HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.3.23 ES Volume C - Road traffic-related effects (project-wide) App C2-4 - DCO TA Appendix I - VISSIM Model Results

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Executive summary

Introduction

Jacobs was commissioned by Horizon Nuclear Power Wylfa Limited (Horizon) to develop a VISSIM microsimulation model of A55 Britannia Bridge and A5 Menai Bridge, which link Anglesey and the Welsh mainland across the Menai Strait. The purpose of the model is to assess the effects associated with peak construction of the Power Station and the subsequent requirement for any potential mitigation.

The model simulation area has been developed in consultation with the Welsh Government, Gwynedd Council and Isle of Anglesey County Council and includes both the Britannia and Menai Bridges. The model area covers the A55 Junctions 7 (A5152) to 11 (A5), allowing for potential rerouting impacts across the Menai Strait to be assessed. Coverage has also been defined by existing A55 traffic conditions and the anticipated impact of construction traffic associated with the Wylfa Newydd Project.

Methodology

The Britannia Bridge microsimulation model has been developed in VISSIM 8.0 software. The model base year is 2016, using a pre-summer neutral month as the basis of assessment as this is time that count data was collected. All future year analysis has been undertaken for the forecast future year 2023, which is anticipated to be the peak construction year. Simulation periods are 06:00-09:00 and 15:00-18:00 with a 15 minute warm up period preceding each peak. Demand is disaggregated by car, Light Goods Vehicle (LGV) and Heavy Goods Vehicle (HGV) vehicle types. The current bus network (February 2017) has been coded as a series of fixed routes.

A major programme of traffic surveys has been undertaken including turning count, Automatic Traffic Count (ATC), journey time/routing and video analysis.

An initial programme of turning count surveys was undertaken in March 2016, focused on the A55. Additional surveys were undertaken in June 2016 targeted at collecting data elsewhere in the model area, including Menai Bridge. In total, surveys captured all major junctions on the A55 between Junctions 7 and 11, local junctions on the A5 including Menai Bridge and key junctions on the A4087/ B4547.

ATC data were collected by Gwynedd Council in order to enable validation of key turning counts.

A programme of Bluetooth surveys has been undertaken to capture journey time and routing data. Bluetooth units were placed by the roadside to create a cordon around the study area. In addition, units were placed on both Britannia and Menai Bridges. This ensured all traffic entering and leaving the cordoned area was captured, together with their routing across the Menai Strait. This routing data were used to help validate the model. Two-way sample rates were approximately 15% of total traffic on the A55 and 4% on the A5.

Video surveys were located at all turning counts; additional cameras were placed north and south of Britannia Bridge to enable queuing and merge behaviour on the approaches to be checked.

Generally, the data show a strong level of consistency across each survey. Data highlights the eastbound tidal flow from Anglesey to the mainland in the morning peak with the reverse flow in the evening peak. Morning peak eastbound queues towards Britannia Bridge commence around 08:00 and at their peak lie midway between Junctions 8 and 8a. Queuing continues until after 09:00. Westbound queuing commences around 17:15 and continues until after 18:00 extending to Junction 9.

To replicate travel demand within the model, a zone system has been developed. Each zone represents an origin or destination with a matrix of traffic assigned to or from each.

Matrix development has been undertaken in two stages.

1. A simple initial matrix has been created from turning count data using the traffic volumes and the percentage distribution passing through the entry and exit of each survey location along the model network.
2. A process of matrix estimation has then been applied, using the turning count data to adjust travel demands to better reflect observed values.

Matrices have been disaggregated into 15 minute periods in order to replicate the observed profile of demand. Within the peak hour, there may be significant variation of demand. Disaggregating by 15 minute period enables the effects of 'peak within peak' demand to be assessed.

Welsh Government Transport Appraisal Guidance (WelTAG) (RD1) requires the application of Web-based Transport Appraisal Guidance (WebTAG) standards in the development of transport models (RD2). Consequently, the adequacy of the Britannia Bridge VISSIM Model calibration and validation has been measured against guidance WebTAG (RD2).

Model calibration and validation

The VISSIM model has been calibrated to represent existing (base) traffic conditions.

Network calibration has been an iterative process with minor adjustments made each time. The results have been reviewed with further minor changes made. The overall aim has been to achieve the best balance between:

- turning count calibration;
- journey times;
- routing; and
- queuing.

Initial model assignments have been improved through minor adjustments to the trip matrices. Routing has also been optimised to match Bluetooth data by adjusting link speeds and costs. Junction merge and give way parameters

have been reviewed for appropriateness; roundabout performance has also been checked and adjusted where necessary.

In accordance with WebTAG, model calibration has been separately assessed for both car and total vehicle flows. Generally, the calibration of each model period is within acceptability guidelines for all model hours. In the busiest morning peak hour (08:00-09:00), 92% of car and 91% of total vehicle flows calibrate to GEH guidance (<5) (RD2). In the busiest evening peak hour (17:00-1800), calibration statistics of 85% and 87% are achieved for car and total vehicles respectively. In both cases this indicates calibration within required guidance.

Model validation has included a comparison of observed and modelled journey times. East and westbound A55 journey times validate across each model hour in both morning and evening peaks. A5 eastbound journey times in the morning peak validate between 07:00 and 09:00; westbound times validate across all time periods.

Traffic routing show a high level of consistency with observed conditions across both bridges. Traffic travelling along the A55 would follow the direct route across Britannia Bridge under normal circumstances. Similarly, traffic on the A5 would use Menai Bridge unless network conditions result in closure or long delay.

Eastbound routing from the A55 towards Bangor show a strong correlation with observed values in both morning and evening peaks. Similarly, routing between the A5 Pentraeth Road and the A55 is consistent east and westbound in both model periods. Only the morning peak movement from Bangor to the A55 westbound is inconsistent with observed values from the Bluetooth data. This modelled routing has been verified against turning count data and is considered more consistent with actual travel behaviour.

Modelled queue lengths have been reviewed and are consistent with March 2016 video surveys and site visit records. Eastbound modelled queuing commenced around 08:00 and continued through to 09:00. At 08:45, queuing reaches midway between Junction 8a and 8, consistent with on-site observations. Westbound queuing commences around 17:15 and extends back and onto the Junction 9 westbound on-slip by approximately 17:30.

The VISSIM model has been reviewed by Welsh Government for robustness.

Future background traffic growth (without Project traffic)

VISSIM model tests show that the biggest change in future network conditions by 2023 is background growth without the Wylfa Newydd Project. In the morning peak, eastbound traffic from Anglesey must join a longer queue towards Britannia Bridge as commuting traffic travels towards Bangor and the mainland. Queues extend beyond the Junction 8 overbridge with increased merge delays on the A5025 eastbound on-slip.

In the evening peak, the reverse pattern occurs with longer queues westbound towards Britannia Bridge. While A55 queues are only slightly increased, significantly increased queues result on the A487 merge, extending through the A487 roundabout, southwards beyond Penrhos Road. The cause of the

queues is the merge from two lanes to one on the approach to A55 Britannia Bridge, not the merge at J9 itself.

Worker/construction traffic assessment (with Project traffic)

This scenario assumes that bus services would be provided from Caernarfon and Bangor across Britannia Bridge direct to the Wylfa Newydd Development Area for construction workers. This provides benefits by reducing the number of construction worker vehicle trips crossing between the mainland and Anglesey.

Eastbound construction worker trips cross Britannia Bridge before 06:00 and after 18:00. Mitigation targets these trips, and so the proposed measures have no eastbound impact in either the morning or evening peak periods. Forecast increased eastbound queues and delays towards Britannia Bridge are primarily as a result of background growth with a small amount of additional delay (+13 seconds) between 08:00 and 09:00 resulting from construction LGV and HGV traffic.

In the morning peak (06:00-09:00), construction worker traffic results in an additional 298 westbound vehicle trips as explained above there are no eastbound construction worker vehicle trips in the morning peak. None of this traffic occurs in the busiest hour of the model (08:00-09:00). Only LGV and HGV construction traffic crosses between 08:00 and 09:00, with a negligible impact on travel times.

In the evening peak (15:00-18:00), 129 westbound and 0 eastbound vehicle trips are generated by the construction worker traffic. None of this traffic occurs in the busiest hour of the model (17:00-18:00) with only LGV and HGV construction traffic crossing during the peak hour.

Direct buses would help remove a proportion of westbound construction worker trips during the early part of the evening peak. This provides benefit in helping slightly reduce queues and journey times in the peak within the peak period (17:00-18:00).

Traffic associated with the Wylfa Newydd Project would peak in 2023. The effects of the construction worker vehicle movements would be temporary.

A sensitivity test for August background traffic in 2023 indicates that the effects of project traffic would be negligible.

Conclusion

In conclusion, the VISSIM modelling illustrates that:

- the primary cause of increased queues and delays in 2023 is forecast background growth, not the additional construction traffic associated with the Wylfa Newydd Project.
- eastbound, construction worker trips cross Britannia Bridge outside peak periods. LGV and HGV traffic slightly increases morning peak queue lengths and journey times between 08:00 and 09:00.

- westbound, morning construction trips cross the bridge before 07:00; only night shift traffic has the potential to impact on the operational performance of Britannia Bridge.
- the introduction of Direct buses reduces the effect of construction worker traffic in the early part of the evening peak.

1. Introduction

1.1 Background

Background to the study

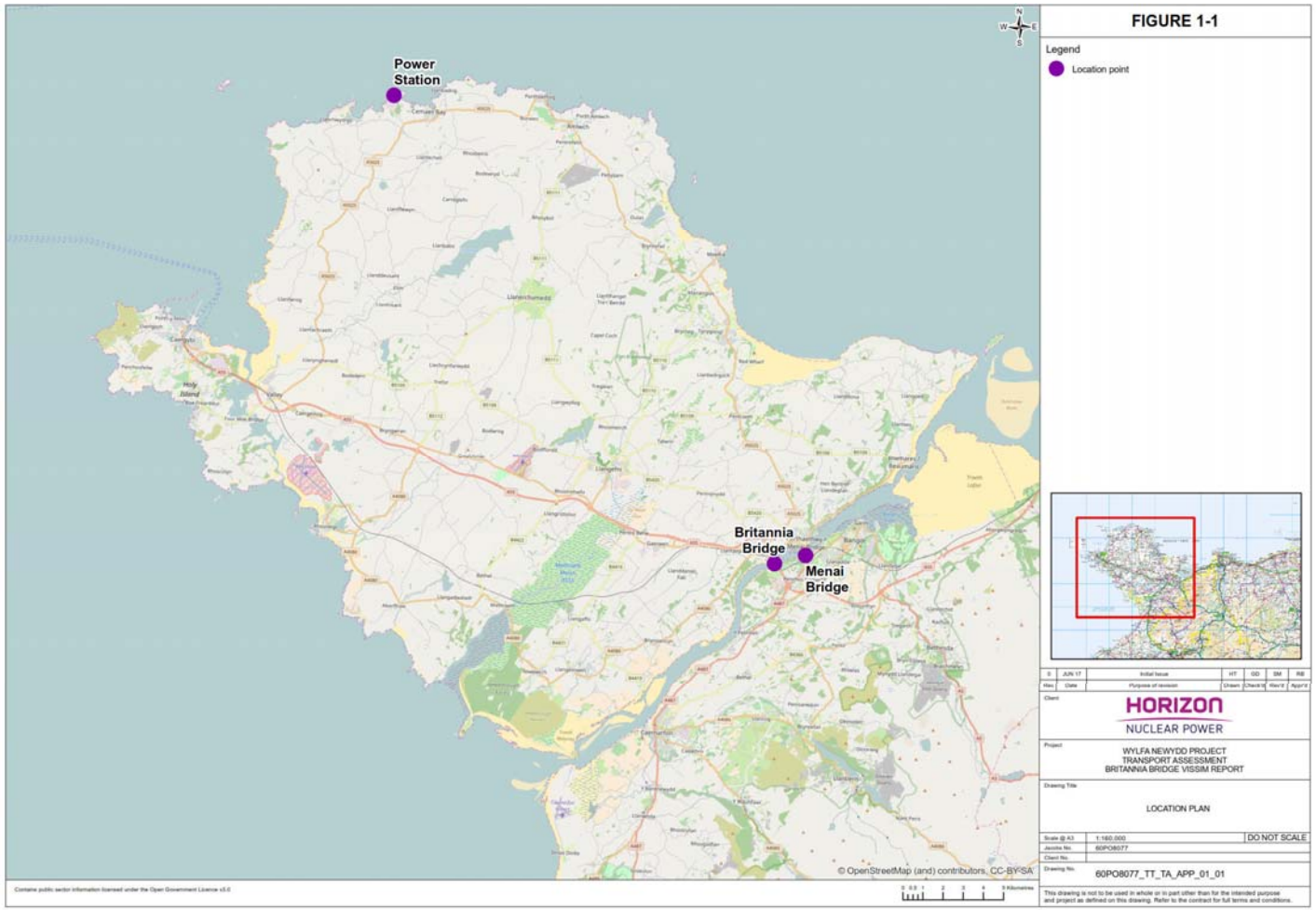
1.1.1 Jacobs UK Limited (Jacobs) was commissioned by Horizon Nuclear Power Wylfa Limited (Horizon) to develop a VISSIM microsimulation model to assess the impact of the construction of the Wylfa Newydd Power Station (the Power Station) on the A55 Britannia Bridge.

1.1.2 The model area includes both the A55 Britannia Bridge and A5 Menai Bridge. These crossings are the two road links between the Isle of Anglesey and the Welsh mainland, across the Menai Strait (figure 1-1).

1.1.3 Britannia Bridge lies on the A55 North Wales Expressway, which, apart from the bridge itself, is dual carriageway. The construction of the Power Station would result in an increase in traffic associated with both construction workers and materials movements, with construction workers predominantly travelling outside network peak hours.

1.1.4 The Menai Bridge has height and width restrictions and is not anticipated to be used by additional construction or material traffic. Nevertheless, general traffic may choose to reroute between the crossings depending on local network conditions. Including both Britannia and Menai Bridges within the model enables the potential impact of such changes to be explored.

Figure 1-1 Location Plan



Purpose of the VISSIM model

1.1.5 The purpose of the VISSIM model is to assess the traffic impacts associated with the increase in traffic generated during the construction of the Power Station.

1.1.6 This report details the process of calibrating and validating the A55 Britannia Bridge VISSIM Model.

1.1.7 The following demand and network mitigation measures have then been tested with findings discussed:

- 2023 future background traffic growth only;
- 2023 Wylfa Newydd Project traffic with mitigation - direct bus services

1.2 Consultation

1.2.1 The general model specification, including extents and time periods, has been developed in consultation with the Welsh Government, Gwynedd Council and Isle of Anglesey County Council. Survey specifications that form the basis of the neutral month assessment were provided to Welsh government for comment.

1.2.2 An initial Appraisal Specification Report was developed for review by stakeholders. Following its issue, a scoping meeting was held on 1 June 2016 to review the content and finalise the model specification.

1.2.3 A key decision was that the VISSIM model should include both Britannia Bridge and Menai Bridge in order that both strategic and local traffic impacts could be tested. Model time periods were also agreed with three-hour weekday morning and evening peak models being required.

1.2.4 The outcomes from the modelling were presented at a meeting on 22 December 2016 to Welsh Government; this included an overview of the calibration and validation and also the findings from the future year assessments. Following this, all model files and a draft of this report were provided to Welsh Government.

1.2.5 A review of the model has been undertaken by Welsh Government with a comments log received from Welsh Government. Horizon Nuclear Power provided responses to these comments in May 2017 and these, together with refined project assumptions, have been incorporated into the updated modelling upon which this report is based.

1.3 Baseline constraints

1.3.1 Since they are the only two crossings of the Menai Strait, Britannia Bridge and Menai Bridge are busy at peak periods. Congestion across Britannia Bridge occurs eastbound in the morning peak as traffic leaves Anglesey towards Bangor and other mainland destinations. Evening peak congestion occurs westbound across Britannia Bridge as traffic makes the reverse movement.

1.3.2 Forecast background growth will worsen existing conditions, increasing queues and delays at each crossing. Traffic associated with the Wylfa

Newydd Project would add to background traffic, peaking during the busiest construction year in 2023; these effects would be temporary with the greatest traffic volumes travelling outside of peak hours.

1.4 Report structure

1.4.1 The structure of this report is given below. The model development methodology and calibration/validation are summarised first.

1.4.2 Using the validated model, the impact of future background on network performance is then tested. Finally, the impact of additional Wylfa Newydd Project construction traffic (both workers, LGVs and HGVs) is considered with potential options to mitigate any traffic impact explored.

- Section 2 Methodology;
- Section 3 Model calibration and validation;
- Section 4 Future background traffic growth;
- Section 5 Worker/construction traffic and proposed mitigation;
- Section 6 Worker/construction traffic assessment;
- Section 7 August sensitivity test; and
- Section 8 Summary and conclusions.

2. Methodology

2.1 Introduction

2.1.1 The Britannia Bridge microsimulation model has been developed using VISSIM 8.0 software. VISSIM is one of a number of microsimulation software packages with similar functionality. It has been selected based on its superior graphic output and ability to accurately model detailed junction and merge behaviour.

2.1.2 VISSIM is Transport for London's preferred microsimulation tool and is also widely used by Highways England and local authorities across the UK. As a result, there is a large user and knowledge base across the UK. This enables easy auditing and review of the model by stakeholders compared with other less well known and used software.

2.1.3 The overarching project assumptions used in the production of the Britannia Bridge microsimulation model are located in App C2-4 - DCO TA Appendix G - Strategic Traffic Model – Overview (Application Reference Number: 6.3.21).

2.2 VISSIM model specification

Study area

2.2.1 The model area has been determined based on the initial scoping meeting and stakeholder consultation described in Section 1.

2.2.2 The model includes both Britannia Bridge and Menai Bridge, as requested by Welsh Government, Gwynedd Council and Isle of Anglesey County Council. The modelling of both crossings enables route choice across the Menai Strait to be assessed with the impacts, in terms of queues and journey times, identified. There are no traffic signals within the modelled area with all junctions being either priority junctions or roundabouts.

2.2.3 The model includes:

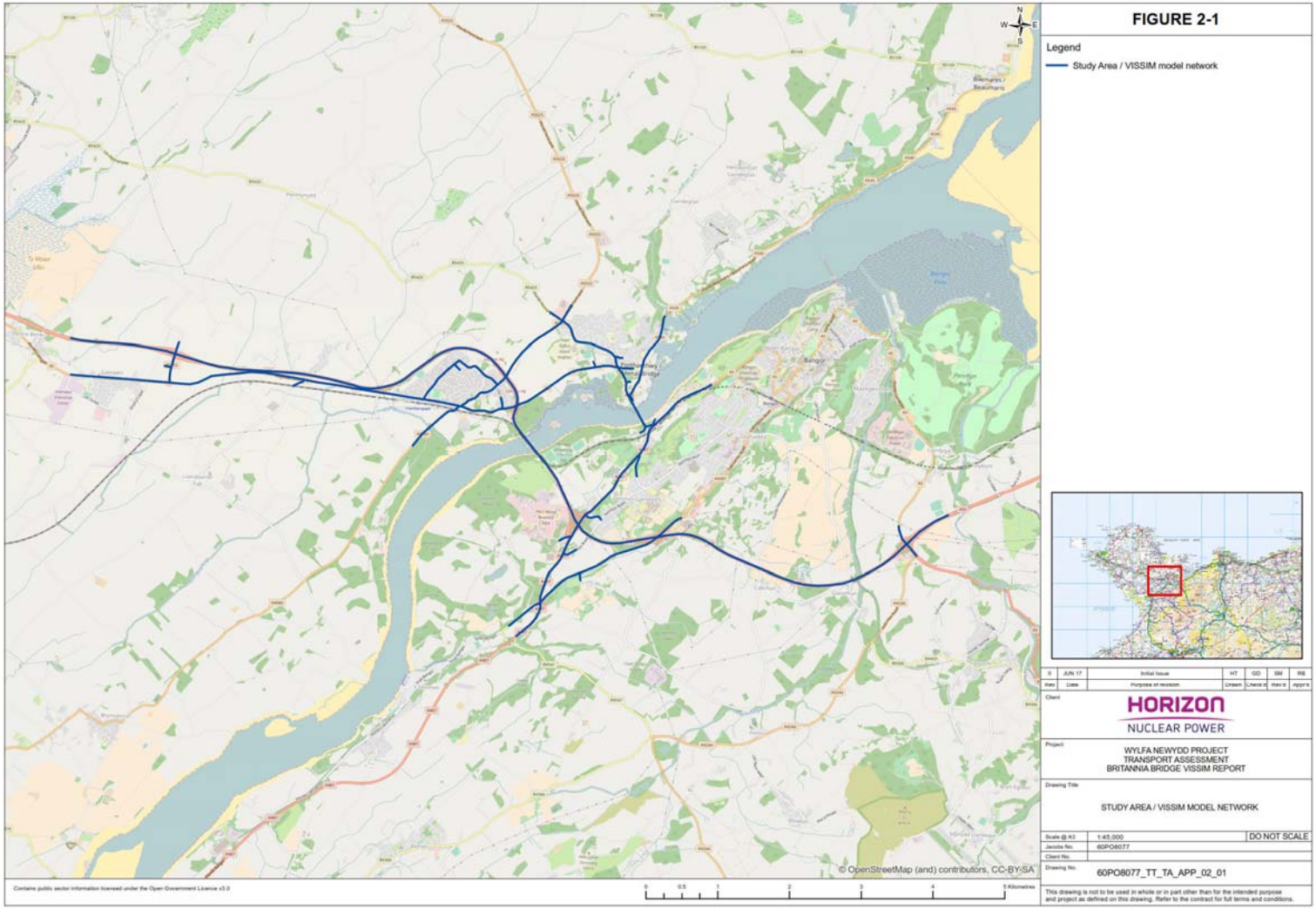
- the A55 between Junctions 7 and 11;
- the A5 between the A5152 roundabout and Holyhead Road;
- the A487 between Holyhead Road and the A4087 roundabout;
- the A4087 between the A55 and the A487 roundabout;
- the A5025 between the A55 and the B5420;
- the A4080 immediately south of the A55;
- Lon Graig; and
- Pentraeth Road.

2.2.4 The study area and VISSIM model network extents are illustrated in figure 2-1.

Model years and time periods

2.2.5 The model base year is 2016; the forecast year is the peak construction year for the Wylfa Newydd Project, 2023.

Figure 2-1 Study Area/ VISSIM model network



2.2.6 Model time periods have been determined based on anticipated construction worker shift patterns. Day shifts are expected to start at the Wylfa Newydd Development Area between 07:00 and 08:00 and end between 17:00 and 18:00. Night shifts should start between 16:30 and 17:30 and end between 03:00 and 04:00. Worker traffic is expected to cross Britannia Bridge in excess of one hour before shift start westbound, and one hour after shift end eastbound.

2.2.7 A full explanation of construction demand and time periods is given in Section 5.1.

2.2.8 Model periods have been chosen to capture times when construction worker traffic has the potential to overlap with peak general traffic. Discussion with the Welsh Government and stakeholders also informed the final choice of model periods.

2.2.9 The finalised simulation periods are:

- weekday AM peak 06:00-09:00; and
- weekday PM peak 15:00-18:00.

2.2.10 A 15 minute warm up period precedes each peak to ensure that an adequate base level of traffic is assigned at the start of the simulation period.

