Greater Cambridge Partnership

CAMBRIDGE EASTERN ACCESS

P&R Site P1, P10 & P11 Assessment

P&R APPRAISAL
MAY 2024

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Greater **Cambridge Partnership**

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P&R Site P1, P10 & P11 Assessment

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1. INTRODUCTION

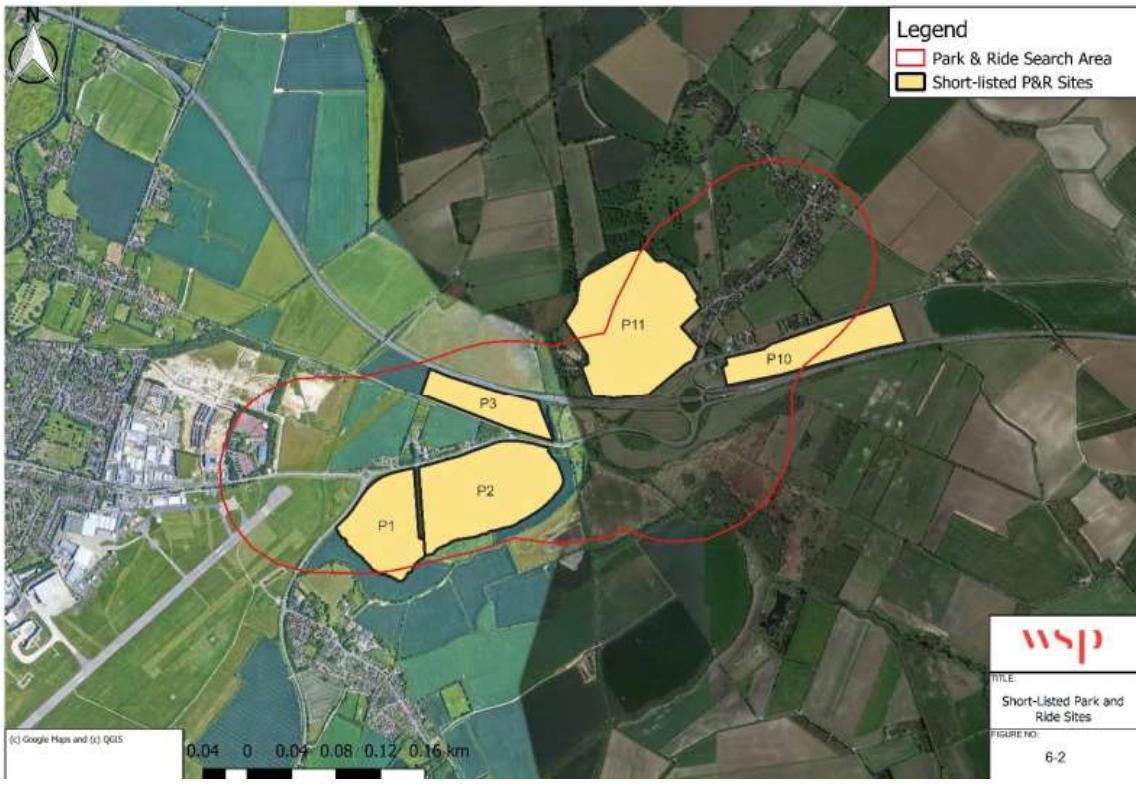
1.1. CAMBRIDGE EASTERN ACCESS PROGRAMME

1.1.1. WSP are supporting the GCP on the Cambridge Eastern Access (CEA) programme which includes the comprehensive improvement of Newmarket Road (Elizabeth Way to Airport Way), and the relocation and expansion of the existing Newmarket Road Park and Ride (P&R) to enable more people to walk, cycle and travel by public transport.

1.2. NEWMARKET ROAD PARK AND RIDE

1.2.1. It is proposed to relocate and expand the existing Newmarket Road P&R site. To support the GCP in identifying a preferred location for the relocated and expanded P&R, WSP produced a Newmarket Road P&R Site Selection and Appraisal Report in May 2022. This report identified a long list of potential relocation sites to the east of the existing site, undertook a sift of the sites to identify a short list (Figure 1-1) that were then subjected to a qualitative multi-criteria appraisal. A summary of the P&R Site Selection and Appraisal Report assessment key findings are provided in Chapter 2.

Figure 1-1 - Short Listed P&R Sites



1.2.2. The key outcome from the P&R Site Selection and Appraisal Report was that on balance, taking into consideration a range of environmental, operational and feasibility criteria, short-listed area P1 was the preferred relocation site for the P&R. Site P2 and P3 were ranked second and third respectively, with sites P10 and P11 ranked least favoured.

1.2.3. The GCP supported the conclusions of the report, and P1 was taken to the GCP Board for approval as the preferred relocation site. This recommendation was not approved by the GCP Board, with following concerns raised:

- **Challenge 1:** There is a lack of information available on existing users of the P&R, including their routing on the local road network; which will influence the preferred site location. Evidence is required on the existing routing to the P&R;
- **Challenge 2:** The P&R should be located to the north of the A14 (site P10 or P11) to intercept trips on the A1303 and improve the operation of the A14 Junction 35 and merge on the inbound A1303 towards Cambridge; and
- **Challenge 3:** There is concern that site P1 precludes opportunities for a future orbital bus route from the east to north Cambridge.

1.3. REPORT PURPOSE

1.3.1. The purpose of this report is to provide an evidenced response to each of the concerns raised by the GCP board. The assessment provided in this report focusses on Site P1 (the preferred site) and Sites P10 and P11 to the north of the A14, which are the preferred sites identified by the GCP Board (Challenge 2). This report:

- Summarises the travel patterns of existing P&R users (Challenge 1);
- Provides a concept layout and access design for site P1, P10 and P11 to identify the feasibility of a P&R within each site and the relative pros and cons;
- Provides an assessment of the impact of the three concept designs on the operation of the local highway network in the weekday peak periods (Challenge 2); and
- Provides a review of the bus operational impacts of site P1, P10 and P11, and potential for a future orbital bus route (Challenge 3).

1.4. REPORT STRUCTURE

1.4.1. The evidence provided in this report comprises:

- **Chapter 2 – P&R Site Selection and Appraisal:** provides a summary of the key outcomes from the Newmarket Road P&R Site Selection and Appraisal Report;
- **Chapter 3 – Existing P&R Users**: sets out evidence on the existing levels of P&R use and user travel patterns (Challenge 1);
- **Chapter 4 – Surrounding Road Network**: summarises the existing traffic conditions on the surrounding road network;
- **Chapter 5 – Site Access Feasibility:** presents the concept access designs for site P1, P10 and P11 and associated mitigation measures that could be implemented to support each site location;
- **Chapter 6 – Transport Network Impacts:** provides the results of the impact assessment of site P1, P10 and P11 on the operation of the local highway network and P&R bus journey times;
- **Chapter 7 – P&R Operational Assessment**: provides a comparison of the additional potential bus operational costs of site P1, P10 and P11, and a public transport expert review of the potential for a future orbital bus service; and
- **Chapters 8 - Conclusions & Next Steps:** provides the assessment conclusions and recommended next steps.

2. P&R SITE SELECTION AND APPRAISAL

2.1. INTRODUCTION

2.1.1. The purpose of this Chapter is to summarise the key outcomes from the Newmarket Road P&R Site Selection and Appraisal Report, May 2022. The key outcomes from this report are relevant to this study as they included a high-level environmental impact appraisal of sites P1, P10 and P11 which was relevant in concluding site P1 as the preferred relocation site. The operational impact conclusions drawn in this previous report on sites P1, P10 and P11 are further strengthened by the additional evidence provided in this study.

2.2. REPORT OVERVIEW

2.2.1. The Newmarket Road P&R Site Selection and Appraisal Report identified a long list of 12 broad site locations to the east of the existing site that could accommodate a new P&R site. The 12 sites were sifted, discounting sites that were too small (unlikely to accommodate 2,000 car parking spaces), restricted by Local planning policies or located in close proximity to sensitive environmental receptors.

2.2.2. This sift resulted in a short list of five broad locations for the P&R facility (Figure 1-1). A qualitative multi-criteria appraisal (MCAF) of these remaining sites was then undertaken using publicly available data and the professional judgement of the project team.

2.2.3. The results of the MCAF were used to inform a final comparative analysis that considered the relative merits of each site and applied professional judgement to reach a recommendation on the preferred site.

2.3. REPORT FINDINGS

2.3.1. The outcomes from this report were:

- The Newmarket Road P&R site requires a Green Belt location in order to deliver an attractive bus journey time into the city from the east, and intercept vehicle trips from the strategic road network;
- The existing site should be relocated and expanded to a site accessible from the A1303 between Airport Way and Junction 35 of the A14;
- All five short listed sites shown in Figure 1-1 are capable of accommodating a P&R facility;
- On balance, Site P1 (east of Airport Way) is recommended as the preferred site to accommodate the P&R and should be located within the northern land parcel;
- Site P2 (south of Newmarket Road) and P3 (High Ditch Road) are ranked second and third due to being located further from Cambridge compared to P1, have the potential for a higher environmental impact (P2) and higher level of harm to the Green Belt (P3); and
- Sites P10 and P11 (North of Junction 35 of the A14) are the least preferable due to being the furthest from Cambridge (longest P&R bus and cycle times into Cambridge), highest bus priority infrastructure requirements and increased concerns regarding environmental impacts to existing Stow-cum-Quy residents.

2.4. SHORT LIST SITE APPRAISAL

2.4.1. Table 2-1 summarises the results of the environmental, operational, constructability and Green Belt impact qualitative appraisal results of the five short-listed sites. The full multi-criteria appraisal is provided in Appendix A.

Table 2-1 – MCAF Comparative Results Summary

Criteria	P1	P2	P3	P10	P11
Air Quality	Minor Positive	Minor Positive	Minor Positive	Minor Negative	Minor Negative
Noise	Minor Negative	Minor Negative	Neutral	Minor Negative	Minor Negative
Landscape/Townscape	Neutral	Neutral	Neutral	Minor Negative	Minor Negative
Carbon Emissions	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Minor Negative
Historic Environment	Minor Negative	Major Negative	Major Negative	Minor Negative	Major Negative
Biodiversity	Minor Negative	Major Negative	Minor Negative	Minor Negative	Minor Negative
Water Environment	Neutral	Minor Negative	Minor Negative	Neutral	Minor Negative
Pass-by Intercept Potential					
Site Access/Egress by Car					
Households within a 10 min Cycle					
Cycle Journey time to Cambridge city centre					
Site Access/Egress by Bicycle					
Households within a 10 min walk					
Site Access/Egress by Pedestrians					
AM Peak Bus Journey Time to Drummer Street Bus Station					
Opportunity for Segregated Bus Priority Access/Egress					
Plot Shape/Topography					
Land Ownership					

Constructability					
Predicted Level of Green Belt Harm	Moderate/ High	Moderate	High	Moderate/High	Moderate

2.4.2. Table 2-1 shows that P1 (land adjacent to Airport Way) performed the best when considering the MCAF ratings in insolation, with no major negative environmental impacts, one red operational impact, amber constructability and availability concerns and a moderate high predicted level of harm to the Green Belt purposes.

2.4.3. Site P2, P3 and P10 all had four red ratings based on impacts to the historic environment, biodiversity, proximity to existing communities within walking and cycling distance, level of harm to the Green Belt (P3 High) or cycle and bus journey times to Cambridge (P10) and opportunities to provide segregated bus infrastructure (P10). P11 included five red ratings related to potential impacts on the Historic environment, direct pass-by potential, cycle and bus journey times to Cambridge city centre and the challenges with providing segregated bus infrastructure.

2.5. REPORT FINDINGS ON P1, P10 AND P11

2.5.1. Drawing on the MCAF results it was considered that on balance Site P1 is the preferred site to accommodate the P&R. From an environmental perspective P1 ranked more highly as a preferred option compared to the other four short listed sites. Option P1 is located closest to the village of Teversham. The site is likely to have a minor positive impact on air quality, a neutral impact on townscape, a minor negative impact on carbon, and a minor negative impact on noise for the village. Although Option P1 is located within 250m of the Quy Water, it is unlikely to have any notable impacts on the watercourse. Likewise, although there is a possibility of identifying archaeological features, there are yet no confirmed findings at the site.

2.5.2. Options P10 and P11 are close to Stow cum Quy village, which is a sensitive receptor to noise, visual and air quality impacts, as well as the settings of listed buildings. There are some minor differences in the impact of both options, but overall, these scored similarly. The main environmental impact difference was that site P11 was scored as a major negative impact on the historic environment compared to minor negative for site P10 and P1.

2.5.3. From an operational perspective, P1 ranked as the best performing option and P10 and P11 the least favourable. This is because P1 is the closest to Cambridge and therefore provides the quickest onward bus and cycle journey times to destinations in the city. It can directly support the future communities at Marleigh and the Airport development as well as provides the opportunity to directly route additional bus services through the Airport development site or along Airport Way.

2.5.4. P1 provides flexibility in access options by all modes with frontages onto both Newmarket Road and Airport Way. This results in a high intercept potential as well as flexible access options into the site and the adjacent Airport Way mixed-use development site. The site is owned by Marshalls who are understood to be supportive in principle to relocating the P&R from its existing site to a site east of Airport Way.

2.5.5. P10 and P11 all result in increasing P&R bus and cycle journey times to Cambridge and increased need for extensive bus priority measures to maintain attractive bus journey times and are therefore considered less preferrable to P1. Site P10 is wholly owned by Cambridgeshire County Council and therefore could be made available to accommodate a new P&R. Site P11 is wholly owned by a private owner resulting in a higher risk to scheme deliverability.

2.5.6. It was recognised in the report that P10 and P11 could provide benefits to people accessing the P&R by car due to being intercepted earlier and avoiding the need to travel through Junction 35 of the A14 and along Newmarket Road towards Cambridge. However, the car journey time benefits will be off-set by increased bus and cycle journey times. This will particularly be the case if substantial bus priority infrastructure is not provided from P10 or P11 to Cambridge, which will add significant additional costs to these two site options. This conclusion is assessed in more detail in this report (Chapter 6).

2.5.7. P10 and P11 were ranked least preferable due to the increased bus and cycle journey times to Cambridge, the potential for environmental impacts on the existing residents in Stow cum Quy and the need for substantial bus priority measures towards Cambridge.

3. EXISTING P&R USERS

3.1. INTRODUCTION

3.1.1. This chapter presents the existing Newmarket Road P&R levels of use and user travel patterns, in order to provide an evidenced response to the GCP Board Challenge 1:

"There is a lack of information available on existing users of the P&R, including their routing on the local road network; which will influence the preferred site location. Evidence is required on the existing routing to the P&R".

3.2. EXISTING DATA SOURCES

3.2.1. Evidence has been gathered on the existing levels of P&R use, user travel behaviour, including vehicle routing of users to the Newmarket Road P&R from the following sources of data:

- P&R Car park occupancy data (2023);
- P&R Site Access Junction Turning Counts (June 2023);
- P&R User survey (June 2023); and
- GPS (TomTom) Origin and Destination Data (2023).

3.3. P&R CAR PARK OCCUPANCY DATA

3.3.1. To understand the current levels of use at the Newmarket Road P&R, car park occupancy data has been analysed using data recorded by Smart Cambridge online at Parking Map (smartcambridge.org). The existing site provides 873 car parking spaces.

3.3.2. Analysis of neutral weekday data for 2023 shows the following annual average car parking occupancy at each hour throughout the day (Table 3-1).

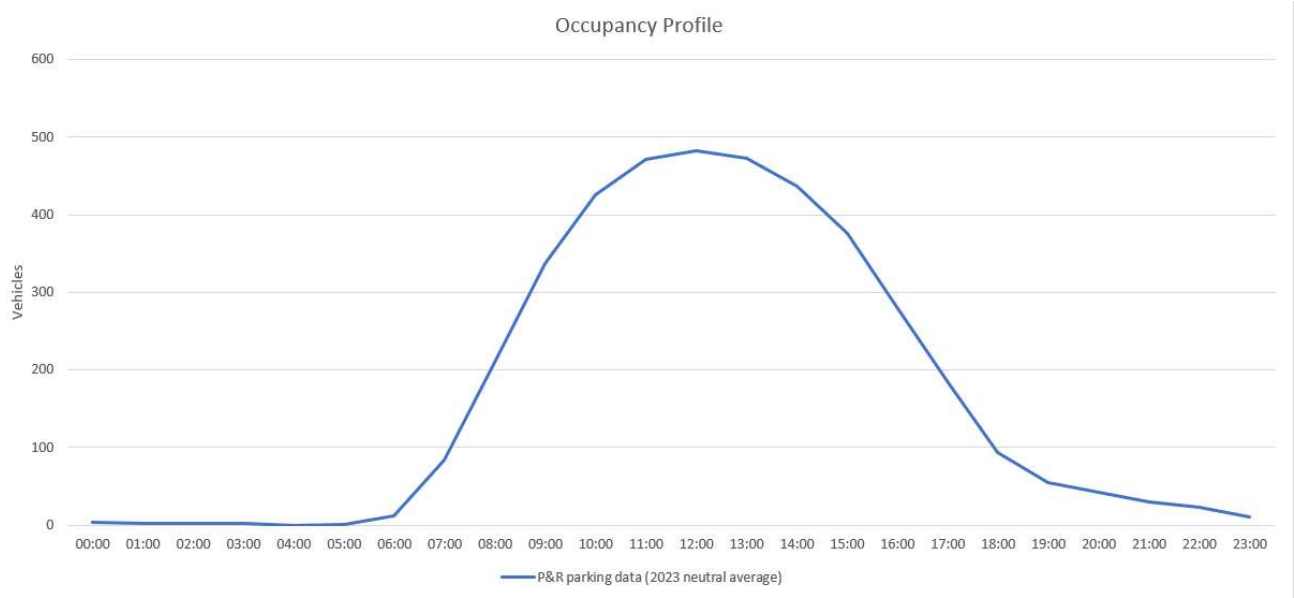
Table 3-1 – Newmarket Road P&R: Annual Average Weekday Car Park occupancy (2023)

Time		Annual Average Occupancy
00:00	01:00	4
01:00	02:00	3
02:00	03:00	3
03:00	04:00	3
04:00	05:00	0
05:00	06:00	1
06:00	07:00	12
07:00	08:00	84
08:00	09:00	210

09:00	10:00	338
10:00	11:00	425
11:00	12:00	471
12:00	**13:00**	**482**
13:00	14:00	472
14:00	15:00	437
15:00	16:00	375
16:00	17:00	279
17:00	18:00	183
18:00	19:00	94
19:00	20:00	54
20:00	21:00	42
21:00	22:00	30
22:00	23:00	22
23:00	24:00	10
24:00	00:00	4

3.3.3. Table 3-1 shows that on average, weekday car parking occupancy at the site increases throughout the morning, before peaking at an average occupancy of 482 vehicles (55%) between 12:00-13:00. After 13:00, average car parking occupancy begins to decrease as vehicles leave the site. The daily profile of the average weekday car parking occupancy is shown below in Figure 3-1.

Figure 3-1 - Average Car Parking Occupancy Profile



3.3.4. This average occupancy profile matches the profile obtained from a 2023 traffic count undertaken at the P&R site access junction. However, it should be noted that the level of P&R use does vary throughout the year.

3.3.5. The P&R accommodates much higher levels of occupancy on event days in Cambridge such as Cambridge United home matches where this P&R is promoted for use by home and away fans and the Cambridge half marathon where tickets to the P&R are pre-sold as part of the management strategy for people accessing the city.

3.4. P&R ACCESS JUNCTION TURNING COUNTS

3.4.1. To understand where existing users are accessing the P&R from, vehicle turning count data from a recent survey at the P&R access junction has been analysed. The turning count survey was undertaken in June 2023 as part of the evidence base for the new Cambridgeshire County Council Sub-Regional traffic model. The results for both the AM Peak Hour 8:00-9:00 and PM Peak Hour 17:00-18:00 are shown in Tables 3-2 and 3-3 below.

Table 3-2 – Newmarket Road Park & Ride junction (AM Peak Hour 08:00-09:00)

Arm	P&R	Newmarket Road (E)	Newmarket Road (W)	Total
P&R	-	19	16	**35**
Newmarket Road (E)	**121**	-	848	**969**
Newmarket Road (W)	**33**	469	-	**502**
Total	**154**	**488**	**864**	**1,506**

3.4.2. Table 3-2 shows that in the AM Peak Hour, a total of 154 vehicles entered the site, whilst 35 vehicles egressed the site. By analysing the proportion of turns into the site from each arm, we are able to understand the distribution between people arriving from the west (towards the city) versus those arriving from the east (towards Airport Way and the A14).

3.4.3. In the AM Peak Hour, the data shows that approximately 79% of all vehicle trips accessing the Newmarket Road P&R site are doing so from the east, towards Airport Way and the A14. The remaining 21% are accessing the site from the west.

Table 3-3 - Newmarket Road Park & Ride junction (PM Peak Hour 17:00-18:00)

Arm	P&R	Newmarket Road (E)	Newmarket Road (W)	Total
P&R	-	**130**	**46**	**176**
Newmarket Road (E)	40	-	504	**544**
Newmarket Road (W)	26	708	-	**734**
Total	**66**	**838**	**550**	**1,454**

3.4.4. Table 3-3 shows that in the PM Peak Hour, a total of 66 vehicles entered the site, whilst 176 vehicles egressed the site. In the PM Peak Hour, the AM Peak Hour arrival distribution is mirrored, with approximately 74% of the vehicles exiting the site and heading east along Newmarket Road towards Airport Way and the A14, whilst the remaining 26% head west towards the city.

3.4.5. This trip distribution evidence suggests the majority of the site's users are people travelling into the city from the east/northeast, outside of the existing built-up area of the city. This is evidenced further in Section 3.5 below.

3.4.6. Trips entering the P&R from the west may not be using the site for its primary purpose (accessing P&R buses or Park and Cycle), and may include pick-up and drop-off trips for the neighbouring Marleigh Primary Academy School, which can be accessed directly from the P&R, and/or people visiting the Cambridge Ice Arena (public parking is provided by the P&R) or using the drive through NHS Blood Facility, located in the northeast corner of the site.

3.5. P&R USER SURVEYS

3.5.1. To compliment the above car park occupancy and site access turning count data and provide a robust evidenced response to Challenge 1, P&R user survey data collected at the Newmarket Road P&R site has been reviewed. A P&R user survey was conducted as part of the Cambridgeshire County Council CapCAM Sub-Regional Model update in June 2023.

3.5.2. This survey identified the origin and destination of 48 Newmarket Road P&R users. It is recognised that the sample size if small compared to the number of daily and weekly users, however it provides some useful insight into the potential routing of users to and from the existing site. The data is summarised in Table 3-4. The routing presented in Table 3-4 has been assumed based on their stated origin.

Table 3-4 – P&R User Survey: Origin and Destination Split (2023)

Approach/Routing	Percentage Split (%)*
A14 (East)	60%
A14 (West)	8%
B1102 Church Road	6%
A1303 (northeast)	2%
Airport Way	17%
A1303 (west of existing site)	6%
Total	**100%**

*Sample of 48 completed survey responses

3.5.3. Of the 48 responses gathered in this survey, the majority of users at the P&R (60%) were likely to be accessing the site from the A14 (East), whilst a small proportion of respondents (8%) were likely to be accessing the site from the A14 (West). A very small proportion of respondents are likely to be accessing the site from either the A1303 (2%) or B1102 Church Road (6%), north of and Quy Interchange (Junction 35 of the A14). This survey indicates that very few of the surveyed P&R users are likely to be routing to the site via the A1303 or B1102 to the north of the Quy Interchange.

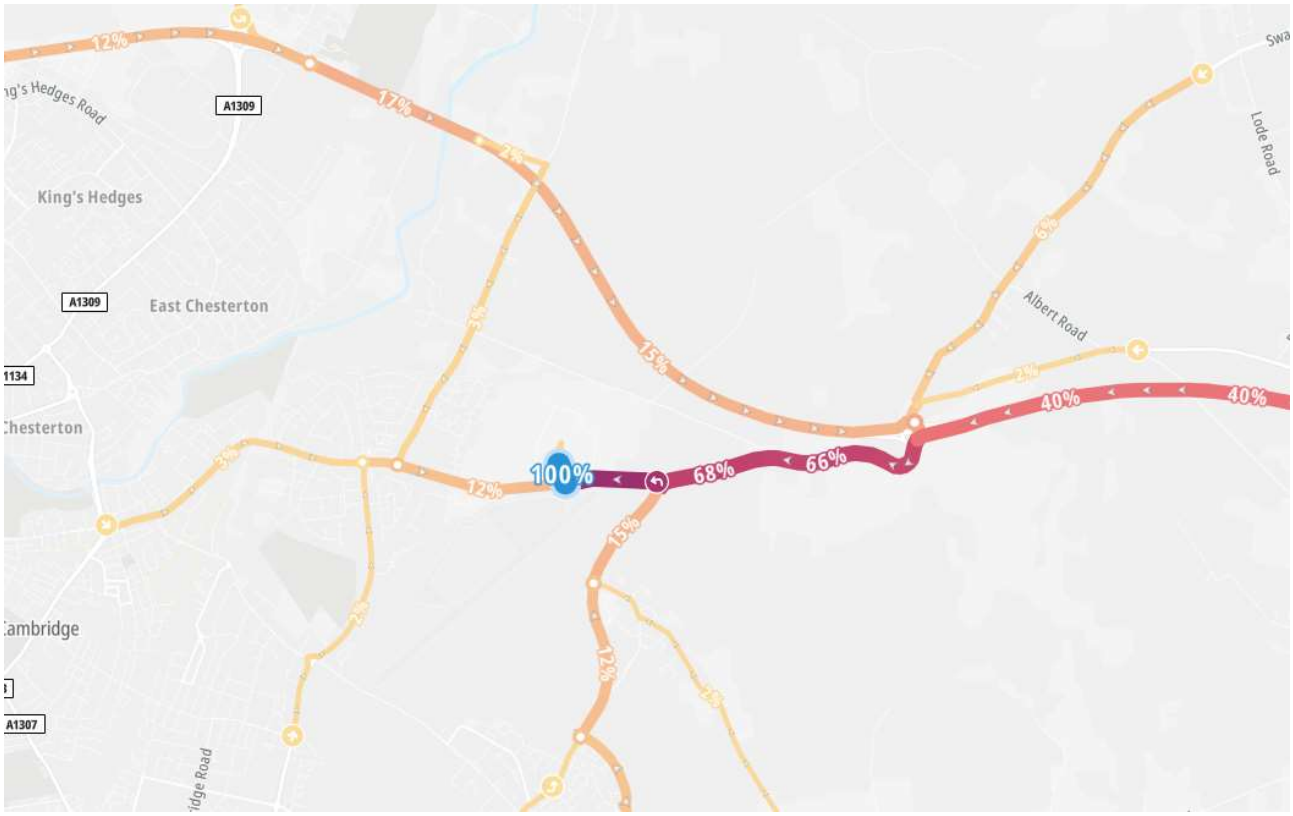
3.5.4. Whilst this data gives an indication of the routing of existing P&R users to the Newmarket Road P&R site, additional origin and destination data was required to get a more accurate and robust evidence base of how users access the site.

3.6. GPS (TOMTOM) ORIGIN AND DESTINATION DATA

3.6.1. To obtain a larger sample size of existing P&R users access routes into the site and further strengthen the existing P&R user and local traffic flow evidence base, localised TomTom data was obtained to understand the existing origins and destinations of trips to and from the P&R.

3.6.2. The TomTom GPS data is collected from passive GPS data from mobile phones and groups movements based on vehicles (rather than individuals). The data provided 1,200 data points collected for neutral weekdays across a three-month period and therefore provides a substantially larger sample size compared to the CapCAM survey (48 respondents). The TomTom data distribution of inbound trips into the P&R during the AM Peak Hour are shown in Figure 3-2.

Figure 3-2 - TomTom Select Link Analysis (AM Peak 08:00-09:00 - inbound trips)



3.6.3. Figure 3-2 shows that in majority of trips into the existing P&R in the AM Peak Hour are accessing the site from the east (86%), from either Airport Way (15%) or the Quy Interchange. At the Quy Interchange the main access route is via the A14 East (40%) towards Newmarket, and the A14 West (15%) towards Milton. Only 2% of the recorded trips arrived via the A1303 north of the Quy Interchange and 6% via the B1102 Church Road.

3.6.4. Figure 3-2 shows a proportion of trips accessed the site from the west (12%). Of these vehicles, 3% routed through Fen Ditton as an alternative to routing via the Quy Interchange. Some of the trips are shorter distance trips from origins along Newmarket Road and Barnwell Road. Figure 3-2 also shows there are some shorter local trips via Airport Way and Teversham village.

3.6.5. As identified above, it is considered likely that some of these shorter local trips may be attributable to the other land uses within and adjacent to the P&R, including Marleigh Primary Academy School, The Cambridge Ice Arena and the Addenbrooke's Drive-Through Blood Facility. These local non-P&R trips to the current site will not reassign to the new P&R site.

3.6.6. The network assignment shown in Figure 3-2 is broadly consistent with the traffic survey data obtained at the Newmarket Road P&R access junction, for the same period, which showed a 79/21 east to west split and the CapCAM P&R interview survey results summarised in Table 3-4.

3.7. SUMMARY AND CONCLUSIONS

3.7.1. In summary, this chapter has presented a range of existing P&R user data from a variety of sources to strengthen the evidence base on the existing levels of use and arrival and departure travel patterns of P&R users.

3.7.2. In response the Challenge 1 (the need to provide more evidence on existing P&R routing), all the evidence obtained and analysed on the routing of existing P&R users shows that the majority of users come for the east of the site. The TomTom data provides the largest and therefore most robust dataset, showing the majority of users (40%) arrive from the A14 east towards Newmarket, followed by 15% from the A14 West and Airport Way. Only a small proportion of site users' route via the A1303 (2%) and B1102 (6%) to the north of the Quy Interchange.

3.7.3. A proportion of existing users' route from local origins along Newmarket Road, Barnwell Road and Airport Way. However, some of these trips may be for non-P&R purposes including accessing Marleigh Primary School, the Ice Arena and the NHS Drive-Through Blood Facility within the site, which would remain once the P&R is relocated.

3.7.4. In conclusion, the evidence shows that locating a P&R to the north of the A14 will not directly intercept a large number of existing P&R users passing site P10 or P11 on the A1303 or B1102 Church Road respectively, as the majority of existing users' route via the A14 and will therefore have to divert towards these sites. Site P1 is likely to result in a similar assignment pattern to the existing P&R site.

4. SURROUNDING ROAD NETWORK

4.1. INTRODUCTION

4.1.1. The purpose of this chapter is to summarise the existing traffic conditions on the surrounding road network as this is an important consideration in determining the preferred location and developing the access strategy for the relocated P&R site. The existing baseline traffic data summarised in this chapter has been used to inform the traffic modelling presented in Chapter 6.

4.1.2. The focus is on the operation of the network from Airport Way to the A14 Quy Interchange as this will be directly impacted by site P1, P10 or P11.

4.2. BASELINE CONDITIONS

AIRPORT WAY ROUNDABOUT

4.2.1. A weekday vehicle turning count survey was conducted at the Airport Way roundabout junction as part of the recent CapCAM surveys (June 2023). The results for both the AM Peak Hour 8:00-9:00 and PM Peak Hour 17:00-18:00 are shown in Tables 4-1 and 4-2 below.

Table 4-1 – Airport Way Roundabout (AM Peak Hour 08:00-09:00)

Arm	Newmarket Road (E)	Airport Way	Newmarket Road (W)	Total
Newmarket Road (E)	0	803	707	**1,510**
Airport Way	467	1	242	**710**
Newmarket Road (W)	241	212	0	**453**
Total	**708**	**1016**	**949**	**2,673**

4.2.2. Table 4-1 shows that in the weekday AM Peak Hour, Airport Way is a busy junction accommodating a high inbound flow along Newmarket Road East, with 1,510 inbound movements, including vehicles heading for the existing Newmarket Road P&R. There is a relatively even split between vehicles turning left onto Airport Way and heading westbound along Newmarket Road. Airport Way accommodated 710 northbound movements and Newmarket Road West 453 outbound movements evenly split between destinations via Airport Way and Newmarket Road. Relevant to the site selection, this evidence shows that locating a P&R on Newmarket Road East provides the opportunity to directly intercept the highest number of inbound trips into the city during the AM Peak Hour.

Table 4-2 - Airport Way Roundabout (PM Peak Hour 17:00-18:00)

Arm	Newmarket Road (E)	Airport Way	Newmarket Road (W)	Total
Newmarket Road (E)	1	406	359	**766**
Airport Way	844	0	144	**988**
Newmarket Road (W)	566	187	1	**754**
Total	**1,411**	**593**	**504**	**2,508**

4.2.3. Table 4-2 shows that in the weekday PM Peak Hour, Airport Way remains a busy junction accommodating a high outbound flow to Newmarket Road East, with 1,411 outbound movements from Airport Way (844) and Newmarket Road West (566).

QUY INTERCHANGE AND CHURCH ROAD JUNCTION

4.2.4. Manual Classified Turning Counts were commissioned for this study at the Quy Interchange (Junction 35 of the A14) and the A1303 Newmarket Road / Church Road junction as a full existing dataset could not be sourced. The surveys were conducted on a neutral weekday (Thursday 15th February 2024) between 07:00 and 19:00 hours.

4.2.5. The extent of queuing on all junction approach arms and the A1303 exit merge into Cambridge was recorded to understand the existing level of congestion and identify any evidence of blocking back into the Quy Interchange.

Quy Interchange

4.2.6. The AM and PM Peak Hour results for the vehicle turning count surveys conducted at the Quy Interchange are summarised in Table 4-3 and Table 4-4.

Table 4-3 – Quy Interchange (AM Peak Hour 08:00-09:00)

Arm	A1303 North	A14 East	A1303 South	A14 West	Total
A1303 North	3	13	410	537	**963**
A14 East	102	0	608	6	**716**
A1303 South	255	185	0	271	**711**
A14 West	740	0	427	0	**1,167**
Total	**1,100**	**198**	**1,445**	**814**	**3,557**

4.2.7. Table 4-3 shows that during the AM Peak Hour (08:00-09:00) the junction accommodates high vehicle turning flows, with a total of 3,557 movements through the junction. The busiest arm is the A14 West (eastbound off slip) with 1,167 movements, followed by the A1303 approach from the north of the junction with 963 movements.

4.2.8. The main destination is the A1303 South towards Cambridge (1,445 movements) followed by the A1303 North (1,100 movements).

4.2.9. The main turning movements are by vehicles exiting the A14, with 740 vehicles turning left from the A14 West off slip to the A1303 (north) and 608 vehicles turning left from the A14 East off slip onto the A1303 (south) towards Cambridge.

4.2.10. From the A1303 North, 410 vehicles continue southwards to the A1303 (south) into Cambridge and 537 vehicles turn right and head west onto the A14. This evidence shows the main flow into Cambridge at the Quy Interchange is from the east, from the A14 westbound off-slip.

Table 4-4 - Quy Interchange (PM Peak Hour 16:00-17:00)

Arm	A1303 North	A14 East	A1303 South	A14 West	Total
A1303 North	1	23	224	396	**644**
A14 East	23	1	248	1	**273**
A1303 South	617	444	0	548	**1,609**
A14 West	841	0	279	0	**1,120**
Total	**1,482**	**468**	**751**	**945**	**3,646**

4.2.11. Table 4-4 shows that during the PM Peak Hour (16:00-17:00), traffic flow remains high with a total of 3,646 vehicle turning movements through the junction. The busiest arm is the A1303 South with 1,609 movements exiting the city, followed by the A14 West off slip approach with 1,120 movements. The main destination is the A1303 North towards Bottisham (1,482 movements) followed by the A14 West (945 movements).

4.2.12. The main turning movements during this period are the 841 vehicles turning left from the A14 (west) to the A1303 (north), the 617 vehicles heading northbound through the junction on the A1303 and the 548 vehicles exiting the city and heading westbound along the A14.

4.2.13. The results of the queue length surveys are summarised in Table 4-5 which displays the maximum queue length of each lane within the AM and PM Peak hour in vehicles.

Table 4-5 – Maximum Vehicle Queue Length: Quy Interchange

Arm	AM Peak Hour (08:00-09:00)		PM Peak Hour (16:00-17:00)	
	Lane 1	Lane 2	Lane 1	Lane 2
A1303 (north)	21	18	6	11
A14 (East)	11	6	0	2
A1303 (south)	7	13	12	13
A14 (West)	30	50	18	60

4.2.14. Table 4-5 shows that in the AM Peak Hour, a maximum queue length of 50 vehicles was observed on Lane 2 of the A14 West, eastbound off slip. This lane is used by vehicles turning right towards the A1303 (south) heading into Cambridge. At a maximum queue length of 50 vehicles, this lane occasionally blocks back onto the mainline of traffic on the A14. A maximum queue length of 21 vehicles was recorded in Lane 1 of the A1303 North used by vehicles accessing the A14 eastbound on slip and Cambridge. This maximum queue is sufficient to block back to the Church Road junction.

4.2.15. Whilst queuing on the A14 (east) arm appears to be significantly less between 08:00-09:00, the data shows there was much more significant queues recorded slightly earlier on in the day between 07:00 – 08:00, with queue length varying between 13 and 48 vehicles on Lane 1 into Cambridge (free flow left turn). This shows that the free flow exit from Lane 1 into Cambridge is blocking back during the morning peak as vehicles cannot freely exit onto the A1303.

4.2.16. In the PM Peak Hour, queuing on the A14 West eastbound off slip arm worsens to a maximum of 60 vehicles, raising significant safety concern with blocking back onto the mainline. This is because vehicles on this off-slip have to give way to the high outbound flows from Cambridge travelling to the A1303 North and A14 eastbound. Queuing on all other approach arms are relatively low.

Church Road/A1303 Junction

4.2.17. The AM and PM Peak Hour results for the vehicle turning count surveys conducted at the A1303 Newmarket Road /Church Road are summarised in Table 4-6 and Table 4-7.

Table 4-6 – A1303/Church Street (AM Peak Hour 08:00-09:00)

Arm	Church Road	A1303 (NE)	A1303 (S)	Total
Church Road	0	7	388	**395**
A1303 (NE)	0	0	559	**559**
A1303 (S)	241	864	0	**1,105**
Total	**241**	**871**	**947**	**2,059**

4.2.18. During the AM Peak Hour (08:00-09:00), the dominant movement (864 vehicles) is made by vehicles that have left the Quy Interchange and are continuing their journey northeast along the A1303. However, 559 vehicles are doing the reverse of this movement and are routing southbound along the A1303 towards the Quy Interchange.

4.2.19. In total 395 vehicles are entering the junction from Church Road, with 388 and heading south along the A1303 (towards the Quy Interchange).

Table 4-7 - A1303/Church Street (PM Peak Hour 16:00-17:00)

Arm	Church Road	A1303 (NE)	A1303 (S)	Total
Church Road	0	8	320	**328**
A1303 (NE)	0	0	316	**316**
A1303 (S)	629	844	0	**1,473**
Total	**629**	**852**	**636**	**2,117**

4.2.20. During the PM Peak Hour (16:00-17:00), traffic flow is somewhat mirrored, with the majority or movements originating from the Quy Interchange. Of these 1,473 movements that have routed from the Quy Interchange, 629 continue along Church Road and 844 route northeast along the A1303.

4.2.21. The results of the queue length surveys are outlined within Table 4-8 which displays the maximum queue length of each lane within the Peak Hour in vehicles.

Table 4-8 - Maximum Vehicle Queue Length: Church Road Junction

Arm	AM Peak Hour (08:00-09:00)		PM Peak Hour (16:00-17:00)	
	Lane 1	Lane 2	Lane 1	Lane 2
Church Road	1	29	0	19
A1303 (NE)	12	22	5	4
A1303 (S)	0	23	15	19

4.2.22. During the AM Peak Hour, a maximum queue length of 29 vehicles was observed on Lane 2 of Church Road. Lane 1 of Church Road only shows a max queue length of 1 vehicle as it represents the left turn flare onto the A1303 (NE), which only has space for 1 vehicle to queue.

4.2.23. Substantial queueing was also observed along the A1303 (NE) during the AM Peak Hour, where a maximum queue length of 22 vehicles was observed in Lane 2. This level of queue appeared to last for approximately 30 minutes before subsiding at around 08:40.

4.2.24. During the PM Peak Hour, maximum queue lengths at the Church Road junction are significantly reduced, with a maximum peak queue of 19 vehicles observed on Lane 2 of Church Road and the A1303 South.

4.2.25. The A1303 (S) from the Quy Interchange accommodated a maximum queue of 23 and 19 vehicles in Lane 2 during the AM and PM Peak Hours respectively. This level of queue represents a risk of blocking back onto Junction 35 of the A14 (The Quy Interchange).

4.2.26. This risk is evidenced by the blocking back log for this junction which recorded 12 blocking back incidences for this arm of the Church Road junction during the AM Peak Hour.

Two Lane Exit Merge (A1303)

4.2.27. A blocking back survey was conducted at the two-lane exit merge on the A1303 (Newmarket Road) into Cambridge. This merge is a known pinch-point on the network in the weekday AM Peak period, where two lanes of traffic exiting the Quy Interchange merge into one lane. This merge is congested resulting in exit delays from the A14 westbound off-slip free flow exit and the circulatory carriageway.

4.2.28. Between 07:00-10:00 hours there were 33 recorded incidents of the A1303 blocking back at the 2-lane merge, with an average duration of 2 minutes and 49 seconds during this period.

4.2.29. Of these 33 incidents, 13 were recorded as having a maximum queue length greater than 50 vehicles in either the inside or outside lane (or both) of the exit merge. At this level of queueing there is further risk of blocking back onto the Quy Interchange. There were no incidents of blocking back at the two-lane merge during the PM Peak period.

4.3. SUMMARY

4.3.1. The evidence shows that the local highway network accommodates high traffic flows in the weekday peak periods. In the AM Peak Hour, the network is congested with high inbound flows into Cambridge along the A1303 resulting in congestion in the exit merge at the Quy interchange and on the A14 off slips. The queueing on the A14 exit slips are of particular concerns due to the potential for blocking back onto the mainline which will be a significant safety concern for National Highways.

4.3.2. This evidence is relevant to the assessment of P1, P10 and P11 as without substantial bus priority measures, P&R buses from P10 and P11 will have to travel though this congested network in the weekday morning peak. A quick and reliable inbound P&R bus journey time is important in the morning peak to provide an attractive service to commuters.

4.3.3. The level of congestion will increase P&R bus journey times and impact reliability. This could impact P&R user perception of the P&R providing a quick and direct service into the city. In addition, due to the National Highways concerns regarding queuing on the off-slips (which are substantial), any road space reallocation to bus priority measures are unlikely to be unacceptable if they increase queueing on the off-slips back on to the A14 mainline.

4.3.4. The evidence also shows that the off-slips contain lower levels of queuing for movements towards the A1303 North. Therefore, the reassignment of P&R users to sites P10 and P11 could improve the operation of the Quy Interchange in the AM Peak Hour, however additional vehicle movements will occur through the Church Road junction.

4.3.5. In the PM Peak Hour, the evidence shows the Quy Interchange and Church Road are less congested when compared to the AM Peak Hour. The exception is the A14 West off-slip which has long queues in Lane 2 towards Cambridge due to the high outbound flows from Cambridge.

5. P1, P10 AND P11 SITE FEASIBILITY

5.1. INTRODUCTION

5.1.1. In order to understand if safe and suitable access can be achieved into site P1, P10 and P11, site access arrangement drawings and concept layout plans for the P&R sites were developed (Appendix B). The concept layout and access junction arrangements for Site P1, P10 and P11 are summarised below along with the pros and cons of each arrangement.

5.1.2. The concept access plans have been utilised in the Paramics micro-simulation modelling to assess the impact of these three P&R locations on the operation of the surrounding local road network, including the Quy Interchange (Chapter 6).

5.1.3. The designs provide a 'concept' level of detail at this site selection stage and are based on OS data. Preliminary design work will be required once a preferred site location has been agreed at the GCP Board and feedback has been received from the future pre-application discussions.

5.1.4. In addition to the P1, P10 and P11 site access concept designs, consideration has been given to the provision of bus priority measures within the public highway (road space reallocation) to enable P&R buses to travel more reliably through the Quy Interchange and along the A1303 towards Cambridge. The feasibility of these measures are outlined in more detail in Section 5.5.

5.2. SITE P1

5.2.1. Site P1 is currently the preferred relocation site and is located to the east of the Airport Way roundabout, south of the A1303 Newmarket Road. It is the closest short-listed site to the existing P&R and has the potential to integrate with the long-term redevelopment of Cambridge Airport.

5.2.2. P1 is located at the eastern end of the Newmarket Road scheme and therefore will directly benefit from the additional bus lanes that form part of the CEA improvements for Newmarket Road.

5.2.3. Figure 5-1 shows the preferred site access arrangement into Site P1. Pedestrian and cycle access to the site would be possible via a signal-controlled crossing to the existing shared-use path along the northern side of Newmarket Road. Vehicular access into the site would be provided via a new a signalised T-junction on Newmarket Road; whilst segregated bus access and egress could be provided via an additional arm onto the partially signalised Airport Way roundabout.

Figure 5-1 - Site P1 - Preferred Access Option

5.2.4. The main benefits of this access arrangement are the vehicle access is located on the A1303 Newmarket Road and will intercept the main inbound flow of vehicles into Cambridge in the AM Peak periods before they reach the Airport Way roundabout. A controlled crossing can be provided to the existing shared-use path on the northern side of Newmarket Road to support Park and Pedal cycle users. Bus priority can be provided directly onto the Airport Way roundabout with buses accessing the bus lanes proposed along Newmarket Road.

5.2.5. The disadvantages of this access arrangement is the crossing on Newmarket Road and vehicles exiting the site, particularly in the PM Peak Hour will cause delays to vehicle movements along Newmarket Road which will remain a busy road in the peak travel periods.

5.2.6. An alternative access/egress point for P&R buses could be provided along Airport Way, south of the roundabout. This would enable buses to directly access the redevelopment of Cambridge Airport site. This alternative access arrangement is provided in Appendix B.

5.2.7. As the site is closest to the city centre, it will result in quickest P&R bus journey times, particularly in the AM and PM Peak Hours, which may prove more attractive to bus operators and P&R users. This is evidenced in Chapter 6.

5.2.8. The site is owned by Marshall's who are supportive in principle of relocating the existing P&R to this site. The flat topography and regular shaped plot means that there will be limited constraints to the proposed development.

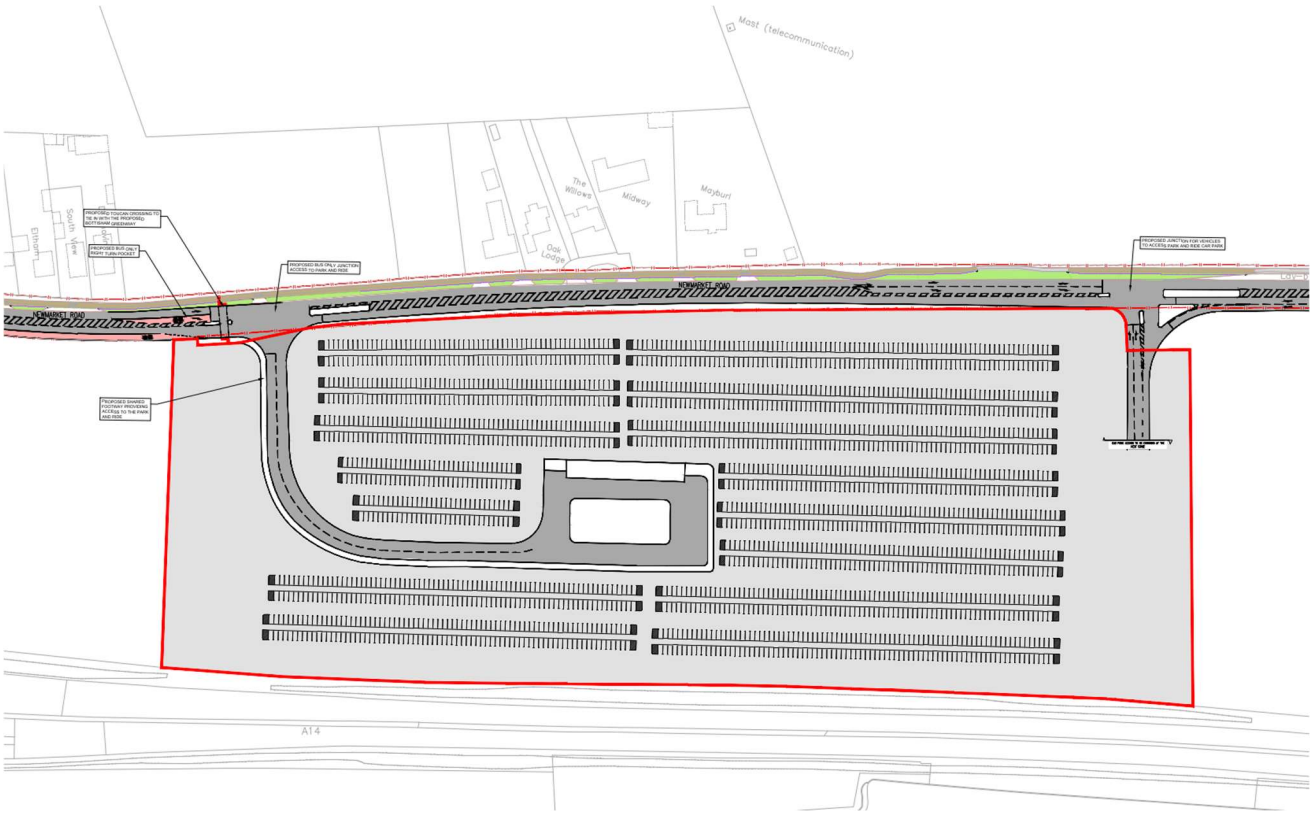
5.3. SITE P10

5.3.1. Site P10 is located to the northeast of the Quy Interchange between the A1303 Newmarket Raod and the eastbound off-slip of the A14. Vehicular, pedestrian and cycle access and egress into the site would be provided from the A1303.

5.3.2. The benefits of this site location is that it has the potential to directly intercept P&R trips routing past the site on the A1303 (although the evidence in Chapter 3 shows this is a very low proportion of existing P&R users) and P&R users currently accessing the existing site from the A14 would redistribute to the A1303 north, potentially reducing the pinch point congestion on the A1303 exit merge and A14 off slips in the AM Peak period.

5.3.3. Figure 5-2 below shows a feasible concept design arrangement for Site P10. This layout plan is also provided in Appendix B. This concept design provides a new signal controlled vehicle access T-junction to the east of the site and a separate signal controlled access T-junction for buses further west along the A1303, closer to the Quy Interchange. Pedestrian and cycle access can be provided to the existing shared-use path and future Swaffham Greenway on the northern side of Newmarket Road via a controlled crossing at the bus only access.

Figure 5-2 - Site P10: Concept Design Overview



5.3.4. This arrangement provides bus priority for P&R buses as they do not have to enter and exit the site using the same junction as private vehicles. It also minimises the distance they have to travel on the A1303.

5.3.5. One of the key trade-offs with P10 is it will result in an increase in P&R bus journey times and impact journey time reliability compared the site P1, due to the need to route through the congested Church Road and Quy Interchange junctions and A1303 into Cambridge during peak travel periods. The bus journey time impact associated with Site P10 has been investigated further as part of the Operational Assessment summarised in Chapter 7.

5.3.6. To mitigate the impact on P&R bus journeys times as far as reasonably practicable, bus priority has been proposed in the form of an inbound bus lane along the A1303 from the bus only access to the Quy Interchange by reallocating the existing road space (Appendix B). This will reduce the existing A1303 approach to the Quy Interchange from two general traffic lanes to a bus lane and single traffic lane, but will enable P&R buses to bypass existing queuing on this approach, particularly in the weekday morning periods.

5.3.7. Private vehicles travelling inbound towards Cambridge on the A1303 would be intercepted by the site directly. Whilst private vehicles wishing to access the site from the B1102 may route via Albert Road or Church Street. Private vehicles wishing to access the site from the A14 (from either direction) would need to do so via the Quy Interchange and route through the Church Road junction.

5.3.8. Alternative access options could include a single combined bus and vehicle access which would result in a cost reduction compared to the proposed arrangement. However, this would come with a resultant impact upon bus journey time.

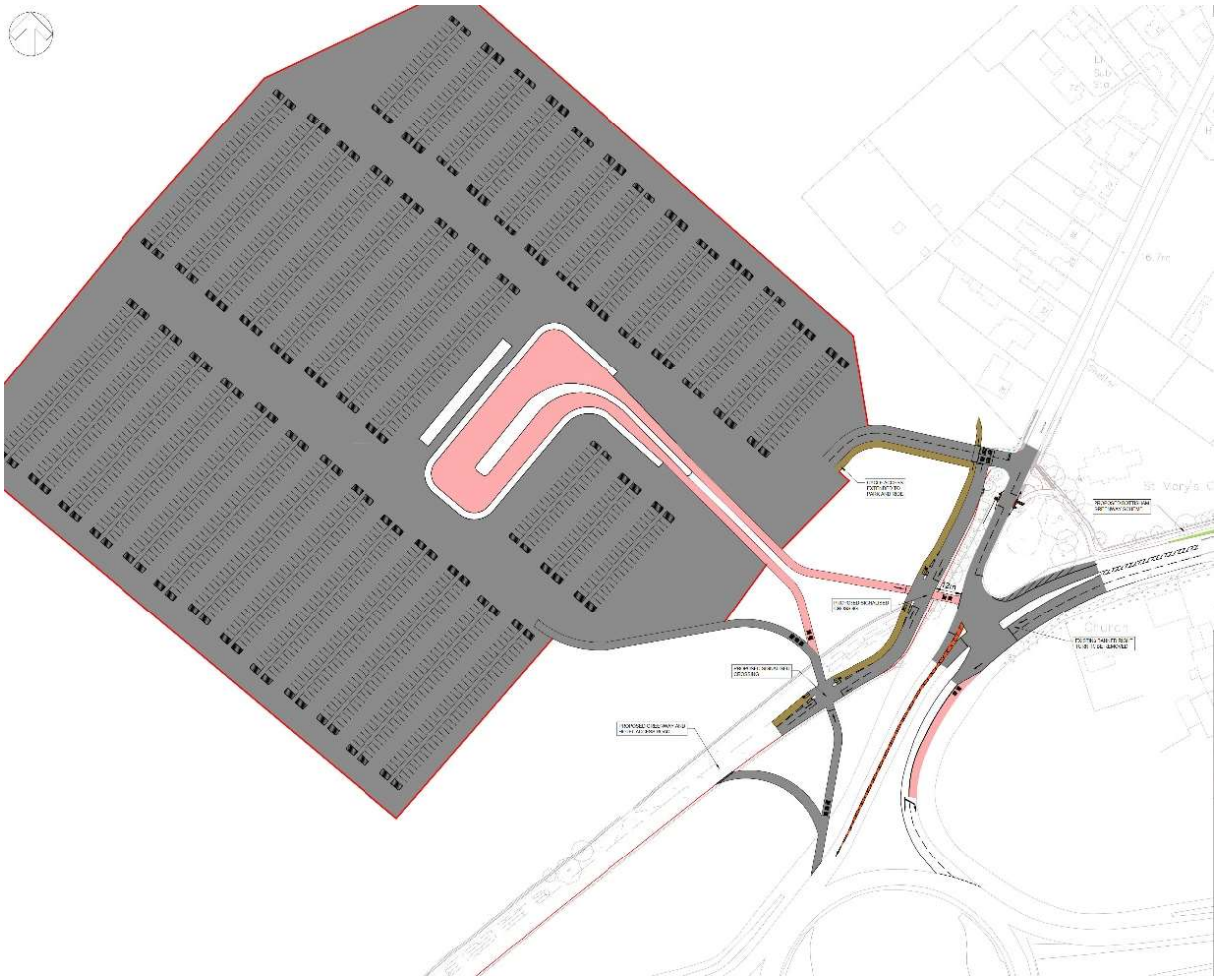
5.4. SITE P11

5.4.1. Site P11 is located to the north of the Quy Interchange, north of the A14 and west of Church Road. Vehicular access and egress into the site could be provided from both the A1303 and Church Road, whilst pedestrian and cycle access would be linked in with the proposals for the Bottisham/Swaffham Greenway which is currently proposed to route alongside the existing hotel access road to the south of the site.

