128 168 158 3 13 1 3 0 467 481 733 128 24 18 5 4 2 1 3 0 467 481 733 128 24 18 5 3 3 1 1 1 1 1 1 1 1 0 457 461 733 3 3 0 0 0 3 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0</td>	0 0	1 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1500-1600 338 74 17 10 4 2 1 4457 487 487 481 73 128 24 165 4 2 1500-1700 440 10 15 2 1 57 35 3 1 3 0 467 481 73 128 168 5 487 481 73 128 168 158 3 13 1 3 0 467 481 733 128 24 18 5 4 2 1 3 0 467 481 733 128 24 18 5 3 3 1 1 1 1 1 1 1 1 0 457 461 733 3 3 0 0 0 3 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0
0 259 44 14 10 0 1 0 328 0 274 37 13 0 2 1 333 0 274 37 13 0 2 1 333 0 274 37 13 10 41 1 333 0 274 37 13 10 41 1 436 0 388 70 13 10 41 1 436 0 436 98 8 5 2 5 0 544 0 450 61 2 2 2 3 0 573 3388 578 97 105 17 20 9 4706 7 COARM & Bucknell Road (North) CAR Lev Ocivil Ocivil Pevil Pevil Pevil ToTAL PA 1 0 0 0 0 0 0 0	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 16 11 373 17 2 2 0 0 0 16 11 373 17 2 2 0 0 0 19 22 554 4 0 0 1 19 22 22 23 3 2 0 0 0 1 28 22 22 23 4 0 0 0 0 1 28 22 22 23 4 0 0 0 0 1 28 22 22 23 4 0 0 0 0 0 1 28 22 22 23 1 1 28 1 1 1 1 1 1 1 1 1 1 1 1 <td>0 0</td> <td>1 0 0 0 2 3 0</td> <td>1900-1000 338 74 17 10 4 2 1 465 407 397 62 7 8 1 2 1 467 467 467 467 467 1687 778 78 78 78 78 78 78 71 10 47 467<</td>	0 0	1 0 0 0 2 3 0	1900-1000 338 74 17 10 4 2 1 465 407 397 62 7 8 1 2 1 467 467 467 467 467 1687 778 78 78 78 78 78 78 71 10 47 467<
0 259 44 14 10 0 1 0 328 0 274 37 7 15 0 2 1 333 0 274 37 15 0 2 1 333 00 274 37 10 4 0 2 0 351 00 274 37 10 4 0 2 0 351 00 228 70 10 1 1 426 1 1 426 01 426 2 2 1 3 2 519 0 549 0 573 3 3889 578 77 105 17 20 9 4706 - 4706 - 1<400	347 11 4 3 0 0 0 16 21 321 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 16 11 373 17 2 2 0 0 0 1 16 11 373 17 2 0 0 0 1 10 12 22 23 3 2 0 0 0 1 12 28 22 27 18 0 0 0 2 0 28 22 27 34 16 0 3 1 28 22 28 24	0 0	1 0 0 0 2 3 0	1500-1600 338 74 17 10 4 2 1 445 470 397 52 7 8 1 2 1 477 487
0 259 44 14 10 0 1 0 326 0 274 37 7 13 0 2 1 333 0 274 37 13 0 2 1 333 0 274 37 17 1 0 2 1 333 0 274 37 17 10 4 0 2 0 351 0 282 70 15 10 4 1 1 436 0 426 51 2 2 2 3 0 573 0 651 2 2 2 3 0 6773 3 388 578 97 165 17 28 9 4706 7 0 1 0 0 0 0 0 1 1 0 1 0 1 1 <td>347 11 4 3 0 0 0 18 22 321 14 2 0 0 0 0 0 18 22 373 17 2 2 0 0 0 16 11 373 17 2 2 0 0 0 1 19 22 545 43 3 2 0 0 0 1 12 25 23 4 0 0 0 1 18 22 23 14 0 0 0 0 18 11 18 19 19 19 11 20 12 18 11 19 10 10 10 10 <td< td=""><td>0 0</td><td>1 0 0 0 2 3 0</td><td>1500-1600 338 74 17 10 4 2 1 467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 