2.2.11 Matrices have been disaggregated by Car, LGV and HGV vehicle types.

2.3 Traffic surveys

2.3.1 Traffic surveys were initially conducted in March 2016 and then subsequently in June 2016 to expand the scope of the model in response to comments from stakeholders. This defines the baseline as a 2016 pre-summer neutral month. A site visit was also completed recording key observations, including:

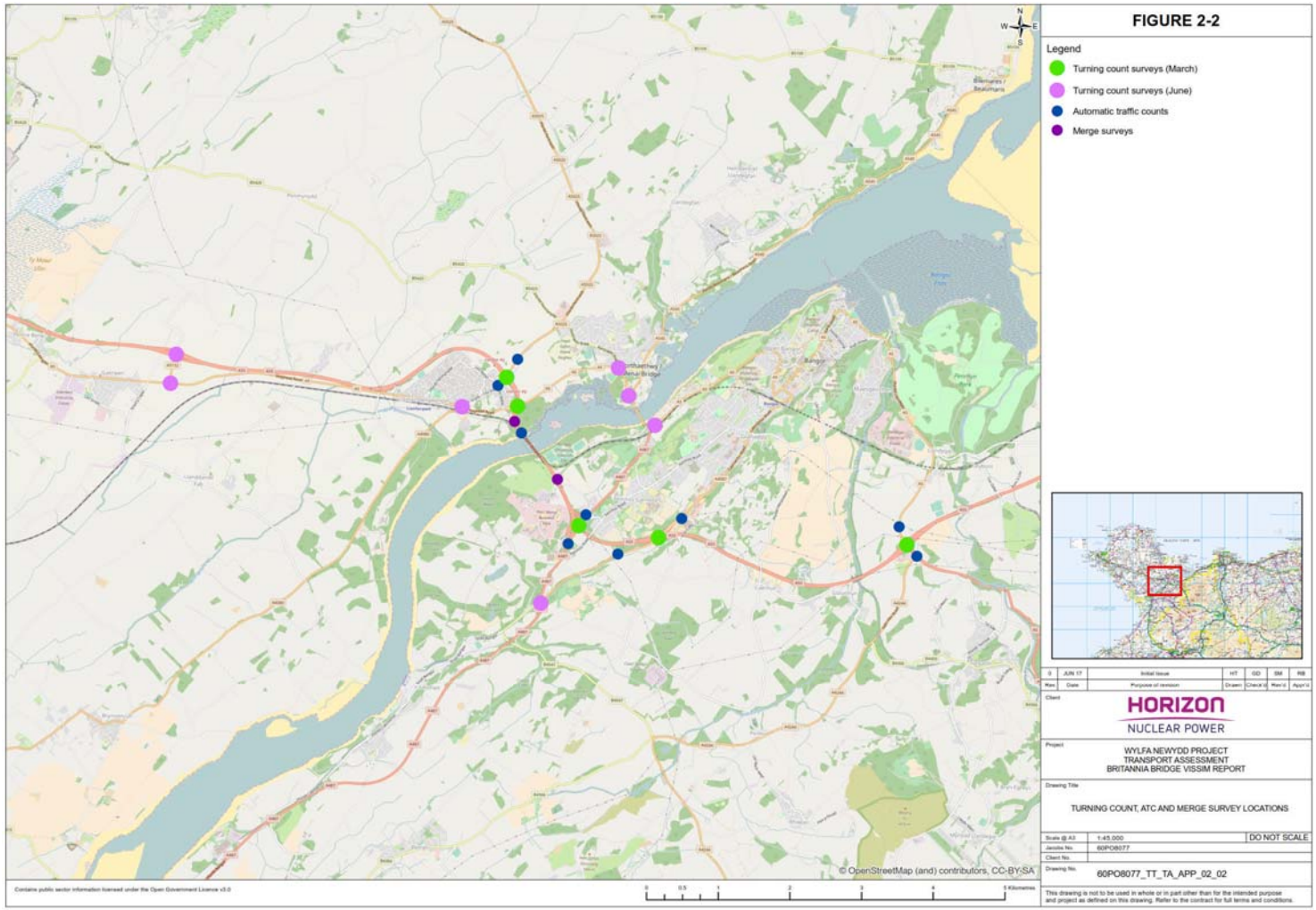
- a review of general network performance;
- the length and timing of morning and evening peak queues on the approach to Britannia Bridge; and
- a qualitative review of merge behaviour.

Turning count data

2.3.2 Turning count data were collected in two separate surveys (figure 2-2). An initial survey was undertaken on Tuesday 22 March 2016 with data collection focused on the A55 corridor. Surveys were undertaken at the following locations:

- Junction 8 A55;
- Junction 8a A55;
- Junction 9 North roundabout A55;
- Junction 9 South roundabout A55;
- Junction 10 A55; and
- Junction 11 A55.

Figure 2-2: Turning count, ATC and merge survey locations



2.3.3 Additional turning count data were collected on Thursday 30 June 2016. This programme of surveys was targeted at collecting data elsewhere in the model area, including Menai Bridge. This enabled a wider road network to be included within the VISSIM model, allowing wider queueing and route choice to be modelled. Surveys included the locations below:

- Junction 7 A55;
- A5/A5152 roundabout;
- A5/A4080/Lon Graig junction;
- A5025/B5420 roundabout;
- A5/A545/Mona Road roundabout;
- A5/A487 roundabout; and
- A487/A4087/B4547 roundabout.

2.3.4 Data were collected in 15 minute time segments for the AM peak period and the PM peak period. Survey times were consistent with model simulation periods with data collected across the following periods:

- AM peak 05:45 – 09:00; and
- PM peak 14:45 – 18:00.

2.3.5 Counts were classified into car, LGV, HGV, Public Service Vehicle, motorcycle and pedal cycle. All count data were collated with counts tracked through the network to establish consistency. The process automatically highlighted where there was an inconsistency in a small number of cases. Where this was the case the higher traffic volume was assumed, representing a worst case scenario.

2.3.6 Note that, as count data were collected in neutral months March and June (defined as neutral by Department for Transport (RD3)), no adjustment for seasonality has been undertaken during data processing.

ATC data

2.3.7 ATC data were collected over a nine day period between 15 March 2016 and 23 March 2016 by the hour over the whole of each day. The locations of the ATCs are shown in figure 2-2. Final site selection and the full programme of surveys were undertaken by Gwynedd Council.

2.3.8 The ATC data were used to validate the turning count data described above. Tables A-1 and A-2 in Appendix A summarise the validation results for the morning and evening periods.

2.3.9 The majority of the ATC volumes corroborate the turning count data with one exception, as explained below.

2.3.10 The ATC values for Junction 10 North Arm, A4087 (Site 5 Arm A) for both the origin and destination data do not validate. This is due to the ATC counter and the turning count location being in different locations. (It was necessary to relocate the ATC counter for safety reasons). There is a large supermarket

on the roundabout between the ATC counter and the turning count location, so numbers from each survey cannot be directly compared. This meant that the ATC values for Site 5 Arm A could not be used but all other ATC data could.

2.3.11 Validated observed morning and evening peak traffic volumes, on key links, are summarised in figure 2-3.

Journey time data/routing data

2.3.12 A number of options were considered to best capture journey time and routing data. Conventional survey techniques were evaluated and discounted - the 'floating car' method being one option. With this approach, a driver and surveyor team travel backwards and forwards along predefined routes noting timings at key locations. Unfortunately, the 'floating car' method normally achieves very low sample rates. Data can also be skewed towards shorter journey times, as more return journeys are captured off peak than in the peak when congestion is higher.

2.3.13 By comparison, Bluetooth was considered an effective method of capturing a relatively high and accurate data sample. Recording units were placed at strategic points on the road network as shown in figure 2-4. The Bluetooth identifier, from mobile phone and other electronic devices, passing each site, was recorded together with the time of observation. Records were then matched offline to give the journey time between each location.

2.3.14 Bluetooth data were collected in two separate months. An initial survey was undertaken along the A55 corridor in March 2016. Data were collected between 17 March and 23 March 2016 throughout the day at the sites identified in figure 2-4.

2.3.15 An expanded survey was undertaken in June 2016 to capture both the A55 Britannia Bridge and the A5 Menai Bridge. This survey had a dual purpose, with data required to inform both journey times and route choice across the Menai Strait. As the number of vehicles recorded in the original survey was lower than expected, the duration of the second survey was increased to two weeks. Data were collected between 30 June and 13 July at the sites shown in figure 2-4.

2.3.16 The number of vehicles recorded between Junctions 8a and 9 on the A55 in the March and June 2016 surveys is shown in table 2-1.

Table 2-1 Bluetooth records along A55 – March and June 2016 surveys

	Westbound AM	Eastbound AM	Total AM	Westbound PM	Eastbound PM	Total PM
A55 March	312	296	608	136	127	263
A55 June	1,067	1,709	2,776	935	935	1,870

2.3.17 The number of June records is substantially higher with a consequent improvement in the reliability of the data; as such, only the June records were used for analysis.

2.3.18 On first inspection of the Bluetooth data, it was found that some of the journey times recorded were extremely long compared with those experienced on the site visit. On further investigation, it was identified that these long journey times were as a result of vehicles making an intermediate stop on the network, potentially for school trips or for shopping.

Figure 2-3 Observed ATC traffic volumes

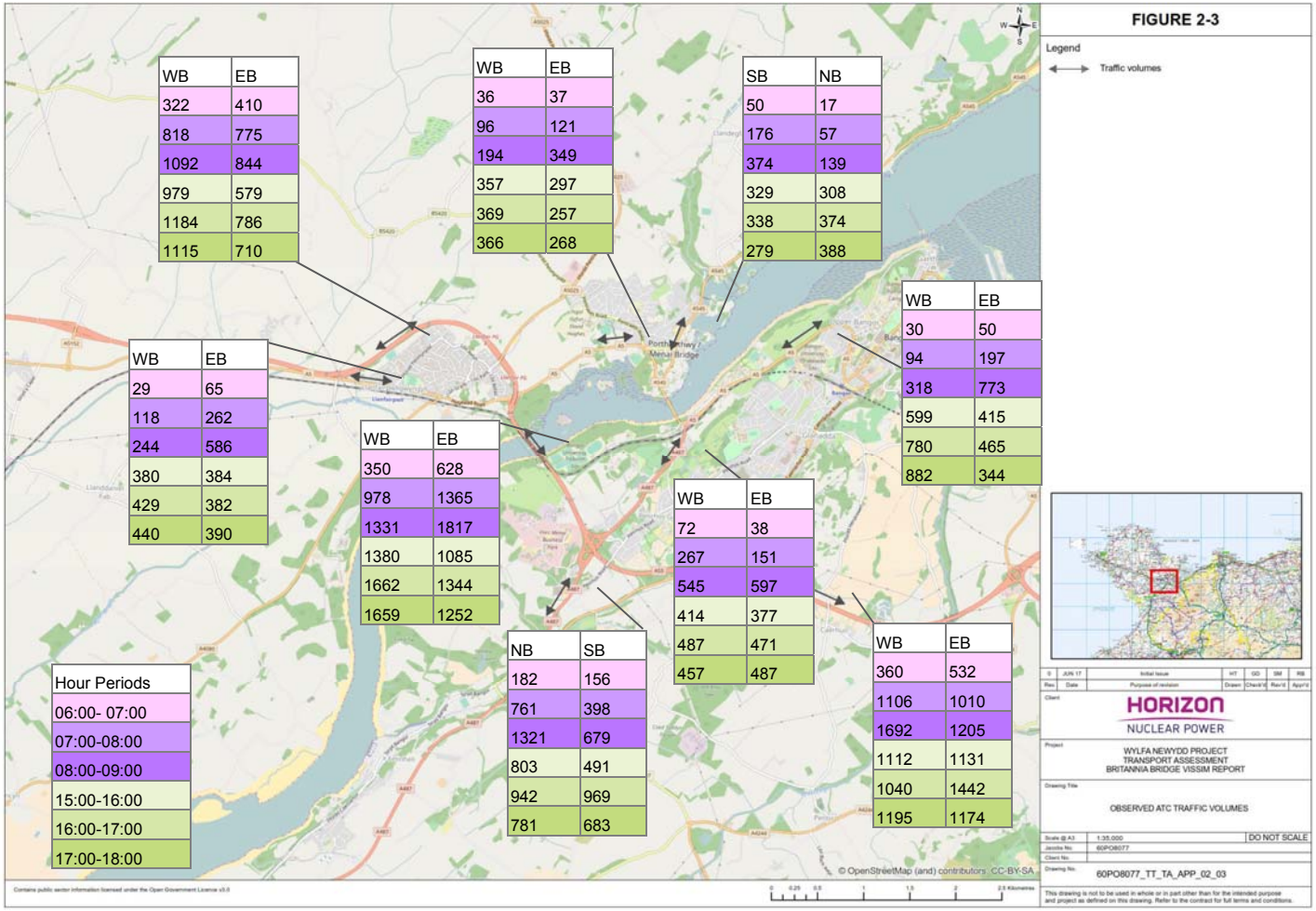
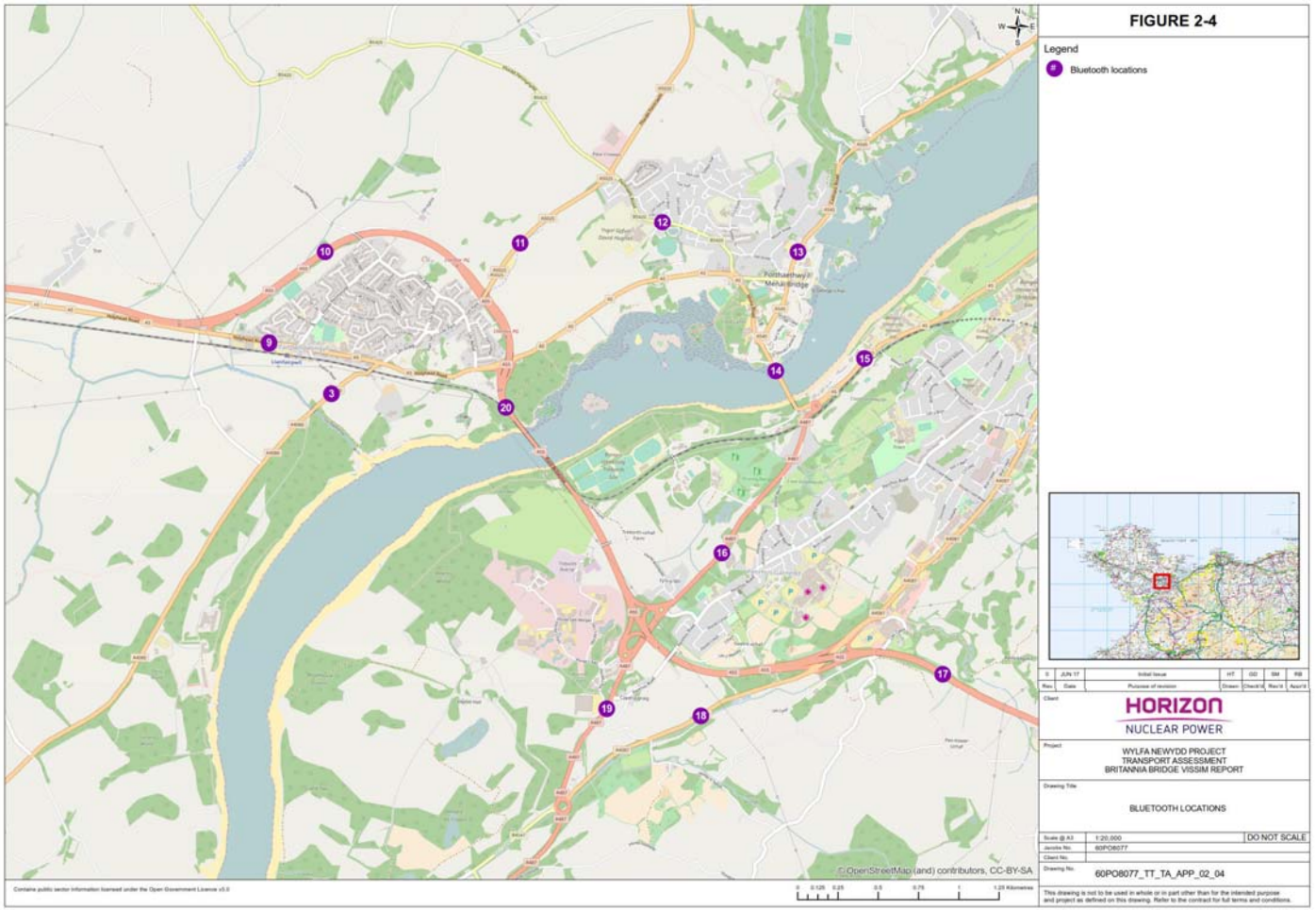


Figure 2-4 Bluetooth locations



2.3.19 To eliminate these erroneous travel times from journey time analysis, a cut off was introduced to the recorded journey times of 10 minutes, meaning that any journey time over the cut off time was discounted and not used in calculating the mean.

2.3.20 Table 2-2 and table 2-3 show the proportion of total bluetooth surveys available compared to the number of surveys used for the calculation of the mean journey times across both A55 Britannia Bridge and A5 Menai Bridge. The Bluetooth survey numbers are based on the total captured over ten weekdays while A and B denote the start and end Bluetooth identifier, respectively.

2.3.21 For other minor origin-destination pairs, insufficient records were available to accurately determine observed journey times.

Table 2-2: Number of Bluetooth surveys used for calculation of observed morning peak journey times

			06:00 – 07:00			07:00 – 08:00			08:00 – 09:00		
Location/Direction	**A**	**B**	**Total Surveys**	**Surveys Used**	**%**	**Surveys Used**	**Surveys Used**	**%**	**Surveys Used**	**Surveys Used**	**%**
A55 eastbound (Includes Britannia Bridge)	10	17	838	590	**70%**	699	503	**72%**	733	529	**72%**
A55 westbound (Includes Britannia Bridge)	17	10	490	240	**49%**	921	428	**46%**	892	389	**44%**
A5 eastbound (Includes Menai Bridge)	12	15	13	10	**77%**	80	71	**89%**	171	139	**81%**
A5 westbound (Includes Menai Bridge)	15	12	5	3	**60%**	17	13	**76%**	41	26	**63%**

			06:00 – 09:00		
Location/Direction	**A**	**B**	**Total Surveys**	**Surveys Used**	**%**
A55 - Holyhead Road	10	15	173	48	**28%**
Holyhead Road - A55	15	10	38	9	**24%**
Pentraeth Road - A55	12	17	67	13	**19%**
A55 - Pentraeth Road	17	12	57	18	**32%**

Table 2-3 Number of Bluetooth surveys used for calculation of observed evening peak journey times

			15:00 – 16:00			16:00 – 17:00			17:00 – 18:00		
Location/Direction	**A**	**B**	**Total Surveys**	**Surveys Used**	**%**	**Surveys Used**	**Surveys Used**	**%**	**Surveys Used**	**Surveys Used**	**%**
A55 eastbound (Includes Britannia Bridge)	10	17	840	509	**61%**	859	533	**62%**	753	535	**71%**
A55 westbound (Includes Britannia Bridge)	17	10	925	399	**43%**	972	409	**42%**	857	357	**42%**
A5 eastbound (Includes Menai Bridge)	12	15	63	44	**70%**	55	40	**73%**	58	40	**69%**
A5 westbound (Includes Menai Bridge)	15	12	126	82	**65%**	181	138	**76%**	167	141	**84%**

			15:00 – 18:00		
Location/Direction	**A**	**B**	**Total Surveys**	**Surveys Used**	**%**
A55 - Holyhead Road	10	15	99	26	**26%**
Holyhead Road - A55	15	10	208	81	**39%**
Pentraeth Road - A55	12	17	78	24	**31%**
A55 - Pentraeth Road	17	12	116	20	**17%**

2.3.23 The sample rate for the westbound direction was lower than those for the eastbound direction because it was not possible to identify safe locations for bluetooth equipment to be installed that would have resulted in a higher sample rate. However, the sample rates for both directions meet WebTAG requirements (WebTAG M12 Data Sources and Surveys) that the 95% confidence level of the mean of the observations is ± 10% or less over the whole route (see table 2-4 and table 2-5).

Table 2-4 Eastbound calculation of journey time sample confidence interval across A55 Britannia Bridge

Hour Period	06:00-07:00	07:00-08:00	08:00-09:00	15:00-16:00	16:00-17:00	17:00-18:00
Total Bluetooth Surveys (number used)	590	503	529	509	533	535
Square root of Total Bluetooth Survey	24.29	22.43	23.00	22.56	23.09	23.13
t-score - scaling factor (p,n-1)	1.9640	1.9647	1.9645	1.9646	1.9644	1.9644
Average Journey Time (mm:ss)	03:27	03:41	05:00	03:36	03:33	04:13
Journey Time Standard deviation (mm:ss)	00:27	00:34	01:32	00:28	00:30	01:19
Confidence interval (mm:ss)	00:02	00:03	00:08	00:02	00:03	00:07
Accuracy	**1.0%**	**1.3%**	**2.6%**	**1.2%**	**1.2%**	**2.7%**

Table 2-5 Westbound calculation of journey time sample confidence interval across A55 Britannia Bridge

Hour Period	06:00-07:00	07:00-08:00	08:00-09:00	15:00-16:00	16:00-17:00	17:00-18:00
Total Bluetooth Surveys (number used)	240	428	389	399	409	357
Square root of Total Bluetooth Survey	15.49	20.69	19.72	19.97	20.22	18.89
t-score - scalling factor (p,n-1)	1.9699	1.9655	1.9661	1.9659	1.9658	1.9666
Average Journey Time (mm:ss)	03:27	03:29	03:33	04:21	05:09	05:47
Journey Time Standard deviation (mm:ss)	00:20	00:38	00:32	01:13	01:11	00:56
Confidence interval (mm:ss)	00:03	00:04	00:03	00:07	00:07	00:06
Accuracy	**1.3%**	**1.7%**	**1.5%**	**2.7%**	**2.2%**	**1.7%**

2.3.24 Base model flows have been used to determine the approximate size of the sample of final surveys used in relation to the possible total number of vehicles on these routes. As the Bluetooth data was gathered over two weeks (10 weekdays) the number of surveys used were divided by ten to give a representative number of surveys for one day. The results of this analysis are shown below in table 2-7 and table 2-8.

2.3.25 Two-way sample rates were approximately 15% and 4% of modelled traffic on those routes crossing Britannia Bridge (A55) and Menai Bridge (A5) respectively. A summary of Bluetooth data available between all O-D pairs across the Menai Strait is provided in table 2-6.

