



Job Name: Land at Grange Farm, Cannington

Job N<sup>o</sup>: IMA-18-040

Date: January 2019

Client: A&M Hollis

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## Technical Note 1: Issues Raised in Local Highway Authority Consultation Response

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### 1 Introduction

- 1.1 This report has been produced to address points raised in the Local Highway Authority (LHA) consultation response dated 4<sup>th</sup> December 2018 regarding outline planning application 13/18/00040/DD, for up to 73 dwellings and formation of an access on land north of Grange Farm, Main Road, Cannington.
- 1.2 The planning application was supported by a Transport Assessment (TA) prepared by IMA Transport Planning in July 2018. The LHA response to the TA raised the following matters following a review of the transport modelling by their consultant WSP and an internal Safety Audit:

- Timing of the peak hours
- Visibility at new roundabout entry
- Geometry of new roundabout entry
- Road Safety Audit issues

- 1.3 Each point raised is addressed in the sections below.

### 2 Peak Hour Timing

- 2.1 The LHA commented that the TA assumed standard peak hours (08:00-09:00 and 17:00-18:00) rather than considering the peak hours from the traffic surveys, which WSP stated fell in the periods 07:30-08:30 and 16:30-17:30, when flows were higher.
- 2.2 WSP repeated the A39 roundabout modelling with the junction peak hour flows and found the junction still operated within capacity.
- 2.3 The geometric alterations considered later in this report require the modelling to be revised, so the peak periods were checked again. The TA in fact used the peak hour periods for the development traffic, rather than the highway network peaks.
- 2.4 The survey data has been re-analysed and the weekday AM peak at the roundabout actually falls in the period 07:15 to 08:15. Revised traffic flows for the peak hours of 07:15-08:15 and 16:30-17:30 are shown in Figures TN1-1 to 5.
- 2.5 As a worst-case, the development traffic flows are still based on the development peak rather than the revised highway peak.

### 3 Visibility at New Roundabout Entry

- 3.1 Plots of forward visibility onto the circulating carriageway and visibility to the right on entry have been added to plan IMA-18-040-008, included in Appendix TN1-2. There are no issues with visibility at the proposed access.

### 4 Geometry of New Roundabout Entry

- 4.1 Entry and exit widths at the proposed site access have been widened to 4.5m at the request of the LHA, with entry deflection maintained. The revised general arrangement plan (IMA-18-040-007) is included in Appendix TN1-2.

- 4.2 The Junctions 9 model of the roundabout has been repeated using the revised access geometry and the traffic flows from Figures TN1-4 (2023 baseline) and TN1-5 (2023 with development) to reflect the revised peak periods. The full outputs are included in Appendix TN1-3, with results summarised in the table below.

|                            | Morning Peak (08:00-09:00) |           |       | Evening Peak (17:00-18:00) |           |       |
|----------------------------|----------------------------|-----------|-------|----------------------------|-----------|-------|
|                            | Max RFC                    | Delay (s) | Queue | Max RFC                    | Delay (s) | Queue |
| 2018                       |                            |           |       |                            |           |       |
| Main Road                  | 0.27                       | 3.44      | 0.4   | 0.46                       | 4.73      | 0.8   |
| A39 Main Road              | 0.59                       | 5.66      | 1.6   | 0.44                       | 3.85      | 0.8   |
| A39                        | 0.34                       | 3.81      | 0.6   | 0.39                       | 3.89      | 0.7   |
| 2023 Base                  |                            |           |       |                            |           |       |
| Main Road                  | 0.29                       | 3.61      | 0.4   | 0.49                       | 5.18      | 1.0   |
| A39 Main Road              | 0.63                       | 6.34      | 1.9   | 0.46                       | 4.05      | 0.9   |
| A39                        | 0.36                       | 4.00      | 0.6   | 0.42                       | 4.11      | 0.8   |
| 2023 Base plus Development |                            |           |       |                            |           |       |
| Main Road                  | 0.30                       | 3.63      | 0.4   | 0.50                       | 5.35      | 1.0   |
| Site Access                | 0.06                       | 6.37      | 0.1   | 0.03                       | 9.04      | 0.0   |
| A39 Main Road              | 0.64                       | 6.41      | 1.9   | 0.48                       | 4.17      | 1.0   |
| A39                        | 0.36                       | 4.01      | 0.6   | 0.42                       | 4.20      | 0.8   |

Table 1: A39/Main Road/Site Access Assessment Results

- 4.3 The revised assessments show the A39 roundabout would continue to operate with a large reserve capacity after the addition of a fourth arm to serve the development. The changes to capacity, delays and queues likely to arise from the additional arm are negligible.
- 4.4 The swept path of a Refuse Collection Vehicle to Somerset Waste Partnership standards is shown in Plan IMA-18-040-009, included in Appendix TN1-2.
- 4.5 Various points relating to vertical alignment, landscaping, surfacing, drainage, lighting, kerbs, services and markings/signs raised by the LHA are all matters of detailed design and have been noted for consideration in the preparation of a Section 278 submission following a reserved matters planning application.
- 5 Road Safety Audit Issues
- 5.1 An issue regarding alignment of the proposed access onto the roundabout has been noted and addressed in the new general arrangement plan (IMA-18-040-007 in Appendix TN1-2) when considering the access widening and swept path analysis requested by the LHA.
- 5.2 Notes have been added regarding the tactile paving at the roundabout crossing at the request of the LHA and the point noted for detailed design at the S278 stage.
- 5.3 The entry to the off-road shared-use footway/cycleway that exists along the east side of the A39 has been modified to enable cyclists to join it away from the mouth of the roundabout entry (see plan IMA-18-040-007 in Appendix TN1-2).

- 5.4 Other points regarding signs, markings etc are matters of detailed design and are all noted for consideration in a Section 278 submission.
- 6 Travel Plan
- 6.1 The following points regarding the Travel Plan have been incorporated into a revised framework document included in Appendix TN1-4.
- TP fee of £2,000 plus VAT should be committed to within the document.
- 6.2 References to the Travel Plan Fee have been added at paragraph 5.1.2 in the section on monitoring, to which the fee relates, and in the list of actions in section 6.2.
- Safeguard sum of £9,300 should be committed to.
- 6.3 References to safeguarding through funding to allow the Travel Plan outcomes to be achieved in the event of default by the developer or landowner have been added at section 3.5 and in the list of actions in section 6.2.
- TP Management Fund should be committed to. This is usually based on 3-5 events per year, with approximately £1,500 per event.
- 6.4 References to the budget have been added at paragraph 4.2.3 and section 4.4. A budget of £1,000 is suggested in years 2 & 5 of the Travel Plan for events to promote cycling, based on the details set out in section 4.4, which is in addition to a commitment to fund a Green Travel Voucher scheme discussed below.
- Measures that have been omitted: Green Travel Vouchers, Electric Vehicle Charging points, Noticeboard.
- 6.5 A section on Green Travel Vouchers has been added at 4.3. The commitment has been offered for the first occupant of each dwelling only, as experience with residential travel plans has shown that there is no effective/reasonably economic means of establishing when plots change ownership.
- 6.6 Section 4.7 sets out a commitment to EVCPs, with their numbers and specification to be agreed as part of a reserved matters planning application, when more details of the dwellings are available than at this outline stage.
- 6.7 The Travel Plan has a commitment to a website, which is considered far more relevant than a physical noticeboard, which are less likely to be updated regularly and an ongoing maintenance liability.
- No mention of how this TP will be secured. Given the lack of details and the TP falling within the threshold of a Full Travel Plan, this should be secured by S106.
- 6.8 A commitment to secure the Travel Plan via S106 agreement has been added at paragraph 1.1.3.
- The document states it will consider SCC Parking standards for both parking and cycle parking at reserved matters. I would be happier if they commit to using SCC Parking Strategy 2013.
- 6.9 Section 2.2 already refers explicitly to the Parking Strategy, but the references have been amended specifically to 'SCC Parking Strategy 2013'.
- Census data is not at ward level. I have therefore provided an Excel spread sheet for you to pass to the client for action.
- 6.10 The census data in Table 1 in section 2.5 is now presented at Ward level.

## 7 Summary & Conclusions

7.1 This Technical Note has considered points raised in the Local Highway Authority (LHA) consultation response dated 4<sup>th</sup> December 2018 regarding outline planning application 13/18/00040/DD, for up to 73 dwellings and formation of an access on land north of Grange Farm, Main Road, Cannington.

7.2 The main points are summarised as follows:

- (i) The timing of highway network peak hours has been re-examined, with no alteration to the conclusions of the Transport Assessment.
- (ii) The visibility requirements for the new entry arm have been added to scheme plans to demonstrate that they are achievable.
- (iii) The geometry of the entry and exit to the new roundabout arm has been amended as requested by the LHA, with swept path analysis based on the Somerset Waste Partnership design refuse collection vehicle.
- (iv) The Junctions9 model of the A39 roundabout has been re-run with the revised peak hours and altered entry geometry, showing that the addition of a new arm and the development traffic would have no material impact on the junction, which would continue to operate with a large reserve of capacity and minimal queues or delays.
- (v) A range of Road Safety Audit issues have been considered and incorporated into a new General Arrangement Drawing where required, or otherwise noted for consideration during detailed design for a Section 278 application.
- (vi) The Travel Plan has been expanded to include a range of additional commitments requested by the LHA.

7.3 It is concluded that this Technical Note has thoroughly addressed all of the points raised by the LHA consultation response and that the conclusions of the initial Transport Assessment remain valid, such that the proposed development will have no adverse highway implications that might warrant refusal on transport grounds.

## FIGURES

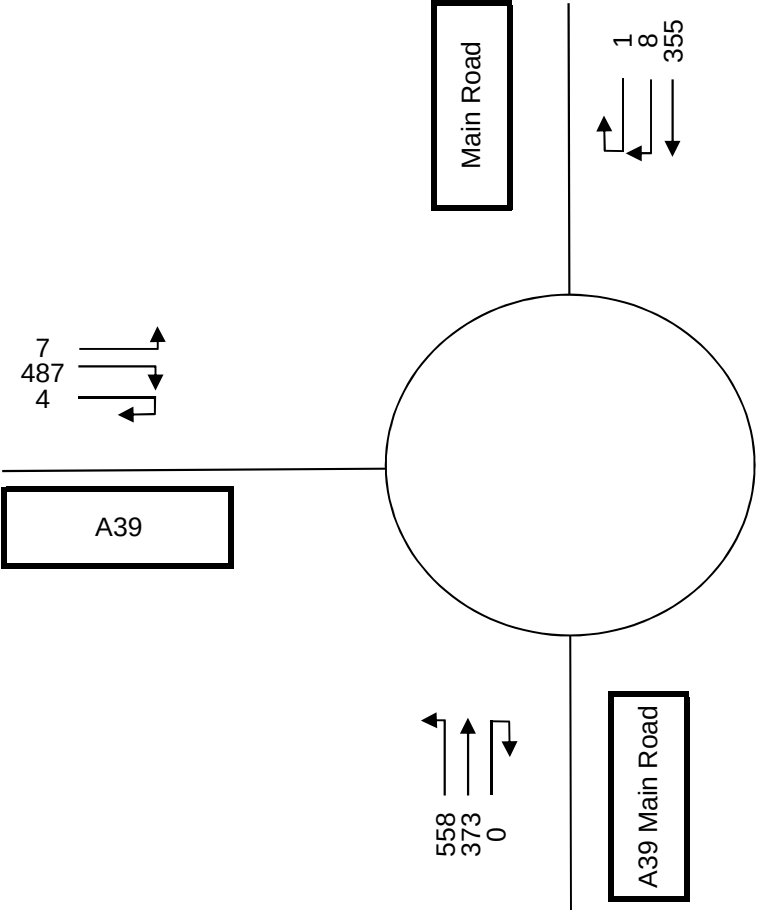
Figures TN1-1 to 5

## APPENDICES

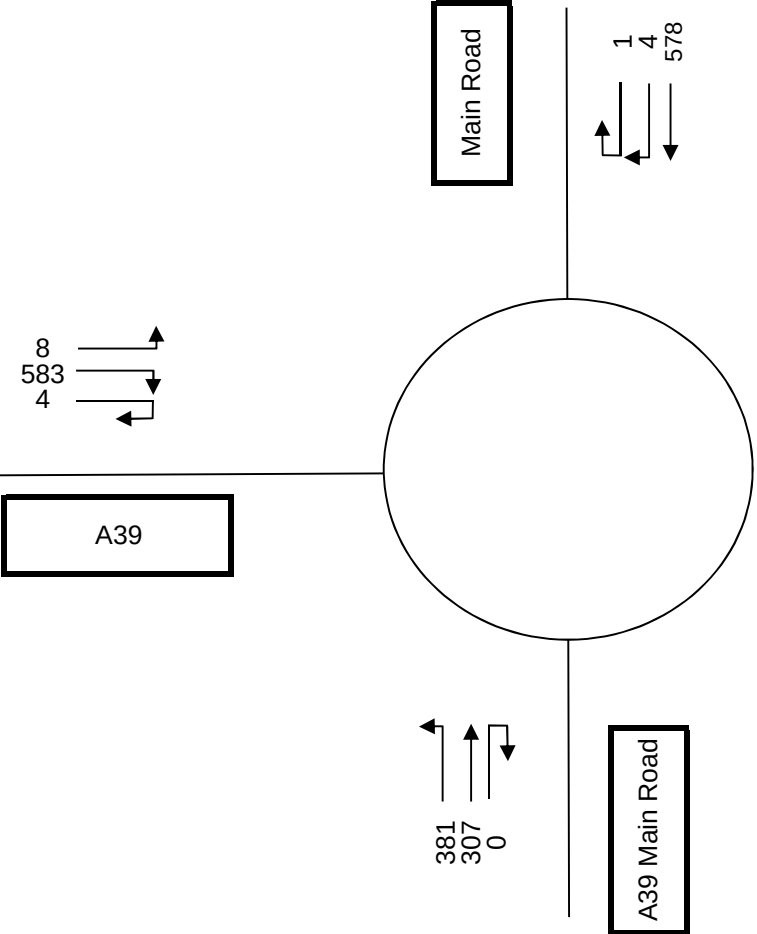
|                |   |                               |
|----------------|---|-------------------------------|
| Appendix TN1-1 | - | Survey Analysis               |
| Appendix TN1-2 | - | Plans IMA-18-040-007 to 009   |
| Appendix TN1-3 | - | Junctions 9 Output            |
| Appendix TN1-4 | - | Revised Travel Plan Framework |