5.4.2. The main benefit of the site is that it has the potential to intercept trips routing into Cambridge directly along Church Road (although the evidence presented in Chapter 3 shows this is relatively low). As per site P10, P11 will also remove the need for P&R users to route along the congested A1303 in the weekday morning periods, but as a result increase P&R bus journey times to and from the site (Chapter 6).

5.4.3. Figure 5-3 below shows a feasible concept design arrangement for Site P11. A larger plan is provided in Appendix B.

Figure 5-3 - Site P11: Concept Design Overview



5.4.4. Figure 5-3 shows that to access site P11, a dedicated entrance slip is proposed from the A1303 for vehicles arriving from the Quy Interchange. This slip would provide access to the hotel access road, the P&R car park and for P&R buses to access the site. In the concept design it would have to cross the retained hotel access road and the Bottisham Greenways via a signal controlled arrangement. If this option was taken forward further design development would be undertaken to see if the Bottisham Greenway could be rerouted to remove or reduce this user conflict.

5.4.5. All private vehicles would egress the site via the existing hotel access with Church Road. This is shown as remaining in priority control which is likely to result in long exit delays in the PM Peak periods due to queuing on Church Road from the signal controlled junction past this junction. Therefore, if this option is taken forward this junction may need to be signalised. P&R users arriving at the site from Church Road or the A1303 would enter the site via this junction.

5.4.6. P&R bus egress is provided by a bus only exit directly into the Church Road signal controlled junction. This is shown crossing the retained hotel access road and Bottisham Greenway, resulting in an additional signal controlled junction to manage the conflict between buses, the hotel access and cyclists on the Greenway.

5.4.7. The bus only exit would have its own stage called when a P&R bus departs the site. The Church Road junction has also been modified with the off-side approach lane on the A1303 westbound approach converted to a right turn lane to enable P&R users to access the site from the east. Currently it is not possible to turn right at this junction. These changes to the Church Road junction require additional signal stages which will impact the efficiency of the junction (Chapter 6).

5.4.8. The layout design presented in Figure 5-3 shows that accommodating a P&R site within P11 is challenging due to the constraints of retaining vehicle access to the hotel, retaining the Bottisham Greenway (currently under scheme design), providing vehicle access into the P&R and prioritising P&R bus access and egress. The concept design results in the need for multiple signal-controlled junctions to manage all the conflicts within the site and modifications to the Church Road junction.

5.4.9. To mitigate the impact on P&R bus journeys times as far as reasonably practicable, a small section of bus lane is proposed on approach to the Quy Interchange to enable buses to bypass queuing traffic.

5.4.10. Alternative access options could include a much larger access roundabout at the Church Road/A1303 junction. However, this would require additional private land take near St Mary's Church. The hotel access road and associated Greenway proposals could also be routed through or around the P&R site to reduce the number of junctions and conflict points.

5.5. P&R BUS PRIORITY MEASURES

5.5.1. More ambitious bus priority measures through the Quy Interchange junction and the exit merge on the A1303 have been considered as part of the concept design work for Site P10 and P11 in order to mitigate the impact of these sites on P&R bus journey times and journey reliability. For example, the nearside general traffic lane on the circulatory carriageway and exit merge could be reallocated to a bus lane to enable buses the travel through the junction more quickly and reliably.

5.5.2. However, based on a design review and sensitivity modelling using the Paramics micro-simulation model, it is not considered viable to reallocate the existing nearside lanes to a bus lane to provide additional bus priority through the Quy Interchange and on the exit without causing significant congestion and safety concerns for the operation of the junction during the peak travel periods. As a result, bus priority measures in the form of reallocated road space to bus lanes through the Quy Interchange and on the exit merge has not been considered as part of the P10 and P11 access proposals.

5.5.3. In addition, any changes to the circulatory carriageway on the Quy Interchange would need to be designed and agreed with National Highways, as the junction forms part of their Strategic Road Network (SRN).

5.6. ADDITIONAL P1 MITIGATION MEASURES

5.6.1. Site P1 results in the majority of P&R users travelling through the A1303 two lane merge. Consideration has been given to extending the existing two-lane exit merge into Cambridge (known as a Differential Acceleration Lane (DAL) as part of this high-level concept design review, to ease congestion and the blocking back into the Quy Interchange.

5.6.2. Differential Acceleration Lanes (DALs) are utilised to provide overtaking opportunities on exit arms of roundabouts with higher traffic flows and are usually located on straight sections of carriageway only.

5.6.3. The existing design layout for the western exit arm to the A1303 includes a DAL highway arrangement, however this arrangement stops short of the left-hand bend. By stopping the DAL arrangement before the left-hand bend, it enables the two lanes of traffic to merge on a straight section of highway which is deemed to be safer than merging on a bend where drivers must negotiate a change in highway alignment and a change in visibility.

5.6.4. Whilst the existing width of the A1303 is sufficient for two westbound lanes prior to the bend, the width of the carriageway gradually reduces beyond this point, meaning it is unlikely the merge point could be extended beyond its current location without significant widening works of the A1303. Some of the early constraints identified with widening the A1303 include highway boundaries, private accesses, and a bridge over a stream just beyond the western access. The design review has therefore identified that it is not considered possible to extend the length of the DAL in this area without substantial highway works.

5.7. SUMMARY

5.7.1. The evidence presented in this chapter shows that feasible access arrangements can be achieved into P1, P10 and P11. Site P11 is the most constrained due to the need to retain an access into the hotel and accommodate the existing Bottisham Greenway, resulting in a complex arrangement with multiple signal-controlled junctions. This site also requires the right turn at the Church Road junction to be enabled for P&R users accessing and egressing from the east.

5.7.2. P10 is less constrained, with space to provide signal-controlled T-junctions into the site for buses and private vehicles. P&R users from the A14 will have to route through the Church Road junction, the impact of this is assessed in Chapter 6.

5.7.3. Site P1 can be feasibly accessed from Newmarket Road by private vehicles, with prioritised bus access provided directly onto the Airport Way roundabout or Airport Way.

5.7.4. As identified in this chapter the key trade-offs are that P10 and P11 will reduce the number of P&R users travelling through the congested Quy Interchange and A1303 merge in the weekday morning peaks, however the P&R buses will need to travel through this congestion, increasing their journey time and reducing their reliability. Providing bus priority through the pinch point has been reviewed and is not considered to be viable due to the potential impact on the operation of the Quy Interchange and for increased queuing on the A14 off-slips onto the mainline which would result in objections from National Highways.

6. TRANSPORT NETWORK IMPACT ASSESSMENT

6.1. INTRODUCTION

6.1.1. The purpose of this chapter is to present an assessment of the potential highway and P&R bus journey time impacts of P1, P10 and P11 during the weekday AM and PM Peak Hours. The focus of the assessment is on the Quy Interchange and Church Road junctions and the A1303 towards Cambridge which are known to be congested during these travel periods (Chapter 4).

6.1.2. A bespoke Paramics micro-simulation model covering the study area (Airport Way to Church Road) has been produced for a 2023 base year. This model has been used to provide evidence for Challenge 2 as follows:

"The P&R should be located to the north of the A14 (site P10 or P11) to intercept trips on the A1303 and improve the operation of the A14 Junction 35 and merge on the inbound A1303 towards Cambridge".

6.1.3. It is agreed that a P&R site north of the A14 provides the opportunity to intercept private vehicle traffic on the A1303 before they route through the Quy Interchange and routes via the A1303 towards Cambridge, improving the operation of the junction and the existing inbound merge bottleneck in the weekday morning peak period.

6.1.4. However, the impact of relocating the P&R to the north side of the A14 will be increased P&R bus journey times and variability in the peak travel times and increased delays to movements through the Church Road junction. This chapter assesses the scale of these predicted impacts in the 2023 weekday AM and PM Peak Hours.

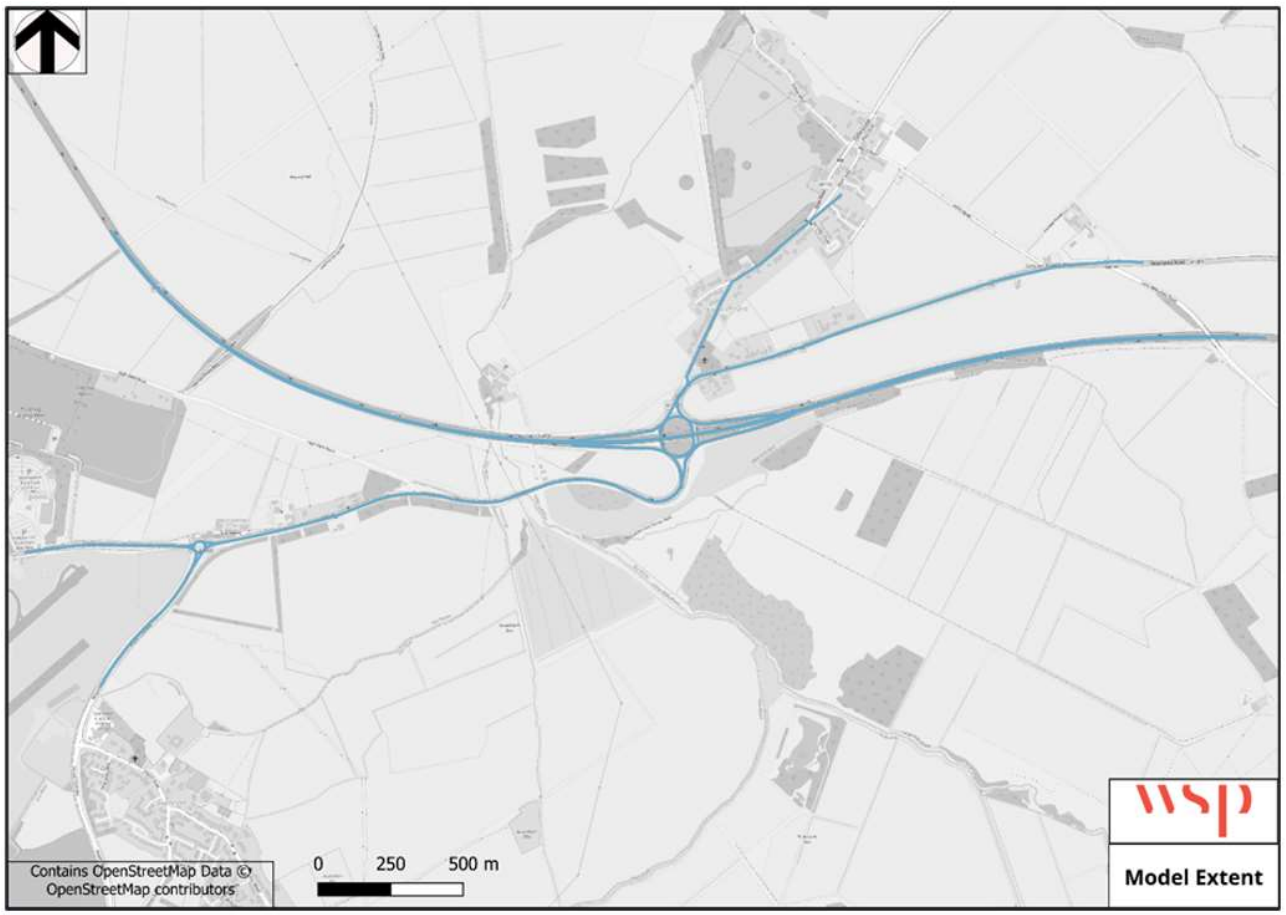
6.1.5. The Paramics micro-simulation assessment uses existing observed P&R vehicle demand and 2023/24 observed traffic flows in order to enable a comparative assessment to be undertaken between the three sites. An impact assessment taking into account forecast growth in traffic flows and P&R patronage has not been undertaken at this stage. If traffic levels and/or congestion levels were to increase on the local network, then the delays and impacts of P1, P10 and P11 reported in this chapter will worsen.

6.2. P&R PARAMICS MODEL

2023 BASE MODEL

6.2.1. A Paramics discovery micro-simulation model covering the A1303 Newmarket Road between Airport Way roundabout in the west and Church Road/Newmarket Road junction in the northeast was developed (Figure 6-1). The base model was calibrated / validated to represent existing observed weekday 2023 AM and PM Peak Hour travel conditions. The Local Model Validation Report (LMVR) is provided in Appendix C. The LMVR demonstrates that the micro-simulation model validates well against the observed data and is therefore considered fit for purpose for assessing the impacts of P1, P10 and P11 on the operation of the local network.

Figure 6-1 - Paramics Model Study Area



6.2.2. A micro-simulation model produces a visual simulation of the movement and queuing of individual vehicles on the local network. It is a powerful tool for comparing the P&R sites and associated access and mitigation measures. The model produces a series of outputs on the congestion and journeys times which are summarised in this chapter.

2024 P&R P1, P10 AND P11 MODEL

6.2.3. The three P&R sites and their access arrangements (Chapter 5) were coded into the Paramics models, and the results were compared to the base model to understand the forecast impact of the options. The following scenarios were developed:

- Do Minimum (DM) – 2023 Base Year model;
- Do Something 1 (DS1) – 2023 Base Year model + relocation of the Newmarket Road P&R to location P1;
- Do Something 2 (DS2) – 2023 Base Year model + relocation of the Newmarket Road P&R to location P10; and
- Do Something 3 (DS3) – 2023 Base Year model + relocation of the Newmarket Road P&R to location P11.

6.2.4. All scenarios use the 2023 base year observed traffic flows. The only changes in the network between these scenarios were the coding of the access arrangements to the proposed P&R, the reassignment of the existing AM and PM Peak Hour P&R vehicle demand, and the updates to the P&R bus routes.

P&R ACCESS CODING

6.2.5. The signal controlled junctions proposed for P1, P10 and P11 were coded on vehicle actuation detection. This means when a bus is detected the appropriate bus only junction stage is triggered to enable P&R buses to enter and exit each site. The existing P&R frequency of one bus every 10 minutes has been applied in this assessment.

6.2.6. Pedestrian and cycle crossing stages are assumed to be activated every other junction cycle. The vehicle access junctions are set up on a 120 second fixed time cycle.

P&R ARRIVAL AND DEPARTURE VEHICLE MOVEMENTS

6.2.7. The June 2023 MCC Traffic Count at the existing P&R access junction has been used to determine the P&R user vehicle trip attraction in the Paramics Model. The TomTom GPS data has been used to understand the origins and destinations of private vehicle movements to and from the current P&R to calculate the distribution to each site in the model. Table 6-1 shows the number of cars coming in and going out of the P&R during the AM and PM period.

Table 6-1 P&R Vehicle Demand

P&R Vehicle Trips	Newmarket Road East		Newmarket Road West	
	AM	PM	AM	PM
Arrive	202	75	34	46
Depart	16	218	10	65

6.2.8. The TomTom data was used to distribute the existing observed P&R vehicle demand to P1, P10 and P11 within the Paramics model. It was assumed that the observed distribution to the existing P&R would remain constant regardless of the location of the P&R site. I.e. if people are currently routing via the A1303, they will continue to do so if the P&R relocates to P1, P10 or P11.

6.2.9. The TomTom data identified that some existing P&R trips come from local origins in Cambridge. It has been assumed that those trips coming from the centre of Cambridge use the P&R for other purposes not related to using the P&R buses (e.g. Marleigh Primary School, NHS Blood Facility or Ice Arena).

MODEL RESULTS

6.2.10. This section presents the model results used to compare the different scenarios that were tested. All the results presented represent an average of 20 simulation runs as each run produces variable congestion results. The results are compared for the AM and PM Peak Hours only (07:30 to 08:30 and 16:45 to 17:45 respectively) as this represents the busiest time within the model.

Overall Model Network Performance

6.2.11. Network performance statistics are a representation of all vehicle trips in the model as a whole and are summarised as follows:

- Average travel time: the total travel time for every vehicle trip in the model network in seconds, no matter the origin or destination;
- Total vehicles: the total number of vehicle trips completed in the Peak Hour; and
- Average speed: the average speed of all vehicles completing trips in the Peak Hour, averaged to a single value.

6.2.12. Network performance statistics comparison between the Base and P&R models for the AM and PM Peak Hours are presented in Tables 6-2 and 6-3 respectively.

Table 6-2 Network Performance Results (Base vs Options) for AM Peak Hour

Parameters	AM Peak Hour			
	Base	P1	P10	P11
Average Time (veh/sec)	231	244	211	193
Total Vehicles	7,666	7,667	7,675	7,659
Average Speed (mph)	37	35	40	44

6.2.13. In the AM Peak Hour, Table 6-2 shows that P11 resulted in the lowest average travel time for all vehicles movements in the model, showing a reduction of about 38 seconds compared to the base. At the model level, P1 and P10 result in similar results to the base. P11 also shows an improvement in average speed compared to the other P&R sites, resulting in an average vehicle speed that is 7 mph faster than the existing situation. All scenarios allow a similar number of trips through the network during the AM Peak Hour, showing that each P&R site is not significantly impacting congestion levels which would impact the ability for vehicles to enter and route through the model.

Table 6-3 Network Performance Results (Base vs Options) for PM Peak Hour

Parameters	PM Peak Hour			
	Base	P1	P10	P11
Average Time (veh/sec)	189	184	191	191
Total Vehicles	7,296	7,273	7,265	7,281
Average Speed (mph)	45	46	44	44

6.2.14. In the PM Peak Hour, the overall model results do not show any substantial changes between the different scenarios. P1 is showing a minor improvement in average travel time of 5 seconds compared to base. Average speed also increases slightly for option P1. However, these differences are not deemed significant at the overall model level.

Queue Lengths

6.2.15. Modelled queue lengths on all approaches to the Quy Interchange and Church Road / Newmarket Road junction, as well as the 2-lane exit merge on Newmarket Road are compared below between the base and do-something scenarios.

6.2.16. Table 6-4 and Table 6-5 show the mean max queue lengths in metres for the approaches in the AM and PM Peak Hours respectively, between the base and each option model. Queue graphs are provided in Appendix D.

Table 6-4 Queue Length (m) Comparison for AM Peak Hour

Junction	Queue Route	Queue Length (m)			
		Base	P1	P10	P11
Quy Interchange (J35 of the A14)	A1303 Newmarket Road (Northeast)	105	112	130	124
	A14 off-slip (East)	206	263	8	0
	A1303 Newmarket Road (Southwest)	62	71	81	74
	A14 off-slip (West)	99	104	192	124
B1102 Church Road/ A1303 Newmarket Road	B1102 Church Road	74	71	100	164
	A1303 Newmarket Road (Northeast)	60	60	184	116
	A1303 Newmarket Road (Southwest)	122	121	137	116
	2-Lane Exit Merge (A1303 Newmarket Road)	354	353	222	177

6.2.17. The Paramics model results show that during the AM Peak Hour, the A14 off-slip (East) shows significant reduction in queues for both site option P10 and P11. This is due to the fact that for both of these options, the P&R is located to the north of Quy interchange, causing a proportion of existing traffic using the inside lane towards Cambridge to reallocate to the offside lane at the off-slip and route around the Quy Interchange to access the P&R.

6.2.18. There is an increase in queues predicted on the A14 off-slip (West) for P10. This is due to the increased demand through the Church Street Junction, which increases the probability of a queue along the A1303 Newmarket Road blocking back to the Quy Interchange. This increases the length of queue at the A14 off-slip (West) as vehicles find it more difficult to enter the junction.

6.2.19. At the Church Road / Newmarket Road junction, Base and P1 show similar levels of queuing, and therefore it is concluded that P1 does not have significant impact on the operation of this junction. P10 and P11 show substantial increases in queue length, particularly along the A1303 Newmarket Road (Northeast). This additional queueing is in part due to the redistributed demand to/from the P&R, but also as a result of the bus lane that has been proposed between the Newmarket Road / Church Road junction and the Quy Interchange which reduces the stacking capacity and increases the probability of the queue reaching back to the signalised junction. This bus lane could be removed; however this would further increase P&R bus journey times to P10 and P11.

6.2.20. Changes are also required to the Church Road junction for P11 to enable right turning vehicles from the A1303 and buses to exit the P&R which increase delays. This results in increased queuing on the B1102 Church Road (compared to the base and P1 and P10) and the A1303 southbound approach.

6.2.21. At the 2-lane exit merge, P1 is predicted to have no impact on the existing levels of congestion as the existing P&R demand adopts to same routing as the existing P&R site. P10 and P11 are predicted to reduce the merge queuing as P&R vehicles have been reassigned to movements to the north. This results in a reduction in the probability of the queue reaching back to the Quy Interchange.

6.2.22. The results therefore show that in the 2023 AM Peak Hour, P1 is not predicted to have a significant impact on the local network, whereas P10 and P11 are predicted to reduce queuing on the 2-lane exit merge and A14 East off-slip but increase queuing on the A14 West off-slip and on the approaches to the Church Road junction.

Table 6-5 Queue Length (m) Comparison for PM Peak Hour

Junction	Queue Route	Queue Length (m)			
		Base	P1	P10	P11
Quy Interchange (J35 of the A14)	A1303 Newmarket Road (Northeast)	71	68	93	79
	A14 off-slip (East)	0	0	0	0
	A1303 Newmarket Road (Southwest)	128	142	136	125
	A14 off-slip (West)	233	190	226	228
B1102 Church Road/ A1303 Newmarket Road	B1102 Church Road	43	41	44	129
	A1303 Newmarket Road (Northeast)	29	31	82	58
	A1303 Newmarket Road (Southwest)	94	93	99	118
2-Lane Merge (A1303 Newmarket Road)		12	11	13	14

6.2.23. During the PM Peak Hour, the results show that congestion at theses junctions is reduced on all approaches with the exception of the A14 West off-slip and the northbound approach to the Quy Interchange due the vehicles travelling into Cambridge giving way to the high outbound flows.

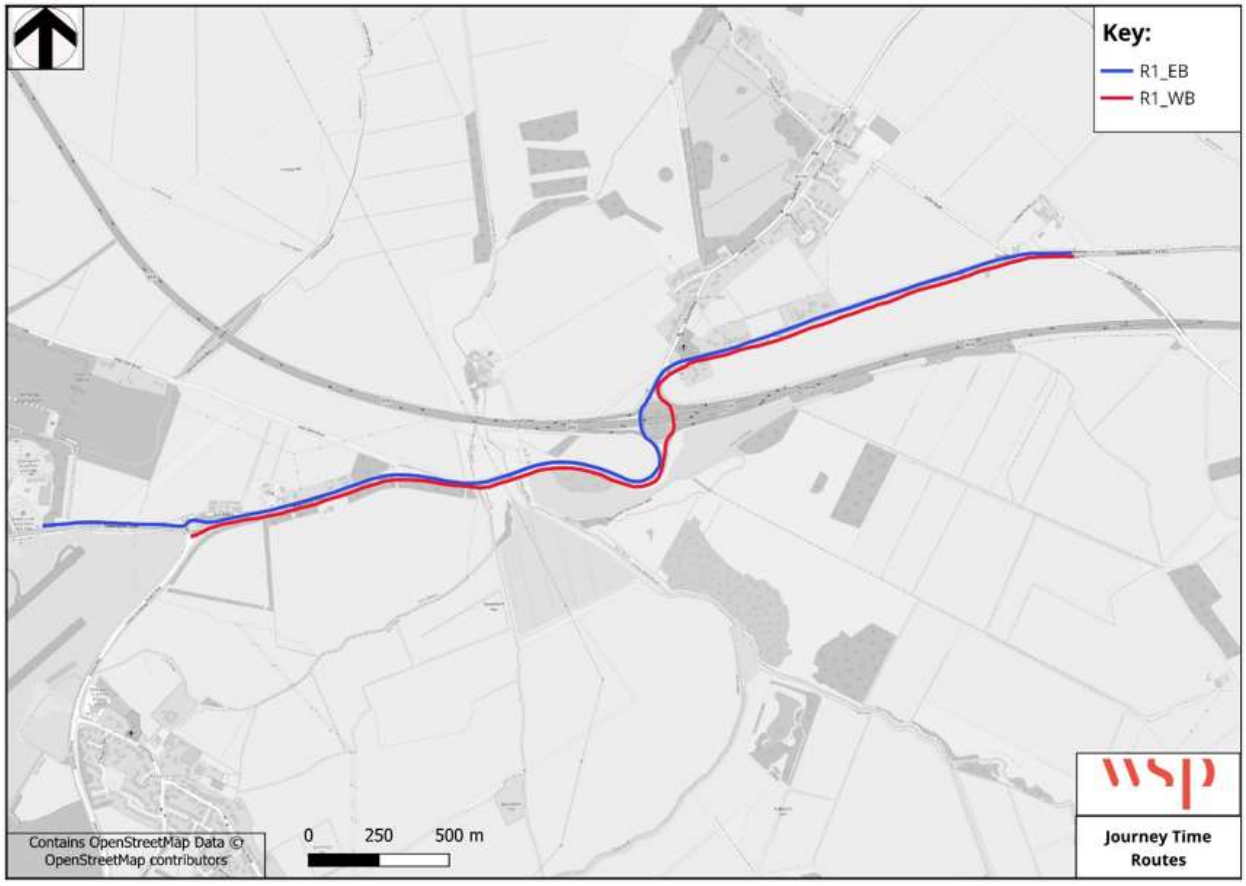
6.2.24. For P1, the results shows the site is not predicted to have significant impact on the existing local congestion levels in the PM Peak Hour compared to the base. For P10, the main impact is predicted to be on the southbound approach to the Church Road junction as vehicles exiting the P&R are predicted to increase the queue length from 29m to 82m (approximately 14 vehicles).

6.2.25. Site P11, the main predicted impact in the PM Peak Hour is an increase in mean max queue length along Church Road due to the additional demand exiting the P&R via this road. The queue length is predicted to increase from 43m to 129m (approximately 22 vehicles).

Vehicle Journey Times

6.2.26. The modelled vehicle journey times along Newmarket Road in both directions have been compared between the base and the option models. Figure 6-2 shows the extents of the journey time routes that were used.

Figure 6-2 - Journey Time Routes



6.2.27. Table 6-6 and Table 6-7 show the vehicle journey time comparison between the Base model and each of the options tested for the AM and PM Peak Hours respectively.

Table 6-6 Journey Time (mm:ss) Comparison for AM Peak Hour

Journey Time Route	Journey Time in Minutes			
	Base	P1	P10	P11
Eastbound	04:05	04:11	04:27	04:09
Westbound	06:04	06:37	05:46	04:45

6.2.28. Table 6-6 shows that in the eastbound direction during the AM Peak Hour, none of the P&R sites are predicted to have a noticeable impact on vehicle journey times between Airport Way and Church Road compared to base. In the outbound direction on the A1303 in the AM Peak Hour, congestion levels are relatively light on approach to the Quy Interchange, with congestion on the outbound approach to the Church Road junction which can reach back to the Quy Interchange. The majority of P&R user journeys are inbound in the AM Peak Hour and therefore do not impact the eastbound movement from Airport Way to the Quy Interchange.

6.2.29. In the westbound direction, the model shows P1 results in a slight increase in vehicle journey times (33 seconds) compared to the base. P10 shows a slight reduction in vehicle journey times (18 seconds) compared to the base, whilst P11 shows a larger reduction in vehicle journey times of 1 minute 19 seconds, when compared to the base model.

Table 6-7 Journey Time (mm:ss) Comparison for PM Peak

Journey Time Route	PM Peak			
	Base	P1	P10	P11
Eastbound	04:10	04:40	04:21	04:11
Westbound	03:21	03:41	03:49	03:27

6.2.30. Table 6-7 shows that in the PM Peak Hour, the eastbound direction shows similar trend to that of AM Peak Hour, with none of the P&R sites resulting in a significant impact on outbound journey times on the A1303. In the westbound direction, the model results show that the P&R sites are not predicted to have a significant impact on vehicle journey times along the A1303. The largest increase is the additional 28 seconds along the route as a result of P10.

BUS JOURNEY TIME

6.2.31. Table 6-8 and Table 6-9 show the average modelled P&R bus journey time from each of the proposed P&R sites to the existing Newmarket Road P&R junction. This represents an estimation of the additional AM and PM Peak Hour P&R bus journey time required for each site compared to the bus journey time from the existing location (under 2023 traffic conditions).

Table 6-8 Average Bus Service Journey Times (mm:ss) AM Peak Hour

Service	Journey Time in Minutes		
	P1	P10	P11
P&R EB	01:36	04:42	03:10
P&R WB	00:48	06:20	04:34

6.2.32. Table 6-8 shows that as expected site P1 results in the lowest increase in P&R bus journeys times in the AM Peak Hour when compared to the existing site due to its close proximity. P&R buses travelling through the Airport Way roundabout from P1 are not adding substantial additional travel times, with the modelled results showing an increase of 48 seconds westbound and to 1 minute 36 seconds eastbound from the existing P&R junction to P1.

6.2.33. The results show the location of P10 is predicted to have the highest impact on P&R bus journey times. Inbound, P&R bus journey times are predicted to increase by 6 minutes and 20 seconds, as buses have to travel through the congested Quy Interchange and A1303 towards Cambridge. Outbound, the P&R bus journey time has increased by four minutes and 42 seconds.

6.2.34. P11 is predicted to have a lower impact on P&R bus journey times in the AM Peak Hour compared to P10. Inbound P&R bus journey times are predicted to increase by 4 minutes and 34 seconds. Outbound, the P&R bus journey time has increased by three minutes and 10 seconds. The increase is lower than P10 as the P&R buses do not travel through the Church Road junction but do travel through the inbound congestion towards Cambridge.

Table 6-9 Average Bus Service Journey Times (mm:ss) PM Peak Hour

Service	Journey Time in Minutes		
	P1	P10	P11
P&R EB	01:22	04:52	03:11
P&R WB	00:48	04:41	03:36

6.2.35. Table 6-9 shows the same pattern as the AM Peak Hour, with P1 resulting in lowest increase in P&R bus journey times, followed by P11 and P10. The modelled results for P1 show an increase of 48 seconds westbound and 1 minute 22 seconds eastbound from the existing P&R junction.

6.2.36. P10 is predicted to increase inbound P&R bus journey times by 4 minutes and 41 seconds and outbound by four minutes and 52 seconds. Compared to the AM Peak Hour, the increases inbound are less substantial, but slightly higher outbound reflecting the tidal nature of congestion on the A1303.

6.2.37. P11, the modelling results show that the inbound P&R bus journey times are predicted to increase by 3 minutes and 36 seconds. Outbound, the P&R bus journey time has increased by three minutes and 11 seconds.

6.3. SUMMARY

6.3.1. Overall, the Paramics model results shows that P1 is not predicted to have a material impact on the operation of the local highway network under existing 2023 AM and PM Peak Hour travel conditions. Vehicle journey times along the A1303 through the model network remain relatively similar to the base model and P&R bus journey times are predicted to increase by less than 1 minute and 36 seconds from the existing P&R site to P1. The impact on queuing at the Church Road and Quy Interchange junctions is predicted to be relatively minor as P1 does not have a significant impact on the routing of P&R users through the network compared to the existing P&R site. The exception is a 63m increase in queuing on the A14 East off slip in the AM Peak Hour to 263m.

6.3.2. For P10 and P11, the model results show an improvement to congestion levels along the A1303 Newmarket Road south of the Quy Interchange due to the relocation of the P&R to the north of the junction, which causes a reduction in P&R user vehicle flows along this congested section of the road into Cambridge in the AM Peak Hour. These sites also reduce queues on the A14 East off-slip, however sites P10 and P11 are predicted to increase queuing on the A14 west off-slip and A1303 southbound approach to the Church Road junction and along Church Road.

6.3.3. In the AM Peak Hour, in the westbound direction, journey time savings of 1 minute 19 seconds through the model were achieved for P11 compared to the base, in combination with a reduction in queues of at the merge section of 177m which in turn reduces the probability of blocking back onto the Quy Interchange. P10 results in a similar impact but with lower journey time savings of 18 seconds and reductions in queuing at the merge (132m) compared to the base.

6.3.4. Whilst P10 and P11 result in a reduction in inbound journey times and congestion on the A1303 in the AM Peak Hour, the relocation of the P&R to these northern locations are predicted to have a negative effect on the Church Road junction, resulting in higher levels of queuing along Church Road and Newmarket Road, particularly in the PM Peak Hour.

6.3.5. The proposed bus lane between the Church Road junction and the Quy Interchange, needed to provide priority for P&R buses, reduces the general vehicle capacity along this section. Both P10 and P11 also result in changes to the number of signal stages at the Church Road junction reducing its efficiency. As a result, P10 and P11 result in increased queue lengths on Church Road and the A1303 southbound approach in the AM Peak Hour.

6.3.6. In the PM Peak Hour, P11 increases queuing on Church Road substantially and on the A1303 northbound approach. Sites P10 and P11 therefore increase the probability that queues from the Church Street junction will block back into the Quy Interchange. This issue has the potential to increase the level of queueing observed on the A14 (West) off-slip and increases the risk of this slip blocking back onto the A14.

6.3.7. P10 is predicted to have the largest impact on P&R bus journey times, with the AM Peak Hour inbound bus journey time increasing by 6 minutes 20 seconds compared to the existing P&R site. For P11, the AM Peak Hour inbound increase was 4 minutes 34 seconds. In the PM Peak Hour, the increase in P&R bus journey times are lower with a maximum of 4 minutes 52 seconds for P10. The impact of the increased P&R bus journey times is considered further in Chapter 7.

7. P&R OPERATIONAL ASSESSMENT

7.1. INTRODUCTION

7.1.1. This chapter sets out the potential P&R bus operational impact of each P&R site, drawing on information on the current operation at the existing Newmarket Road P&R site. This chapter also considers whether P1 precludes any opportunities for future orbital bus routes from the east to north Cambridge in response to Challenge 3:

"There is concern that site P1 precludes any opportunities for future orbital bus routes from the east to north Cambridge."

7.2. CURRENT P&R SERVICE

7.2.1. The current P&R bus service, PR2, operates at a 10-minute headway from start of service until mid-evening on Mondays to Saturdays, with the evening service operating at a 20-minute headway. The service starts slightly later in the morning on Saturdays, compared to Mondays to Fridays, but operates until the same time in the evening. The standard timetabled timings shown in Table 7-1 apply throughout the whole of the operating day on all days.

Table 7-1 - Existing P&R Bus Service Information

P&R site	Drummer St Stop D1 to P&R site	Layover at P&R	P&R site to Drummer St Stop D1	Layover in City Centre	Total Round Trip
Newmarket Road P&R	15 minutes	5 minutes	12 minutes	8 minutes	40 minutes

7.2.2. Layover is the time between journeys to allow for operational procedures, as well as recovery from minor operational delays, in order to start the next journey on time. A minimum layover of 5 minutes at each end of the route is in line with standard UK bus industry operating practice and has therefore been maintained in this analysis.

7.2.3. The total round trip plus layover times of the core P&R service, with a 10-minute headway, leads to a Peak Vehicle Requirement (PVR – maximum number of buses operating on the service at any time) of 4, reducing to 2 buses in the evening.

7.2.4. On Sundays and Public Holidays, the daytime headway is wider at every 15 minutes, but with the same scheduled journey and layover time as Mondays to Saturdays, meaning that 3 buses are required on Sundays. The service starts slightly later in the morning on Sundays, and finishes earlier, in the early evening than on Saturdays.

7.2.5. In order to understand bus journey time variability on the existing P&R service along Newmarket Road, a high-level review has been made of the vehicle tracking data recorded for 2023, as available from the Smart Cambridge portal. The data covers 2 monitored traffic zones (Figure 7-1) which form the majority of the length of the P&R route and are 'Newmarket Road' and 'Newmarket Road outer', covering both the inbound and outbound directions.

Figure 7-1 - Smart Cambridge P&R Bus Journey Time Zones

7.2.6. Although there appear to be a very small number of outliers in the recorded data, these do not undermine the validity of the high-level analysis of the distribution of bus journey times through these traffic zones (Table 7-2), as the volume of observations in total is sufficient to draw an initial view and calculate the 95th percentile value of journey times (as bus operators are required to operate 95% of services on time).

Table 7-2 - Smart Cambridge Dataset Journeys by Zone and Journey Time

Zone	Newmarket Road outer inbound	Newmarket Road inbound	Newmarket Road outbound	Newmarket Road outer outbound
Number of data records	18,769	20,339	20,267	18,978
95th percentile (rounded)	4 minutes	8 minutes	7 minutes	5 minutes

7.2.7. Table 7-2 shows that the 95th percentile for inbound travel time is 12 minutes on these sections of the P&R route, which is the same as the current total scheduled journey time, which also includes exiting the P&R site, crossing the junction with Barnwell Road and travelling along Emmanuel Road to Drummer Street. The consequence of this is that the existing P&R service is unlikely to achieve 95% punctuality and/or routinely require to use some of the additional layover in the City Centre in order to start the outbound journey on time.

7.2.8. For outbound travel time, the combined 95th percentile is 12 minutes, which leaves 3 minutes in the total scheduled time of 15 minutes to cover the rest of the outbound route from Drummer Street Stop D1 to the P&R site, via Emmanuel Street, Saint Andrew's Street, Park Terrace and Emmanuel Road in the city centre, as well as crossing the junction with Barnwell Road and entering the P&R site.

7.2.9. Reviewing the existing P&R timetable, this analysis shows that there is a risk that actual P&R bus journey times are very different, meaning that bus trips take longer and/or do not arrive and depart exactly when due. This is an important factor when considering the extension of the service to the alternative sites, as the amount of additional journey time may also have an impact on the time available for layover within the overall vehicle operating cycle and therefore a cautious approach has been adopted to the amount of additional time needed for the extension, so as not to make existing punctuality, and the potential to recover from it during layover time, any worse.

7.3. P&R RELOCATION OPERATIONAL IMPACT

7.3.1. Relocation of the P&R will lengthen the bus journey time and potentially add additional journey time variability due to the road network layout e.g. routing through the Quy Interchange and Church Road junctions (P10 and P11). The difference in bus journey times for each P&R site has been modelled in the AM and PM Peak Hours using the Paramics model. The additional inbound and outbound P&R bus journey times in the AM and PM Peak Hours have been combined and rounded to the nearest half-minute (in order not to impact journey time reliability negatively). A summary of the additional P&R bus journey time is provided in Table 7-3.

Table 7-3 – Additional Modelled Combined Inbound and Outbound P&R Bus Journey Time to P&R Sites

Peak Hour	P1	P10	P11
AM Peak Hour	2.5 minutes	11 minutes	8 minutes
PM Peak Hour	2.5 minutes	9.5 minutes	7 minutes

7.3.2. Based on the principle of the additional bus journey time being added cautiously to the existing scheduled journey time, in order not to have a negative impact on punctuality, the rounded values for the AM Peak Hour have been used on the basis of applying all day, as these are the same as the PM Peak Hour for Site P1 and higher than the PM Peak Hour for both location P10 and P11.

7.3.3. In terms of P1, and despite the total for inbound and outbound journeys being less than 3 minutes in both the AM and PM Peak Hours, it is not considered appropriate to reduce the layover time at Drummer Street from 8 minutes to 5 minutes, in order for P1 to still be served by 4 PVR. Therefore, 1 additional vehicle is needed to provide for the additional 2.5 minutes in the round trip schedule.

7.3.4. This would provide a very robust schedule, as a further 7 minutes would be available within the round-trip time of the 5 PVR to increase the layover (at either or both ends) and provide greater resilience against journey time variability and delays.

7.3.5. While this schedule of five buses provides more time than the minimum needed in terms of round-trip journey time, this is the inevitable consequence of relocating the site further away from the City Centre.

7.3.6. P11 has the next highest increase in bus journey time, and by adding a total of 8 minutes to the cycle, it is feasible to serve this site with 1 additional vehicle compared to the existing site, as there would still be a further 2 minutes available within the round-trip time of the 5 PVR, which would increase the layover and provide slightly greater resilience against journey time variability and delays. As a result of the greater distance from the current site than P1, P11 would have a greater increase in mileage-based operating costs, on top of the additional PVR.

7.3.7. P10 has the highest increase in bus journey time, projected from the modelling to be 11 minutes for the AM Peak Hour (but only 9.5 minutes in the PM Peak Hour, which is the biggest difference in AM and PM Peak Hour journey times of the 3 alternative sites). By limiting the increase to the cycle to a total of 10 minutes, it would be feasible to serve this site with 1 additional vehicle, without impacting on the layover time.

7.3.8. If however, the journey time was to be increased by 11 minutes, which is consistent with the modelled journey time, there would need to be a reduction in layover time of 1 minute, in order not to require a second additional PVR to be added. Given the operating cost of additional vehicles (as set out below), limiting the increase to 1 PVR is considered a reasonable balance as the distribution of actual journey times does not have a very wide spread in terms of the number of minutes leading to the 95th percentile, and the 11 minutes are for the AM Peak Hour only, while the PM Peak Hour is nearly a minute and a half less in additional time.

7.3.9. It is also noted that the difference between the AM and PM Peak Hour is substantial for the outbound direction, which is the direction of the bus schedule which has more scheduled time than the traffic journey time data, as presented above. Nevertheless, if P10 is taken forward, and 1 additional PVR is allocated, it will be even more beneficial than it is currently to ensure that the bus priority measures on the line of route are enforced to give the P&R service the best chance of achieving the planned schedule and high levels of punctuality as a result. The impact on the journey time and layover has been summarised in Table 7-4.

Table 7-4 – Impact on Journey Time and Layover for each P&R site

P&R site	Drummer St Stop D1 to P&R site	Layover at P&R	P&R site to Drummer St Stop D1	Layover in City Centre	Total
Newmarket Road P&R	15 minutes	5 minutes	12 minutes	8 minutes	40 minutes
P1	17 minutes	5 minutes	13 minutes	8 minutes	43 minutes
P10	20 minutes	5 minutes	18 minutes	7 minutes	50 minutes
P11	18 minutes	5 minutes	17 minutes	8 minutes	48 minutes

7.3.10. It should be noted that the additional P&R bus journey time has been modelled on the current traffic conditions; if traffic congestion and/or journey time variability increased, or any road layout changes are made which slow the passage of buses, the journey time for P&R buses would increase and there may be a need to implement a further additional PVR. Such a situation would also be applicable to the existing service in the event that the site was not relocated and therefore the net effect would still be 1 PVR, albeit that P10 would likely require the additional resource sooner, as it would be comparatively tighter in terms of the overall journey cycle than P1 or P11.

7.3.11. The projected cost of the additional vehicle has been derived from the operating cost of the current fleet, as set out in the Cambridgeshire and Peterborough Combined Authority (CPCA) Zero Emission Bus Regional Area (ZEBRA) Scheme Business Case, dated 20 August 2021, with a 10% per annum increase applied to cover fuel and labour cost rises resulting in an estimated cost of £289,300 per bus per annum.

Table 7-5 – Projected Operating Cost of an Additional P&R Bus

Total OPEX of 5 P&R services (22 PVR, 2022)	OPEX per PVR (2022)	Effect of 10% inflation (2 years to 2024)	OPEX per PVR (2024)
£5,260,000	£239,000	£50,300	£289,300

7.3.12. The other 4 P&R buses would also all have a longer round-trip distance but operate fewer journeys per day and therefore no net uplift has been factored into the cost of those vehicles under the revised operation, however, as noted above, there could be an additional mileage cost for P10 and P11 compared to P1, as those schedules would have buses spending less time on layover and more time travelling along the extended route length.

SUMMARY

7.3.13. As outlined above, the estimated impact of all three alternative P&R sites is to require 1 additional PVR to be added to the existing operation of the PR2 service, although there is a small risk that P10 may not be able to sustain a punctual service if traffic volumes and/or journey time variability increases e.g. due to further development on Newmarket Road or changes in levels of congestion). This represents a 25% increase in the number of buses (from 4 to 5) and an additional cost of £289k per annum for each of the three sites.

7.3.14. As a service aiming to provide a journey time which is competitive with travel by private car, and to be experienced to be direct, it is beneficial for the P&R site access to be prioritised. P10 and P11 result in P&R buses travelling through the Quy Interchange and Church Road junctions. This introduces additional journey time and journey time variability risks into the P&R bus operations.

7.3.15. As identified in Chapter 5, providing reliable bus journeys through the Quy Interchange will be challenging as it is considered that reallocating road space to bus lanes will have an unacceptable impact on queueing on the off-slips during the peak travel periods.

7.3.16. Therefore, it is considered that the relocation of the P&R site to either P10 or P11 would alter the perception of the length of the P&R bus journey, from being a short section within the city to a longer-distance service, and as such these sites are likely to be less attractive to P&R users than the existing site or P1.

7.4. ORBITAL BUS SERVICE

7.4.1. In response to Challenge 3 "There is concern that site P1 precludes any opportunities for future orbital bus routes from the east to north Cambridge", this section considers whether any of the three P&R sites provide for use by a potential 'east of Cambridge to north Cambridge' orbital bus service. It has been assumed this would use the A14 to access Cambridge North and the Science Parks. A commentary by a WSP Bus Operations Expert has been provided on the key considerations for commercial viability of any such 'east of Cambridge to north Cambridge' orbital bus service.

EXISTING PUBLIC BUS NETWORK

7.4.2. To consider how a new orbital service may operate, the existing bus network serving the greater Cambridge area has been reviewed for geographic connectivity to the north-east of the city, in the area of the three alternative P&R site locations. Current local bus services* on Newmarket Road operating past the P&R site (apart from P&R service PR2) are shown in Table 7-6.

Table 7-6 – Existing bus services on Newmarket Road

Service	Route	Operator	Timetable
11	Newmarket – Swaffham Prior – Cambridge	Stephensons	Hourly daytime, Mondays to Saturdays
12	Newmarket – Bottisham – Cambridge	Stephensons	Hourly daytime, Mondays to Saturdays
18	Newmarket – Fulbourn – Newmarket Road P&R	A2B Bus and Coach	2 off-peak return journeys, Tuesdays and Fridays only

*long-distance services operated by National Express and Megabus also operate along Newmarket Road.

7.4.3. The existing services from the east of Cambridge area to the location of the existing P&R site are limited to hourly daytime services (i.e. no evening services), Mondays to Saturdays (i.e. no service on Sundays or Public Holidays), although services 11 and 12 are broadly evenly spaced, providing an approximately half-hourly frequency over the common section between the Quy Interchange and Cambridge Drummer Street Bus Station.

7.4.4. The other notable feature is that the services are not provided by the main commercial operator in Cambridgeshire (Stagecoach), indicating that the demand levels may require more agile service delivery in order to be financially sustainable and are not part of the core commercial bus network.

7.4.5. Such a situation is not unusual for inter-urban routes in an otherwise rural county, but does illustrate that bringing a new service to commercial viability will either need to address a very significant flow which is currently under-served or be delivered very cost-effectively. In any case, it is also likely that some element of pump-priming would be required in order to support a new service until its full ridership could be established.

BUS PLANNING PRINCIPLES

7.4.6. Established bus networks are typically concentrated on town and city centres, on the historical travel pattern that the main employment, retail, leisure and civic amenities are all located centrally, and with all routes serving the centre, ease of interchange (in terms of proximity of bus stops and maximum frequency and operating span of services) is facilitated there. This is generally supported by the critical mass of demand, such that purely orbital services typically only exist in larger cities, where the volume of public transport demand is sufficient to sustain services which do not serve the area of the city with the densest and most concentrated land uses and trip generators.

7.4.7. With changing travel patterns and demand profiles arising from wider societal changes, accelerated by the Covid-19 pandemic, and prevailing land use planning policies and developments meaning that traditional commuting and shopping habits are reducing, new opportunities for bus network planning can arise. However, these new employment and buying habits are also not typically as intensive in terms of travel as the ones which they replace, as working from home can have the flexibility to avoid peak times, further reducing the likelihood of providing a public transport vehicle on a viable basis. Furthermore, online delivery services increasingly mean that the demand for transport does not come from personal travel but from the logistics sector.

7.4.8. A new orbital bus service using the A14 to access Cambridge North and the Science Park could be considered in principle to be a beneficial addition to the local bus network on the basis that it would be a direct service using the quickest route, however the lack of bus stops on the A14 (between the Quy Interchange and Junction 33 Milton Interchange) means that there is no opportunity to serve intermediate bus demand, which is typically always critical to generating sufficient passenger journeys to make the provision of a bus service commercially viable.

7.4.9. While the lack of competition from other bus services means that any such service would capture a high percentage of demand for such a movement by public transport, the Milton P&R site already provides a frequent service to the Science Park at peak times and would therefore be more attractive to most car users, due to the shorter bus journey time on the A14/A10 corridor.

7.4.10. A general principle in P&R planning is that car users are expected to minimise their time on a bus and those travelling from east of Cambridge would therefore logically be expected to take that option (as they currently can do). The potential exists for any such new orbital service to be tailored to the Science Park, e.g. exact times of operation, with corresponding branding and/or employer contributions, however the latter would be an indication that the service was not commercially viable on an ongoing basis, which is also seen for other business park locations in England.

7.4.11. In order to give an indication of the level of demand which would be needed to cover the cost of providing such a service, the OPEX cost per bus for the P&R has been used as the base, factored down to reflect 6 day a week operation (Monday to Saturday), which is considered more likely for any such orbital service, and would be consistent with the existing local bus routes (services 11 and 12) which serve Newmarket Road. The resultant OPEX cost per bus value has then been divided by the operating revenue per passenger journey on local bus services in England (outside London) from the DfT's annual bus statistics series.

7.4.12. Using the assumption of a service operating Mondays to Saturdays, and for a conceptual 07:00 to 19:00 operating span, Table 7-7 gives a number of passengers per year, per day and per hour required on each bus to be able to cover its costs.

Table 7-7 – Required Number of Passengers based on Operating Expenditure

Annual OPEX per bus (Mondays to Saturdays)	Operating revenue per passenger journey (2024)	Annual passengers required per bus (OPEX divided by operating revenue per passenger journey)	Daily passengers required per bus (annual passengers divided by 255 days, representing 6 days a week)	Hourly passengers required per bus (daily passengers divided by 12 hours)
£247,971	£2.91	85,198	334	28

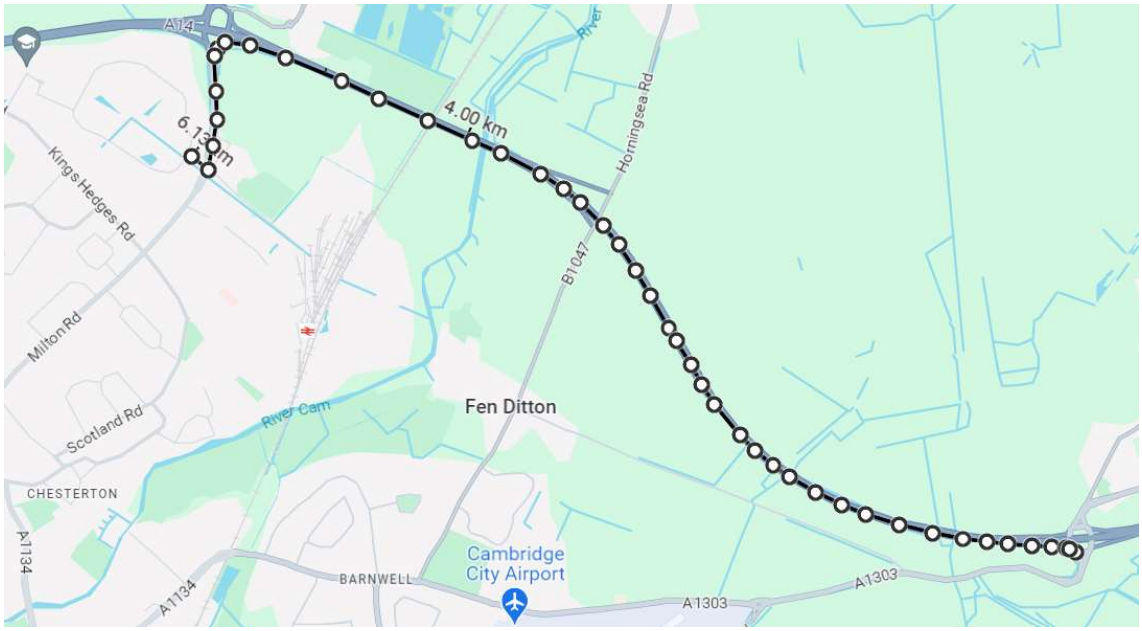
7.4.13. This consideration is of course applicable to any orbital bus service and is not specific to any of the three P&R site options. However, based on direct experience of planning bus services, it is considered highly unlikely that a simple 'point to point' service from east of Cambridge to north Cambridge, using the A14 to access Cambridge North and the Science Park, would achieve this level of demand and thus be viable, given that any car user would be most likely to continue by car for as long as possible until changing to the Milton P&R service.

7.4.14. Furthermore, as an indicator of the general demand for public transport, the existing bus services in the east of Cambridge area are relatively limited which is considered to fairly reflect the generally rural nature of the county between Cambridge and Newmarket, rather than any omission of commercial bus service provision.

7.4.15. Further work would need to be done to investigate the potential demand, e.g. by engagement with the Science Park and the bus operators, and to investigate potential alternative supply options, e.g. on-demand service or re-routing of either service 11 or 12 between Stow cum Quy and Cambridge city centre, via Milton Road, although the re-routing would require substantial timetable reconfiguration, as well as assessment of the impact on existing patronage, as the journey times of all through passengers would be increased as a result.

7.4.16. Notwithstanding the concerns raised with being able to operate a commercially viable Orbital Bus service, a conceptual 'shortest possible' route (whether operating from P10 or P11) could be as shown in Figure 7-2, with other options, such as extending to Cambridge North Station, also possible.