Table 2-6 Bluetooth sample across the Menai Strait

Period	Direction	Surveys	Survey / 10 (no. of weekdays)	Observed flow	Sample
AM	Eastbound	6835	684	5261	13%
	Westbound	4684	468	3157	15%
PM	Eastbound	7863	786	5275	15%
	Westbound	9764	976	7407	13%

Table 2-7 Analysis of Bluetooth sample size in relation to base model vehicle flows (morning peak)

			06:00 – 07:00			07:00 – 08:00			08:00 – 09:00		
Location/Direction	**A**	**B**	**Model Flow**	**Surveys Used ÷ 10**	**%**	**Model Flow**	**Surveys Used ÷ 10**	**%**	**Model Flow**	**Surveys Used ÷ 10**	**%**
A55 eastbound (Includes Britannia Bridge)	10	17	260	59	**23%**	338	50	**15%**	337	53	**16%**
A55 westbound (Includes Britannia Bridge)	17	10	170	24	**14%**	370	43	**12%**	442	39	**9%**
A5 eastbound (Includes Menai Bridge)	12	15	40	1	**3%**	116	7	**6%**	175	14	**8%**
A5 westbound (Includes Menai Bridge)	15	12	11	1	**3%**	35	1	**4%**	153	3	**2%**

			06:00 – 09:00		
Location/Direction	**A**	**B**	**Model Flow**	**Surveys Used ÷ 10**	**%**
A55 - Holyhead Road	10	15	165	5	**3%**
Holyhead Road - A55	15	10	49	1	**2%**
Pentraeth Road - A55	12	17	61	1	**2%**
A55 - Pentraeth Road	17	12	30	2	**6%**

Table 2-8 Analysis of Bluetooth sample size in relation to base model vehicle flows (evening peak)

			15:00 – 16:00			16:00 – 17:00			17:00 – 18:00		
Location/Direction	**A**	**B**	**Model Flow**	**Surveys Used ÷ 10**	**%**	**Model Flow**	**Surveys Used ÷ 10**	**%**	**Model Flow**	**Surveys Used ÷ 10**	**%**
A55 eastbound (Includes Britannia Bridge)	10	17	227	51	**22 %**	327	53	**16%**	219	54	**24%**
A55 westbound (Includes Britannia Bridge)	17	10	243	40	**16 %**	335	41	**12%**	434	36	**8%**
A5 eastbound (Includes Menai Bridge)	12	15	128	4	**3%**	153	4	**3%**	145	4	**3%**
A5 westbound (Includes Menai Bridge)	15	12	233	8	**4%**	406	14	**3%**	420	14	**3%**

			15:00 – 18:00		
Location/Direction	**A**	**B**	**Model Flow**	**Surveys Used ÷ 10**	**%**
A55 - Holyhead Road	10	15	163	3	**2%**
Holyhead Road - A55	15	10	170	8	**5%**
Pentraeth Road - A55	12	17	84	2	**3%**
A55 - Pentraeth Road	17	12	68	2	**3%**

2.3.26 The mean journey times across the two bridges were calculated from the Bluetooth data and as shown in table 2-9 and table 2-10, where A and B denote the start and end Bluetooth identifier, respectively.

2.3.27 Journey times are dissagregated by hour for major movements across the Britannia and Menai Bridges. Journey time data by model period are available between the A55 and Holyhead Road and the A55 and Pentraeth Road.

Table 2-9 Bluetooth AM journey times across the bridges

			06:00 (seconds)	07:00 (seconds)	08:00 (seconds)
Location/Direction	A	B	Observed	Observed	Observed
A55 eastbound (Includes Britannia Bridge)	10	17	207	221	300
A55 westbound (Includes Britannia Bridge)	17	10	207	209	213
A5 eastbound (Includes Menai Bridge)	12	15	146	174	234
A5 westbound (Includes Menai Bridge)	15	12	156	168	203

			06:00-09:00 (seconds)
Location/Direction	A	B	Observed
A55 - Holyhead Road	10	15	357
Holyhead Road - A55	15	10	332
Pentraeth Road - A55	12	17	339
A55 - Pentraeth Road	17	12	322

Table 2-10 Bluetooth PM journey times across the bridges

			15:00 (seconds)	16:00 (seconds)	17:00 (seconds)
Location/Direction	A	B	Observed	Observed	Observed
A55 eastbound (Includes Britannia Bridge)	10	17	216	213	253
A55 westbound (Includes Britannia Bridge)	17	10	221	259	307
A5 eastbound (Includes Menai Bridge)	12	15	210	205	205
A5 westbound (Includes Menai Bridge)	15	12	214	227	241

			15:00-18:00 (seconds)
Location/Direction	A	B	Observed
A55 - Holyhead Road	10	15	306
Holyhead Road - A55	15	10	385
Pentraeth Road - A55	12	17	388
A55 - Pentraeth Road	17	12	454

Video surveys

2.3.28 A video survey was undertaken at all the locations of the turning counts during the March 2016 counts (figure 2-2):

- Junction 8 A55;

- Junction 8a A55;
- Junction 9 north roundabout A55;
- Junction 9 south roundabout A55;
- Junction 10 A55;
- Junction 11 A55;
- A55 north of Britannia Bridge; and
- A55 south of Britannia Bridge.

2.3.29 Cameras were placed on each arm of the junctions to capture all turning movements. The location of these surveys ensured counts were available for all of the junctions on the A55 that are included in the model area. The two camera locations north and south of Britannia Bridge enabled queuing on the approaches to be reviewed.

2.3.30 Video surveys are consistent with conditions experienced during the site visit. Eastbound queuing commenced around 08:00 and continued through to 09:00. Westbound queuing commenced around 17:15.

2.3.31 Video footage show that the short merge lengths at Junction 8a and 9 can make it difficult for traffic to join the A55. For short periods, the resulting difference in speed between main line and merging traffic prevents safe entry, causing queues to form.

Conclusions/ key trends

2.3.32 Generally, the data show a strong level of consistency across each survey. Turning count data is consistent with supporting ATC data. Bluetooth journey times are consistent with on-site observations, with the expanded June sample providing greater accuracy across a wider number of movements. Video surveys are consistent with both journey time data and site visit conditions.

2.3.33 Generally, the survey data highlight an eastbound tidal flow from Anglesey to the mainland in the morning peak with the reverse tidal flow in the evening peak. Morning peak queuing commences eastbound around 08:00 and continues until after 09:00. At its peak, queuing extends to midway between Junctions 8a and 8. Evening peak westbound queuing commences around 17:15 (with short period queuing after 16:30) and continues until 18:00. At their maximum, these extend to Junction 9 on the A55 with further queuing on the A487 on-slip back towards and occasionally onto the roundabout.

2.4 Matrix development

Matrix development

2.4.1 To replicate travel demand, a model zone system was developed. Each zone represents an origin or destination with a matrix of traffic assigned to or from each, as shown in figure 2-5.

2.4.2 The majority of zones represent either the edge of the model (external demand) or local roads within the modelled area. A small number of zones represent simplified centres of population, for example along the A5. Table 2-11 show which roads the zone number corresponds to.

Figure 2-5 Zone system

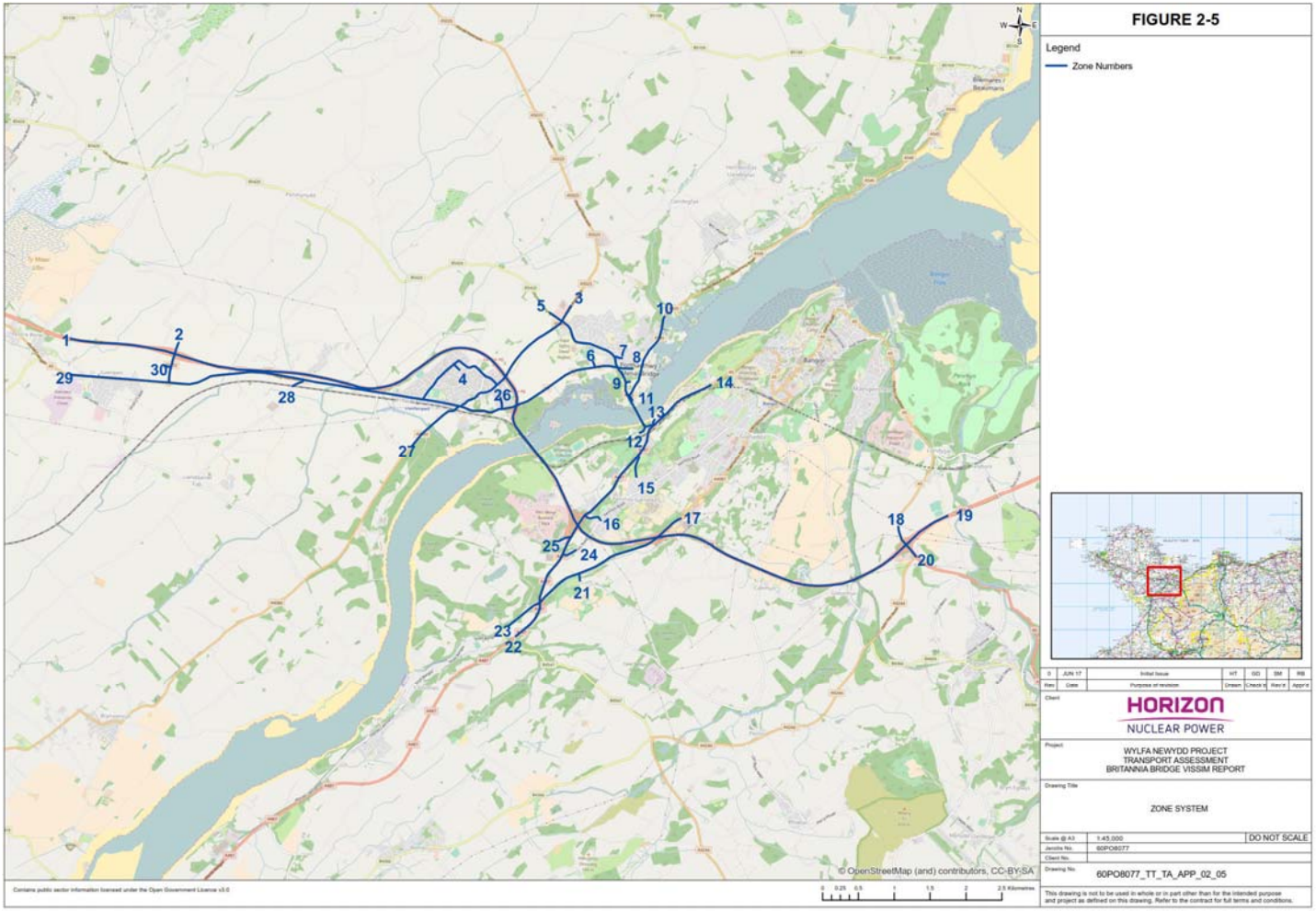


Table 2-11 Zone names

Zone Number	Zone Name	Zone Number	Zone Name	Zone Number	Zone Name
1	A55 west	**11**	New Street	**21**	Off A4087
2	A5152	**12**	Unclassified Road	**22**	A487 (Y Felinheli Bypass)
3	A5025 (Pentraeth Road)	**13**	Unclassified Road	**23**	B4547
4	Lon Refail (Local)	**14**	A5 (Holyhead Road	**24**	Off A487
5	B5420 (Ffordd Penmynydd	**15**	Off A487	**25**	Unclassified Road
6	Off A5025	**16**	Unclassified Road	**26**	Off A5 west
7	Off B5420 (Pentraeth Road)	**17**	A4087 (Caernarfon Road)	**27**	A4080 (Ffordd Brynsiencyn)
8	Dale Street	**18**	A5 north	**28**	Off A5 west
9	Off Mona Road	**19**	A55 east	**29**	A5 west
10	A545 (Cadnant Road)	**20**	A5 south	**30**	Off A5152

2.4.3 Matrix development has been undertaken in two stages. A simple initial matrix has been created from turning count data using the traffic volumes and the percentage distribution passing through the entry and exit of each survey location along the model network.

2.4.4 These preliminary matrices have been assigned to a simple VISUM network that reflects the VISSIM model study area. The reason for using VISUM software is explained below. A process of matrix estimation has then been applied, using the turning count data to adjust travel demands to better reflect observed values. As part of the procedure, the GEH of the turning count data were compared with the VISUM values in order to confirm the calibration of the matrices and be certain that the resulting demands were accurate. The resulting matrices have then been imported into the VISSIM model following the completion of the matrix estimation process in VISUM.

Matrix estimation

Matrix estimation tries to improve the fit between observed and modelled flows by factoring individual cells of the input matrix. In many modelling packages, the matrix estimation methods employed rely on multiple factoring of a matrix until a solution is derived. Factoring is undertaken in series, and because many of the values in the matrix are affected by multiple control counts, the process has to be repeated iteratively until a suitable correlation is found for all the counts. Inevitably, this means that those trips that are affected by fewer control counts (usually the shorter trips) are subject to more extreme aggregate factors and this can distort the trip distribution.

The matrix estimation process in VISUM is more complex and hence is less prone to such distortions; it attempts to find suitable factors by considering all control counts simultaneously. The most noticeable advantage of this is that the trip distribution is maintained, whilst still producing a good correlation between the count data and predicted flows.

2.4.5 It is important that matrix estimation does not significantly change the shape of the matrix; otherwise, observed data can be lost. Pre- and post-matrix estimation trip lengths have been checked to ensure that matrix changes are minimised.

2.4.6 The matrix estimation process was carried on all hour periods in the modelled morning peak (06:00-07:00, 07:00-08:00 and 08:00-09:00) and modelled evening peak (15:00-16:00, 16:00-17:00 and 17:00-18:00). The change in trip length distribution as a result of the estimation process is given in figure 2-6 and figure 2-7 for the morning (08:00-09:00) and evening peak (17:00-18:00) respectively.

Figure 2-6 AM pre versus post trip length distribution

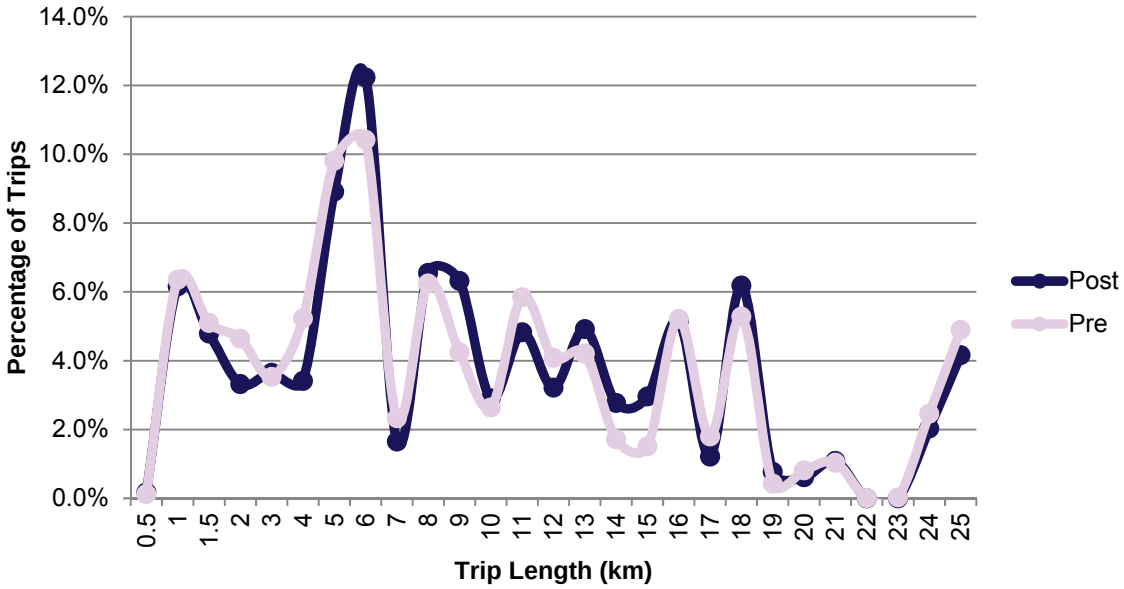
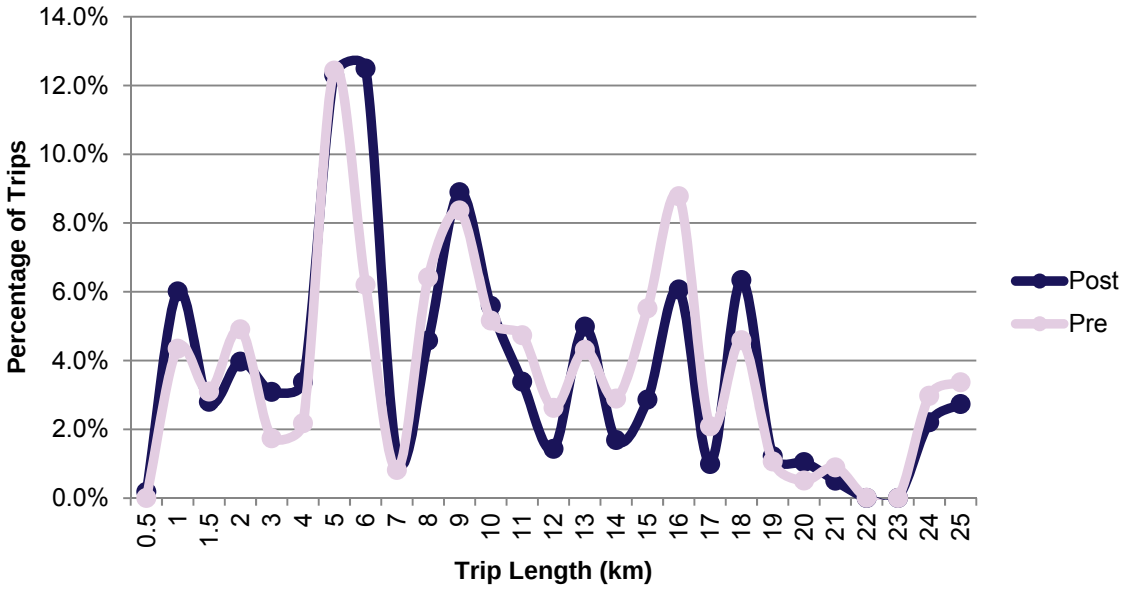


Figure 2-7 PM pre versus post trip length distribution



15 minute period matrices

2.4.7 Matrices have been disaggregated by 15 minute periods to replicate the observed profile of demand. This approach was adopted because within a peak hour, the peak 15 minutes of demand may be significantly higher than the remainder of the period. Disaggregating matrices by 15 minute periods enables the effects of 'peak-within-peak' demand to be replicated.

2.4.8 Factors to derive each 15 minute matrix were calculated based on the

distribution of the total number of cars joining the model during each 15 minute time period.

2.4.9 Resulting factors for cars for the morning and evening periods are shown in table 2-12. LGV and HGV factors are given in Appendix B.

Table 2-12 AM and PM 15 minute car matrix factors

Period	Start time	End time	Profile factor	Period	Start time	End time	Profile factor
1	05:45	06:00	0.2500	**14**	14:45	15:00	0.2500
2	06:00	06:15	0.1515	**15**	15:00	15:15	0.2356
3	06:15	06:30	0.2100	**16**	15:15	15:30	0.2424
4	06:30	06:45	0.2824	**17**	15.30	15:45	0.2595
5	06:45	07:00	0.3561	**18**	15:45	16:00	0.2625
Total			1	**Total**			1
6	07:00	07:15	0.1307	**19**	16:00	16:15	0.2413
7	07:15	07:30	0.1911	**20**	16:15	16:30	0.2478
8	07:30	07:45	0.2859	**21**	16:30	16:45	0.2557
9	07:45	08:00	0.3923	**22**	16:45	17:00	0.2551
Total			1	**Total**			1
10	08:00	08:15	0.2052	**23**	17:00	17:15	0.2705
11	08:15	08:30	0.2736	**24**	17:15	17:30	0.2663
12	08:30	08:45	0.2728	**25**	17:30	17:45	0.2424
13	08:45	09:00	0.2483	**26**	17:45	18:00	0.2208
Total			1	**Total**			1

Resulting matrix totals

2.4.10 Base matrix totals, for each model period and hour, are given in table 2-13 below.

Table 2-13 Matrix totals

Hour start	Car	LGV	HGV	Hour start	Car	LGV	HGV
06:00	1,283	313	368	**15:00**	7,012	956	330
07:00	4,137	1,026	403	**16:00**	8,208	1,156	262
08:00	8,385	1,297	502	**17:00**	9,080	983	201

2.5 Model operation

2.5.1 As part of the model calibration/validation and testing, which is summarised in the following section, VISSIM models have been run with a random seed value for a minimum of five operations; this allows any large differences between the operations to be averaged out. Results are based on the average of all simulations, ensuring a robust analysis and the minimisation of randomness effects.

2.6 Validation criteria and modelling guidelines

2.6.1 Welsh Government Transport Appraisal Guidance (WelTAG) (RD1) requires the application of UK Department for Transport WebTAG standards in the development of transport models (RD2). Consequently, the adequacy of the Britannia Bridge VISSIM Model calibration and validation was measured against WebTAG, (RD2).

Calibration/validation

Model calibration data are used directly in the development of the model network and/ or matrices. It is used to help refinement of the model and optimise performance.

- Calibration data typically include link and turning volumes.

Model validation data are not used directly in the model development process. Instead, outputs from the model are compared with these independent data sets to authenticate performance.

- Validation data include journey time and routing data.

2.6.2 The appraisal guidance sets out measures to compare the base year model against observed independent data to quantify the level of fit. Primary model calibration/ validation measures are:

- assigned flows and count comparison on individual links and turning movements at junctions, as a check on the quality of the assignment; and
- modelled and observed journey time comparison along routes, as a check on the quality of the network and the assignment.

2.6.3 Guidance criteria are strictly for model validation; however, they are typically used to assess the quality of both the model calibration and validation.

Link flow and turning movement calibration criteria

2.6.4 Two model calibration measures are used:

- the GEH statistic, which is useful in comparing two different values of flow on a link. The GEH statistic is defined as:

  $GEH = \sqrt{[\ (Modelled-Observed)^2 / \{\ (Observed + Modelled)/ 2\ \}\ ]}$.

- the absolute and percentage differences between modelled flows and counts.

2.6.5 Both measures are broadly consistent, and link and turning flows that meet either criterion should be regarded as satisfactory.

2.6.6 Confirmation of calibration criteria is given in table 2-14 below. WebTAG requires that results are presented for both car and total vehicles.

Table 2-14 Link flow and turning movement calibration criteria

Description of criteria	Acceptability guideline
Individual flows within 100 veh/hr of counts for flows less than 700 veh/hr	>85% of cases
Individual flows within 15% of counts for flows from 700 veh/hr to 2,700 veh/hr	>85% of cases
Individual flows within 400 veh/hr of counts for flows more than 2,700 veh/hr	>85% of cases
GEH <5 for individual flows	>85% of cases

Journey time validation criteria

2.6.7 Morning and evening base VISSIM model journey times have been validated against observed survey data. WebTAG guidance has been used to validate the journey time data as specified in table 2-15.

Table 2-15 Journey time validation criteria

Description of criteria	Acceptability guideline
Modelled times along routes should be within 15% of surveyed time, or within one minute if higher	>85% of routes

3. Model calibration and validation

3.1 Calibration process

3.1.1 The VISSIM model has been calibrated to accurately model existing (base) traffic conditions. Initial model assignments have been improved through minor adjustments to the trip matrices.

3.1.2 Routing has been optimised by adjusting link speeds and costs. Link speeds are based on sign-posted values, although local speed reductions apply at junction movements. The application of link costs helps specify major and minor roads within the network. The major A55 route has zero cost factors, local road cost factors are typically six and slip roads are generally set to 20 to avoid illogical local routing. In a small number of locations, a surcharge has also been applied to reflect actual routing patterns from the Bluetooth data.

3.1.3 Merge and give way parameters have been reviewed for appropriateness. Generally, locations which act as zone centroids have been coded without restriction. This improves model stability as, otherwise, traffic may queue unrealistically to enter the network.

3.1.4 Roundabout performance has also been reviewed and adjusted where necessary. Key parameters are 'avoid blocking back' and 'anticipate routing'. The former helps reduce the potential for roundabouts to lock up in busy traffic conditions. The latter can help increase capacity as vehicles approaching the give way line anticipate the routing of circulating traffic.

3.1.5 Network calibration has been an iterative process with minor adjustments made each time. The results have been reviewed with further minor changes made. The overall aim has been to achieve the best balance between turning count calibration, journey times, routing and queuing

3.2 Calibration results

3.2.1 In accordance with WebTAG, model calibration has been separately assessed for both Car and Total vehicle flows. The calibration of each model period is within the acceptability guidelines for all morning and evening peak modelled hours. A summary of results for each hour is shown in table 3-1.