735 126 24 16 5 4 2 1500-1000 440 10 16 2 1 5 1 57 53 13 1 3 0 463 469 477 74 16 1 1 0 467 461 733 3 3 0 0 16 416 927 74 3 3 3 0 0 168 41 10 0 416 927 74 3 3 3 0 0 168 927 74 3 3 3 0 0 0 168 927 748 74</td></td<></td>	347 11 4 3 0 0 0 18 22 321 14 2 0 0 0 0 0 18 22 373 17 2 2 0 0 0 16 11 373 17 2 2 0 0 0 1 19 22 545 43 3 2 0 0 0 1 12 25 23 4 0 0 0 1 18 22 23 14 0 0 0 0 18 11 18 19 19 19 11 20 12 18 11 19 10 10 10 10 <td< td=""><td>0 0</td><td>1 0 0 0 2 3 0</td><td>1500-1600 338 74 17 10 4 2 1 467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 735 126 24 16 5 4 2 1500-1000 440 10 16 2 1 5 1 57 53 13 1 3 0 463 469 477 74 16 1 1 0 467 461 733 3 3 0 0 16 416 927 74 3 3 3 0 0 168 41 10 0 416 927 74 3 3 3 0 0 168 927 74 3 3 3 0 0 0 168 927 748 74</td></td<>	0 0	1 0 0 0 2 3 0	1500-1600 338 74 17 10 4 2 1 467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 73 12 1467 461 735 126 24 16 5 4 2 1500-1000 440 10 16 2 1 5 1 57 53 13 1 3 0 463 469 477 74 16 1 1 0 467 461 733 3 3 0 0 16 416 927 74 3 3 3 0 0 168 41 10 0 416 927 74 3 3 3 0 0 168 927 74 3 3 3 0 0 0 168 927 748 74
0 55 44 14 10 0 1 0 328 0 274 37 15 0 2 1 338 00 274 37 15 0 2 1 338 00 274 37 10 0 1 1 338 00 224 70 15 10 4 1 1 436 00 226 70 15 10 4 1 1 426 00 426 5 2 2 1 3 2 549 00 578 97 105 17 20 9 4706 CAR 400 0 0 0 0 0 1 1 1 426 1 426 1 426 1 4706 4706 4706 4706 4706 4706 4706 4706 0 0	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 10 12 22 54 4 0 0 0 1 1 22 52 52 3 3 2 0 0 0 1 12 22 52 23 3 0 0 0 2 0 2 2 22 23 3 0 0 0 2 0 28 22 23 3 6 0 0 1 128 23 23 21 28 23 13 28 23 1 28 23 1 28 23 1 28 23 1 28 28 28 28 28 28 <	0 0	1 0 0 0 2 3 0	1900-1000 338 74 17 10 44 21 1 446 70 397 52 7 8 1 2 1 467 <th< td=""></th<>
00 259 44 14 10 0 1 0 333 02 274 37 7 13 0 2 1 333 00 274 37 13 0 2 1 333 00 274 37 13 10 4 1 1 480 00 228 70 3 10 4 1 1 480 00 460 51 2 2 1 3 2 519 544 0 2 2 3 0 578 97 105 17 28 9 4706 7 7 10 1 42 2 2 3 0 578 97 105 17 28 9 4706 7 CAR 160 0 0 0 0 0 0 1 0 0 1 0 1<	347 11 4 3 0 0 0 18 23 347 21 4 3 0 0 0 0 0 18 14 373 17 2 2 0 0 0 1 0 12 12 554 2.3 3 2 0 0 0 1 18 22 255 2.3 3 2 0 0 2 0 2 2 22 2<	0 0	1 0 0 0 2 3 0	Incontrol 338 74 17 10 44 21 1 446 70 397 62 7 8 1 2 1 467 461 735 128 24 16 6 4 2 1 467 461 735 128 24 16 6 4 2 1 3 0 467 461 735 128 24 16 6 4 23 10001000 483 55 2 2 1 5 2 53 53 11 1 0 0 415 3 3 3 0 TOTAL 498 51 115 10 51 55 35 35 35 11 10 0 415 12 11 10 0 415 12 13 12 14 14 12 13 0 45 3 3 3 3 3