Figure 7-2 - Conceptual Orbital Bus Route from Site P10/P11 to the Northern Employment Centres



7.4.17. A route via the A14 would have a route distance of approximately 6 km in each direction; meaning that a reasonable initial frequency, balancing service levels to potential users with the expected operating costs, would be 30 minutes.

7.4.18. A service operating at an estimated average speed of 35 kmph, reflecting the use of the A14, would require 2 vehicles to meet its PVR, regardless of which P&R location was utilised. This equates to 56 hourly passengers to cover its costs.

7.4.19. A route test could provide a bus operator with confidence to schedule a higher operating speed, even to the point of only requiring 1 PVR, however the assumption used is consistent with general traffic data for the AM peak journey time and therefore provides a realistic assessment, particularly when considering that a bus will not generally travel as quickly as a car.

7.4.20. In principle, there would be nothing to prevent the orbital bus service from using any of the P&R site options as its eastern terminus. In the case of P1, the use of that site would add a further 2 km to the one-way route distance however this would not require additional vehicle resource to that calculated above, as the total round trip time required for the 'shortest possible' route (whether operating from P10 or P11) is only just over the level at which 1 PVR would be required and is therefore has sufficient float to be able to accommodate P1 instead.

SUMMARY

7.4.21. Commercial local bus services generally rely on a turnover of passengers getting on and off along the route i.e. more than 1 passenger using the same capacity over the length of the bus route, unless they can capture relatively concentrated demand, such as in the case of P&R serving a city centre.

7.4.22. Consequently, a simple ‘point to point’ service from east of Cambridge to north Cambridge, using the A14 to access Cambridge North and the Science Park, where there are no intermediate bus stops to capture additional demand, would have to tap into a major source of demand from whichever P&R site is chosen.

7.4.23. Given P1, P10 and P11 would all serve the wider, relatively rural, east of Cambridge area, where car drivers would have the existing alternative option to minimise their bus journey time by continuing on the A14 to Milton P&R, such an orbital bus service would logically be unable to capture a high percentage of any such demand and therefore the fundamental premise of the service does not appear to support commercial viability.

8. SUMMARY AND CONCLUSIONS

8.1. INTRODUCTION

8.1.1. This study has sought to provide evidenced responses to three challenges raised by the GCP board with the recommendation to relocate and expand the Newmarket Road P&R to site P1, rather than within site P10 or P11 to the north of the A14. The evidence provided in this report also strengths the conclusions and recommendations provided in the P&R Newmarket Road P&R Site Selection and Appraisal Report, May 2022.

8.2. SUMMARY

CHALLENGE 1: EXISTING P&R USERS

8.2.1. The GCP Board required more information on the routing of Newmarket Road P&R users on the local network to understand if a P&R site to the north of the A14 will directly intercept a high proportion of P&R users.

8.2.2. The evidence shows that the majority (40%) of the existing users arrive from the A14 East (towards Newmarket) followed by 15% from Airport Way and A14 West. Only a small proportion route via the A1303 Newmarket Road (2%) and B1102 (6%) to the north of the Quy Interchange.

8.2.3. The evidence also showed a proportion of trips to the existing P&R are from local origins along Newmarket Road, Barnwell Road and Airport Way. It is likely that some of these trips will be for non-P&R purposes including accessing Marleigh Primary School, the Ice Arena and the NHS Drive-Through Blood Facility within the existing P&R site, which would remain once the P&R is relocate.

8.2.4. In conclusion, the evidence shows that locating a P&R to the north of the A14 will not directly intercept a large proportion of existing P&R users passing site P10 or P11 on the A1303 or B1102 Church Road respectively, as the majority of existing users' route via the A14 and will therefore have to divert towards these sites. Site P1 is likely to result in a similar assignment pattern to the existing P&R site.

CHALLENGE 2: LOCAL NETWORK OPERATION

8.2.5. The GCP Board required more information on the scale of benefits that could be achieved to the operation of the Quy Interchange if the P&R is located to the north (P10 or P11).

8.2.6. A Paramics micro-simulation model was constructed using 2023 observed traffic flows to assess the potential impact of P1, P10 and P11 on 2023 congestion levels at the Quy Interchange and Church Road junction.

8.2.7. Overall, the Paramics model results showed that P1 is not predicted to have a material impact on the operation of the local highway network under existing 2023 AM and PM Peak Hour travel conditions. Vehicle journey times along the A1303 through the model network remain relatively similar to the base model and P&R bus journey times are predicted to increase by less than 1 minute and 36 seconds from the existing P&R site to P1.

8.2.8. The impact on queuing at the Church Road and Quy Interchange junctions is predicted to be relatively minor as P1 does not have a significant impact on the routing of P&R users through the network compared to the existing P&R site. The exception is a 63m increase in queuing on the A14 East off slip in the AM Peak Hour to 263m.

8.2.9. P10 and P11, the model results showed an improvement to congestion levels along the A1303 Newmarket Road south of the Quy Interchange due to the relocation of the P&R to the north of the junction, which causes a reduction in P&R user vehicle flows along this congested section into Cambridge in the AM Peak Hour. These sites also reduce queues on the A14 East off-slip, however increased queuing on the A14 west off-slip and A1303 southbound approach to the Church Road junction and along Church Road were predicted.

8.2.10. In the AM Peak Hour, in the westbound direction, vehicle journey time savings of 1 minute 19 seconds through the model were achieved for P11 compared to the base, in combination with a reduction in queues of at the merge section of 177m which in turn reduces the probability of blocking back onto the Quy Interchange. P10 resulted in a similar impact but with lower journey time savings of 18 seconds and reductions in queuing at the merge (132m) compared to the base.

8.2.11. The relocation of the P&R to P10 and P11 is predicted to have a negative effect on the operation of the Church Road junction, resulting in higher levels of queuing along Church Road and Newmarket Road, particularly in the PM Peak Hour.

8.2.12. The proposed bus lane between the Church Road junction and the Quy Interchange, needed to provide priority for P&R buses, reduces the general vehicle capacity along this section. Both P10 and P11 also result in changes to the number of signal stages at the Church Road junction reducing its efficiency. As a result, P10 and P11 result in increased queue lengths on Church Road and the A1303 southbound approach in the AM Peak Hour.

8.2.13. In the PM Peak Hour, P11 increases queuing on Church Road substantially and on the A1303 northbound approach. Sites P10 and P11 therefore increase the probability that queues from the Church Street junction will block back into the Quy Interchange. This issue has the potential to increase the level of queueing observed on the A14 (West) off-slip and increases the risk of this slip blocking back onto the A14.

8.2.14. P10 is predicted to have the largest impact on P&R bus journey times, with the AM Peak Hour inbound bus journey time increasing by 6 minutes 20 seconds compared to the existing P&R site. For P11, the AM Peak Hour inbound increase was 4 minutes 34 seconds. In the PM Peak Hour, the increase in P&R bus journey times are lower with a maximum of 4 minutes 52 seconds for P10.

CHALLENGE 3: BUS OPERATIONS

8.2.15. The GCP Board required more information on whether site P1 precludes opportunities for a future orbital bus route from the east to north Cambridge.

8.2.16. A P&R bus operational impact appraisal has been undertaken which identified that P1, P10 and P11 would all require one additional P&R bus to be added to the existing operation of the PR2 service at an additional cost of £289k per annum.

8.2.17. The appraisal also identified that there is a small risk that P10 may not be able to sustain a punctual service if traffic volumes and/or journey time variability increases e.g. due to future development on Newmarket Road or changes in levels of congestion.

8.2.18. The WSP Bus Operations Expert concluded that a P&R service aims to provide a journey time which is competitive with travel by private car, and to be experienced to be direct, it is beneficial for the P&R site access to be prioritised. P10 and P11 result in P&R buses travelling through the Quy Interchange and Church Road junctions. This introduces additional bus journey time and journey time variability risks into the P&R bus operations.

8.2.19. Providing reliable bus journeys through the Quy Interchange has been identified as challenging as it is considered that reallocating road space to bus lanes will have an unacceptable impact on queueing on the A14 off-slips during the peak travel periods which would not be acceptable to National Highways.

8.2.20. Therefore, it is concluded that the relocation of the P&R site to either P10 or P11 would alter the perception of the length of the P&R bus journey, from being a short section within the city to a longer-distance service, and as such these sites are likely to be less attractive to P&R users than the existing site or P1.

8.2.21. In reviewing the potential for a new orbital bus route, it has been concluded that a simple 'point to point' service from east of Cambridge to north Cambridge, using the A14 to access Cambridge North and the Science Park, where there are no intermediate bus stops to capture additional demand, would have to tap into a major source of demand from whichever P&R site is chosen.

8.2.22. Given P1, P10 and P11 would all serve the wider, relatively rural, east of Cambridge area, where car drivers would have the existing alternative option to minimise their bus journey time by continuing on the A14 to Milton P&R, such an orbital bus service would logically be unable to capture a high percentage of any such demand and therefore the fundamental premise of the service does not appear to support commercial viability.

8.3. CONCLUSION

8.3.1. In conclusion, the assessment provided in this report supports the recommendations made in the Newmarket Road P&R Site Selection and Appraisal Report, May 2022 which identified site P1 as the preferred relocation site.

8.3.2. The traffic modelling presented in this report shows that P10 and P11 could provide some benefit by reducing inbound P&R traffic on Newmarket Road into the city in the weekday AM peak period, but this would be offset by increased congestion at the Church Road junction and longer and more unreliable P&R bus operations. The wider issues of land ownership, the impact on Stow cum Quy village and reduced attractiveness for Park and Cycle users that have been previously identified remain valid concerns.

Appendix A

P&R SITE SELECTION MCAF

Cover Sheet

Project Name	Phase A - Cambridge Eastern Access P&R Relocation
Job Number	70086306
Version	1.0
File Path	\\uk.wspgroup.com\central data\Projects\70086xxx\70086306 - Cambs JPSF - Cambridge Eastern Access\03 WIP\TP Transport Planning\Phase A2 Park and Ride\P&R Appraisal Report\
File Name	Cambridge East_P&R Option Appraisal MCAF_V2.xlsx
Primary Contact Name	Andrew Redhead
Primary Contact e-mail	andrew.redhead@wsp.com

Disclaimer

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MCAF Overview

This MCAF tool documents the criteria and qualitative scoring relating to the list of P&R sites identified for relocating the Newmarket Road P&R.
A MCAF sifting tab has been created which assesses all the potential sites identified.

Tab List

	Tab Name	Description	Sheet Type
1	Versions	Version Control Summary	Reference
2	MCAF Option Sifting	MCAF options sifting framework	Calculation
3			
4			
5			
6			
7			
8			
9			
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Sheet Types
Reference Sheet
Calculation Sheet

Document History

Revision	Originated	Date	Contents/Self-Checks	Checked	Date	Reviewed	Date	Authorised	Date	Checks and Review Undertaken
1.0	AJR	09/05/2022	Draft MCAF for Discussion	AJR	09/05/2022	AJR	09/05/2022	GC	09/05/2022	All appraisal cells
2.0	AJR	17/05/2022	Final MCAF	AJR	17/05/2022	AJR	17/05/2022	GC	17/05/2022	Site availability appraisal

Phase A: Multi-Criteria Appraisal Framework

				INITIAL SIFT								
				Located within P&R Area of Search	Site meets GCP Minimum Size Requirements	Site Availability (Timescales/Land Ownership/Planning Status/Existing Land-Use)		Key Environmental Constraints		Key Uncertainties	Initial Sift Decision	
								Likely to have unacceptable Environmental Impacts	Free Text	Free Text	Park or Proceed with Location (Professional Judgement)	
Site Ref	Site Name	Site Description	Approximate land parcel size (Ha)	Yes/No	Yes/No	Yes/No/NA	Free Text	Yes/No/N/A			Park/Proceed	Free Text
P1	East of Airport Way	This site is south of Newmarket Road and immediately east of Airport Way. It extends as far east as the existing mature hedgerow	16.14	Yes	Yes	Yes	Allocated Green Belt Land Land owned by Marshalls - supportive in principle of relocating the P&R south of Newmarket Road and East of Airport Way Southern portion of P1 is located within allocated Country Park (Policy CE/21/1 of the Cambridge East AAP). All areas to south of existing hedge line are located with allocated Country Park Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	No	Careful site design will be required to minimise ecological impacts to exiting mature flora and future impacts on the Country Park allocation in Cambridge East AAP that runs along the southern portion of the site - the removal of this allocated area and the provision of a suitable landscaping buffer should be considered further in terms of developable site area. P1 is located within allocated Green Belt. No other significant environmental features identified.	Northern section of the site can accommodate a 2,000 space P&R	Proceed	Short-listed, sufficient size, accessible, available and no substantial environmental constraints if site is contained to the north of the plot.
P2	South of Newmarket Road	This site is south of Newmarket Road to the east of P1.	28.13	Yes	Yes	Yes	Allocated Green Belt Land Land owned by Cambridgeshire County Council, assumed to be available. Small section of southern portion is located within allocated Country Park (Policy CE/21/1 of the Cambridge East AAP). Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	No	Proximity to SSSI located to the east would need careful mitigation and management. Future impacts on the Country Park allocation in Cambridge East AAP that runs along the southern portion of the site - the provision of a suitable landscaping buffer should be considered further in terms of developable site area. Listed structure (Milestone) on boundary of site - https://historicengland.org.uk/listing/the-list/list-entry/1331307 Anglo-Saxon burials (HER ref: 0603) have been identified adjacent to the far north-eastern end of Option P2. The extent of the cemetery is not known, but the proximity to P2 and Option P3 suggests that there is a high potential that it may extend into the site. The assets described above are likely to be of medium or high heritage significance (most likely high). Further archaeological evaluation (most likely geophysical survey, followed by trial trench evaluation) will be required, almost certainly pre-determination. Public rights of way have been identified, which would need to be considered. P2 is located within allocated Green Belt. No other significant environmental features identified. **NOTE:** Whilst no environmental protection designations (with the exception of Green Belt) have been identified, it is recognised that the site boarders on areas of fenland habitat. Careful consideration of local flora, fauna and animal species will need to be considered if the scheme should proceed.		Proceed	Short-listed, sufficient size, accessible, available and no substantial environmental constraints if site is located away from the eastern end of the site.
P3	North of High Ditch Road	This site is north of High Ditch Road, bounded by the A14 along its northern boundary.	10.16	Yes	Yes	Yes	Allocated Green Belt Land Land privately owned and not allocated in the SCDC local plan for development. Entire site sits within proposed application boundary for Cambridge Wastewater Treatment Plant Relocation Project - a Nationally Significant Infrastructure Project (NSIP) for which Development Consent Order will be sought under the Planning Act 2008 - EIA Scoping Opinion adopted by SoS (Nov 2021) - https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/WW010003/WW010003-000033-WW010003%20-%20Scoping%20Report.pdf	No	The Anglo-Saxon burials (HER ref: 0603) have been identified within 50m of the south-eastern edge of Option P3. There is a high potential that it may extend into the site. Within P3 there are features indicative of an Iron Age settlement (HER ref: 09039). There are also features indicative of a Roman settlement to the north of the A14, 70m north of P3. The assets described above are likely to be of medium or high heritage significance (most likely high). Further archaeological evaluation (most likely geophysical survey, followed by trial trench evaluation) will be required, almost certainly pre-determination. P3 is located within allocated Green Belt. Other than a small area of deciduous woodland to the south of High Ditch Road (outside the curtilage of P3), there are no other significant environmental features with close proximity.	It is unclear what form of development is proposed at this site in relation to the Cambridge Wastewater Treatment Plant Relocation Project and site may contain medium to high heritage assets.	Proceed	Short-listed, sufficient size, accessible and no substantial environmental constraints,
P4	South of High Ditch Road	This site is south of High Ditch Road, bounded to the south and west by Darwin Nurseries and private properties.	4.26	Yes	No	N/A	Allocated Green Belt Land. Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018 N/A - site already discounted as too small to accommodate up to 2,000 space P&R site	N/A	N/A - site already discounted as too small to accommodate up to 2,000 space P&R site		Park	Discount too small
P5	Adjacent to Marleigh	This site is north of the Airport Way roundabout, bounded by High Ditch Road, Darwin Nurseries, Newmarket Road and the Marleigh development to the north, east, south and west respectively.	13.4	Yes	Yes	No	Site bisected by Cambridge Airport Safety Zone (Policy CE/32 Cambridge Airport Safety Zones) - presumption against new development that would 'increase the numbers of people living, working or congregating on the land' whilst Cambridge Airport remains operational (2031). Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	N/A	N/A - Site already discounted as located within Airport Safety Zone		Park	Discount - bisected by Airport Safety Zone
P6	West of Airport Way	This site is located in the north-east corner of the Cambridge Airport site, bounded by Newmarket Road and Airport Way.	12.65	Yes	Yes	No	Site bisected by Cambridge Airport Safety Zone (Policy CE/32 Cambridge Airport Safety Zones) - presumption against new development that would 'increase the numbers of people living, working or congregating on the land' whilst Cambridge Airport remains operational (2031). Site allocated of major residential and employment development (Policy CE/3 The Site For Cambridge East in the Cambridge East AAP and Policy SS/3: Cambridge East in the SCDC Local Plan). Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	N/A	N/A - Site already discounted as located within allocated development site.		Park	Discount - allocated for development post 2031
P7	Existing Site	This is the existing Newmarket Road P&R site.	3.78	Yes	No	No	Site allocated of major residential and employment development (Policy CE/3 The Site For Cambridge East in the Cambridge East AAP and Policy SS/3: Cambridge East in the SCDC Local Plan). Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	N/A	N/A - Site already discounted as located within allocated development site. Site too small to accommodate up to 2,000 space P&R site		Park	Discount - too small and allocated for development post 2031
P8	South of Junction 35	This site is located immediately south of Junction 35 of the A14, on the northern site of the A1303 Newmarket Road.	3.27	Yes	No	N/A	Allocated Green Belt Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018. N/A - site already discounted as too small to accommodate up to 2,000 space P&R site	N/A	N/A - site already discounted as too small to accommodate up to 2,000 space P&R site		Park	Discount too small
P9	East of Quy Water	This site is located south of P8, bounded by the A1303 Newmarket Road to the north and Quy Water to the west.	5.48	Yes	Yes	Yes	Allocated Green Belt - not allocated for development. Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	Yes	P9 is located within allocated Green Belt. P9 boarders a local SSSI. The SSSI will be a significant environmental feature to consider if the proposed scheme is shortlisted. Public rights of way are located very close to the scheme boundary, which would need to be considered. No other significant environmental features identified.		Park	Discount, sites further from the SSSI available
P10	North of A14 East	This site is north of the A14 and east of Junction 35. It is bounded to the north by the A1303 Newmarket Road and to the south by the A14.	15.83	Yes	Yes	Yes	Allocated Green Belt - not allocated for development Sections of the site along its northern boundary are allocated as Local Green Space (Policy NH/12 - Local Green Space) in the SCDC Local Plan. Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	No	Site close to existing properties on the A1303 Newmarket Road, but located away from the main Stow cum Quy village P10 is located within allocated Green Belt. P10 is in proximity to grade II and II* listing building; one of which falls within the curtilage of the proposed scheme (List UID: 1127355). No other significant environmental features identified.		Proceed	Short-listed, sufficient size, accessible, available and no substantial environmental constraints.
P11	North of A14 West	This site is north of the A14 and west of Junction 35. Its eastern boundary is adjacent to the existing village of Stow cum Quy and accessed via Church Road.	37.2	Yes	Yes	Yes	Allocated Green Belt - not allocated for development. Sections of the site along its south-eastern boundary are allocated as Local Green Space (Policy NH/12 - Local Green Space) in the SCDC Local Plan. Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	No	Southern part of the site separated from the existing village P11 is located within allocated Green Belt. P11 is in proximity to grade II and II* listing buildings. None of which fall within the curtilage of the proposed scheme; however, List UID: 1301986 is on the site boundary. Public rights of way have been identified, which would need to be considered. The site boundary is in very close proximity to a village and would likely be susceptible to amenity impacts. No other significant environmental features identified.		Proceed	Short-listed, sufficient size, accessible, available and no substantial environmental constraints.
P12	South of Stow cum Quy	This site is located to the south of Stow cum Quy village, bounded to the east by Albert Road and to the south by the A1303 Newmarket Road	23.26	Yes	Yes	Yes	Allocated Green Belt - not allocated for development The majority of the site is allocated as Local Green Space (Policy NH/12 - Local Green Space) in the SCDC Local Plan. Areas of site allocated under Policy 5: Mineral Safeguarding Area (Sand and Gravel) of the Cambridgeshire and Peterborough Minerals and Waste Local Plan 2018	Yes	The site is located furthest from Junction 35 of the A14, resulting in increased bus and car travel distances and is almost entirely covered by Policy NH/12 - Local Green Space. Therefore a P&R located within P12 would have a substantial impact on the designated Local Green space. P12 is located within allocated Green Belt. P12 is in proximity to grade II and II* listing buildings; none if which fall within the curtilage of the proposed scheme. The site boundary is in very close proximity to the village and would likely be susceptible to amenity impacts. No other significant environmental features identified.		Park	Discount - close to Stow Cum Quy and almost wholly covered by Local Green designation.

		LOCAL ENVIRONMENT													
		Air Quality: What impact does the option have on local air quality?		Noise: Does this option increase/reduce disturbance from noise?		Landscape/townscape: What is the overall impact on the natural and urban environment		Carbon Emissions: What is the expected impact of the intervention on carbon emissions?		Historic Environment: What is the expected impact on designated heritage assets?		Biodiversity: What is the expected impact of the intervention on biodiversity?		Water environment: What is the expected impact of the intervention on flood risk?	
Site Ref	Site Name	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text	Major Positive Minor Positive Neutral Minor Negative Major Negative	Free Text
P1	East of Airport Way	Minor Positive	Not within an Air Quality Management Area (AQMA). Minor air quality benefits to locating the site further away from Cambridge AQMA. Possible local air quality impacts from changes in traffic flows. Not clear if these would be better or worse. Located closer to Teversham than the existing site. No impact on air quality expected.	Minor Negative	Does not fall within a Noise Action Planning Important Area. Receptors include the village of Teversham. Potential increase in noise arising from construction activities impacting the village Background noise increase during operation impacting the village. No long-term impacts expected.	Neutral	Situated within rural surrounds with the village of Teversham to the South and Stow cum Quy to the Northeast. Within the Greenbelt. No AONBs. Possible temporary visual impacts from construction. Alterations to the landscape character. No rights of way are expected to be impacted. No long-term impacts expected.	Minor Negative	Potential short-term negatives from removal of topsoil during construction and loss of embodied carbon. Embedded carbon within the new facilities will also have an impact Carbon emissions cannot effectively be evaluated at this stage, though it is expected that there will be no differences between options.	Minor Negative	5 Grade II listed buildings and 1 Grade II* listed building located in the village of Teversham which is within 600m of the site, though unlikely to be affected. No archaeological features identified. Anglo-Saxon and Roman features identified at other sites and in the vicinity of P1. Likely that similar features exist. Possible minor impact expected.	Minor Negative	Likely minor impact on biodiversity and ecology. The closest designated sites are WIbraham Fens SSSI, Barnwell LNR, and Coldham's Common LNR (All within roughly 2 km), though risk of impacts is low.	Neutral	The nearest main river is Quy Water, which is within 250m of the Southern edge of P1. The site is in a Flood zone 1 area which means there is a low probability of flooding. Changes in land use might bring about some minor benefits in reducing agricultural runoff. Potential for short-term minor impacts from the construction works, and longer-term impacts from road run-off (i.e., oils, greases, heavy metals), but unlikely. There are no other water receptors identified. No long-term impacts expected.
P2	South of Newmarket Road	Minor Positive	Not within an Air Quality Management Area (AQMA). Minor air quality benefits to locating the site further away from Cambridge AQMA. Possible local air quality impacts from changes in traffic flows. Not clear if these would be better or worse. Located closer to Teversham than the existing site. No impact on air quality expected.	Minor Negative	Does not fall within a Noise Action Planning Important Area. Receptors include the village of Teversham. Potential increase in noise arising from construction activities impacting the village Background noise increase during operation impacting the village. No long-term impacts expected.	Neutral	Situated within rural surrounds with the village of Teversham to the Southwest and Stow cum Quy to the Northeast. Within the Greenbelt. No AONBs. Possible temporary visual impacts from construction. Alterations to the landscape character. No rights of way are expected to be impacted. Public rights of way have been identified, which would need to be diverted. No long-term impacts expected.	Minor Negative	Potential short-term negatives from removal of topsoil during construction and loss of embodied carbon. Embedded carbon within the new facilities will also have an impact Carbon emissions cannot effectively be evaluated at this stage, though it is expected that there will be no differences between options.	Major Negative	Grade II listed building 'Milestone southwest of Quy mill' on the Northern border of the site. The milestone looks to be within the site boundary. Minor impact expected. 5 Grade II listed buildings and 1 Grade II* listed building are in the village of Teversham which within 1000m of the site, though unlikely to be affected. Anglo-Saxon burials identified adjacent to the far north-eastern end of site. Assets are likely to be of medium or high heritage significance. Possible major impact expected.	Major Negative	Eastern edge of site lies within 500m Wilbraham Fens SSSI and within 100m of SSSI quality reedbed. Important fenland habitat and wildlife much closer to the site including notable wintering and breeding birds. Likely to have a major impact on biodiversity and ecology. The closest designated sites are WIbraham Fens SSSI, Barnwell LNR, and Coldham's Common LNR (All within roughly 2 km), though risk of impacts is low.	Minor Negative	The nearest main river is Quy Water, which is immediately adjacent to the eastern edge of P2. Changes in land use might bring about some minor benefits in reducing agricultural runoff. Potential for short-term impacts from the construction works, and longer-term impacts from road run-off (i.e., oils, greases, heavy metals). Likely minor negative impact. The site is in a Flood zone 1 area which means there is a low probability of flooding. There are no other water receptors identified.
P3	North of High Ditch Road	Minor Positive	Not within an Air Quality Management Area (AQMA). Minor air quality benefits to locating the site further away from Cambridge AQMA. Possible local air quality impacts from changes in traffic flows. Not clear if these would be better or worse. Located closer to Teversham than the existing site. No impact on air quality expected.	Neutral	Does not fall within a Noise Action Planning Important Area. There are no known sensitive receptors. Stow cum Quy and Teversham are similar distances away to the existing park and ride. Impact on Villages during the construction phase not likely. No long-term impacts expected.	Neutral	Situated within rural surrounds with the village of Teversham to the South and Stow cum Quy to the East. Within the Greenbelt. No AONBs. Possible temporary visual impacts from construction. Alterations to the landscape character. No rights of way are expected to be impacted. No long-term impacts expected.	Minor Negative	Potential short-term negatives from removal of topsoil during construction and loss of embodied carbon. Embedded carbon within the new facilities will also have an impact Carbon emissions cannot effectively be evaluated at this stage, though it is expected that there will be no differences between options.	Major Negative	Grade II listed building 'Milestone Southwest of Quy mill' directly to the South of the site, though unlikely to be affected. Photographic evidence of remains for possible iron age settlement. Anglo-Saxon burials possibly extending into this site. The assets are likely to be of medium or high heritage significance. Possible major impact expected.	Minor Negative	It is assumed that there will be features of biological and ecological significance and therefore the intervention is likely to have a minor negative impact. The closest designated sites are Wilbraham Fens SSSI, Barnwell LNR, and Coldham's Common LNR (All within roughly 2 km), though there are no expected impacts.	Minor Negative	The nearest main river is Quy Water, which is immediately adjacent to the eastern edge of P3. Changes in land use might bring about some minor benefits in reducing agricultural runoff. Potential for short-term impacts from the construction works, and longer-term impacts from road run-off (i.e., oils, greases, heavy metals). Likely minor negative impact. The site is in a Flood zone 1 area which means there is a low probability of flooding. There are no other water receptors identified.
P4	South of High Ditch Road														
P5	Adjacent to Marleigh														
P6	West of Airport Way														
P7	Existing Site														
P8	South of Junction 35														
P9	East of Quy Water														
P10	North of A14 East	Minor Negative	Not within an Air Quality Management Area (AQMA). Minor air quality benefits to locating the site further away from Cambridge AQMA. Possible local air quality impacts from changes in traffic flows. Not clear if these would be better or worse. Located close to Stow Cum Quy. May have a minor negative impact on air quality.	Minor Negative	Does not fall within a Noise Action Planning Important Area. Sensitive receptors include the village of Stow cum Quy. Potential increase in noise and vibration arising from construction activities impacting the village. Background noise increase during operation impacting the village. Noise levels may raise long-term as a result of increased vehicle movements.	Minor Negative	Situated within rural surrounds with the village of Teversham to the Southwest and Stow cum Quy directly to the North. Within the Greenbelt. No AONBs. Possible temporary visual impacts from construction. Alterations to the landscape character. Expected long-term visual impacts on natural and urban environment for village of Stow cum Quy No rights of way are expected to be impacted.	Minor Negative	Potential short-term negatives from removal of topsoil during construction and loss of embodied carbon. Embedded carbon within the new facilities will also have an impact Carbon emissions cannot effectively be evaluated at this stage, though it is expected that there will be no differences between options.	Minor Negative	One Grade II listed building bordering the north side of the site: Milestone to east northeast of St Marys parish church. Eleven Grade II listed buildings and two Grade II* listed buildings in the village of Stow cum Quy which are within 250m to 1000m of the site. Direct impacts on listed buildings - construction and potential indirect permanent impacts on visual/amenity. No archaeological features identified. Anglo-Saxon and Roman features identified at other sites. Likely that similar features exist. Possible minor	Minor Negative	It is assumed that there will be features of biological and ecological significance and therefore the intervention is likely to have a minor negative impact. The site is located within proximity of a SSSI (<250m), though not anticipated that the intervention will have any impact on the designated site. Other designated sites include Barnwell LNR, and Coldham's Common LNR (All within roughly 2 km), though there are no expected impacts.	Neutral	The nearest river is Quy Water is roughly 1 km away, though there are no expected impacts. The site is in a Flood zone 1 area which means there is a low probability of flooding. The site is located in proximity of drinking water source protection zone (SPZ) 3 (<1000), though it is not anticipated that P10 will have any impact. There are no other water receptors identified.
P11	North of A14 West	Minor Negative	Not within an Air Quality Management Area (AQMA). Minor air quality benefits to locating the site further away from Cambridge AQMA. Possible local air quality impacts from changes in traffic flows. Not clear if these would be better or worse. Located close to Stow Cum Quy. May have a minor negative impact on air quality.	Minor Negative	Does not fall within a Noise Action Planning Important Area. Sensitive receptors include the village of Stow cum Quy Potential increase in noise and vibration arising from construction activities impacting the village. Background noise increase during operation impacting the village. Noise levels may raise long-term as a result of increased vehicle movements.	Minor Negative	Situated within rural surrounds with the village of Teversham to the Southwest and Stow cum Quy directly to the East. Within the Greenbelt. No AONBs. Possible temporary visual impacts from construction. Alterations to the landscape character. Expected long-term visual impacts on natural and urban environment for village of Stow cum Quy and Quy Mill Hotel. Public rights of way have been identified, which would need to be diverted.	Minor Negative	Potential short-term negatives from removal of topsoil during construction and loss of embodied carbon. Embedded carbon within the new facilities will also have an impact Carbon emissions cannot effectively be evaluated at this stage, though it is expected that there will be no differences between options.	Major Negative	Two Grade II and one Grade II* buildings bordering the site: Garden Wall of Guy Mill House, Quy Water Mill and Parish Church of St Mary Eleven Grade II listed buildings and two Grade II* listed buildings in the village of Stow cum Quy which are within 100m to 500m of the site. Major impact on listed buildings - construction and potential indirect permanent impacts on visual/amenity. Evidence of archaeological remains in 250m west of the site, thought to be indicative of a Roman settlement. Possible	Minor Negative	It is assumed that there will be features of biological and ecological significance and therefore the intervention is likely to have a minor negative impact. The closest designated sites are Wilbraham Fens SSSI, Barnwell LNR, and Coldham's Common LNR (All within roughly 2 km), though there are no expected impacts.	Minor Negative	The nearest main river is Quy Water, which is immediately adjacent to North / Northwest edge of P11. Changes in land use might bring about some minor benefits in reducing agricultural runoff. Potential for short-term impacts from the construction works, and longer-term impacts from road run-off (i.e., oils, greases, heavy metals). Likely minor negative impact. The site is in a Flood zone 1 area which means there is a low probability of flooding. There are no other water receptors identified.
P12	South of Stow cum Quy														

DELIVERY CASE

DELIVERABILITY / OPERATIONA

		AM Peak inbound Pass-by Intercept Potential		Site Access/Egress by Car		Households within 10 min Cycle		Cycle Journey time to Cambridge city centre		Site Access/Egress by Bicycle		Households within 10 min Walk		Site Access/Egress by Pedestrians	
Site Ref	Site Name	Red - Low Potential Amber - Medium Potential Green - High Potential	Free Text	Red - Major Constraints Amber - Minor Constraints Green - No Significant Constraints	Free Text	Red - less than 400 Amber - 400-900 Green - greater than 900	Free Text	Red - Greater than 25 mins Amber - 20-25 mins Green - less than 25 mins	Free Text	Red - Major Constraints Amber - Minor Constraints Green - No Significant Constraints	Free Text	Red - less than 50 Amber - 50-250 Green - greater than 250	Free Text	Red - Major Constraints Amber - Minor Constraints Green - No Significant Constraints	Free Text
P1	East of Airport Way	Green	AM Peak 2041 - **1,947** pass-by vehicle movements at the Airport Way roundabout.	Green	Access off the A1303 Newmarket Road at, or to the east of, the Airport Way roundabout and off Airport Way to the south of the roundabout is feasible. The A1303 Newmarket Road provides a direct link to the A1303/A14 fully grade separated interchange, enabling convenient access to the strategic road network. Access to P1 will be on the 'inbound' route towards Cambridge which provides easier access for arriving vehicles from the east.	Green	**965 households currently within a 10min cycle.** Teversham, Newmarket Road west to Barnwell Roundabout, Marleigh and future Airport development site within 10 min cycle	Green	Journey time is 23 minutes (12.5mph/20kmh) cycle cruising speed from P1 to Grand Arcade Cycle Store via the most direct route (Newmarket Road)	Green	Near the National Cycle Route No.51, which along with the CEA proposals for Newmarket Road, provide links to Cambridge City Centre No significant additional cycle infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site. Direct access from P1 to the proposed cycle infrastructure on both sides of Newmarket Road can be provided at the Airport Way Roundabout. Direction cycle access can also be provided the existing cycle route alongside Airport Way and in the future into the Airport strategic development. People living in Marleigh and Teversham will also be able to easily access the P1 by bicycle.	Red	**18 households currently within a 10min walk.** Newmarket Road east towards High Ditch Road and west to the existing P&R site and the edge of Teversham. However the north-eastern path of the Cambridge Airport development site will be within 10 min walk in the future.	Green	There is an existing shared unsegregated footway/cycleway running alongside Airport Way on the west side There is also an existing shared unsegregated Footway/Cycleway (National Cycle route no. 51) running along the north side of Newmarket Road adjacent to the site. No significant additional pedestrian infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.
P2	South of Newmarket Road	Green	AM Peak 2041 - **1,657** pass-by vehicle movements on Newmarket Road	Green	Access can be achieved from the A1303 Newmarket Road to the east of the Airport Way roundabout. To avoid existing accesses on the north side of Newmarket Rd opposite the site, it is considered that access into this site should be provided opposite the High Ditch Road junction, effectively creating a 4-arm junction with High Ditch Road. Eastwards, the A1303 Newmarket Road provides a direct link to the A1303/A14 fully grade separated interchange, enabling convenient access to the strategic road network. Access to P2 will be on the 'inbound' route towards Cambridge which provides easier access for arriving vehicles from the east.	Red	**385 households currently within a 10min cycle.** Part of Teversham covered and less of the residential areas in Barnwell compared to P1. However Marleigh and the Airport development will be within 10m cycle distance	Green	Journey time is 24 minutes (12.5mph/20kmh) cycle cruising speed from P2 to Grand Arcade Cycle Store via the most direct route (Newmarket Road)	Green	Near the National Cycle Route No.51, which along with the CEA proposals for Newmarket Road, provide links to Cambridge City Centre. Connections. The site can be connected to the existing National Cycle Route 51 via a crossing across Newmarket Road. Compared to P1, the site is located further from Marleigh, the Cambridge Airport development site and Teversham, potentially users of the relocated Park and Ride.	Red	28 households currently within a 10min walk. Newmarket Road east towards the A14 and west to the Airport Way roundabout. The P&R site won't be within 10 min walk of Cambridge Airport development.	Green	There is an existing shared unsegregated Footway/Cycleway (National Cycle route no. 51) running along the north side of Newmarket Road adjacent to the site. No significant additional pedestrian infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.
P3	North of High Ditch Road	Green	AM Peak 2041 - **1,660** pass-by vehicle movements on Newmarket Road	Green	It is considered that the most appropriate point to access the site would be via a new junction located at the site of the existing High Ditch Road/ A1303 Newmarket Road Junction. The reconfigured junction layout would need to make suitable provision for High Ditch Road as well as the P&R site access. The A1303 Newmarket Road provides a direct link to the A1303/A14 fully grade separated interchange, enabling convenient access to the strategic road network. Access to P3 will require 'inbound' traffic from the A14 to turn right into the site which is slightly less convenient when compared to P1 and P2 and crosses the National Cycle Route 51.	Red	**346 households currently within a 10min cycle.** Just the northern part of Teversham, Marleigh, the north-eastern part of the Airport site and southern Stow cum Quy within a 10min cycle	Amber	Journey time is 25 minutes (12.5mph/20kmh) cycle cruising speed from P3 to Grand Arcade Cycle Store via the most direct route (High Ditch Road/NCN51)	Green	No significant additional cycle infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site. The National Cycle Route No.51 routes along the southern boundary of P3 providing opportunities to provide direct access. However P3 is located further from Cambridge increasing cycle times and travel distance from Marleigh, Cambridge Airport development site and Teversham.	Red	**28 households currently within a 10min walk.** Newmarket Road east towards the A14 and west to the Airport Way roundabout. The P&R site won't be within 10 min walk of Cambridge Airport development but is within 10min walk of Quy Mill Hotel via the existing underpass.	Green	There is an existing shared unsegregated Footway/Cycleway (National Cycle route no. 51) running along the north side of Newmarket Road adjacent to the site. No significant additional pedestrian infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.
P4	South of High Ditch Road														
P5	Adjacent to Marleigh														
P6	West of Airport Way														
P7	Existing Site														
P8	South of Junction 35														
P9	East of Quy Water														
P10	North of A14 East	Amber	AM Peak 2041 - **793** pass-by vehicle movements on Newmarket Road. However it is recognised the site is also close to Junction 35 of the A14	Green	Access to the site will need to be off the A1303 Newmarket Road on the northside of the A14 and to the east of Stow Cum Quy. Westwards the A1303 Newmarket Road provides a direct link to the A1303/A14 fully grade separated interchange, enabling convenient access to the strategic highway network. Access to P10 will require vehicles from the A14 to turn right into the site.	Amber	**434 households currently within a 10min cycle.** Stow cum Quy village within 10 min cycle of P10	Red	Journey time is 31 minutes (12.5mph/20kmh) cycle cruising speed from P4 to Grand Arcade Cycle Store via the most direct route (High Ditch Road/NCN 51)	Green	Near the National Cycle Route No.51, which along with the CEA proposals for Newmarket Road, provide links to Cambridge City Centre No significant additional cycle infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.	Amber	**68 households currently within a 10min walk.** Southern part of Stow cum Quy village only and properties along Newmark Road fronting the site	Green	There is an existing shared unsegregated Footway/Cycleway (National Cycle route no. 51) running along the north side of Newmarket Road adjacent to the site. No significant additional pedestrian infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.
P11	North of A14 West	Red	AM Peak 2041 - **584** pass-by vehicle movements on Church Road. However it is recognised the site is also close to Junction 35 of the A14	Amber	Access to the site would need to be located via a new junction incorporating Newmarket Road, Church Road and the access road to the Quy Mill Hotel which may require third party land acquisition. The CCC website confirms the hotel access road is public highway up to the point where the subway under the A14 is located due to National Cycle Route 51 using this access road. The constraint of having only one location to provide access to the site makes this more constrained than the other sites. The A1303 Newmarket Road provides a direct link to the A1303/A14 fully grade separated interchange, enabling convenient access to the National Highways network.	Amber	**452 households currently within a 10min cycle.** Stow cum Quy village within 10 min cycle of P10	Red	Journey time is 30 minutes (12.5mph/20kmh) cycle cruising speed from P5 to Grand Arcade Cycle Store via the most direct route (High Ditch Road/NCN 51)	Green	Site is adjacent to National Cycle Route 51 providing access to Cambridge. No significant additional cycle infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.	Green	**208 households currently within a 10min walk.** Southern part of Stow cum Quy village and the Quy Mill Hotel.	Green	There is an existing shared unsegregated Footway/Cycleway (National Cycle route no. 51) running along the north side of Newmarket Road adjacent to the site. No significant additional pedestrian infrastructure is anticipated to connect the CEA Newmarket Road scheme appropriately to a new P&R facility at this site.
P12	South of Stow cum Quy														

L CASE

		Average AM Peak Bus Journey Time to Emmanuel Street Bus Stops		Opportunity to Deliver Segregated Bus Priority Access/Egress		Does the plot shape/topography constrain development?		Land Ownership/Availability		Constructability		Overall Decision	
Site Ref	Site Name	Red - Greater than 20 mins Amber - 17-20 mins Green - less than 17 mins	Free Text	Red - Major Constraints/Costs Amber - Moderate Constraints/Costs Green - No Significant Constraints/Cost	Free Text	Red - Irregular shape close to min size Amber - Irregular shape but plenty of space Green - Ample space and efficient plot shape	Free Text	Red - Complex/multiple ownership Amber - Single Private Owner/Willing Owner Green - Public Sector Ownership	Free Text	Red - Complex/Constrained Amber - Some Challenges Green - No Significant Challenges	Free Text	Scheme Rank Score	Decision Notes Free Text
P1	East of Airport Way	Green	15:46	Green	Site is the furthest west and therefore will require the shortest lengths of additional bus priority measures to and from the site. There is flexibility in being able to provide segregated bus access onto Airport Way, Newmarket Road and/or Airport Way. Newmarket Road, west of Airport Way has the land availability to accommodate additional inbound and outbound bus lanes to P1. The direct access onto Airport Way provides the opportunity to provide a direct HQPT into the Cambridge Airport Strategic Development Site.	Green	Overall P1 has ample space to accommodate a 2,000 space P&R. However, the initial sift identified the need for careful site design to minimise ecological impacts to existing mature flora and future impacts on the Country Park allocation in Cambridge East AAP that runs along the southern portion of the site. The available space within the north-west corner of the site is 5.9 hectares, which should provide sufficient space to accommodate the P&R.	Amber	Site owned by Marshalls who are in principle supportive of locating the P&R to the south of Newmarket Road and east of Airport Way.	Amber	Site is located in open farmland Surface Water Drainage by infiltration may be possible. If infiltration not viable, nearest watercourse is approx. 200m to the south of the site. Access to this watercourse will be over third-party land and flows will be restricted to pre-development greenfield run-off rates. This will result in large amounts of attenuation storage, either at ground level in the form of basins, swales or underground in the form of buried storage tanks. There are no records of any public Foul Water or Surface Water sewers in the area. Foul Water drainage may be achieved by a package treatment tank which discharges into the watercourse. Existing Utilities can be found in Newmarket Road which could provide service to the site.	1	P1 ranks '1', preferred site as its scores highest in minimising the environmental impact of the P&R facility, provides the best operational performance due to being located in the 'inbound' side of Newmarket Road and is the closest to Cambridge resulting in the quickest onward cycle and bus journey times. The site location in close proximity to Marleigh and the allocated Airport development means the P&R facility will be accessible from existing and future local communities. It is recognised that P1 scores 'moderate high' in likely harm to the Green Belt purposes. But on balance taking into consideration all the assessed factors P1 is considered to provide the most suitable site of the 5 shortlisted options.
P2	South of Newmarket Road	Amber	17:08	Amber	Compared to P1 - additional lengths of bus lane on Newmarket Road could be required to provide bus priority to and from the site.	Green	Overall P2 has ample space to accommodate a 2,000 space P&R. However, the initial sift identified the need for careful site design to minimise ecological impacts to the SSSI to the east of the site. The available space within the site means there is flexibility to locate the P&R away from the eastern edge to provide a sufficient buffer to the SSSI.	Green	Site wholly owned by Cambridgeshire County Council and therefore considered to be available to the GCP to accommodate a new P&R.	Amber	Site is located in open farmland Surface Water Drainage by infiltration may be possible. If infiltration not viable, nearest watercourse is approx. 200m to the south of the site. Access to this watercourse will be over third-party land and flows will be restricted to pre-development greenfield run-off rates. This will result in large amounts of attenuation storage, either at ground level in the form of basins, swales or underground in the form of buried storage tanks. There are no records of any public Foul Water of Surface Water sewers in the area. Foul Water drainage may be achieved by a package treatment tank which discharges into the watercourse. Existing Utilities can be found in Newmarket Road which could provide service to the site.	2	P2 is ranked second as operationally it is the second best site due to the proximity to Cambridge (short bus and cycle journey times) and located on the inbound side of Newmarket Road. Compared to P1, the potential harm to the Green Belt is assessed as 'moderate', however major concerns were raised regarding potential environmental impacts due to the immediate proximity to Teversham Fen (SSSI quality reedbeds) and heritage assets. It is recognised that these impacts may be mitigated to some degree by locating the P&R in the west of P2 and undertaking further surveys, but on balance, P1 is preferable due to the closer proximity to Cambridge and committed and planned communities.
P3	North of High Ditch Road	Amber	17:56	Amber	Compared to P1 - additional lengths of bus lane on Newmarket Road could be required to provide bus priority to and from the site.	Green	Overall P3 has ample space to accommodate a 2,000 space P&R. However, within the site it would be preferable to locate the P&R at the eastern end, close as possible to Newmarket Road to minimise bus journey times. The site appears to be relatively flat topography and is approximately 175 metres wide which would result in the need to provide a rectangular shaped site layout.	Amber	Site wholly owned by a single private owner. Not allocated for development so could be open to purchase discussions.	Amber	Site is located in open farmland Surface Water Drainage by infiltration may be possible. If infiltration not viable, nearest watercourse is Quy Water approx. 200m to the east of the site. Access to this watercourse will be over third-party land and flows will be restricted to pre-development greenfield run-off rates. This will result in large amounts of attenuation storage, either at ground level in the form of basins, swales or underground in the form of buried storage tanks. There are no records of any public Foul Water of Surface Water sewers in the area. Foul Water drainage may be achieved by a package treatment tank which discharges into the watercourse. Existing Utilities can be found in Newmarket Road which could provide service to the site. There are cable networks crossing the existing priority junction on the north side of Newmarket Road. One of these is fibre optic which will be expensive to divert/lower.	3	P3 is ranked third. Overall P3 scores better than P2 in terms of potential environmental impact as it is located further from the SSSI. However the site could have major heritage constraints based on the information provided by Cambridgeshire County Council. Located further east than P1 and P2, onward cycle and bus journey times will increase and the site is located on the 'outbound' side of Newmarket Road. P3 will therefore require more extensive bus priority infrastructure compared to P1 and P2, and is in private ownership. Green Belt impact is assessed as 'high', which is the highest potential level of harm of the fiver short-listed sites.
P4	South of High Ditch Road												
P5	Adjacent to Marleigh												.
P6	West of Airport Way												
P7	Existing Site												
P8	South of Junction 35												
P9	East of Quy Water												
P10	North of A14 East	Red	23:48	Red	Substantial bus priority measures would be required to enable P&R buses to avoid congestion at Junction 35 of the A14 during peak travel periods.	Green	Overall P10 has ample space to accommodate a 2,000 space P&R. However, within the site it would be preferable to locate the P&R at the western end, close as possible to Newmarket Road to minimise bus journey times. The site appears to be relatively flat topography and is approximately 145 metres wide which would result in the need to provide a rectangular shaped site layout.	Green	Site wholly owned by Cambridgeshire County Council and therefore considered to be available to the GCP to accommodate a new P&R.	Red	Site is located in open farmland Underlying soils sand and gravel according to the British Geological Survey website. This type of soil may support infiltration as a form of surface water drainage. If infiltration is not viable, there is not a nearby watercourse available to accept the surface water run-off via gravity so surface water will need to be pumped. The site lies outside the scope area of the C2 enquiries made for the Cambridge Eastern Access scheme so the location of any public Foul Water of Surface Water sewers or any other utilities in the area is not known.	4	Sites P10 and P11 are the least favoured sites to accommodate the P&R facility. Operationally, both sites would require extensive additional bus priority infrastructure to enable attractive bus journey times to Cambridge. The cycle time has also increased, making the sites less attractive to potential 'Park and Pedal' users. The proximity to Stow-cum-Quy village means there is potential for negative environmental impacts on existing residents. Site P10 and P11 are appraised as potentially having 'moderate high' and 'moderate' harm on the Green Belt functions. Concerns are also raised with the constructability of P10. It has been recognised that a P&R facility on the north side of the A14 will intercept Cambridge bound vehicle trips earlier, potentially reducing movements through Junction 35 of the A14 and along Newmarket Road towards Cambridge. However as set out earlier, extensive bus priority infrastructure would be required to provide attractive bus journey times to off-set any vehicle journey times. The bus priority infrastructure requirements would substantially increase the cost of a P&R facility at P10 and P11 and is not considered to outweigh the benefit of a reduced vehicle access journey time.
P11	North of A14 West	Red	22:51	Red	Substantial bus priority measures would be required to enable bus to avoid congestion at Junction 35 of the A14 during peak travel periods.	Green	Overall P11 has ample space to accommodate a 2,000 space P&R. However, within the site it would be preferable to locate the P&R at the south-eastern end, close as possible to Church Road to minimise bus journey times. The site appears to be relatively flat topography and could accommodate a very efficient P&R layout.	Amber	Site wholly owned by a single private owner. Not allocated for development so could be open to purchase discussions.	Green	Site is located in open farmland Surface Water Drainage by infiltration may be possible. If infiltration not viable, nearest watercourse is approx. 200m to the south of the site. Access to this watercourse will be over third-party land and flows will be restricted to pre-development greenfield run-off rates. This will result in large amounts of attenuation storage, either at ground level in the form of basins, swales or underground in the form of buried storage tanks. The site lies outside the scope area of the C2 enquiries made for the Cambridge Eastern Access scheme so the location of any public Foul Water of Surface Water sewers or any other utilities in the area is not known	4	
P12	South of Stow cum Quy												

Appendix B

P&R ACCESS LAYOUT PLANS

DO NOT SCALE

NOTES
1. THE JUNCTION LAYOUT SHOWN IS INDICATIVE AND IS INTENDED TO SHOW THE MAIN FEATURES FOR PUBLIC CONSULTATION PURPOSES.
2. NUMBER OF TRAFFIC LANES ON EACH APPROACH / EXITS IS SUBJECT TO FURTHER ANALYSIS AND JUNCTION MODELLING

KEY:
- HIGHWAY BOUNDARY
- PARK & RIDE BOUNDARY
- PARK & RIDE – P1 SUBSET BOUNDARY
- P1 BOUNDARY
- CARRIAGEWAY
- BUS LANE
- CYCLEWAY
- FOOTWAY
- PARKING AREA
- VERGE
- LANDSCAPING

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	10/08/2022	AKM	ISSUED FOR CONSULTATION	AG	GC
P02	24/06/2022	SBI	SECOND ISSUE	AG	GC
P01	21/09/2021	HJ	FIRST ISSUE	AG	GC

DRAWING STATUS: S2 - FOR INFORMATION

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wsp.com

CLIENT: GREATER CAMBRIDGE PARTNERSHIP

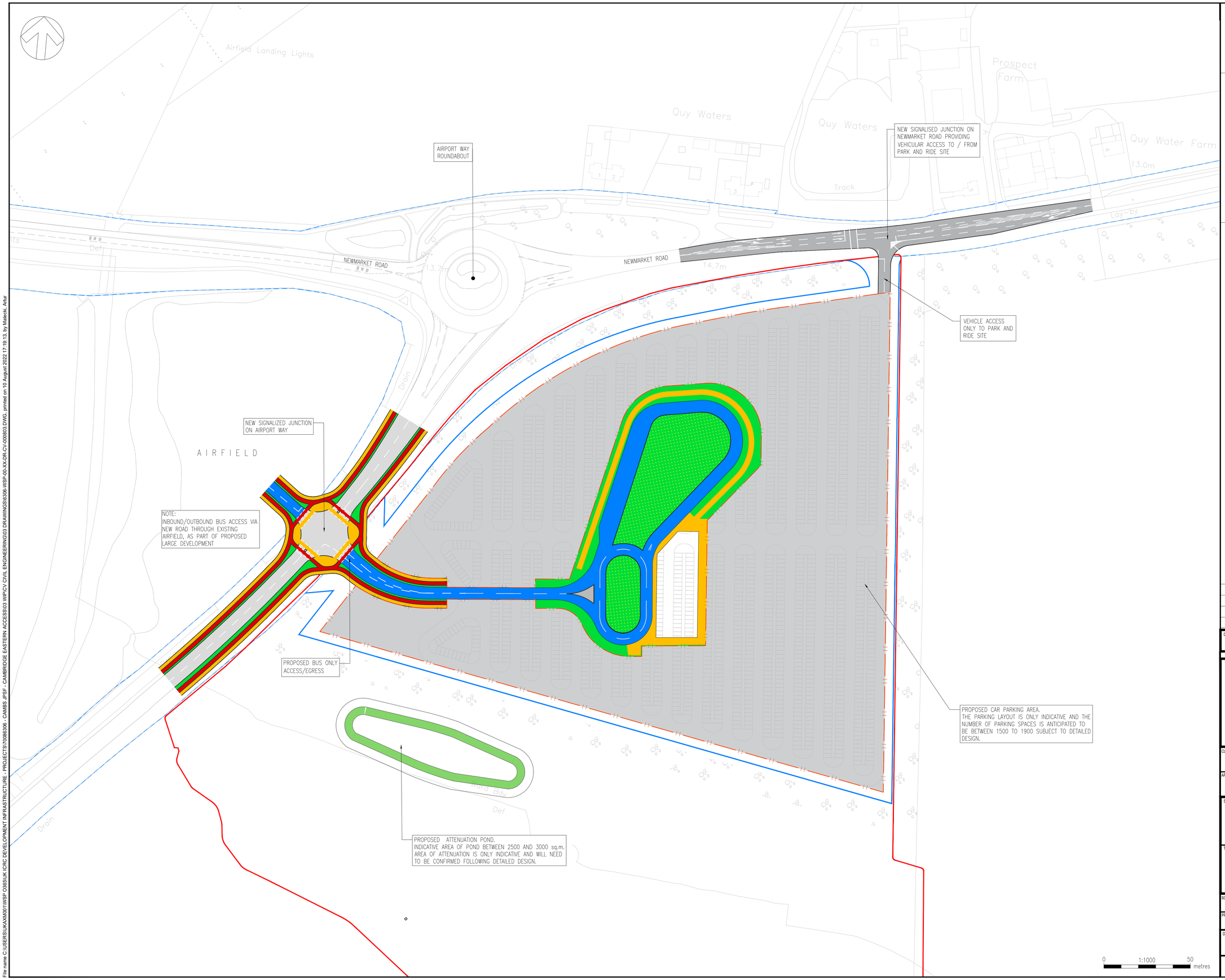
ARCHITECT:

SITE/PROJECT: CAMBRIDGE EASTERN ACCESS NEWMARKET ROAD

TITLE: OPTION 1: PROPOSED PARK & RIDE GENERAL ARRANGEMENTS

SCALE @ A1:	CHECKED:		APPROVED:
1:1000	AG		GC
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70086306	BW	HJ	June 2022

DRAWING No: 6306-WSP-00-XX-DR-CV-000801 REV: P03



DO NOT SCALE

NOTES
1. THE JUNCTION LAYOUT SHOWN IS INDICATIVE AND IS INTENDED TO SHOW THE MAIN FEATURES FOR PUBLIC CONSULTATION PURPOSES.
2. NUMBER OF TRAFFIC LANES ON EACH APPROACH / EXITS IS SUBJECT TO FURTHER ANALYSIS AND JUNCTION MODELLING

KEY:

- HIGHWAY BOUNDARY
- PARK & RIDE BOUNDARY
- PARK & RIDE – P1 SUBSET BOUNDARY
- P1 BOUNDARY
- CARRIAGEWAY
- BUS LANE
- CYCLEWAY
- FOOTWAY
- PARKING AREA
- VERGE
- LANDSCAPING

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	10/08/2022	AKM	ISSUED FOR CONSULTATION	AG	GC
P02	24/06/2022	SBI	SECOND ISSUE	AG	GC
P01	21/09/2021	HJ	FIRST ISSUE	AG	GC

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wsp.com

CLIENT: GREATER CAMBRIDGE PARTNERSHIP

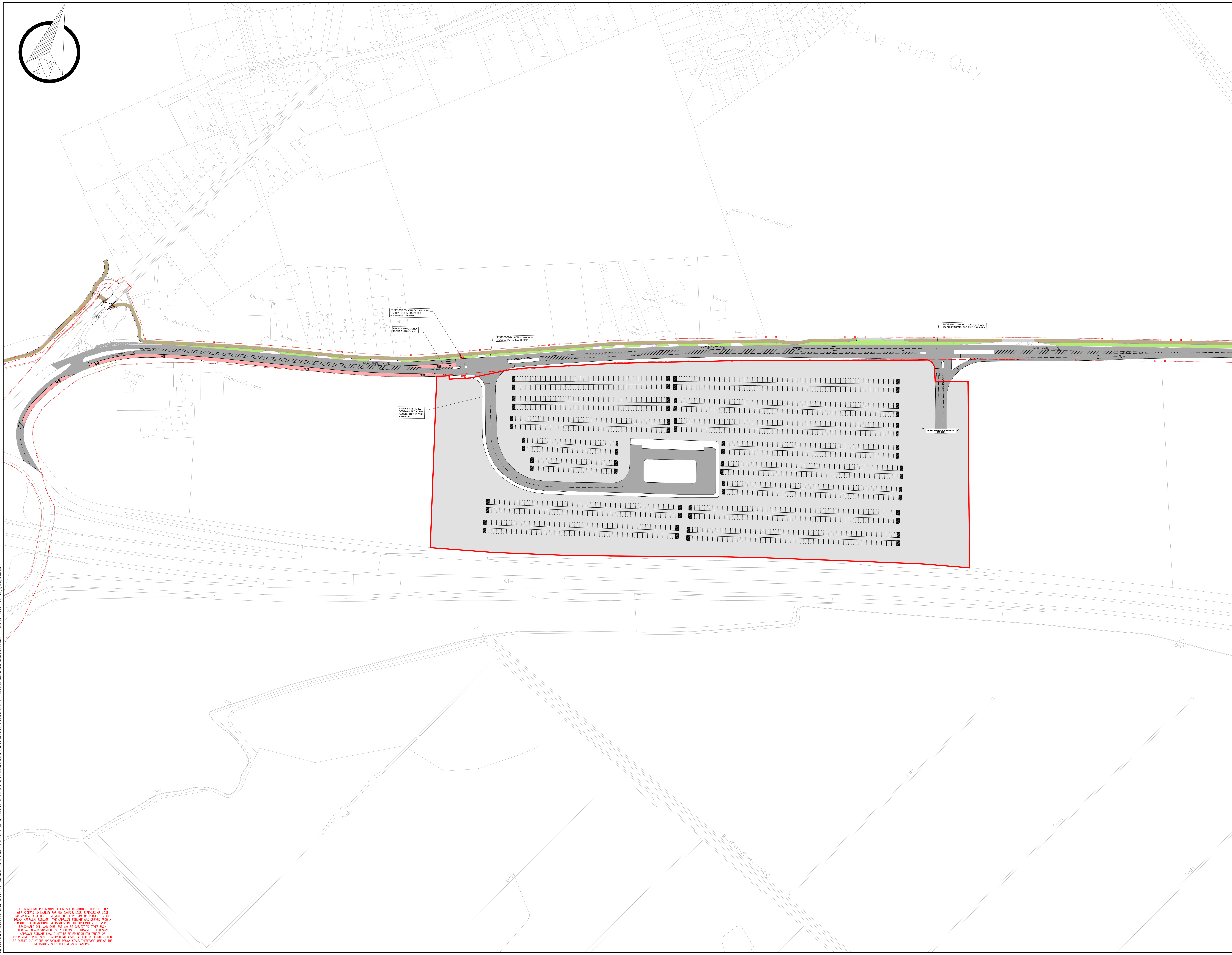
ARCHITECT:

SITE/PROJECT: CAMBRIDGE EASTERN ACCESS
NEWMARKET ROAD

TITLE: OPTION 3: PROPOSED PARK & RIDE
GENERAL ARRANGEMENTS

SCALE @ A1:	CHECKED:		APPROVED:
1:1000	AG		GC
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70086306	BW	HJ	June 2022

DRAWING No: 6306-WSP-00-XX-DR-CV-000803 REV: P03



Stow cum Quy
ORCHARD STREET
CHURCH ROAD
B 1102
16.5m
16.7m
14.8m
LB
Shelter
St Mary's Church
Church View
Alvescote
Wisbeach
Good View
Kendor
Eltham
South View
The Willows
Midway
Mayburl
Oak Lodge
Mast (telecommunication)
Church Farm
D'Engayne's Farm
NEWMARKET ROAD
ALBERT ROAD
Lay-by
A14
SHORT DROVE WAY (TRACK)
Drain
SD
FB
PROPOSED TOUCAN CROSSING TO TIE IN WITH THE PROPOSED BOTTISHAM GREENWAY
PROPOSED BUS ONLY RIGHT TURN POCKET
PROPOSED BUS ONLY JUNCTION ACCESS TO PARK AND RIDE
PROPOSED SHARED FOOTWAY PROVIDING ACCESS TO THE PARK AND RIDE
PROPOSED JUNCTION FOR VEHICLES TO ACCESS PARK AND RIDE CAR PARK
CAR PARK ACCESS TO BE DESIGNED AT THE NEXT STAGE

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DO NOT SCALE

KEY:

- Proposed Bus Lane
- Bottisham Greenway Scheme–Proposed Shared Footway
- Bottisham Greenway Scheme–Proposed Verge
- Proposed Kerb Layout
- Existing Highway Boundary
- Proposed Tactile Paving
- Proposed Park and Ride Site Extent

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	25/03/2024	BKM	FIRST ISSUE	CLM	CLM

DRAWING STATUS: S0 - WORK IN PROGRESS

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ARCHITECT:

PROJECT: CAMBRIDGE EASTERN ACCESS- NEWMARKET ROAD

TITLE: SITE 10 -PROPOSED PARK AND RIDE ACCESS OPTION 1 GENERAL ARRANGEMENT

SCALE @ A0: NTS	CHECKED: CLM		APPROVED: CLM
PROJECT No: 70086306	DESIGNED: BKM	DRAWN: BKM	DATE: March 24

DRAWING No: 70086306-WSP-XX-P10-DR-LP-0100 — REV: P01

DO NOT SCALE

KEY:

- Proposed Bus Lane
- Bottisham Greenway Scheme–Proposed Shared Footway
- Bottisham Greenway Scheme–Proposed Verge
- Proposed Kerb Layout
- Existing Highway Boundary
- Proposed Tactile Paving

CYCLE ACCESS EXTENDED TO PARK AND RIDE

PROPOSED BOTTISHAM GREENWAY SCHEME

PROPOSED SIGNALISED CROSSING

PROPOSED SIGNALISED CROSSING

PROPOSED GREENWAY AND HOTEL ACCESS ROAD

EXISTING BANNED RIGHT TURN TO BE REMOVED

12m

16.7m

El Sub Sta

Shelter

Church

St Mary's C

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REV	DATE	BY	DESCRIPTION	CHK	APP
P01	01/01/1901	XXX	FIRST ISSUE	XXX	XXX

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CLIENT: GREATER CAMBRIDGE PARTNERSHIP

ARCHITECT:

SITE/PROJECT: CAMRBRIDGE EASTERN ACCESS NEWMARKET ROAD

TITLE: SITE P11 - PROPOSED PARK AND RIDE ACCESS GENERAL ARRANGEMENT

SCALE @ A1:	CHECKED:		APPROVED:
NTS	CLM		CLM
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70086306	JR	JR	March 24

DRAWING No: 70086306-WSP-XX-P11-DR-LP-0100_ REV: P01

Appendix C

PARAMICS MODEL LOCAL VALIDATION REPORT

Greater Cambridge Partnership

CAMBRIDGE EASTERN ACCESS PARK & RIDE SITE ASSESSMENT

Local Model Validation Report

MAY 2024

PUBLIC

Greater Cambridge Partnership

CAMBRIDGE EASTERN ACCESS PARK & RIDE

Local Model Validation Report

PUBLIC

PROJECT NO. 70086306

DATE: MAY 2024

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QUALITY CONTROL

Issue/revision	Internal draft	First issue	Revision 1
Remarks	V1	V1	
Date	03/04/2024	16/05/2024	
Prepared by	Deepa Dileep	Deepa Dileep	
Signature			
Checked by	Sanjay Radhakrishnan	Sanjay Radhakrishnan	
Signature			
Authorised by	Eduardo Carbajo	Eduardo Carbajo	
Signature			
Project number			
Report number			
File reference			

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP have been commissioned by the Greater Cambridge Partnership (GCP) to develop a Paramics Discovery model for the Newmarket Road corridor between Airport Way and east of Church Road to assess the potential highway impact of the Park and Ride (P&R) scheme options at sites P1, P10 and P11.

1.1.2. The Cambridge Paramics model used for the Cambridge Eastern Access SOBC stage has been used as a starting point for this assessment. This model has been cordoned to cover the area of Newmarket Road between Newmarket Road / Airport Way roundabout in the west and Newmarket Road / Church Road in the northeast.

1.1.3. Traffic microsimulation model in Paramics Discovery brings the following benefits:

- A visual simulation output where individual vehicles can be viewed throughout the multiple-hour modelled period traversing the road network and interacting with each other. This output is a powerful tool for stakeholders to see the existing model performance and compare with proposed interventions.
- Dynamic traffic assignment - the model is provided with a set of origin and destination traffic demands and assigns these to the road network.

1.2 PURPOSE OF THIS REPORT

1.2.1. The aim of this Model Development Report is to provide information related to the development and calibration/validation of the Cambridge Eastern Access Park and Ride (CEA P&R) Paramics model. The report demonstrates the calibration/validation of the model against observed data and published model performance guidelines.

1.2.2. Following this introduction, this report contains sections which provide details on the following elements of the model development and its calibration and validation:

- Section 2 details the modelled area and data sources used in model development.
- Section 3 details the Paramics model network development.
- Section 4 presents the matrix development.
- Section 5 sets out the results of the model calibration and validation; and
- Section 6 provides a summary of the model development and calibration/validation.

1.3 WIDER CONTEXT

1.3.1. An existing Cambridge Paramics model developed in 2017 was used as a starting point. This model covers the whole of Cambridge including the A14 to the north and east, the M11 to the west, Addenbrookes Hospital in the south and Cherry Hinton in the south-east.

1.3.2. The extent of the city-wide Cambridge Paramics model is shown in Figure 1 1.

Figure 1-1 Cambridge Model Extent

1.3.3. Due to the age of the model and the fact that it represents a situation before COVID-19, it has been agreed that a model update is required. A city-wide model update would require a lot of time and effort to be developed, and it would not be proportionate for the purpose of assessing the impact of the proposed P&R locations. Therefore, a smaller model only covering the Newmarket Road corridor has been developed.

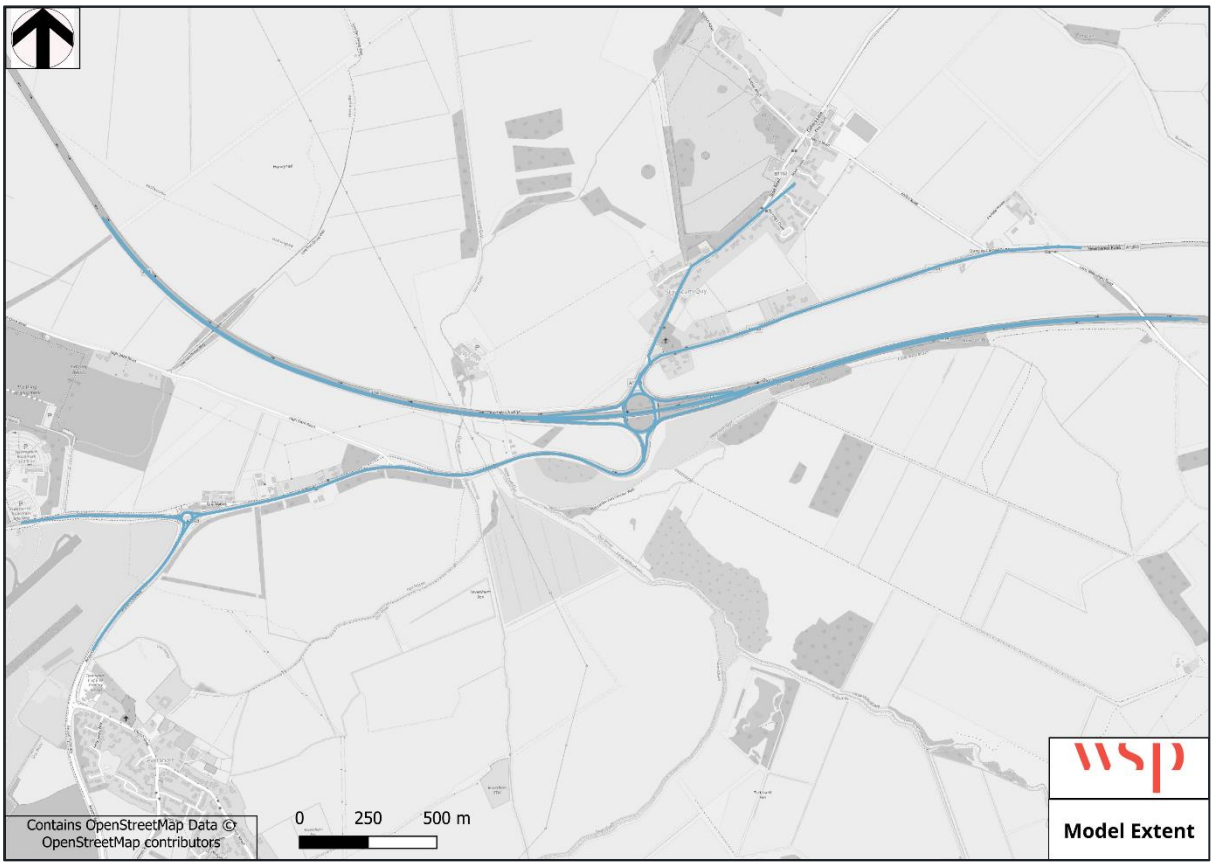
2 MODEL AREA AND DATA SOURCES

2.1 MODEL AREA

2.1.1. The CEA P&R Paramics model has been built from the 2017 Cambridge Paramics model.

2.1.2. The CEA P&R Paramics model area covers Newmarket Road corridor between the junction Newmarket Road / Airport Way roundabout to the west, Quy Interchange, and Newmarket Road / Church Road junction to the northeast. The model extent is shown in Figure 2-1.

Figure 2-1 Model Extent



2.2 TRAFFIC SURVEY DATA

2.2.1. Traffic surveys were undertaken by Intelligent Data Collection and Streetwise UK Management Limited to understand the travel patterns and network conditions.

2.2.2. The survey data is comprised of:

- Manual Classified Turning Counts (MCCs) at the junctions;
- Automatic Traffic Count (ATC) data;
- Queue length surveys on junction approaches;
- WebTRIS data; and
- INRIX Journey time data.

Figure 2-2 Traffic Survey Locations

MANUAL CLASSIFIED COUNTS (MCC)

2.2.3. Two sets of MCC survey data were available, one for the year 2023 and another for the year 2024. MCC survey locations are shown in Figure 2-2.

2.2.4. Classified turning count data in fifteen-minute intervals from 07:00 - 19:00 was collected by Intelligent Data Collection at two sites listed in Table 2-1 on 13 June 2023.

2.2.5. Classified turning count data in fifteen-minute intervals from 07:00 - 19:00 was collected Streetwise UK Management Ltd at two sites listed in Table 2-1 on 15 February 2024.

2.2.6. No data loss was noted for the MCCs at any of the sites during the survey period.

2.2.7. Queue length data was collected between 07:00 - 19:00 on Thursday 15 February 2024 by Streetwise UK Management Ltd. Maximum queue lengths in vehicles were recorded in five-minute intervals on each approach by lane at the two surveyed locations. A summary of the queue length survey is given in Table 2-1.

Table 2-1 MCC and Queue Site Locations

Site Number	Junction Name	Junction Type	Queue Data	Date of survey
J1	Quy Interchange	Roundabout	Yes	15-02-2024
J2	Church Road / Newmarket Road	Signalised Junction	Yes	15-02-2024
59	Newmarket Road / Newmarket Road Park & Ride	Signalised Junction	No	13-06-2023
99	Newmarket Road / Airport Way	Roundabout	No	13-06-2023

ATC DATA

2.2.8. Classified ATC data in five-minute intervals from 07:00 - 19:00 in the month of June 2023 was collected by Intelligent Data Collection. No data loss was noted at any of the ATC sites during the survey period. A summary of the ATC survey is given in Table 2-2 and the locations are shown in Figure 2-2.

2.2.9. The average traffic count data corresponding to the neutral days in the month of June 2023 was used as an input to the model.

Table 2-2 ATC Survey Locations

Site Number	Location	Date of survey
8	At Newmarket Road - Between Quy Interchange and Church Road/ Newmarket Road	05-06-2023 to 18-06-2023
401	Newmarket Road - Between Quy Interchange and Newmarket Road / Airport Way roundabout	05-06-2023 to 18-06-2023

WebTRIS data

2.2.10. WebTRIS automatic traffic count data was extracted for the A14 off-slips and mainline at the Quy Interchange in the month of June 2023, therefore covering the same period as the 2023 MCC and ATC survey.

2.2.11. The data extracted for the A14 off-slips was observed to be inconsistent with the 2024 MCC and the video footage, hence this data has not been used for model calibration.

2.2.12. The average traffic corresponding to the neutral days in the month of June 2023 were used as the traffic input for the A14 mainline flows.

2.2.13. The location of the WebTRIS sites is shown in Figure 2-2 and is listed in Table 2-3.

Table 2-3 WebTRIS Survey Locations

Site Number	Location	Reference ID
1	A14 Mainline EB	6314/2
2	A14 Mainline WB	6313/2

JOURNEY TIME ROUTES

2.2.14. INRIX data from March to September 2023 has been used to calculate observed journey time data for thirteen routes spread across the model area. The INRIX journey time data was processed from Monday to Thursday excluding non-neutral days such as Bank Holidays and School Holidays.

2.2.15. The journey time partial routes are shown in Figure 2-3 and the journey time full routes are shown in Figure 2-4. The JT routes are listed in Table 2-4.Two journey time routes along the Newmarket Road have been used for validating the model.

2.2.16. The journey time for the full Newmarket Road eastbound route (R1_EB) has been taken as the sum of partial routes R1 E_1, R1 E_2 and R1 E_3. The journey time for the full Newmarket Road westbound route (R1_WB) has been taken as the sum of partial routes R1 W_1, R1 W_2 and R1 W_3.

2.2.17. Five journey time routes have been used to calibrate the gap acceptance parameters of the model as it covers the approaches to the junction.

Table 2-4 Journey Time Routes

Number	JT Route IDs	Route Description	Calibration/ Validation
1	R1_EB	Along Newmarket Road from Newmarket Road Park & Ride/Newmarket Road to A1303/Albert Road.	Validation
2	R1 E_1	Along Newmarket Road from Newmarket Road Park & Ride to Newmarket Road / Airport Way roundabout	Validation
3	R1 E_2	Along Newmarket Road from Newmarket Road / Airport Way roundabout to Quy Interchange.	Validation
4	R1 E_3	Along Newmarket Road from Quy Interchange to Albert Road / Newmarket Road junction.	Validation
5	R1_WB	Along Newmarket Road from Newmarket Road to A1303/Albert Road to Newmarket Road Park & Ride	Validation
6	R1 W_1	Along Newmarket Road from Albert Road / Newmarket Road junction to Quy Interchange	Validation
7	R1 W_2	Along Newmarket Road from Quy Interchange to Newmarket Road merge section	Validation
8	R1 W_3	Along Newmarket Road from Newmarket Road merge section to Newmarket Road / Airport Way roundabout	Validation

Number	JT Route IDs	Route Description	Calibration/ Validation
9	R2 N_1	Along Airport Way near Teversham C of E Primary School to Newmarket Road / Airport Way roundabout	Calibration
10	R4 S	From Church Road/ Newmarket Road to Stow Road/Main Street/Herring's Cl	Calibration
11	R3 E_Offslip	Along A14 West offslip	Calibration
12	R3 W_Offslip	Along A14 East offslip	Calibration
13	R4 N	From Stow Road/Main Street/Herring's Cl to Church Road/ Newmarket Road	Calibration

Figure 2-3 Journey Time for Partial Routes

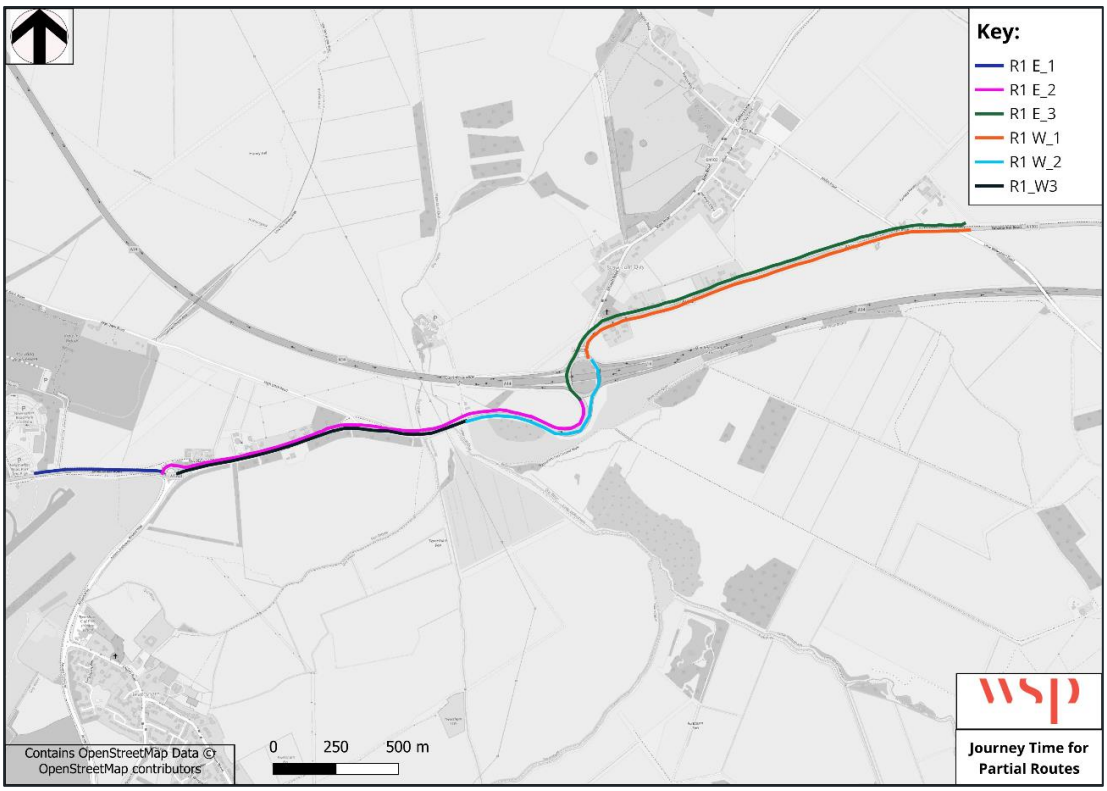
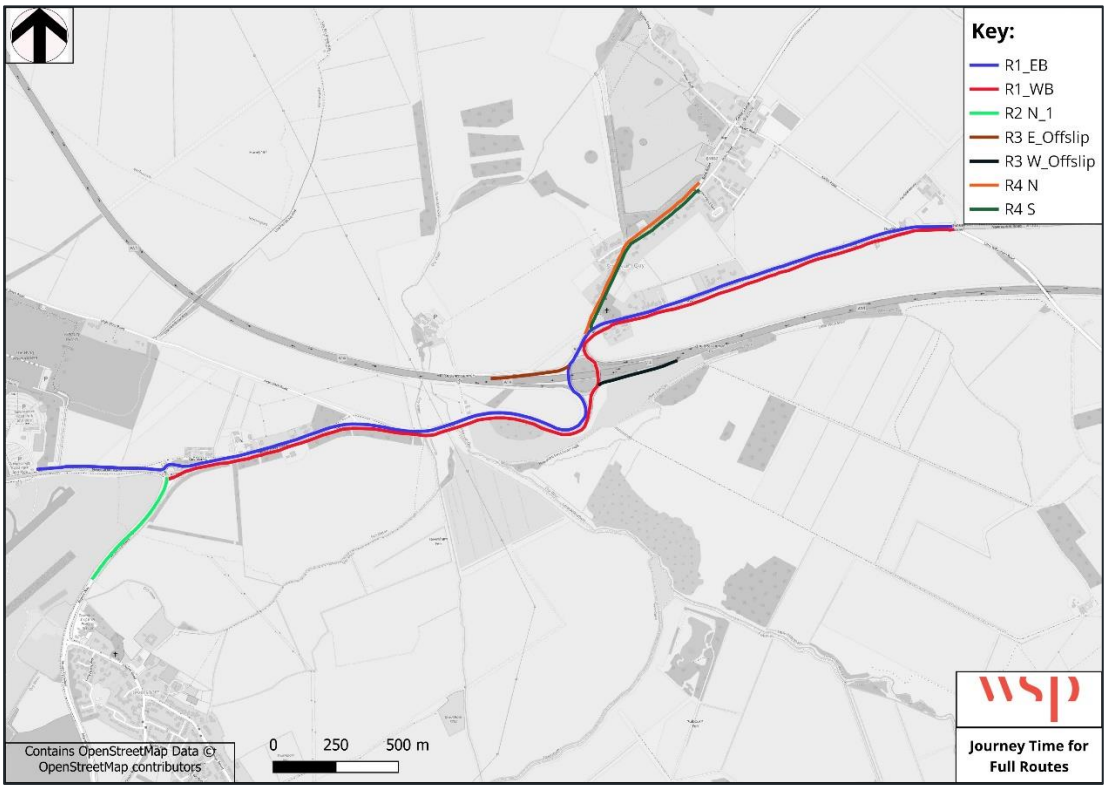


Figure 2-4 Journey Time for Full Routes



TOMTOM DATA

2.2.18. TomTom Origin and Destination analysis data from 18 April 2023 to 30 June 2023 for the period 7:00 – 10:00 and 16:00 – 19:00 has been used for the P&R demand calculation.

2.2.19. The data provides a select link analysis on the inbound link to the P&R, detailing the percentage of trips to the P&R by origin of the trip. This data has been used to distribute the traffic going into the P&R from the edges of the study area. This assessment assumes that the distribution of outbound trips is the same as the inbound trips (i.e. drivers to the P&R in the morning return to their origin in the evening).

PEAK HOUR CALCULATION

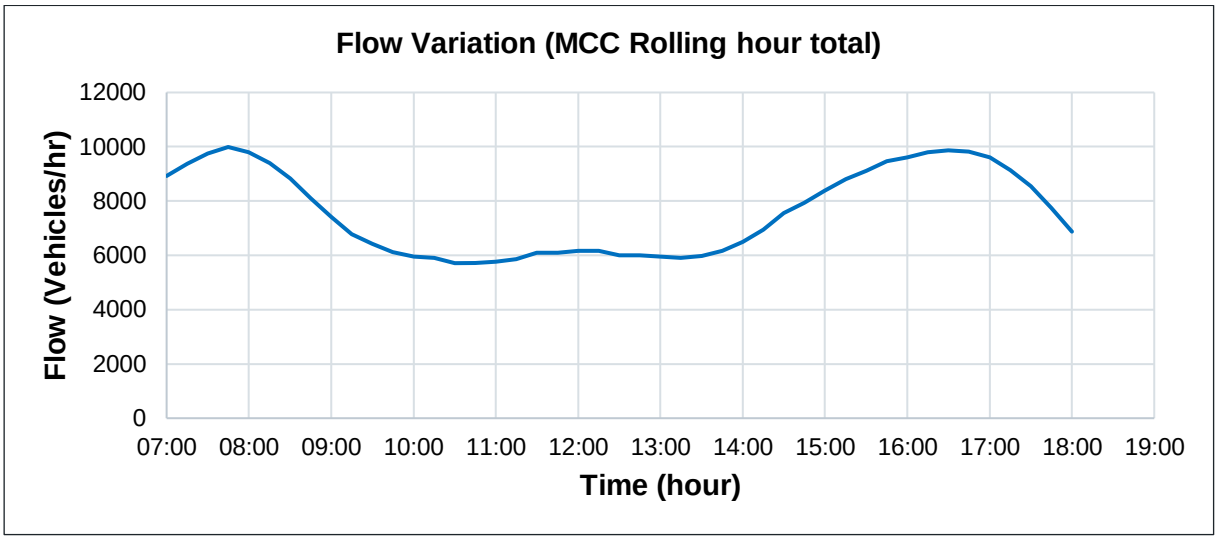
2.2.20. For the peak hour calculation, the following types of survey data were analysed:

- MCC data;
- ATC data; and
- INRIX data.

MCC Data

2.2.21. MCC data from 2023 and 2024 was used to calculate the rolling hour flows for all vehicles. A graph was plotted to capture the variation of flows with respect to the rolling hours and is shown in Figure 2-5.

Figure 2-5 MCC Flow Profile

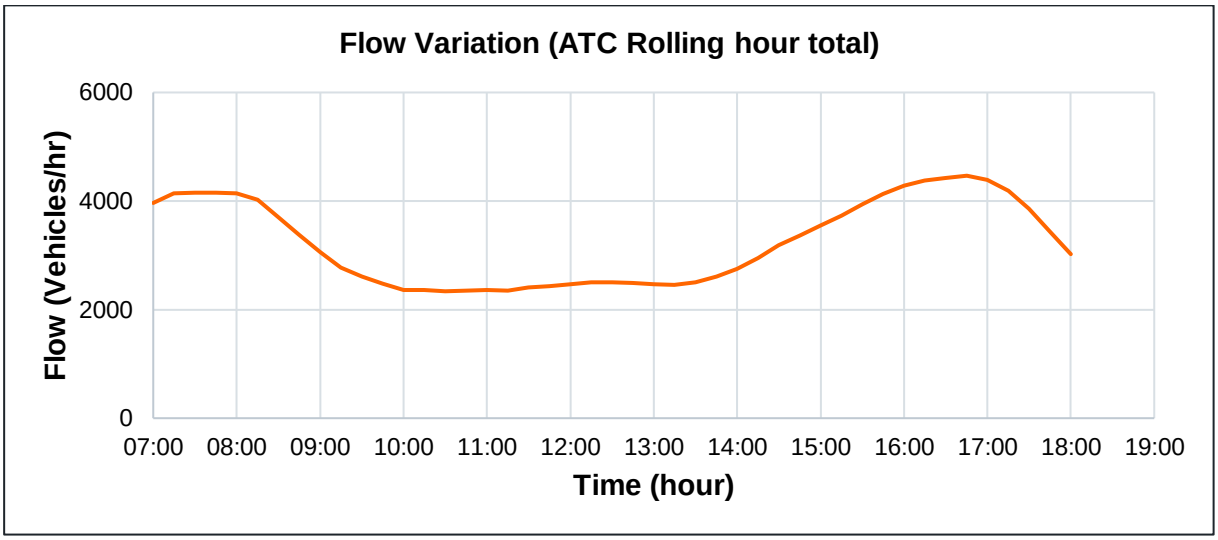


2.2.22. From the graph, it can be observed that the maximum flow occurred at 07:45 - 08:45 in the morning and 16:30 – 17:30 in the evening.

ATC Data

2.2.23. Rolling hour flows have been calculated using the two available ATC sites. The peak hour has been identified by plotting a flow variation graph with respect to the rolling hours.

Figure 2-6 ATC Flow Profile

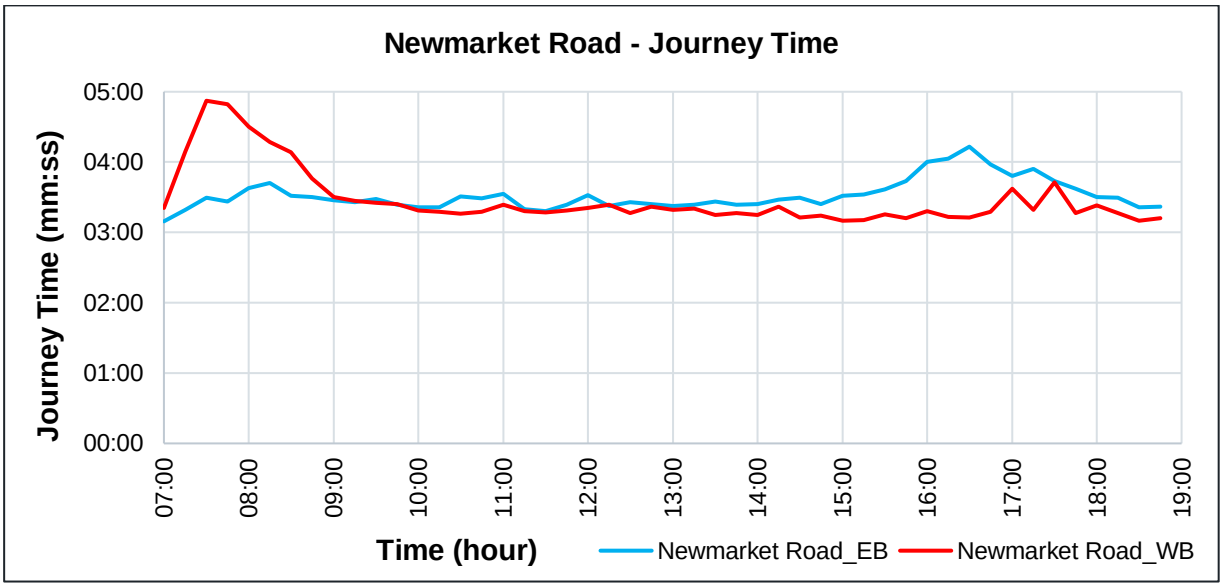


2.2.24. Figure 2-6 shows that the peak hour is 07:45 – 08:45 in the morning and 16:45 – 17:45 in the evening.

INRIX Data

2.2.25. INRIX data from March to September 2023 has been used to calculate the peak hour based on journey time along Newmarket Road in eastbound and westbound directions. Figure 2-7 shows the variation of journey time along Newmarket Road during the day. It can be observed that the peak journey time occurred at 07:30 – 08:30 in the morning and 16:45 – 17:45 in the evening.

Figure 2-7 Journey Time Profile along Newmarket Road



Peak Hour Summary

2.2.26. Based on the flow variation using MCC and ATC data, and based on the journey time conditions, the following peak hours have been identified as the model peak hours:

- Morning Peak Hour: 07:30 – 08:30; and
- Evening Peak Hour: 16:45 – 17:45.

2.2.27. Warm-up and cool-down periods were added to ensure there are vehicles in the whole network by the time the peak hour starts and allow for the vehicles to exit the network after the peak hour finishes. The modelled periods were initially set to 07:00 – 09:00 and 16:00 – 18:00 in the AM and PM respectively.

2.2.28. A review of the video footage along Newmarket Road and the A14 East off-slip was undertaken, and it could be observed that queuing would start at the Newmarket Road merge section from 06:30 in the morning. To replicate the same effect in the model, an extra 30-minute warmup was added in the AM period.

2.2.29. Since MCC survey data was not available between 06:30 to 07:00, 25% of the total demand from 07:00 - 09:00 was used as the warmup matrix for 06:30 – 07:00 demand.

2.2.30. The following period have been used in the model:

- Morning period: 06:30 – 9:00; and
- Evening period: 16:00 – 18:00.

2.3 TRAFFIC SIGNAL DATA

2.3.1. There is one signalised junction and one signalised pedestrian crossing located in the model area and these are summarised in Table 2-5.

Table 2-5 Signalised Junction and Pedestrian Crossing Locations

Site Number	Description	Type
1	Church Road/ Newmarket Road	Traffic signals
2	Pedestrian Crossing near St.Mary's Church, Quy	Signalised Pedestrian Crossing

2.3.2. The locations of the signalised junctions are shown in Figure 2-8.

Figure 2-8 Signalised Junctions and Pedestrian Crossings

2.3.3. Information on the operation of the junctions, including staging, intergreens, demand dependency and stage timings were taken from the 2017 Cambridge Paramics model.

2.4 BUS SERVICE DATA

2.4.1. Information regarding Bus schedules and routes in the study area was obtained from the website1. This data was collated for 27 February 2024 (Tuesday), on a typical non-Bank Holiday school day.

[1] *Bustimes.org*

2.4.2. The bus services were coded into the model and a summary of the frequencies are listed in Table 2-6.

Table 2-6 Bus Route and Frequency

Service	Route Description	Service Frequencies (number of services)	
		AM Period (7:00 - 9:00)	PM Period (16:00 - 18:00)
11_1	Drummer St Bus Station - The Guineas Bus Station	2	2
11_2	The Guineas Bus Station - Drummer St Bus Station	2	2
12_1	Drummer St Bus Station - The Guineas Bus Station	2	2
12_2	The Guineas Bus Station - Drummer St Bus Station	2	2

2.5 OTHER DATA SOURCES

2.5.1. The following additional data sources have been collected or obtained to support the model development:

- Digital Ordnance Survey (OS) mapping at Master Map level of detail (topographic line) was used;
- Google mapping (aerial and Streetview) has been used extensively through the model development;
- Posted speed limits within the model area;
- Lane usage and markings; and
- Observations of traffic signal operation.

2.6 SURVEY VIDEO FOOTAGE

2.6.1. The 2024 MCC surveys were undertaken using video cameras, and the footage from all of the cameras at all sites were supplied to WSP. This provides an additional data source in terms of additional insight into on-the-day conditions, vehicle behaviour and junction operation that cannot be gleaned from the tabulated survey counts. The video footage recorded on the 15 February 2024 were available at the following locations:

- A14 J35 Quy Interchange;
- Church Road/ Newmarket Road ; and
- Newmarket Road merge section.

3 MODEL DEVELOPMENT

3.1 SOFTWARE VERSION

3.1.1. The model was developed using Paramics Discovery version 26.0.3, with 20 randomly seeded runs used to produce the output statistics.

3.2 NETWORK CONSTRUCTION

3.2.1. The model network was constructed to match OS digital mapping tiles, which describes the physical features of the highway and the junction layouts, thereby allowing suitably accurate replication of kerb lines and on street stop/give way line positions. This ensures, for example, the vehicle paths through the network are appropriate and reflect the relative conflict between traffic streams at junctions. The OS mapping has been supplemented with aerial and street level imagery available from Google.

3.2.2. Permitted U-turns have been modelled at the Newmarket Road / Airport Way roundabout and Quy Interchange junctions for the morning and evening periods.

3.2.3. Further changes have been made as part of the model network calibration to better reflect the performance of the network as recorded through observed data and survey videos. These are described below.

3.3 ROAD HIERARCHY

3.3.1. Paramics Discovery allows users to classify links as *Major* or *Minor* links. A *Major* link is typically a signposted, main route. A *Minor* link is usually equivalent to minor routes that only drivers with a good knowledge of the local area would tend to use or use as an access route to a destination. This difference in the perception of costs between drivers is managed through *familiarity* with the network. This is an attribute for each vehicle in the model where *Unfamiliar* drivers perceive *Minor* links as twice the cost compared to *Familiar* drivers in routeing calculation.

3.3.2. Since there is no route choice in the model, the classification of *Major* and *Minor* links has no impact on the model operation.

3.4 LINK CATEGORIES

3.4.1. In addition to the *Major/Minor* classification, different link categories were created for different road speeds in the model area. Setting a link speed on a model link to match the posted speed limit does not mean vehicles will travel exactly at or never exceed this speed. Indeed, vehicle speeds along each link in the model vary depending on the assigned behavioural characteristics for each vehicle and current conditions the driver encounters.

3.4.2. These speed-based categories were then further disaggregated to reflect the:

- Place and function of different roads in the local hierarchy, reflected through *Major/Minor* Road classes and category cost factor changes; and
- Different levels of activity present along the modelled area: traffic calming measures and on-street parking, with different speed limits, for example.

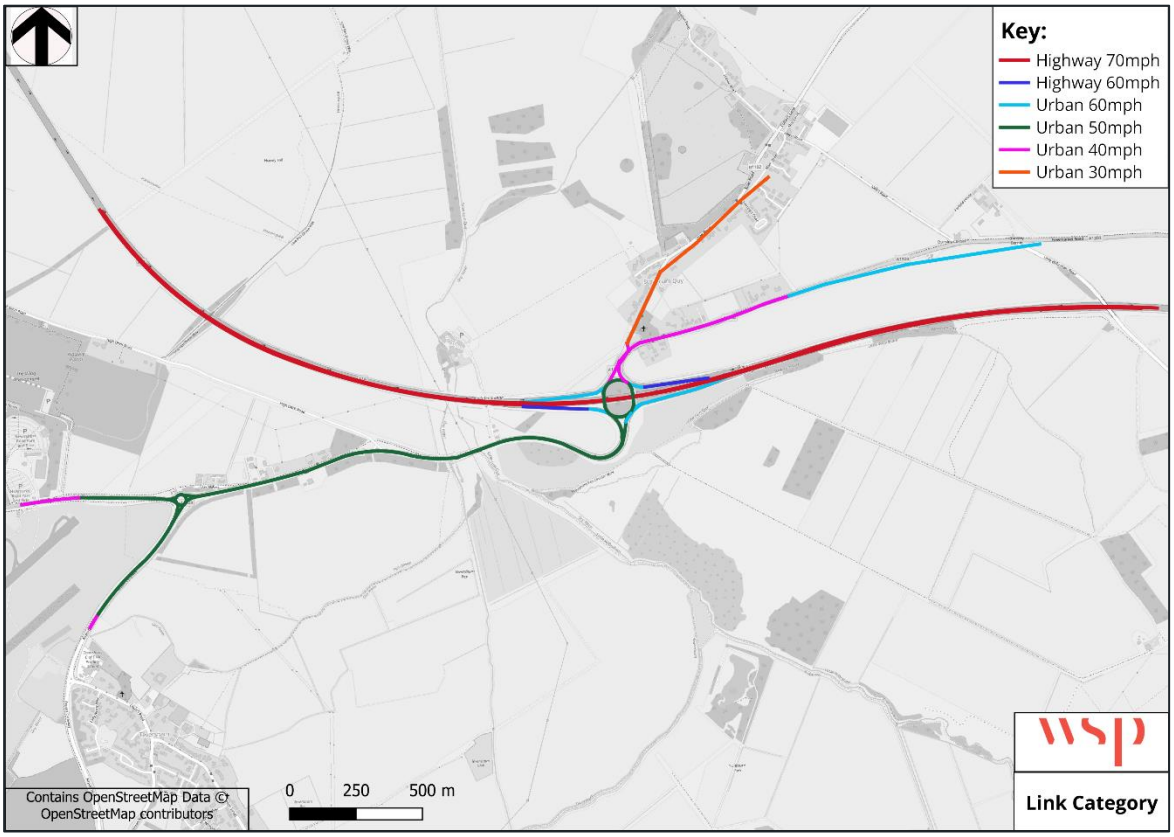
3.4.3. As stated in paragraph 3.3.1, the category level cost factors defined in Table 3-1 are perceived differently by *Familiar* and *Unfamiliar* type drivers and depending on whether they are applied to

Major or *Minor* links. The link categories used in the model are listed in Table 3-1 with their properties and illustrated in Figure 3-1.

Table 3-1 Link Categories

Category Name	Urban/ Highway	Major / Minor	Speed (mph)	Cost Factor
Highway 70mph	Highway	Major	70	1.00
Highway 60mph	Highway	Major	60	1.00
Urban 60mph Major	Urban	Major	60	1.00
Urban 50mph	Urban	Major	50	1.00
Urban 40mph	Urban	Major	40	1.00
Urban 30mph Major	Urban	Major	30	1.00

Figure 3-1 Link Categories



3.4.4. The link speed along Newmarket Road (EB) on the approach to the Newmarket Road / Airport Way roundabout has been reduced from 50mph to 40mph based on the observations of the free flow speed from the INRIX dataset.

3.4.5. The road type along the Newmarket Road merge section (Links – 679:82 and 82:680z) has been changed from “Urban” to “Highway” to replicate the merging behaviour of vehicles more accurately.

3.5 ROUTEING PARAMETERS

3.5.1. Generalised Cost Equation coefficients and dynamic assignment parameters have been disabled as there is no route choice in the network.

3.5.2. Familiarity and perturbation values, related to vehicles' varying perceptions of cost, are similarly unchanged.

3.6 SIGNAL CONTROLLED JUNCTIONS

3.6.1. There is a single signal-controlled junction in the study area, as detailed in Section 2.3. Information about the operation of the junction, including staging, intergreens, demand dependency and stage timings for Church Road/ Newmarket Road was taken from the original city-wide Cambridge Paramics Model which was coded as a fixed signal. This means a consistent stage sequence and signal timings are applied for the morning and evening modelled periods.

3.6.2. The initial signal timings were reviewed based on observed flows, queues and the video footage to calibrate and validate the model. In all cases the resulting timings were sense checked for minimum green times and representative cycle times to confirm a realistic set of timings have been set.

3.6.3. The fixed time approach to signal staging and timings will be reviewed with each future application and update of the model to ensure it remains an appropriate strategy with any changes in network or demand.

PEDESTRIAN CROSSING

3.6.4. There is a single signal-controlled pedestrian crossing present in the study area, as detailed in Section 2.3. The frequency and green time for the pedestrian stage has been assumed based on local knowledge as the pedestrian survey data was not available.

3.6.5. The signal timing for the pedestrian crossing used in the model is given in the Table 3-2. These pedestrian crossings have been coded using pedestrian crossing function in Paramics.

Table 3-2 Signal Timing for the Pedestrian Crossings

Site Reference	Pedestrian Crossing	Frequencies (seconds)	
		AM Period	PM Period
1	Pedestrian Crossing near St.Mary's Church ,Quy	8s - 10s for every 180s - 240s	8s - 10s for every 180s - 200s

3.7 JUNCTION SPECIFIC PARAMETER MODIFICATION

3.7.1. During the process of model calibration, junction specific parameters have been adjusted as necessary to achieve a satisfactory reflection of local driver behaviour to match observed conditions insofar as is possible. Observed queues, journey times and the video footage have been used in this process. Parameters that have been adjusted are listed below.

GAP ACCEPTANCE

3.7.2. Gap acceptance refers to the size of gap that vehicles at priority-controlled junctions will allow to pull out. There are three gap acceptance parameters for each link: lane cross, lane merge and path cross. These parameters have been changed at locations listed in Table 3-3 to improve calibration by replicating observed throughput and reflecting more aggressive behaviour in congested conditions.

Table 3-3 Gap Acceptance Parameters

Junction	Arm	Link	Gap Acceptance Parameters		
			Lane Merge	Lane Cross	Path Cross
Newmarket Road / Airport Way roundabout	Newmarket Road (West)	1572y:1573	6	6	5
	Airport Way	1567:1577z	3	3	2
	Newmarket Road (East)	1568:1575	5	5	4
A14 J35 Quy Interchange	Newmarket Road (South)	629:627	3	3	3

VISIBILITY

3.7.3. Visibility refers to how far back from the give way line a vehicle can see the vehicles on the major road. Link visibilities have been defined at priority conflicts (i.e. priority junctions, opposed turns at traffic signals and priority-controlled approaches to roundabouts).

3.7.4. To simplify and ensure consistency in the setting of visibility values, a set of values ranging from 5m to 30m has been adopted in the model. The visibility value of priority conflicts has been derived based on professional judgement using observations from the site visit and Google Streetview imagery.

3.7.5. Visibility has been applied to the merge section in the Newmarket Road (Link 82:680z), south of Quy Interchange in order to capture the merging behaviour of vehicles. The visibility parameter has been calibrated by comparing against the behaviour of vehicles in the video footage.

FLAGS AND MODIFIERS

3.7.6. The gap acceptance look-through flag has been applied to short links, wherever it is appropriate.

3.7.7. Next lanes can be applied between the end (wait) lane points and the start (merge) lane points on the next link to ensure lane discipline. Next lanes have been applied on the circulatory of the Quy Interchange, Newmarket Road / Airport Way roundabout and along other certain links to achieve lane discipline.

3.7.8. Clear exit adherence is a parameter used to replicate a “yellow box” behaviour at a signalised junction. It represents the percentage of vehicles that would wait at the stop line when the section downstream is occupied by slow moving or stopped vehicles.

3.8 HAZARDS AND HAZARDS OVERRIDES

3.8.1. Hazards and hazards overrides have been used in the model to improve the behaviour of the vehicles as they travel through the network.

3.8.2. Signposting distance is a node parameter that determines how far upstream a vehicle becomes aware of the hazard. This distance is set by default at 250 metres for Urban road and 750 metres for Highways.

3.8.3. The signpost distance at the node 680z has been changed to 39m to capture the behaviour of merging in Newmarket Road (Link 82:680z), south of the Quy Interchange.

3.8.4. Hazard overrides are used to specify the lane choice when the default hazards are not applicable.

3.9 LINK SPECIFIC PARAMETER MODIFICATION

HEADWAY FACTORS

3.9.1. The Mean headway represents the time between vehicles travelling in the network. Headway factors have been changed for certain links as a part of calibration of the model. Headway factors for the links listed in Table 3-4 have been increased from 1 to 1.5 to improve calibration by replicating observed situations from the video footage.

Table 3-4 Headway factor

Junction	Arm	Link	Headway Factor
Newmarket Road / Airport Way roundabout	Newmarket Road (West)	1572y:1573	1.5
Church Road/ Newmarket Road	Church Road	81:1869, 1869:677	1.5
Newmarket Road merge section		680z:83, 83:1571z, 1571z:1572	1.5

VEHICLE RESTRICTIONS

3.9.2. A P&R lane restriction has been applied along the offside lane from the exit of Newmarket Road / Airport Way roundabout to the P&R junction to allow the vehicles going to the P&R.

3.10 PUBLIC TRANSPORT SERVICES AND STOPS

3.10.1. Bus services corresponding to routes shown in Table 2-6 have been included in the model. These have been modelled to begin their journeys at the first point they enter the modelled network, scheduled according to published weekday timetables, and specified to run along published routes.

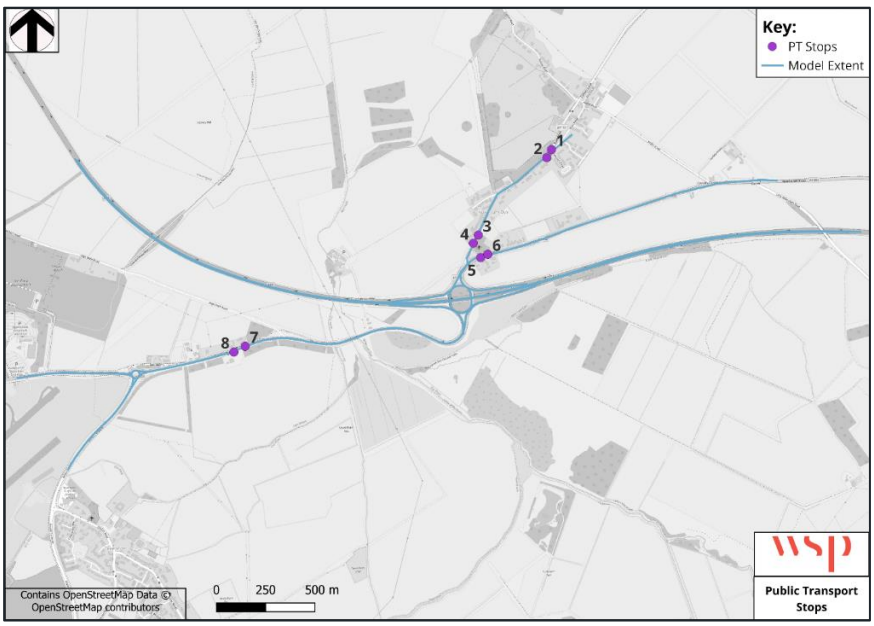
3.10.2. Public transport stops have been coded into the model as on-street bus stops and lay-by bus stops based on satellite imagery. The summary of bus stops serving the model area is listed in Table 3-5 and shown in Figure 3-2.

Table 3-5 List of Bus stops in the Model Area

ID	PT Stop
1	Herring's Close NB
2	Herring's Close SB
3	St. Mary's Church SB
4	St. Mary's Church NB
5	Church Farm WB
6	Church Farm EB
7	High Ditch Road EB
8	High Ditch Road WB

3.10.3. A dwell time of 10 to 15 seconds has been used for all bus stops in the model. Although it is acknowledged that buses may stop for longer or shorter times, depending on how many passengers are boarding and alighting at each stop, and may have a different stopping pattern depending on the prevailing demand at different times of the day, this simplified pattern is deemed appropriate to model the total delay along each bus route and impact on traffic flow surrounding bus stops.