Table 3-1 Turning count calibration results by hour (GEH<5)

Time period	Acceptability of car counts	Acceptability of total counts (car + LGV + HGV)
06:00-07:00	100%	100%
07:00-08:00	92%	91%
08:00-09:00	91%	89%
15:00-16:00	85%	85%
16:00-17:00	88%	87%
17:00-18:00	86%	86%

3.2.2 Note that the 15 minute warm up period in each model has been excluded from the calibration.

3.2.3 Generally, there is a high level of calibration across both the morning and evening peak periods. During the busiest times of the model 08:00-09:00 and 17:00-18:00, 91% and 86% of modelled car flows pass WebTAG GEH standards. Similarly, 89% and 86% of Total vehicle flow locations calibrate to observed values in the same morning and evening period hours, passing WebTAG GEH standards.

3.2.4 Table 3-2 to table 3-6, summarise observed and modelled turning flow calibration eastbound (EB), westbound (WB), northbound (NB) and southbound (SB) for key network junctions including A55 Junctions 8, 8a and 9 and Menai Bridge approaches.

3.2.5 Full calibration results by model hour, for each model period, are provided in Appendix C.

Table 3-2 Junction 8 turning count calibration

Hour start	A55 Junction 8 turning movements			Observed		Modelled		Abs Diff	% Diff		Abs Diff	% Diff		GEH			
				Car	Total	Car	Total	Car			Total			Car		Total	
06:00	A55 EB	To	A5025	14	22	34	45	20	143%	✓	23	105%	✓	4.08	✓	3.97	✓
	A55 EB	To	A55 EB	224	410	208	405	-16	-7%	✓	-5	-1%	✓	1.09	✓	0.25	✓
	A5025	To	A55 EB	98	136	93	129	-5	-5%	✓	-7	-5%	✓	0.51	✓	0.61	✓
	A55 WB	To	A5025	30	43	15	18	-15	-50%	✓	-25	-58%	✓	3.16	✓	4.53	✓
	A55 WB	To	A55 WB	155	284	160	293	5	3%	✓	9	3%	✓	0.40	✓	0.53	✓
	A5025	To	A55 WB	31	38	31	43	0	0%	✓	5	13%	✓	0.00	✓	0.79	✓
07:00	A55 EB	To	A5025	99	128	125	173	26	26%	✓	45	35%	✓	2.46	✓	3.67	✓
	A55 EB	To	A55 EB	575	773	584	769	9	2%	✓	-4	-1%	✓	0.37	✓	0.14	✓
	A5025	To	A55 EB	283	339	297	351	14	5%	✓	12	4%	✓	0.82	✓	0.65	✓
	A55 WB	To	A5025	95	159	36	50	-59	-62%	✓	-109	-69%	×	7.29	×	10.66	×
	A55 WB	To	A55 WB	419	682	426	685	7	2%	✓	3	0%	✓	0.34	✓	0.11	✓
	A5025	To	A55 WB	105	133	91	115	-14	-13%	✓	-18	-14%	✓	1.41	✓	1.62	✓
08:00	A55 EB	To	A5025	233	288	245	308	12	5%	✓	20	7%	✓	0.78	✓	1.16	✓
	A55 EB	To	A55 EB	665	842	660	830	-5	-1%	✓	-12	-1%	✓	0.19	✓	0.42	✓
	A5025	To	A55 EB	259	307	245	307	-14	-5%	✓	0	0%	✓	0.88	✓	0.00	✓
	A55 WB	To	A5025	163	235	120	145	-43	-26%	✓	-90	-38%	✓	3.61	✓	6.53	×
	A55 WB	To	A55 WB	608	830	667	912	59	10%	✓	82	10%	✓	2.34	✓	2.78	✓
	A5025	To	A55 WB	196	251	151	187	-45	-23%	✓	-64	-25%	✓	3.42	✓	4.32	✓
15:00	A55 EB	To	A5025	129	165	204	244	75	58%	✓	79	48%	✓	5.81	×	5.52	×
	A55 EB	To	A55 EB	418	579	425	588	7	2%	✓	9	2%	✓	0.34	✓	0.37	✓
	A5025	To	A55 EB	200	257	144	193	-56	-28%	✓	-64	-25%	✓	4.27	✓	4.27	✓
	A55 WB	To	A5025	279	315	258	286	-21	-8%	✓	-29	-9%	✓	1.28	✓	1.67	✓
	A55 WB	To	A55 WB	618	766	613	773	-5	-1%	✓	7	1%	✓	0.20	✓	0.25	✓
	A5025	To	A55 WB	177	210	227	260	50	28%	✓	50	24%	✓	3.52	✓	3.26	✓
16:00	A55 EB	To	A5025	168	203	231	277	63	38%	✓	74	36%	✓	4.46	✓	4.78	✓
	A55 EB	To	A55 EB	574	780	554	743	-20	-3%	✓	-37	-5%	✓	0.84	✓	1.34	✓
	A5025	To	A55 EB	208	265	124	176	-84	-40%	✓	-89	-34%	✓	6.52	×	5.99	×
	A55 WB	To	A5025	349	392	273	305	-76	-22%	✓	-87	-22%	✓	4.31	✓	4.66	✓
	A55 WB	To	A55 WB	750	917	852	990	102	14%	✓	73	8%	✓	3.60	✓	2.36	✓
	A5025	To	A55 WB	202	247	161	216	-41	-20%	✓	-31	-13%	✓	3.04	✓	2.04	✓
17:00	A55 EB	To	A5025	165	200	254	298	89	54%	✓	98	49%	✓	6.15	×	6.21	×
	A55 EB	To	A55 EB	583	707	592	708	9	2%	✓	1	0%	✓	0.37	✓	0.04	✓
	A5025	To	A55 EB	218	271	272	322	54	25%	✓	51	19%	✓	3.45	✓	2.96	✓
	A55 WB	To	A5025	386	447	274	308	-112	-29%	×	-139	-31%	×	6.17	×	7.15	×
	A55 WB	To	A55 WB	709	855	964	1,113	255	36%	×	258	30%	×	8.82	×	8.22	×
	A5025	To	A55 WB	232	256	155	185	-77	-33%	✓	-71	-28%	✓	5.54	×	4.78	✓

Table 3-3 Junction 8a turning count calibration

Hour start	A55 Junction 8a turning movements			Observed		Modelled		Abs Diff	% Diff		Abs Diff	% Diff		GEH			
				Car	Total	Car	Total	Car			Total			Car		Total	
06:00	A55 EB	To	A55 EB	322	546	300	511	-22	-7%	✓	-35	-6%	✓	1.25	✓	1.52	✓
	A5	To	A55 EB	58	81	54	75	-4	-7%	✓	-6	-7%	✓	0.53	✓	0.68	✓
	A55 WB	To	A5	15	21	13	13	-2	-13%	✓	-8	-38%	✓	0.53	✓	1.94	✓
	A55 WB	To	A55 WB	185	327	177	311	-8	-4%	✓	-16	-5%	✓	0.59	✓	0.90	✓
07:00	A55 EB	To	A55 EB	858	1,112	843	1,073	-15	-2%	✓	-39	-4%	✓	0.51	✓	1.18	✓
	A5	To	A55 EB	187	241	153	205	-34	-18%	✓	-36	-15%	✓	2.61	✓	2.41	✓
	A55 WB	To	A5	81	129	59	82	-22	-27%	✓	-47	-36%	✓	2.63	✓	4.58	✓
	A55 WB	To	A55 WB	514	841	465	741	-49	-10%	✓	-100	-12%	✓	2.21	✓	3.56	✓
08:00	A55 EB	To	A55 EB	924	1,149	927	1,162	3	0%	✓	13	1%	✓	0.10	✓	0.38	✓
	A5	To	A55 EB	582	657	569	642	-13	-2%	✓	-15	-2%	✓	0.54	✓	0.59	✓
	A55 WB	To	A5	180	260	170	238	-10	-6%	✓	-22	-8%	✓	0.76	✓	1.39	✓
	A55 WB	To	A55 WB	771	1065	787	1,054	16	2%	✓	-11	-1%	✓	0.57	✓	0.34	✓
15:00	A55 EB	To	A55 EB	618	836	570	783	-48	-8%	✓	-53	-6%	✓	1.97	✓	1.86	✓
	A5	To	A55 EB	185	238	231	272	46	25%	✓	34	14%	✓	3.19	✓	2.13	✓
	A55 WB	To	A5	256	292	257	279	1	0%	✓	-13	-4%	✓	0.06	✓	0.77	✓
	A55 WB	To	A55 WB	897	1,081	872	1,059	-25	-3%	✓	-22	-2%	✓	0.84	✓	0.67	✓
16:00	A55 EB	To	A55 EB	782	1,045	676	928	-106	-14%	✓	-117	-11%	✓	3.93	✓	3.73	✓
	A5	To	A55 EB	228	282	298	349	70	31%	✓	67	24%	✓	4.32	✓	3.77	✓
	A55 WB	To	A5	293	327	237	269	-56	-19%	✓	-58	-18%	✓	3.44	✓	3.36	✓
	A55 WB	To	A55 WB	1,099	1,309	1,128	1,299	29	3%	✓	-10	-1%	✓	0.87	✓	0.28	✓
17:00	A55 EB	To	A55 EB	801	978	864	1,034	63	8%	✓	56	6%	✓	2.18	✓	1.77	✓
	A5	To	A55 EB	223	266	274	318	51	23%	✓	52	20%	✓	3.24	✓	3.04	✓
	A55 WB	To	A5	317	346	369	396	52	16%	✓	50	14%	✓	2.81	✓	2.60	✓
	A55 WB	To	A55 WB	1,095	1,302	1,235	1,421	140	13%	✓	119	9%	✓	4.10	✓	3.23	✓

Table 3-4 Junction 9 turning count calibration

Hour start	A55 Junction 9 turning movements			Observed		Modelled		Abs Diff	% Diff		Abs Diff	% Diff		GEH			
				Car	Total	Car	Total	Car			Total			Car		Total	
06:00	A55 EB	To	J9 off slip	119	153	100	126	-19	-16%	✓	-27	-18%	✓	1.82	✓	2.29	✓
	A55 EB	To	A55 EB	261	474	250	455	-11	-4%	✓	-19	-4%	✓	0.69	✓	0.88	✓
	J9 on-slip	To	A55 EB	73	105	79	111	6	8%	✓	6	6%	✓	0.69	✓	0.58	✓
	A55 WB	To	J9 off-slip	33	37	29	29	-4	-12%	✓	-8	-22%	✓	0.72	✓	1.39	✓
	A55 WB	To	A55 WB	117	240	112	225	-5	-4%	✓	-15	-6%	✓	0.47	✓	0.98	✓
	J9 on-slip	To	A55 WB	83	108	82	104	-1	-1%	✓	-4	-4%	✓	0.11	✓	0.39	✓
07:00	A55 EB	To	J9 off-slip	541	634	460	530	-81	-15%	✓	-104	-16%	×	3.62	✓	4.31	✓
	A55 EB	To	A55 EB	504	719	516	723	12	2%	✓	4	1%	✓	0.53	✓	0.15	✓
	J9 on-slip	To	A55 EB	239	300	201	243	-38	-16%	✓	-57	-19%	✓	2.56	✓	3.46	✓
	A55 WB	To	J9 off-slip	242	293	211	252	-31	-13%	✓	-41	-14%	✓	2.06	✓	2.48	✓
	A55 WB	To	A55 WB	341	590	308	517	-33	-10%	✓	-73	-12%	✓	1.83	✓	3.10	✓
	J9 on-slip	To	A55 WB	255	381	230	327	-25	-10%	✓	-54	-14%	✓	1.61	✓	2.87	✓
08:00	A55 EB	To	J9 off-slip	878	976	733	822	-145	-17%	×	-154	-16%	×	5.11	×	5.14	×
	A55 EB	To	A55 EB	628	830	749	969	121	19%	×	139	17%	×	4.61	✓	4.63	✓
	J9 on-slip	To	A55 EB	353	439	312	404	-41	-12%	✓	-35	-8%	✓	2.25	✓	1.70	✓
	A55 WB	To	J9 off-slip	521	576	455	502	-66	-13%	✓	-74	-13%	✓	2.99	✓	3.19	✓
	A55 WB	To	A55 WB	458	711	519	751	61	13%	✓	40	6%	✓	2.76	✓	1.48	✓
	J9 on-slip	To	A55 WB	494	615	439	536	-55	-11%	✓	-79	-13%	✓	2.55	✓	3.29	✓
15:00	A55 EB	To	J9 off-slip	367	464	354	439	-13	-4%	✓	-25	-5%	✓	0.68	✓	1.18	✓
	A55 EB	To	A55 EB	436	610	441	608	5	1%	✓	-2	0%	✓	0.24	✓	0.08	✓
	J9 on-slip	To	A55 EB	430	526	458	561	28	7%	✓	35	7%	✓	1.33	✓	1.50	✓
	A55 WB	To	J9 off-slip	237	263	175	198	-62	-26%	✓	-65	-25%	✓	4.32	✓	4.28	✓
	A55 WB	To	A55 WB	657	785	673	800	16	2%	✓	15	2%	✓	0.62	✓	0.53	✓
	J9 on-slip	To	A55 WB	496	589	457	544	-39	-8%	✓	-45	-8%	✓	1.79	✓	1.89	✓
16:00	A55 EB	To	J9 off-slip	406	522	389	496	-17	-4%	✓	-26	-5%	✓	0.85	✓	1.15	✓
	A55 EB	To	A55 EB	604	805	584	777	-20	-3%	✓	-28	-3%	✓	0.82	✓	1.00	✓
	J9 on-slip	To	A55 EB	541	625	551	643	10	2%	✓	18	3%	✓	0.43	✓	0.71	✓
	A55 WB	To	J9 off-slip	197	227	174	203	-23	-12%	✓	-24	-11%	✓	1.69	✓	1.64	✓
	A55 WB	To	A55 WB	720	857	742	859	22	3%	✓	2	0%	✓	0.81	✓	0.07	✓
	J9 on-slip	To	A55 WB	673	780	630	716	-43	-6%	✓	-64	-8%	✓	1.68	✓	2.34	✓
17:00	A55 EB	To	J9 off-slip	528	630	535	629	7	1%	✓	-1	0%	✓	0.30	✓	0.04	✓
	A55 EB	To	A55 EB	496	614	610	733	114	23%	×	119	19%	×	4.85	✓	4.59	✓
	J9 on-slip	To	A55 EB	532	580	456	509	-76	-14%	✓	-71	-12%	✓	3.42	✓	3.04	✓
	A55 WB	To	J9 off-slip	239	265	245	274	6	3%	✓	9	3%	✓	0.39	✓	0.55	✓
	A55 WB	To	A55 WB	726	876	859	1,000	133	18%	×	124	14%	✓	4.72	✓	4.05	✓
	J9 on-slip	To	A55 WB	686	772	733	803	47	7%	✓	31	4%	✓	1.76	✓	1.10	✓

Table 3-5 Menai Bridge northern approach roundabout turning count calibration

Hour start	Menai Bridge north approach turning movements			Observed		Modelled		Abs Diff	% Diff		Abs Diff	% Diff		GEH			
				Car	Total	Car	Total	Car			Total			Car		Total	
06:00	A5 Mona Road EB	To	A5 Menai Bridge EB	53	60	62	66	9	17%	✓	6	10%	✓	1.19	✓	0.76	✓
	A545 SB	To	A5 Menai Bridge EB	42	45	38	40	-4	-10%	✓	-5	-11%	✓	0.63	✓	0.77	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	14	19	19	21	5	36%	✓	2	11%	✓	1.23	✓	0.45	✓
	A5 Menai Bridge WB	To	A545 NB	8	10	5	5	-3	-38%	✓	-5	-50%	✓	1.18	✓	1.83	✓
07:00	A5 Mona Road EB	To	A5 Menai Bridge EB	224	251	233	263	9	4%	✓	12	5%	✓	0.60	✓	0.75	✓
	A545 SB	To	A5 Menai Bridge EB	136	152	117	134	-19	-14%	✓	-18	-12%	✓	1.69	✓	1.51	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	50	67	53	82	3	6%	✓	15	22%	✓	0.42	✓	1.74	✓
	A5 Menai Bridge WB	To	A545 NB	33	44	66	73	33	100%	✓	29	66%	✓	4.69	✓	3.79	✓
08:00	A5 Mona Road EB	To	A5 Menai Bridge EB	619	664	569	611	-50	-8%	✓	-53	-8%	✓	2.05	✓	2.10	✓
	A545 SB	To	A5 Menai Bridge EB	295	322	344	368	49	17%	✓	46	14%	✓	2.74	✓	2.48	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	215	236	276	314	61	28%	✓	78	33%	✓	3.89	✓	4.70	✓
	A5 Menai Bridge WB	To	A545 NB	88	112	56	70	-32	-36%	✓	-42	-38%	✓	3.77	✓	4.40	✓
15:00	A5 Mona Road EB	To	A5 Menai Bridge EB	294	327	241	267	-53	-18%	✓	-60	-18%	✓	3.24	✓	3.48	✓
	A545 SB	To	A5 Menai Bridge EB	188	210	176	194	-12	-6%	✓	-16	-8%	✓	0.89	✓	1.13	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	406	435	326	358	-80	-20%	✓	-77	-18%	✓	4.18	✓	3.87	✓
	A5 Menai Bridge WB	To	A545 NB	192	218	174	188	-18	-9%	✓	-30	-14%	✓	1.33	✓	2.11	✓
16:00	A5 Mona Road EB	To	A5 Menai Bridge EB	316	347	303	335	-13	-4%	✓	-12	-3%	✓	0.74	✓	0.65	✓
	A545 SB	To	A5 Menai Bridge EB	195	228	191	222	-4	-2%	✓	-6	-3%	✓	0.29	✓	0.40	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	600	654	709	772	109	18%	×	118	18%	×	4.26	✓	4.42	✓
	A5 Menai Bridge WB	To	A545 NB	241	266	196	213	-45	-19%	✓	-53	-20%	✓	3.04	✓	3.42	✓
17:00	A5 Mona Road EB	To	A5 Menai Bridge EB	271	303	281	303	10	4%	✓	0	0%	✓	0.60	✓	0.00	✓
	A545 SB	To	A5 Menai Bridge EB	172	196	163	184	-9	-5%	✓	-12	-6%	✓	0.70	✓	0.87	✓
	A5 Menai Bridge WB	To	A5 Mona Road WB	778	842	874	958	96	12%	✓	116	14%	✓	3.34	✓	3.87	✓
	A5 Menai Bridge WB	To	A545 NB	281	305	295	314	14	5%	✓	9	3%	✓	0.82	✓	0.51	✓

Table 3-6 Menai Bridge southern approach roundabout turning counts calibration

Hour start	Menai Bridge south approach turning movements			Observed		Modelled		Abs Diff	% Diff		Abs Diff	% Diff		GEH			
				Car	Total	Car	Total	Car			Total			Car		Total	
06:00	A5 Menai Bridge EB	To	A5 EB	42	46	41	41	-1	-2%	✓	-5	-11%	✓	0.16	✓	0.76	✓
	A5 Menai Bridge EB	To	A487 SB	56	61	58	64	2	4%	✓	3	5%	✓	0.26	✓	0.38	✓
	A5 WB	To	A5 Menai Bridge WB	9	17	10	11	1	11%	✓	-6	-35%	✓	0.32	✓	1.60	✓
	A487 NB	To	A5 Menai Bridge WB	12	14	14	15	2	17%	✓	1	7%	✓	0.55	✓	0.26	✓
07:00	A5 Menai Bridge EB	To	A5 EB	132	155	135	157	3	2%	✓	2	1%	✓	0.26	✓	0.16	✓
	A5 Menai Bridge EB	To	A487 SB	214	238	196	221	-18	-8%	✓	-17	-7%	✓	1.26	✓	1.12	✓
	A5 WB	To	A5 Menai Bridge WB	47	60	58	72	11	23%	✓	12	20%	✓	1.52	✓	1.48	✓
	A487 NB	To	A5 Menai Bridge WB	51	67	74	95	23	45%	✓	28	42%	✓	2.91	✓	3.11	✓
08:00	A5 Menai Bridge EB	To	A5 EB	504	546	706	738	202	40%	×	192	35%	×	8.21	×	7.58	×
	A5 Menai Bridge EB	To	A487 SB	402	428	278	310	-124	-31%	×	-118	-28%	×	6.72	×	6.14	×
	A5 WB	To	A5 Menai Bridge WB	181	205	188	206	7	4%	✓	1	0%	✓	0.52	✓	0.07	✓
	A487 NB	To	A5 Menai Bridge WB	127	149	155	187	28	22%	✓	38	26%	✓	2.36	✓	2.93	✓
15:00	A5 Menai Bridge EB	To	A5 EB	247	274	213	230	-34	-14%	✓	-44	-16%	✓	2.24	✓	2.77	✓
	A5 Menai Bridge EB	To	A487 SB	239	264	195	225	-44	-18%	✓	-39	-15%	✓	2.99	✓	2.49	✓
	A5 WB	To	A5 Menai Bridge WB	396	435	388	414	-8	-2%	✓	-21	-5%	✓	0.40	✓	1.02	✓
	A487 NB	To	A5 Menai Bridge WB	207	222	115	136	-92	-44%	✓	-86	-39%	✓	7.25	×	6.43	×
16:00	A5 Menai Bridge EB	To	A5 EB	246	280	217	243	-29	-12%	✓	-37	-13%	✓	1.91	✓	2.29	✓
	A5 Menai Bridge EB	To	A487 SB	274	305	268	303	-6	-2%	✓	-2	-1%	✓	0.36	✓	0.11	✓
	A5 WB	To	A5 Menai Bridge WB	500	541	506	544	6	1%	✓	3	1%	✓	0.27	✓	0.13	✓
	A487 NB	To	A5 Menai Bridge WB	350	388	408	450	58	17%	✓	62	16%	✓	2.98	✓	3.03	✓
17:00	A5 Menai Bridge EB	To	A5 EB	206	228	188	203	-18	-9%	✓	-25	-11%	✓	1.28	✓	1.70	✓
	A5 Menai Bridge EB	To	A487 SB	232	268	245	277	13	6%	✓	9	3%	✓	0.84	✓	0.55	✓
	A5 WB	To	A5 Menai Bridge WB	594	639	600	645	6	1%	✓	6	1%	✓	0.25	✓	0.24	✓
	A487 NB	To	A5 Menai Bridge WB	473	515	569	628	96	20%	✓	113	22%	×	4.21	✓	4.73	✓

3.3 Validation results

Journey times

3.3.1 Modelled journey times have been compared with observed values from the Bluetooth data.

3.3.2 For major routing patterns, A55/A5 east and westbound sufficient journey time data are available to disaggregate journey times by model hour. For less busy routes, insufficient data is available to disaggregate travel times by individual hour so results are presented for the overall model period. These aggregated routes are:

- A55 – Holyhead Road
- A55 – Pentraeth Road

3.3.3 Observed and modelled journey times are summarised in table 3-7 and table 3-8 for the morning and evening period respectively.

3.3.4 In the morning peak, east and westbound A55 journey times validate across each model hour to within 6% of observed values. In the evening peak, eastbound and westbound journey times again validate across each model time period, although with a slightly higher variation. As an example, westbound modelled journey times are slightly faster than observed values in the 16:00-17:00 hour but consistent with observed times between 17:00 and 18:00.

3.3.5 A5 eastbound journey times in the morning peak validate between 07:00 and 09:00. The observed value between 06:00 and 07:00 is much faster than other periods. While the total number of observed vehicles is low, the quick journey time suggests an element of speeding on the network, early in the morning, while modelled times are constrained to actual speed limit values.