00 259 44 14 10 0 1 0 328 00 274 37 7 13 0 2 1 333 00 274 37 13 0 2 1 333 00 274 37 13 0 4 1 1 436 00 328 70 13 10 4 1 1 436 00 426 5 2 2 1 3 2 5 0 546 00 460 51 2 2 1 3 2 5 0 578 97 185 17 20 9 4706 - 00 578 97 185 17 20 9 4706 - - - - 1 0 0 0 1 0 0 1 0 0 1 <td< td=""><td>347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 10 12 22 54 4 0 0 1 1 12 22 52 23 3 2 0 0 1 12 22 22 23 3 0 0 0 2 0 2 2 23 3 0 0 0 0 1 28 22 23 3 0 0 0 0 1 28 22 23 34 16 0 0 3 1 28 22 23 34 1 1 28 23 1 28 23 1 28 28 28 28 28 28</td><td>0 0</td><td>1 0 0 0 2 3 0</td><td>1 0</td></td<>	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 10 12 22 54 4 0 0 1 1 12 22 52 23 3 2 0 0 1 12 22 22 23 3 0 0 0 2 0 2 2 23 3 0 0 0 0 1 28 22 23 3 0 0 0 0 1 28 22 23 34 16 0 0 3 1 28 22 23 34 1 1 28 23 1 28 23 1 28 28 28 28 28 28	0 0	1 0 0 0 2 3 0	1 0
0 250 44 14 10 0 1 0 333 274 37 7 13 0 2 1 333 0 274 37 13 0 2 1 333 00 274 37 11 0 2 1 333 00 274 37 11 14 4 2 0 351 00 282 70 13 10 4.1 1 450 00 460 61 2 2 1 3 2 619 01 480 2 2 2 3 0 578 01 14 0 0 0 0 0 1 400 02 1 0 0 0 0 0 0 1 1 1 400 1 1 1 1 1 1 1 <td>347 11 4 3 0 0 0 18 23 347 21 4 3 0 0 0 0 0 18 14 373 17 2 2 0 0 0 1 19 22 564 2.3 3 2 0 0 1 1 28 22 22 2</td> <td>0 0</td> <td>1 0 0 0 2 3 0</td> <td>1900-1000 338 74 17 10 4 2 1 467 401 73 6 74 74 10 44 2 1 467 461 735 72 24 16 5 44 2 1 467 461 735 728 24 16 5 4 2 1500-1700 440 10 16 2 1 5 2 1 5 2 5 3 13 1 0 463 467 461 73 3 3 3 0 1 1 0 463 467 481 73 3 3 3 0 0 1 0 0 415 22 7 3 3 3 0 0 0 0 0 145 24 14 24 14 24 14 21 1 0 0 16 0 0 1<!--</td--></td>	347 11 4 3 0 0 0 18 23 347 21 4 3 0 0 0 0 0 18 14 373 17 2 2 0 0 0 1 19 22 564 2.3 3 2 0 0 1 1 28 22 22 2	0 0	1 0 0 0 2 3 0	1900-1000 338 74 17 10 4 2 1 467 401 73 6 74 74 10 44 2 1 467 461 735 72 24 16 5 44 2 1 467 461 735 728 24 16 5 4 2 1500-1700 440 10 16 2 1 5 2 1 5 2 5 3 13 1 0 463 467 461 73 3 3 3 0 1 1 0 463 467 481 73 3 3 3 0 0 1 0 0 415 22 7 3 3 3 0 0 0 0 0 145 24 14 24 14 24 14 21 1 0 0 16 0 0 1 </td
00 259 44 14 10 0 1 0 328 00 274 37 7 13 0 2 1 333 0 274 37 13 0 2 1 333 0 274 37 13 0 4 1 1 436 0 326 70 13 10 4 1 1 436 0 365 0 546 5 2 2 1 3<2	347 11 4 3 0 0 0 18 23 347 17 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 10 12 22 56 23 3 2 0 0 0 1 10 12 22 22 23 22 23 3 2 0 0 0 1 28 22 23 3 0 0 0 2 0 28 22 27 16 0 0 0 0 1 28 22 27 28 24 </td <td>0 0</td> <td>1 0 0 0 2 3 0</td> <td>1500-1600 338 74 17 10 4 2 1 446 101 10 10 2 1 446 101 10 5 2 1 52 1 52 1 52 1 53 13 1 468 27 175 15 3 1 3 0 463 468 27 177 13 3 3 0 463 468 27 11 15 1 3 0 463 468 27 13 3 3 0 10 3 0 613 610 11 1 0 0 416 11 13 3</td>	0 0	1 0 0 0 2 3 0	1500-1600 338 74 17 10 4 2 1 446 101 10 10 2 1 446 101 10 5 2 1 52 1 52 1 52 1 53 13 1 468 27 175 15 3 1 3 0 463 468 27 177 13 3 3 0 463 468 27 11 15 1 3 0 463 468 27 13 3 3 0 10 3 0 613 610 11 1 0 0 416 11 13 3