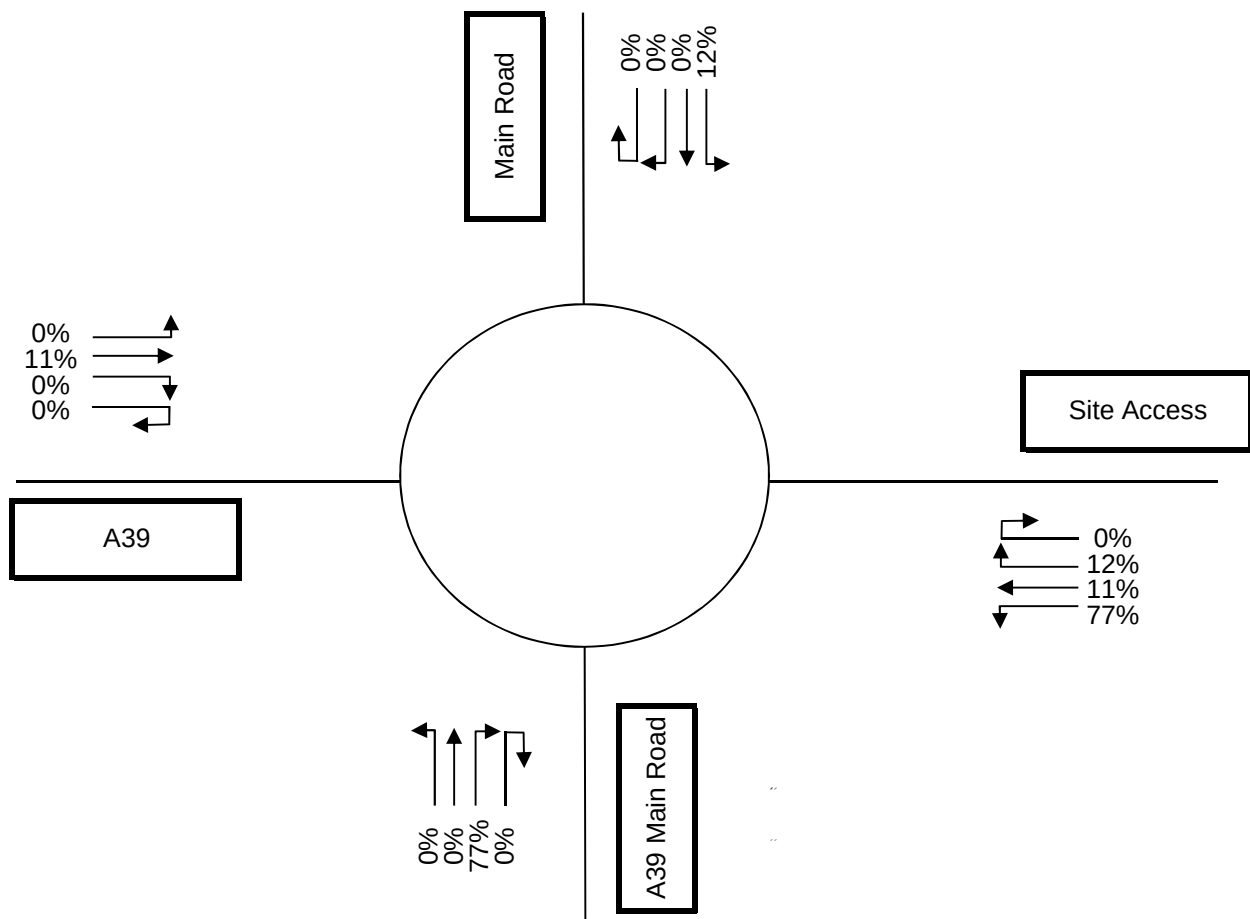
## Figures TN1-1 to 5

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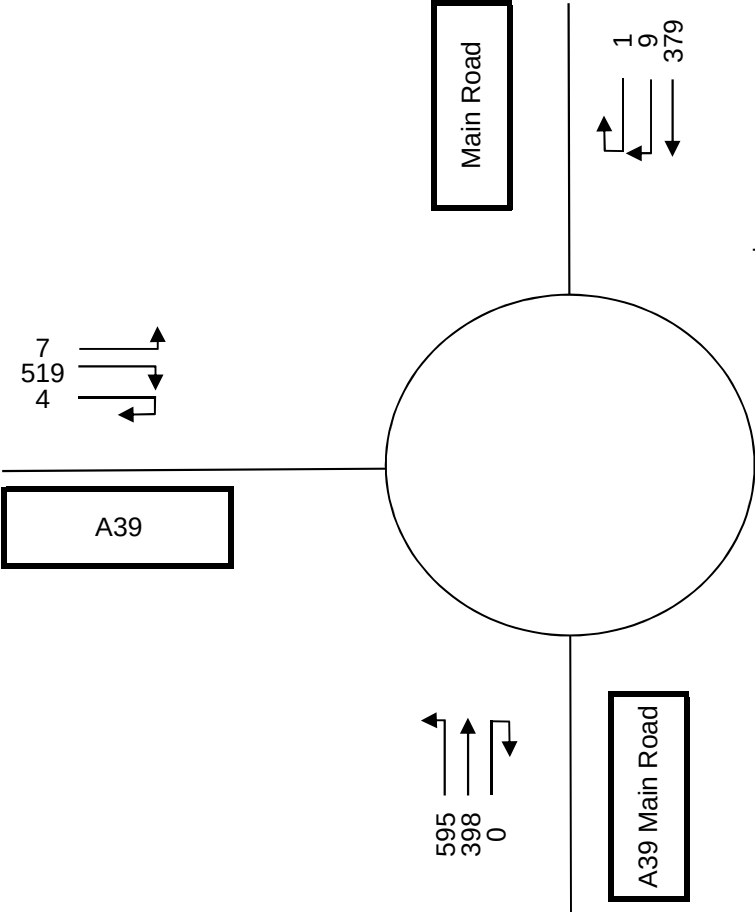


PM PEAK - 16:30-17:30



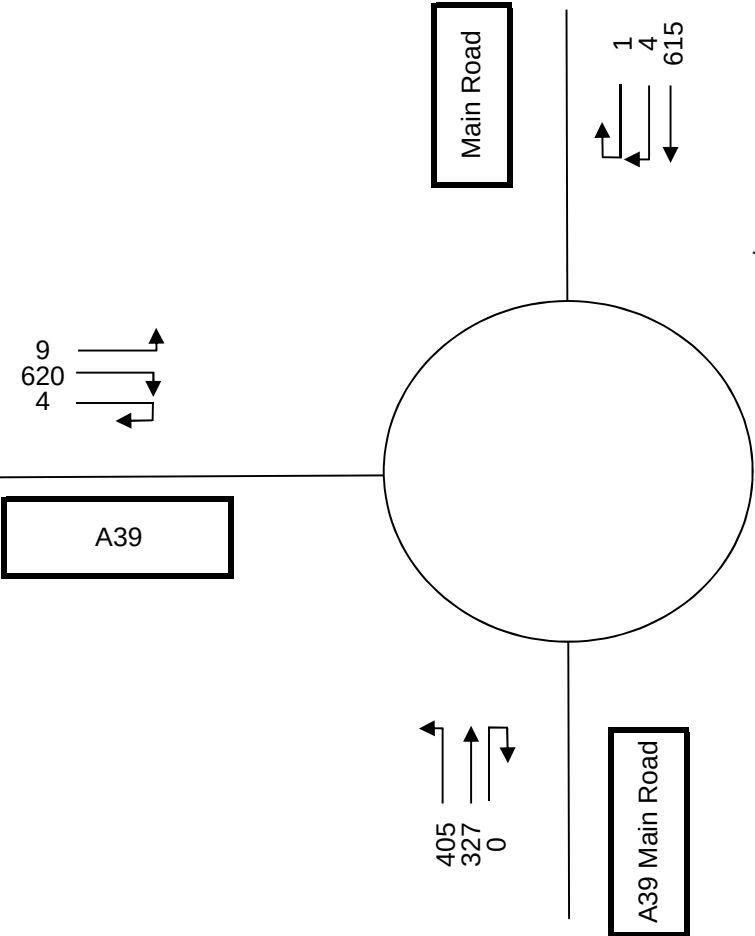


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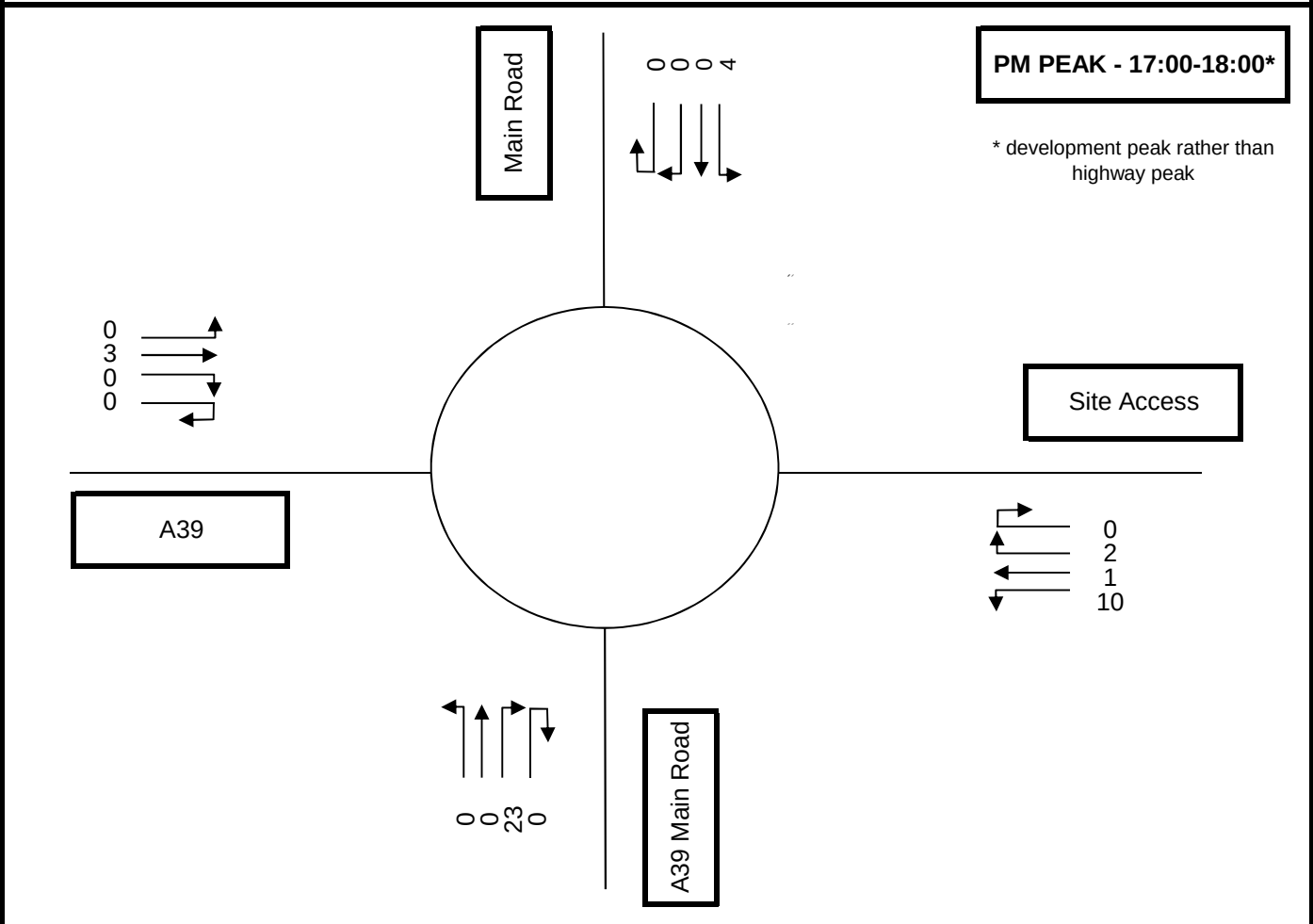
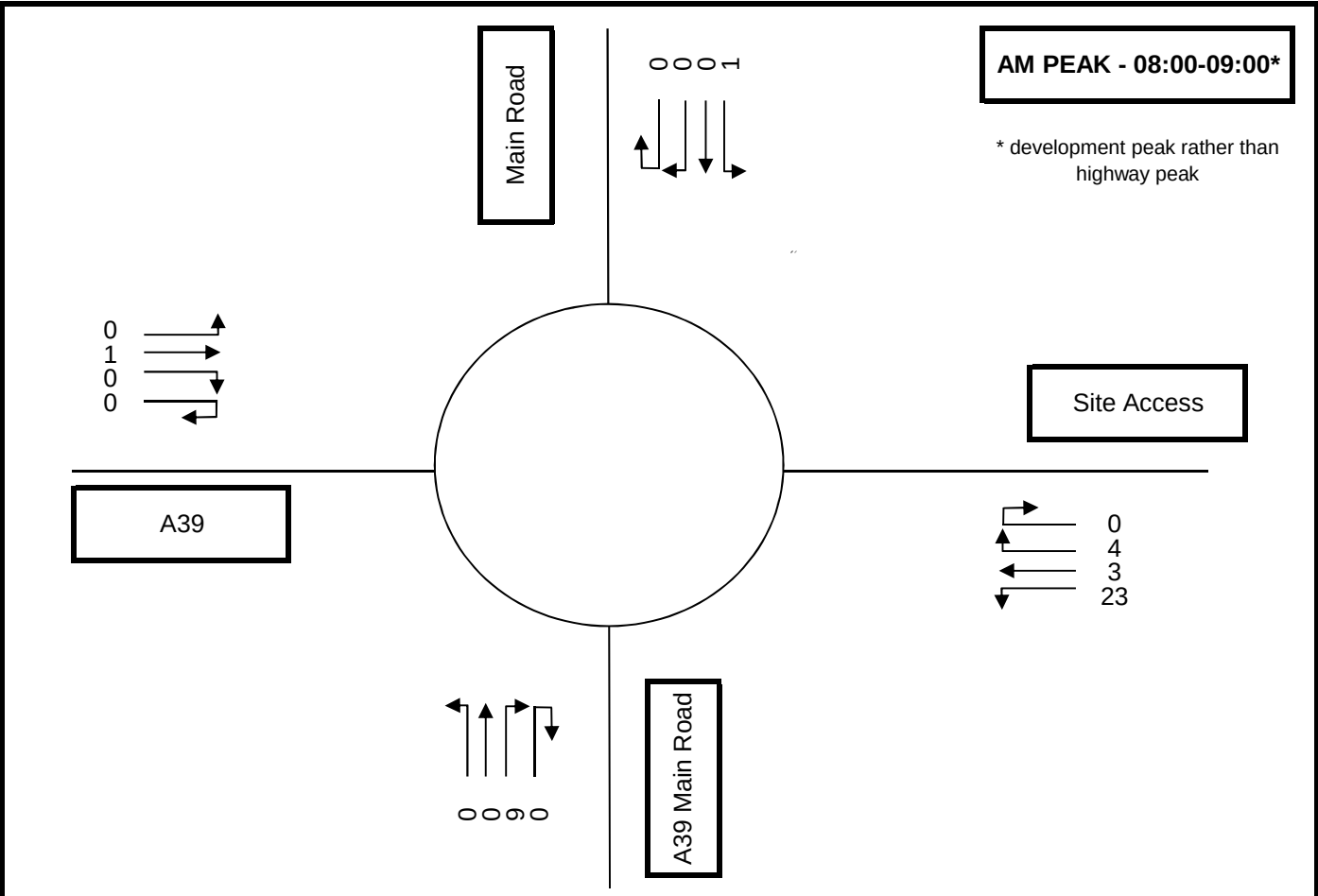
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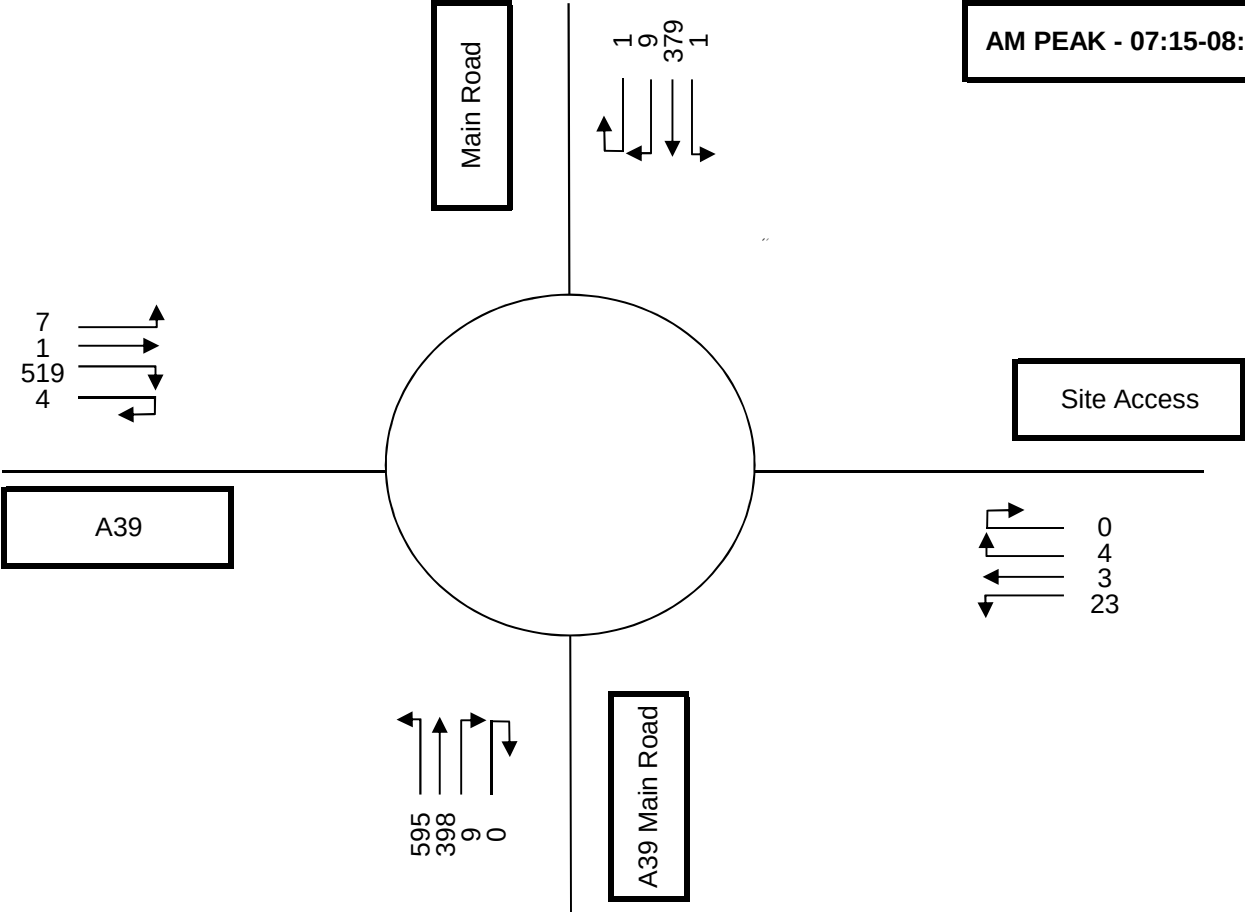