3.3.6 In the morning peak, the A55 to Holyhead Road (Bangor) journey time is faster than the observed value; however, both this and the reverse movement validate. In the evening peak, the westbound modelled movement is slightly faster than observed values while eastbound times are within the criteria. Note that if modelled times were two seconds slower, then journey times would validate.

3.3.7 The Pentraeth Road to A55 movement, and reverse, meets WebTAG criteria across each peak.

3.3.8 As summarised in table 3-1, WebTAG requires that 85% of routes validate to within 15% or one minute, if higher. All but one route in each period validates, 93% of the total, exceeding WebTAG requirements.

Table 3-7 AM journey time comparison

Location/Direction	A	B	06:00 (seconds)					07:00 (seconds)					08:00 (seconds)				
			Observed	Modelled	% difference	Difference (seconds)	Pass	Observed	Modelled	% difference	Difference (seconds)	Pass	Observed	Modelled	% difference	Difference (seconds)	Pass
A55 eastbound (includes Britannia Bridge)	10	17	207	208	0%		✓	221	216	-2%		✓	300	301	0%		✓
A55 westbound (includes Britannia Bridge)	17	10	207	200	-3%		✓	209	204	-3%		✓	213	20	-2%		✓
A5 eastbound (includes Menai Bridge)	12	15	146	220	51%	74.3	×	174	223	28%	49.2	✓	234	254	9%		✓
A5 westbound (includes Menai Bridge)	15	12	156	168	8%		✓	168	171	2%		✓	203	181	-11%		✓

			06:00-09:00 (seconds)				
A55 - Holyhead Road	10	15	357	303	-15%	54.3	✓
Holyhead Road - A55	15	10	332	296	-11%		✓
Pentraeth Road - A55	12	17	339	349	3%		✓
A55 - Pentraeth Road	17	12	322	361	12%		✓

Table 3-8 PM journey time comparison

Location/direction			15:00 (seconds)					16:00 (seconds)					17:00 (seconds)				
	A	B	Observed	Modelled	% difference	Difference (seconds)	Pass	Observed	Modelled	% difference	Difference (seconds)	Pass	Observed	Modelled	% difference	Difference (seconds)	Pass
A55 eastbound (includes Britannia Bridge)	10	17	216	209	-3%		✓	213	213	-0%		✓	253	212	-16%	41	✓
A55 westbound (includes Britannia Bridge)	17	10	221	206	-7%		✓	259	206	-21%	53.5	✓	307	274	-11%		✓
A5 eastbound (includes Menai Bridge)	12	15	210	225	7%		✓	205	229	12%		✓	205	240.2	17%	35.2	✓
A5 westbound (includes Menai Bridge)	15	12	214	182	-15%	32.2	✓	227	189	-17%	38	✓	241	201	-17%	40.2	✓
			15:00-18:00 (seconds)														
A55 - Holyhead Road	10	15	306	281	-8%		✓										
Holyhead Road - A55	15	10	385	324	-16%	61.4	×										
Pentraeth Road - A55	12	17	388	338	-13%		✓										
A55 - Pentraeth Road	17	12	424	381	-10%		✓										

Routing

3.3.9 Observed and modelled routing across Britannia Bridge and Menai Bridge has been compared as part of the validation process.

3.3.10 Traffic travelling along the A55 would follow the direct route across Britannia Bridge under normal circumstances. Similarly, traffic on the A5 would use Menai Bridge unless network conditions result in closure or long delay.

3.3.11 Traffic from the A55 west (Bluetooth Site 10) travelling towards Bangor (Site 15) has the option of travelling via Britannia Bridge (Site 20) or Menai Bridge (Site 14). Traffic from the A5 Pentraeth Road (Site 12) travelling to the A55 east (Site 17) would also choose between alternative bridge crossings based on traffic conditions. The percentage of traffic using each route and their reverse is summarised for the morning and evening peak in table 3-9 and table 3-10 respectively.

Table 3-9 AM observed and modelled routing

Location	Direction	Bridge	A	B	C	Observed	% by route	Modelled	% by route
A55 - Holyhead Road (south of Menai Bridge)	west - east	Britannia Bridge	10	20	15	116	70%	121	67%
		Menai Bridge	10	14	15	50	30%	59	33%
Holyhead Road (south of Menai Bridge) - A55	east - west	Britannia Bridge	15	20	10	18	62%	31	57%
		Menai Bridge	15	14	10	11	38%	23	43%
Pentraeth Road (north of Menai Bridge) - A55	west - east	Britannia Bridge	12	20	17	44	76%	59	84%
		Menai Bridge	12	14	17	14	24%	11	16%
A55 - Pentraeth Road (north of Menai Bridge)	east - west	Britannia Bridge	17	20	12	36	82%	64	68%
		Menai Bridge	17	14	12	8	18%	30	32%

Table 3-10: PM observed and modelled routing

Location	Direction	Bridge	A	B	C	Observed	% by route	Modelled	% by route
A55 - Holyhead Road (south of Menai Bridge)	west - east	Britannia Bridge	10	20	15	60	76%	141	80%
		Menai Bridge	10	14	15	19	24%	36	20%
Holyhead Road (south of Menai Bridge) - A55	east - west	Britannia Bridge	15	20	10	28	22%	100	58%
		Menai Bridge	15	14	10	98	78%	71	42%
Pentraeth Road (north of Menai Bridge) - A55	west - east	Britannia Bridge	12	20	17	30	53%	80	73%
		Menai Bridge	12	14	17	27	47%	29	27%
A55 - Pentraeth Road (north of Menai Bridge)	east - west	Britannia Bridge	17	20	12	34	52%	77	50%
		Menai Bridge	17	14	12	31	48%	78	50%

3.3.12 Routing show a strong level of consistency across both bridges. Morning and evening peak modelled eastbound routing from the A55 towards Bangor show a strong correlation with observed values. Routing between the A5 Pentraeth Road and the A55 is consistent east and westbound in both model periods. Only the morning peak movement from Bangor to the A55 westbound is inconsistent with observed values (82% observed / 68% modelled); however, actual sample sizes are low.

3.3.13 Modelled routing has been verified against turning counts and has shown to be more consistent with observed travel behaviour (in terms of both calibration count and journey time results).

Queue lengths

3.3.14 Validation against queue lengths is not included in WebTAG. The reason is that in congested networks, minor variations in network performance can result in a large variation in queue lengths. In such circumstances, it can be hard to quantify normal conditions. In addition, different software calculates queueing differently. 'Blocking back' and other capacity constraint methodologies (demand/actual flows) further complicate queue calculations.

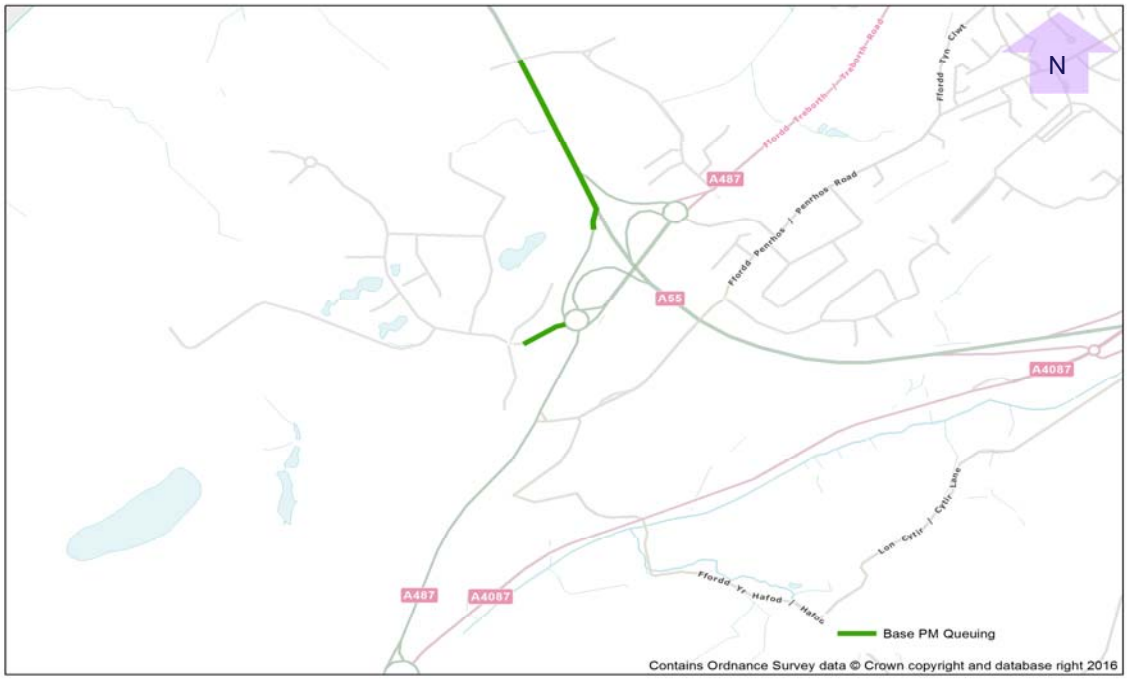
Nevertheless, in the context of Britannia Bridge, reporting queue lengths is useful as they are one of the most recognisable indicators of model performance available to stakeholders - and an effective way to assess low level congestion.

3.3.15 Modelled queue lengths have been reviewed and are consistent with March 2016 video survey and site visit records.

3.3.16 Eastbound modelled queuing commenced around 08:00 and continued through to 09:00. At 08:45, queuing reaches midway between Junction 8a and 8, as shown in figure 3-1, consistent with on-site observations. Westbound queuing commenced around 17:15 and reaches back and onto the Junction 9 westbound on-slip at approximately 17:30 (see figure 3-2).

Figure 3-1 Base 2016 eastbound queues at 08:45, Junction 8/ 8a

Figure 3-2 Base 2016 westbound queues at 17:30, Junction 9



3.3.17 Modelled merge behaviour is also consistent with video footage. As observed, the short merge lengths at Junction 8a and 9 can make it difficult for traffic to join the A55, and these conditions are reflected in the base model.

Summary

3.3.18 Overall, the model validates to a high standard. Three parameters have been considered: journey times, routing and queue lengths. As summarised in table 3-7 and table 3-8, the majority of journey times across the AM and PM peak times validate within WebTAG guidelines.

3.3.19 In the morning peak, the A5 eastbound 06:00-07:00 modelled journey time is slower than observed. While the number of observations at this time is small, the quick journey time, compared with later periods, may indicate that some vehicles are travelling faster than the speed limit in the early morning. Modelled journey times are constrained to actual speed limit values at all times.

3.3.20 In the evening peak, the Holyhead Road (Bangor) to A55 journey time is faster than the observed value; however, this is only marginally outside WebTAG criteria (by less than two seconds).

3.3.21 Model routing is consistent with the Bluetooth analysis.

3.3.22 Modelled queue lengths, although not directly used for validation, have been checked and match observed lengths from the video survey and on-site observations.

3.3.23 The VISSIM model has been reviewed by Welsh Government for robustness.

3.4 Journey time routes

3.4.1 In subsequent Chapters 4 to 6, a number of tables summarise journey times. These tables represent journey times for the primary movements eastbound and westbound across both Britannia Bridge and Menai Bridge. The values reported are based on the combined weighted average journey times from a number of approach routes as outlined below.

- Britannia Bridge eastbound to Junction 9 diverge from the following locations:
  - Ffordd Penmynydd overbridge before Junction 8 to (3.05km);
  - A5025 west of Junction 8 at Lon Refail (2.26km);
  - A5025 500m east of Junction 8 (2.63km);
  - A5 west of Junction 8a at Lon Graig (2.46km); and
  - A5 east of Junction 8a at Menai Bridge Viewpoint (2.21km).
- Britannia Bridge westbound to Junction 8a diverge from the following locations:
  - A55 west of Junction 10 merge (2.37km);
  - A4087 west of Tesco roundabout (3.4km);
  - A487/B4547 roundabout (2.92km); and
  - A487 Treborth Rd at driving range (3.2km).
- Menai Bridge eastbound to southern Menai Bridge roundabout from the following locations:
  - A545 Cadnant Rd at Askew Street (1.12km);
  - B5420 Pentraeth Rd at Y Glyn (1.42km); and
  - A5 Holyhead Rd at Lon Germant (1.34km).
- Menai Bridge westbound to northern Menai Bridge roundabout from the following locations:
  - A5 Holyhead Road at Belmont Road (1.16km); and
  - A487 Treborth Rd at Sunnybank Bus Stop.

4. Future background traffic growth

4.1 Traffic growth

4.1.1 It is anticipated that 2023 would be the peak construction year with project traffic at its highest level during this time. Consequently, a model forecast year of 2023 has been chosen, representing a worst case demand scenario. The basis for model years is explained in Introduction to the topics B3 - Traffic and transport (Application Reference Number: 6.2.3).

4.1.2 Base calibrated car demand has been factored to 2023 using TEMPro Version 7.2 March 2017 (RD4) growth factors. LGV and HGV traffic has been factored to the forecast year using values taken from Department for Transport Regional Traffic Forecasts (RD5 and RD4). All factors are consistent with the strategic model; values are summarised in table 4-1.

Table 4-1 TEMPro / Regional Traffic Forecast growth figures

Year	Cars	LGV	Rigid	Artic	HGV (average of rigid and artic)
2023 AM	1.0736	1.1930	1.0315	1.0915	1.0513
2023 PM	1.0680	1.1930	1.0315	1.0915	1.0513

4.1.3 Resulting one hour travel demands, assigned to the model, are given by vehicle type in table 4-2.

Table 4-2 Future year travel demand

Hour	Car		LGV		HGV		Hour	Car		LGV		HGV	
	2016	2023	2016	2023	2016	2023		2016	2023	2016	2023	2016	2023
06:00	1,283	1,377	313	373	368	380	15:00	6,990	7,465	956	1,141	330	347
07:00	4,187	4,495	1,026	1,224	403	416	16:00	8,158	8,713	1,156	1,379	262	275
08:00	8,417	9,036	1,297	1,547	502	518	17:00	9,010	9,623	983	1,173	201	225

4.1.4 Future demand has then been disaggregated by the 15 minute matrix factors, given in Section 2.4 to reflect peak within peak demand. As a result, it is assumed that travellers do not respond to potentially increased journey times and delay by adjusting their journey start (known as peak spreading).

4.2 Future background traffic growth impacts

Summary

General model performance

4.2.1 VISSIM model results illustrate that future background traffic growth will worsen traffic conditions at existing network constraint locations.

4.2.2 In the morning peak, traffic queues and delays increase eastbound from Anglesey towards the mainland. Queuing on Britannia Bridge starts to form before 08:00 and continues through to the model end at 09:00.

4.2.3 Traffic volumes also increase across the Menai Bridge towards Bangor, although potential queues are moderated by the roundabouts at the A5/Pentraeth Road/Dale Street and A5025/B5420 to the north. Localised queuing occurs northbound on the A487 at Faenol Hill where the carriageway reduces from two lanes to one. Elsewhere, the model show no major queuing or delay throughout the simulation period.

4.2.4 Evening peak congestion locations are also the same as existing congestion locations, with increased queues and delays westbound on the A55 towards Britannia Bridge, the A487 northbound and the A5 leaving Bangor.

4.2.5 Overall morning and evening peak network simulation traffic conditions are illustrated in figure 4-1 and figure 4-2 at 08:45 and 17:30 respectively.

Figure 4-1 AM 2023 network queues without Project traffic (08:45)

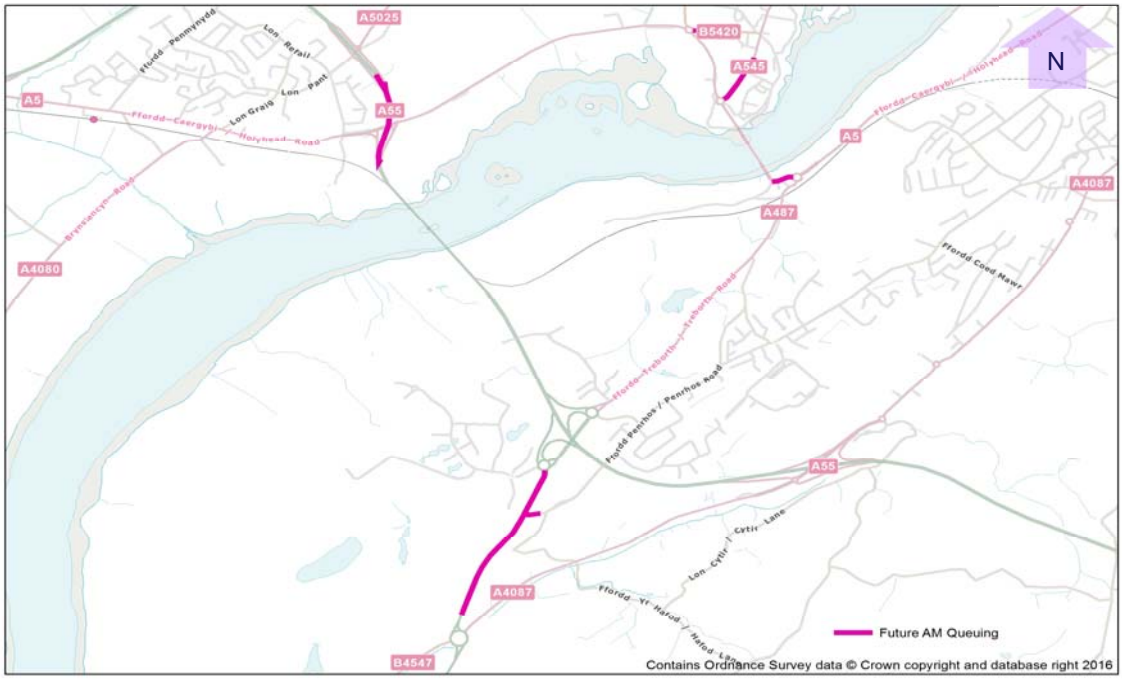
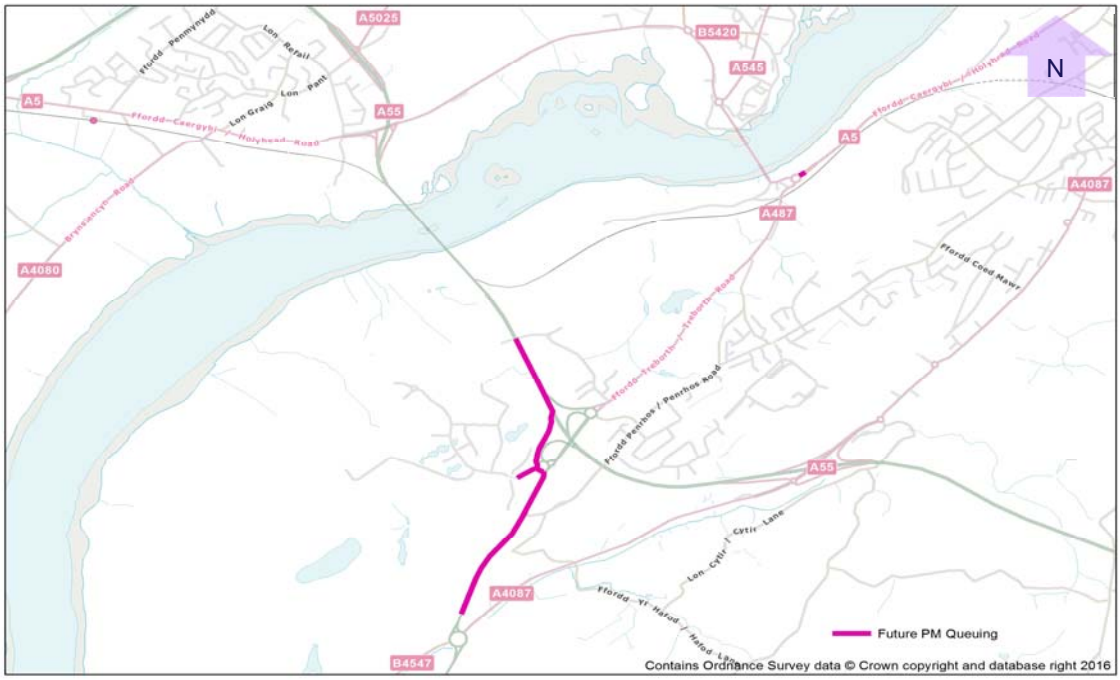


Figure 4-2 PM 2023 network queues without Project traffic (17:30)

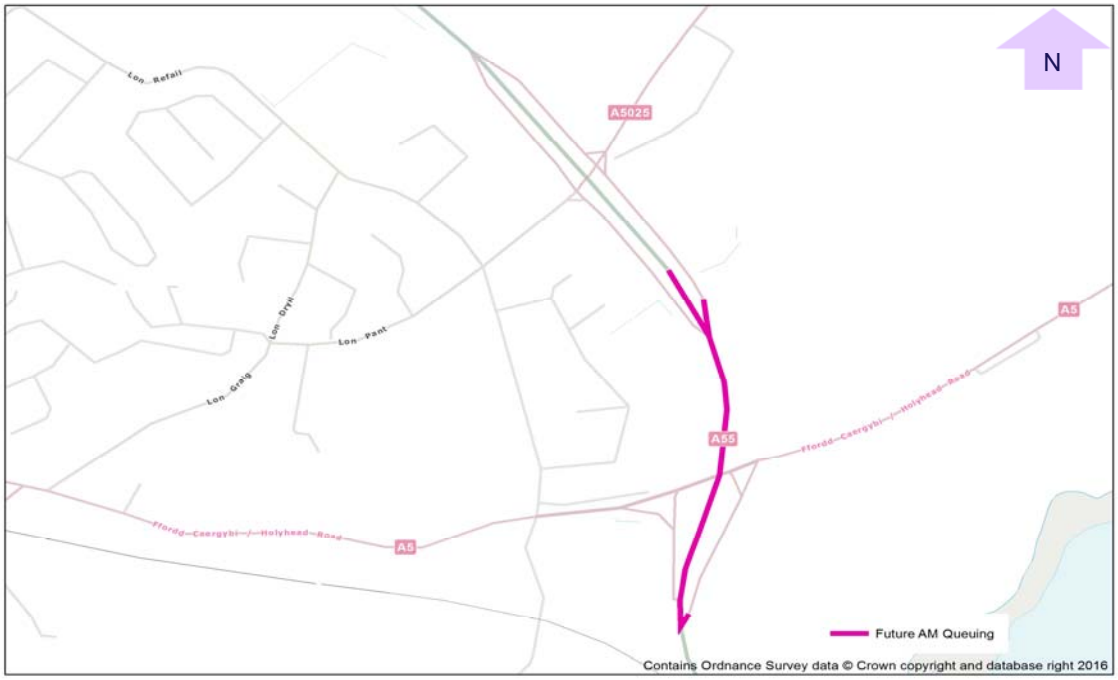


Key locations

Britannia Bridge, AM peak

4.2.6 Figure 4-3 show that morning peak eastbound traffic queues extend back towards Junction 8 on-slip. The simulation time shown is 08:45; by 08:50 queues extend to the junction overbridge. Towards the end of the model the queuing reduces slightly back to that shown in figure 4-3.

Figure 4-3 2023 morning peak queuing eastbound towards Britannia Bridge without Project traffic (08:45), Junction 8a



4.2.7 Travel demands and journey times by model hour are summarised in table 4-3. Although eastbound traffic volumes increase between 06:00 and 08:00, demand is less than network capacity and so any increase in journey time is marginal.