0 55 44 14 10 0 1 0 328 0 74 37 7 15 0 2 1 338 00 74 37 15 0 2 1 338 00 74 37 15 0 4 0 2 0 355 00 228 70 15 10 4 1 1 426 00 426 8 8 5 2 5 0 549 00 516 45 2 2 1 3 2 519 3889 578 97 105 17 20 9 4706 00 1 0 0 0 0 0 1 1 426 00 1 0 0 0 0 0 1 1 1 426 200 10<	347 11 4 3 0 0 0 18 22 32 14 2 0 0 0 0 0 0 16 11 373 17 2 2 0 0 0 1 10 14 21 22 2 0 0 0 1 12 22 52 23 3 2 0 0 0 1 12 22 22 23 3 0 0 0 2 0 22 2 23 1 0 0 0 0 1 28 22 23 3 1 0 0 0 2 0 28 22 23 3 1 10 0 0 0 1 128 128 23 1 28 23 1 28 23 1 28 23 1 20 0 0 0<	0 0	1 0 0 0 2 3 0	1500-1600 338 74 17 10 4 2 1 446 101 10 6 2 1 446 101 10 5 1 572 8 1 2 1 446 101 10 6 2 1 572 16 13 1 30 468 271 173 13 3 468 271 174 15 6 3 8 1 13 1467 468 687 171 15 8 11 13 1 30 468 271 13 3 3 10 13 36 687 11 11 10 0 451 148 145 148 145 148 145 148 145 148 145 148 145 148 148 148 135 148





Arm Destination

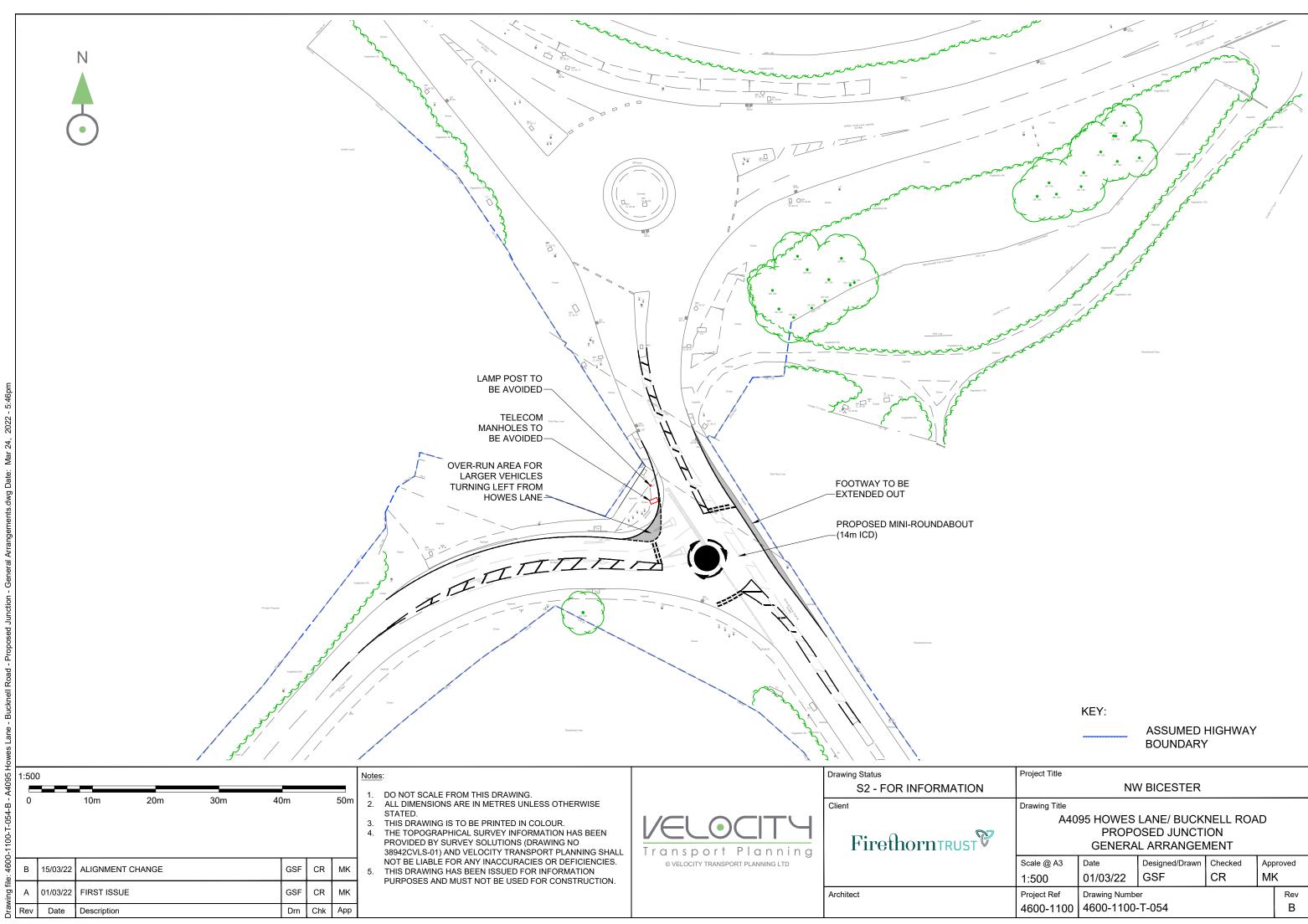
		Α	В	С	D	Total
ч	Α	0	1395	5598	10	7003
Origin	В	1393	0	516	0	1909
Arm 0	С	4706	228	3	7	4944
A	D	10	1	7	0	18
	Total	6109	1624	6124	17	



	A - Bucknell Ro	ad (North) / B - B		any / C - Manuel L	ane / D - Unnames	Read	
41 	Lane 1	Bunhmell Road (Seu Lana 1	C · Her	Lane 3	D - Unrannel Road Lane 1	Lana 1	Garue Lane 3
EuropyParind	BAX.	MAX	BAX.	MAX	BAX	MAK	MAX
07.06 - 07.05 07.06 - 07.10	1		0		0	3	e e
07.50 · 07.55 07.55 · 07.20	6	*	0	-	0	2	0
07.20 - 07.26 07.26 - 07.56	4	•	0	-	0	3	1
07.30 · 07.56 07.36 · 07.66	-		0		0	3	1
07.40 · 07.45	- 1	*	8		•	6	1
07.45 - 07.65 07.60 - 07.65	7	0 0	0	-	0	e e	0
07.65 · 06.00 08.00 · 06.05	-		0		0	3	0
08.05 - 08.10	-	0 0	4		0	6 6	1
08.15 08.20	4		0		0	6	1
08.26 - 08.30	1	1	6		•	6	-
08.30 · 08.55 08.31 · 08.40	-	0 0	3	-	0	6	1
08.40 - 08.45	4	*	0		0 0	3 6	2
08.60 - 08.65	1	0 0	0		0	6	1
08-00 - 08-05 08-05 - 08-10	-	•			0	5	0
08.10 08.15	2	0	0		o	6	é
well - 0820 0820 - 0821	4 3	0 0	0	8	0	4	0
09-26 · 09-30 09-30 · 09-36	4		a a		2	4	
09-30 - 08-40 09-40 - 09-45	4	0 0	2	-	0	6	0
08-85 · 08-85 08-80 · 08-85	3		0		1	6	1
0007 - 1840	3				0		1
	4		0 0		0	3	
10-10 · 10-16 10-16 · 10-20	3		0		0	3	3
10-20 - 10-26	3	4 4	0	-	0 0	3	1
10.30 - 10.36	7				•	1	0
1040 · 1040	4	0 0	0	8	0	4	
wdi - 1040 1040 - 1046	4	*	0	-	0	د د	0
1046 - 1100 1100 - 1105	3	0	0		0	4	0
1146 - 1176	3	0 0	0 0	0 0	0	4	0
1546 - 1120 1120 - 1126	4				•	4	
11.26 - 11.26	-	-	0		0	5	
15.30 · 11.56 15.36 · 11.40	4	•	0		0	3	0
1140 - 1148 1146 - 1148	4	0 0	0	-	0	4	1
1140 - 1146		•	0		0	4	
12.00 - 12.05	3	0	0		0	4	i.