TEMPRO Growth 2018 to 2023: 1.064

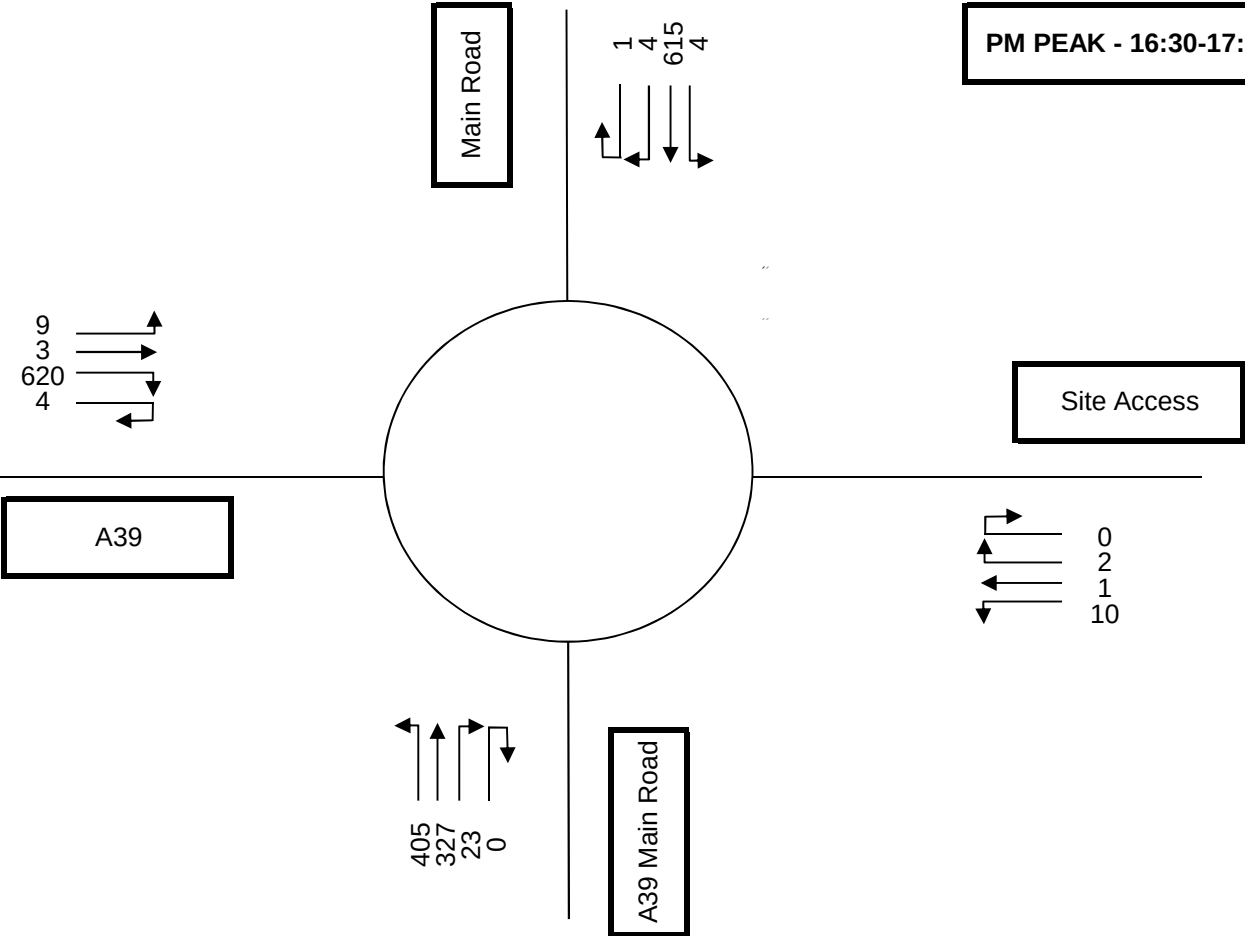




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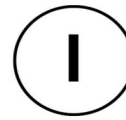


PM PEAK - 16:30-17:30



# Appendix TN1-1

(Survey Analysis)



TRANSPORT PLANNING

| TIME         | MOVEMENT 1<br>FROM MAIN ROAD TO<br>A39 MAIN ROAD |              |     | MOVEMENT 2<br>FROM MAIN ROAD TO<br>A39 |              |     | MOVEMENT 3<br>FROM MAIN ROAD TO<br>MAIN ROAD |              |     | MOVEMENT 4<br>FROM A39 TO MAIN<br>ROAD |              |     | MOVEMENT 5<br>FROM A39 TO A39 MAIN<br>ROAD |              |     | MOVEMENT 6<br>FROM A39 TO A39 |              |     | MOVEMENT 7<br>FROM A39 MAIN ROAD<br>TO A39 |              |     | MOVEMENT 8<br>FROM A39 MAIN ROAD<br>TO MAIN ROAD |              |     |
|--------------|--------------------------------------------------|--------------|-----|----------------------------------------|--------------|-----|----------------------------------------------|--------------|-----|----------------------------------------|--------------|-----|--------------------------------------------|--------------|-----|-------------------------------|--------------|-----|--------------------------------------------|--------------|-----|--------------------------------------------------|--------------|-----|
|              | Light<br>Veh                                     | Heavy<br>Veh | PCU | Light<br>Veh                           | Heavy<br>Veh | PCU | Light<br>Veh                                 | Heavy<br>Veh | PCU | Light<br>Veh                           | Heavy<br>Veh | PCU | Light<br>Veh                               | Heavy<br>Veh | PCU | Light<br>Veh                  | Heavy<br>Veh | PCU | Light<br>Veh                               | Heavy<br>Veh | PCU | Light<br>Veh                                     | Heavy<br>Veh | PCU |
| 7:00         | 72                                               | 1            | 74  | 0                                      | 1            | 2   | 0                                            | 0            | 0   | 1                                      | 0            | 1   | 71                                         | 13           | 97  | 0                             | 1            | 2   | 87                                         | 23           | 133 | 122                                              | 2            | 126 |
| 7:15         | 74                                               | 2            | 78  | 2                                      | 0            | 2   | 0                                            | 0            | 0   | 0                                      | 0            | 0   | 75                                         | 15           | 105 | 0                             | 0            | 0   | 93                                         | 32           | 157 | 106                                              | 4            | 114 |
| 7:30         | 96                                               | 1            | 98  | 1                                      | 0            | 1   | 0                                            | 0            | 0   | 0                                      | 0            | 0   | 86                                         | 22           | 130 | 0                             | 1            | 2   | 63                                         | 22           | 107 | 78                                               | 4            | 86  |
| 7:45         | 76                                               | 4            | 84  | 2                                      | 0            | 2   | 0                                            | 0            | 0   | 3                                      | 0            | 3   | 95                                         | 17           | 129 | 0                             | 0            | 0   | 97                                         | 28           | 153 | 77                                               | 5            | 87  |
| 8:00         | 87                                               | 4            | 95  | 3                                      | 0            | 3   | 1                                            | 0            | 1   | 4                                      | 0            | 4   | 83                                         | 20           | 123 | 0                             | 1            | 2   | 101                                        | 20           | 141 | 78                                               | 4            | 86  |
| 8:15         | 64                                               | 6            | 76  | 2                                      | 0            | 2   | 0                                            | 0            | 0   | 1                                      | 1            | 3   | 93                                         | 19           | 131 | 0                             | 0            | 0   | 86                                         | 11           | 108 | 82                                               | 4            | 90  |
| 8:30         | 58                                               | 3            | 64  | 5                                      | 0            | 5   | 1                                            | 0            | 1   | 3                                      | 1            | 5   | 82                                         | 9            | 100 | 0                             | 0            | 0   | 76                                         | 15           | 106 | 82                                               | 3            | 88  |
| 8:45         | 63                                               | 1            | 65  | 6                                      | 0            | 6   | 1                                            | 0            | 1   | 1                                      | 0            | 1   | 61                                         | 18           | 97  | 0                             | 0            | 0   | 67                                         | 17           | 101 | 89                                               | 1            | 91  |
| 9:00         | 78                                               | 4            | 86  | 3                                      | 0            | 3   | 1                                            | 0            | 1   | 2                                      | 0            | 2   | 60                                         | 18           | 96  | 0                             | 0            | 0   | 65                                         | 29           | 123 | 56                                               | 4            | 64  |
| 9:15         | 66                                               | 6            | 78  | 4                                      | 0            | 4   | 0                                            | 0            | 0   | 2                                      | 0            | 2   | 73                                         | 6            | 85  | 1                             | 0            | 1   | 48                                         | 10           | 68  | 45                                               | 5            | 55  |
| 9:30         | 50                                               | 4            | 58  | 0                                      | 0            | 0   | 1                                            | 0            | 1   | 1                                      | 0            | 1   | 85                                         | 21           | 127 | 0                             | 0            | 0   | 51                                         | 18           | 87  | 53                                               | 1            | 55  |
| 9:45         | 51                                               | 1            | 53  | 2                                      | 0            | 2   | 1                                            | 0            | 1   | 1                                      | 0            | 1   | 47                                         | 20           | 87  | 0                             | 0            | 0   | 71                                         | 24           | 119 | 40                                               | 1            | 42  |
| Actual Peak  | 333                                              | 11           | 355 | 8                                      | 0            | 8   | 1                                            | 0            | 1   | 7                                      | 0            | 7   | 339                                        | 74           | 487 | 0                             | 2            | 4   | 354                                        | 102          | 558 | 339                                              | 17           | 373 |
| Assumed Peak | 272                                              | 14           | 300 | 16                                     | 0            | 16  | 3                                            | 0            | 3   | 9                                      | 2            | 13  | 319                                        | 66           | 451 | 0                             | 1            | 2   | 330                                        | 63           | 456 | 331                                              | 12           | 355 |

| TIME         | MOVEMENT 1<br>FROM MAIN ROAD TO<br>A39 MAIN ROAD |              |     | MOVEMENT 2<br>FROM MAIN ROAD TO<br>A39 |              |     | MOVEMENT 3<br>FROM MAIN ROAD TO<br>MAIN ROAD |              |     | MOVEMENT 4<br>FROM A39 TO MAIN<br>ROAD |              |     | MOVEMENT 5<br>FROM A39 TO A39 MAIN<br>ROAD |              |     | MOVEMENT 6<br>FROM A39 TO A39 |              |     | MOVEMENT 7<br>FROM A39 MAIN ROAD<br>TO A39 |              |     | MOVEMENT 8<br>FROM A39 MAIN ROAD<br>TO MAIN ROAD |              |     |
|--------------|--------------------------------------------------|--------------|-----|----------------------------------------|--------------|-----|----------------------------------------------|--------------|-----|----------------------------------------|--------------|-----|--------------------------------------------|--------------|-----|-------------------------------|--------------|-----|--------------------------------------------|--------------|-----|--------------------------------------------------|--------------|-----|
|              | Light<br>Veh                                     | Heavy<br>Veh | PCU | Light<br>Veh                           | Heavy<br>Veh | PCU | Light<br>Veh                                 | Heavy<br>Veh | PCU | Light<br>Veh                           | Heavy<br>Veh | PCU | Light<br>Veh                               | Heavy<br>Veh | PCU | Light<br>Veh                  | Heavy<br>Veh | PCU | Light<br>Veh                               | Heavy<br>Veh | PCU | Light<br>Veh                                     | Heavy<br>Veh | PCU |
| 16:00        | 78                                               | 7            | 92  | 0                                      | 0            | 0   | 0                                            | 0            | 0   | 3                                      | 0            | 3   | 86                                         | 24           | 134 | 0                             | 0            | 0   | 80                                         | 16           | 112 | 60                                               | 2            | 64  |
| 16:15        | 99                                               | 4            | 107 | 2                                      | 0            | 2   | 1                                            | 0            | 1   | 1                                      | 0            | 1   | 74                                         | 24           | 122 | 0                             | 1            | 2   | 92                                         | 12           | 116 | 69                                               | 2            | 73  |
| 16:30        | 133                                              | 2            | 137 | 0                                      | 0            | 0   | 0                                            | 0            | 0   | 3                                      | 0            | 3   | 98                                         | 20           | 138 | 0                             | 0            | 0   | 90                                         | 7            | 104 | 76                                               | 2            | 80  |
| 16:45        | 148                                              | 2            | 152 | 1                                      | 0            | 1   | 1                                            | 0            | 1   | 1                                      | 0            | 1   | 119                                        | 15           | 149 | 0                             | 0            | 0   | 71                                         | 9            | 89  | 68                                               | 0            | 68  |
| 17:00        | 159                                              | 0            | 159 | 0                                      | 0            | 0   | 0                                            | 0            | 0   | 1                                      | 0            | 1   | 115                                        | 10           | 135 | 0                             | 1            | 2   | 75                                         | 8            | 91  | 79                                               | 2            | 83  |
| 17:15        | 124                                              | 3            | 130 | 1                                      | 1            | 3   | 0                                            | 0            | 0   | 3                                      | 0            | 3   | 119                                        | 21           | 161 | 0                             | 1            | 2   | 89                                         | 4            | 97  | 72                                               | 2            | 76  |
| 17:30        | 102                                              | 3            | 108 | 0                                      | 0            | 0   | 0                                            | 0            | 0   | 5                                      | 0            | 5   | 85                                         | 13           | 111 | 0                             | 0            | 0   | 105                                        | 7            | 119 | 83                                               | 2            | 87  |
| 17:45        | 57                                               | 2            | 61  | 2                                      | 0            | 2   | 0                                            | 0            | 0   | 0                                      | 0            | 0   | 80                                         | 12           | 104 | 0                             | 1            | 2   | 85                                         | 7            | 99  | 103                                              | 0            | 103 |
| 18:00        | 87                                               | 4            | 95  | 0                                      | 0            | 0   | 0                                            | 1            | 2   | 2                                      | 0            | 2   | 87                                         | 10           | 107 | 0                             | 0            | 0   | 66                                         | 9            | 84  | 90                                               | 1            | 92  |
| 18:15        | 72                                               | 1            | 74  | 1                                      | 0            | 1   | 0                                            | 0            | 0   | 2                                      | 0            | 2   | 49                                         | 18           | 85  | 0                             | 1            | 2   | 77                                         | 3            | 83  | 92                                               | 1            | 94  |
| 18:30        | 49                                               | 0            | 49  | 2                                      | 0            | 2   | 0                                            | 0            | 0   | 2                                      | 0            | 2   | 49                                         | 14           | 77  | 0                             | 0            | 0   | 77                                         | 5            | 87  | 78                                               | 2            | 82  |
| 18:45        | 63                                               | 0            | 63  | 1                                      | 0            | 1   | 0                                            | 0            | 0   | 2                                      | 0            | 2   | 52                                         | 11           | 74  | 0                             | 0            | 0   | 57                                         | 3            | 63  | 72                                               | 1            | 74  |
| Peak         | 564                                              | 7            | 578 | 2                                      | 1            | 4   | 1                                            | 0            | 1   | 8                                      | 0            | 8   | 451                                        | 66           | 583 | 0                             | 2            | 4   | 325                                        | 28           | 381 | 295                                              | 6            | 307 |
| Assumed Peak | 442                                              | 8            | 458 | 3                                      | 1            | 5   | 0                                            | 0            | 0   | 9                                      | 0            | 9   | 399                                        | 56           | 511 | 0                             | 3            | 6   | 354                                        | 26           | 406 | 337                                              | 6            | 349 |

# Appendix TN1-2

(Plans IMA-18-040-007 to 009)