Figure 3-2 Public Transport Stops



4 DEMAND MATRIX DEVELOPMENT

4.1 DEMAND MATRIX DIMENSIONS

4.1.1. Seven zones have been coded in the model and connected to links at the edge of the model. The zones used in the base model are listed in Table 4-1 and illustrated in Figure 4-1. Even though zones 6 and 7 are both connected to the same link, the demand has been split between P&R and non-P&R demand to simplify the P&R zone development in the forecast assessment scenarios.

Table 4-1 Model zones

Zone Number	Zone Name
1	A14 West
2	Church Road
3	Newmarket Road East
4	A14 East
5	Airport Way
6	Newmarket Road West
7	Newmarket Road Park & Ride

Figure 4-1 Zoning System

4.1.2. The following two weekday time periods have been defined, with a warm-up and cool down period so that the traffic is present on the network before the start of the modelled period:

- Morning period: 06:30 – 9:00; and
- Evening period: 16:00 – 18:00.

4.1.3. The peak hour of the model are as follows:

- Morning peak: 07:30 – 08:30; and
- Evening peak: 16:45 – 17:45.

4.1.4. Demand matrices were developed for the full two-hour morning and evening periods using the available MCC, ATC data and WebTRIS data.

4.1.5. A 30-minute extra warmup in the morning has been added to allow the vehicles to create the level of queuing observed in the video footage along the merge section near the Quy Interchange.

4.1.6. The extra 30-minute AM warmup matrix has been taken as 25% of the demand matrix of 7:00 – 9:00 due to the lack of survey data.

4.2 VEHICLE TYPE DEMAND MATRICES

4.2.1. Four separate demand matrices have been developed for the morning and for the evening modelled periods so that the variation in distribution between vehicle types can be modelled. The three demand matrices for each period correspond to Car, LGV, HGV and P&R vehicles.

4.2.2. The proportion of OGV1 and OGV2 vehicle types in the HGV matrix have been taken from the MCC survey data for the morning and evening periods. The proportions are presented in Table 4-2.

Table 4-2 Vehicle Proportions

Matrix Level	Vehicle Type	Morning Period	Evening Period
Heavy	OGV1	56.3%	54.5%
	OGV2	43.7%	45.5%

PUBLIC TRANSPORT

4.2.3. Service buses have been modelled with available bus schedule information using the PT routes feature in Paramics Discovery along their respective routes provided by the service providers. Service buses were represented with the following vehicle types:

- Single decker bus;
- Double decker bus; and
- Coach.

4.3 DEMAND MATRIX DEVELOPMENT

4.3.1. The matrix development process has used the MCC and ATC survey data as the basis on which trips from each zone were calculated to reflect the 2023 traffic conditions. Further details of these traffic surveys are provided in Section 2.2.

4.3.2. A traffic flow diagram has been developed for the model network, summarising the turn and link flows available at each survey site. Appendix A shows the traffic flow diagram of all vehicles during the peak hours.

4.3.3. The traffic flow diagram was developed for the two-hour morning and evening periods, for Car, LGV, P&R and heavy vehicles (OGV1 and OGV2).

4.3.4. For the Quy Interchange and Newmarket Road / Church Road junction, MCC data was available for 2024. The 2023 ATC survey data flows have been proportioned based on the 2024 MCC split to calculate the zone totals for zones 2 and 3.

4.3.5. The 2023 ATC flows along Newmarket Road, north and south of the Quy Interchange were used to adjust the 2024 MCC flows from the off-slip.

4.3.6. Each of the turning movements were then manually balanced between adjacent junctions. An Origin-Destination (O-D) matrix was then formed based on the origin totals with the destination zone synthesized based on professional judgement and the proportion of turning movements at each junction.

4.3.7. The P&R demand has been added as a separate matrix to accommodate the demand change in the option models. MCC survey data conducted on the 13 June 2023 has been used to determine the P&R trip attraction and the TomTom origin-destination select link data has been used to calculate the trip distribution for the P&R zone. Table 4-3 shows the number of cars coming in and going out of the P&R during the AM and PM period.

Table 4-3 P&R Demand

MCC P&R (Base trips From/To P&R)	Newmarket Road East		Newmarket Road West	
	AM Period	PM Period	AM Period	PM Period
Zone 7 Origin /Out P&R	16	218	10	65
Zone 7 Destination /In P&R	202	75	34	46

4.3.8. The demand from/to Newmarket Road West has not been added in the Base model, as these trips fall outside of the model extent.

4.3.9. TomTom select link analysis has been used to identify the proportional split of trips going to the P&R from the eastern and western approach of Newmarket Road. Table 4-4 shows the percentage trips obtained from TomTom select link analysis during the morning and evening peaks.

4.3.10. Since the trips from/to Newmarket Road West are not included in the base model, the TomTom distribution percentage has been adjusted by excluding these trips. Table 4-4 shows the proportional split used for the P&R demand calculation for the AM and PM periods.

Table 4-4 TomTom Proportional split for P&R

Paramics Zone	Location	AM Peak		PM Peak	
		Percentage Trips (%)	Adjusted Percentage Trips (%)	Percentage Trips (%)	Adjusted Percentage Trips (%)
1	A14 West	15	19	12	39
2	Church Road	6	8	1	3
3	Newmarket Road East	2	3	2	6
4	A14 East	40	51	4	13
5	Airport Way	15	19	12	39
6	Newmarket Road West	14	0	63	0
7	Park & Ride	0	0	0	0

PROFILE DEVELOPMENT

4.3.11. The vehicle release profiles for the model have been generated from fifteen-minute interval traffic count data of vehicles entering the model area to provide a traffic demand from each zone.

4.3.12. Twenty-six vehicle profiles have been developed for each of the matrix for the morning and evening time periods, one for each zone (excluding U-turn zones).

4.3.13. For zones 1 and 4, for which survey data was not available, WebTRIS data has been used to create the profile development for the following vehicular movement:

- Zone 1 – Zone 4; and
- Zone 4 – Zone 1.

5 MODEL CALIBRATION AND VALIDATION

5.1 MODEL RUNS

5.1.1. The model was run for the morning period (06:30 – 9:00) and evening period (16:00 – 18:00), which includes the peak hour as well as the warm-up and cool down periods.

5.1.2. Paramics Discovery is a stochastic microsimulation package in which individual model runs will generate different results. This is due to random seeding of the model to produce differences between each run to simulate the daily variation seen in the real-world operation of the road network. Multiple runs of the model are therefore required, with the result being the average of some measure across these runs.

5.1.3. The average of 20 randomly seeded model runs has been used to generate the modelled data used in the calibration processes. This ensures that the volume of data and analyses required is manageable, whilst ensuring that the data reflects variation in the model runs. The variance of the results, based on network wide statistics, between runs has been checked to ensure there are no outliers caused by a typical model run.

5.2 CALIBRATION STEPS

5.2.1. Calibration of the model network and demand matrices has been carried out in an iterative loop to test whether the model provides a satisfactory representation of the observed traffic data, and where it does not the model network and demand matrices have been adjusted and the model re-run.

5.2.2. The calibration process includes all work undertaken on either the network or the demand matrices to achieve a satisfactory representation of traffic flows and operational conditions in the base model, in so doing matching on the ground, observed conditions. Even though these processes are regarded as separate and have been discussed separately in preceding sections, both were carried out simultaneously as part of the model calibration and fine-tuning.

5.2.3. This section details the data used for this process, the guidelines followed, and the calibration results achieved.

5.3 DATA USED

5.3.1. Calibration and validation of the base year model has been carried out using the following surveyed data:

- MCC data from four junctions has been used as calibration counts and two ATC count sites data has been used as validation counts in the study area;
- Journey times for 7 routes; out of which 5 routes are used for calibration and 2 routes for validation (2 full routes split into 3 subsections each); and
- Queue length data at two junctions and the Newmarket Road merge section has been used for calibration.

5.3.2. The locations of the MCCs is shown in Figure 2-2, the queue length surveys are listed in Table 2-1 and journey time routes shown in Table 2-4.

5.4 TRAFFIC FLOW CALIBRATION GUIDELINES

5.4.1. Model calibration has been carried out in accordance with the acceptability guidelines specified in *Transport Analysis Guidance* (*TAG*) *Unit M3-1 Highway Assignment Modelling (May 2020)*. These guidelines are summarised in Table 5-1.

Table 5-1 TAG Calibration Acceptability Guidelines

Criteria and Measures	Acceptability Guideline
Individual flows within 100 veh/h for flows less than 700 veh/h	> 85% of cases
Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	
Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	
GEH < 5 for individual flows	> 85% of cases

5.5 TURN COUNT CALIBRATION / LINK COUNT VALIDATION

5.5.1. A summary of the turning count calibration results against the individual flow criteria is given in Table 5-2 for the peak hour. Table 5-3 shows the link count validation against the individual flow criteria.

Table 5-2 Peak Hour Turning Flow Calibration

Criterion	*TAG* Criteria Satisfied ?	AM Peak Hour 08:00 – 09:00			PM Peak Hour 17:00 – 18:00		
		Count	No. Pass	Percentage	Count	No. Pass	Percentage
Individual flows within 100 veh/h for flows < 700 veh/h	✓	24	24	100.0%	25	25	100.0%
Individual flows within 15% for flows 700 to 2,700 veh/h	✓	5	5	100.0%	4	4	100.0%
Individual flows within 400 veh/h for flows > 2,700 veh/h	✓	0	0	-	0	0	-
Total counts satisfying *TAG* guidelines		29	29	100.0%	29	29	100.0%

Table 5-3 Peak Hour Link Flow Validation

Criterion	*TAG* Criteria Satisfied?	AM Peak Hour 07:00 – 10:00			PM Peak Hour 16:00 – 19:00		
		Count	No. Pass	Percentage	Count	No. Pass	Percentage
Individual flows within 100 veh/h for flows < 700 veh/h	✓	1	1	100.0%	0	0	-
Individual flows within 15% for flows 700 to 2,700 veh/h	✓	3	3	100.0%	4	4	100.0%
Individual flows within 400 veh/h for flows > 2,700 veh/h	✓	0	0	-	0	0	-
Total counts satisfying *TAG* guidelines		4	4	100.0%	4	4	100.0%

5.5.2. Table 5-2 shows that flows during the AM and PM peaks both pass the WebTAG criteria with overall pass rate of 100%. This pass rate provides confidence that the turning movements in the model closely match the observed ones.

5.5.3. ATC data from two count sites has been used for validating the flows and from Table 5-3 both AM and PM peak hour has 100% pass rate.

5.5.4. WebTAG specifies that 85% of modelled movements should obtain a GEH score of less than 5 when compared to observed values. A GEH value of 0 represents a perfect fit, a value up to and including 5 reflects a good fit, a value between 5 and 10 represents an acceptable fit, and values over 10 represent a poor fit.

5.5.5. Table 5-4 presents a summary of the peak hour observed count calibration results against the criterion using the GEH statistic.

Table 5-4 Peak Hour GEH Calibration Summary (AM and PM Peak Hours)

Matrix	Vehicle type	Count	No. Pass	Count Percentage within 5 GEH	Count	No. Pass	Count Percentage within 10 GEH
AM	CAR	29	29	100%	29	29	100%
	LGV	29	29	100%	29	29	100%
	HGV	29	29	100%	29	29	100%

Matrix	Vehicle type	Count	No. Pass	Count Percentage within 5 GEH	Count	No. Pass	Count Percentage within 10 GEH
PM	CAR	29	29	100%	29	29	100%
	LGV	29	29	100%	29	29	100%
	HGV	29	29	100%	29	29	100%

5.5.6. In both the morning and evening periods the turn calibration results show that over 100% of turns fall within a GEH of five for each time period. This suggests that there is a close correlation between the observed and modelled flows in each time period.

5.5.7. Table 5-5 presents a summary of the ATC link count validation results against the criterion using the GEH statistic.

Table 5-5 ATC Peak hour GEH Validation Summary (AM and PM Peak Hours)

Matrix	Vehicle type	Count	No. Pass	Count Percentage within 5 GEH	No. Pass	Count Percentage within 10 GEH
AM	CAR	4	4	100%	4	100%
	LGV	4	4	100%	4	100%
	HGV	4	4	100%	4	100%
PM	CAR	4	4	100%	4	100%
	LGV	4	4	100%	4	100%
	HGV	4	4	100%	4	100%

5.5.8. Tables presenting calibration and validation comparisons between the peak hour, individual modelled hours and period observed and modelled counts for every observed movement are presented in Appendix B.

5.6 JOURNEY TIME CALIBRATION / VALIDATION

5.6.1. The guidelines in *TAG* have been used to indicate the degree of calibration of the model in respect of travel time, which require that modelled times along routes should be within 15% of surveyed times *(or one minute, if higher than 15%)*.

5.6.2. In general journey time is used for validating the model, but due to lack of 2023 queue data, five journey time routes have been taken for calibrating the gap acceptance parameters for junction approaches and two full routes along Newmarket Road have been considered for validating the model.

5.6.3. Table 5-6 and Table 5-7 summarises the results of the calibration assessment for the AM peak hour and PM peak hour. The observed and modelled journey times are presented along with an indication whether the criterion is met.

Table 5-6 AM Peak hour Journey Time Calibration Summary

Route	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Difference (%)	WebTAG Satisfied?	Calibration/ Validation
R2 N_1	00:34	01:08	00:34	100.2%	*x*	Calibration
R4 N	00:57	00:52	-00:05	-8.5%	✓	Calibration
R4 S	01:24	01:23	-00:01	-0.8%	✓	Calibration
R3 E_Offslip	00:23	00:27	00:05	20.5%	*x*	Calibration
R3 W_Offslip	00:24	00:58	00:34	141.4%	*x*	Calibration

Table 5-7 PM Peak Hour Journey Time Calibration Summary

Route	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Difference (%)	WebTAG Satisfied ?	Calibration/ Validation
R2 N_1	00:36	01:06	00:30	84.8%	*x*	Calibration
R4 N	01:03	00:53	00:10	-15.9%	*x*	Calibration
R4 S	01:16	01:17	00:01	1.0%	✓	Calibration
R3 E_Offslip	00:25	01:06	00:41	167.4%	*x*	Calibration
R3 W_Offslip	00:16	00:10	00:06	-37.9%	*x*	Calibration

5.6.4. Out of the five journey time routes considered for calibration, two routes have modelled journey time well within the observed journey time and thus satisfy the WebTAG criteria in the AM peak hour and one route in the PM peak hour.

5.6.5. Regarding the journey time route A14 East off-slip (R3 W_Offslip) and A14 West off-slip (R3 E_Offslip) it is difficult to match the observed time due to the unequal lane usage at the off-slip, where vehicles on one lane go much faster than the others. This results in a large range of times, and since INRIX only captures a small sample size, this observed data might be skewed.

Table 5-8 AM Peak Hour Journey Time Validation Summary

Route	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Difference (%)	WebTAG Satisfied?	Calibration/ Validation
R1_EB	04:29	04:05	-00:24	-9.0%	✓	Validation
R1_WB	05:59	06:03	00:04	1.1%	✓	Validation

Table 5-9 PM Peak Hour Journey Time Validation Summary

Route	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Difference (%)	WebTAG Satisfied?	Calibration/ Validation
R1_EB	04:49	04:10	00:39	-13.6%	✓	Validation
R1_WB	03:28	03:21	00:07	-3.3%	✓	Validation

5.6.6. From Table 5-8 and Table 5-9, it can be observed that the modelled journey time on all the routes is well within the observed journey time and thus satisfy the WebTAG criteria for validation.

5.6.7. Thus, the assessment of journey time validation suggests that the model can be considered fit for purpose and is suitable for option testing.

5.6.8. Appendix C contains journey time route graphs of modelled and observed journey times.

5.7 QUEUE LENGTH CALIBRATION

5.7.1. When observing a junction in a real-world situation, the queue will fluctuate both throughout the period being observed and from day to day. The modelled queues are therefore never expected or required to exactly replicate the observed queues. Recording observed queues is also usually based in some way on subjective judgements by a human observer, which also vary. On top of this, queues have been collected for a single day in 2024 in a location with significant variability in traffic conditions.

5.7.2. Undertaking a queue length comparison is nevertheless important in ensuring that the overall observed conditions are being represented satisfactorily. Although *TAG* provides no guidelines for comparing observed and modelled queue lengths, industry standard practice over recent years has been to compare the modelled queue to the observed in terms of magnitude, or maximum length, and profile across the period.

5.7.3. Queue length data was available for two junctions namely the Quy Interchange and Church Road/ Newmarket Road and along the Newmarket Road exit merge section. The observed queue length was compared against modelled queues at all these locations. Most of the queue routes compared reasonably well against the observed queue data.

5.7.4. Queue graphs comparing observed queue against modelled queues for the AM and PM peaks are included in Appendix D.

6 SUMMARY

6.1.1. WSP have been commissioned by Greater Cambridge Partnership (GCP) to develop a Paramics Discovery model along the Newmarket Road between Airport Way and east of Church Road to assess the potential highway impact of the Park and Ride (P&R) scheme options at sites P1, P10 and P11.

6.1.2. This LMVR has been produced to provide information relating to the development and calibration/validation of the Cambridge Eastern Access Park and Ride (CEA P&R) Paramics model. The model area covers the Newmarket Road corridor between the junction of Newmarket Road / Airport Way roundabout in the west, Quy Interchange and Newmarket Road / Church Road junction in the northeast.

6.1.3. The model has been built in Paramics Discovery version 26.0.3 and run for twenty random seeds to collect the outputs. The network has been developed using OS digital mapping tiles to reflect the physical features of the model area. More detailed model coding has been undertaken throughout the model network calibration.

6.1.4. Demand matrices for the model have been developed for a June 2023 neutral period using MCC and ATC survey data. Due to the different periods covered by the survey data, turning movements were manually balanced between adjacent junctions and an O-D matrix was formed based on the origin totals with the destination zone synthesized based on professional judgement and the proportion of turning movements at each junction. The P&R demand has been added as a separate matrix, where the trip ends have been obtained from the MCC and the trip distribution has been taken from the TomTom select link analysis.

6.1.5. The traffic flow calibration showed that 100% of turns have a GEH less than five for both AM and PM peak hours, hence meeting the TAG criterion using the GEH statistic. The link flow validation criteria is met with 100% of ATC data meeting the individual flow criteria in the morning peak and 100% in the evening peak.

6.1.6. The journey time validation showed journey times along Newmarket Road are within 15% of observed times and hence meet TAG journey time criteria.

6.1.7. The queue length calibration shows that the majority of queues show a good correlation between observed and modelled queues, with modelled queues reaching a similar magnitude as the observed ones.

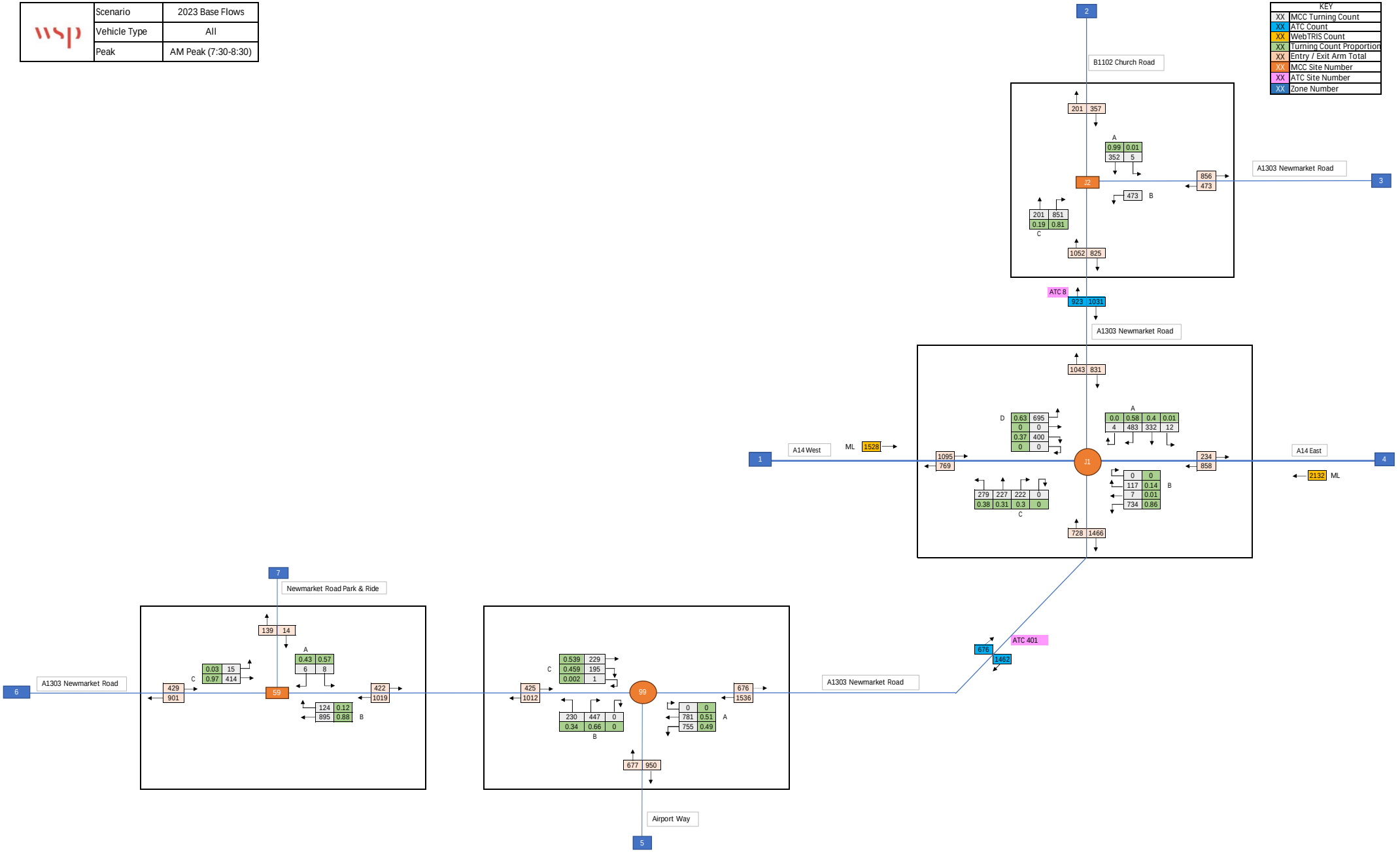
6.1.8. Overall, the model is well validated against the observed data and can be considered fit for the purpose of assessing the future P&R location options.

Appendix A

TRAFFIC FLOW DIAGRAM

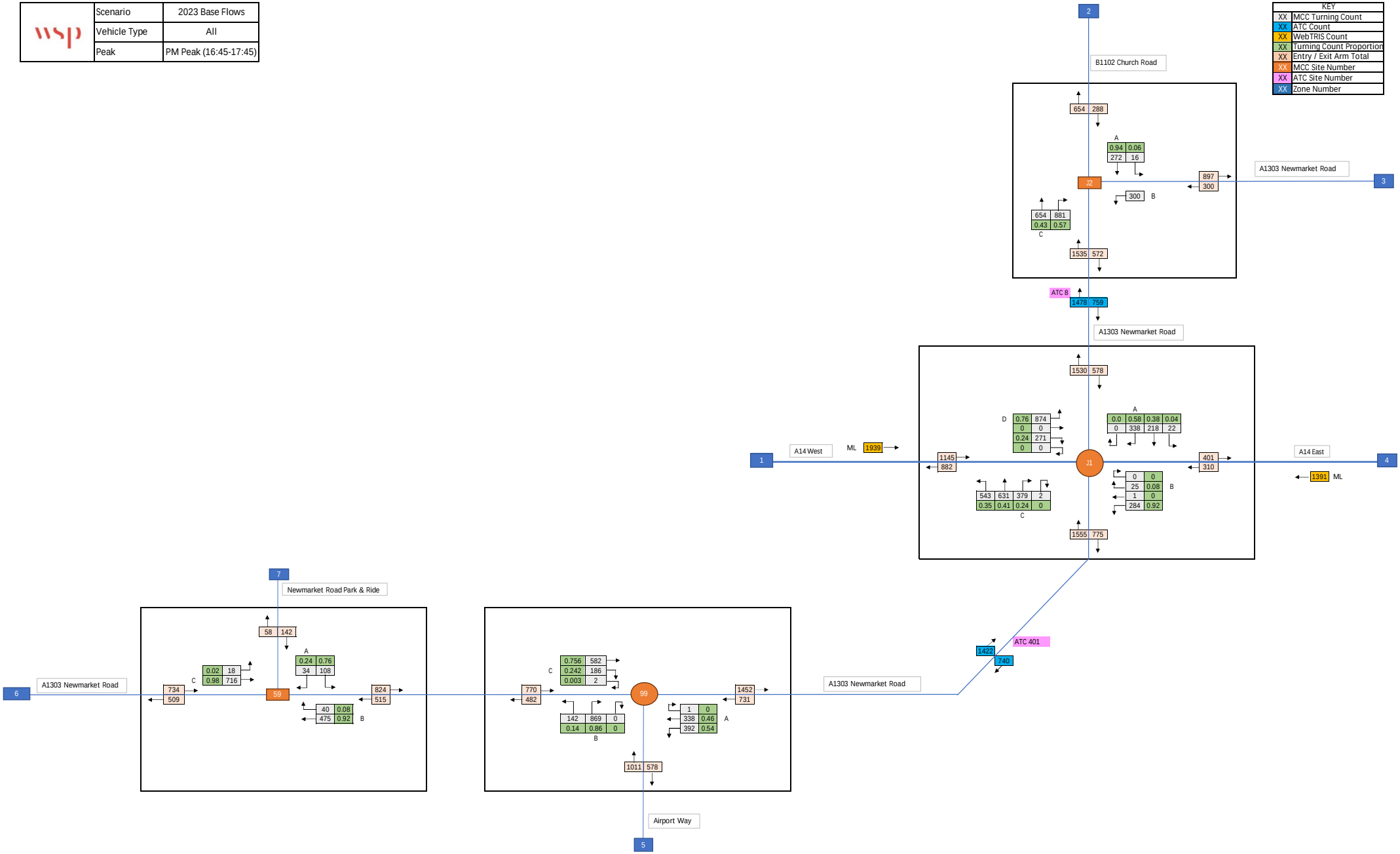
wsp	Scenario	2023 Base Flows
	Vehicle Type	All
	Peak	AM Peak (7:30-8:30)

KEY	
XX	MCC Turning Count
XX	ATC Count
XX	WebTRIS Count
XX	Turning Count Proportion
XX	Entry / Exit Arm Total
XX	MCC Site Number
XX	ATC Site Number
XX	Zone Number



wsp	Scenario	2023 Base Flows
	Vehicle Type	All
	Peak	PM Peak (16:45-17:45)

KEY	
XX	MCC Turning Count
XX	ATC Count
XX	WebTRIS Count
XX	Turning Count Proportion
XX	Entry / Exit Arm Total
XX	MCC Site Number
XX	ATC Site Number
XX	Zone Number



Appendix B

FLOW CALIBRATION AND VALIDATION RESULTS

Vehicle Flow Information
Calibration Statistics
Car Vehicles
AM Period

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::1568	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::1567	1237	1253	16	1.3%	0.3	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	568::1575::1577::1572	1267	1287	20	1.6%	0.4	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	567::1577z::1574::156	674	661	-13	-1.9%	0.4	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::1572	373	362	-11	-2.8%	0.4	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	572y::1573::1574::156	367	362	-5	-1.3%	0.2	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	572y::1573::1576::156	271	271	0	0.1%	0.0	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	572y::1573::1577::1572	1	0	-1	-100.0%	1.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	7	8	1	15.0%	0.3	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	810	811	1	0.1%	0.0	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	930	886	-44	-4.8%	1.0	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	266	258	-8	-2.9%	0.3	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	1027	994	-33	-3.2%	0.7	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	15	15	0	0.5%	0.0	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	815	792	-23	-2.8%	0.6	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	903	888	-15	-1.7%	0.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	7	0	-7	-100.0%	2.6	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	1167	1207	40	3.4%	0.8	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	7	0	-7	-100.0%	2.6	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	114	114	0	-0.4%	0.0	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	405	401	-4	-1.0%	0.1	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	315	304	-12	-3.7%	0.5	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	321	304	-17	-5.2%	0.7	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	862	845	-18	-2.0%	0.4	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	621	616	-6	-0.9%	0.2	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	1609	1647	38	2.4%	0.7	Pass Mid
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	637	637	0	0.0%	0.0	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	15029	14922	-106	-0.7%	0.5

Vehicle Flow Information
Validation Statistics
Car Vehicles
AM Period

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	1293	1252	-41	-3.2%	0.8	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	1740	1697	-43	-2.5%	0.7	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	1030	1011	-18	-1.8%	0.4	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	2413	2608	195	8.1%	2.8	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	6476	6568	92	1.4%	1.2

Vehicle Flow Information
Calibration Statistics
LGV Vehicles
AM Period

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	235	232	-3	-1.3%	0.1	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	248	245	-3	-1.4%	0.2	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	134	134	0	0.1%	0.0	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::157	54	53	-1	-1.0%	0.1	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	40	51	11	27.4%	1.1	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	60	75	15	24.7%	1.3	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	1	1	0	-10.0%	0.1	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	136	136	0	0.1%	0.0	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	186	184	-2	-1.2%	0.1	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	78	82	5	6.2%	0.4	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	259	265	6	2.2%	0.2	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	10	9	-1	-8.0%	0.2	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	101	98	-3	-2.5%	0.2	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	210	212	2	1.1%	0.1	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	1	0	-1	-100.0%	1.1	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	272	270	-1	-0.5%	0.1	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	3	0	-3	-100.0%	1.7	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	35	33	-1	-4.3%	0.2	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	58	61	3	4.6%	0.2	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	69	74	4	6.1%	0.4	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	47	49	2	5.1%	0.2	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	242	242	0	-0.2%	0.0	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	122	119	-2	-1.9%	0.1	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	315	297	-18	-5.7%	0.7	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	127	126	-1	-0.6%	0.1	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3042	3049	7	0.2%	0.3

Vehicle Flow Information
Validation Statistics
LGV Vehicles
AM Period

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	337	347	10	3.1%	0.4	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	322	320	-2	-0.6%	0.1	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	192	184	-9	-4.6%	0.5	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	466	487	21	4.4%	0.7	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	1317	1337	20	1.5%	0.4

Vehicle Flow Information
Calibration Statistics
HGV Vehicles
AM Period

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	32	30	-2	-6.6%	0.3	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	27	25	-2	-8.0%	0.3	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	24	24	0	0.6%	0.0	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::1572	7	6	-1	-8.6%	0.2	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	25	23	-2	-8.6%	0.3	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	6	5	-1	-10.0%	0.2	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	0	0	0		0.0	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	23	23	0	-2.0%	0.1	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	15	14	-1	-9.0%	0.2	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	8	9	1	11.6%	0.2	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	36	33	-3	-7.1%	0.3	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	1	1	0	26.3%	0.2	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	4	4	0	1.3%	0.0	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	33	31	-2	-6.3%	0.3	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	28	27	-1	-2.5%	0.1	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	2	0	-2	-100.0%	1.4	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	3	3	0	-9.0%	0.1	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	29	27	-1	-5.2%	0.2	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	8	8	-1	-7.6%	0.2	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	12	11	-1	-10.2%	0.3	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	33	33	-1	-2.5%	0.1	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	29	26	-3	-11.1%	0.4	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	34	31	-3	-8.5%	0.4	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	29	28	-1	-2.2%	0.1	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	448	421	-27	-5.9%	0.2

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	44	42	-2	-3.7%	0.2	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	38	36	-2	-4.7%	0.2	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	44	46	2	4.1%	0.2	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	63	56	-7	-10.5%	0.6	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	189	180	-8	-4.4%	0.3

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	1504	1515	11	0.7%	0.2	Pass Mid
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	1542	1557	15	0.9%	0.3	Pass Mid
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	832	819	-13	-1.5%	0.3	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::1572	434	422	-12	-2.7%	0.4	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	432	436	4	0.9%	0.1	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	337	351	14	4.3%	0.6	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	1	0	-1	-100.0%	1.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	8	9	1	11.9%	0.2	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	969	970	1	0.1%	0.0	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	1131	1083	-48	-4.2%	1.0	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	351	349	-2	-0.6%	0.1	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	1322	1292	-30	-2.3%	0.6	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	26	25	0	-1.8%	0.1	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	920	894	-25	-2.7%	0.6	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	1146	1132	-15	-1.3%	0.3	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	8	0	-8	-100.0%	2.9	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	1466	1504	38	2.6%	0.7	Pass Mid
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	12	0	-12	-100.0%	3.5	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	152	150	-2	-1.4%	0.1	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	491	488	-3	-0.6%	0.1	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	393	385	-8	-2.0%	0.3	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	380	364	-16	-4.1%	0.6	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	1138	1119	-19	-1.7%	0.4	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	772	761	-11	-1.5%	0.3	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	1958	1975	17	0.9%	0.3	Pass Mid
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	793	792	-1	-0.2%	0.0	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	18518	18393	-126	-0.7%	0.5

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37	ATC 8	A1303 Newmarket Road(N)			631::677	1674	1642	-32	-1.9%	0.6	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	2100	2053	-47	-2.3%	0.7	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	1266	1240	-25	-2.0%	0.5	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	2942	3151	209	7.1%	2.7	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	7982	8086	105	1.3%	1.1

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1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	622	637	15	2.5%	0.6	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	658	652	-6	-0.9%	0.2	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	369	361	-8	-2.1%	0.4	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::157	202	198	-4	-2.1%	0.3	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	201	192	-9	-4.5%	0.6	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	154	141	-13	-8.5%	1.1	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	1	0	-1	-100.0%	1.4	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	4	4	0	-7.5%	0.2	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	365	430	64	17.6%	3.2	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	486	476	-11	-2.2%	0.5	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	129	137	8	6.0%	0.7	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	580	547	-33	-5.7%	1.4	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	10	8	-2	-18.4%	0.6	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	365	420	55	15.1%	2.8	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	472	472	0	0.1%	0.0	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	5	0	-5	-100.0%	3.2	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	633	578	-55	-8.8%	2.3	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	5	0	-5	-100.0%	3.2	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	74	54	-20	-27.0%	2.5	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	213	217	5	2.3%	0.3	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	180	167	-13	-7.0%	1.0	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	178	165	-13	-7.2%	1.0	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	462	467	5	1.1%	0.2	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	335	335	-1	-0.2%	0.0	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	849	849	0	0.0%	0.0	Pass Mid
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	341	335	-6	-1.9%	0.3	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	7893	7841	-52	-0.7%	1.0

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37	ATC 8	A1303 Newmarket Road(N)			631::677	710	684	-25	-3.6%	1.0	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	852	905	53	6.2%	1.8	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	553	551	-1	-0.2%	0.1	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	1204	1330	126	10.4%	3.5	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3318	3470	152	4.6%	1.6

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	115	121	6	4.8%	0.5	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	110	128	18	16.0%	1.6	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	70	67	-3	-3.7%	0.3	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	25	28	3	10.2%	0.5	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	19	29	10	50.5%	2.0	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	35	42	7	18.9%	1.1	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	1	0	-1	-60.0%	0.7	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	63	64	1	1.7%	0.1	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	96	98	2	2.4%	0.2	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	43	45	2	3.5%	0.2	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	145	146	0	0.3%	0.0	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	5	5	0	-5.6%	0.1	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	44	50	6	12.4%	0.8	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	110	107	-2	-2.2%	0.2	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	118	130	11	9.6%	1.0	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.4	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	27	16	-11	-41.8%	2.5	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	34	33	-2	-4.8%	0.3	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	34	39	5	14.3%	0.8	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	21	24	3	15.2%	0.7	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	132	136	4	2.7%	0.3	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	68	65	-3	-4.4%	0.4	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	153	155	2	1.6%	0.2	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	70	70	0	0.6%	0.1	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	1540	1595	55	3.6%	0.6

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37	ATC 8	A1303 Newmarket Road(N)			631::677	189	190	2	1.0%	0.1	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	159	162	3	2.0%	0.3	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	104	96	-8	-8.0%	0.8	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	225	246	21	9.3%	1.4	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	676	694	18	2.6%	0.6

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	18	16	-2	-9.2%	0.4	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	13	14	1	8.8%	0.3	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	8	9	1	7.5%	0.2	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::157	3	2	-1	-25.0%	0.5	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	9	9	0	-3.3%	0.1	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	6	2	-4	-64.2%	1.9	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	0	0	0		0.0	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	11	9	-3	-23.6%	0.8	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	9	6	-3	-29.5%	0.9	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	4	5	1	22.9%	0.4	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	21	18	-4	-18.1%	0.9	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	0	1	1		1.1	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	3	2	-1	-28.9%	0.5	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	18	12	-5	-29.7%	1.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	17	17	0	-0.8%	0.0	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.4	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	2	2	0	-17.2%	0.3	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	9	11	2	19.6%	0.6	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	1	2	1	72.9%	0.7	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	6	4	-2	-32.4%	0.9	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	21	18	-3	-12.6%	0.6	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	13	14	1	5.2%	0.2	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	17	16	-1	-3.8%	0.2	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	11	11	0	-1.4%	0.0	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	221	200	-22	-9.9%	0.5

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	25	22	-3	-11.9%	0.6	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	20	15	-5	-26.2%	1.3	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	20	18	-2	-9.9%	0.5	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	33	32	-1	-2.2%	0.1	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	98	87	-11	-11.2%	0.6

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	755	774	19	2.5%	0.7	Pass Mid
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	781	794	13	1.6%	0.4	Pass Mid
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	447	437	-10	-2.2%	0.5	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	230	228	-2	-1.0%	0.2	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	229	229	0	0.2%	0.0	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	195	185	-10	-5.3%	0.8	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	1	0	-1	-100.0%	1.4	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	5	4	-1	-18.0%	0.4	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	440	502	63	14.2%	2.9	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	591	580	-11	-1.8%	0.4	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	176	187	10	5.8%	0.8	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	747	710	-37	-4.9%	1.4	Pass Mid
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	15	13	-1	-9.8%	0.4	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	412	472	60	14.5%	2.8	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	599	592	-7	-1.2%	0.3	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	5	0	-5	-100.0%	3.2	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	768	724	-44	-5.8%	1.6	Pass Mid
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	7	0	-7	-100.0%	3.7	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	104	72	-32	-30.7%	3.4	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	256	261	5	2.0%	0.3	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	215	209	-7	-3.1%	0.5	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	205	193	-12	-5.6%	0.8	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	614	621	6	1.0%	0.2	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	416	413	-3	-0.7%	0.1	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	1019	1021	2	0.2%	0.1	Pass Mid
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	422	416	-6	-1.4%	0.3	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	9654	9636	-18	-0.2%	1.0

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37	ATC 8	A1303 Newmarket Road(N)			631::677	923	897	-26	-2.9%	0.9	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	1031	1082	51	4.9%	1.6	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	676	665	-12	-1.7%	0.4	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	1462	1608	146	10.0%	3.7	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	4092	4251	159	3.9%	1.7

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	1	0	-1	-100.0%	1.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	675	707	32	4.7%	0.9	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	595	616	21	3.5%	0.6	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	1472	1459	-13	-0.9%	0.2	Pass Mid
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	227	239	12	5.4%	0.6	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	1002	1056	54	5.4%	1.2	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	327	324	-3	-0.9%	0.1	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	3	0	-3	-100.0%	1.7	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	19	20	1	6.1%	0.2	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	588	573	-15	-2.5%	0.4	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	606	594	-12	-2.0%	0.3	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	1054	1018	-36	-3.4%	0.8	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	1410	1330	-80	-5.7%	1.5	Pass Mid
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	49	48	-1	-2.8%	0.1	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	463	448	-15	-3.3%	0.5	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	681	671	-9	-1.4%	0.3	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	1	0	-1	-100.0%	1.1	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	460	454	-7	-1.5%	0.2	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	32	32	0	-1.1%	0.0	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	840	830	-10	-1.2%	0.2	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	1018	972	-45	-4.5%	1.0	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	616	681	65	10.5%	1.8	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	1	0	-1	-100.0%	1.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	1355	1355	0	0.0%	0.0	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	437	443	6	1.3%	0.2	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	895	852	-43	-4.8%	1.0	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	1410	1390	-20	-1.4%	0.4	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	16239	16112	-127	-0.8%	0.6

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	2464	2349	-116	-4.7%	1.7	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	1194	1167	-27	-2.2%	0.5	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	2421	2488	67	2.8%	1.0	Pass Mid
40	ATC 401	A1303 Newmarket Road(S)			630::637	1282	1341	59	4.6%	1.2	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	7360	7344	-16	-0.2%	1.1

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	94	97	3	2.7%	0.2	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	60	58	-2	-2.6%	0.1	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	201	202	1	0.7%	0.1	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	32	31	-1	-3.9%	0.2	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	115	117	2	1.8%	0.1	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	40	41	1	2.7%	0.1	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	1	0	-1	-100.0%	1.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	2	2	0	-7.5%	0.1	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	69	65	-4	-6.4%	0.4	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	122	116	-7	-5.3%	0.4	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	147	137	-9	-6.4%	0.6	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	247	230	-17	-6.9%	0.8	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	8	8	-1	-7.5%	0.2	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	39	35	-3	-8.7%	0.4	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	145	138	-7	-4.9%	0.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	53	54	1	1.7%	0.1	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	0	0	0		0.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	10	9	-1	-14.2%	0.3	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	102	102	-1	-0.5%	0.0	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	113	116	3	2.4%	0.2	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	100	100	0	0.4%	0.0	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	1	0	-1	-100.0%	0.9	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	247	244	-3	-1.2%	0.1	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	70	67	-3	-3.9%	0.2	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	111	89	-22	-19.8%	1.6	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	162	158	-4	-2.3%	0.2	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	2291	2215	-76	-3.3%	0.3

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37	ATC 8	A1303 Newmarket Road(N)			631::677	394	367	-27	-6.7%	1.0	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	192	181	-11	-5.7%	0.6	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	368	318	-50	-13.6%	1.9	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	152	156	4	2.8%	0.2	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	1105	1022	-83	-7.5%	0.9

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	3	3	0	13.3%	0.2	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	4	5	1	27.5%	0.4	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	6	5	-1	-19.2%	0.3	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::157	2	2	0	-22.5%	0.2	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	13	9	-4	-32.7%	0.9	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	1	1	0	0.0%	0.0	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	1	1	0	0.0%	0.0	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	5	5	-1	-9.5%	0.2	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	10	9	-1	-8.1%	0.2	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	8	6	-2	-23.7%	0.5	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	15	13	-2	-14.4%	0.4	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	1	1	0	2.9%	0.0	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	3	3	0	14.3%	0.2	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	11	10	-2	-15.2%	0.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	2	3	1	27.7%	0.3	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	0	0	0		0.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	1	1	0	3.5%	0.0	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	11	9	-2	-19.0%	0.5	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	2	0	-2	-81.1%	1.1	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	6	5	-2	-28.9%	0.6	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	18	18	0	-1.8%	0.1	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	3	3	0	-8.7%	0.1	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	5	7	2	32.0%	0.5	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	11	10	-1	-11.4%	0.3	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	142	126	-16	-11.4%	0.2

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37	ATC 8	A1303 Newmarket Road(N)			631::677	23	19	-4	-17.6%	0.6	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	15	14	-1	-8.6%	0.2	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	21	14	-7	-35.3%	1.3	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	12	9	-3	-26.7%	0.7	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	71	55	-16	-22.5%	0.7

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1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	1	0	-1	-100.0%	1.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	772	807	35	4.5%	0.9	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	659	679	20	3.1%	0.6	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	1679	1666	-13	-0.8%	0.2	Pass Mid
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	261	271	10	4.0%	0.5	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	1130	1182	52	4.6%	1.1	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	368	366	-2	-0.5%	0.1	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	4	0	-4	-100.0%	2.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	22	23	1	4.5%	0.1	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	662	643	-20	-3.0%	0.5	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	738	719	-19	-2.6%	0.5	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	1208	1161	-47	-3.9%	1.0	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	1673	1574	-99	-5.9%	1.7	Pass Mid
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	58	56	-2	-3.4%	0.2	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	504	486	-18	-3.6%	0.6	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	837	819	-18	-2.2%	0.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	1	0	-1	-100.0%	1.1	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	515	510	-5	-1.0%	0.2	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	43	41	-2	-4.1%	0.2	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	953	940	-13	-1.3%	0.3	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	1133	1088	-44	-3.9%	0.9	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	722	786	63	8.8%	1.6	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	2	0	-2	-100.0%	1.3	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	1620	1617	-3	-0.2%	0.1	Pass Mid
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	510	513	3	0.6%	0.1	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	1011	948	-63	-6.3%	1.4	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	1583	1558	-25	-1.6%	0.4	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	18672	18453	-219	-1.2%	0.7

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37	ATC 8	A1303 Newmarket Road(N)			631::677	2881	2735	-146	-5.1%	2.0	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	1401	1362	-39	-2.8%	0.7	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	2810	2819	10	0.3%	0.1	Pass Mid
40	ATC 401	A1303 Newmarket Road(S)			630::637	1445	1505	60	4.2%	1.1	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	8536	8421	-115	-1.4%	1.0

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	1	0	-1	-100.0%	1.4	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	347	381	34	9.9%	1.8	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	312	331	19	6.0%	1.0	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	799	793	-6	-0.8%	0.2	Pass Mid
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::157	127	126	-1	-0.9%	0.1	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	531	561	30	5.6%	1.3	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	168	180	12	7.4%	0.9	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	2	0	-2	-100.0%	2.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	13	11	-2	-18.8%	0.7	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	330	304	-26	-7.9%	1.5	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	339	311	-28	-8.3%	1.6	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	560	554	-6	-1.1%	0.3	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	741	730	-11	-1.4%	0.4	Pass Mid
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	26	27	1	5.6%	0.3	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	263	233	-30	-11.5%	1.9	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	380	356	-24	-6.3%	1.3	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	239	242	3	1.4%	0.2	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.4	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	18	17	-2	-9.6%	0.4	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	457	448	-9	-1.9%	0.4	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	547	530	-17	-3.1%	0.7	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	327	373	46	14.2%	2.5	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	1	0	-1	-100.0%	1.4	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	735	739	3	0.4%	0.1	Pass Mid
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	229	241	12	5.2%	0.8	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	477	457	-20	-4.2%	0.9	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	756	743	-13	-1.7%	0.5	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	8725	8685	-39	-0.4%	0.9

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37	ATC 8	A1303 Newmarket Road(N)			631::677	1300	1284	-16	-1.3%	0.5	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	669	615	-54	-8.1%	2.1	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	1269	1350	81	6.4%	2.2	Pass Mid
40	ATC 401	A1303 Newmarket Road(S)			630::637	668	716	48	7.2%	1.8	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3906	3964	59	1.5%	1.7

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	44	45	1	1.3%	0.1	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::1572	23	27	4	16.1%	0.7	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	67	71	4	6.3%	0.5	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	1567::1577z::1577::1572	15	10	-5	-32.0%	1.4	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	45	47	2	5.2%	0.3	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	18	17	-1	-6.9%	0.3	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::1572	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	2	1	-1	-55.0%	0.9	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	28	24	-4	-14.1%	0.8	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	57	48	-9	-15.8%	1.2	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	68	54	-13	-19.9%	1.7	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	102	95	-7	-6.6%	0.7	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	2	4	2	123.5%	1.3	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	19	14	-4	-23.3%	1.1	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	65	54	-11	-16.4%	1.4	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	28	28	0	0.8%	0.0	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	0	0	0		0.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	6	4	-2	-32.2%	0.8	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	39	39	0	-0.6%	0.0	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	46	44	-3	-6.1%	0.4	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	26	40	14	52.3%	2.4	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	1	0	-1	-100.0%	1.2	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	100	101	1	1.2%	0.1	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	26	28	2	7.7%	0.4	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	35	37	2	6.7%	0.4	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	62	64	2	3.1%	0.2	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	922	896	-27	-2.9%	0.6

Vehicle Flow Information
Validation Statistics
LGV Vehicles
PM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	170	150	-20	-11.9%	1.6	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	85	72	-13	-15.2%	1.5	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	144	121	-23	-15.8%	2.0	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	66	70	4	5.9%	0.5	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	465	413	-52	-11.2%	1.4

Vehicle Flow Information
Calibration Statistics
HGV Vehicles
PM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::156	0	0	0		0.0	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::156	1	2	1	75.0%	0.6	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	1568::1575::1577::157	3	2	-1	-31.7%	0.6	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	1567::1577z::1574::156	3	2	-1	-26.7%	0.5	Pass Low
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::157	0	1	1		1.2	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	1572y::1573::1574::156	6	5	-1	-20.8%	0.5	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	1572y::1573::1576::156	0	0	0		0.8	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	1572y::1573::1577::157	0	0	0		0.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	1	0	-1	-55.0%	0.6	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	1	1	0	-9.1%	0.1	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	4	3	-1	-32.1%	0.7	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	3	3	0	-10.4%	0.2	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	5	6	1	13.0%	0.3	Pass Low
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	1	0	-1	-81.8%	1.2	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	1	1	-1	-45.5%	0.6	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	3	3	0	12.7%	0.2	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	2	1	-1	-30.0%	0.5	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	0	0	0		0.0	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	0	1	1		1.0	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	7	5	-2	-30.8%	0.9	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	0	0	0	-36.1%	0.2	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	2	2	0	12.4%	0.2	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	0	0	0		0.0	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	8	8	0	3.3%	0.1	Pass Low
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	1	2	1	50.0%	0.4	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	3	3	0	-10.0%	0.2	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	6	5	-1	-19.2%	0.5	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	62	55	-7	-11.3%	0.4

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HGV Vehicles
PM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	8	9	0	4.6%	0.1	Pass Low
38	ATC 8	A1303 Newmarket Road(N)			677::632	6	4	-1	-25.5%	0.6	Pass Low
39	ATC 401	A1303 Newmarket Road(S)			679::629	9	7	-2	-22.2%	0.7	Pass Low
40	ATC 401	A1303 Newmarket Road(S)			630::637	5	4	-2	-31.2%	0.8	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	28	23	-5	-16.8%	0.6

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (E)	1568::1575::1574::1568	1	0	-1	-100.0%	1.4	Pass Low
2	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	Airport Way (SW)	1568::1575::1576::1567	392	428	36	9.1%	1.8	Pass Low
3	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	A1303 Newmarket Road (W)	568::1575::1577::1572	338	359	21	6.3%	1.1	Pass Low
4	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (E)	567::1577z::1574::156	869	866	-3	-0.3%	0.1	Pass Mid
6	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	Airport Way (SW)	A1303 Newmarket Road (W)	567::1577z::1577::1572	142	137	-5	-3.7%	0.4	Pass Low
7	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (E)	572y::1573::1574::156	582	613	31	5.3%	1.3	Pass Low
8	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	Airport Way (SW)	572y::1573::1576::156	186	198	12	6.2%	0.8	Pass Low
9	99	A1303 Newmarket Road (E) / Airport Way (SW) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	A1303 Newmarket Road (W)	572y::1573::1577::1572	2	0	-2	-100.0%	2.0	Pass Low
10	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (NE)	1869::677::1871	16	12	-4	-25.6%	1.1	Pass Low
11	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	Church Road	A1303 New Market Road (SW)	1869::677::632	359	329	-30	-8.4%	1.6	Pass Low
13	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (NE)	A1303 New Market Road (SW)	1871::677::632	400	362	-39	-9.7%	2.0	Pass Low
16	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	Church Road	631::677::1869	630	611	-20	-3.1%	0.8	Pass Low
17	J2	Church Road / A1303 New Market Road (NE) / A1303 New Market Road (SW)	A1303 New Market Road (SW)	A1303 New Market Road (NE)	631::677::1871	848	832	-17	-2.0%	0.6	Pass Mid
19	J1	Quy Interchange	A1303 New Market Road (NE)	A14 E	632::623::624::633	29	31	2	8.4%	0.4	Pass Low
20	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (SW)	632::623::626::630	283	248	-35	-12.4%	2.2	Pass Low
21	J1	Quy Interchange	A1303 New Market Road (NE)	A14 W	632::623::628::635	448	413	-34	-7.7%	1.7	Pass Low
22	J1	Quy Interchange	A1303 New Market Road (NE)	A1303 New Market Road (NE)	632::623::622::631	0	0	0		0.0	Pass Low
23	J1	Quy Interchange	A14 E	A1303 New Market Road (SW)	639::634::630	268	272	3	1.1%	0.2	Pass Low
24	J1	Quy Interchange	A14 E	A14 W	634::625::628::635	1	0	-1	-100.0%	1.4	Pass Low
25	J1	Quy Interchange	A14 E	A1303 New Market Road (NE)	634::625::622::631	24	21	-3	-12.9%	0.7	Pass Low
27	J1	Quy Interchange	A1303 New Market Road (SW)	A14 W	629::627::628::635	502	491	-11	-2.2%	0.5	Pass Low
28	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (NE)	629::627::622::631	594	574	-20	-3.3%	0.8	Pass Low
29	J1	Quy Interchange	A1303 New Market Road (SW)	A14 E	629::627::624::633	355	415	60	17.0%	3.1	Pass Low
30	J1	Quy Interchange	A1303 New Market Road (SW)	A1303 New Market Road (SW)	629::627::626::630	2	0	-2	-100.0%	1.8	Pass Low
31	J1	Quy Interchange	A14 W	A1303 New Market Road (NE)	636::621::622::631	843	848	5	0.6%	0.2	Pass Mid
32	J1	Quy Interchange	A14 W	A14 E	636::621::624::633	0	0	0		0.0	Pass Low
33	J1	Quy Interchange	A14 W	A1303 New Market Road (SW)	636::621::626::630	256	270	14	5.6%	0.9	Pass Low
35	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (E) +PR	A1303 Newmarket Road (W) + PR	1571y::1572z::12660	515	497	-18	-3.5%	0.8	Pass Low
36	59	Newmarket Road Park & Ride (N) / A1303 Newmarket Road (E) / A1303 Newmarket Road (W)	A1303 Newmarket Road (W) + PR	A1303 Newmarket Road (E)	12660::1572z::1571y	824	812	-12	-1.5%	0.4	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	9708	9636	-73	-0.8%	1.0

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All Vehicles
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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
37	ATC 8	A1303 Newmarket Road(N)			631::677	1478	1442	-36	-2.5%	1.0	Pass Mid
38	ATC 8	A1303 Newmarket Road(N)			677::632	759	691	-69	-9.0%	2.5	Pass Mid
39	ATC 401	A1303 Newmarket Road(S)			679::629	1422	1478	56	3.9%	1.5	Pass Mid
40	ATC 401	A1303 Newmarket Road(S)			630::637	740	790	51	6.8%	1.8	Pass Mid