12-06 - 12-16	2	-	0		0	3	2
12.15 - 12.26	4	•	0		0	4	0 2
12.36 - 12.36	2	*	0	-	2	6 6	- 1
12.35 - 02.45	1	•			0	4	3
1246 - 1246 1240 - 1246	2		0		0	3	0
1246 - 1346	4		٥		٥		1
13.66 - 13.16	1	*	3		•		-
13-10 - 03-18 13-16 - 03-20	6 0	0 0	0	-	0	3	1
13-26 · 03-26 13-26 · 03-36	3		0 0	-	0	-	
1230 - 0241 1230 - 0241	4	0 0	0	8 8	0	8 3	3
1340 - 0348	0 6	0 0	0 0	0 0	0	1	1
1340 - 044	*	•	0	*	0	3	0
1348 - 1400 1400 - 1405 1405 - 1410	4				0		
1410 - 1415	0 6	0 0	0 7	8	0	5	3
1416 - 1420 1420 - 1426	4	0 0	0	-	0	4	
1428 - 1430 1430 - 1436	4	0 0	7		2	3	
1436 - 1448	4	*			1	3	
1440 - 1445 1446 - 1460 1440 - 1445	2	*		-	1		
1446 · 1600	2				ů		4
16-00 - 16-05 16-06 - 16-16	4	0 0	0	8	2 0	6	
18-10 · 18-18 18-18 · 18-20	4	0 0	9		0	4	1
18.20 · 18.26 18.28 · 18.30	4 3	0 0	6	0 0	0	6	-