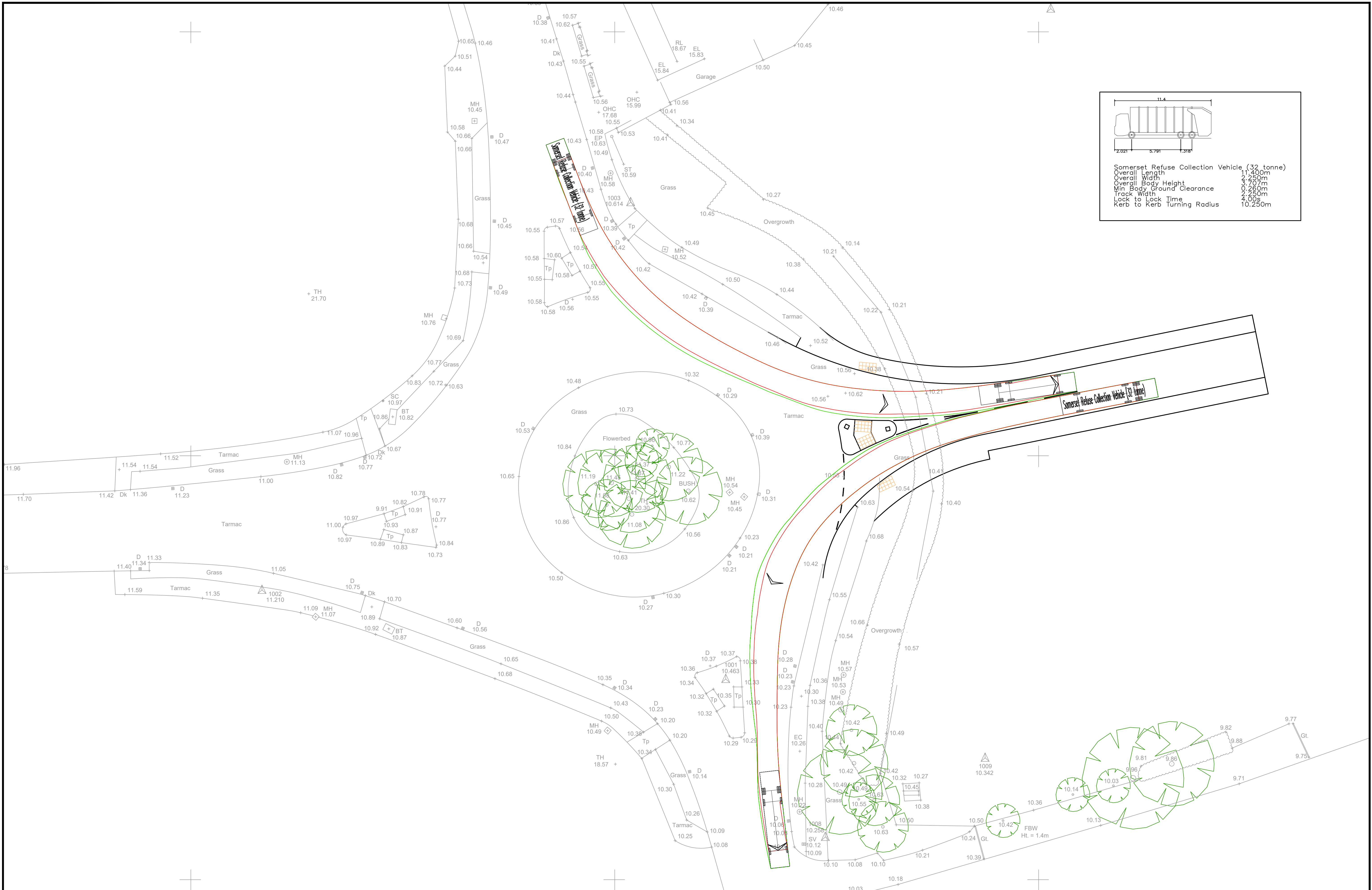












Somerset Refuse Collection Vehicle (32 tonne)

Overall Length 11.400m

Overall Width 2.250m

Overall Body Height 3.707m

Min Body Ground Clearance 0.280m

Track Width 2.230m

Lock to Lock Time 4.00s

Kerb to Kerb Turning Radius 10.250m

|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--------|--|--------------------------------------------|--|---------------------------------------------------------------------------------------------------------|--|-----------------|--|--|
| <div><div><div>I</div><div>M</div><div>A</div></div><div>TRANSPORT PLANNING</div><div>11 KINGSMEAD SQUARE<br/>BATH BA1 2AB<br/>T: 01225 444 011<br/>www.ima-tp.com</div></div> |  |  |  |  |  |  |  |  |  |  |  |  | NOTES: |  | CLIENT: Mrs Daphne Yorke                   |  | TITLE: Proposed Site Access Junction<br>Swept Path Analysis<br>Large Somerset Refuse Collection Vehicle |  | DRAWING STATUS: |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  | PROJECT: Land at Grange Farm<br>Cannington |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |
|                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |  |  |  |        |  |                                            |  |                                                                                                         |  |                 |  |  |



## Appendix TN1-3

(Junctions 9 Outputs)

| Junctions 9                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ARCADY 9 - Roundabout Module                                                                                                                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Version: 9.5.0.6896                                                                                                                                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| +44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 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:** A39-Main Road Existing Rbt (Revised Pks).j9  
**Path:** P:\2018\IMA-18-040 Grange Farm, Cannington\Assessments  
**Report generation date:** 25/01/2019 11:29:35

»2018, AM  
 »2018, PM  
 »2023, AM  
 »2023, PM

### Summary of junction performance

|                   | AM          |                 |           |      |     |                    |              |                           | PM          |                 |           |      |     |                    |              |                           |
|-------------------|-------------|-----------------|-----------|------|-----|--------------------|--------------|---------------------------|-------------|-----------------|-----------|------|-----|--------------------|--------------|---------------------------|
|                   | Queue (PCU) | 95% Queue (PCU) | Delay (s) | RFC  | LOS | Junction Delay (s) | Junction LOS | Network Residual Capacity | Queue (PCU) | 95% Queue (PCU) | Delay (s) | RFC  | LOS | Junction Delay (s) | Junction LOS | Network Residual Capacity |
|                   | 2018        |                 |           |      |     |                    |              |                           |             |                 |           |      |     |                    |              |                           |
| 1 - Main Road     | 0.4         | 1.0             | 3.44      | 0.27 | A   | 4.69               | A            | 60 %                      | 0.8         | 2.5             | 4.73      | 0.46 | A   | 4.14               | A            | 64 %                      |
| 2 - A39 Main Road | 1.6         | 2.1             | 5.66      | 0.59 | A   |                    |              | 0.8                       | 2.2         | 3.85            | 0.44      | A    |     |                    |              |                           |
| 3 - A39           | 0.6         | 2.6             | 3.81      | 0.34 | A   |                    |              | 0.7                       | 3.0         | 3.89            | 0.39      | A    |     |                    |              |                           |
|                   | 2023        |                 |           |      |     |                    |              |                           |             |                 |           |      |     |                    |              |                           |
| 1 - Main Road     | 0.4         | 1.6             | 3.61      | 0.29 | A   | 5.13               | A            | 49 %                      | 1.0         | 2.0             | 5.18      | 0.49 | A   | 4.42               | A            | 55 %                      |
| 2 - A39 Main Road | 1.9         | 3.0             | 6.34      | 0.63 | A   |                    |              | 0.9                       | 1.7         | 4.05            | 0.46      | A    |     |                    |              |                           |
| 3 - A39           | 0.6         | 3.0             | 4.00      | 0.36 | A   |                    |              | 0.8                       | 2.9         | 4.11            | 0.42      | A    |     |                    |              |                           |

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

### File summary

#### File Description

|             |                   |
|-------------|-------------------|
| Title       | (untitled)        |
| Location    |                   |
| Site number |                   |
| Date        | 25/01/2019        |
| Version     |                   |
| Status      | (new file)        |
| Identifier  |                   |
| Client      |                   |
| Jobnumber   |                   |
| Enumerator  | IMA-TP\TRL        |
| Description | Revised nwk peaks |

## 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

| Vehicle length (m) | Calculate Queue Percentiles | Calculate detailed queueing delay | Calculate residual capacity | Residual capacity criteria type | RFC Threshold | Average Delay threshold (s) | Queue threshold (PCU) |
|--------------------|-----------------------------|-----------------------------------|-----------------------------|---------------------------------|---------------|-----------------------------|-----------------------|
| 5.75               | ✓                           |                                   | ✓                           | Delay                           | 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2018          | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |
| D2 | 2018          | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |
| D3 | 2023          | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |
| D4 | 2023          | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |

## Analysis Set Details

| ID | Include in report | Network flow scaling factor (%) | Network capacity scaling factor (%) |
|----|-------------------|---------------------------------|-------------------------------------|
| A1 | ✓                 | 100.000                         | 100.000                             |

# 2018, AM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|-----------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3   | 4.69               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 60                            | 2 - A39 Main Road            |

## Arms

### Arms

| Arm | Name          | Description |
|-----|---------------|-------------|
| 1   | Main Road     |             |
| 2   | A39 Main Road |             |
| 3   | A39           |             |

### Roundabout Geometry

| Arm               | V - Approach road half-width (m) | E - Entry width (m) | I' - Effective flare length (m) | R - Entry radius (m) | D - Inscribed circle diameter (m) | PHI - Conflict (entry) angle (deg) | Exit only |
|-------------------|----------------------------------|---------------------|---------------------------------|----------------------|-----------------------------------|------------------------------------|-----------|
| 1 - Main Road     | 4.34                             | 7.11                | 17.2                            | 25.0                 | 47.0                              | 40.0                               |           |
| 2 - A39 Main Road | 4.30                             | 7.05                | 18.5                            | 17.0                 | 47.0                              | 47.0                               |           |
| 3 - A39           | 4.54                             | 7.66                | 15.2                            | 20.0                 | 47.0                              | 36.0                               |           |

### Slope / Intercept / Capacity

#### Roundabout Slope and Intercept used in model

| Arm               | Final slope | Final intercept (PCU/hr) |
|-------------------|-------------|--------------------------|
| 1 - Main Road     | 0.637       | 1822                     |
| 2 - A39 Main Road | 0.609       | 1741                     |
| 3 - A39           | 0.654       | 1905                     |

The slope and intercept shown above include any corrections and adjustments.

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2018          | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

## Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 364                     | 100.000            |
| 2 - A39 Main Road |            | ONE HOUR     | ✓            | 931                     | 100.000            |
| 3 - A39           |            | ONE HOUR     | ✓            | 498                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 1             | 355               | 8       |
|      | 2 - A39 Main Road | 373           | 0                 | 558     |
|      | 3 - A39           | 7             | 487               | 4       |
|      |                   |               |                   |         |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 0             | 3                 | 0       |
|      | 2 - A39 Main Road | 4             | 0                 | 17      |
|      | 3 - A39           | 0             | 15                | 50      |
|      |                   |               |                   |         |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.27    | 3.44          | 0.4             | 1.0                             | A       | 334                     | 501                           |
| 2 - A39 Main Road | 0.59    | 5.66          | 1.6             | 2.1                             | A       | 854                     | 1281                          |
| 3 - A39           | 0.34    | 3.81          | 0.6             | 2.6                             | A       | 457                     | 685                           |

### Main Results for each time segment

#### 07:45 - 08:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 274                   | 69                      | 368                       | 1588              | 0.173 | 273                 | 286                             | 0.0               | 0.2             | 2.817     | A                             |
| 2 - A39 Main Road | 701                   | 175                     | 10                        | 1735              | 0.404 | 698                 | 632                             | 0.0               | 0.7             | 3.848     | A                             |
| 3 - A39           | 375                   | 94                      | 280                       | 1722              | 0.218 | 374                 | 427                             | 0.0               | 0.3             | 3.068     | A                             |

#### 08:00 - 08:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 327                   | 82                      | 441                       | 1541              | 0.212 | 327                 | 342                             | 0.2               | 0.3             | 3.050     | A                             |
| 2 - A39 Main Road | 837                   | 209                     | 12                        | 1734              | 0.483 | 836                 | 756                             | 0.7               | 1.0             | 4.451     | A                             |
| 3 - A39           | 448                   | 112                     | 336                       | 1685              | 0.266 | 447                 | 512                             | 0.3               | 0.4             | 3.343     | A                             |

### 08:15 - 08:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 401                   | 100                     | 540                       | 1478              | 0.271 | 400                 | 419                             | 0.3               | 0.4             | 3.434     | A                             |
| 2 - A39 Main Road | 1025                  | 256                     | 14                        | 1732              | 0.592 | 1023                | 926                             | 1.0               | 1.6             | 5.623     | A                             |
| 3 - A39           | 548                   | 137                     | 411                       | 1636              | 0.335 | 548                 | 626                             | 0.4               | 0.6             | 3.800     | A                             |

### 08:30 - 08:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 401                   | 100                     | 541                       | 1478              | 0.271 | 401                 | 419                             | 0.4               | 0.4             | 3.438     | A                             |
| 2 - A39 Main Road | 1025                  | 256                     | 14                        | 1732              | 0.592 | 1025                | 927                             | 1.6               | 1.6             | 5.658     | A                             |
| 3 - A39           | 548                   | 137                     | 412                       | 1636              | 0.335 | 548                 | 628                             | 0.6               | 0.6             | 3.805     | A                             |

### 08:45 - 09:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 327                   | 82                      | 442                       | 1541              | 0.212 | 328                 | 343                             | 0.4               | 0.3             | 3.056     | A                             |
| 2 - A39 Main Road | 837                   | 209                     | 12                        | 1734              | 0.483 | 839                 | 758                             | 1.6               | 1.0             | 4.485     | A                             |
| 3 - A39           | 448                   | 112                     | 337                       | 1684              | 0.266 | 448                 | 514                             | 0.6               | 0.4             | 3.352     | A                             |

### 09:00 - 09:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 274                   | 69                      | 370                       | 1587              | 0.173 | 274                 | 287                             | 0.3               | 0.2             | 2.825     | A                             |
| 2 - A39 Main Road | 701                   | 175                     | 10                        | 1735              | 0.404 | 702                 | 635                             | 1.0               | 0.8             | 3.878     | A                             |
| 3 - A39           | 375                   | 94                      | 282                       | 1720              | 0.218 | 375                 | 430                             | 0.4               | 0.3             | 3.079     | A                             |

## Queue Variation Results for each time segment

### 07:45 - 08:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.21       | 0.00      | 0.00      | 0.21      | 0.21      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.75       | 0.61      | 1.11      | 1.56      | 1.61      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.32       | 0.00      | 0.00      | 0.32      | 0.32      |                    |                | N/A                                         | N/A                                    |

### 08:00 - 08:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.28       | 0.00      | 0.00      | 0.28      | 0.28      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.03       | 0.09      | 0.96      | 1.69      | 2.09      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.41       | 0.00      | 0.00      | 0.41      | 0.41      |                    |                | N/A                                         | N/A                                    |

### 08:15 - 08:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.38       | 0.03      | 0.26      | 0.47      | 0.49      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.59       | 0.03      | 0.29      | 1.59      | 1.59      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.58       | 0.03      | 0.29      | 0.58      | 0.58      |                    |                | N/A                                         | N/A                                    |



**08:30 - 08:45**

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.38       | 0.03      | 0.34      | 1.03      | 1.03      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.60       | 0.03      | 0.29      | 1.60      | 1.60      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.58       | 0.04      | 0.35      | 1.61      | 2.62      |                    |                | N/A                                         | N/A                                    |

**08:45 - 09:00**

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.28       | 0.00      | 0.00      | 0.28      | 0.28      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.05       | 0.25      | 1.10      | 1.63      | 1.63      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.42       | 0.00      | 0.00      | 0.42      | 0.42      |                    |                | N/A                                         | N/A                                    |

**09:00 - 09:15**

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.22       | 0.00      | 0.00      | 0.22      | 0.22      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.76       | 0.08      | 0.82      | 1.54      | 1.63      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.32       | 0.00      | 0.00      | 0.32      | 0.32      |                    |                | N/A                                         | N/A                                    |

# 2018, PM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|-----------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3   | 4.14               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 64                            | 1 - Main Road                |

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D2 | 2018          | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

### Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 583                     | 100.000            |
| 2 - A39 Main Road |            | ONE HOUR     | ✓            | 688                     | 100.000            |
| 3 - A39           |            | ONE HOUR     | ✓            | 595                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 1             | 578               | 4       |
|      | 2 - A39 Main Road | 307           | 0                 | 381     |
|      | 3 - A39           | 8             | 583               | 4       |
|      |                   |               |                   |         |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 0             | 1                 | 25      |
|      | 2 - A39 Main Road | 2             | 0                 | 7       |
|      | 3 - A39           | 0             | 11                | 50      |
|      |                   |               |                   |         |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.46    | 4.73          | 0.8             | 2.5                             | A       | 535                     | 802                           |
| 2 - A39 Main Road | 0.44    | 3.85          | 0.8             | 2.2                             | A       | 631                     | 947                           |
| 3 - A39           | 0.39    | 3.89          | 0.7             | 3.0                             | A       | 546                     | 819                           |

### Main Results for each time segment

#### 16:45 - 17:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 439                   | 110                     | 440                       | 1542              | 0.285 | 437                 | 237                             | 0.0               | 0.4             | 3.292     | A                             |
| 2 - A39 Main Road | 518                   | 129                     | 7                         | 1737              | 0.298 | 516                 | 871                             | 0.0               | 0.4             | 3.078     | A                             |
| 3 - A39           | 448                   | 112                     | 231                       | 1754              | 0.255 | 446                 | 292                             | 0.0               | 0.4             | 3.055     | A                             |

#### 17:00 - 17:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 524                   | 131                     | 527                       | 1487              | 0.353 | 524                 | 284                             | 0.4               | 0.5             | 3.778     | A                             |
| 2 - A39 Main Road | 618                   | 155                     | 8                         | 1736              | 0.356 | 618                 | 1043                            | 0.4               | 0.6             | 3.362     | A                             |
| 3 - A39           | 535                   | 134                     | 277                       | 1724              | 0.310 | 534                 | 349                             | 0.4               | 0.5             | 3.358     | A                             |

#### 17:15 - 17:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 642                   | 160                     | 645                       | 1411              | 0.455 | 641                 | 348                             | 0.5               | 0.8             | 4.719     | A                             |
| 2 - A39 Main Road | 758                   | 189                     | 10                        | 1735              | 0.437 | 757                 | 1276                            | 0.6               | 0.8             | 3.842     | A                             |
| 3 - A39           | 655                   | 164                     | 339                       | 1683              | 0.389 | 654                 | 428                             | 0.5               | 0.7             | 3.880     | A                             |