4.2.8 Traffic increases eastbound between 08:00 and 09:00 result in an average journey increase of 135 seconds between the base and future year with background growth.

4.2.9 The additional number of vehicles merging at Junction 8a and, in particular, Junction 8 result in the significantly increased delay along the A55. Table 4-3 show that a lower number of vehicles than expected travel eastbound during the main peak hour 08:00-09:00; however, this is as a result of the increased levels of congestion. This leads to fewer vehicles reaching the journey time counter before the end of the simulation hour indicating a more congested network.

4.2.10 Westbound journey times are almost unchanged, as this movement is the reverse of the morning commuter flow.

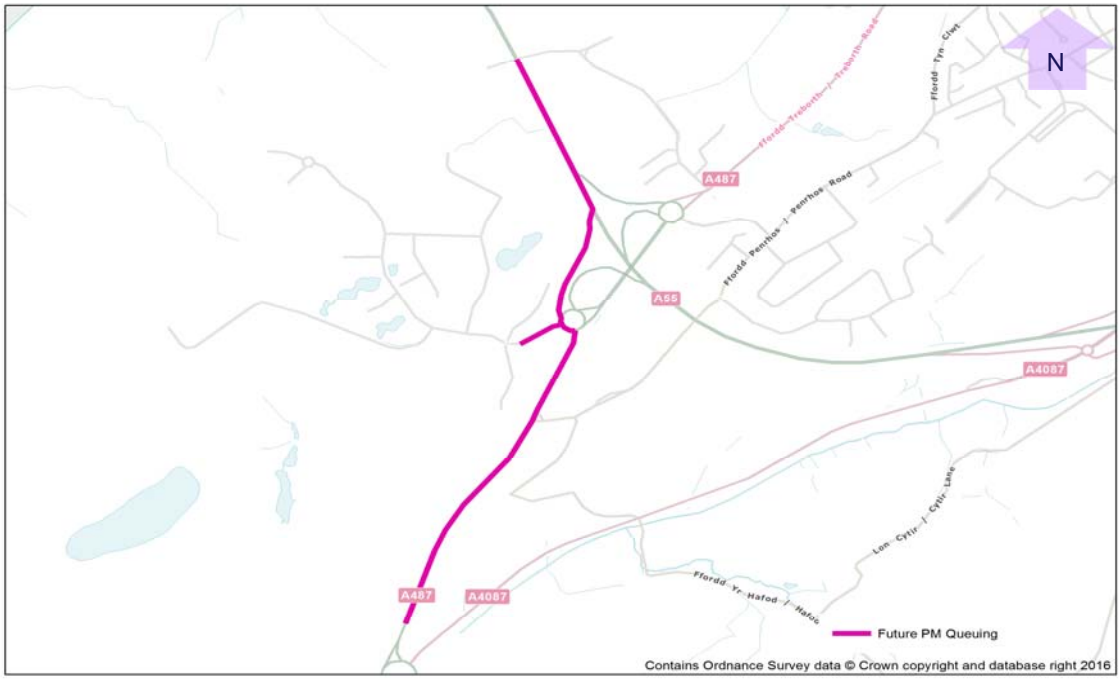
Table 4-3 2023 AM vehicle trips and travel time by simulation hour without Project, Britannia Bridge

background growth only	Hour start	2016	2023	2023-2016	2016	2023	2023-2016
Location		Vehicles	Vehicles	Vehicles diff	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	06:00	585	635	+50	123	123	0
	07:00	1,284	1,349	+65	134	137	+3
	08:00	1,804	1,777	-27	199	327	+135
Britannia Bridge westbound	06:00	329	348	+19	109	109	0
	07:00	845	922	+77	115	115	0
	08:00	1,287	1,321	+34	172	192	+19

Britannia Bridge, PM peak

4.2.11 In the evening peak, the return movement towards Anglesey is the dominant commuter flow. Future forecast evening peak queues on the westbound approach to Britannia Bridge are illustrated in figure 4-4. On the A55, these extend past the on-slip on Junction 9. Queues on the junction on-slip extend through the A487 roundabout, southwards beyond Penrhos Road. This effect is consistent with existing traffic conditions where A487 on-slip merge capacity is restricted by the A55 flow.

Figure 4-4 2023 evening peak queuing westbound towards Britannia Bridge without Project (17:30), Junction 9



4.2.12 A small number of vehicles (approximately 30) are unreleased from Zone 25.

This is a result of the large volume of traffic joining the A55 westbound at Junction 9, which reduces exit capacity from the zone in the future year.

4.2.13 Travel demands and journey times are given in table 4-4 only minor increases result eastbound. Similarly, westbound journey times increase only marginally between 15:00 and 17:00. In the final simulation hour, queuing starts to occur before 17:15 and increases as shown above by 17:30. As a consequence, westbound average journey times across the model hour increase by 130 seconds compared with the base 2016 model.

Table 4-4 2023 PM vehicle trips and travel time by simulation hour without Project, Britannia Bridge

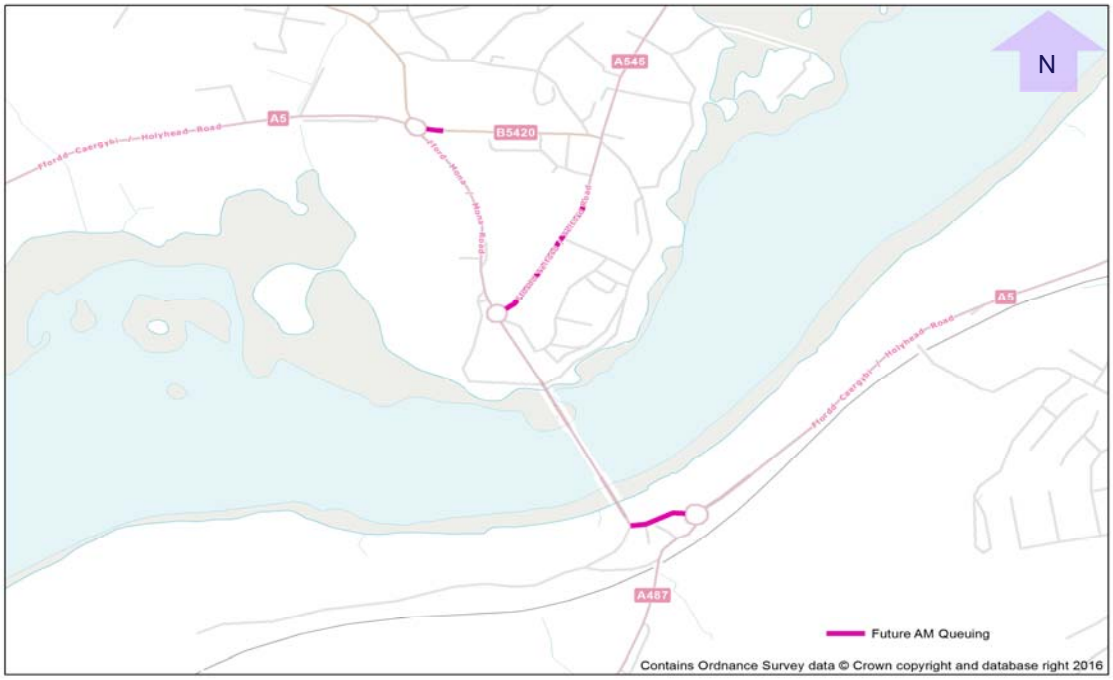
background growth only	Hour start	2016	2023	2023-2016	2016	2023	2023-2016
Location		Vehicles	Vehicles	Vehicles diff	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	15:00	1,055	1,139	+84	123	124	+1
	16:00	1,277	1,375	+98	124	125	+1
	17:00	1,352	1,453	+101	125	126	+1
Britannia Bridge westbound	15:00	1,344	1,451	+107	119	120	+1
	16:00	1,575	1,701	+126	123	128	+5
	17:00	1,803	1,959	+156	197	327	+130

Menai Bridge

4.2.14 As noted above, morning traffic volumes increase across the Menai Bridge towards Bangor, although queues across the bridge are moderated by the roundabouts at the A5/Pentraeth Road/Dale Street and A5025/ B5420.

4.2.15 Eastbound queues in the vicinity of the bridge at 08:45 are illustrated in figure 4-5.

Figure 4-5 2023 morning peak queuing eastbound towards Menai Bridge without Project (08:45)



4.2.16 East and westbound travel demands and journey times by morning model hour are summarised in table 4-5. At Menai Bridge, eastbound journey times increase by 90 seconds between 08:00-09:00. Apart from this increase journey times elsewhere are largely unaffected, with only small increases throughout the morning peak despite an increase in traffic volumes.

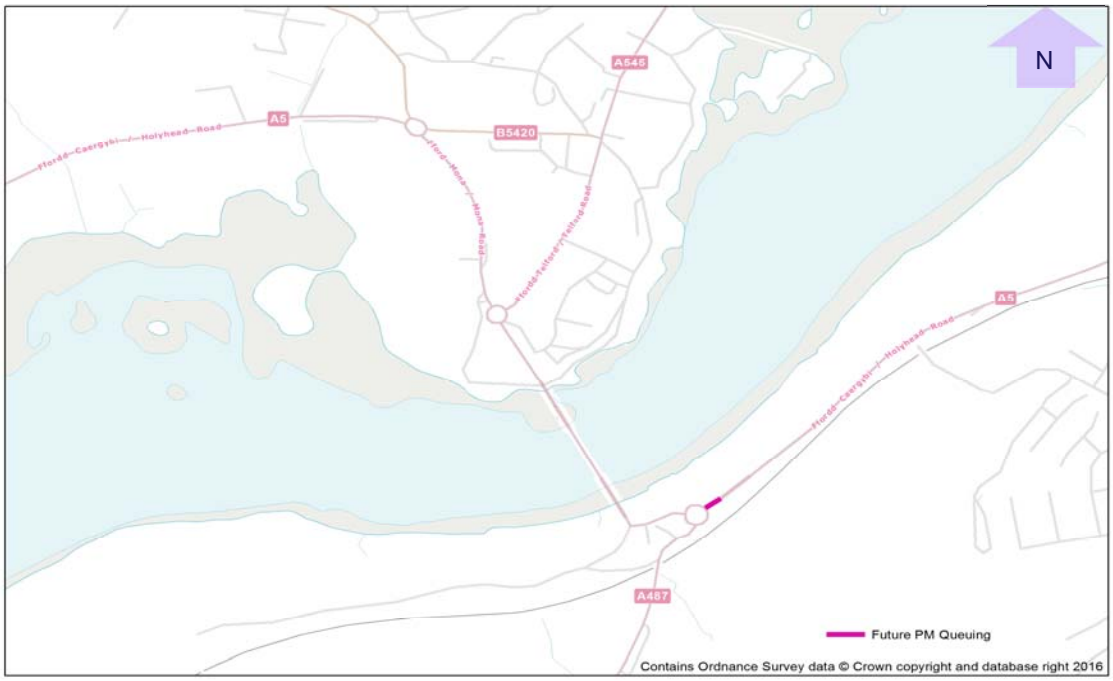
Table 4-5 2023 AM vehicle trips and travel time by simulation hour without Project, Menai Bridge

background growth only	Hour start	2016	2023	2023-2016	2016	2023	2023-2016
Location		Vehicles	Vehicles	Vehicles diff	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	06:00	106	117	+11	108	107	-1
	07:00	393	455	+62	109	111	+1
	08:00	1,077	1,174	+97	134	224	+90
Menai Bridge westbound	06:00	26	30	+4	82	82	0
	07:00	167	186	+19	80	80	0
	08:00	393	420	+27	84	86	+2

4.2.17 Evening peak travel demand is again higher westbound as traffic leaves Bangor towards Anglesey. Queues occur on the Holyhead Road approach to the A5/A487 junction although, as a result, Menai Bridge operates without significant issue.

4.2.18 Further northwest, conflicting traffic movements result in localised queuing at the A5/ Pentraeth Road/Dale Street and A5025/B5420 roundabouts, as shown in figure 4-6.

Figure 4-6 2023 evening peak queuing westbound towards Menai Bridge without Project (17:30)



4.2.19 Existing and 2023 future background traffic volumes and travel times are given in table 4-6. Travel times show a consistent pattern with other model locations; only modest increases occur between 15:00 and 17:00 in each direction. After 17:00, journey time variances are similar, indicating that background growth has limited effect on Menai Bridge during the evening peak.

Table 4-6 2023 PM vehicle trips and travel time by simulation hour without Project, Menai Bridge

background growth only	Hour start	2016	2023	2023-2016	2016	2023	2023-2016
Location		Vehicles	Vehicles	Vehicles diff	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	15:00	461	507	+46	109	108	-1
	16:00	557	619	+62	113	115	+2
	17:00	487	547	+60	127	119	-8
Menai Bridge westbound	15:00	550	582	+32	87	87	0
	16:00	994	1,065	+71	89	92	+4
	17:00	1,273	1,286	+13	95	100	+5

5. Worker/construction traffic and proposed mitigation

5.1 Construction worker traffic

5.1.1 The VISSIM models summarised in the remainder of the report assume that the Wylfa Newydd Project goes ahead and so includes construction worker traffic. An estimated 1,036 workers are anticipated to live on the mainland and commute to site.

5.1.2 The most likely shift pattern has previously been defined, and this is summarised in table 5-1 for eastbound traffic and table 5-2 for westbound traffic. Depending on the final destination of the construction traffic the vehicle occupancy varies resulting in 668 construction worker cars crossing the bridge per day. Of these, 70% are assumed to travel to and from site during the day shift, the remaining 30% travel to and from the Wylfa Newydd Development Area during the night shift.

Table 5-1 Total eastbound construction worker traffic

Shift	Shift end	Earliest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	17:00	18:00	18:00-18:30	133	242
	17:30	18:30	18:30-19:00	133	242
	18:00	19:00	19:00-19:30	133	242
Night	03:00	04:00	04:00-04:30	57	104
	03:30	04:30	04:30-05:00	57	103
	04:00	05:00	05:00-05:30	57	103
Total				**570**	**1,036**

Table 5-2 Total westbound construction worker traffic

Shift	Shift start	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	07:00	06:00	**05:30-06:00**	133	242
	07:30	06:30	**06:00-06:30**	133	242
	08:00	07:00	**06:30-07:00**	133	242
Night	16:30	15:30	**15:00-15:30**	57	104
	17:00	16:00	**15:30-16:00**	57	103
	17:30	16:30	**16:00-16:30**	57	103
Total				**570**	**1,036**

5.1.3 The shifts highlighted in bold are those that coincide with the model time periods and are therefore included within the analysis.

5.2 Facilities management

5.2.1 There are expected to be 147 facilities management workers living on the mainland and travelling across A55 Britannia Bridge each day. These employees would start work at 08:00 and finish at 17:00. An average car occupancy of 1.5 has been assumed based on the figures set out in App C2-4 - DCO TA Appendix F - Integrated Traffic and Transport Strategy (Application Reference Number: 6.3.20) and the expected time of their crossing Britannia Bridge is given in table 5-3 and table 5-4.

Table 5-3 Total eastbound facilities management construction worker traffic

Shift	Shift end	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	17:00	18:00	18:00-18:30	98	147

Table 5-4 Total westbound facilities management construction worker traffic

Shift	Shift start	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	08:00	07:00	06:30-07:00	98	147

5.3 Construction vehicle traffic

5.3.1 Construction and other material traffic has been calculated to be 14 LGVs and 18 HGVs per hour in each direction at periods of peak construction activity. This traffic has been included in all model scenarios that include Wylfa Newydd Project traffic.

5.3.2 The number of daily HGVs was averaged over the 12 hour delivery window, in practice HGVs may be likely to cross A55 Britannia Bridge in a more dispersed profile. This is different from the pattern of traffic on the A5025 where HGVs would be controlled by the Logistics centre to a maximum of 40 HGVs per hour one-way.

5.4 Mainland worker distribution

5.4.1 The distribution of mainland worker traffic has been derived from the existing Worker Gravity Model developed by the socio-economic team. GIS has been used to assign census ward areas to each VISSIM zone, as shown in figure 5-1. From this information, a gravity model to VISSIM zone correspondence has been derived.

5.4.2 Where wards cover more than one zone, demand has been further disaggregated by base model link traffic flows. The resulting distribution of the 1,183 construction worker and facilities management staff is given in table 5-5 and table 5-6 below.

5.4.3 The distribution of trips from Bangor and Caernarfon has been considered separately to those from the rest of Wales and the UK to aid further analysis during option testing.

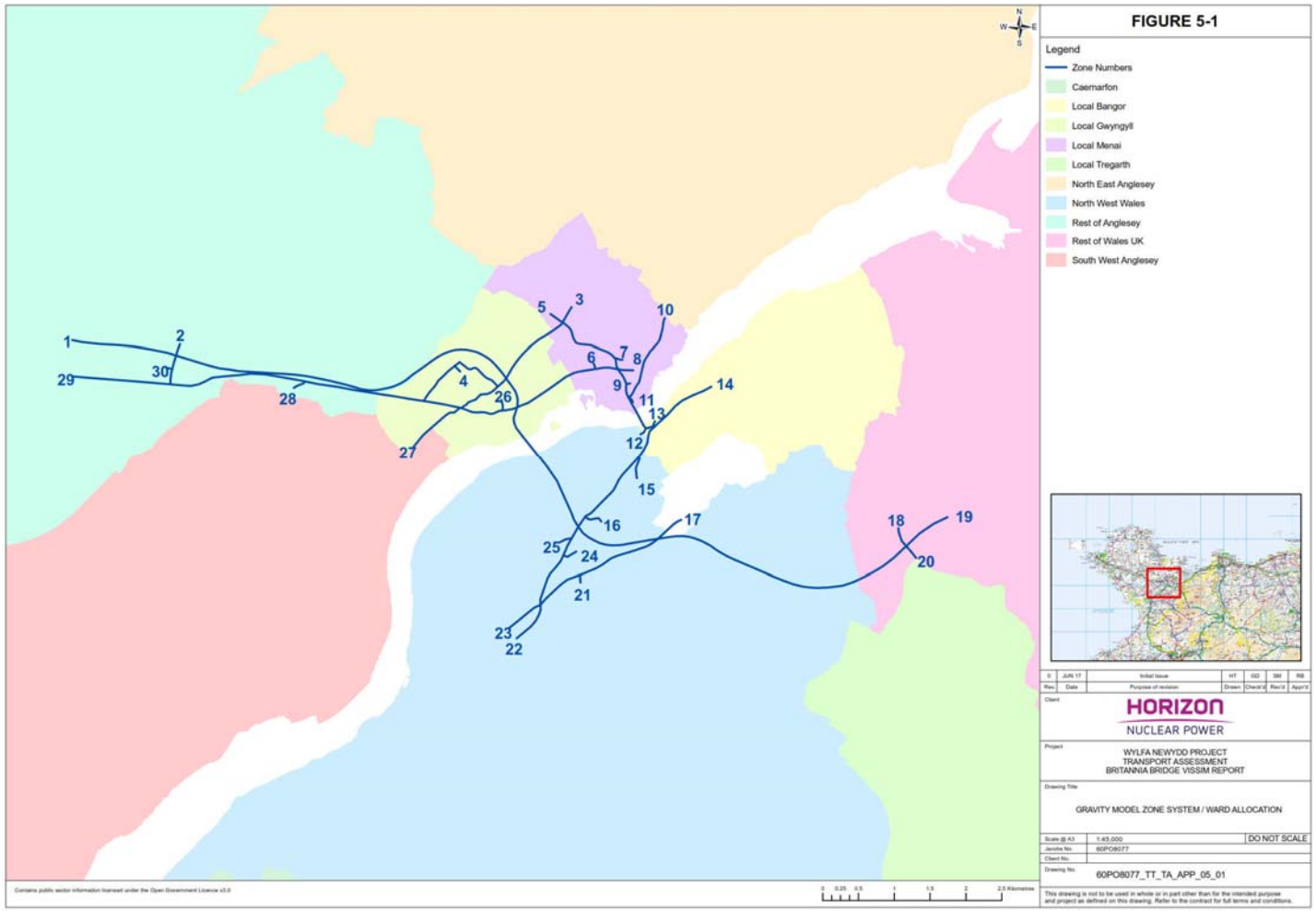
Table 5-5 VISSIM gravity model distribution from Bangor and Caernarfon

AM from/ PM to zone	AM to/ PM from zone	% Distribution
13	1	0%
14	1	32%
17	1	26%
22	1	28%
23	1	15%

Table 5-6 VISSIM gravity model distribution from rest of mainland

AM from/ PM to zone	AM to/ PM from zone	% Distribution
16	1	4%
18	1	14%
19	1	64%
20	1	1%
22	1	9%
23	1	5%
25	1	4%

Figure 5-1 Gravity model zone system/ward allocation



5.5 Proposed mitigation – direct bus services

5.5.1 In order to reduce the level of construction worker traffic crossing Britannia Bridge, it is proposed to provide bus services from Caernarfon and Bangor across Britannia Bridge direct to the Wylfa Newydd Development Area.

5.5.2 During peak of construction direct bus services in place 216 workers would use these services (table 5-7) every weekday with the remaining 820 workers travelling by car (as driver or passenger) across Britannia Bridge.

Table 5-7 Direct buses

Location	Gravity model distribution	No of workers
Bangor (Zone 17)	58%	125
Caernarfon (Zone 22)	42%	91
Total	**100%**	**216**

5.5.3 Construction workers have been split equally over the three day and three night shifts based on a 70%/30% distribution between day and night.

5.5.4 Construction workers travelling by car would either drive to the Park and Ride on Anglesey or the Wylfa Newydd Development Area itself. The car occupancy of construction workers travelling to the Park and Ride site has been assumed to be 1.5; for those travelling directly to the Wylfa Newydd Development Area car occupancy has been assumed to be three.

5.5.5 Based on the above mitigation, east and westbound construction traffic is summarised in table 5-8 and table 5-9.

Table 5-8 Eastbound construction worker traffic with mitigation

Shift	Shift end	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker Cars	Workers	Workers on buses
Day	17:00	18:00	18:00-18:30	100	192	38
	17:30	18:30	18:30-19:00	100	191	38
	18:00	19:00	19:00-19:30	100	191	38
Night	03:00	04:00	04:00-04:30	43	82	22
	03:30	04:30	04:30-05:00	43	82	22
	04:00	05:00	05:00-05:30	43	82	21
Total				**429**	**820**	**216**

Table 5-9 Westbound construction worker traffic with mitigation

Shift	Shift start	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker Cars	Workers	Workers on buses
Day	07:00	06:00	05:30-06:00	100	192	38
	07:30	06:30	06:00-06:30	100	191	38
	08:00	07:00	06:30-07:00	100	191	38
Night	16:30	15:30	15:00-15:30	43	82	22
	17:00	16:00	15:30-16:00	43	82	22
	17:30	16:30	16:00-16:30	43	82	21
Total				**429**	**820**	**216**

5.5.6 The facilities management employees would not be affected by the proposed mitigation. As before these employees with start work at 08:00 and finish at 17:00. An average car occupancy of 1.5 has been assumed and the expected time of their crossing Britannia Bridge is given in table 5-10 and table 5-11 with travel demand during peak construction.

Table 5-10 Total eastbound facilities management construction worker traffic

Shift	Shift end	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	17:00	18:00	18:00-18:30	98	147

Table 5-11 Total westbound facilities management construction worker traffic

Shift	Shift start	Latest time at Britannia Bridge	Time allocated to Britannia Bridge	Worker cars	Workers
Day	08:00	07:00	06:30-07:00	98	147

5.5.7 Construction worker matrices have been adjusted to the values above. 527 worker vehicles cross Britannia Bridge with the direct buses scenario.