1630 - 1636 1636 - 1640	4	0 0	0 0	0 0	0	ь 3	1
1640 · 1646	4	•	6	*	0	4	3
1640 - 1646	3		3		0		
16:00 · 16:00	6	-	0	-	0	5	3
16-05 · 16-10 16-10 · 16-15	4	0 0	9	0 0	0	4	1
16-16 · 16-20 16-20 · 16-26	4	4 4	0	-	0	6	0
16.26 - 16.50	3	•	0	*	0	3	3
1438 · 1640	2		0		0	3	1
16-45 - 16-65	4	-	24 0	-	0	6	- 1
1640 - 1646 1646 - 1700	3		0 4	8	0 0	3 6	4
17.00 - 17.05 17.05 - 17.10	4 8	0 0	0 0	0 0	0	5	1
12.60 - 17.66	4		3		e		
17.46 - 17.20	6	e e	3 0	8	e e	6	1
17.26 - 17.56 17.30 - 17.56	-		a a		0	-	
1236 - 1746 1740 - 1746	3	0 0	0 6	-	0	2	1
17.46 - 17.66	2		2	0 	0	1	3
17.6E · 18.00	2				0		1
18-06 - 18-10	4	0 0	0	8	0	6 2	3
18-10 · 18-16 18-16 · 18-20	2		3		0	4	-
18.20 · 18.26	5 8	0 0	6 0	0 0	0	5	1
18.30 - 18.56			3		•	i.	
1840 · 1840	1	0 0	0 4	8	e e	6 5	2

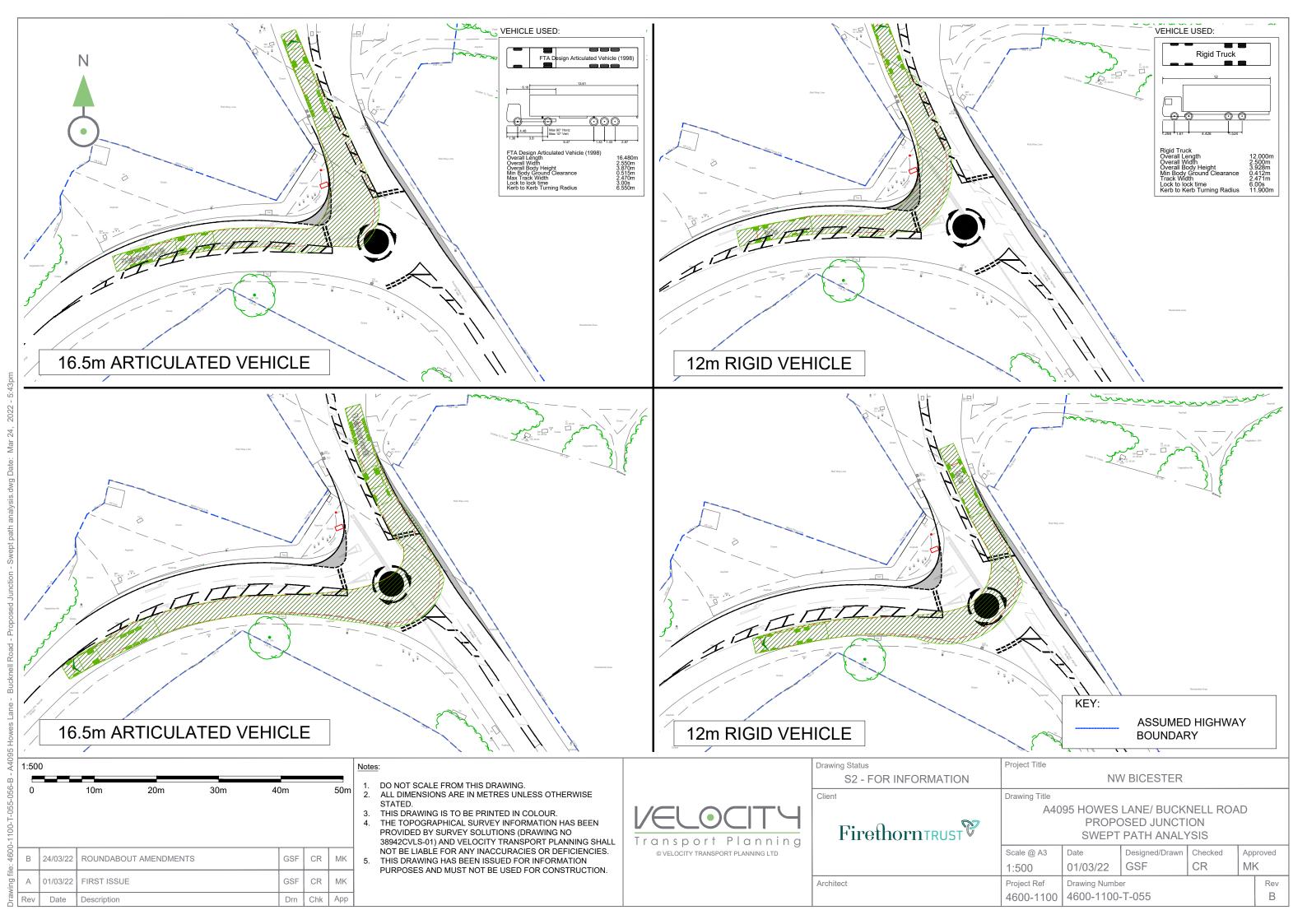
ATTACHMENT E