#### 17:30 - 17:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 642                   | 160                     | 646                       | 1411              | 0.455 | 642                 | 348                             | 0.8               | 0.8             | 4.735     | A                             |
| 2 - A39 Main Road | 758                   | 189                     | 10                        | 1735              | 0.437 | 757                 | 1278                            | 0.8               | 0.8             | 3.848     | A                             |
| 3 - A39           | 655                   | 164                     | 339                       | 1683              | 0.389 | 655                 | 428                             | 0.7               | 0.7             | 3.887     | A                             |

#### 17:45 - 18:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 524                   | 131                     | 529                       | 1486              | 0.353 | 525                 | 284                             | 0.8               | 0.6             | 3.794     | A                             |
| 2 - A39 Main Road | 618                   | 155                     | 8                         | 1736              | 0.356 | 619                 | 1046                            | 0.8               | 0.6             | 3.373     | A                             |
| 3 - A39           | 535                   | 134                     | 277                       | 1724              | 0.310 | 536                 | 350                             | 0.7               | 0.5             | 3.366     | A                             |

### 18:00 - 18:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 439                   | 110                     | 442                       | 1541              | 0.285 | 440                 | 238                             | 0.6               | 0.4             | 3.307     | A                             |
| 2 - A39 Main Road | 518                   | 129                     | 7                         | 1737              | 0.298 | 519                 | 875                             | 0.6               | 0.4             | 3.088     | A                             |
| 3 - A39           | 448                   | 112                     | 232                       | 1753              | 0.256 | 448                 | 293                             | 0.5               | 0.4             | 3.066     | A                             |

## Queue Variation Results for each time segment

### 16:45 - 17:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.40       | 0.00      | 0.00      | 0.40      | 0.40      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.44       | 0.00      | 0.00      | 0.44      | 0.44      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.38       | 0.00      | 0.00      | 0.38      | 0.38      |                    |                | N/A                                         | N/A                                    |

### 17:00 - 17:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.55       | 0.07      | 0.72      | 1.36      | 1.44      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.58       | 0.08      | 0.80      | 1.41      | 1.49      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.50       | 0.00      | 0.00      | 0.50      | 0.50      |                    |                | N/A                                         | N/A                                    |

### 17:15 - 17:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.84       | 0.03      | 0.26      | 0.84      | 0.84      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.80       | 0.03      | 0.26      | 0.80      | 0.80      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.70       | 0.03      | 0.28      | 0.70      | 0.70      |                    |                | N/A                                         | N/A                                    |

### 17:30 - 17:45

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.84       | 0.03      | 0.28      | 0.84      | 2.48      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.81       | 0.03      | 0.29      | 0.81      | 2.18      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.71       | 0.03      | 0.32      | 1.18      | 3.01      |                    |                | N/A                                         | N/A                                    |

### 17:45 - 18:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.55       | 0.55      | 1.01      | 1.42      | 1.47      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.58       | 0.57      | 1.05      | 1.46      | 1.52      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.50       | 0.00      | 0.00      | 0.50      | 0.50      |                    |                | N/A                                         | N/A                                    |

### 18:00 - 18:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.40       | 0.00      | 0.00      | 0.40      | 0.40      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.45       | 0.00      | 0.00      | 0.45      | 0.45      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.38       | 0.00      | 0.00      | 0.38      | 0.38      |                    |                | N/A                                         | N/A                                    |

# 2023, AM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|-----------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3   | 5.13               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 49                            | 2 - A39 Main Road            |

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D3 | 2023          | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

### Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 389                     | 100.000            |
| 2 - A39 Main Road |            | ONE HOUR     | ✓            | 993                     | 100.000            |
| 3 - A39           |            | ONE HOUR     | ✓            | 530                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 1             | 379               | 9       |
|      | 2 - A39 Main Road | 398           | 0                 | 595     |
|      | 3 - A39           | 7             | 519               | 4       |
|      |                   |               |                   |         |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 0             | 3                 | 0       |
|      | 2 - A39 Main Road | 5             | 0                 | 18      |
|      | 3 - A39           | 0             | 15                | 50      |
|      |                   |               |                   |         |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.29    | 3.61          | 0.4             | 1.6                             | A       | 357                     | 535                           |
| 2 - A39 Main Road | 0.63    | 6.34          | 1.9             | 3.0                             | A       | 911                     | 1367                          |
| 3 - A39           | 0.36    | 4.00          | 0.6             | 3.0                             | A       | 486                     | 730                           |

### Main Results for each time segment

#### 07:45 - 08:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 293                   | 73                      | 392                       | 1572              | 0.186 | 292                 | 304                             | 0.0               | 0.2             | 2.892     | A                             |
| 2 - A39 Main Road | 748                   | 187                     | 11                        | 1735              | 0.431 | 744                 | 674                             | 0.0               | 0.8             | 4.072     | A                             |
| 3 - A39           | 399                   | 100                     | 299                       | 1709              | 0.233 | 398                 | 456                             | 0.0               | 0.3             | 3.153     | A                             |

#### 08:00 - 08:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 350                   | 87                      | 470                       | 1523              | 0.230 | 349                 | 364                             | 0.2               | 0.3             | 3.156     | A                             |
| 2 - A39 Main Road | 893                   | 223                     | 13                        | 1733              | 0.515 | 891                 | 807                             | 0.8               | 1.2             | 4.798     | A                             |
| 3 - A39           | 476                   | 119                     | 358                       | 1671              | 0.285 | 476                 | 546                             | 0.3               | 0.5             | 3.465     | A                             |

#### 08:15 - 08:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 428                   | 107                     | 575                       | 1456              | 0.294 | 428                 | 446                             | 0.3               | 0.4             | 3.601     | A                             |
| 2 - A39 Main Road | 1093                  | 273                     | 15                        | 1732              | 0.631 | 1090                | 988                             | 1.2               | 1.9             | 6.284     | A                             |
| 3 - A39           | 584                   | 146                     | 438                       | 1618              | 0.361 | 583                 | 668                             | 0.5               | 0.6             | 3.995     | A                             |

#### 08:30 - 08:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 428                   | 107                     | 576                       | 1456              | 0.294 | 428                 | 447                             | 0.4               | 0.4             | 3.605     | A                             |
| 2 - A39 Main Road | 1093                  | 273                     | 15                        | 1732              | 0.631 | 1093                | 989                             | 1.9               | 1.9             | 6.336     | A                             |
| 3 - A39           | 584                   | 146                     | 439                       | 1618              | 0.361 | 584                 | 669                             | 0.6               | 0.6             | 4.002     | A                             |

#### 08:45 - 09:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 350                   | 87                      | 471                       | 1522              | 0.230 | 350                 | 366                             | 0.4               | 0.3             | 3.163     | A                             |
| 2 - A39 Main Road | 893                   | 223                     | 13                        | 1733              | 0.515 | 895                 | 808                             | 1.9               | 1.2             | 4.847     | A                             |
| 3 - A39           | 476                   | 119                     | 360                       | 1670              | 0.285 | 477                 | 548                             | 0.6               | 0.5             | 3.472     | A                             |

### 09:00 - 09:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 293                   | 73                      | 394                       | 1571              | 0.186 | 293                 | 306                             | 0.3               | 0.2             | 2.898     | A                             |
| 2 - A39 Main Road | 748                   | 187                     | 11                        | 1735              | 0.431 | 749                 | 677                             | 1.2               | 0.9             | 4.111     | A                             |
| 3 - A39           | 399                   | 100                     | 301                       | 1708              | 0.234 | 399                 | 459                             | 0.5               | 0.4             | 3.163     | A                             |

## Queue Variation Results for each time segment

### 07:45 - 08:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.23       | 0.00      | 0.00      | 0.23      | 0.23      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.84       | 0.62      | 1.12      | 1.57      | 1.63      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.35       | 0.00      | 0.00      | 0.35      | 0.35      |                    |                | N/A                                         | N/A                                    |

### 08:00 - 08:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.31       | 0.00      | 0.00      | 0.31      | 0.31      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.18       | 0.08      | 0.97      | 2.13      | 2.95      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.46       | 0.00      | 0.00      | 0.46      | 0.46      |                    |                | N/A                                         | N/A                                    |

### 08:15 - 08:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.43       | 0.03      | 0.26      | 0.47      | 0.49      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.89       | 0.03      | 0.30      | 1.89      | 1.89      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.64       | 0.03      | 0.29      | 0.64      | 0.64      |                    |                | N/A                                         | N/A                                    |

### 08:30 - 08:45

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.43       | 0.03      | 0.33      | 1.37      | 1.60      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.91       | 0.03      | 0.30      | 1.91      | 1.91      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.65       | 0.03      | 0.34      | 1.52      | 3.03      |                    |                | N/A                                         | N/A                                    |

### 08:45 - 09:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.31       | 0.00      | 0.00      | 0.31      | 0.31      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 1.21       | 0.16      | 1.16      | 1.83      | 2.14      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.46       | 0.00      | 0.00      | 0.46      | 0.46      |                    |                | N/A                                         | N/A                                    |

### 09:00 - 09:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.24       | 0.00      | 0.00      | 0.24      | 0.24      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.86       | 0.07      | 0.80      | 1.17      | 1.80      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.35       | 0.00      | 0.00      | 0.35      | 0.35      |                    |                | N/A                                         | N/A                                    |



# 2023, PM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|-----------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3   | 4.42               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 55                            | 1 - Main Road                |

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D4 | 2023          | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

### Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 620                     | 100.000            |
| 2 - A39 Main Road |            | ONE HOUR     | ✓            | 732                     | 100.000            |
| 3 - A39           |            | ONE HOUR     | ✓            | 633                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 1             | 615               | 4       |
|      | 2 - A39 Main Road | 327           | 0                 | 405     |
|      | 3 - A39           | 9             | 620               | 4       |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                   |         |
|------|-------------------|---------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - A39 Main Road | 3 - A39 |
| From | 1 - Main Road     | 0             | 1                 | 25      |
|      | 2 - A39 Main Road | 2             | 0                 | 7       |
|      | 3 - A39           | 0             | 11                | 50      |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.49    | 5.18          | 1.0             | 2.0                             | A       | 569                     | 853                           |
| 2 - A39 Main Road | 0.46    | 4.05          | 0.9             | 1.7                             | A       | 672                     | 1008                          |
| 3 - A39           | 0.42    | 4.11          | 0.8             | 2.9                             | A       | 581                     | 871                           |

### Main Results for each time segment

#### 16:45 - 17:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 467                   | 117                     | 468                       | 1524              | 0.306 | 465                 | 253                             | 0.0               | 0.4             | 3.431     | A                             |
| 2 - A39 Main Road | 551                   | 138                     | 7                         | 1737              | 0.317 | 549                 | 926                             | 0.0               | 0.5             | 3.162     | A                             |
| 3 - A39           | 477                   | 119                     | 246                       | 1744              | 0.273 | 475                 | 310                             | 0.0               | 0.4             | 3.145     | A                             |

#### 17:00 - 17:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 557                   | 139                     | 560                       | 1465              | 0.380 | 557                 | 303                             | 0.4               | 0.6             | 4.004     | A                             |
| 2 - A39 Main Road | 658                   | 165                     | 8                         | 1736              | 0.379 | 657                 | 1109                            | 0.5               | 0.6             | 3.487     | A                             |
| 3 - A39           | 569                   | 142                     | 295                       | 1712              | 0.332 | 569                 | 371                             | 0.4               | 0.5             | 3.492     | A                             |

#### 17:15 - 17:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 683                   | 171                     | 686                       | 1385              | 0.493 | 681                 | 371                             | 0.6               | 1.0             | 5.159     | A                             |
| 2 - A39 Main Road | 806                   | 201                     | 10                        | 1735              | 0.465 | 805                 | 1357                            | 0.6               | 0.9             | 4.042     | A                             |
| 3 - A39           | 697                   | 174                     | 361                       | 1669              | 0.418 | 696                 | 454                             | 0.5               | 0.8             | 4.102     | A                             |

#### 17:30 - 17:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 683                   | 171                     | 687                       | 1385              | 0.493 | 683                 | 371                             | 1.0               | 1.0             | 5.184     | A                             |
| 2 - A39 Main Road | 806                   | 201                     | 10                        | 1735              | 0.465 | 806                 | 1360                            | 0.9               | 0.9             | 4.050     | A                             |
| 3 - A39           | 697                   | 174                     | 361                       | 1669              | 0.418 | 697                 | 455                             | 0.8               | 0.8             | 4.112     | A                             |

#### 17:45 - 18:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 557                   | 139                     | 562                       | 1464              | 0.381 | 559                 | 303                             | 1.0               | 0.6             | 4.025     | A                             |
| 2 - A39 Main Road | 658                   | 165                     | 8                         | 1736              | 0.379 | 659                 | 1113                            | 0.9               | 0.6             | 3.496     | A                             |
| 3 - A39           | 569                   | 142                     | 295                       | 1712              | 0.332 | 570                 | 372                             | 0.8               | 0.6             | 3.505     | A                             |

### 18:00 - 18:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 467                   | 117                     | 470                       | 1523              | 0.307 | 467                 | 254                             | 0.6               | 0.4             | 3.451     | A                             |
| 2 - A39 Main Road | 551                   | 138                     | 7                         | 1737              | 0.317 | 552                 | 931                             | 0.6               | 0.5             | 3.176     | A                             |
| 3 - A39           | 477                   | 119                     | 247                       | 1743              | 0.273 | 477                 | 311                             | 0.6               | 0.4             | 3.157     | A                             |

## Queue Variation Results for each time segment

### 16:45 - 17:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.44       | 0.00      | 0.00      | 0.44      | 0.44      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.48       | 0.00      | 0.00      | 0.48      | 0.48      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.42       | 0.00      | 0.00      | 0.42      | 0.42      |                    |                | N/A                                         | N/A                                    |

### 17:00 - 17:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.62       | 0.09      | 0.81      | 1.38      | 1.45      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.63       | 0.10      | 0.87      | 1.43      | 1.50      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.55       | 0.00      | 0.00      | 0.55      | 0.55      |                    |                | N/A                                         | N/A                                    |

### 17:15 - 17:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.97       | 0.03      | 0.26      | 0.97      | 0.97      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.90       | 0.03      | 0.27      | 0.90      | 0.90      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.79       | 0.03      | 0.28      | 0.79      | 0.79      |                    |                | N/A                                         | N/A                                    |

### 17:30 - 17:45

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.98       | 0.03      | 0.28      | 0.98      | 1.97      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.90       | 0.03      | 0.28      | 0.90      | 1.69      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.79       | 0.03      | 0.31      | 0.79      | 2.90      |                    |                | N/A                                         | N/A                                    |

### 17:45 - 18:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.63       | 0.56      | 1.01      | 1.42      | 1.47      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.64       | 0.57      | 1.05      | 1.46      | 1.52      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.56       | 0.56      | 1.11      | 1.55      | 1.61      |                    |                | N/A                                         | N/A                                    |

### 18:00 - 18:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.45       | 0.03      | 0.34      | 1.12      | 1.32      |                    |                | N/A                                         | N/A                                    |
| 2 - A39 Main Road | 0.49       | 0.00      | 0.00      | 0.49      | 0.49      |                    |                | N/A                                         | N/A                                    |
| 3 - A39           | 0.42       | 0.00      | 0.00      | 0.42      | 0.42      |                    |                | N/A                                         | N/A                                    |

| Junctions 9                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ARCADY 9 - Roundabout Module                                                                                                                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Version: 9.5.0.6896                                                                                                                                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 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:** A39-Main Road Proposed Rbt (Revised Pks & Geom).j9  
**Path:** P:\2018\IMA-18-040 Grange Farm, Cannington\Assessments  
**Report generation date:** 25/01/2019 13:15:38

»2023 + Dev, AM  
 »2023 + Dev, PM

### Summary of junction performance

|                   | AM          |                 |           |      |     |                    |              |                             | PM          |                 |           |      |     |                    |              |                           |
|-------------------|-------------|-----------------|-----------|------|-----|--------------------|--------------|-----------------------------|-------------|-----------------|-----------|------|-----|--------------------|--------------|---------------------------|
|                   | Queue (PCU) | 95% Queue (PCU) | Delay (s) | RFC  | LOS | Junction Delay (s) | Junction LOS | Network Residual Capacity   | Queue (PCU) | 95% Queue (PCU) | Delay (s) | RFC  | LOS | Junction Delay (s) | Junction LOS | Network Residual Capacity |
| 2023 + Dev        |             |                 |           |      |     |                    |              |                             |             |                 |           |      |     |                    |              |                           |
| 1 - Main Road     | 0.4         | 1.6             | 3.63      | 0.30 | A   | 5.20               | A            | 48 %<br>[3 - A39 Main Road] | 1.0         | 1.9             | 5.35      | 0.50 | A   | 4.58               | A            | 42 %<br>[2 - Site Access] |
| 2 - Site Access   | 0.1         | 0.5             | 6.37      | 0.06 | A   |                    |              |                             | 0.0         | 0.5             | 9.04      | 0.03 | A   |                    |              |                           |
| 3 - A39 Main Road | 1.9         | 3.1             | 6.41      | 0.64 | A   |                    |              |                             | 1.0         | 1.5             | 4.17      | 0.48 | A   |                    |              |                           |
| 4 - A39           | 0.6         | 3.0             | 4.01      | 0.36 | A   |                    |              |                             | 0.8         | 2.9             | 4.20      | 0.42 | A   |                    |              |                           |