5.5.8 Construction and other material traffic are unaffected with 14 LGVs and 18 HGVs travelling in each direction and each model hour.

5.6 Total mitigated demand

5.6.1 Figure 5-2 and figure 5-3 highlight the impact of additional mitigated construction worker and construction traffic throughout the day. Eastbound, construction worker trips crossing Britannia Bridge occur outside peak periods (04:00-06:00 and 18:00-20:00). Westbound, the morning peak shift crosses the bridge before 07:00; however, night shift traffic coincides with evening peak traffic.

5.6.2 LGV and HGV construction traffic crosses the bridge throughout the day.

Figure 5-2 Eastbound additional Wylfa Newydd Project traffic

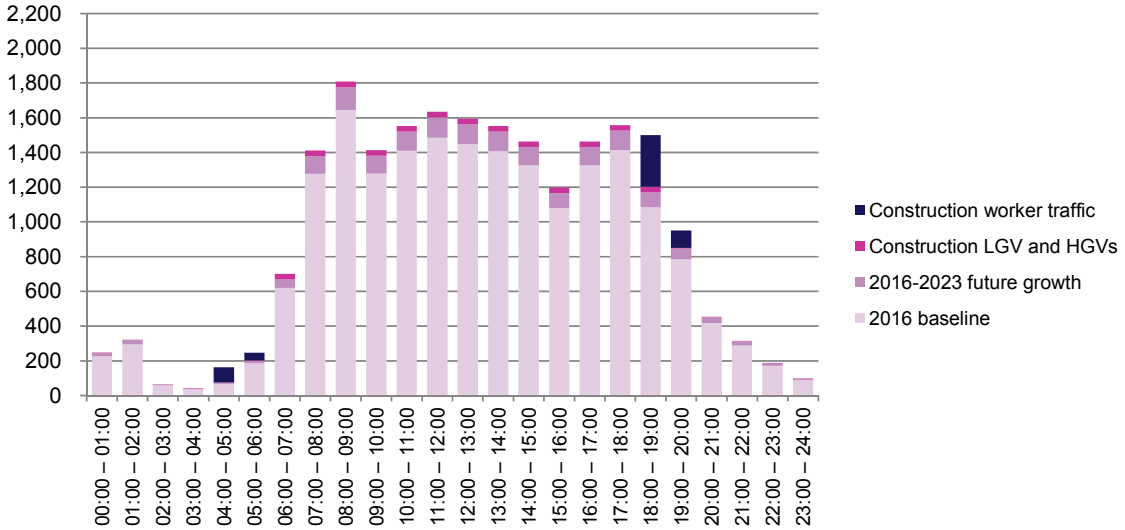
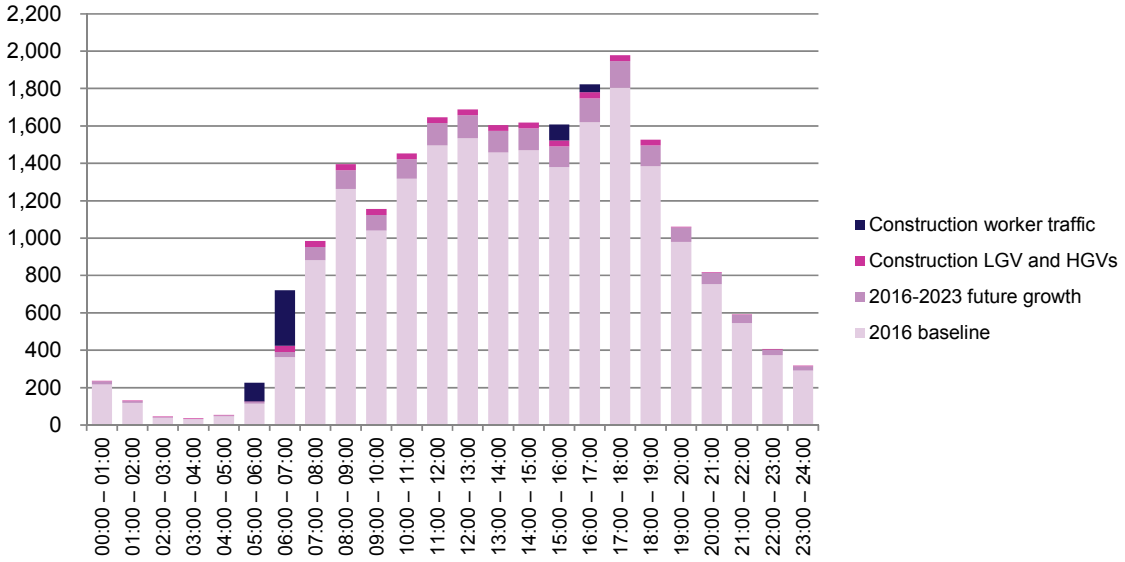


Figure 5-3 Westbound additional Wylfa Newydd Project traffic



6. Worker/construction traffic assessment

6.1 Introduction

6.1.1 Mitigated construction worker and facilities management traffic and LGV and HGVs have been added to the background growth test. The results of the VISSIM modelling are discussed below.

6.2 General model results

6.2.1 The majority of worker/construction traffic crosses the Menai Strait outside the morning and evening peak hours 08:00-09:00 and 17:00-18:00 respectively. Although buses help reduce vehicle trips during the earlier hours of each peak, general traffic conditions at key network constraint locations are unchanged during the main peak hours.

6.2.2 In the AM period, there is an increase in trips westbound during each hour of the simulation; however the journey times remain broadly unchanged with slight increases between 08:00-09:00.

6.2.3 In the evening period, there is a slight benefit from the direct buses mitigation as it removes westbound worker vehicles across Britannia Bridge in the period before the main 17:00 peak. The average journey times remain very similar between the with and without Project assessments. Morning and evening peak network simulation traffic conditions are illustrated in figure 6-1 and figure 6-2 at 08:45 and 17:30 respectively.

Figure 6-1 2023 AM general network queuing with Project (08:45)

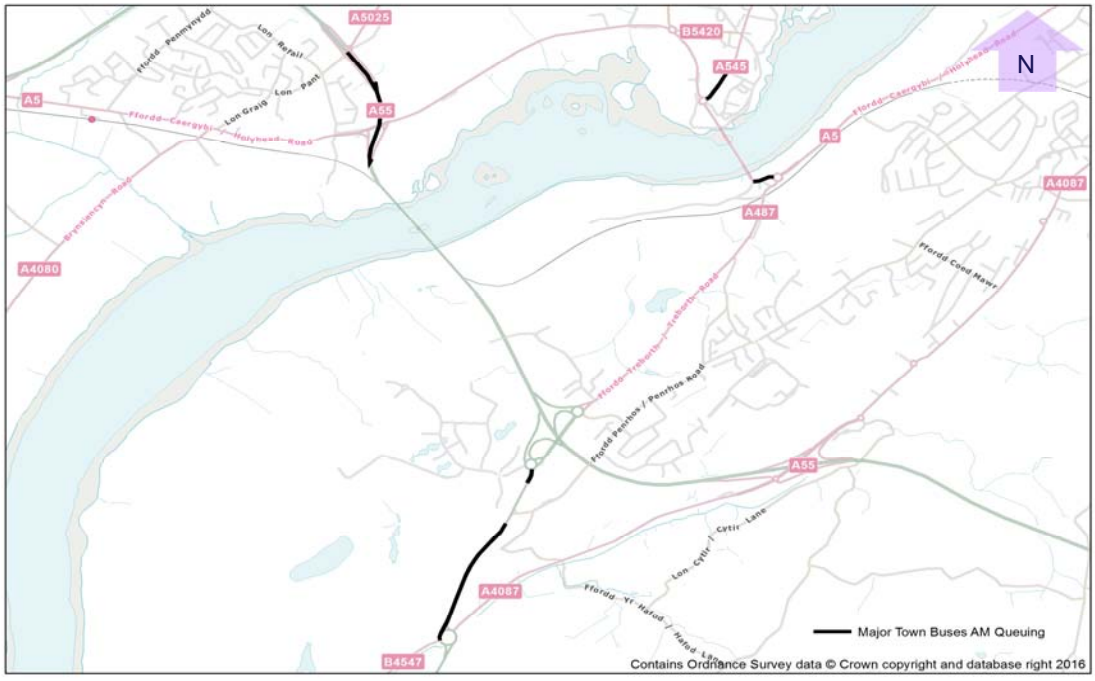
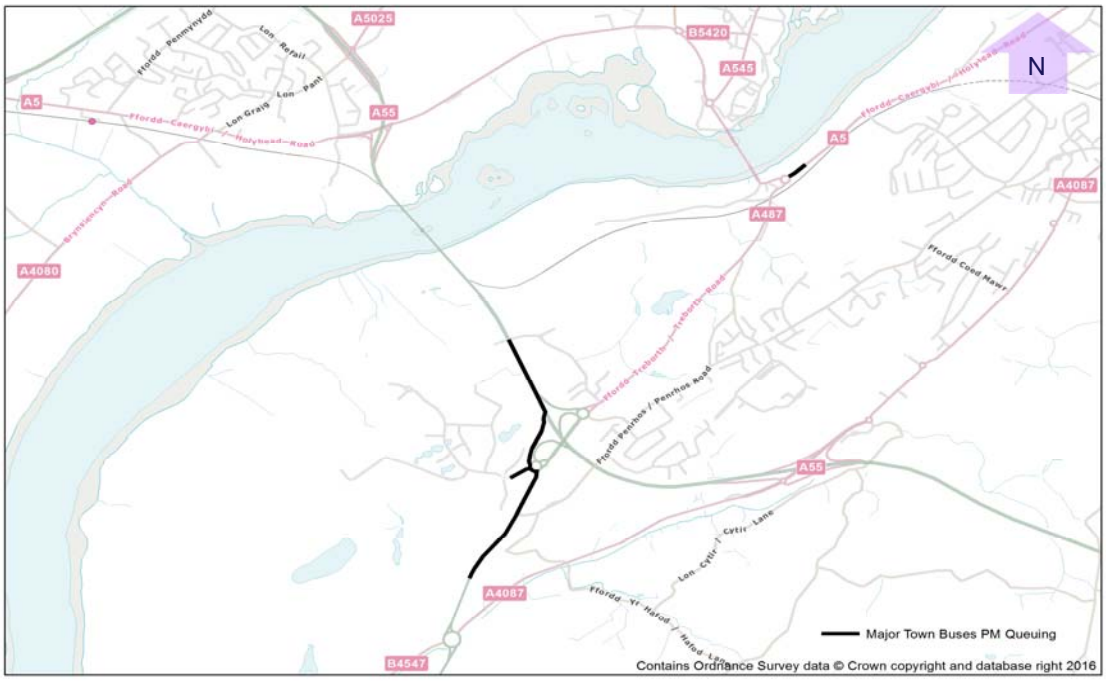


Figure 6-2 2023 PM general network queuing with Project (17:30)

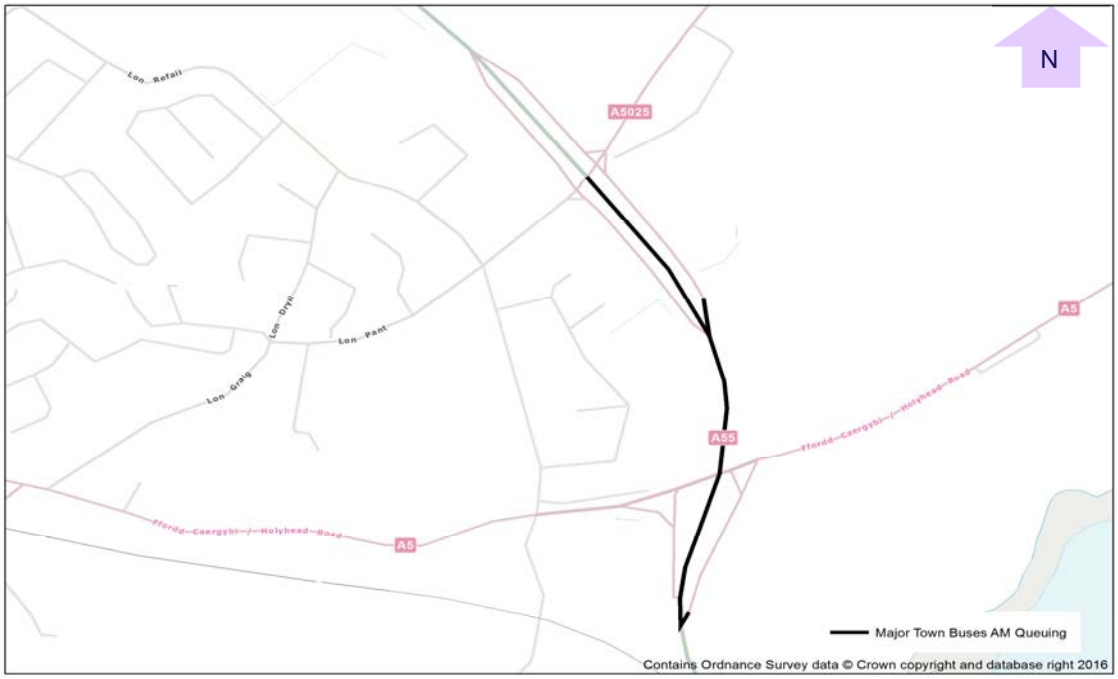


Key locations

Britannia Bridge, AM peak

6.2.4 Queuing, shown in figure 6-3, is slightly increased (+300m) over the future background traffic growth assessment. The eastbound queue continues to build after 08:45 and reaches back onto Junction 8 on-slip to A5025 southbound approach as before continuing through to the end of the model simulation.

Figure 6-3 2023 morning peak queuing eastbound towards Britannia Bridge with Project (08:45)



6.2.5 It can be seen from table 6-1 that, in the simulation hour 06:00 to 07:00, vehicle trips increase by 256 vehicles westbound with the introduction of direct buses. Nevertheless, these and subsequent trips do not have an impact on journey times compared with the 2023 background growth only scenario.

6.2.6 Eastbound, the increase in travel times during the 08:00-09:00 peak hour is a result of the additional LGV and HGV traffic and minor variation in merging and queueing behaviour between this test and the future background traffic growth only model.

6.2.7 As highlighted in Section 3.4, the increased journey time of 13 seconds is an average of a number of the eastbound approach routes across Britannia Bridge to J9 diverge.

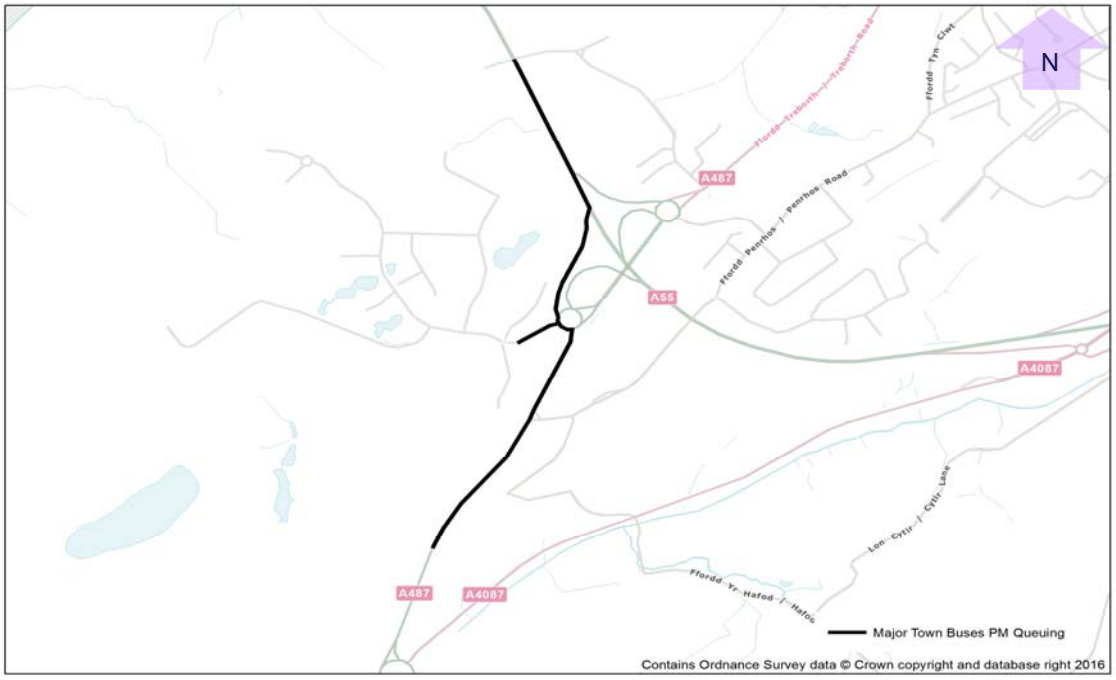
Table 6-1 2023 AM vehicle trips and travel time by simulation hour with Project, Britannia Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - background growth	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - background growth
		Vehicles	Vehicles	Vehicles difference	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	06:00	667	635	+32	124	123	+1
	07:00	1,379	1,349	+30	139	137	+2
	08:00	1,764	1,777	-13	339	327	+13
Britannia Bridge westbound	06:00	708	348	+360	108	109	-1
	07:00	982	922	+60	114	115	-1
	08:00	1,359	1,321	+38	191	192	-1

Britannia Bridge, PM Peak

6.2.8 PM peak queuing conditions remain similar to the background growth only model, as illustrated in figure 6-4Westbound traffic queues are established before 17:15 on the approach to Britannia Bridge and by 17:30 this extends beyond Junction 9. As a result, it is difficult for slip road traffic to safely merge with faster moving A55 vehicles. This is consistent with both background growth model and observed behaviour.

Figure 6-4 2023 evening peak queuing westbound towards Britannia Bridge with Project (17:30)



6.2.9 The direct buses option help remove a proportion of construction worker vehicle trips westbound across Britannia Bridge during the early part of the PM peak. As a result average journey times are only slightly higher than with background growth only demand as shown in table 6-2.

Table 6-2 2023 PM vehicle trips and travel time by simulation hour with Project, Britannia Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - future growth	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - background growth
		Vehicles	Vehicles	Vehicles difference	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	15:00	1,167	1,139	+28	124	124	0
	16:00	1,433	1,375	+58	125	125	0
	17:00	1,535	1,453	+82	127	126	+1
Britannia Bridge westbound	15:00	1,554	1,451	+103	120	120	+0
	16:00	1,764	1,701	+64	131	128	+3
	17:00	1,958	1,959	-1	351	327	+23

Menai Bridge, AM peak

6.2.10 Conditions on Menai Bridge and surrounding roads remain consistent with the future background traffic growth model. Traffic volumes across the bridge remain generally constant and gradually become quieter towards the end of the simulation period. Only small localised queues occur on approaches to the two of the three roundabouts along the route consistent with the background growth scenario.

Figure 6-5 2023 morning peak queuing eastbound towards Menai Bridge with Project (08:45)

6.2.11 Average journey times, summarised in table 6-3, also highlight that conditions are consistent with future background traffic growth models with only a slight increase of 14 seconds eastbound between 08:00 and 09:00.

Table 6-3 AM vehicle trips and travel time by simulation hour, Menai Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - background growth	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses - background growth
		Vehicles	Vehicles	Vehicles difference	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	06:00	117	117	0	106	107	-1
	07:00	467	455	+12	112	111	+1
	08:00	1,212	1,174	+38	239	224	+14
Menai Bridge westbound	06:00	37	30	+7	83	82	+1
	07:00	188	186	+2	81	80	+1
	08:00	422	420	+2	88	86	+2

Menai Bridge, PM peak

6.2.12 Direct buses have no negative impact on eastbound or westbound movements across Menai Bridge in the evening peak with queues, travel demand and journey times remaining consistent with future background traffic growth. This demonstrates that there are no re-routing effects associated with the additional traffic generated by the Wylfa Newydd Project.

6.2.13 Figure 6-6 show a steady stream of westbound vehicles along the A5, which remains consistent throughout the simulation.

Figure 6-6 2023 evening peak queuing westbound towards Menai Bridge with Project (17:30)

6.2.14 Table 6-4 show the similarity in results between the with Project and future background traffic growth only models.

Table 6-4 2023 PM vehicle trips and travel time by simulation hour with Project, Menai Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses -background growth	2023 Wylfa Newydd Project direct buses	2023 background growth	2023 Wylfa Newydd Project direct buses -background growth
		Vehicles	Vehicles	Vehicles difference	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	15:00	511	507	+4	109	108	+1
	16:00	609	619	-10	117	115	+2
	17:00	499	547	-48	119	119	0
Menai Bridge westbound	15:00	593	582	+11	87	87	0
	16:00	1,102	1,065	+37	94	92	+2
	17:00	1,214	1,286	-72	98	100	-2

6.3 Summary

AM peak

6.3.1 Figure 6-7 and figure 6-8 show a comparison of queuing conditions at 08:45 (when modelled queues are at their longest) for the future background traffic growth and direct buses models on Britannia Bridge and Menai Bridge approaches respectively. All eastbound construction worker traffic is clear of the network by 07:00 with only LGV and HGV construction traffic present during the main peak period.

6.3.2 Construction traffic increases maximum traffic queues by approximately 300m. Average delay increases by 13 seconds across the modelled peak hour.

6.3.3 Table 6-5 and table 6-6 summarise the traffic volumes and average journey times across both Britannia and Menai Bridges in the base, background growth and direct buses scenarios.

6.3.4 The greatest impact on journey times is as a result of future background traffic growth with all average 2023 future model journey times being similar.