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	4399	4401	2	0.0%	1.7

Appendix C

JOURNEY TIME CALIBRATION RESULTS

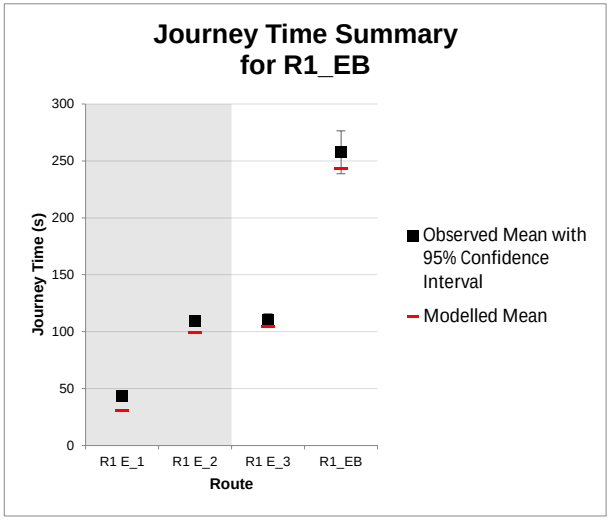
Journey Times
Validation Statistics

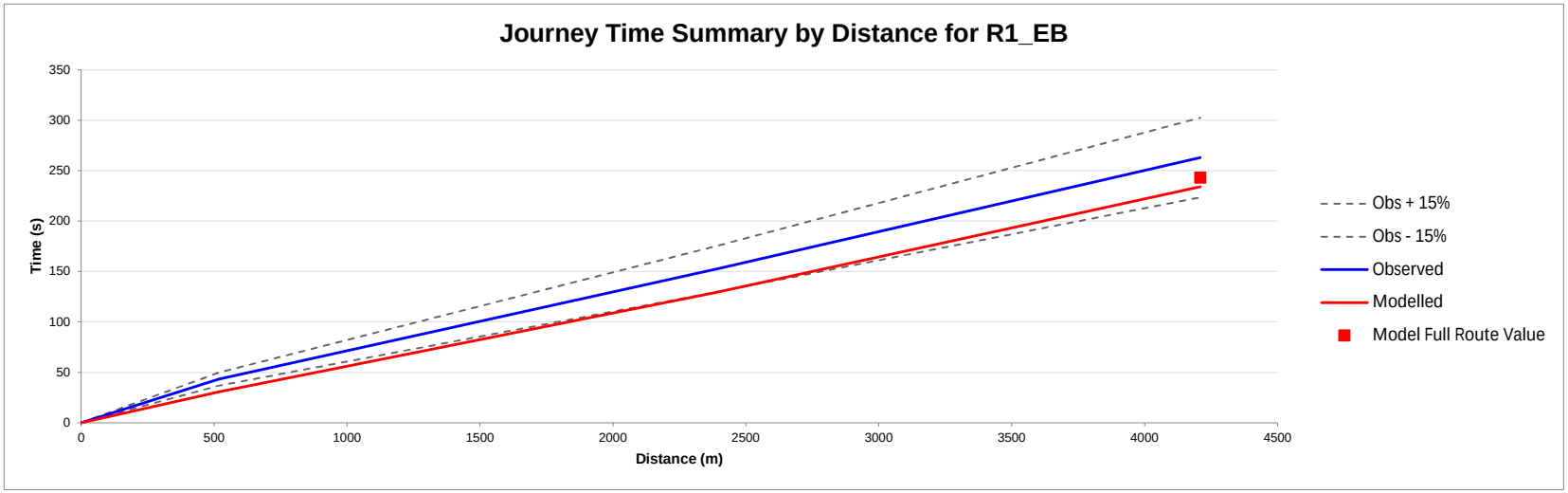
AM Period

Route:	Segment	Graph Group	Observed		Modelled			% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
			Average	95% Conf	Average	95% Conf	Var Chk							
R1 E_1	Partial - A	1	43	2	30	0	TRUE	-29.5%	-13	FALSE	FALSE	TRUE	TRUE	518
R1 E_2	Partial - B	1	110	4	99	1	TRUE	-9.4%	-10	FALSE	TRUE	TRUE	TRUE	1877
R1 E_3	Partial - C	1	110	6	104	1	TRUE	-5.2%	-6	FALSE	TRUE	TRUE	TRUE	1814
R1 W_1	Partial - A	2	109	8	109	3	TRUE	-0.4%	0	TRUE	TRUE	TRUE	TRUE	1667
R1 W_2	Partial - B	2	113	30	123	7	FALSE	8.5%	10	TRUE	TRUE	TRUE	TRUE	777
R1 W_3	Partial - C	2	90	6	110	11	FALSE	23.1%	21	FALSE	FALSE	TRUE	TRUE	1199
R2 N_1	Full	3	33	1	62	5	FALSE	88.9%	29	FALSE	FALSE	TRUE	TRUE	516
R4 N	Full	5	58	5	52	0	TRUE	-9.6%	-6	FALSE	TRUE	TRUE	TRUE	729
R4 S	Full	6	79	7	83	2	TRUE	5.0%	4	TRUE	TRUE	TRUE	TRUE	729
R1_EB	Full	1	258	19	243	2	TRUE	-5.7%	-15	TRUE	TRUE	TRUE	TRUE	4209
R1_WB	Full	2	312	41	348	17	TRUE	11.6%	36	TRUE	TRUE	TRUE	TRUE	3644
R3 E_Offslip	Full	7	21	2	28	2	FALSE	35.5%	7	FALSE	FALSE	TRUE	TRUE	337
R3 W_Offslip	Full	8	21	2	39	13	FALSE	84.0%	18	FALSE	FALSE	TRUE	TRUE	342

Journey Times
Validation Statistics

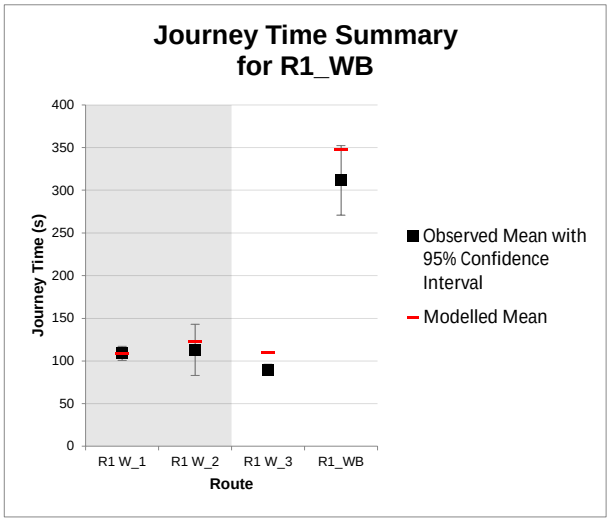
AM Period

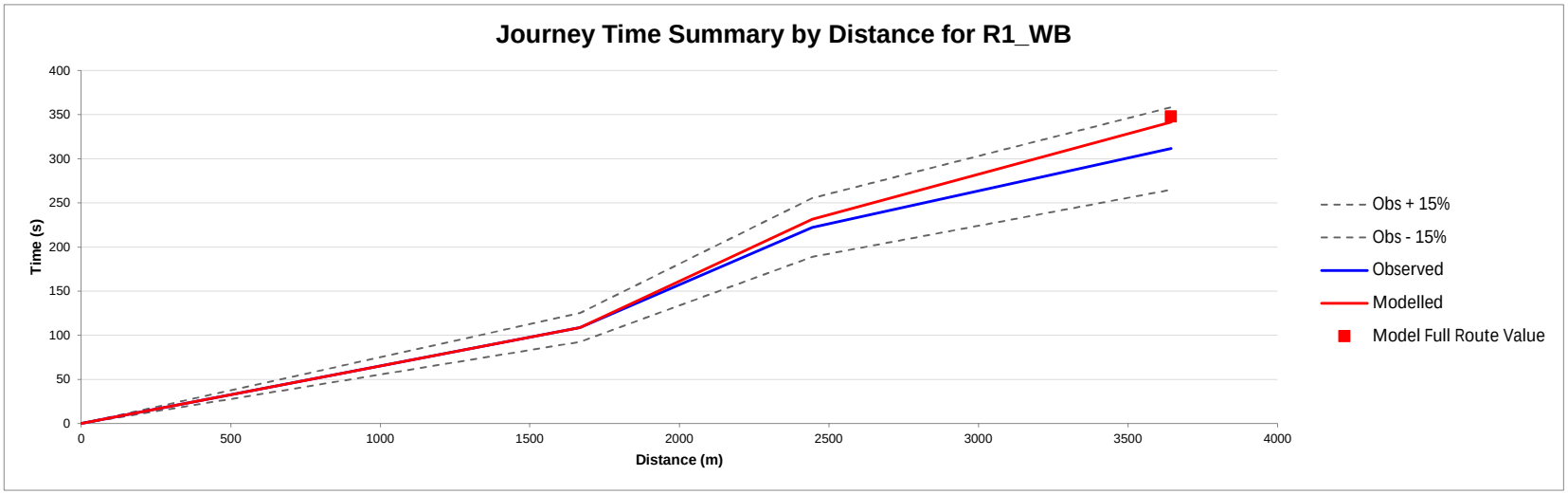




Journey Times
Validation Statistics

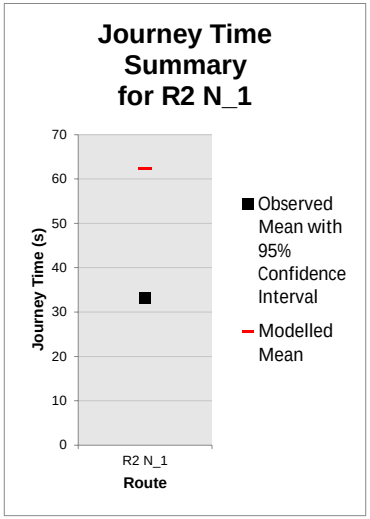
AM Period

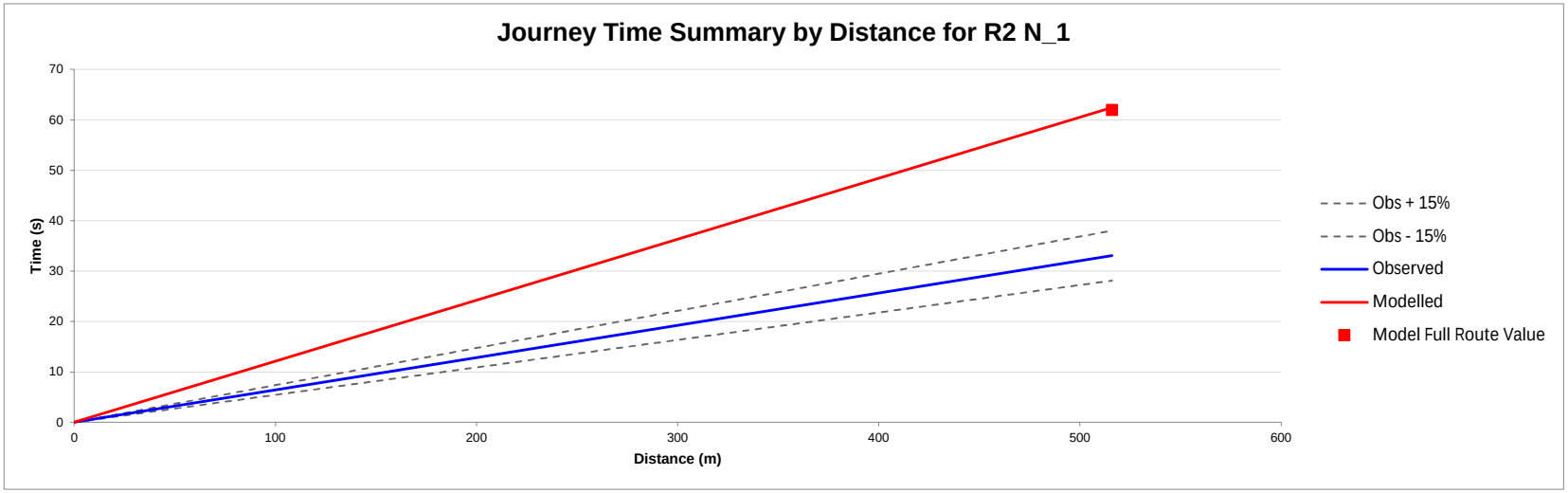




Journey Times
Validation Statistics

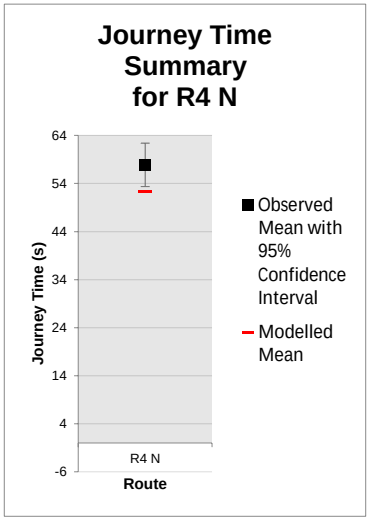
AM Period

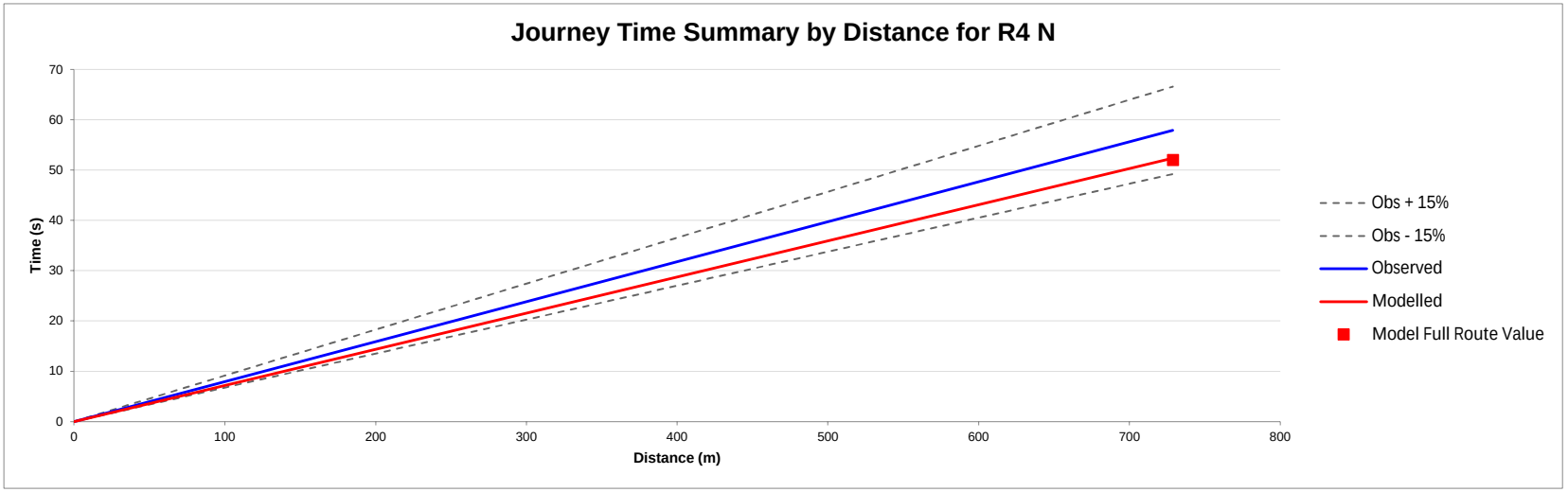




Journey Times
Validation Statistics

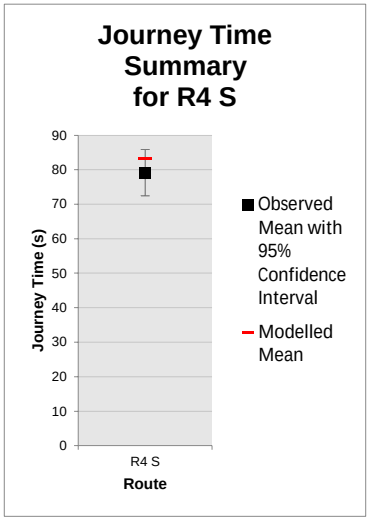
AM Period

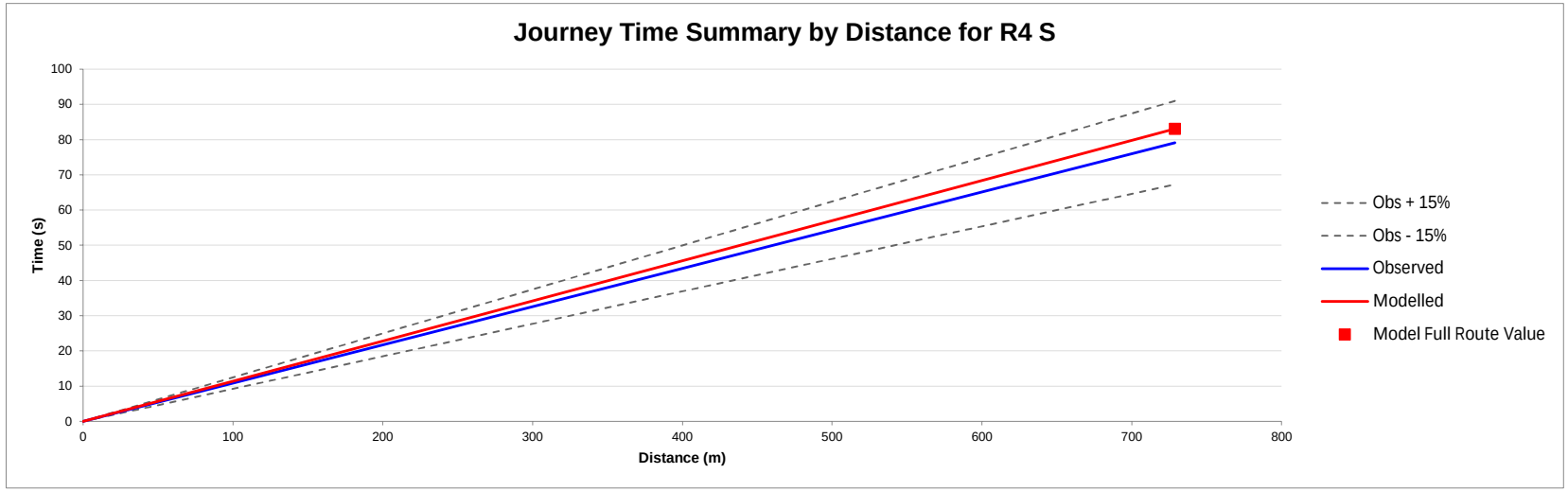




Journey Times
Validation Statistics

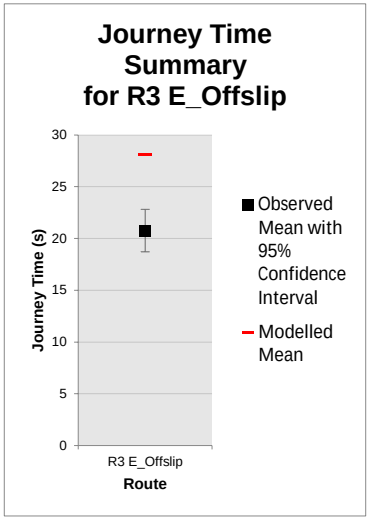
AM Period

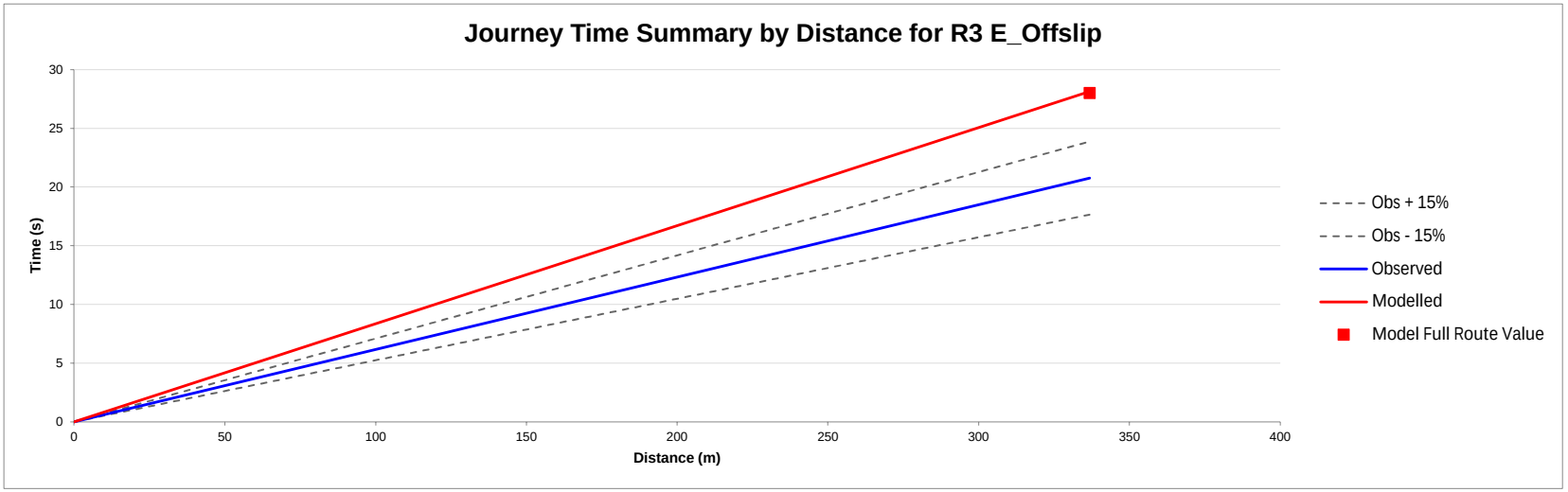




Journey Times
Validation Statistics

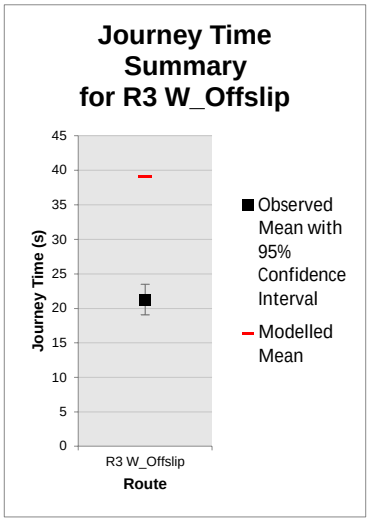
AM Period

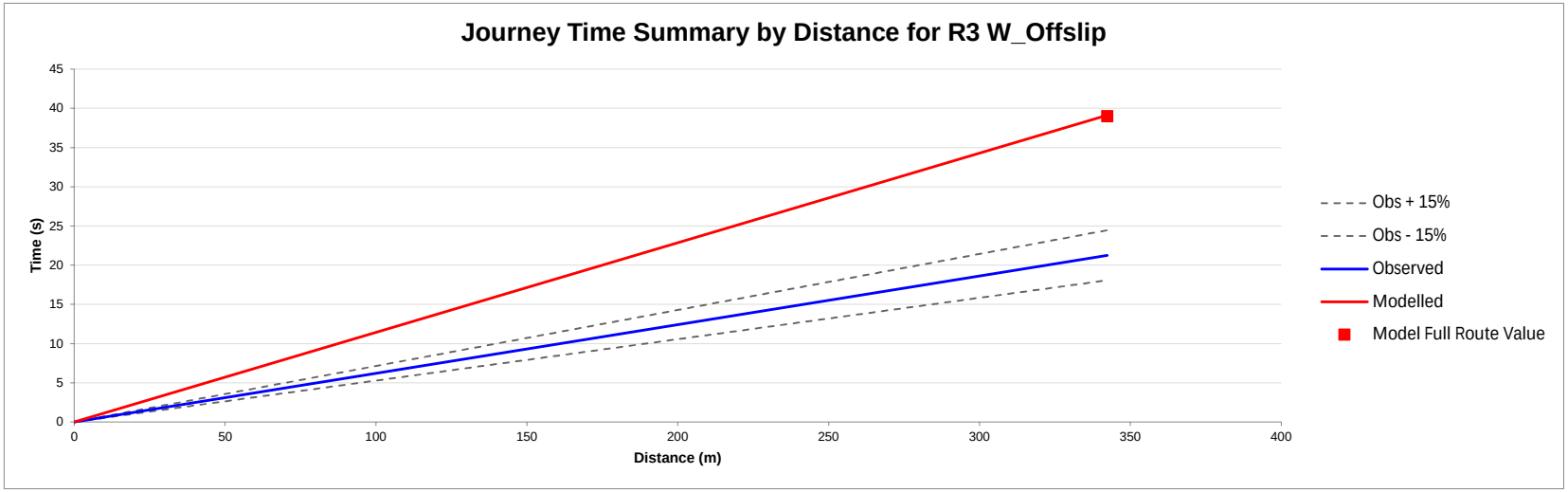




Journey Times
Validation Statistics

AM Period





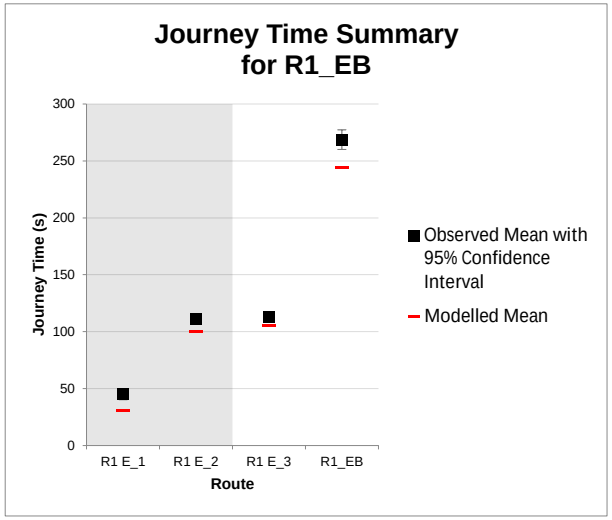
Journey Times
Validation Statistics

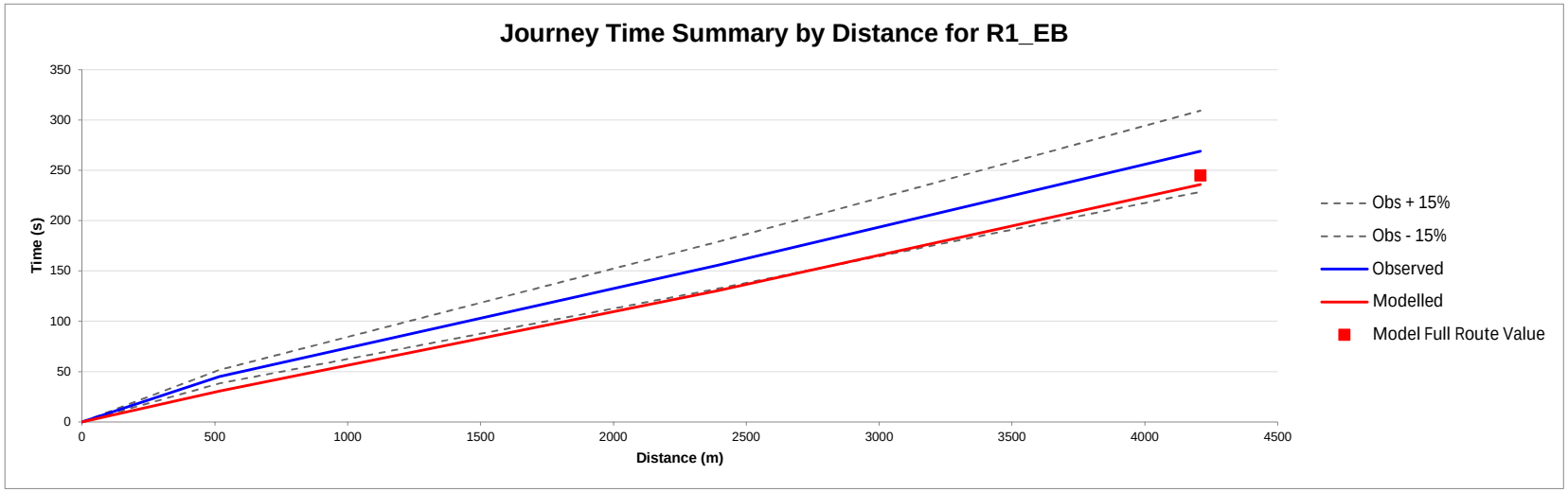
AM Peak

Route:	Segment	Graph Group	Observed		Modelled			% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
			Average	95% Conf	Average	95% Conf	Var Chk							
R1 E_1	Partial - A	1	45	5	31	0	TRUE	-31.9%	-14	FALSE	FALSE	TRUE	TRUE	518
R1 E_2	Partial - B	1	111	4	100	1	TRUE	-9.8%	-11	FALSE	TRUE	TRUE	TRUE	1877
R1 E_3	Partial - C	1	113	4	105	1	TRUE	-7.1%	-8	FALSE	TRUE	TRUE	TRUE	1814
R1 W_1	Partial - A	2	114	11	110	3	TRUE	-3.5%	-4	TRUE	TRUE	TRUE	TRUE	1667
R1 W_2	Partial - B	2	150	20	137	5	TRUE	-8.5%	-13	TRUE	TRUE	TRUE	TRUE	777
R1 W_3	Partial - C	2	95	3	110	12	FALSE	15.1%	14	FALSE	FALSE	TRUE	TRUE	1199
R2 N_1	Full	3	34	2	68	8	FALSE	100.2%	34	FALSE	FALSE	TRUE	TRUE	516
R4 N	Full	5	57	4	52	0	TRUE	-8.5%	-5	FALSE	TRUE	TRUE	TRUE	729
R4 S	Full	6	84	11	83	2	TRUE	-0.8%	-1	TRUE	TRUE	TRUE	TRUE	729
R1_EB	Full	1	269	9	245	2	TRUE	-9.0%	-24	FALSE	TRUE	TRUE	TRUE	4209
R1_WB	Full	2	359	23	363	15	TRUE	1.1%	4	TRUE	TRUE	TRUE	TRUE	3644
R3 E_Offslip	Full	7	23	3	27	2	FALSE	20.5%	5	FALSE	FALSE	TRUE	TRUE	337
R3 W_Offslip	Full	8	24	2	58	20	FALSE	141.4%	34	FALSE	FALSE	TRUE	TRUE	342

Journey Times
Validation Statistics

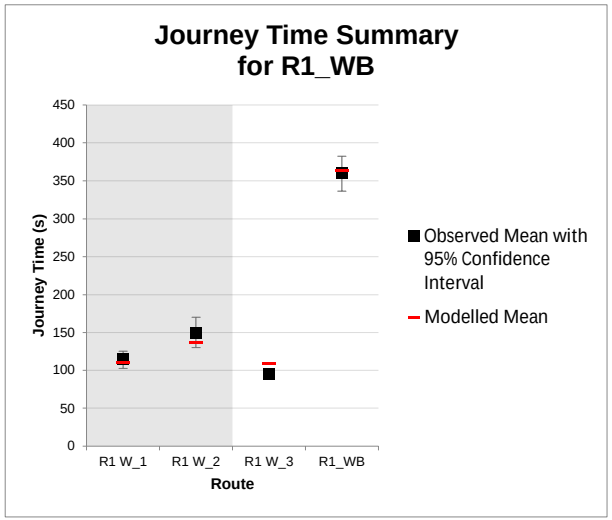
AM Peak

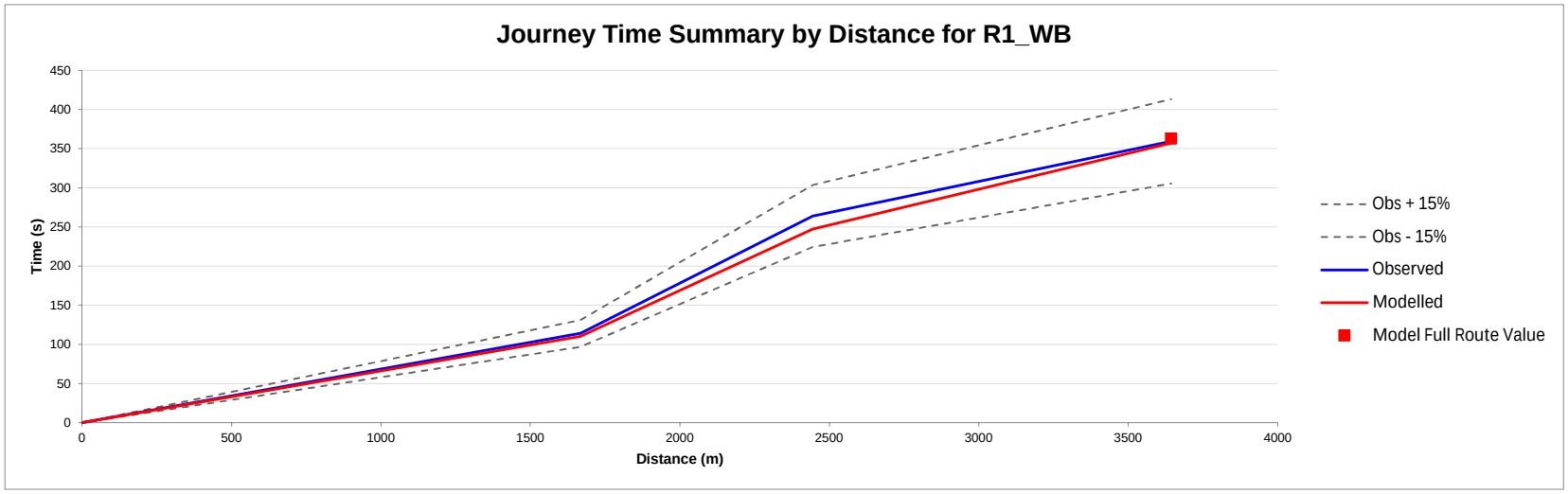




Journey Times
Validation Statistics

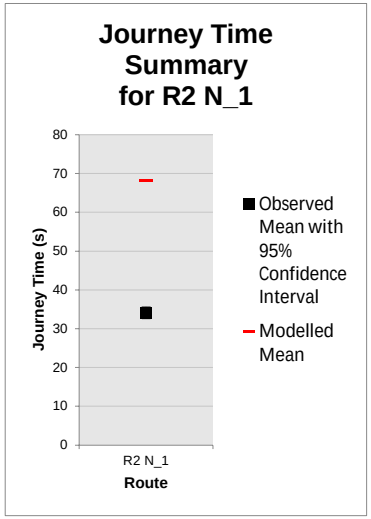
AM Peak

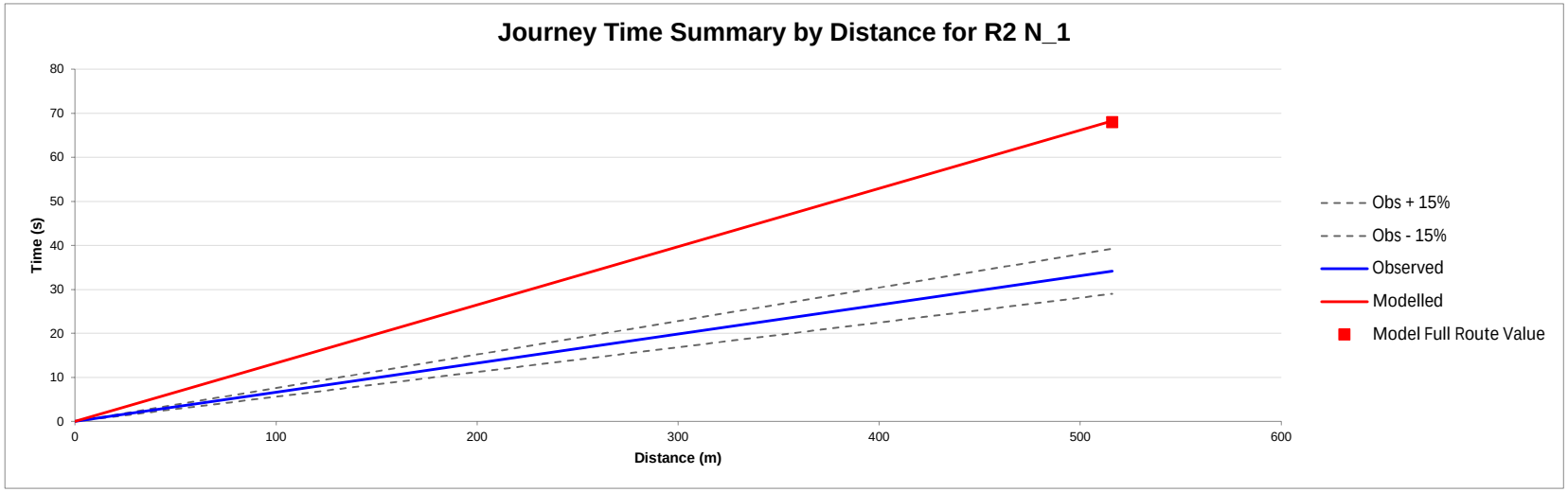




Journey Times
Validation Statistics

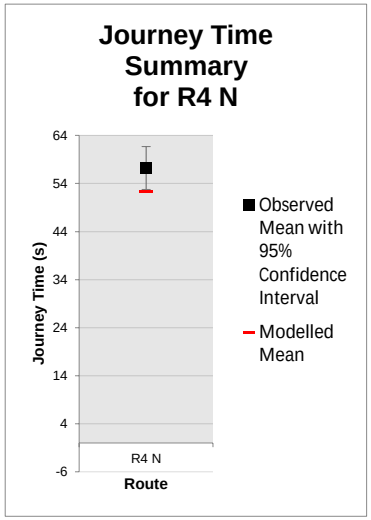
AM Peak

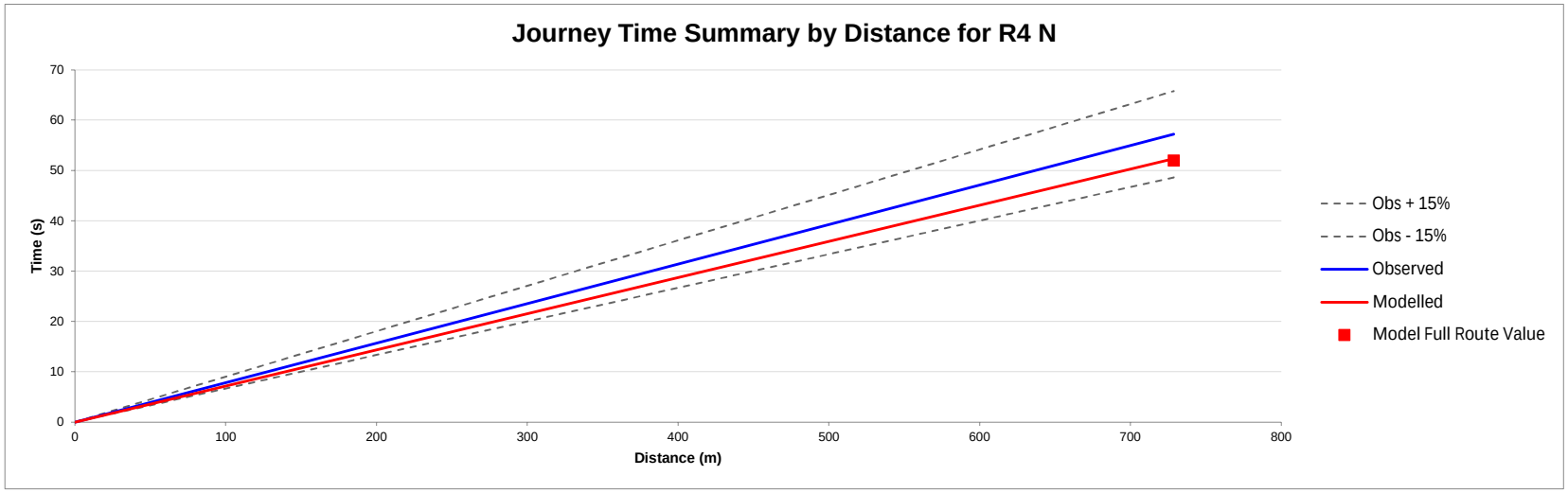




Journey Times
Validation Statistics

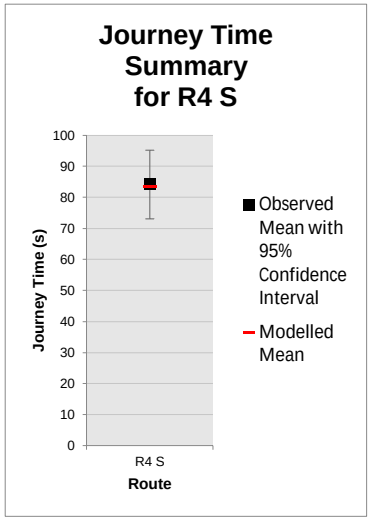
AM Peak

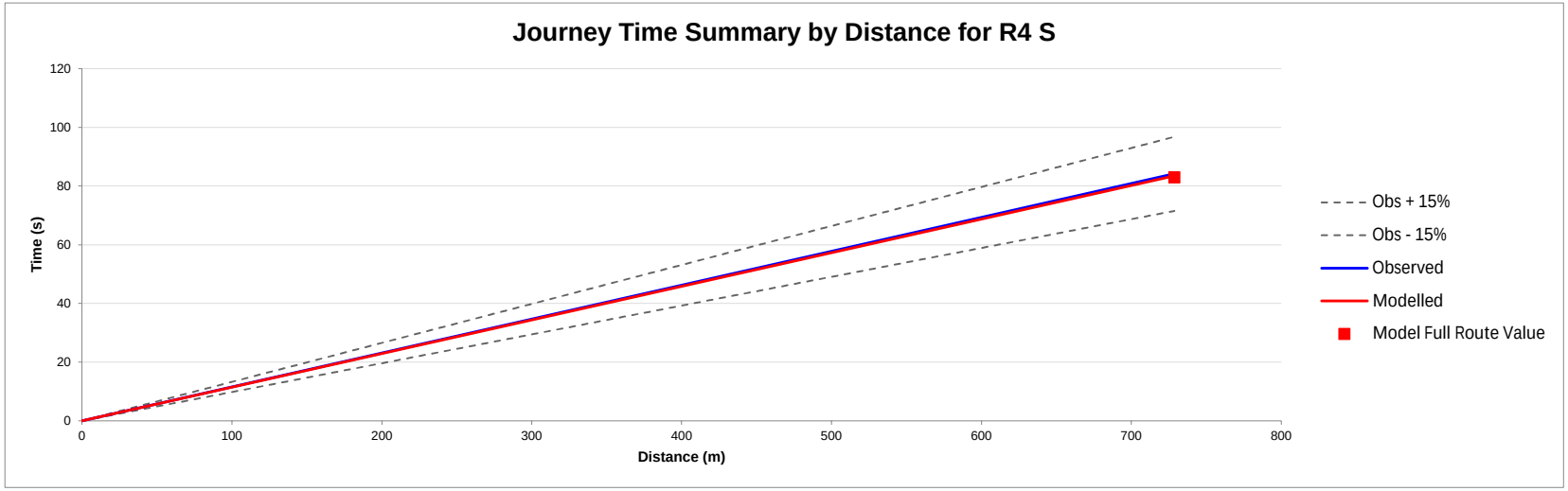




Journey Times
Validation Statistics

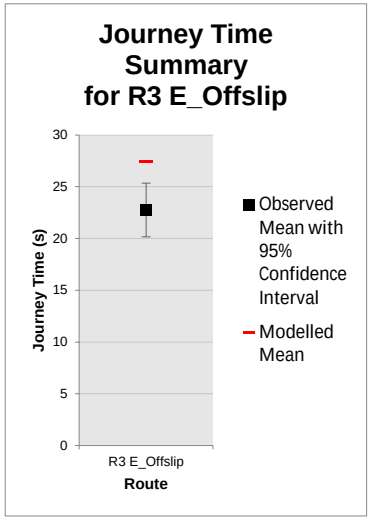
AM Peak

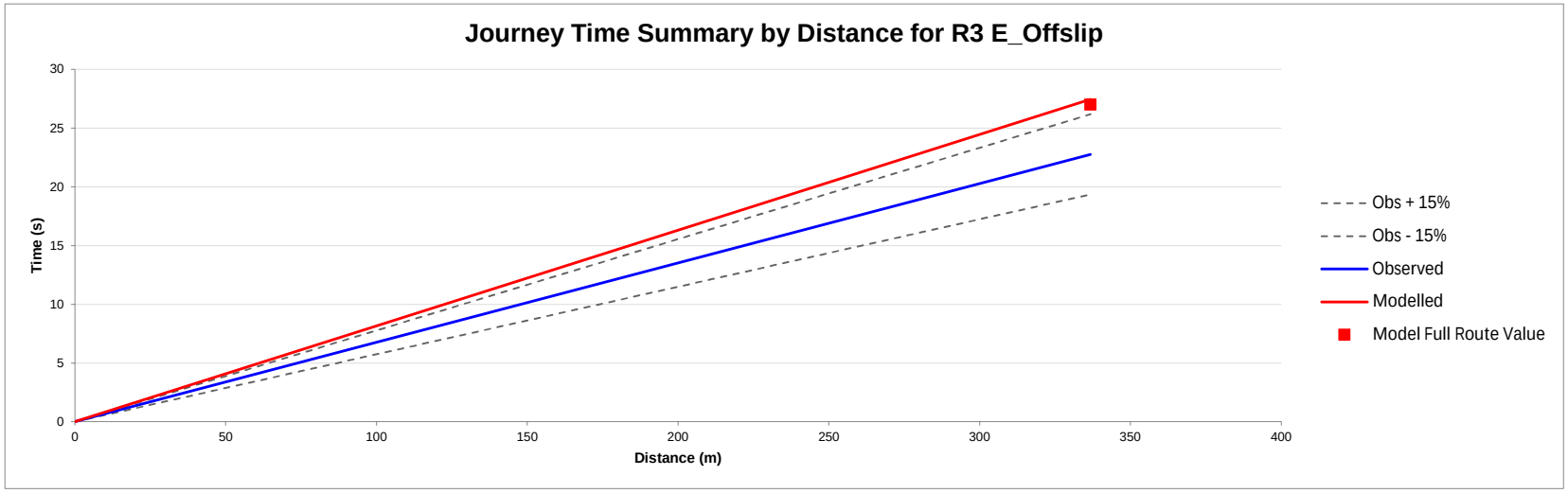




Journey Times
Validation Statistics

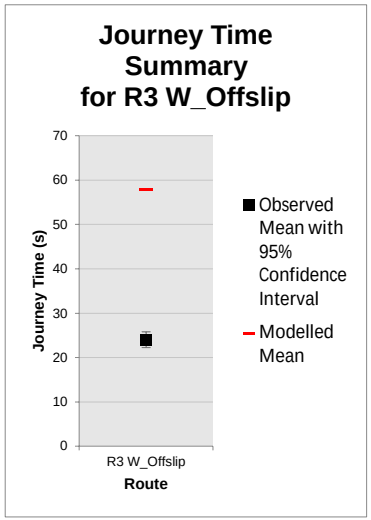
AM Peak

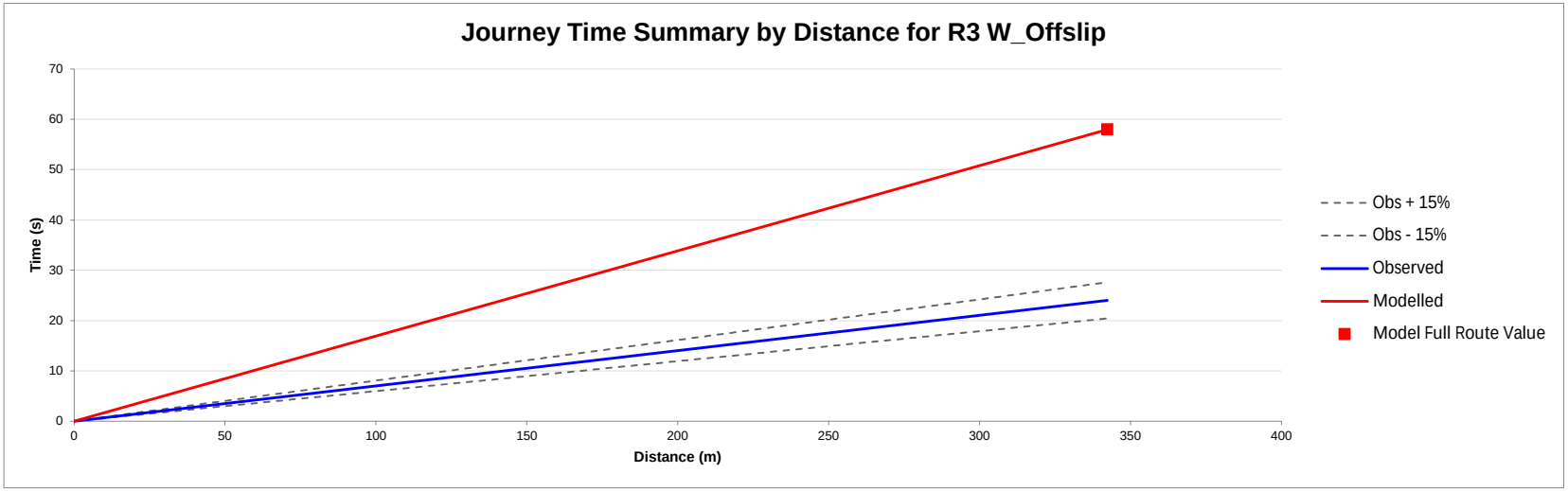




Journey Times
Validation Statistics

AM Peak





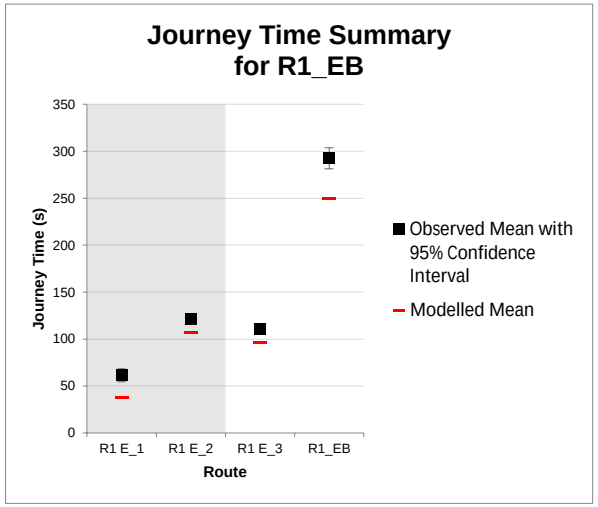
Journey Times
Validation Statistics

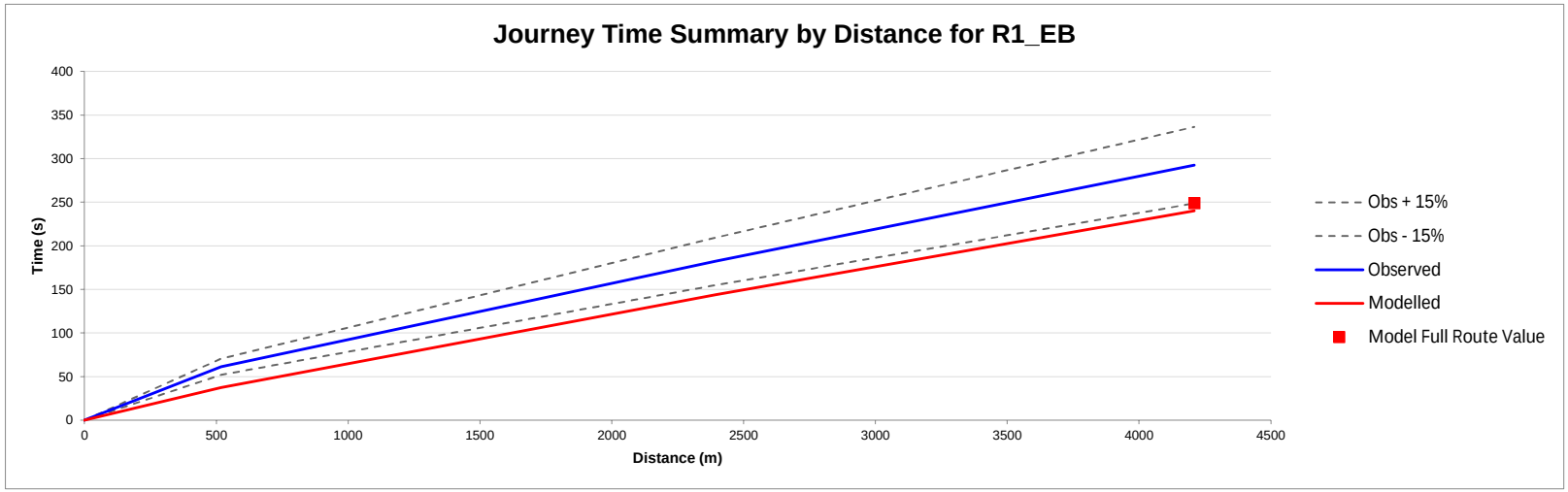
PM Period

Route:	Segment	Graph Group	Observed		Modelled			% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
			Average	95% Conf	Average	95% Conf	Var Chk							
R1 E_1	Partial - A	1	61	7	37	1	TRUE	-38.9%	-24	FALSE	FALSE	TRUE	TRUE	518
R1 E_2	Partial - B	1	121	3	106	1	TRUE	-12.0%	-15	FALSE	TRUE	TRUE	TRUE	1877
R1 E_3	Partial - C	1	110	3	96	0	TRUE	-12.6%	-14	FALSE	TRUE	TRUE	TRUE	1814
R1 W_1	Partial - A	2	96	2	95	1	TRUE	-2.0%	-2	TRUE	TRUE	TRUE	TRUE	1667
R1 W_2	Partial - B	2	46	1	49	0	TRUE	6.2%	3	FALSE	TRUE	TRUE	TRUE	777
R1 W_3	Partial - C	2	64	1	57	0	TRUE	-10.5%	-7	FALSE	TRUE	TRUE	TRUE	1199
R2 N_1	Full	3	35	1	55	6	FALSE	56.9%	20	FALSE	FALSE	TRUE	TRUE	516
R4 N	Full	5	61	3	53	0	TRUE	-13.1%	-8	FALSE	TRUE	TRUE	TRUE	729
R4 S	Full	6	80	9	77	1	TRUE	-4.1%	-3	TRUE	TRUE	TRUE	TRUE	729
R1_EB	Full	1	293	11	249	2	TRUE	-14.8%	-43	FALSE	TRUE	TRUE	TRUE	4209
R1_WB	Full	2	206	3	201	0	TRUE	-2.5%	-5	FALSE	TRUE	TRUE	TRUE	3644
R3 E_Offslip	Full	7	25	2	52	4	FALSE	107.9%	27	FALSE	FALSE	TRUE	TRUE	337
R3 W_Offslip	Full	8	16	1	10			-38.5%	-6	FALSE	FALSE	TRUE	TRUE	342