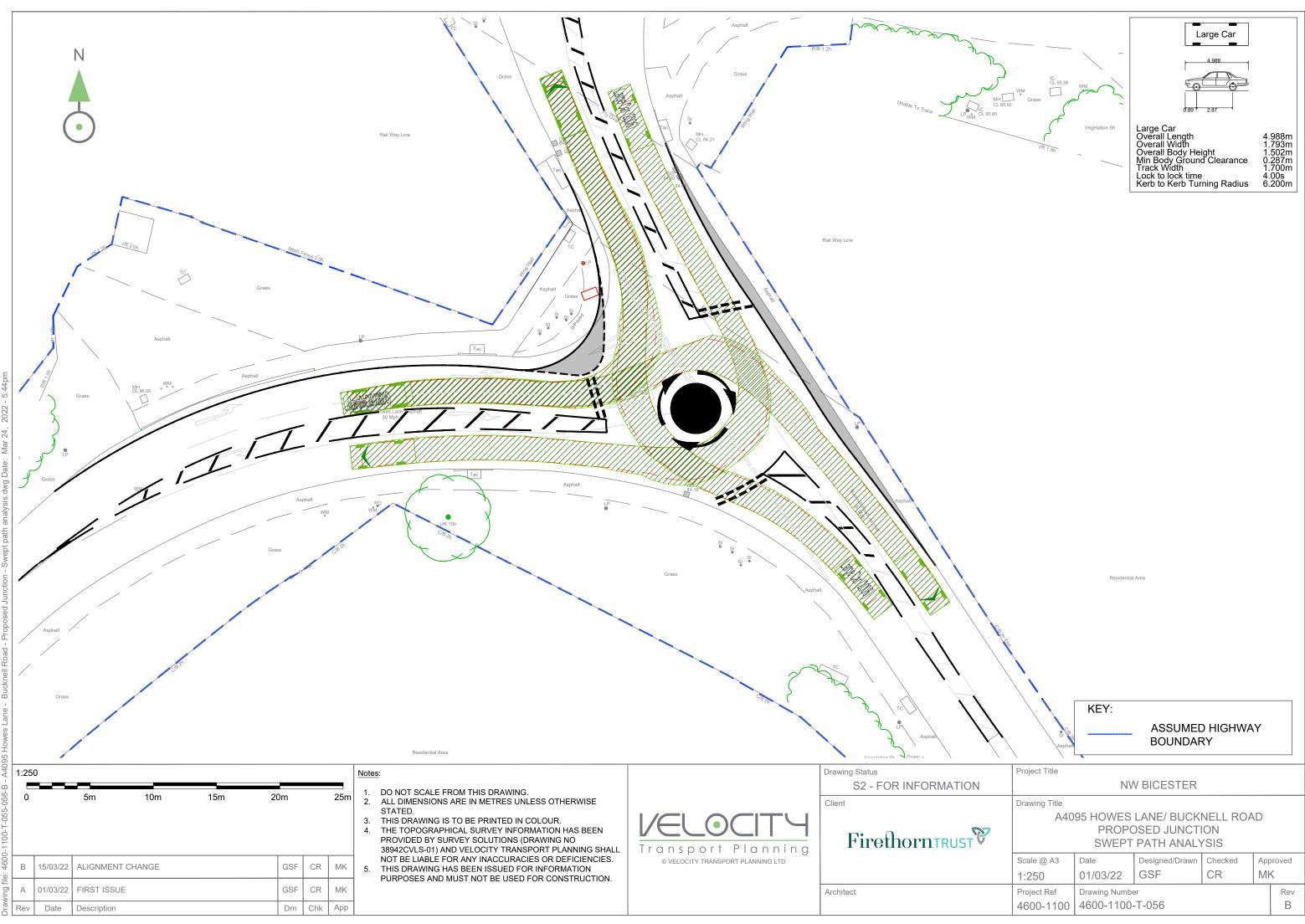
PROPOSED MINI-ROUNDABOUT DRAWINGS

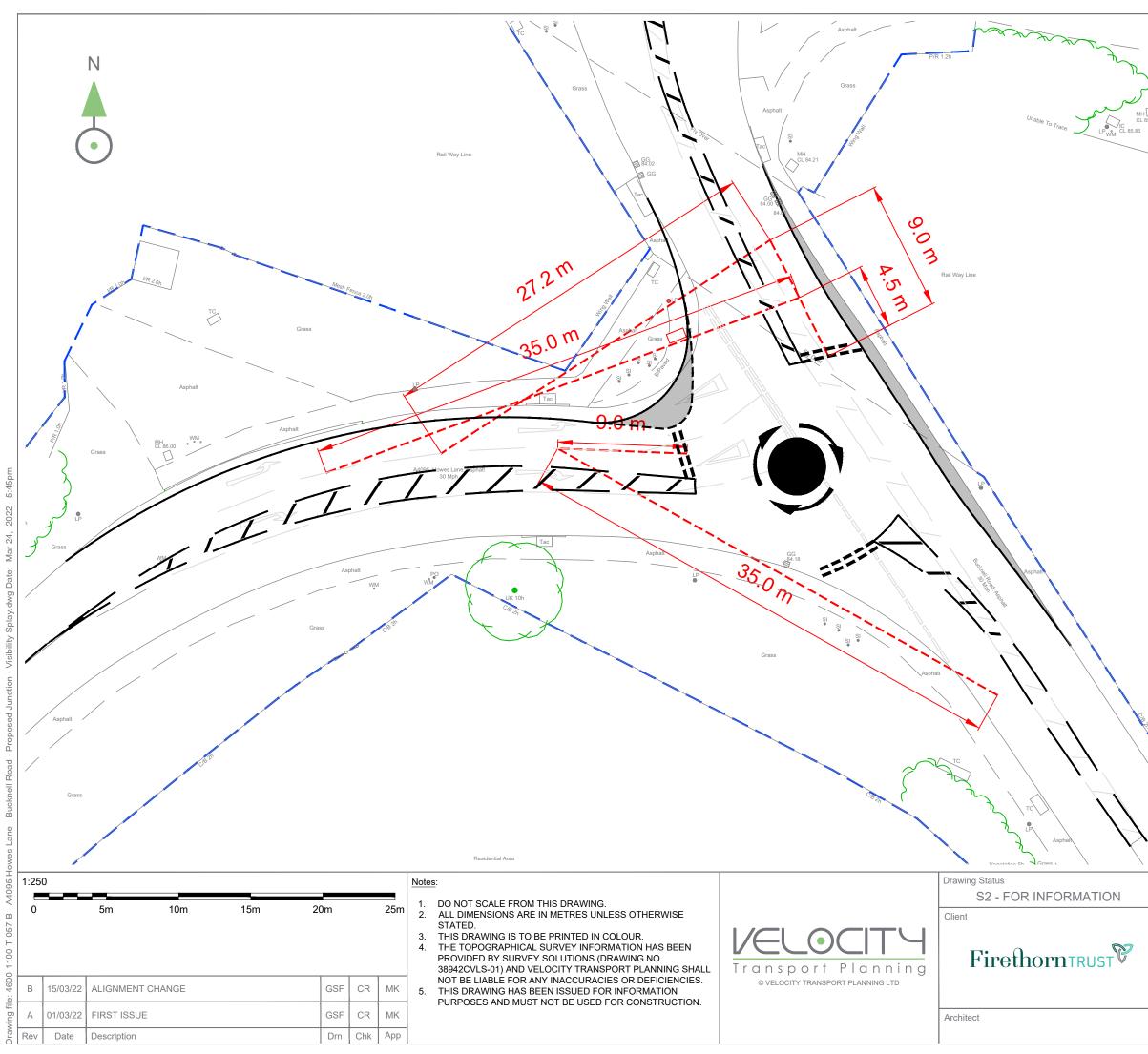


ane - Bucknell Road - Proposed Junction - General Arrangements.dwg Date: Mar 24, 2022 - 5:46pm 00-T-054-B - A4095

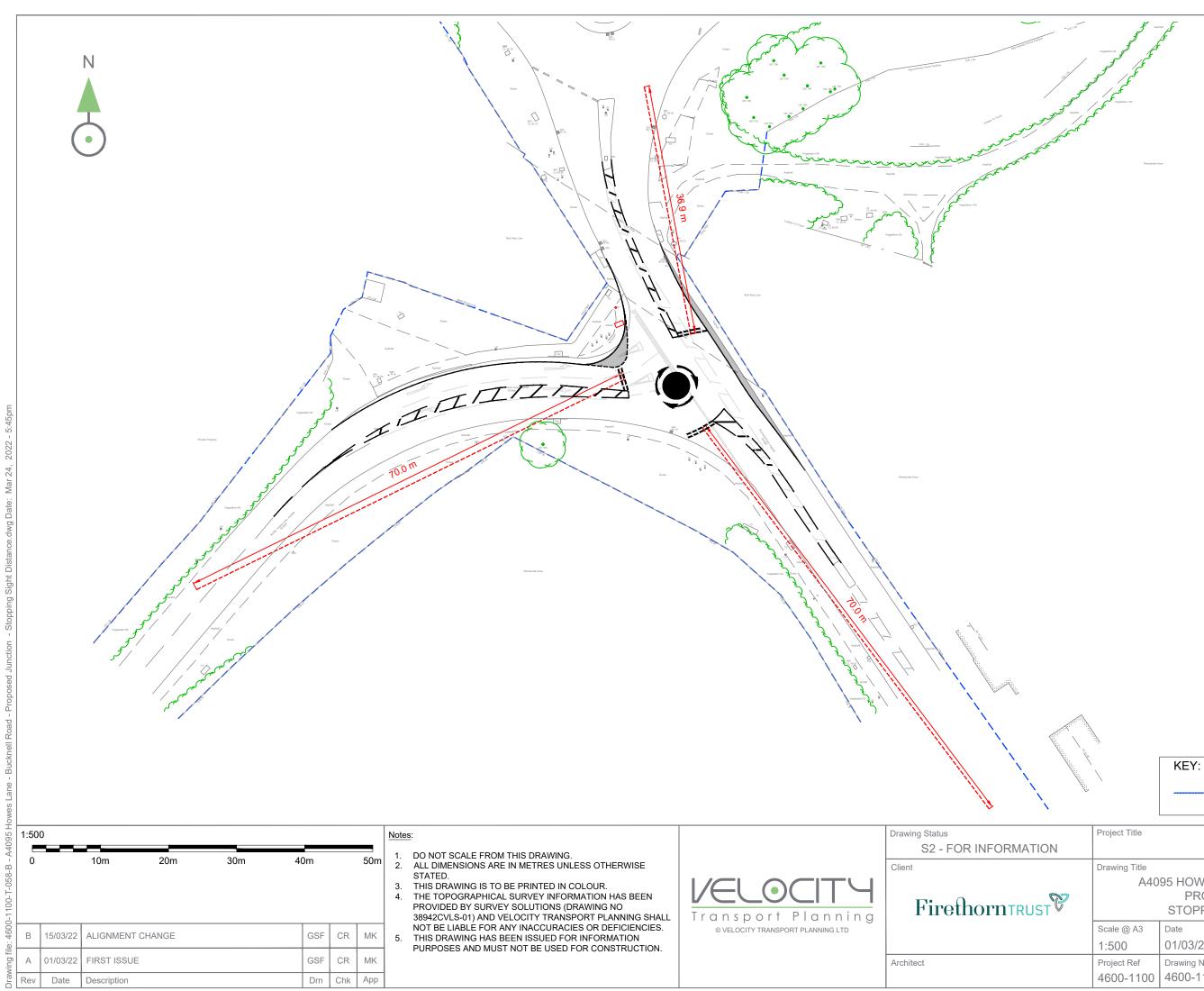
Project Title						
NW BICESTER						
Drawing Title						
A4095 HOWES LANE/ BUCKNELL ROAD						
PROPOSED JUNCTION						
GENERAL ARRANGEMENT						
Scale @ A3	Date	Designed/Drawn	Checked	Approved		
1:500	01/03/22	GSF	CR	M١	<	
Project Ref	Drawing Numbe	Rev				
4600-1100	00-1100 4600-1100-T-054					







				~1	\sim	4
				F		
2			/	/sp ⁻¹		
(_	IC CL 85.96		Grass	Vegetation 10	n	
и мн 🗆	WM	wm have have have have have have have have	\sim	, ,		
CL 85.92	Grass	۳ کر	γ / C'			
	F	Vegetation 6h	3 \ [~			
			218			
	1/R 1.8h	-	$S \mid S$			
			< (
		Residential	l Area			
CIB						
Clar 221 Find						
\backslash						
	$\mathbf{\dot{\mathbf{x}}}$					
		KEY:				
Y	SI CE		ASSUME		Y	
	Asphalt		BOUNDAF	۲Y	_	
`						
	Project Title	NIV	V BICESTER			
	Drowing Title	147	DIOLOIEK			
	Drawing Title A40		LANE/ BUCK		D	
	A40		DSED JUNCT		L)	
			BILITY SPLAY			
	Scale @ A3	Date	Designed/Drawn	Checked	Арр	proved
	1:250	01/03/22	GSF	CR	Mł	
	Project Ref	Drawing Numb				Rev
	4600-1100	4600-1100-	-T-057			В



ASSUMED HIGHWAY BOUNDARY							
Project Title							
NW BICESTER							
Drawing Title							
A4095 HOWES LANE/ BUCKNELL ROAD PROPOSED JUNCTION STOPPING SIGHT DISTANCE							
Scale @ A3	Date	Designed/Drawn	Checked	Арр	proved		
1:500	01/03/22	GSF	CR	Mł	<		
Project Ref 4600-1100	Drawing Number 4600-1100-T-058						