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

### File summary

#### File Description

|             |                                |
|-------------|--------------------------------|
| Title       | (untitled)                     |
| Location    |                                |
| Site number |                                |
| Date        | 25/01/2019                     |
| Version     |                                |
| Status      | (new file)                     |
| Identifier  |                                |
| Client      |                                |
| Jobnumber   |                                |
| Enumerator  | IMA-TP\TRL                     |
| Description | Revised pks and entry geometry |

### 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

| Vehicle length (m) | Calculate Queue Percentiles | Calculate detailed queueing delay | Calculate residual capacity | Residual capacity criteria type | RFC Threshold | Average Delay threshold (s) | Queue threshold (PCU) |
|--------------------|-----------------------------|-----------------------------------|-----------------------------|---------------------------------|---------------|-----------------------------|-----------------------|
| 5.75               | ✓                           |                                   | ✓                           | Delay                           | 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2023 + Dev    | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |
| D2 | 2023 + Dev    | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |

### Analysis Set Details

| ID | Include in report | Network flow scaling factor (%) | Network capacity scaling factor (%) |
|----|-------------------|---------------------------------|-------------------------------------|
| A1 | ✓                 | 100.000                         | 100.000                             |

# 2023 + Dev, AM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order  | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|------------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3, 4 | 5.20               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 48                            | 3 - A39 Main Road            |

## Arms

### Arms

| Arm | Name          | Description |
|-----|---------------|-------------|
| 1   | Main Road     |             |
| 2   | Site Access   |             |
| 3   | A39 Main Road |             |
| 4   | A39           |             |

### Roundabout Geometry

| Arm               | V - Approach road half-width (m) | E - Entry width (m) | I' - Effective flare length (m) | R - Entry radius (m) | D - Inscribed circle diameter (m) | PHI - Conflict (entry) angle (deg) | Exit only |
|-------------------|----------------------------------|---------------------|---------------------------------|----------------------|-----------------------------------|------------------------------------|-----------|
| 1 - Main Road     | 4.34                             | 7.11                | 17.2                            | 25.0                 | 47.0                              | 40.0                               |           |
| 2 - Site Access   | 2.75                             | 4.50                | 5.8                             | 15.0                 | 47.0                              | 24.0                               |           |
| 3 - A39 Main Road | 4.30                             | 7.05                | 18.5                            | 17.0                 | 47.0                              | 47.0                               |           |
| 4 - A39           | 4.54                             | 7.66                | 15.2                            | 20.0                 | 47.0                              | 36.0                               |           |

### Slope / Intercept / Capacity

#### Roundabout Slope and Intercept used in model

| Arm               | Final slope | Final intercept (PCU/hr) |
|-------------------|-------------|--------------------------|
| 1 - Main Road     | 0.637       | 1822                     |
| 2 - Site Access   | 0.508       | 1108                     |
| 3 - A39 Main Road | 0.609       | 1741                     |
| 4 - A39           | 0.654       | 1905                     |

The slope and intercept shown above include any corrections and adjustments.

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2023 + Dev    | AM               | ONE HOUR             | 07:45              | 09:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

## Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 390                     | 100.000            |
| 2 - Site Access   |            | ONE HOUR     | ✓            | 30                      | 100.000            |
| 3 - A39 Main Road |            | ONE HOUR     | ✓            | 1002                    | 100.000            |
| 4 - A39           |            | ONE HOUR     | ✓            | 531                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                 |                   |         |
|------|-------------------|---------------|-----------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - Site Access | 3 - A39 Main Road | 4 - A39 |
| From | 1 - Main Road     | 1             | 1               | 379               | 9       |
|      | 2 - Site Access   | 4             | 0               | 23                | 3       |
|      | 3 - A39 Main Road | 398           | 9               | 0                 | 595     |
|      | 4 - A39           | 7             | 1               | 519               | 4       |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                 |                   |         |
|------|-------------------|---------------|-----------------|-------------------|---------|
|      |                   | 1 - Main Road | 2 - Site Access | 3 - A39 Main Road | 4 - A39 |
| From | 1 - Main Road     | 0             | 0               | 3                 | 0       |
|      | 2 - Site Access   | 0             | 0               | 0                 | 0       |
|      | 3 - A39 Main Road | 4             | 0               | 0                 | 17      |
|      | 4 - A39           | 0             | 0               | 14                | 47      |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.30    | 3.63          | 0.4             | 1.6                             | A       | 358                     | 537                           |
| 2 - Site Access   | 0.06    | 6.37          | 0.1             | 0.5                             | A       | 28                      | 41                            |
| 3 - A39 Main Road | 0.64    | 6.41          | 1.9             | 3.1                             | A       | 919                     | 1379                          |
| 4 - A39           | 0.36    | 4.01          | 0.6             | 3.0                             | A       | 487                     | 731                           |

### Main Results for each time segment

#### 07:45 - 08:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 294                   | 73                      | 400                       | 1568              | 0.187 | 293                 | 307                             | 0.0               | 0.2             | 2.905     | A                             |
| 2 - Site Access   | 23                    | 6                       | 684                       | 761               | 0.030 | 22                  | 8                               | 0.0               | 0.0             | 4.877     | A                             |
| 3 - A39 Main Road | 754                   | 189                     | 16                        | 1732              | 0.436 | 751                 | 691                             | 0.0               | 0.9             | 4.064     | A                             |
| 4 - A39           | 400                   | 100                     | 309                       | 1703              | 0.235 | 398                 | 458                             | 0.0               | 0.3             | 3.142     | A                             |

### 08:00 - 08:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 351                   | 88                      | 479                       | 1517              | 0.231 | 350                 | 368                             | 0.2               | 0.3             | 3.174     | A                             |
| 2 - Site Access   | 27                    | 7                       | 819                       | 692               | 0.039 | 27                  | 10                              | 0.0               | 0.0             | 5.412     | A                             |
| 3 - A39 Main Road | 901                   | 225                     | 19                        | 1730              | 0.521 | 899                 | 827                             | 0.9               | 1.2             | 4.809     | A                             |
| 4 - A39           | 477                   | 119                     | 370                       | 1663              | 0.287 | 477                 | 548                             | 0.3               | 0.5             | 3.459     | A                             |

### 08:15 - 08:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 429                   | 107                     | 586                       | 1449              | 0.296 | 429                 | 450                             | 0.3               | 0.4             | 3.629     | A                             |
| 2 - Site Access   | 33                    | 8                       | 1003                      | 599               | 0.055 | 33                  | 12                              | 0.0               | 0.1             | 6.362     | A                             |
| 3 - A39 Main Road | 1103                  | 276                     | 23                        | 1727              | 0.639 | 1100                | 1013                            | 1.2               | 1.9             | 6.349     | A                             |
| 4 - A39           | 585                   | 146                     | 452                       | 1609              | 0.363 | 584                 | 671                             | 0.5               | 0.6             | 3.999     | A                             |

### 08:30 - 08:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 429                   | 107                     | 587                       | 1449              | 0.296 | 429                 | 451                             | 0.4               | 0.4             | 3.634     | A                             |
| 2 - Site Access   | 33                    | 8                       | 1004                      | 598               | 0.055 | 33                  | 12                              | 0.1               | 0.1             | 6.369     | A                             |
| 3 - A39 Main Road | 1103                  | 276                     | 23                        | 1727              | 0.639 | 1103                | 1014                            | 1.9               | 1.9             | 6.407     | A                             |
| 4 - A39           | 585                   | 146                     | 454                       | 1608              | 0.364 | 585                 | 673                             | 0.6               | 0.6             | 4.007     | A                             |

### 08:45 - 09:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 351                   | 88                      | 480                       | 1517              | 0.231 | 351                 | 370                             | 0.4               | 0.3             | 3.181     | A                             |
| 2 - Site Access   | 27                    | 7                       | 821                       | 691               | 0.039 | 27                  | 10                              | 0.1               | 0.0             | 5.423     | A                             |
| 3 - A39 Main Road | 901                   | 225                     | 19                        | 1730              | 0.521 | 904                 | 829                             | 1.9               | 1.2             | 4.860     | A                             |
| 4 - A39           | 477                   | 119                     | 372                       | 1662              | 0.287 | 478                 | 551                             | 0.6               | 0.5             | 3.469     | A                             |

### 09:00 - 09:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 294                   | 73                      | 402                       | 1566              | 0.187 | 294                 | 309                             | 0.3               | 0.2             | 2.911     | A                             |
| 2 - Site Access   | 23                    | 6                       | 687                       | 759               | 0.030 | 23                  | 8                               | 0.0               | 0.0             | 4.890     | A                             |
| 3 - A39 Main Road | 754                   | 189                     | 16                        | 1731              | 0.436 | 756                 | 694                             | 1.2               | 0.9             | 4.105     | A                             |
| 4 - A39           | 400                   | 100                     | 311                       | 1702              | 0.235 | 400                 | 461                             | 0.5               | 0.4             | 3.154     | A                             |

## Queue Variation Results for each time segment

### 07:45 - 08:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.24       | 0.00      | 0.00      | 0.24      | 0.24      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.03       | 0.00      | 0.00      | 0.03      | 0.03      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.85       | 0.61      | 1.11      | 1.56      | 1.61      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.35       | 0.00      | 0.00      | 0.35      | 0.35      |                    |                | N/A                                         | N/A                                    |



### 08:00 - 08:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.31       | 0.00      | 0.00      | 0.31      | 0.31      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.04       | 0.03      | 0.25      | 0.45      | 0.48      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 1.19       | 0.08      | 0.95      | 2.18      | 3.07      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.46       | 0.00      | 0.00      | 0.46      | 0.46      |                    |                | N/A                                         | N/A                                    |

### 08:15 - 08:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.43       | 0.03      | 0.26      | 0.47      | 0.49      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.06       | 0.03      | 0.26      | 0.46      | 0.49      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 1.93       | 0.03      | 0.30      | 1.93      | 1.93      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.65       | 0.03      | 0.29      | 0.65      | 0.65      |                    |                | N/A                                         | N/A                                    |

### 08:30 - 08:45

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.43       | 0.03      | 0.33      | 1.38      | 1.64      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.06       | 0.00      | 0.00      | 0.06      | 0.06      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 1.95       | 0.03      | 0.29      | 1.95      | 1.95      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.65       | 0.03      | 0.34      | 1.50      | 3.03      |                    |                | N/A                                         | N/A                                    |

### 08:45 - 09:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.31       | 0.00      | 0.00      | 0.31      | 0.31      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.04       | 0.00      | 0.00      | 0.04      | 0.04      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 1.22       | 0.15      | 1.16      | 1.88      | 2.17      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.46       | 0.00      | 0.00      | 0.46      | 0.46      |                    |                | N/A                                         | N/A                                    |

### 09:00 - 09:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.24       | 0.00      | 0.00      | 0.24      | 0.24      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.03       | 0.00      | 0.00      | 0.03      | 0.03      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.86       | 0.07      | 0.79      | 1.30      | 1.87      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.35       | 0.00      | 0.00      | 0.35      | 0.35      |                    |                | N/A                                         | N/A                                    |

# 2023 + Dev, PM

## Data Errors and Warnings

| Severity | Area             | Item             | Description                                                                                         |
|----------|------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Warning  | Queue variations | Analysis Options | Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order  | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|------------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3, 4 | 4.58               | A            |

### Junction Network Options

| Driving side | Lighting       | Network residual capacity (%) | First arm reaching threshold |
|--------------|----------------|-------------------------------|------------------------------|
| Left         | Normal/unknown | 42                            | 2 - Site Access              |

## 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) | Run automatically |
|----|---------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D2 | 2023 + Dev    | PM               | ONE HOUR             | 16:45              | 18:15               | 15                        | ✓                 |

| Vehicle mix varies over turn | Vehicle mix varies over entry | Vehicle mix source | PCU Factor for a HV (PCU) |
|------------------------------|-------------------------------|--------------------|---------------------------|
| ✓                            | ✓                             | HV Percentages     | 2.00                      |

### Demand overview (Traffic)

| Arm               | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-------------------|------------|--------------|--------------|-------------------------|--------------------|
| 1 - Main Road     |            | ONE HOUR     | ✓            | 624                     | 100.000            |
| 2 - Site Access   |            | ONE HOUR     | ✓            | 13                      | 100.000            |
| 3 - A39 Main Road |            | ONE HOUR     | ✓            | 755                     | 100.000            |
| 4 - A39           |            | ONE HOUR     | ✓            | 636                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To                |               |                 |                   |         |
|------|-------------------|---------------|-----------------|-------------------|---------|
| From |                   | 1 - Main Road | 2 - Site Access | 3 - A39 Main Road | 4 - A39 |
|      | 1 - Main Road     | 1             | 4               | 615               | 4       |
|      | 2 - Site Access   | 2             | 0               | 10                | 1       |
|      | 3 - A39 Main Road | 327           | 23              | 0                 | 405     |
|      | 4 - A39           | 9             | 3               | 620               | 4       |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To                |               |                 |                   |         |
|------|-------------------|---------------|-----------------|-------------------|---------|
| From |                   | 1 - Main Road | 2 - Site Access | 3 - A39 Main Road | 4 - A39 |
|      | 1 - Main Road     | 0             | 0               | 1                 | 0       |
|      | 2 - Site Access   | 0             | 0               | 0                 | 0       |
|      | 3 - A39 Main Road | 2             | 0               | 0                 | 7       |
|      | 4 - A39           | 0             | 0               | 11                | 47      |

## Results

### Results Summary for whole modelled period

| Arm               | Max RFC | Max Delay (s) | Max Queue (PCU) | Max 95th percentile Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-------------------|---------|---------------|-----------------|---------------------------------|---------|-------------------------|-------------------------------|
| 1 - Main Road     | 0.50    | 5.35          | 1.0             | 1.9                             | A       | 573                     | 859                           |
| 2 - Site Access   | 0.03    | 9.04          | 0.0             | 0.5                             | A       | 12                      | 18                            |
| 3 - A39 Main Road | 0.48    | 4.17          | 1.0             | 1.5                             | A       | 693                     | 1039                          |
| 4 - A39           | 0.42    | 4.20          | 0.8             | 2.9                             | A       | 584                     | 875                           |

### Main Results for each time segment

#### 16:45 - 17:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 470                   | 117                     | 488                       | 1512              | 0.311 | 468                 | 254                             | 0.0               | 0.5             | 3.477     | A                             |
| 2 - Site Access   | 10                    | 2                       | 933                       | 634               | 0.015 | 10                  | 23                              | 0.0               | 0.0             | 5.764     | A                             |
| 3 - A39 Main Road | 568                   | 142                     | 9                         | 1736              | 0.327 | 566                 | 934                             | 0.0               | 0.5             | 3.214     | A                             |
| 4 - A39           | 479                   | 120                     | 265                       | 1732              | 0.277 | 477                 | 311                             | 0.0               | 0.4             | 3.179     | A                             |

#### 17:00 - 17:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 561                   | 140                     | 584                       | 1451              | 0.387 | 560                 | 304                             | 0.5               | 0.6             | 4.080     | A                             |
| 2 - Site Access   | 12                    | 3                       | 1117                      | 541               | 0.022 | 12                  | 27                              | 0.0               | 0.0             | 6.803     | A                             |
| 3 - A39 Main Road | 679                   | 170                     | 11                        | 1735              | 0.391 | 678                 | 1118                            | 0.5               | 0.7             | 3.561     | A                             |
| 4 - A39           | 572                   | 143                     | 317                       | 1698              | 0.337 | 571                 | 372                             | 0.4               | 0.6             | 3.543     | A                             |

#### 17:15 - 17:30

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 687                   | 172                     | 715                       | 1367              | 0.503 | 686                 | 373                             | 0.6               | 1.0             | 5.321     | A                             |
| 2 - Site Access   | 14                    | 4                       | 1367                      | 414               | 0.035 | 14                  | 33                              | 0.0               | 0.0             | 9.009     | A                             |
| 3 - A39 Main Road | 831                   | 208                     | 13                        | 1733              | 0.480 | 830                 | 1368                            | 0.7               | 1.0             | 4.163     | A                             |
| 4 - A39           | 700                   | 175                     | 388                       | 1651              | 0.424 | 699                 | 455                             | 0.6               | 0.8             | 4.192     | A                             |

#### 17:30 - 17:45

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 687                   | 172                     | 716                       | 1366              | 0.503 | 687                 | 373                             | 1.0               | 1.0             | 5.350     | A                             |
| 2 - Site Access   | 14                    | 4                       | 1370                      | 413               | 0.035 | 14                  | 33                              | 0.0               | 0.0             | 9.039     | A                             |
| 3 - A39 Main Road | 831                   | 208                     | 13                        | 1733              | 0.480 | 831                 | 1371                            | 1.0               | 1.0             | 4.173     | A                             |
| 4 - A39           | 700                   | 175                     | 389                       | 1651              | 0.424 | 700                 | 456                             | 0.8               | 0.8             | 4.201     | A                             |