Journey Times
Validation Statistics

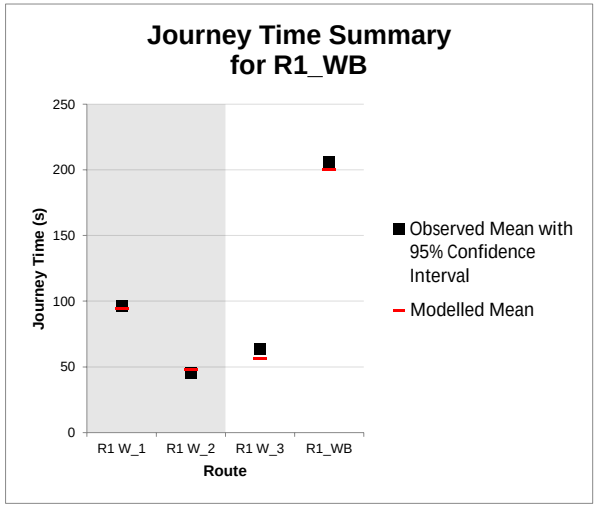
PM Period

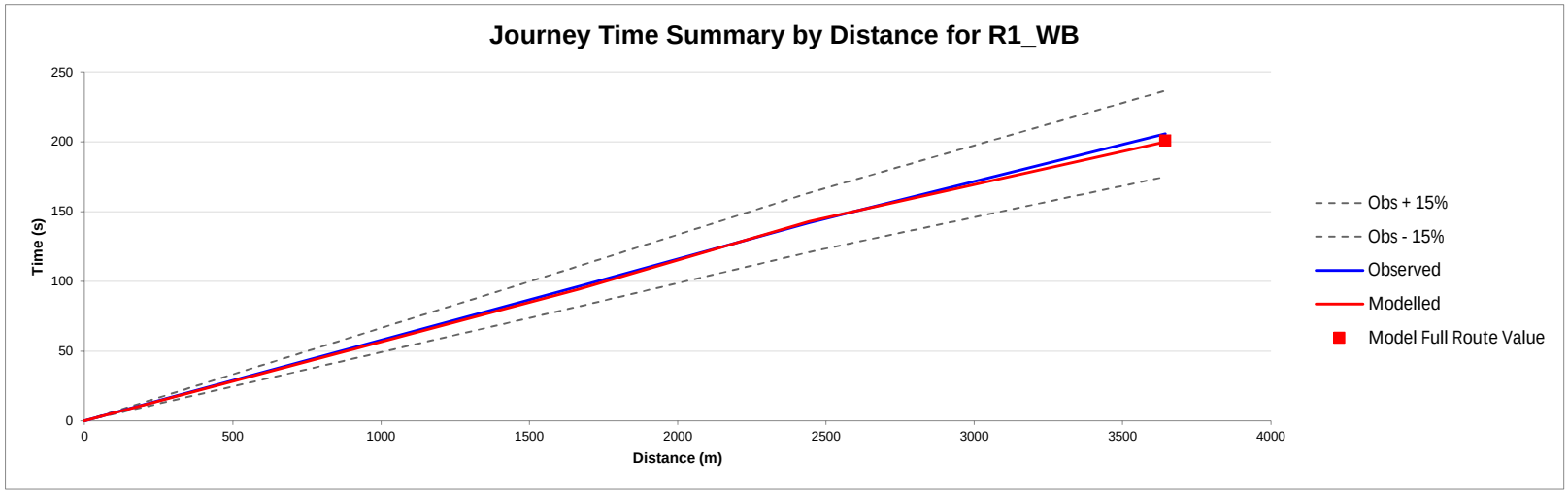




Journey Times
Validation Statistics

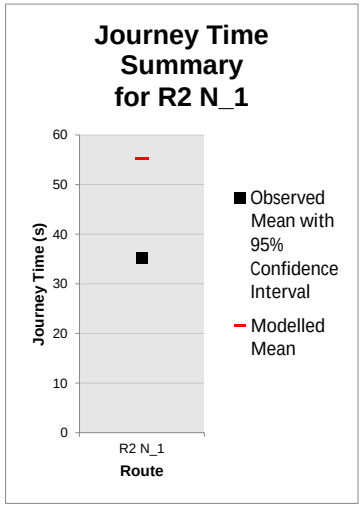
PM Period

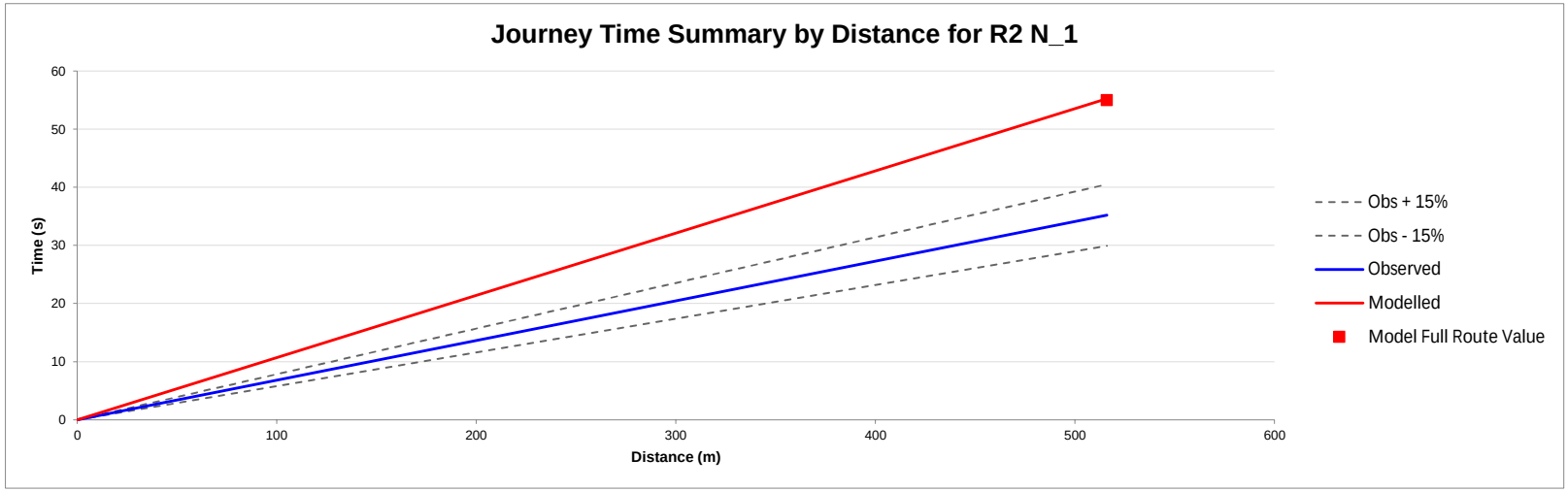




Journey Times
Validation Statistics

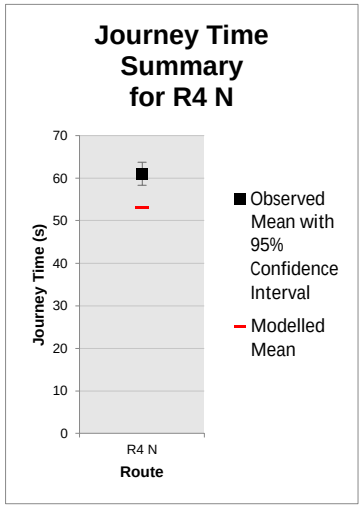
PM Period

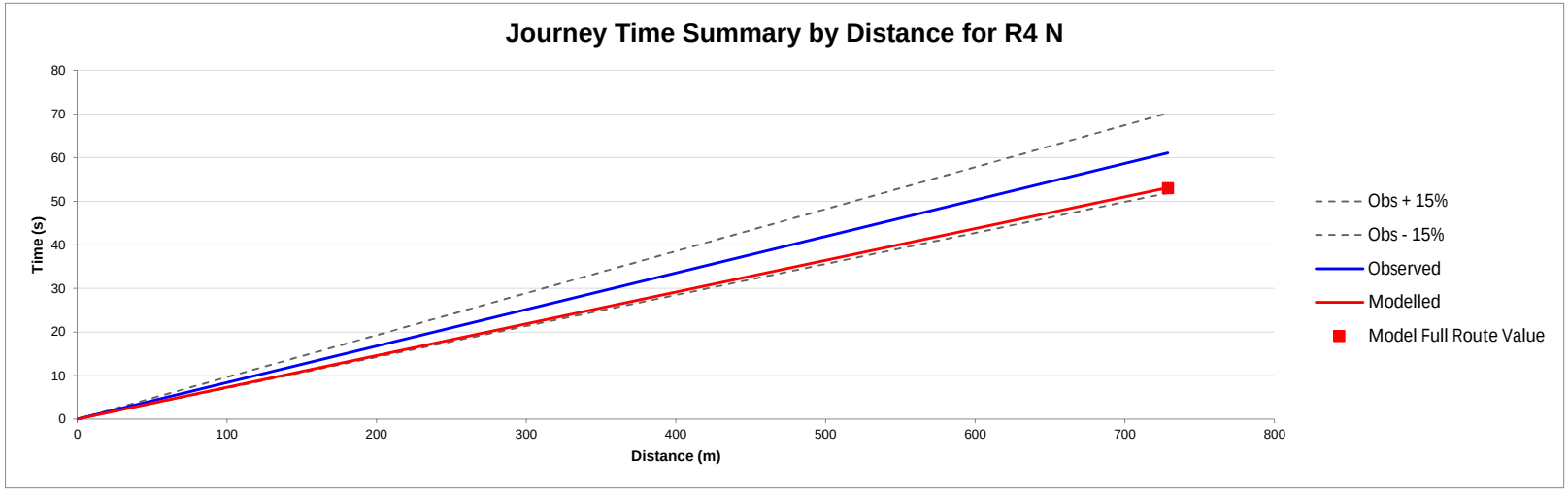




Journey Times
Validation Statistics

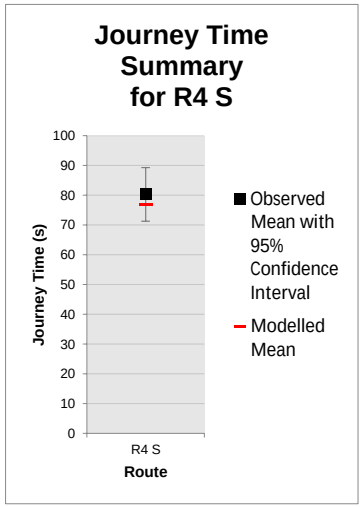
PM Period

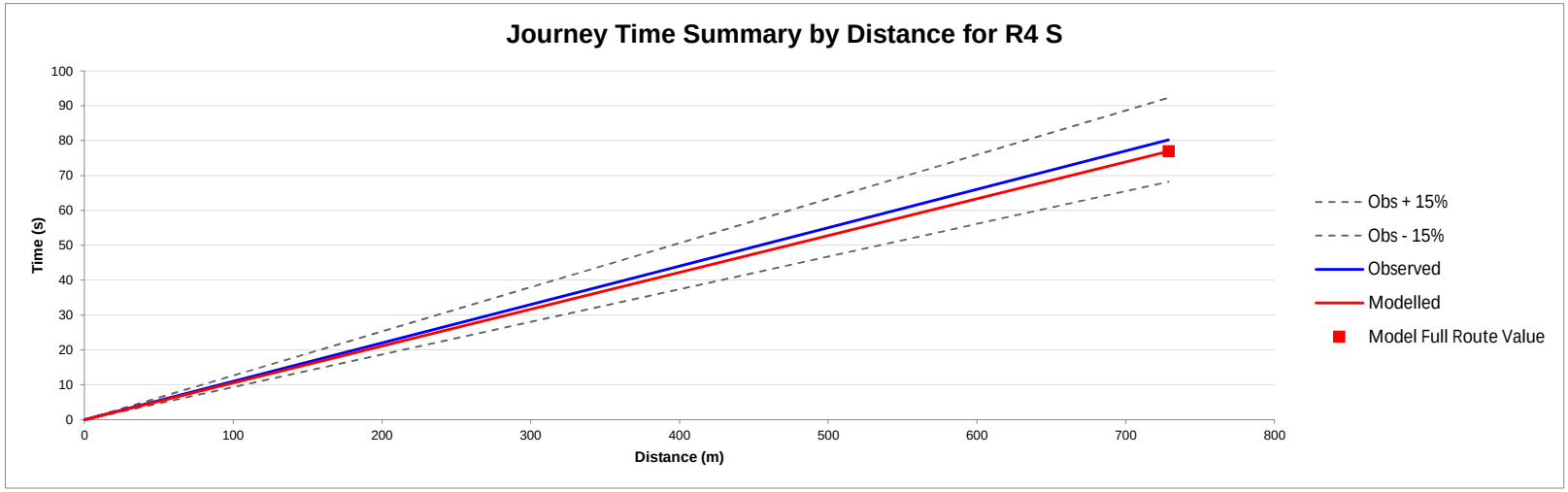




Journey Times
Validation Statistics

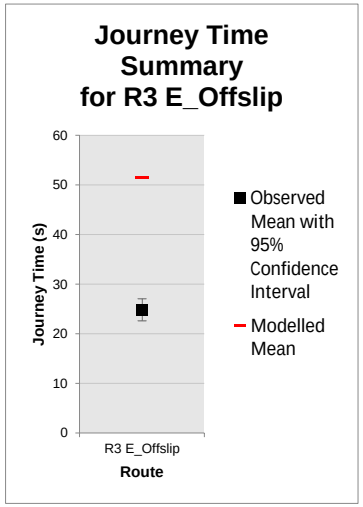
PM Period

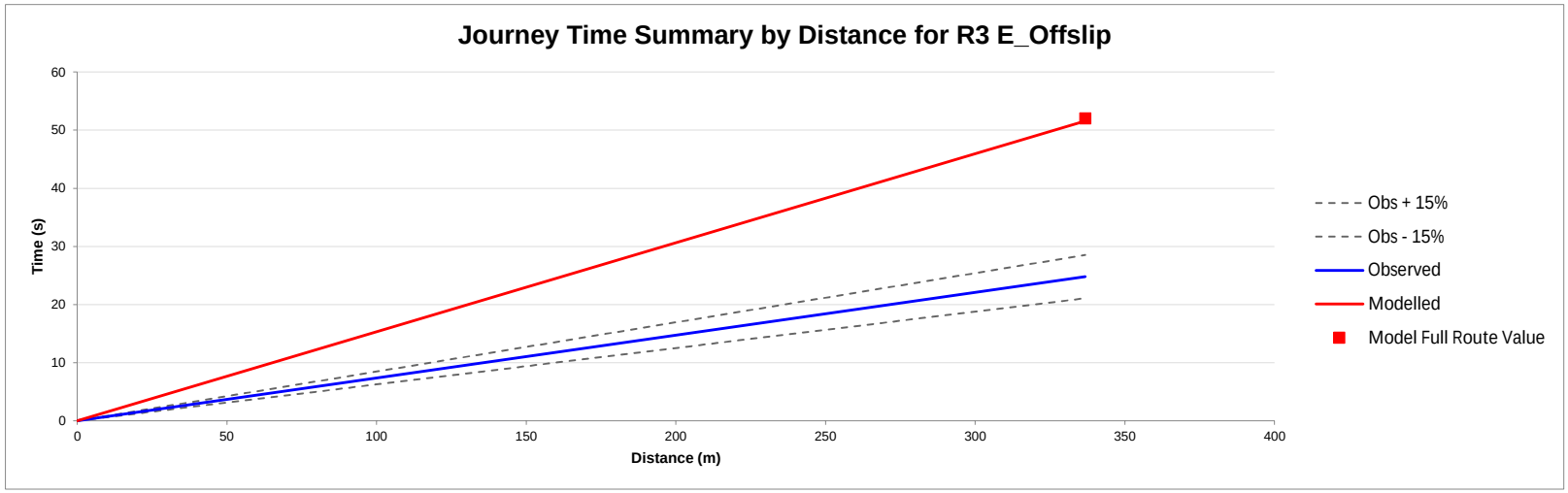




Journey Times
Validation Statistics

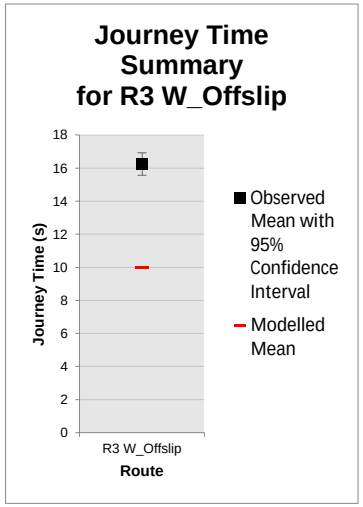
PM Period

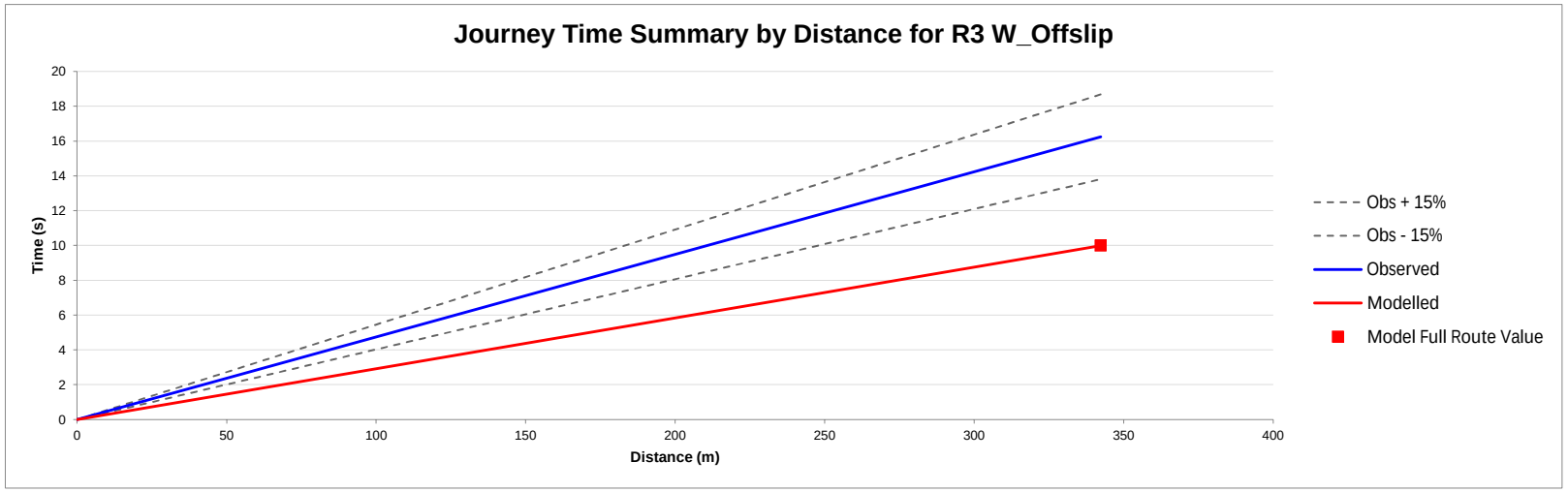




Journey Times
Validation Statistics

PM Period





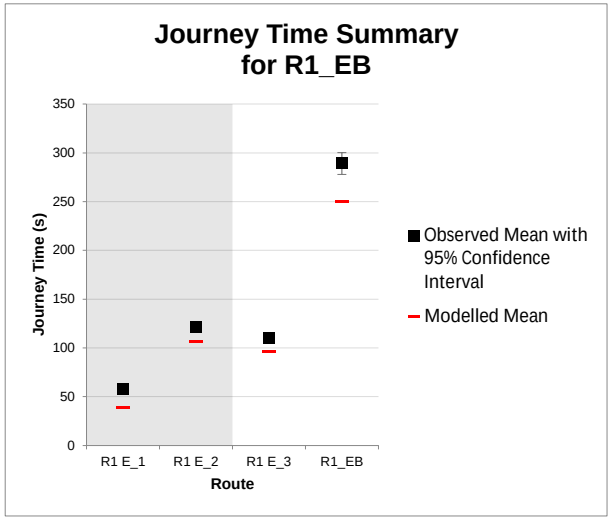
Journey Times
Validation Statistics

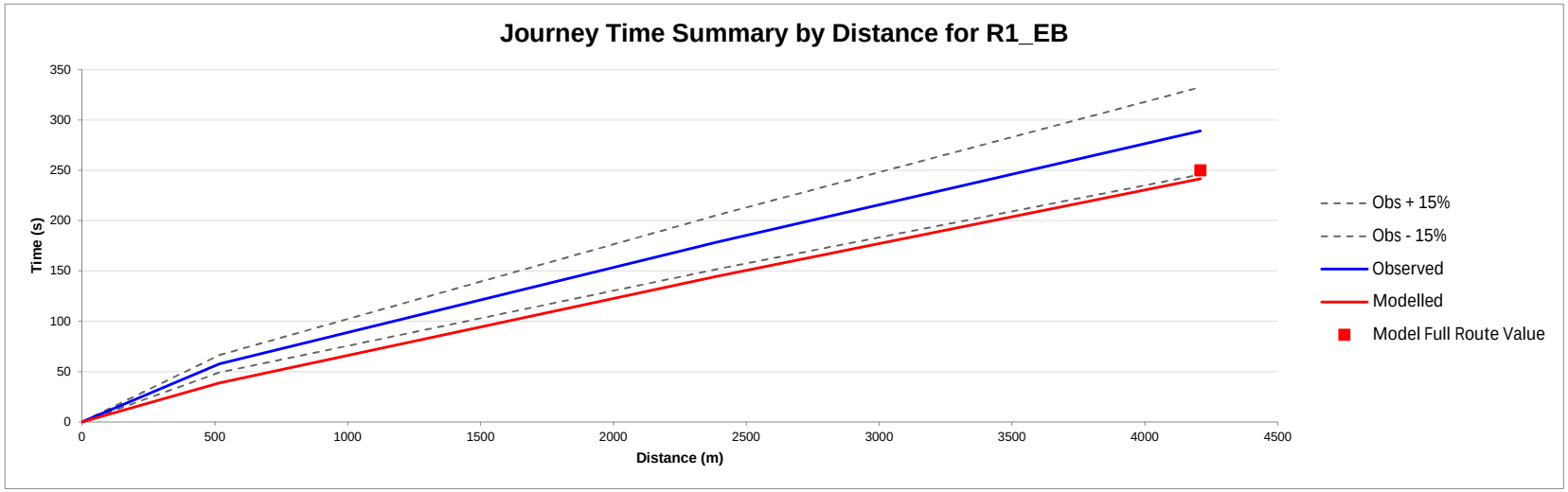
PM Peak

Route:	Segment	Graph Group	Observed		Modelled			% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
			Average	95% Conf	Average	95% Conf	Var Chk							
R1 E_1	Partial - A	1	58	5	39	1	TRUE	-33.3%	-19	FALSE	FALSE	TRUE	TRUE	518
R1 E_2	Partial - B	1	121	4	106	2	TRUE	-12.1%	-15	FALSE	TRUE	TRUE	TRUE	1877
R1 E_3	Partial - C	1	110	3	97	0	TRUE	-12.4%	-14	FALSE	TRUE	TRUE	TRUE	1814
R1 W_1	Partial - A	2	98	4	94	1	TRUE	-4.2%	-4	FALSE	TRUE	TRUE	TRUE	1667
R1 W_2	Partial - B	2	46	1	48	0	TRUE	5.8%	3	FALSE	TRUE	TRUE	TRUE	777
R1 W_3	Partial - C	2	64	2	57	0	TRUE	-10.1%	-6	FALSE	TRUE	TRUE	TRUE	1199
R2 N_1	Full	3	36	1	66	9	FALSE	84.8%	30	FALSE	FALSE	TRUE	TRUE	516
R4 N	Full	5	63	4	53	0	TRUE	-15.9%	-10	FALSE	FALSE	TRUE	TRUE	729
R4 S	Full	6	76	7	77	1	TRUE	1.0%	1	TRUE	TRUE	TRUE	TRUE	729
R1_EB	Full	1	289	11	250	4	TRUE	-13.6%	-39	FALSE	TRUE	TRUE	TRUE	4209
R1_WB	Full	2	208	6	201	1	TRUE	-3.3%	-7	FALSE	TRUE	TRUE	TRUE	3644
R3 E_Offslip	Full	7	25	2	66	7	FALSE	167.4%	41	FALSE	FALSE	TRUE	TRUE	337
R3 W_Offslip	Full	8	16	1	10			-37.9%	-6	FALSE	FALSE	TRUE	TRUE	342

Journey Times
Validation Statistics

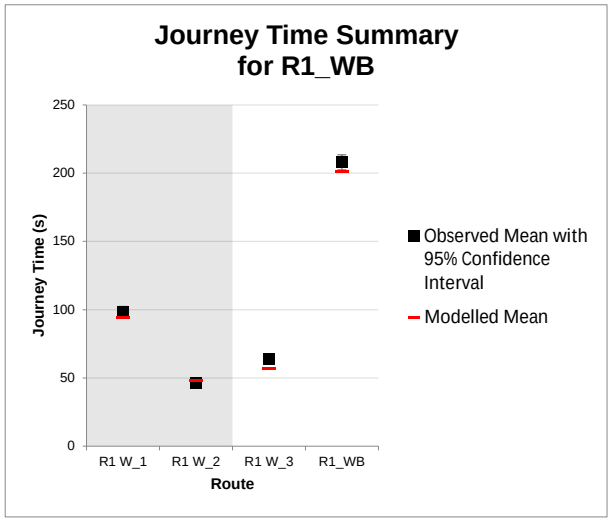
PM Peak

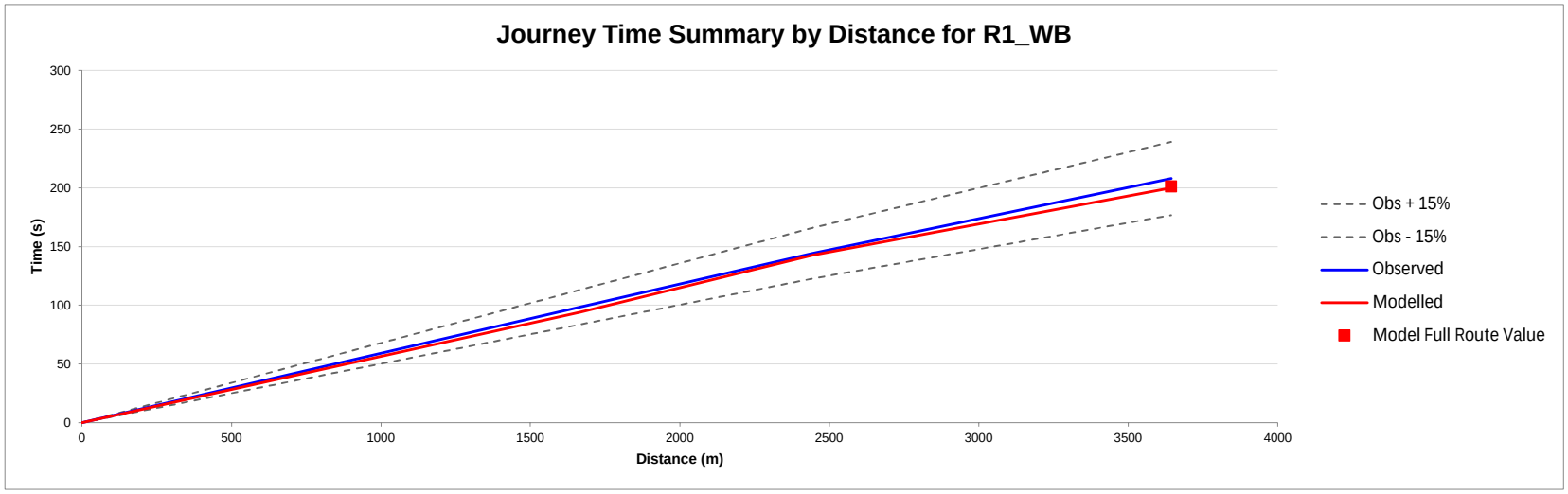




Journey Times
Validation Statistics

PM Peak





Journey Times
Validation Statistics

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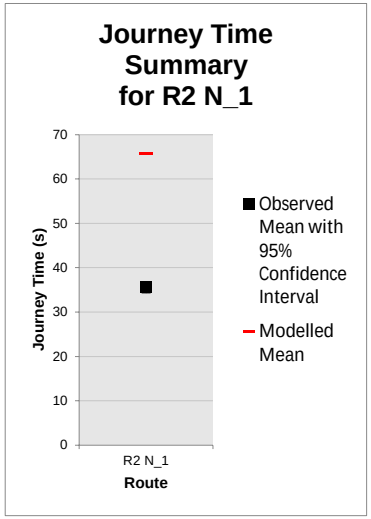
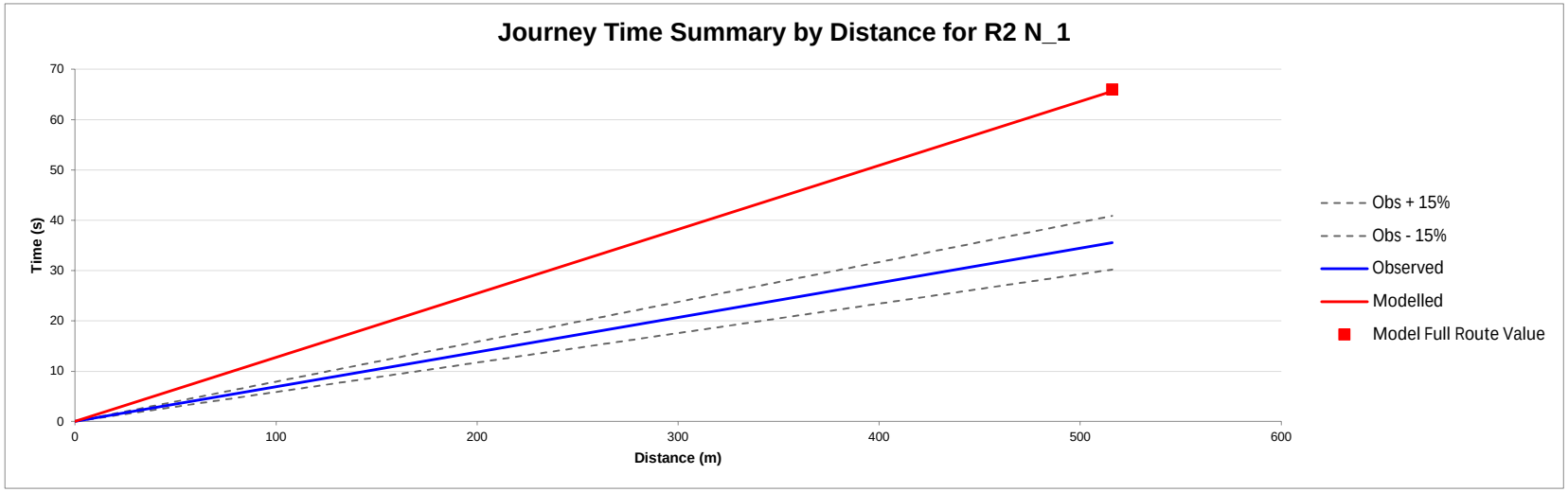
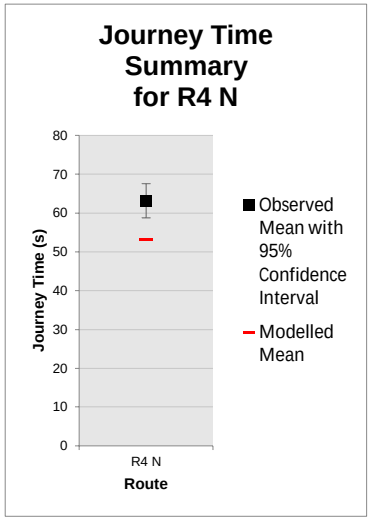
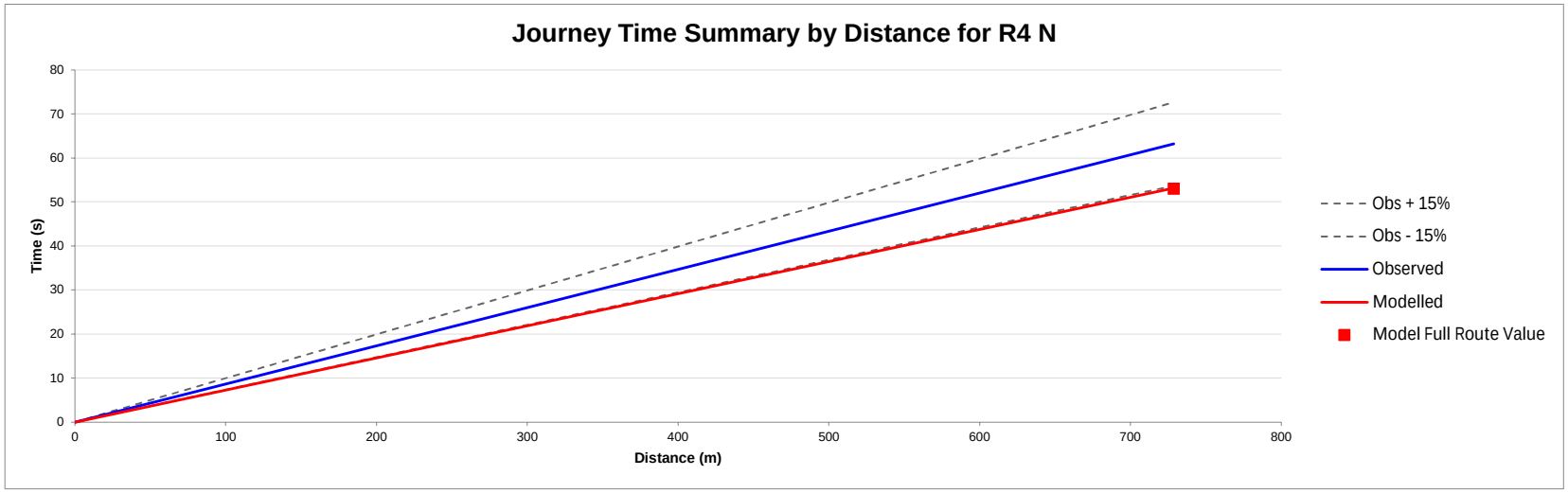