### 17:45 - 18:00

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 561                   | 140                     | 585                       | 1450              | 0.387 | 562                 | 305                             | 1.0               | 0.6             | 4.104     | A                             |
| 2 - Site Access   | 12                    | 3                       | 1121                      | 539               | 0.022 | 12                  | 27                              | 0.0               | 0.0             | 6.831     | A                             |
| 3 - A39 Main Road | 679                   | 170                     | 11                        | 1735              | 0.391 | 680                 | 1122                            | 1.0               | 0.7             | 3.572     | A                             |
| 4 - A39           | 572                   | 143                     | 318                       | 1697              | 0.337 | 573                 | 373                             | 0.8               | 0.6             | 3.554     | A                             |

### 18:00 - 18:15

| Arm               | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-------------------|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1 - Main Road     | 470                   | 117                     | 490                       | 1510              | 0.311 | 471                 | 256                             | 0.6               | 0.5             | 3.498     | A                             |
| 2 - Site Access   | 10                    | 2                       | 938                       | 632               | 0.015 | 10                  | 23                              | 0.0               | 0.0             | 5.789     | A                             |
| 3 - A39 Main Road | 568                   | 142                     | 9                         | 1736              | 0.328 | 569                 | 939                             | 0.7               | 0.5             | 3.227     | A                             |
| 4 - A39           | 479                   | 120                     | 266                       | 1731              | 0.277 | 479                 | 312                             | 0.6               | 0.4             | 3.194     | A                             |

## Queue Variation Results for each time segment

### 16:45 - 17:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.45       | 0.00      | 0.00      | 0.45      | 0.45      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.02       | 0.00      | 0.00      | 0.02      | 0.02      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.51       | 0.00      | 0.00      | 0.51      | 0.51      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.42       | 0.00      | 0.00      | 0.42      | 0.42      |                    |                | N/A                                         | N/A                                    |

### 17:00 - 17:15

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.63       | 0.09      | 0.81      | 1.37      | 1.45      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.02       | 0.02      | 0.25      | 0.45      | 0.48      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.67       | 0.11      | 0.88      | 1.43      | 1.50      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.56       | 0.56      | 1.11      | 1.55      | 1.61      |                    |                | N/A                                         | N/A                                    |

### 17:15 - 17:30

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 1.01       | 0.03      | 0.26      | 1.01      | 1.01      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.04       | 0.00      | 0.00      | 0.04      | 0.04      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.96       | 0.03      | 0.27      | 0.96      | 0.96      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.81       | 0.03      | 0.28      | 0.81      | 0.81      |                    |                | N/A                                         | N/A                                    |

### 17:30 - 17:45

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 1.01       | 0.03      | 0.27      | 1.01      | 1.90      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.04       | 0.00      | 0.00      | 0.04      | 0.04      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.96       | 0.03      | 0.28      | 0.96      | 1.39      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.81       | 0.03      | 0.31      | 0.81      | 2.85      |                    |                | N/A                                         | N/A                                    |

### 17:45 - 18:00

| Arm               | Mean (PCU) | Q05 (PCU) | Q50 (PCU) | Q90 (PCU) | Q95 (PCU) | Percentile message | Marker message | Probability of reaching or exceeding marker | Probability of exactly reaching marker |
|-------------------|------------|-----------|-----------|-----------|-----------|--------------------|----------------|---------------------------------------------|----------------------------------------|
| 1 - Main Road     | 0.64       | 0.23      | 0.95      | 1.40      | 1.46      |                    |                | N/A                                         | N/A                                    |
| 2 - Site Access   | 0.02       | 0.00      | 0.00      | 0.02      | 0.02      |                    |                | N/A                                         | N/A                                    |
| 3 - A39 Main Road | 0.68       | 0.58      | 1.05      | 1.46      | 1.52      |                    |                | N/A                                         | N/A                                    |
| 4 - A39           | 0.57       | 0.57      | 1.11      | 1.55      | 1.61      |                    |                | N/A                                         | N/A                                    |

18:00 - 18:15

| Arm               | Mean<br>(PCU) | Q05<br>(PCU) | Q50<br>(PCU) | Q90<br>(PCU) | Q95<br>(PCU) | Percentile<br>message | Marker<br>message | Probability of reaching or<br>exceeding marker | Probability of exactly<br>reaching marker |
|-------------------|---------------|--------------|--------------|--------------|--------------|-----------------------|-------------------|------------------------------------------------|-------------------------------------------|
| 1 - Main Road     | 0.46          | 0.04         | 0.37         | 1.19         | 1.35         |                       |                   | N/A                                            | N/A                                       |
| 2 - Site Access   | 0.02          | 0.00         | 0.00         | 0.02         | 0.02         |                       |                   | N/A                                            | N/A                                       |
| 3 - A39 Main Road | 0.51          | 0.00         | 0.00         | 0.51         | 0.51         |                       |                   | N/A                                            | N/A                                       |
| 4 - A39           | 0.43          | 0.00         | 0.00         | 0.43         | 0.43         |                       |                   | N/A                                            | N/A                                       |



## Appendix TN1-4

(Revised Travel Plan)



## LAND AT GRANGE FARM, CANNINGTON

Framework Travel Plan

[Second Draft]

January 2019

IMA-18-040

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## PLANS

- Plan 1 - Site Location Plan
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## APPENDICES

- Appendix 1 - Illustrative Site Layout Plan



## 1 Introduction

### 1.1 Background

- 1.1.1 This Travel Plan has been produced by IMA Transport Planning Ltd on behalf of Mrs D Yorke to support an outline planning application for a scheme of up to 73 dwellings on land at Grange Farm, Cannington. The site location is illustrated on Plan 1.
- 1.1.2 This document is in framework format and outlines measures to encourage travel by modes other than single occupancy car use for residents at the development.
- 1.1.3 It is intended that future occupants of the development site will use this framework document to develop their own Full Travel Plan appropriate to their travel needs and characteristics. It is anticipated that delivery of the Travel Plan will be secured via a Section 106 agreement.

### 1.2 Overview of a Travel Plan

- 1.2.1 The Ministry of Housing, Communities & Local Government defines a Travel Plan as:

“Travel Plans are long-term management strategies for integrating proposals for sustainable travel into the planning process. They are based on evidence of the anticipated transport impacts of development and set measures to promote and encourage sustainable travel (such as promoting walking and cycling). They should not, however, be used as an excuse for unfairly penalising drivers and cutting provision for cars in a way this is unsustainable and could have negative impacts on the surrounding streets.

Travel Plans should where possible, be considered in parallel to development proposals and readily integrated into the design and occupation of the new site rather than retrofitted after occupation.

Where there may be more effective or sustainable outcomes, and in order to mitigate the impact of the proposed development, consideration may be given to travel planning over a wider area.”

- 1.2.2 A successful Travel Plan will influence travel behaviour and achieve a shift towards sustainable transport and needs to be tailored to suit the site characteristics.
- 1.2.3 The site is well located in terms of access to local services and facilities by walking, cycling and public transport.

### 1.3 Framework Travel Plan Overview

- 1.3.1 This Framework Travel Plan has been produced to promote a reduction in the number of journeys and distance travelled by car, in accordance with government and local authority planning policy.
- 1.3.2 Framework Travel Plans are required by Somerset County Council (SCC) as part of outline planning applications to provide details of the proposed development and the measures to be adopted to encourage travel using sustainable modes.
- 1.3.3 This Framework Travel Plan sets out a commitment to measures to reduce car travel, particularly by single-occupants, through use of more sustainable alternatives.
- 1.3.4 The Travel Plan will operate on a formal basis for a period of 5 years.

## 2 Site Audit and Existing Mode Share

### 2.1 Introduction

- 2.1.1 This section describes the development before setting out key information about travel associated with the site.

### 2.2 Development Description

- 2.2.1 The development proposes up to 73 dwellings. The proposed site layout is shown in plans produced by Greenslade Taylor Hunt for the planning application included in Appendix 1.
- 2.2.2 The site will be accessed via a new arm on the A39/Main Road roundabout. A pedestrian/cycle refuge island will be provided as part of the site access to facilitate crossing movements. The site access road will be 5.5m in width with 2.0m wide footways provided either side which provide a continuous link from the site to the existing shared footway/cycleway provided to the east of the A39/Main Road roundabout.
- 2.2.3 Parking standards for development in Somerset are set out in the county wide Parking Strategy adopted in September 2013. At this stage the application is in outline form with only access to be determined, however, parking provision will be considered in detail as part of a future reserved matters application. The parking provision will therefore have due regard to the standards identified in the SCC Parking Strategy 2013 or any other relevant guidance at the time of the submission of the reserved matters application.
- 2.2.4 The SCC Parking Strategy 2013 also sets out requirements for cycle parking, specifying one space per bedroom. As identified above, the cycle parking requirements for the proposed development will be considered as part of a future reserved matters application.

### 2.3 Access by Non-Car Modes

- 2.3.1 The existing pedestrian, cycle and public transport facilities/services are illustrated on Plan 2.

#### Pedestrian Infrastructure

- 2.3.2 Cannington village centre lies to the north of the site and the site has access to existing streetlit pedestrian facilities that are provided to the east of the A39/Main Road roundabout.
- 2.3.3 Footways are provided either side of Main Road, with a controlled pedestrian crossing provided to the south of the Brook Street/Duke Avenue junction, providing an opportunity for pedestrians to cross between the eastern and western footways on Brook Street.
- 2.3.4 There is a wide range of everyday amenities within walking distance of the site including a primary school, college, health centre and shops.

### Bicycle Infrastructure

- 2.3.5 A shared footway/cycleway is provided adjacent to the western boundary of the site. The shared footway/cycleway provides a connection to the on-road cycling facilities on Sandford Hill which routes through Wemdon, which in turn connects to a series of cycle routes within Bridgwater.

### Public Transport Infrastructure

- 2.3.6 There are bus stops located approximately 100m north of the site on Main Road, a walk of about one-minute. The stops are served by the 14 and 15 bus services. The 14 service operates at hourly intervals Monday to Saturday between Cannington and Bridgwater. Weekday services run from 07:10 to 19:06 and Saturday services from 08:21 to 17:41.
- 2.3.7 The 15 bus service is a college service providing access to Bridgwater College during term time weekdays.
- 2.3.8 The site is therefore in a highly accessible location with a range of day to day amenities within walking distance and employment opportunities in Bridgwater accessible by bus services located within walking distance of the site.

### 2.4 Predicted Development Traffic

- 2.4.1 The development is only likely to attract in the order of 40 vehicle movements during the weekday morning and evening peak hours, as set out in the Transport Assessment prepared to support the planning application.
- 2.4.2 The traffic predictions have been based on data included in the TRICS trip generation database using data from comparable residential sites. Modelling by Transport Research Laboratory software shows that the site access would operate with no significant queues or delays.

### 2.5 Existing Mode Share

- 2.5.1 Residents of the development are likely to exhibit similar travel patterns to that of existing residents in the local area. A summary of the 2011 Census, obtained from the Office for National Statistics (ONS) via the NOMIS website. The commuting data is from ONS table QS703EQ – Method of Travel to Work.
- 2.5.2 The table shows travel to work modes for people in employment living in the electoral ward covering Cannington.

| Commuting Mode               | Cannington & Wembdon Ward |
|------------------------------|---------------------------|
| Train                        | 0.5%                      |
| Bus, minibus or coach        | 1.7%                      |
| Taxi                         | 0.0%                      |
| Motorcycle, scooter or moped | 1.2%                      |
| Driving a car or van         | 75.8%                     |
| Passenger in a car or van    | 5.8%                      |
| Bicycle                      | 5.2%                      |
| On foot                      | 8.8%                      |
| Other                        | 0.6%                      |

Table 1: Commuting Modes form 2011 Census (Resident Population)

- 2.5.3 This identifies a car borne mode share of 81.6%, with car driver comprising some 75.8%. Walking and cycling account for 14% and public transport usage (bus and train accounts for 2.3%.

### 3 Objectives and Targets

#### 3.1 Introduction

3.1.1 This section sets out the objectives of the Framework Travel Plan and the benefits likely to arise.

#### 3.2 Objectives

3.2.1 This Framework Travel Plan sets out a sustainable transport strategy for the proposed development on the site, the headline objectives for the plan will be as follows:

- To improve accessibility to the site by non-car modes of transport; and
- To reduce the number of single occupancy car journeys to the site.

#### 3.3 Benefits

3.3.1 The development of a Travel Plan has a number of benefits for future residents as well as the existing local community and surrounding environment.

##### Residents

- Improved health and fitness through increased levels of walking and cycling;
- Increased travel flexibility offered through wider travel choices;
- The social aspect of sharing transport with others; and
- A better environment within the site and its immediate environs as vehicular movements are minimised and parking pressures are reduced.

##### Local Community and Environment

3.3.2 The sustainable transport strategy for the development proposal will benefit existing residents in the local area in a number of ways. The potential benefits to the environment, compared to the 'without Travel Plan' scenario, are as follows:

- The impact of the development on the local environment will be lessened in terms of reducing congestion, noise and atmospheric pollution created by vehicle trips to and from the site; and
- A reduction in vehicular movements to and from the site will reduce pollution levels and contribute to a reduction in vehicular turning movements to/from the site. This will contribute to both local air quality management and national climate change reduction targets.

3.3.3 Overall, it is anticipated that the Travel Plan will result in benefits for residents of the site and the wider community in the vicinity of the development.

### 3.4 Targets

3.4.1 Firm targets will be set when the baseline surveys have been completed after one year of occupation of the new dwellings. These would form part of a finalised Travel Plan which would be reviewed and agreed with Somerset County Council. Notwithstanding this, indicative targets have been set out below.

3.4.2 One of the main aims of the Travel Plan is to reduce single occupancy car use for travel to the site. It is therefore proposed to set the following target:

- To reduce single occupancy car use for residents to the site by 10% from the 2011 Census baseline by the end of the five-year monitoring period.

3.4.3 Using the Census data as a base, Table 2 below sets out the initial modal split target for residents of the proposed development.

| Mode                            | 2011 Census | Initial Target |
|---------------------------------|-------------|----------------|
| Car Driver                      | 75.8%       | 68.8%          |
| Other Modes (inc car passenger) | 24.2%       | 34.7%          |
| Total                           | 100%        | 100%           |

Table 2: Residents Travel - Initial Targets

3.4.4 The interim target to reduce single occupancy car travel for residents would result in a modal shift for car drivers of 7% (percentage points) from the base 2011 Census data over a five-year period from first occupation of the site.

3.4.5 Once the first travel survey has been undertaken, the targets will be reviewed and updated as necessary.

### 3.5 Safeguarding

3.5.1 The LHA has requested that this Travel Plans is safeguarded with measures or funds (as bonds, ESCROW accounts or cash sums) to cover the achievement of travel plan outcomes in the event of default by the developer/land owner or occupier/leaseholder during the 5-year formal monitoring period.

3.5.2 The safeguarding sum requested by the LHA is £9,300. Any funds remaining from the safeguarding sum at the end of the formal 5-year monitoring period will be returned to the developer.

## 4 Proposed Measures

### 4.1 Introduction

4.1.1 This section sets out the measures proposed to achieve the objectives set out in the previous section.

### 4.2 Travel Plan Coordinator

4.2.1 The developer will appoint an individual or company to act as the Travel Plan Coordinator (TPC) for the site. Contact details will be supplied to Somerset County Council prior to first occupation of the development proposal.

4.2.2 The TPC will be retained throughout the lifetime of the Travel Plan and prior to their appointment their role will revert to the developer. The post will be funded by the developer throughout the lifetime of the Travel Plan.

4.2.3 The role of the TPC will be as follows:

- To manage the day to day delivery of the measures contained in this section of the Travel Plan and the budget to deliver those measures;
- To market the Travel Plan to encourage interest and involvement of residents;
- To maintain a good level of knowledge of sustainable travel opportunities in the vicinity of the site, so as to provide a basic journey planning service for residents, i.e. how to access schools, workplaces and local facilities by non-car modes;
- To organise the annual monitoring of the Travel Plan in line with the strategy outlined in Section 5 of this document; and
- To provide monitoring feedback to residents and the steering group and to liaise with the local authority as necessary.

### 4.3 Green Travel Voucher Scheme

4.3.1 The Green Travel Voucher system was devised by Somerset County Council and features in their adopted guidance on travel planning. The system is intended to encourage sustainable travel by reimbursing householders with 50% of their expenditure on items associated with sustainable travel.

4.3.2 The amount of reimbursement per household is typically as follows and would be set out in a section 106 agreement:

| Number of Bedrooms<br>per Dwelling | Maximum Reimbursement<br>per Occupier |
|------------------------------------|---------------------------------------|
| 1 bedroom                          | £100                                  |
| 2 bedrooms                         | £150                                  |
| 3 bedrooms                         | £200                                  |
| 4 bedrooms                         | £250                                  |

Table 3: Maximum Value of Green Travel Vouchers

4.3.3 The Developer will provide each resident with a dated voucher that confirms a commitment to reimburse 50% of the cost of a set list of items related to sustainable travel, up to the maximum set out by dwelling size in Table 11.

- 4.3.4 The list of items that will be considered for reimbursement at 50% of the residents' expenditure is as follows:

| Mode              | Item                                                                                                                                                      |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Walking:          | Shopping trolleys<br>Personal attack alarm<br>Torch<br>Waterproof clothing                                                                                |
| Cycling:          | Bicycle<br>Bicycle storage/security<br>Bicycle helmet<br>Waterproof clothing<br>Panniers (or other bicycle luggage)<br>Bicycle lights<br>Bicycle trailers |
| Public Transport: | Bus Season Tickets                                                                                                                                        |

Table 4: Items Qualifying for Reimbursement via Green Travel Vouchers

- 4.3.5 Reimbursement will be entirely at the discretion of the Travel Co-ordinator, who will retain the right to refuse applications for reimbursement where it is consider the item does not relate directly to sustainable travel.
- 4.3.6 To qualify for reimbursement, residents must buy equipment from the approved list within 12 months of the date on the voucher. The receipts must then be sent to the Site Travel Plan Co-ordinator.
- 4.3.7 The Green Travel Voucher system will apply to the first occupiers of each dwelling in the first 5 years of the Travel Plan, after which the scheme will cease.
- 4.4 Promotion of Walking and Cycling
- 4.4.1 The development will facilitate walking and cycling, in particular for local journeys to key destinations. All dwellings will be provided with cycle parking having regard to local parking standards. Information on the walking and cycling routes and local facilities including public rights of way, will be made to new residents through the resident's travel information pack and other means described below.
- 4.4.2 A bicycle user group will be set up for the new development. This will enable cyclists to share information on routes, safety, cycle maintenance etc. It will also enable less experienced cyclists to contact established cyclists and therefore to obtain information, guidance and potentially a 'cycling buddy' to accompany them on cycle journeys.
- 4.4.3 The TPC will assist with the dissemination of information regarding the bicycle user group and will help residents get in contact with one another. Where possible, the TPC will attempt to negotiate discounts or promotions for residents at local cycle stores and will also inform residents of any discounts with local cycle stores.
- 4.4.4 The developer will provide a budget of £1,000 per year in years 2 to 5 of the Travel Plan for events to promote cycling. The events will need to be tailored to demand from residents, but are likely to consist of the following:
- Bikeability Level 1 & 2 training for children
  - Bikeability Level 3 training for adults & older children
  - 'Dr Bike' cycle maintenance events



- 4.4.5 Bikeability Levels 1 & 2 starts with basic control and aims to get children to a level where they are confident riding to school on quiet roads. It is typically carried out over 2 days at a ratio of 1 instructor per 6 children.
- 4.4.6 Bikeability Level 3 is aimed at dealing with more challenging road conditions. It is usually carried out on a 1:1 or 1:2 instructor/student ratio and tailored to the individual's requirements.
- 4.4.7 The budget of £1,000 per year would allow up to 20 adults or children to receive training each year, at a typical cost of £50 per person. This is likely to be more than adequate for the demand from 73 dwellings.
- 4.4.8 Cycle training is considered the appropriate priority for the £1,000 budget, but if funds remain at the end of each year, the STPC may arrange a 'Dr Bike' cycle maintenance event. These typically involve a local specialist mechanic attending site for a half-day session (4 hours), during which they might typically deal with 8 to 12 bicycles, depending on the level of attention required.
- 4.5 Promotion of Public Transport
  - 4.5.1 Information on public transport routes and facilities serving new development will be made available to new residents through the residents' travel plan website (see below) and the other means described below.
  - 4.5.2 The direct public transport services to local destinations will be emphasised.
- 4.6 Car Sharing Scheme
  - 4.6.1 Car sharing will be promoted amongst new residents of the development, particularly in relation to journeys to work. Not only does car sharing cut the costs of travel to work for the individual, but it reduces the number of residents making similar journeys at the same time, thereby reducing peak hour congestion on routes between the site and local employment areas.
  - 4.6.2 Residents will be provided with information about car sharing via the Liftshare.com website. Details of the benefits of the car share scheme and how to register will be included on the residents travel plan website.
- 4.7 Electric Vehicle Charging Points
  - 4.7.1 The developer will commit to providing a percentage of homes with Electric Vehicle Charging Points (EVCPs). The number of EVCPs to be provided and their specification will need to be explored at a later date as part of a reserved matters planning application when more details of the scheme will be available.
- 4.8 Information Provision and Marketing
  - 4.8.1 New residents will be provided with travel information during the purchase of their property. The initial sales pack will include a leaflet about the sustainability credentials of the development and sales staff will be trained in personal journey planning in order that this service can be offered to new residents during the purchase process.
  - 4.8.2 To assist with achieving the objectives of the Travel Plan, details of the package of measures will be provided on the Travel Plan website, which will cover the following:

- Provision of up-to-date travel information for walking, cycling and public transport;
- Details regarding the provision of broadband to enable easy access to local home delivery services and home working;
- Details about the Travel Plan, its aims and objectives, how to get involved and how travel will be monitored and reported back to residents;
- A plan of the new development, highlighting local facilities and nearby key destinations, the walking and cycling routes to these and public transport routes and the location of bus stops;
- Details of any negotiated discounts at local cycle stores;
- Information about opportunities to travel to local schools in the vicinity of the site by sustainable modes, local school travel plans and schemes;
- Maps showing the location of key services and facilities and walking/cycling time isochrones to demonstrate to residents how long it will take to walk or cycle to these destinations;
- Bus and rail maps and timetable information;
- Information about journey planning services e.g. [www.traveline.info](http://www.traveline.info);
- Information about car sharing through the [www.liftshare.com](http://www.liftshare.com) website;
- Information about the home delivery services offered by supermarkets in the local area, and potentially a voucher for free home delivery on first use; and
- The offer of personalised journey planning for residents. The offer will be available to the first residents of each dwelling upon occupation.

4.8.3 If required the above information can be provided in hard copy form.

## 5 Monitoring

### 5.1 Introduction

5.1.1 Monitoring and review of the Travel Plan will be organised by the TPC. Monitoring is important in order to understand if the proposed objectives and targets have been met.

5.1.2 Guidance from Somerset County Council explains that to enable the LHA to monitor the progress of Full Travel Plans over the life of the development, applicants are required to pay a Travel Plan Fee where an appropriate legal agreement is being used to secure highways and/or travel plan measures. The LHA has stated that the Travel Plan fee due for this development is £2,000+VAT.

### 5.2 Travel Surveys

5.2.1 The objective of the monitoring process is to regularly assess the resident travel patterns and identify if any elements of the Travel Plan may need to be changed or if further marketing initiatives are required. The monitoring will also assess the success of achieving the headline targets.

5.2.2 An Automatic Traffic Count (ATC) survey will be undertaken at the vehicular access within one year of the first occupation of the dwellings in order to assess the vehicle trip generation from the site.

5.2.3 A resident questionnaire survey will also be undertaken alongside the ATC survey, one year after the first occupation. The surveys will cover the following areas:

- Where residents work;
- Travel patterns;
- Duration of travel;
- Any barriers to particular types of travel;
- Residents who are most willing to change their travel habits; and
- The popularity of the various incentives and measures that staff may consider to change their methods of transport.

5.2.4 The first surveys will be used to refine the measures that are being promoted in response to the performance against the mode share targets to help ensure that the 10% reduction in single occupancy car trips is achieved within the lifetime of the Travel Plan.

5.2.5 The surveys will be repeated in years three and five following the baseline travel surveys.

## 6 Implementation

### 6.1 Introduction

6.1.1 This section summarises the implementation framework of the Travel Plan.

### 6.2 Framework

6.2.1 The TPC will be appointed three months before the first occupation at the development, in order to commence the initial Travel Plan measures in time for the first occupations. Table 5 provides an initial framework for implementation of the measures.

| Measure                                          |                                                                               | Timescale                                                                                                                                                                                              |
|--------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pay Travel Plan Fee of £2,000+VAT to Somerset CC |                                                                               | Prior to occupation                                                                                                                                                                                    |
| Commit Safeguarding Sum of £9,300+VAT            |                                                                               | Prior to occupation                                                                                                                                                                                    |
| Infrastructure Measures as per Section 5         |                                                                               | To be phased in line with the development.                                                                                                                                                             |
| Travel Plan Co-ordinator                         |                                                                               | Appointed at least 3 months prior to 1 <sup>st</sup> occupation.<br>Contact details to Somerset County Council before 1 <sup>st</sup> occupation.                                                      |
| Steering Group                                   |                                                                               | 1 <sup>st</sup> meeting one month after appointment of TPC. Subsequent 6 monthly meetings for first two years after first occupation, annual meetings thereafter until 5 years after first occupation. |
| Information Development and Provision            | Training of sales team about the Travel Plan and in personal journey planning | Training as part of induction process.                                                                                                                                                                 |
|                                                  | Production of Travel Plan information for sales packs                         | To be developed prior to 1 <sup>st</sup> occupation.                                                                                                                                                   |
|                                                  | Production of travel plan website                                             | To be developed before 1 <sup>st</sup> occupation. Hard copies of the information will be made available for those who request them.                                                                   |
| Promote car share schemes                        |                                                                               | With travel leaflet and on website.                                                                                                                                                                    |
| Arrange cycle training/maintenance events        |                                                                               | Years 2 & 5                                                                                                                                                                                            |
| Walking/cycling/local facilities maps            |                                                                               | With travel leaflet and on website.                                                                                                                                                                    |
| Develop bicycle user group                       |                                                                               | By 50 <sup>th</sup> occupation.                                                                                                                                                                        |

Table 5: Framework for Implementation

# Plans





I

M

A

TRANSPORT PLANNING

11 KINGSMEAD SQUARE  
BATH BA1 2AB  
t: 01225 444 011  
www.ima-tp.com

PROJECT:

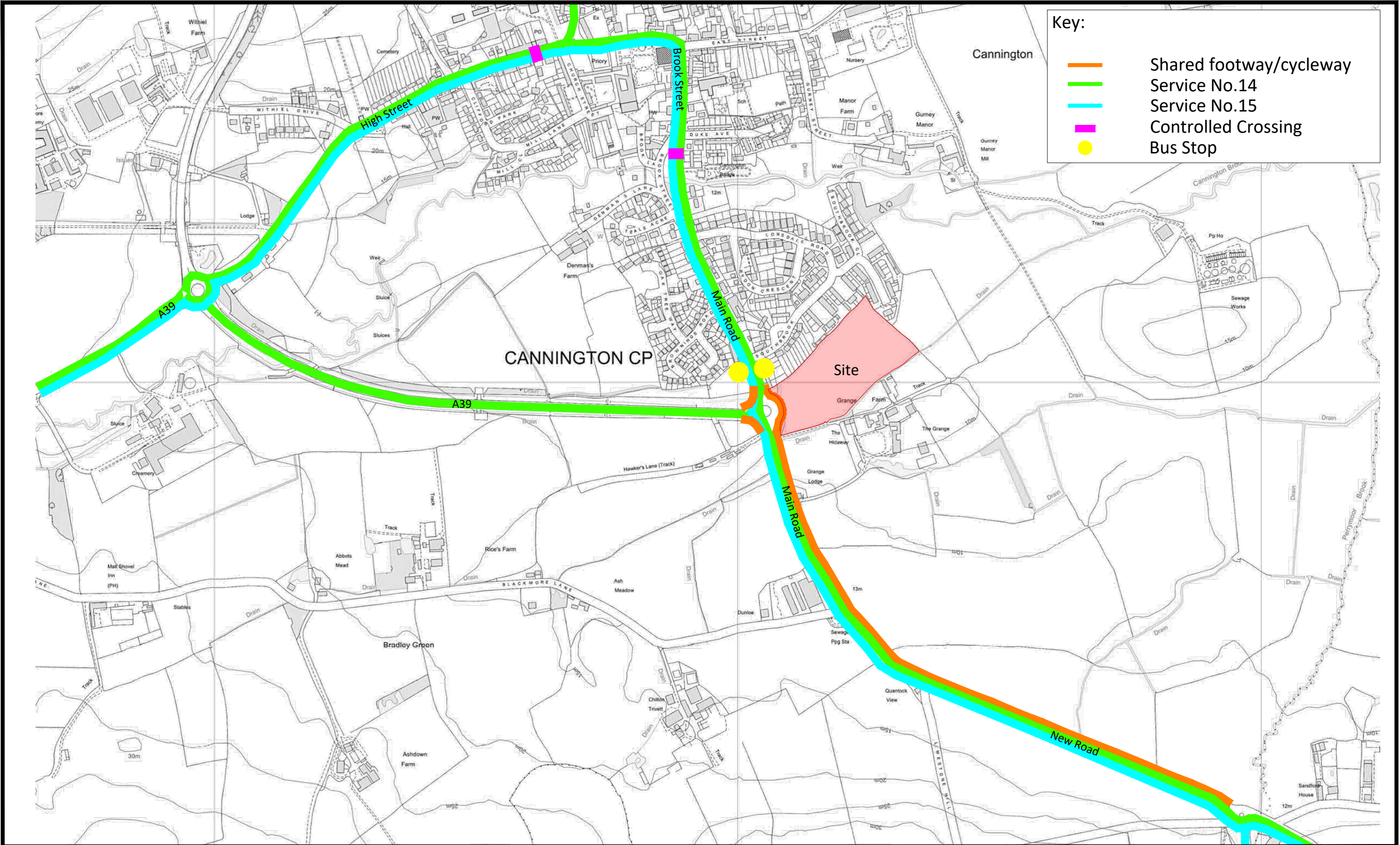
Grange Farm,  
Cannington

TITLE:

Plan 1  
Site Location Plan

|                             |                     |                      |
|-----------------------------|---------------------|----------------------|
| SCALE: (A3)<br>N.T.S        | CHECKED:            | APPROVED:            |
| CAD FILE:<br>Layout_v.1.dwg | DESIGN/DRAWN:<br>AB | DATE:<br>July - 2018 |
| PROJECT No:<br>IMA-18-040   | DRAWING No:<br>004  | REV:                 |





|                                                                                                                                                                                            |                                         |                                                                                           |                             |                     |                      |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------|---------------------|----------------------|--|
| <div><div>I</div><div>M</div><div>A</div></div> <div>TRANSPORT PLANNING</div> <div>11 KINGSMEAD SQUARE</div> <div>BATH BA1 2AB</div> <div>T: 01225 444 011</div> <div>www.ima-tp.com</div> | PROJECT:<br><br>Grange Farm, Cannington | TITLE:<br><br>Plan 2<br>Existing Pedestrian/Cycle Facilities<br>and Existing Bus Services | SCALE: (A3)                 | CHECKED:            | APPROVED:            |  |
|                                                                                                                                                                                            |                                         |                                                                                           | N.T.S                       |                     |                      |  |
|                                                                                                                                                                                            |                                         |                                                                                           | CAD FILE:<br>Layout_v.1.dwg | DESIGN/DRAWN:<br>AB | DATE:<br>July - 2018 |  |
|                                                                                                                                                                                            |                                         |                                                                                           | PROJECT No:<br>IMA-18-040   | DRAWING No:<br>005  | REV:                 |  |

# Appendix 1



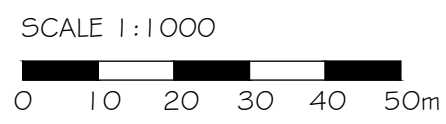


Note:  
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It may not be copied, reproduced or altered in any way  
without their written authority.  
Do not scale for construction purposes - use figured  
dimensions only.  
Check dimensions on site before work proceeds.  
Report discrepancies to the Architect.

| Rev | Description                            | Date     | By   |
|-----|----------------------------------------|----------|------|
| A   | transferred to topographical<br>survey | 20.06.18 | lehm |

N.B: approx. GIAs

|                                                 |                             |                   |
|-------------------------------------------------|-----------------------------|-------------------|
|                                                 | 2 bed - 76m <sup>2</sup>    | x20               |
|                                                 | 3 bed - 88m <sup>2</sup>    | x28               |
|                                                 | 3/4 bed - 115m <sup>2</sup> | x12               |
|                                                 | 4 bed - 120m <sup>2</sup>   | x13               |
| TOTAL                                           |                             | 73                |
|                                                 | garages                     |                   |
|                                                 | approx. site area           | 3.03ha            |
|                                                 | housing density             | 24.1 dwellings/ha |
| excluding swale, buffer strip & pumping station |                             |                   |
|                                                 | approx. site area           | 2.42ha            |
|                                                 | housing density             | 30.2 dwellings/ha |



LAND & PLANNING DIVISION  
WINCHESTER HOUSE  
DEANE GATE AVENUE  
TAUNTON  
SOMERSET  
TA1 2UH  
TEL: 01823 334466

|                                   |                |
|-----------------------------------|----------------|
| PROJECT TITLE                     |                |
| Land at Grange Farm<br>Cannington |                |
| DRAWING TITLE                     |                |
| Proposed residential development  |                |
| Site Plan                         |                |
| STATUS sketch                     |                |
| SCALE 1/1000                      | SHEET SIZE A3L |
| DATE May 2018                     | DRAWN lehm     |
| DWG NO. 2494-sk-01                | REVISION A     |