Journey Times
Validation Statistics

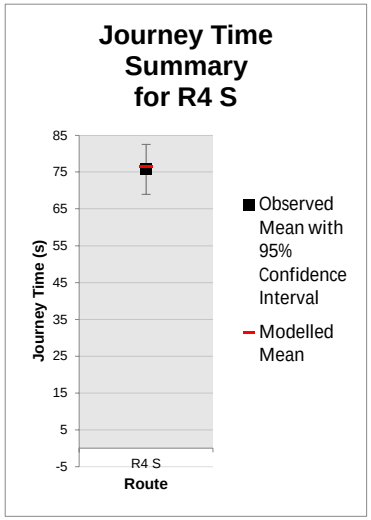
PM Peak

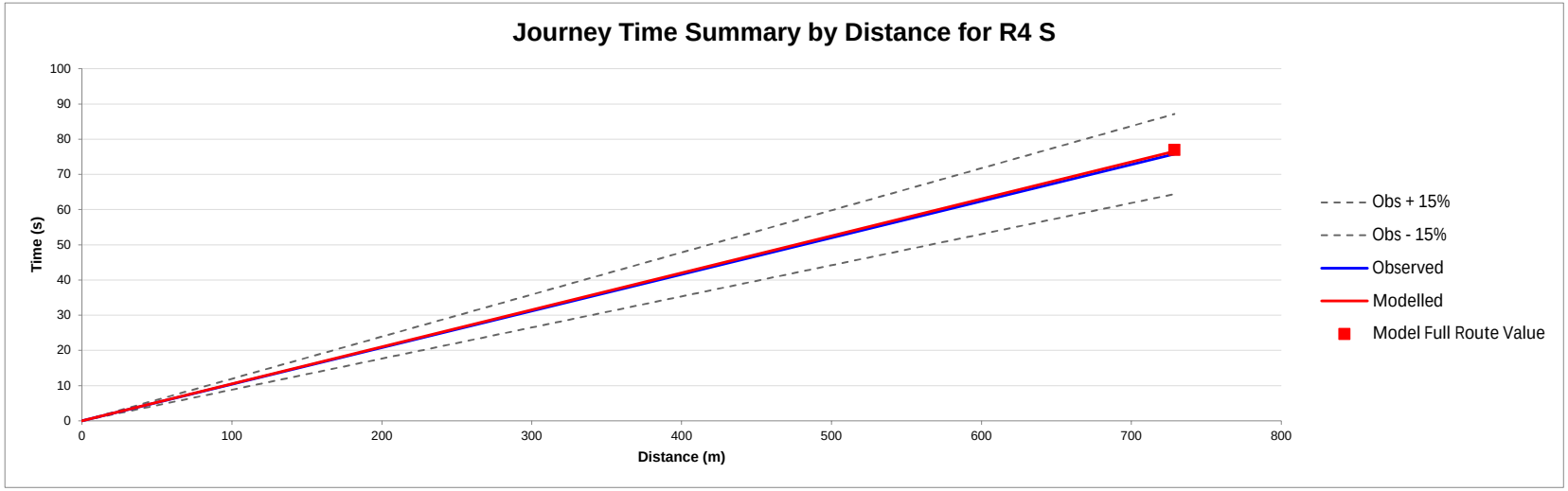




Journey Times
Validation Statistics

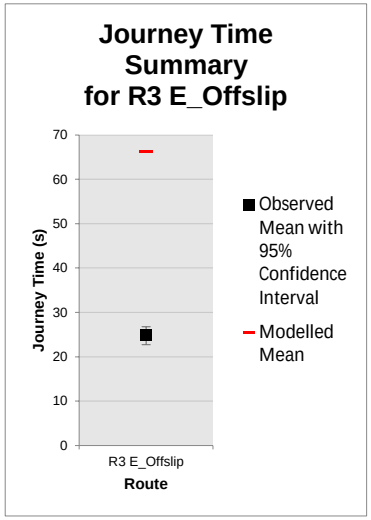
PM Peak

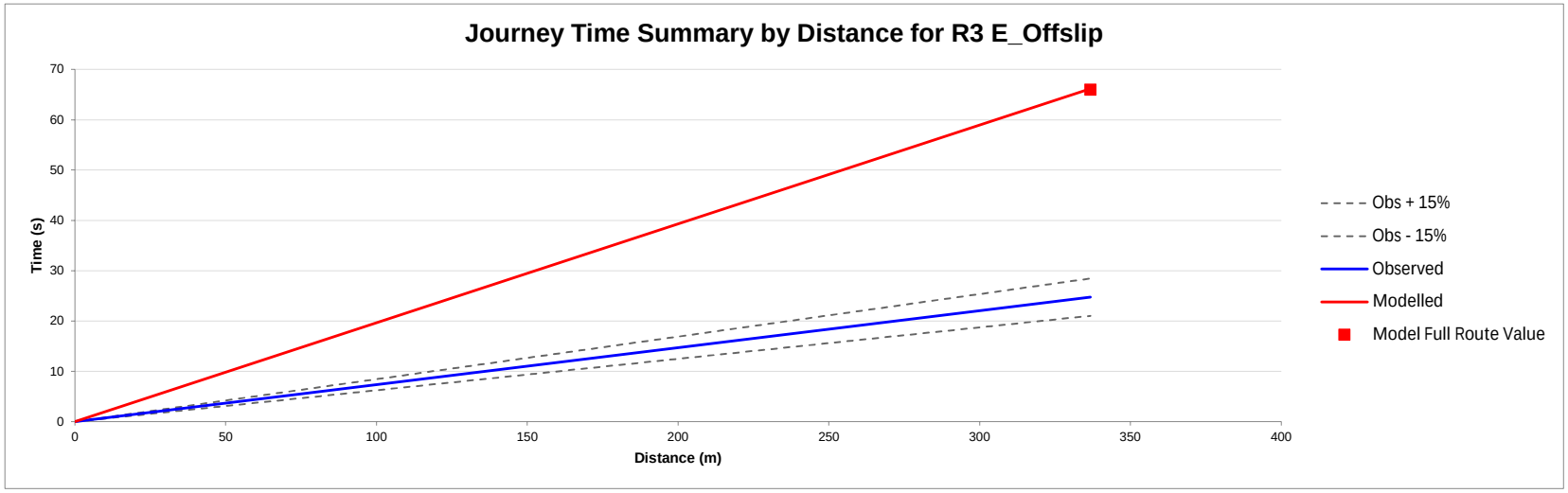




Journey Times
Validation Statistics

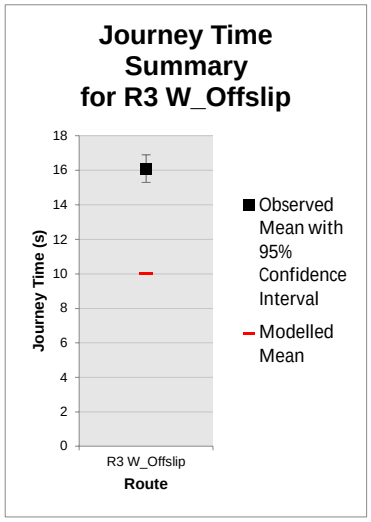
PM Peak

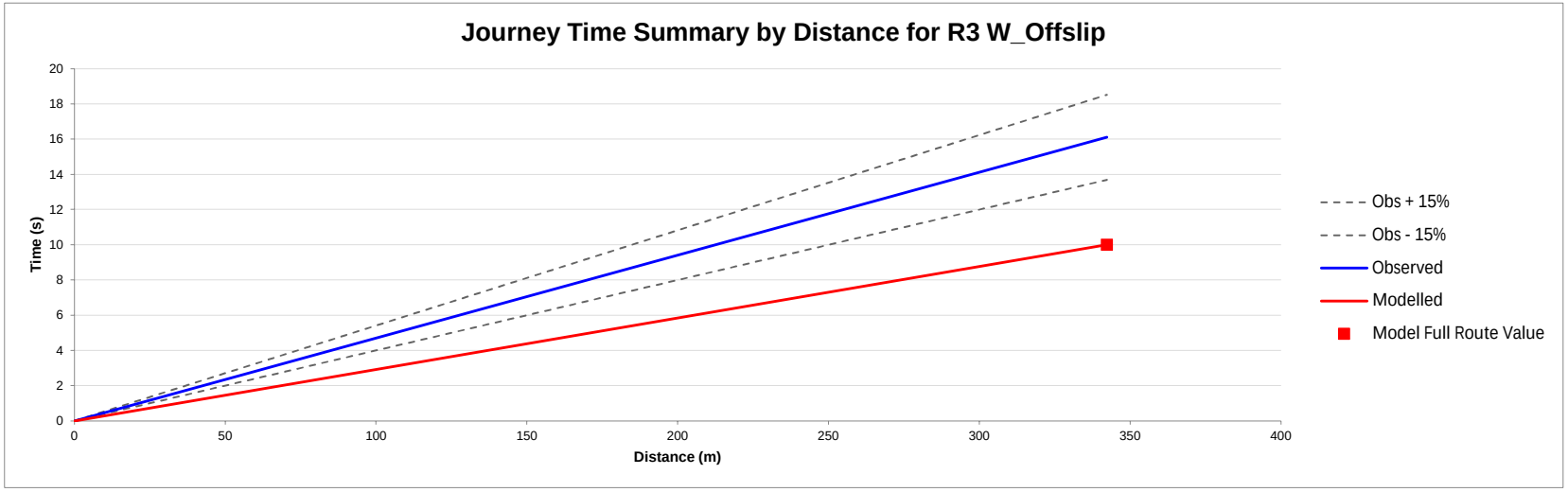




Journey Times
Validation Statistics

PM Peak



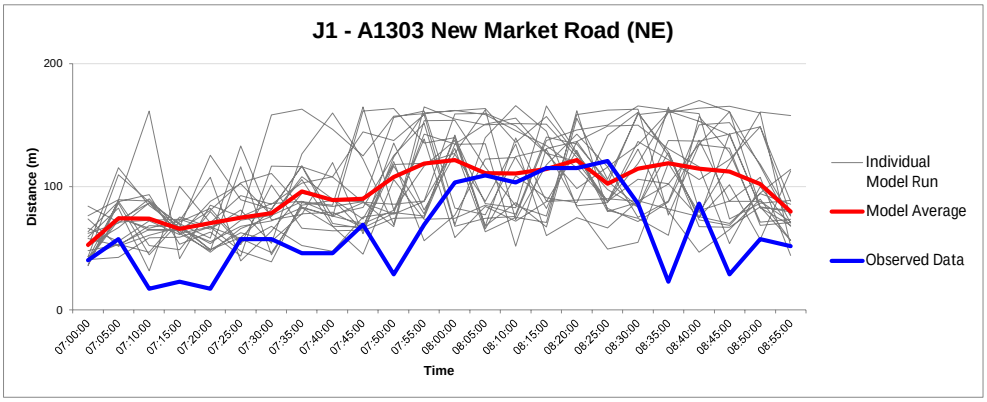


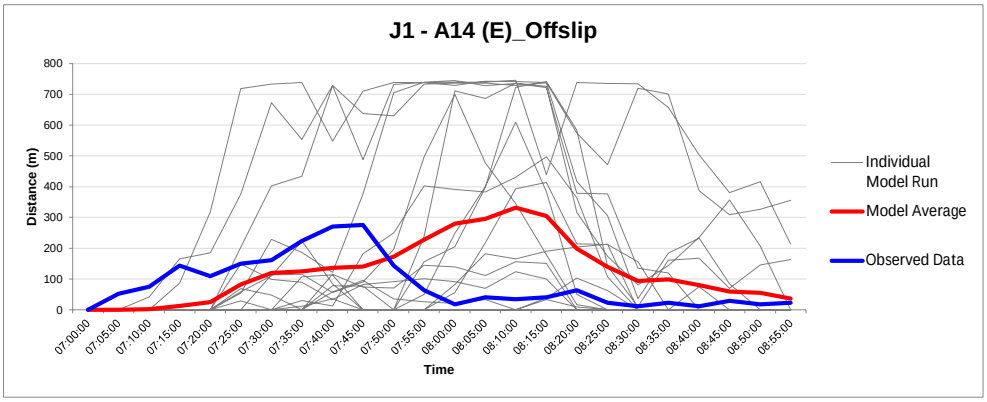
Appendix D

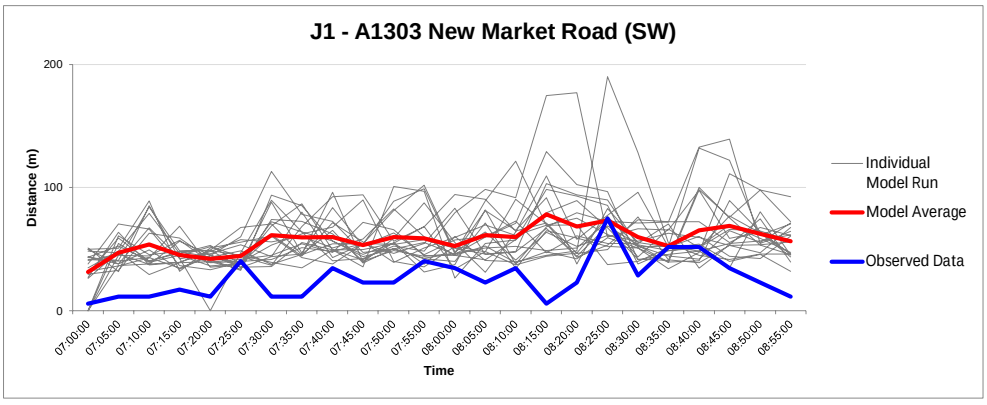
QUEUE LENGTH CALIBRATION

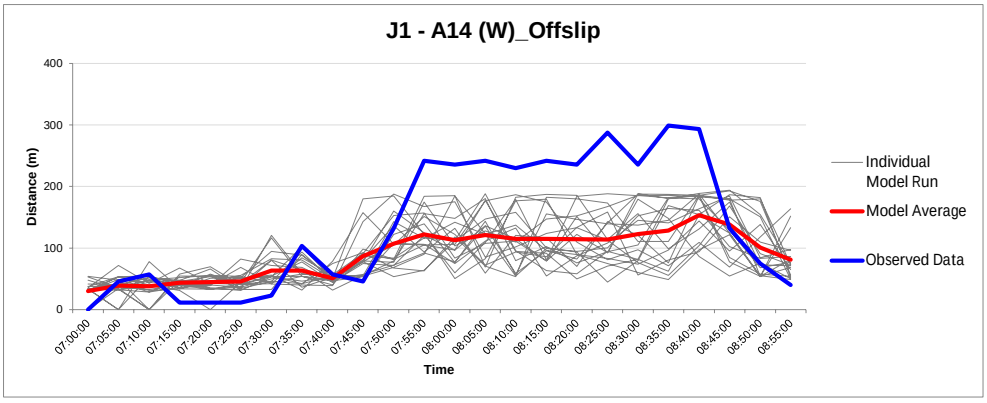
Queue Graphs

Junction Number 1
AM Period



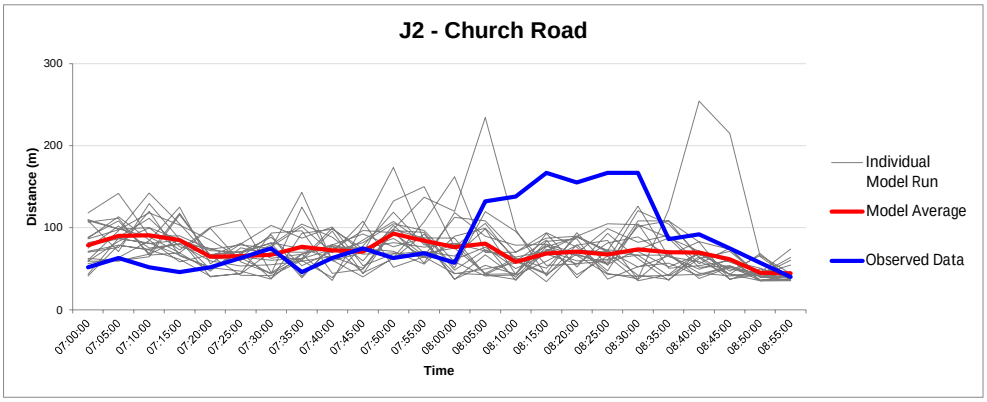


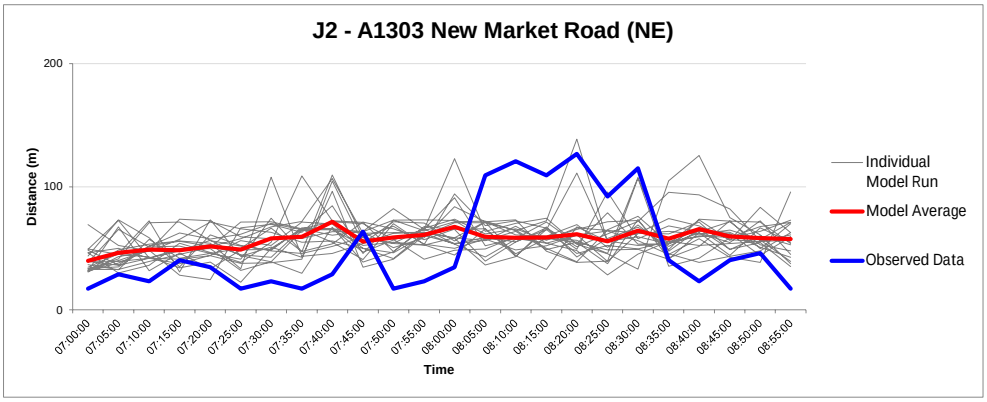


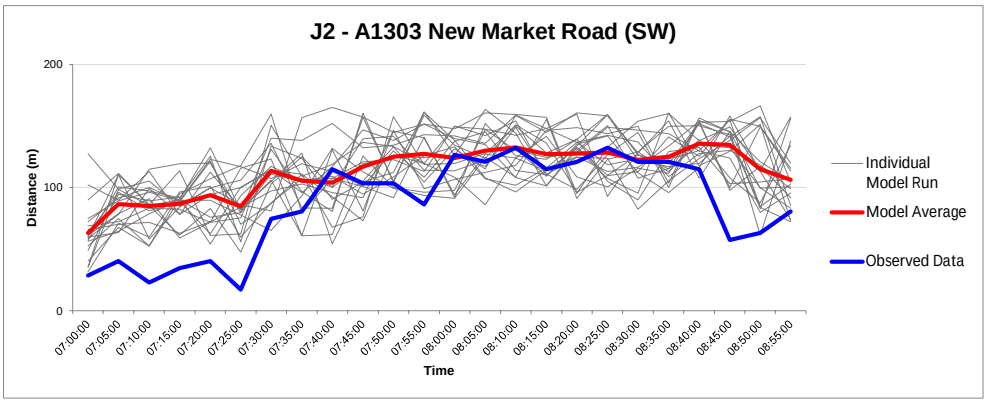


Queue Graphs

Junction Number 2
AM Period

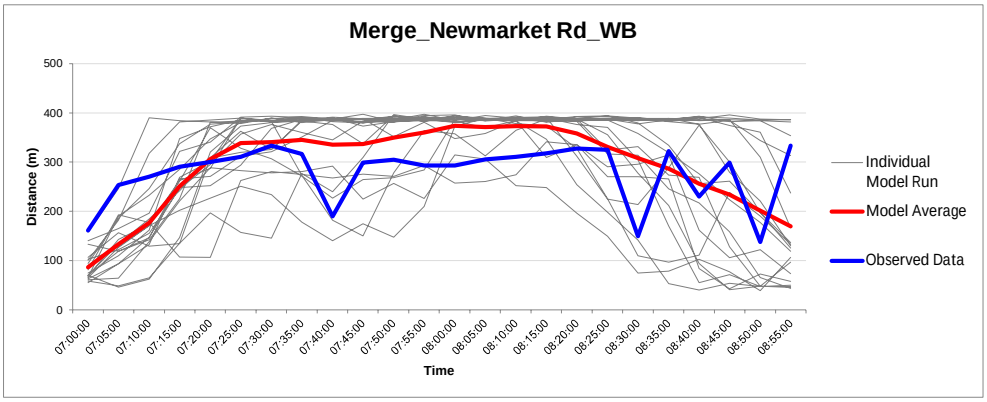






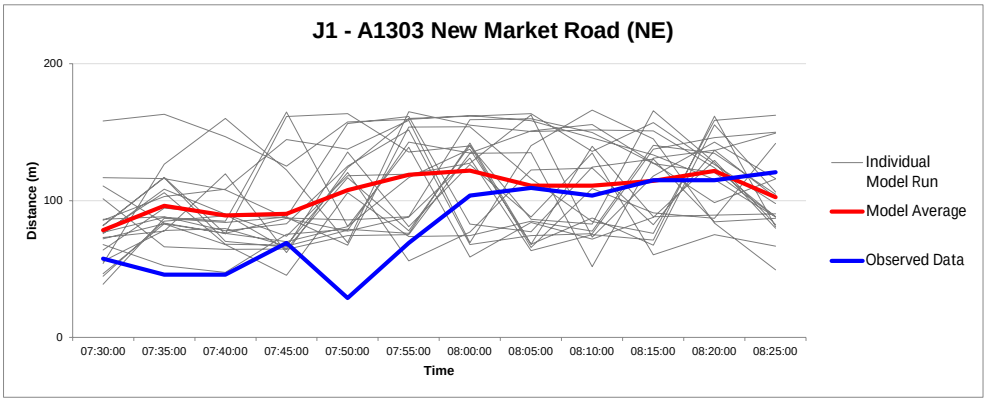
Queue Graphs

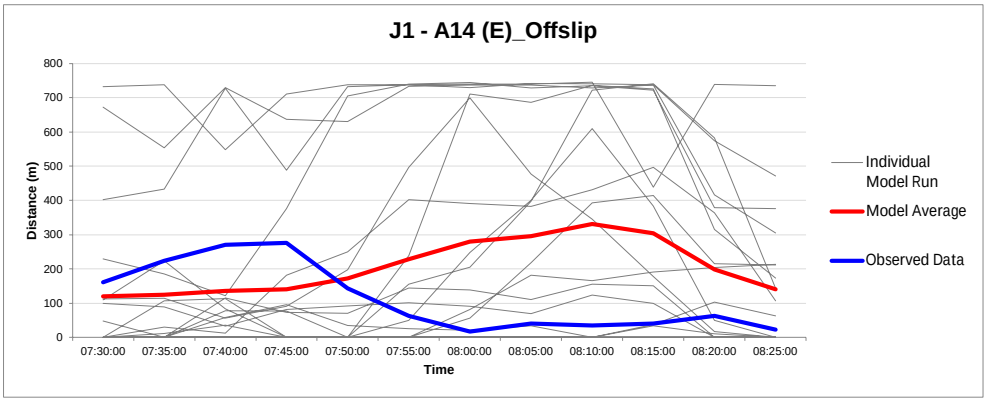
Junction Number 3
AM Period

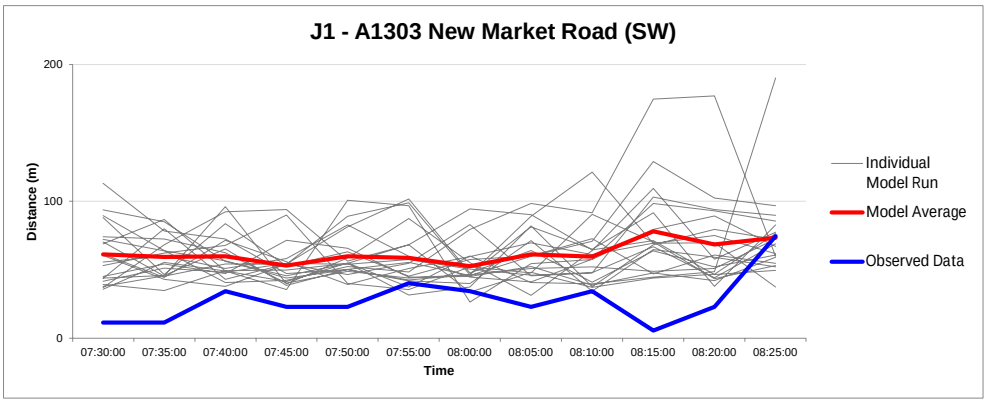


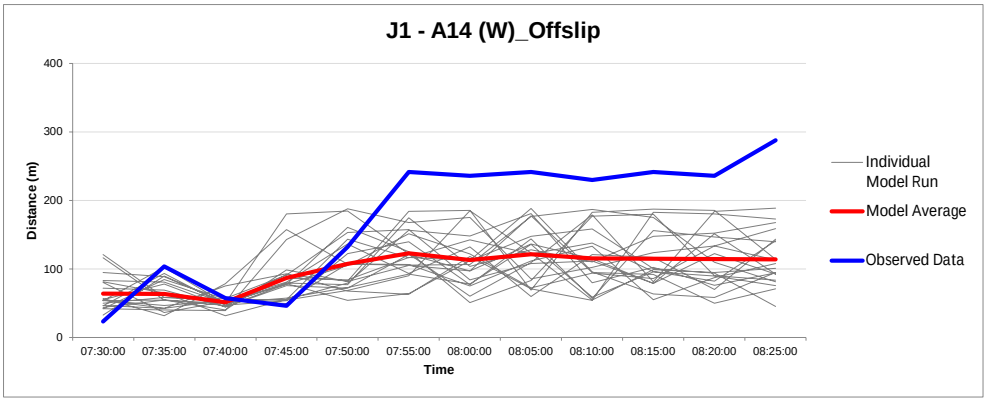
Queue Graphs

Junction Number 1
AM Peak



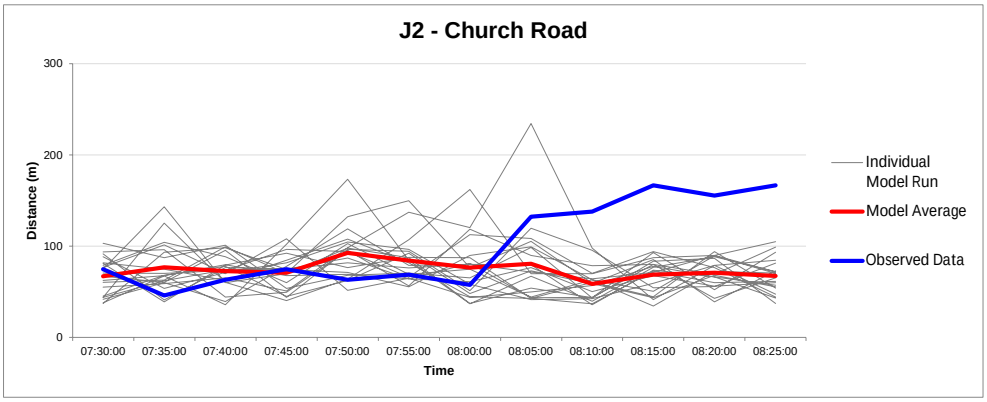


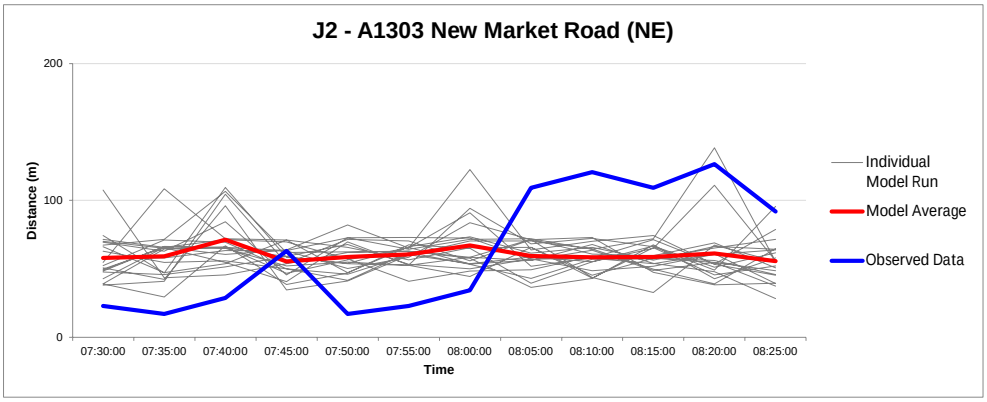


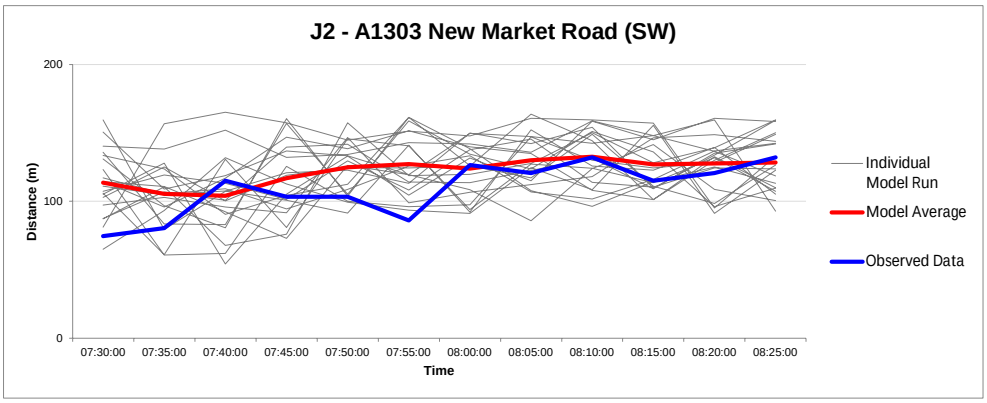


Queue Graphs

Junction Number 2
AM Peak

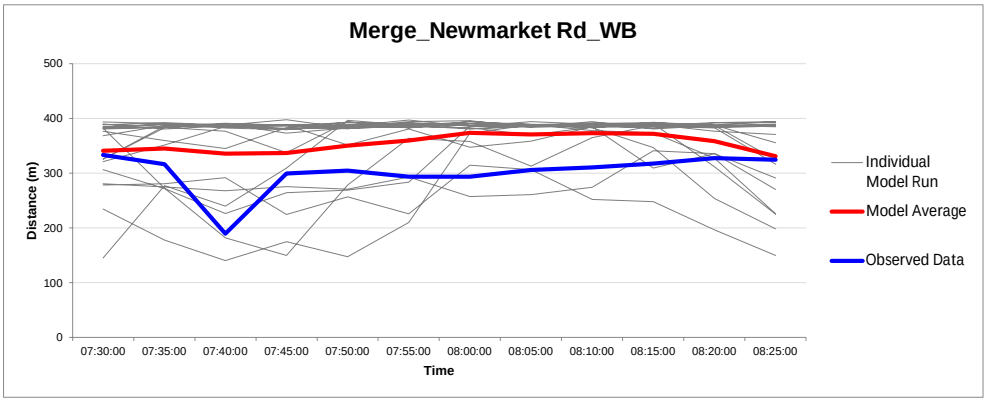






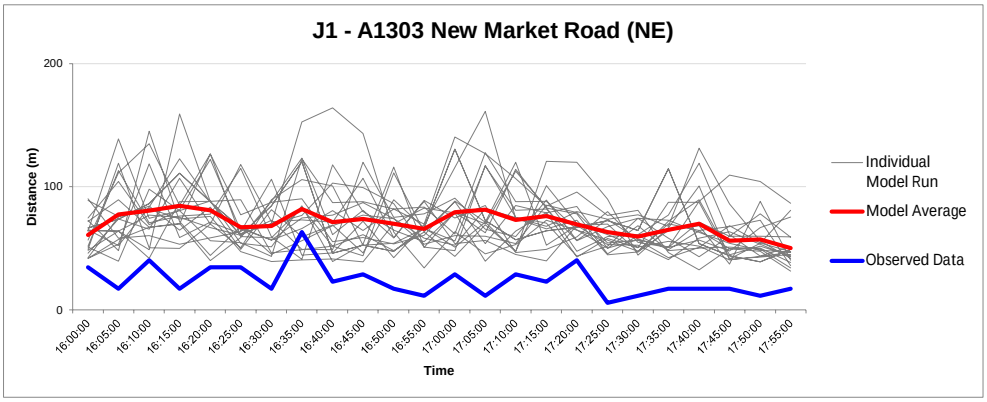
Queue Graphs

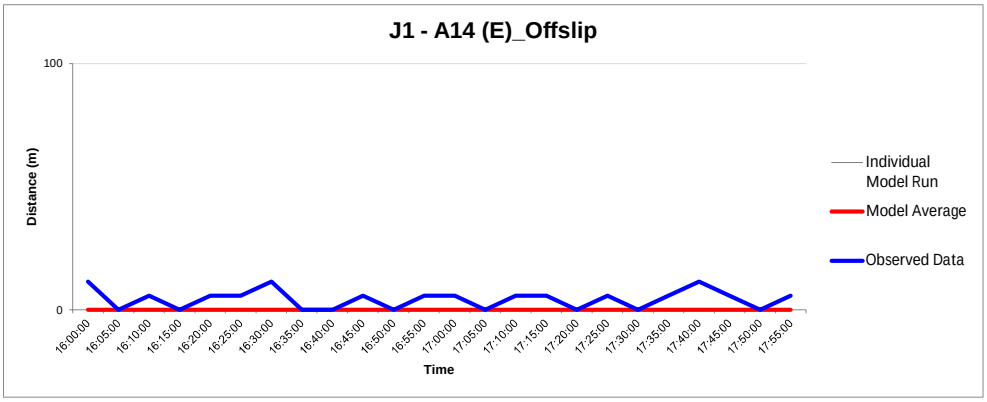
Junction Number 3
AM Peak

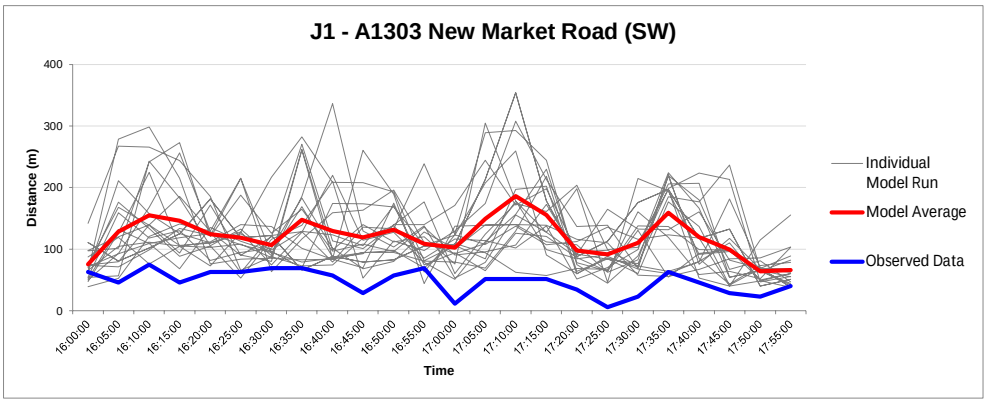


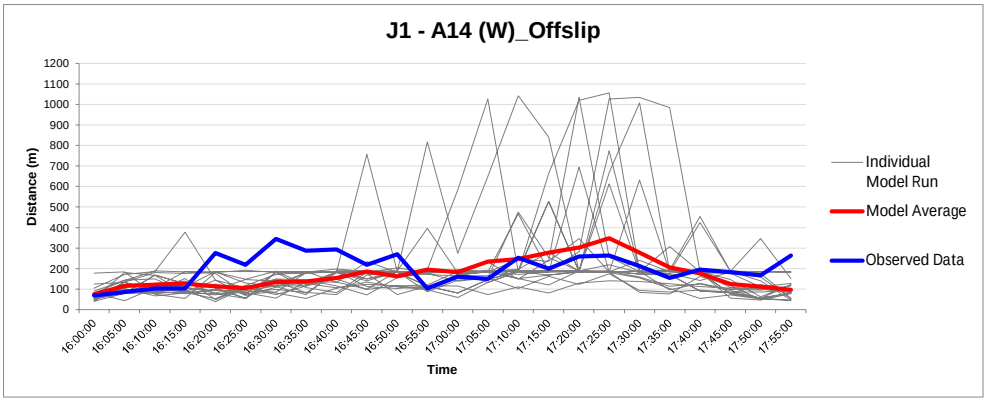
Queue Graphs

Junction Number 1
PM Period



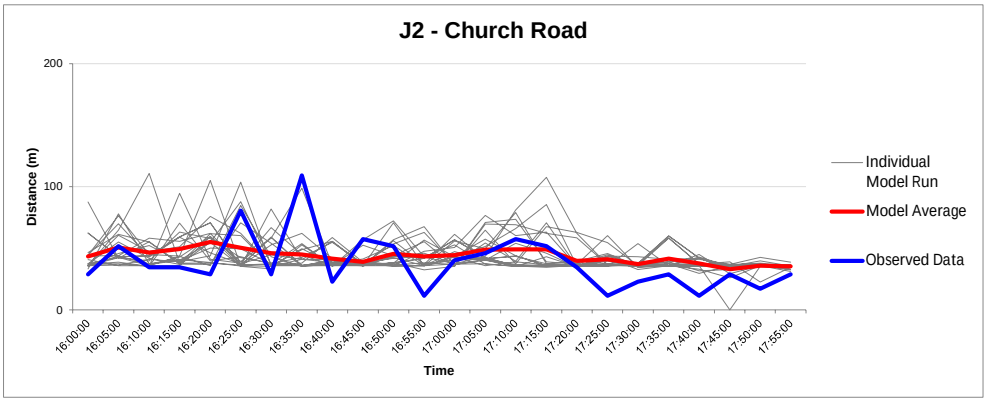


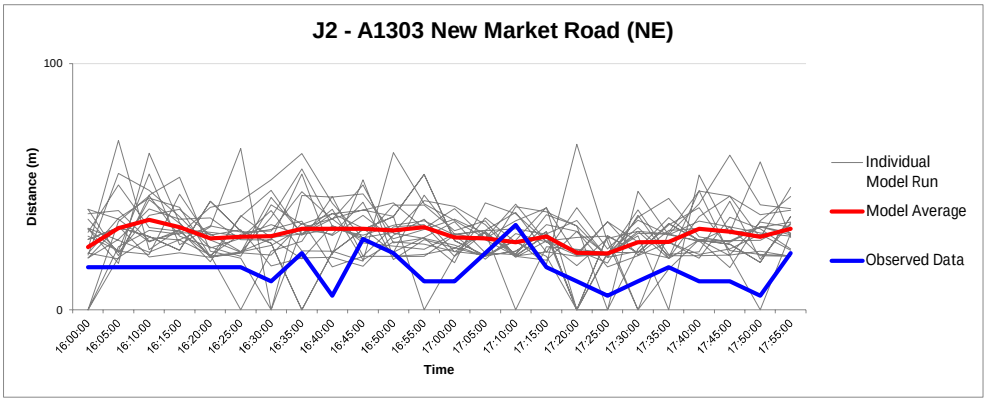


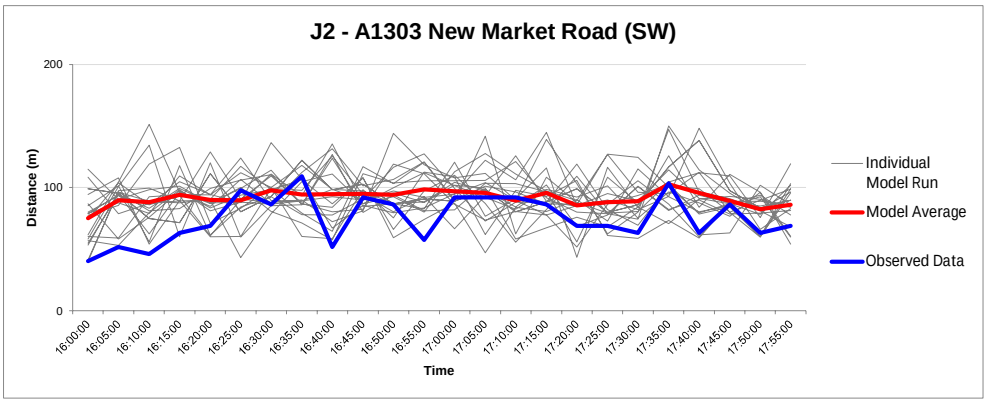


Queue Graphs

Junction Number 2
PM Period

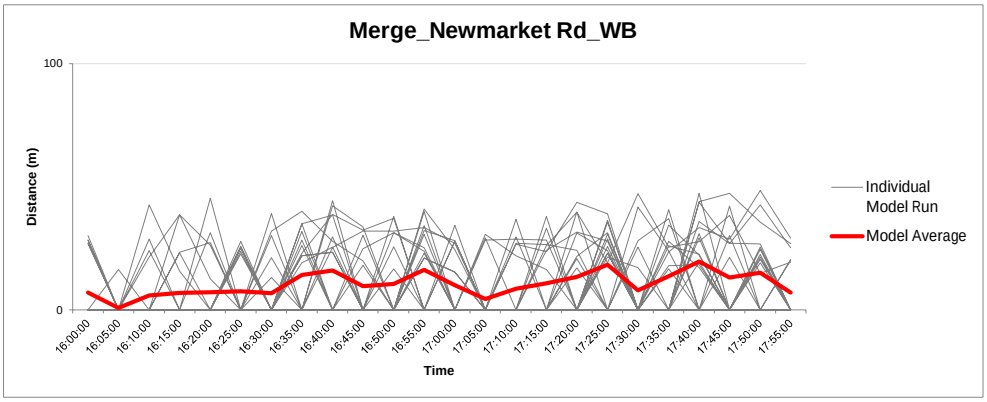






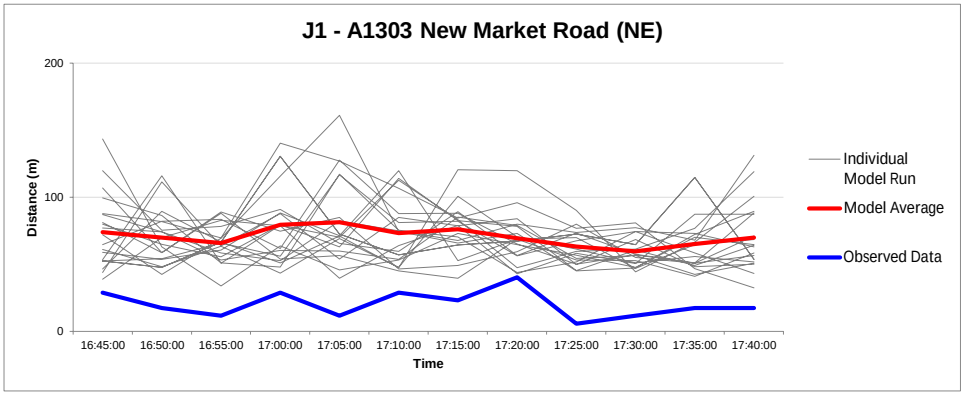
Queue Graphs

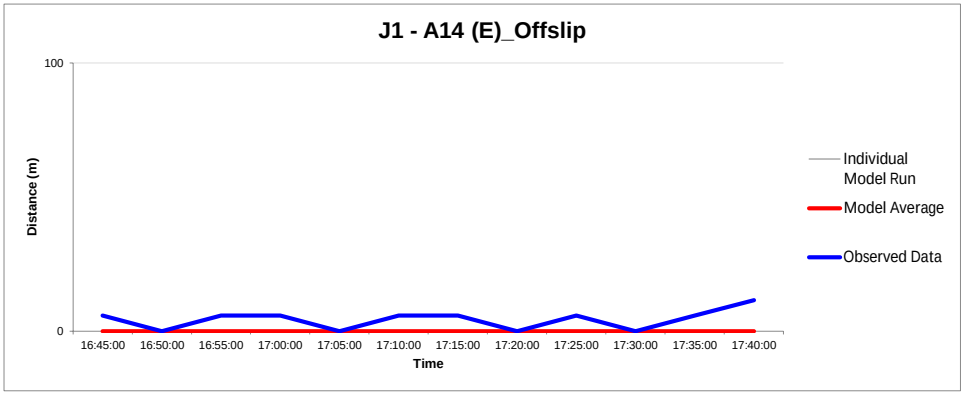
Junction Number 3
PM Period

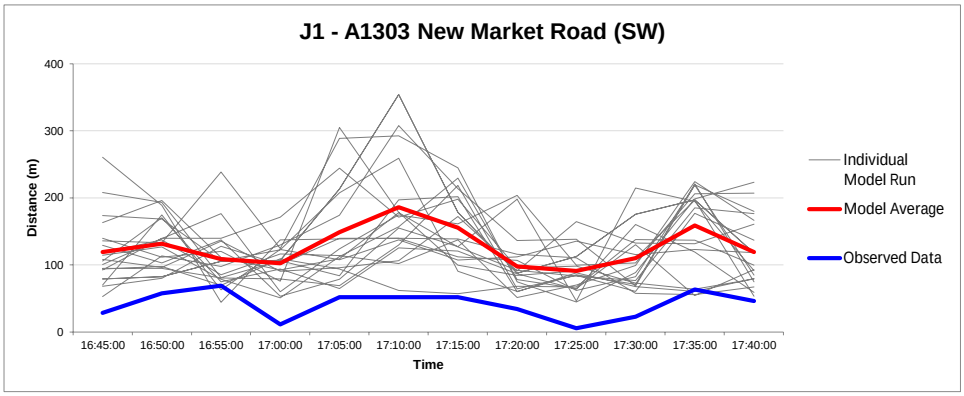


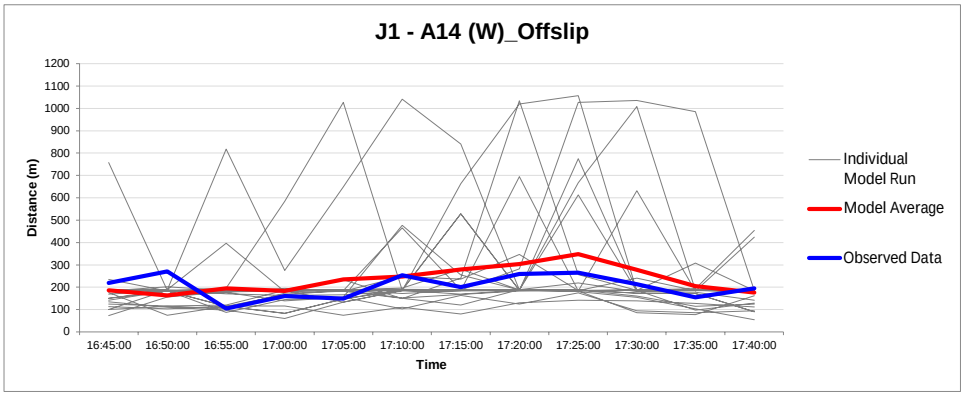
Queue Graphs

Junction Number 1
PM Peak



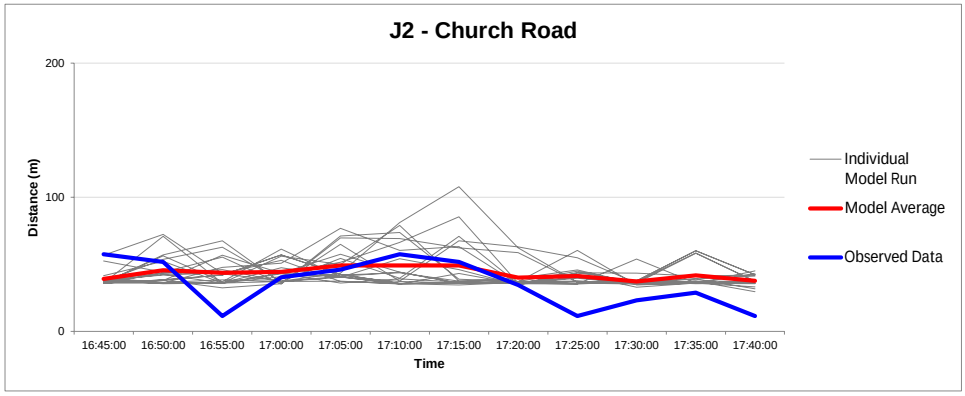


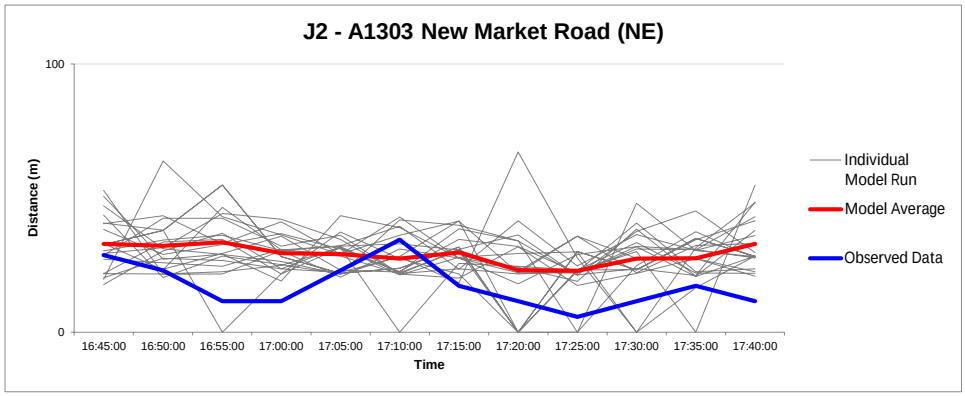


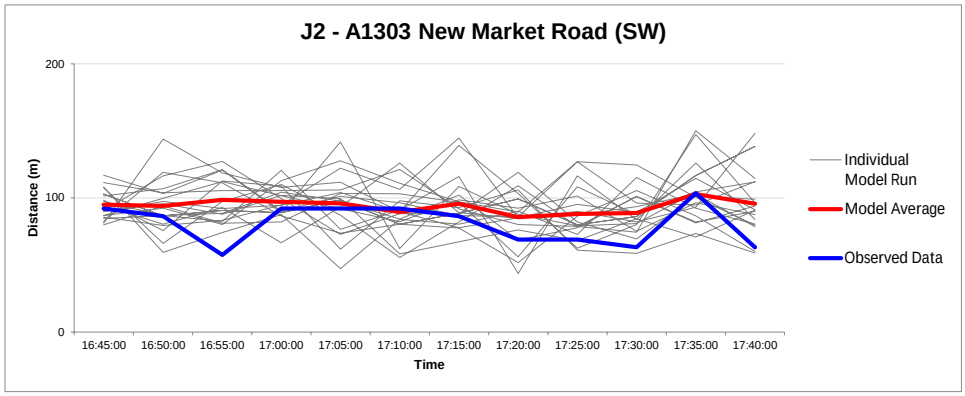


Queue Graphs

Junction Number 2
PM Peak

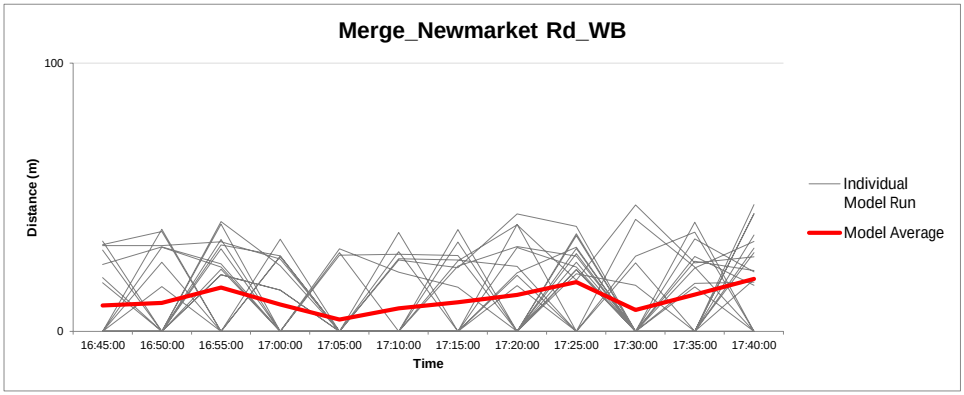






Queue Graphs

Junction Number 3
PM Peak

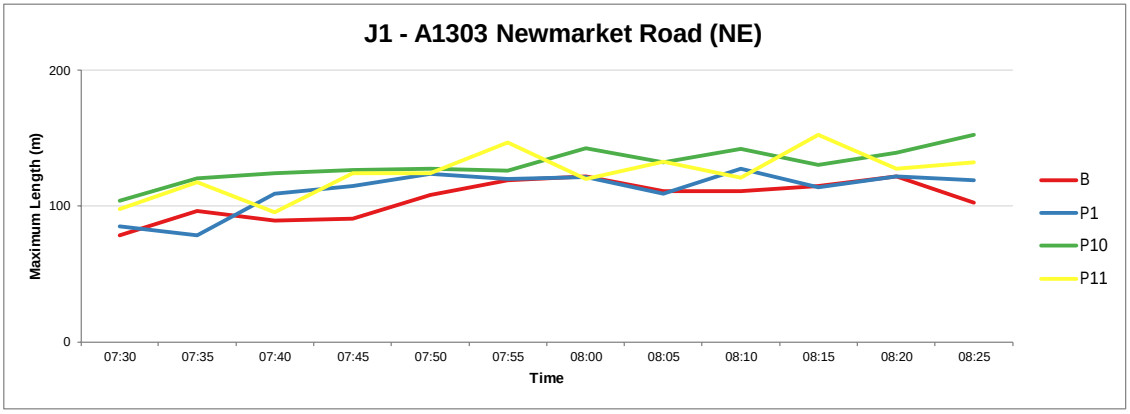


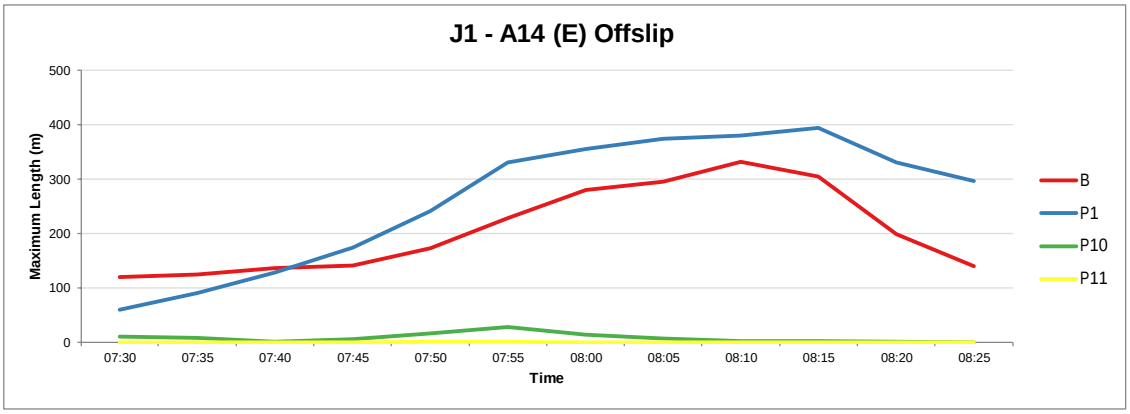
Appendix D

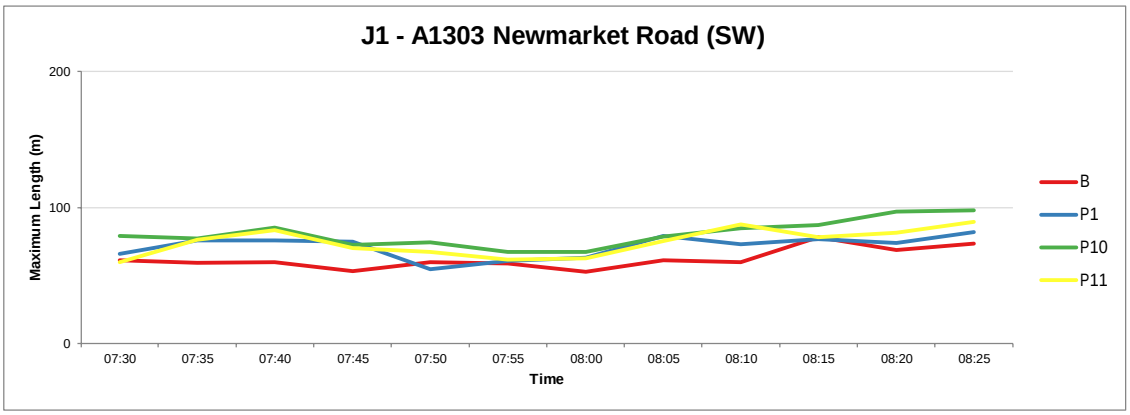
APPENDIX D PARAMICS MODEL RESULTS

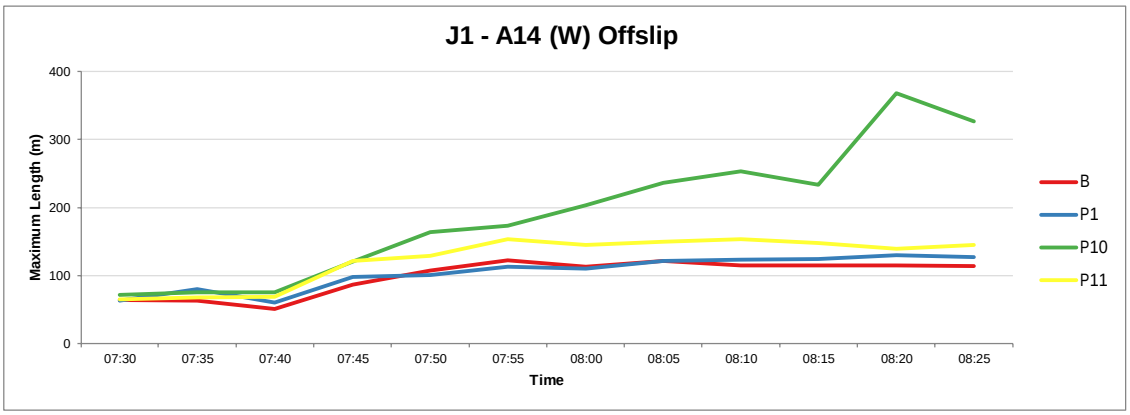
Comparison Graphs
AM

Quy interchange



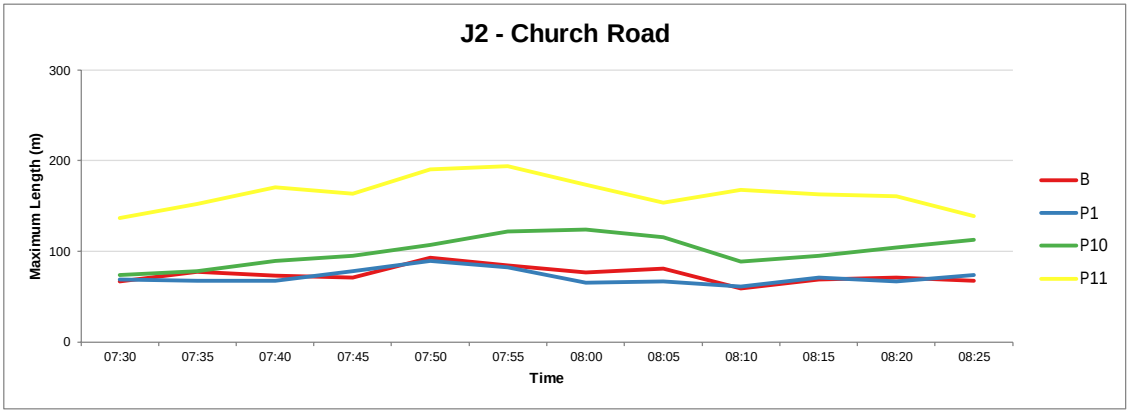


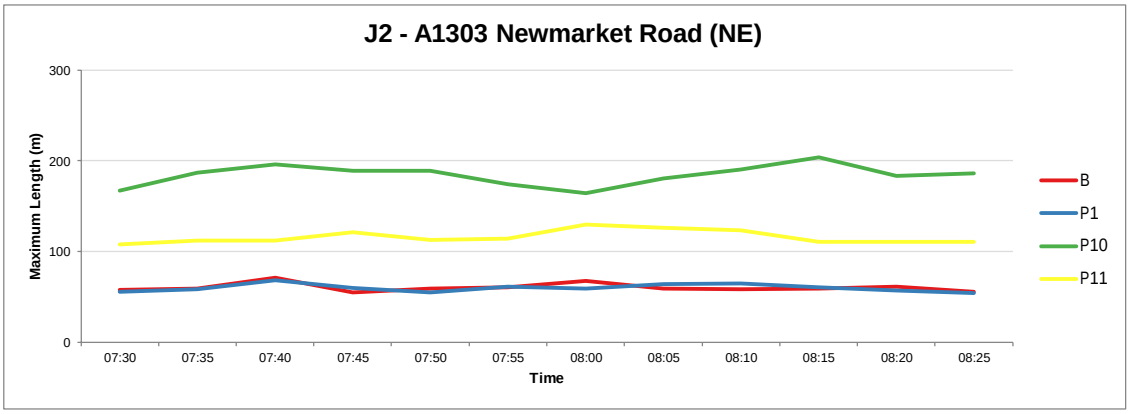


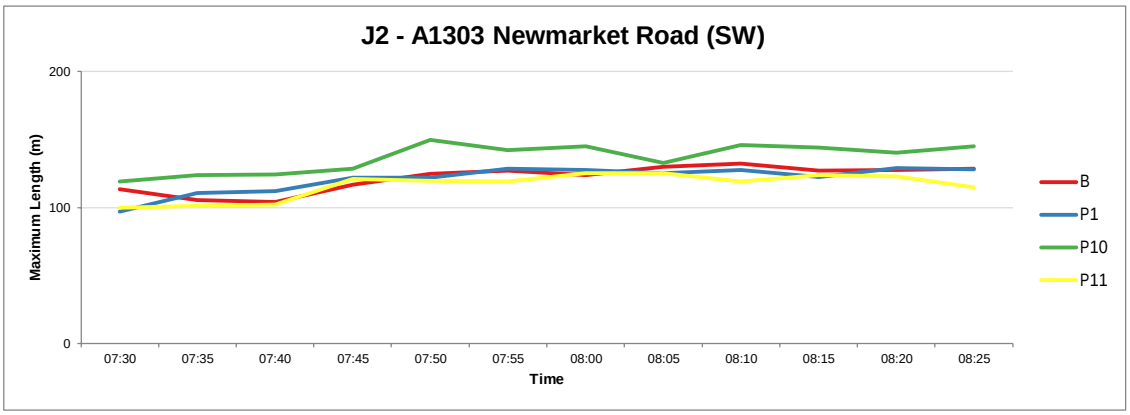


Comparison Graphs
AM

Church Road/Newmarket Road

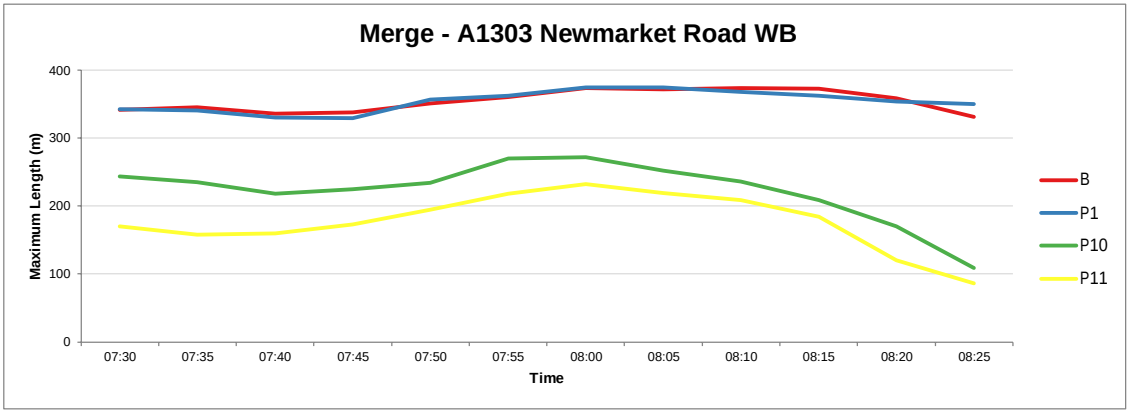






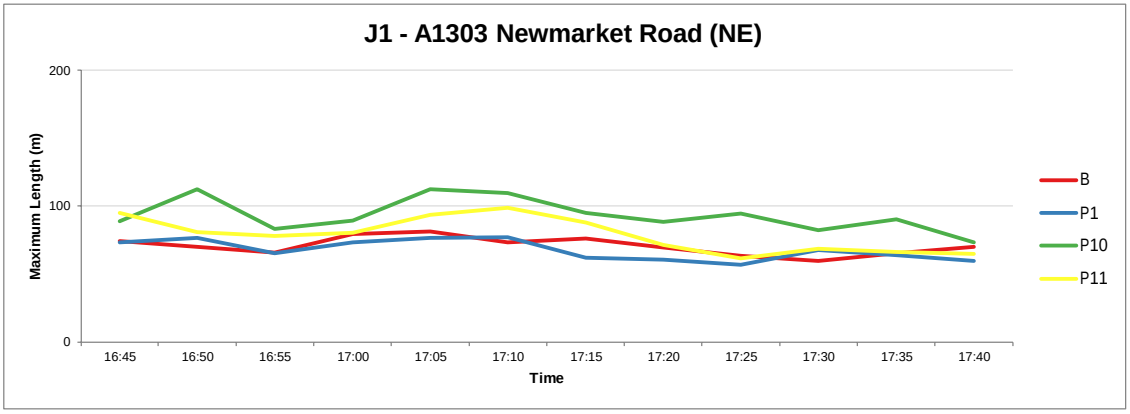
Comparison Graphs
AM

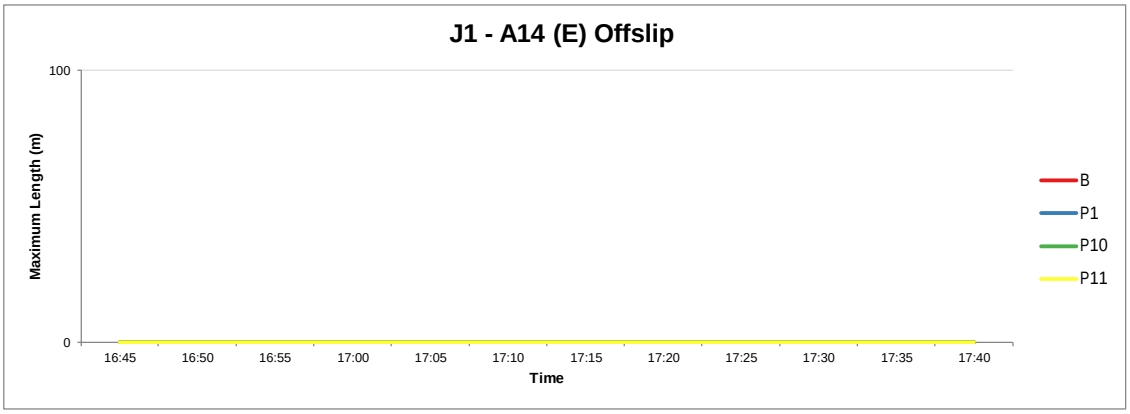
Merge Newmarket Road WB

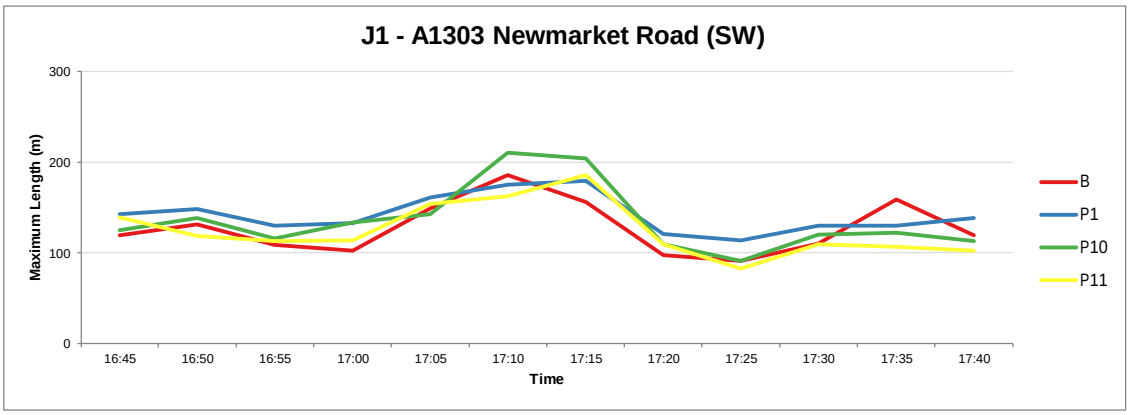


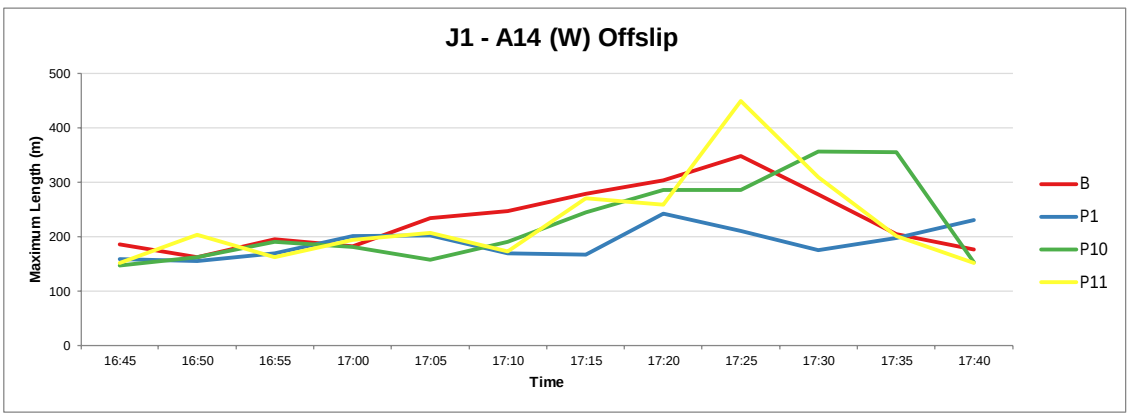
Comparison Graphs
PM

Quy interchange



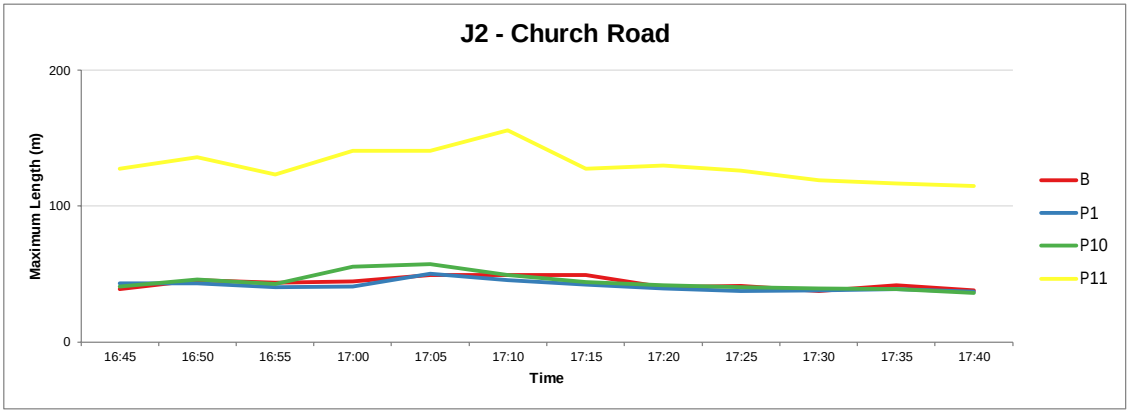


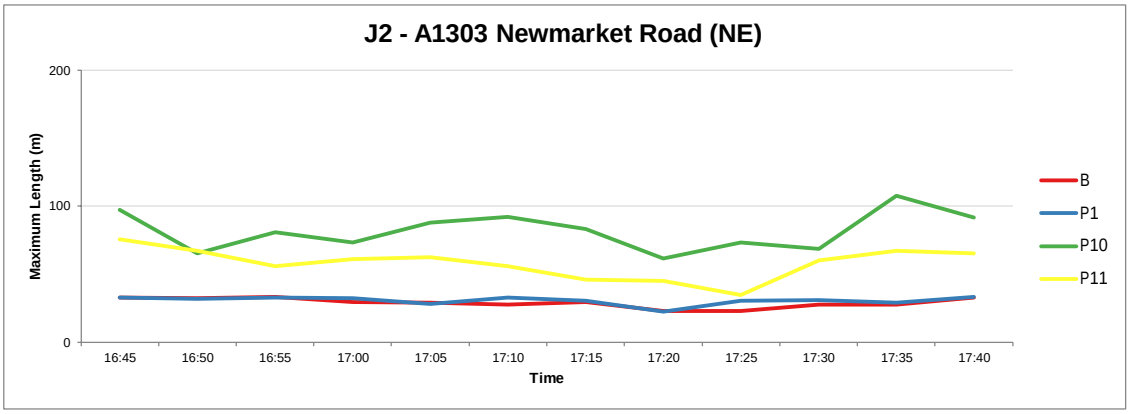


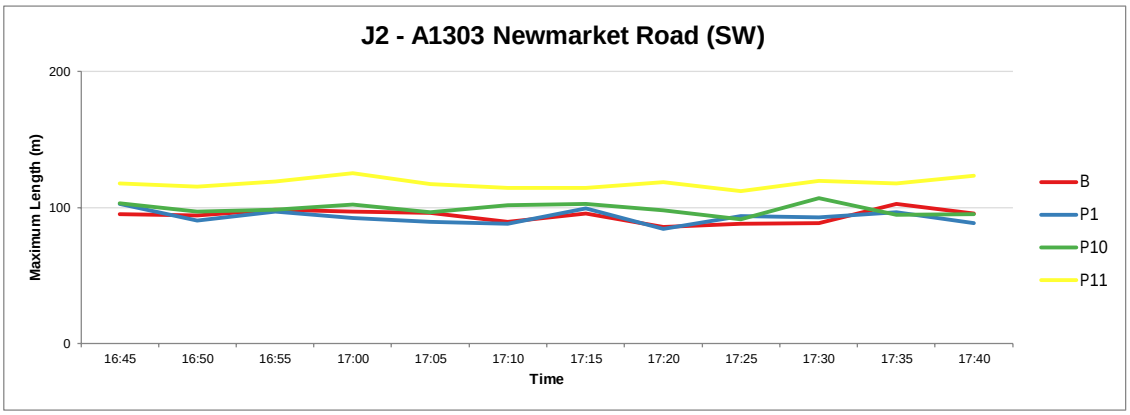


Comparison Graphs
PM

Church Road/Newmarket Road

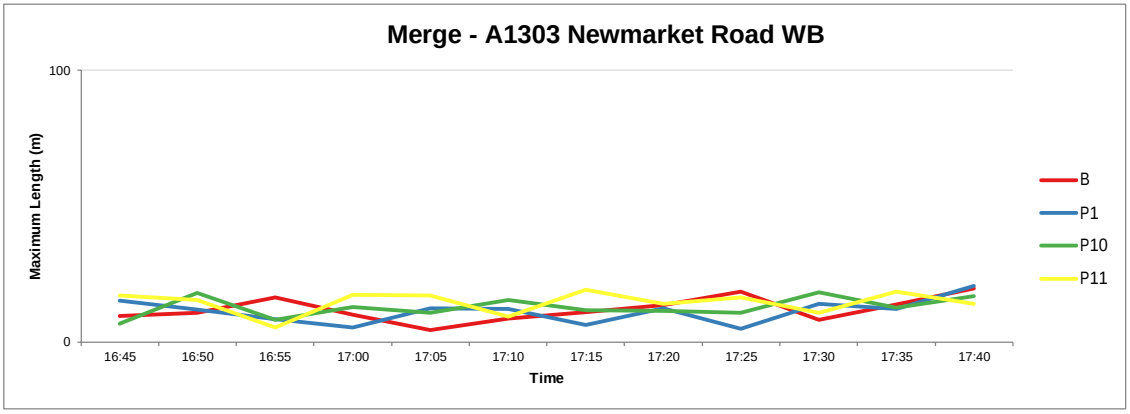






Comparison Graphs
PM

Merge Newmarket Road WB



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