Figure 6-7 AM Britannia Bridge eastbound approach comparison of without project and with Project scenario queues at 08:45

Figure 6-8 AM Menai Bridge comparison of without Project and with Project scenario queues at 08:45

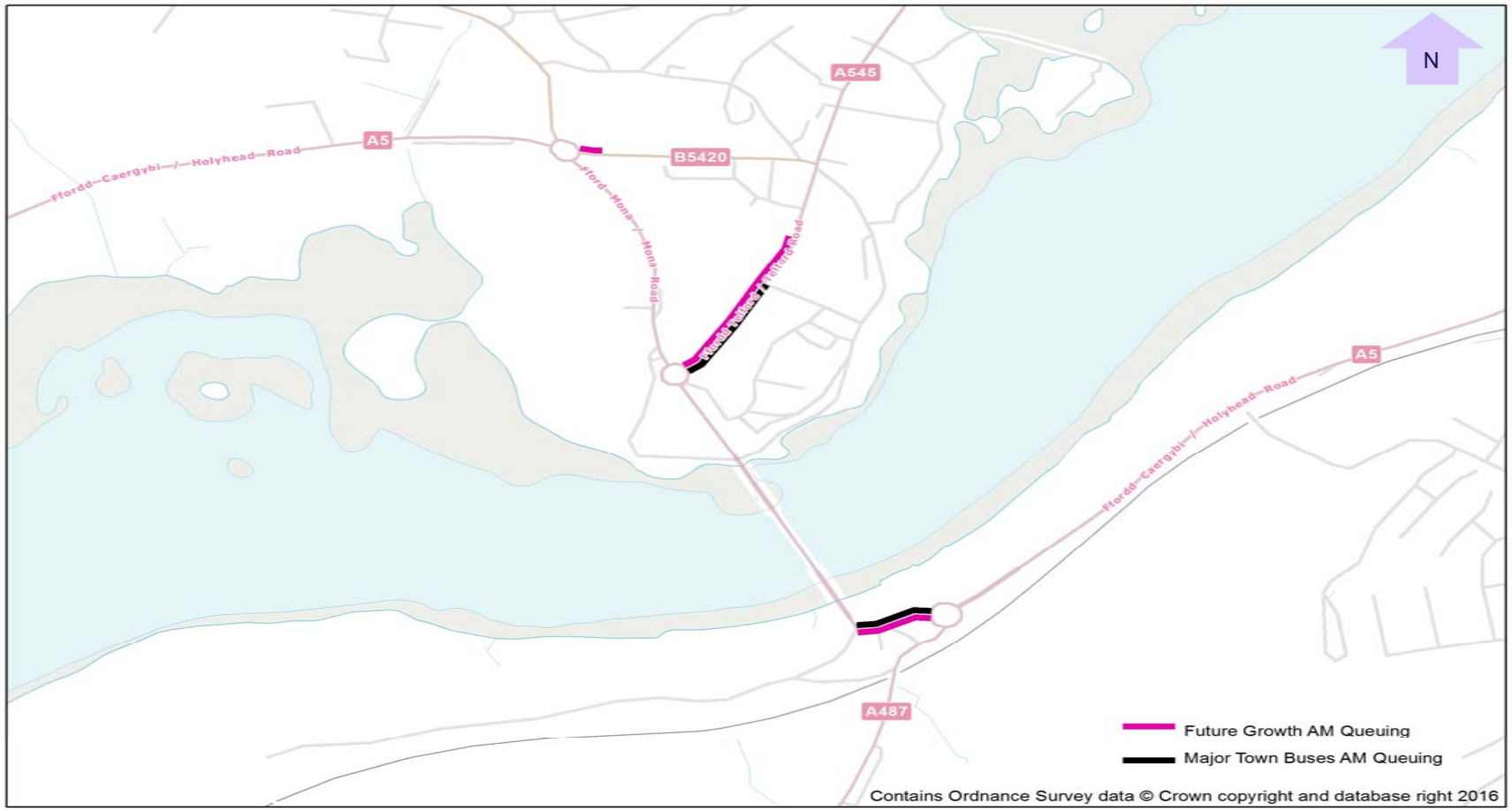


Table 6-5 AM summary comparison of total traffic volumes by option (06:00-09:00)

Movement	base	without Project	with Project
Britannia Bridge eastbound	3,673	3,761	3,810
Britannia Bridge westbound	2,461	2,591	3,049
Menai Bridge eastbound	1,576	1,746	1,796
Menai Bridge westbound	586	636	647

Table 6-6 AM summary comparison of average journey times (seconds) by option (06:00-09:00)

Movement	base	without Project	with Project
Britannia Bridge eastbound	150	196	201
Britannia Bridge westbound	132	138	138
Menai Bridge eastbound	117	147	152
Menai Bridge westbound	82	83	84

PM peak

6.3.5 A comparison of queuing conditions at 17:30 at the westbound approach to Britannia Bridge and Menai Bridge is given in figure 6-9 and figure 6-10.

6.3.6 As a result of construction worker traffic being clear of Britannia Bridge by 16:30, with only LGV and HGV traffic continuing, there is no further impact on network performance after 17:00 compared to the future background traffic growth test.

6.3.7 Menai Bridge is unaffected with a steady flow of vehicles crossing westbound in each model.

6.3.8 Table 6-7 and table 6-8 highlight the similarities between the without Project and with Project options with the main difference being the increase in A55 westbound traffic volumes. The impact on journey times of additional construction worker traffic is limited with the largest change in journey time being 5 seconds.

6.3.9 As in the morning peak, increased journey times are primarily a result of background traffic growth.

Figure 6-9 PM Britannia Bridge westbound approach comparison of without Project and with Project scenario queues at 17:30

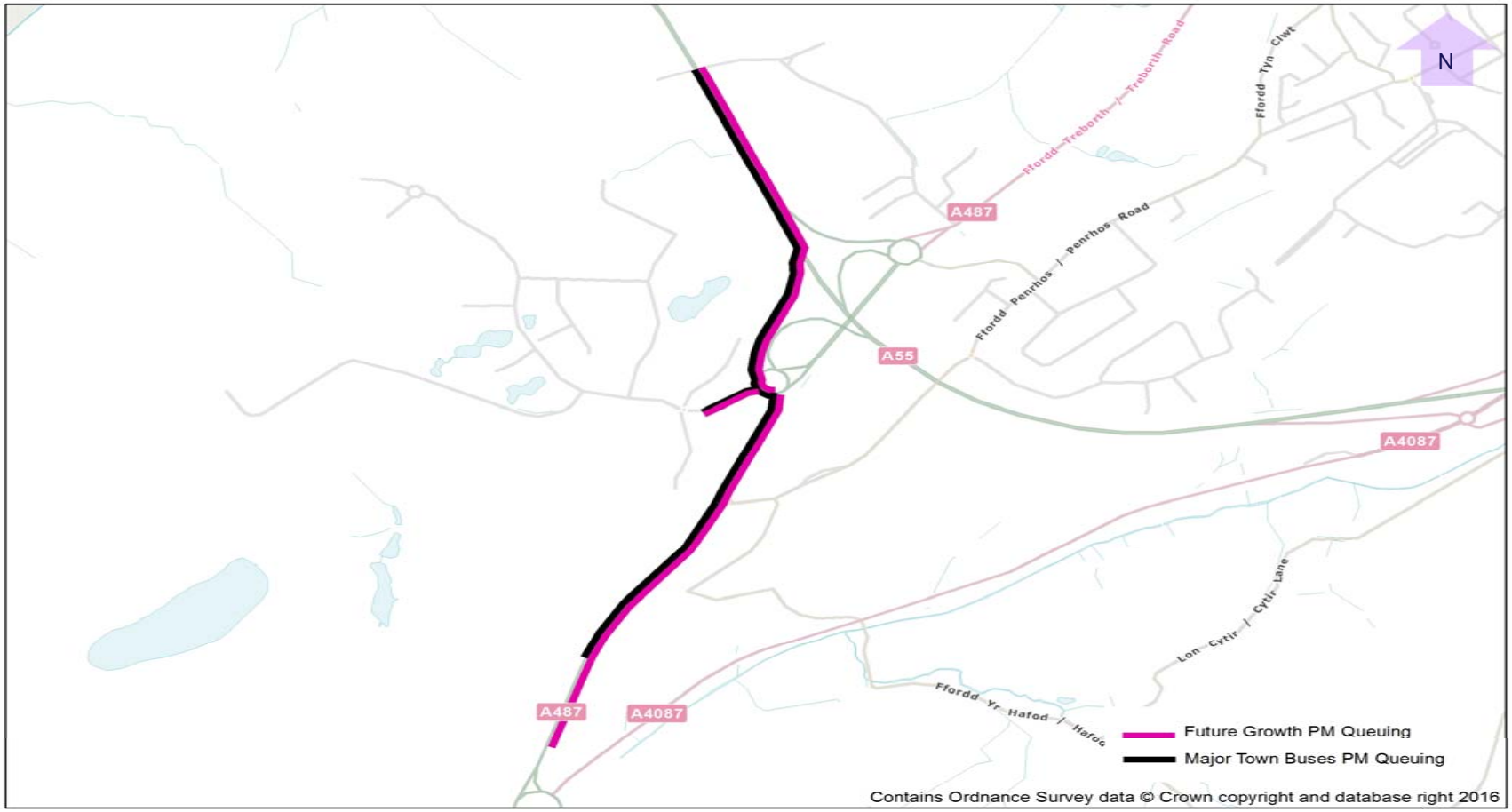


Figure 6-10 PM Menai Bridge comparison of without Project and with Project scenario queues at 17:30

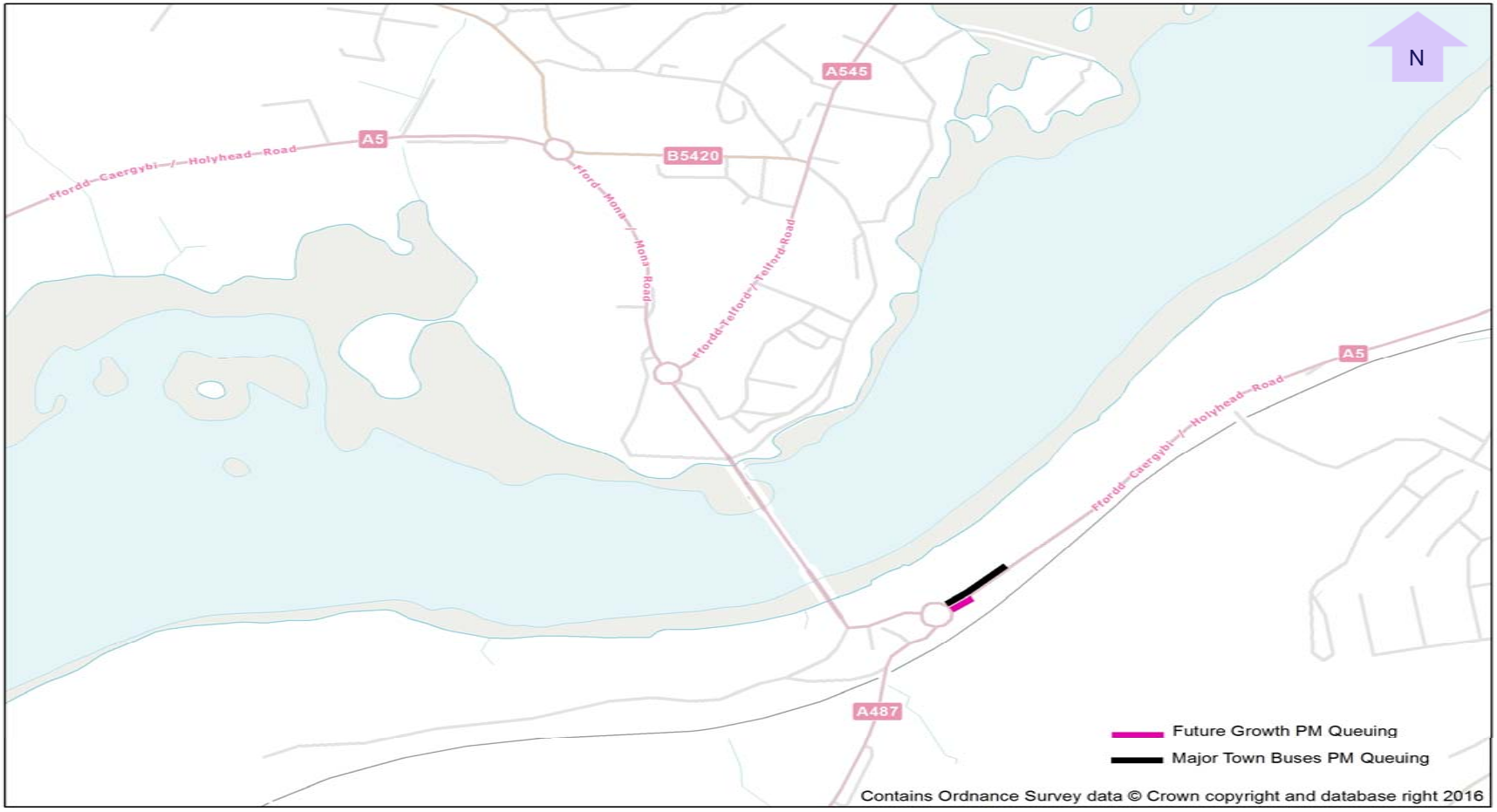


Table 6-7 PM summary comparison of total traffic volumes by option (15:00-18:00)

Movement	base	without Project	with Project
Britannia Bridge eastbound	3,684	3,967	4,135
Britannia Bridge westbound	4,722	5,111	5,276
Menai Bridge eastbound	1,505	1,673	1,619
Menai Bridge westbound	2,817	2,933	2,909

Table 6-8 PM summary comparison of average journey times (seconds) by option (15:00-18:00)

Movement	base	without Project	with Project
Britannia Bridge eastbound	124	125	125
Britannia Bridge westbound	146	192	201
Menai Bridge eastbound	116	114	115
Menai Bridge westbound	90	93	93

6.3.10 In conclusion, the VISSIM modelling illustrates that:

- the primary cause of increased queues and delays in 2023 is background growth.
- eastbound, construction worker trips cross Britannia Bridge outside peak periods with only a small number of LGV and HGV trips continuing.
- westbound, morning construction trips cross the Menai Strait before 07:00; only night shift traffic has the potential to significantly impact on the operational performance of Britannia Bridge.
- direct buses reduce construction worker traffic in the early part of the evening peak.

7. August Sensitivity Test

7.1 Introduction

7.1.1 To determine the possible effects of seasonal variation in baseline traffic flows on A55 Britannia Bridge, origin-destination pairs crossing the Menai Strait have been adjusted based on differences in ATC data between March and August. The results of the VISSIM modelling are discussed in this chapter.

7.2 Britannia Bridge ATC comparison

7.2.1 A comparison of ATC data has been undertaken to calculate the variation in traffic flows on the A55 crossing Britannia Bridge between 15-23 March 2016 and 1-31 August 2016. Hourly March ATC data collected by Jacobs was compared with hourly August ATC data provided by Welsh Government to determine the seasonality adjustment required for each hour and direction. The comparison is based upon the variation in average traffic flows from Monday to Thursday inclusive, with Friday and weekend days excluded to provide a more accurate comparison with the assessment presented in section 6.

7.2.2 August seasonality adjustment factors have been calculated as a percentage increase or decrease from March flows. A comparison by hour is given in figure 7-1 and actual change shown in figure 7-2. The comparison shows that in the network peak hours beginning 08:00 and 17:00 there is a reduction in total traffic compared with March. In addition peak traffic flows in August in any single hour were not observed to exceed the maximum peak traffic flows in March (see table 7-1 and table 7-2).

Figure 7-1 March to August seasonality comparison by hour (percent change)

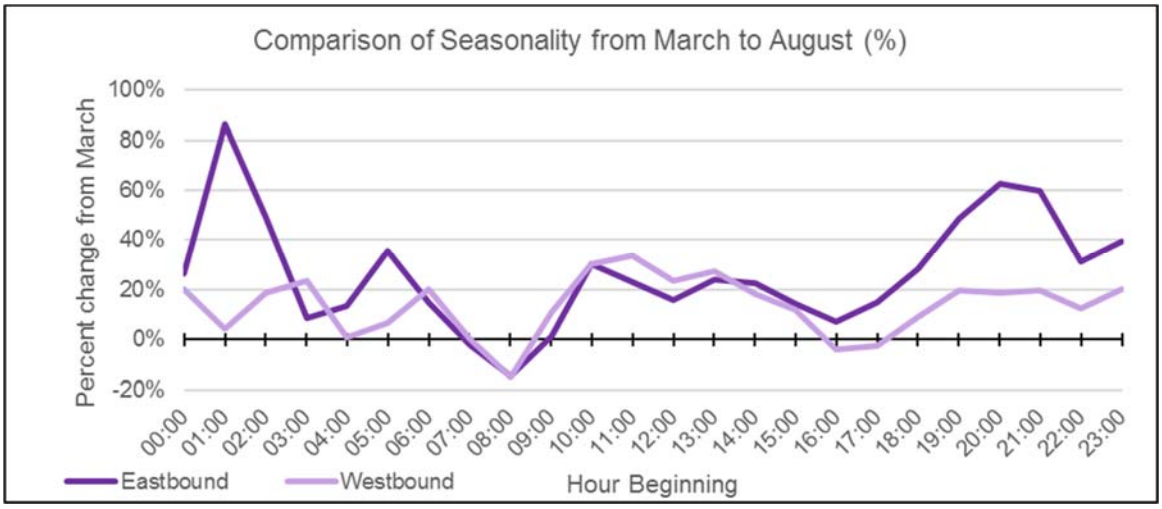
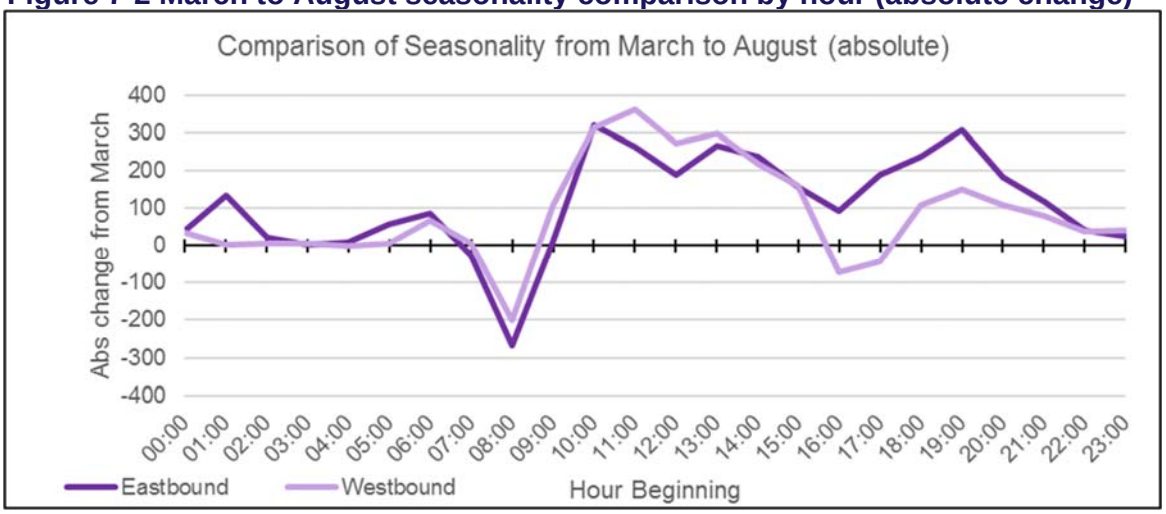


Figure 7-2 March to August seasonality comparison by hour (absolute change)



7.2.3 Model factors by hour and direction are given in table 7-1 and table 7-2.

Table 7-1 A55 Britannia Bridge eastbound ATC flows and seasonality factors

	06:00–07:00	07:00-08:00	08:00-09:00	15:00-16:00	16:00-17:00	17:00-18:00
A55 August Flow	670	1313	1565	1282	1437	1476
A55 March Flow	583	1340	1832	1123	1342	1285
Diff = Aug – Mar	+87	-27	-267	+159	+95	+191
Factors (%)	+15%	-2%	-15%	+14%	+7%	+15%

Table 7-2 A55 Britannia Bridge westbound ATC flows and seasonality factors

	06:00–07:00	07:00-08:00	08:00-09:00	15:00-16:00	16:00-17:00	17:00-18:00
A55 August Flow	392	908	1124	1523	1622	1657
A55 March Flow	327	904	1325	1362	1694	1699
Diff = Aug – Mar	+66	+5	-202	+161	-72	-42
Factors (%)	+20%	+1%	-15%	+12%	-4%	-2%

7.3 Matrix adjustment

7.3.1 Initially, the seasonality factor has been applied to the base model matrices for all origin-destination (OD) pairs crossing the Menai Strait. OD pairs not crossing the Menai Strait remain unchanged.

7.3.2 As vehicles can travel via either A55 Britannia Bridge or Menai Bridge to reach their destination, the change in modelled vehicle flows may vary slightly

compared with the seasonality factor. To ensure growth on Britannia Bridge exactly equals to the seasonality factor, where necessary, a further minor adjustment has been added to the mainline A55 movement (Zones 1-19) in both directions. The maximum adjustment that has been made is 60 vehicles removed westbound in the morning peak, which is 25 percent of the 237 vehicles travelling between those zones.

7.4 August modelled traffic flow results

7.4.1 In the morning peak there is an increase in vehicles travelling in both directions between 06:00-07:00 in the August model compared to the neutral month model however it has no additional impact as vehicle volumes on the network are low during this period. There is a decrease in vehicles travelling in both directions across the Menai Strait between 08:00-09:00 (likely to be a function of reduced commuting) resulting in lower queues and improved journey times eastbound. Traffic volumes remain relatively unchanged between 07:00-08:00.

7.4.2 In the evening peak there is an increase in vehicle flows eastbound during each hour period in the August model compared to the neutral month model. There is an increase in westbound traffic flows between 15:00-16:00 while there is a small reduction in vehicle numbers travelling in the direction in both of the hour periods between 16:00-18:00 (again likely to reflect reduced homebound commuting flows).

7.5 Future background traffic growth impacts

Key locations

7.5.1 The basis for journey time calculations is as outlined in table 7-3 and described in detail in paragraph 3.4.1. This approach was adopted throughout the assessment of seasonality for compatibility with the assessment of a neutral month.

Table 7-3 Journey Time Calculations

Route	Basis of calculation
A55 Britannia Bridge eastbound	Weighted average of the A55 mainline route and the four approach routes to J8 and J8a crossing A55 Britannia Bridge as far as A55 junction 9 diverge.
A55 Britannia Bridge westbound	Weighted average of the A55 mainline route and the three approach routes to J9 crossing A55 Britannia Bridge as far as A55 junction 8a diverge.
Menai Bridge eastbound	Weighted average of the A5, A545 and B5420 approaches crossing Menai Bridge as far as the roundabout directly to the south of the Bridge.
Menai Bridge westbound	Weighted average of the A5 and A487 approaches crossing Menai Bridge as far as the roundabout directly to the north of the Bridge.

Britannia Bridge, AM peak

7.5.2 Unlike in the neutral month model, where morning peak eastbound queues

reach back towards J8 by 08:45, reduced traffic volumes in August result in less congestion across A55 Britannia Bridge. Although the merge at J8a causes vehicles on the A55 to slow, significant queueing does not occur throughout the main peak hour (08:00-09:00).

7.5.3 Table 7-4 highlights the improved journey times in both directions across Britannia Bridge in the 2023 background growth August model. The lack of congestion throughout the main peak hour (08:00-09:00) results in an improvement in eastbound journey time of 180 seconds compared to the neutral month model. Westbound journey times also improved by 20 seconds in the 2023 background growth August model compared to 2023 neutral conditions.

Table 7-4 2016 Base and 2023 background growth, comparison of August model and neutral model AM travel time by simulation hour, Britannia Bridge

Location	Hour start	2016 base			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	06:00	124	123	+1	124	123	+1
	07:00	132	134	-2	134	137	-3
	08:00	138	191	-53	147	327	-180
Britannia Bridge westbound	06:00	109	109	0	109	109	0
	07:00	115	115	0	115	115	0
	08:00	147	172	-25	172	192	-20

Britannia Bridge, PM peak

7.5.4 In the evening peak there is generally an increase in vehicle numbers eastbound and a slight decrease in vehicle flows westbound across Britannia Bridge. August queueing on the westbound A55 approach to Britannia Bridge remains between 17:00-18:00; however, August traffic conditions are improved on the A487 northbound approach to the A55 at Junction 9.

7.5.5 Although traffic volumes increase eastbound across Britannia Bridge, the increase is not significant enough to generate queues.

7.5.6 The journey time changes between models, shown in table 7-5, highlight the traffic changes above. Eastbound there are slight increases in journey time in both the 2016 August base and 2023 August background growth models between 16:00-18:00 compared to the neutral models. The maximum increase is +7 seconds in 2016, between 17:00-18:00.

7.5.7 Westbound journey times, crossing Britannia Bridge, decrease between 17:00-18:00 reflecting the improved conditions on the A487 approach to the A55.

Table 7-5 2016 Base and 2023 background growth, comparison of August model and neutral model PM travel time by simulation hour, Britannia Bridge

Location	Hour start	2016 base			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	15:00	123	123	0	124	124	0
	16:00	125	124	+1	126	125	+1
	17:00	132	125	+7	131	126	+5
Britannia Bridge westbound	15:00	120	119	+1	122	120	+2
	16:00	123	123	0	124	128	-4
	17:00	180	197	-17	290	327	-37

Menai Bridge, AM peak

7.5.8 Reduced vehicle flows eastbound across Menai Bridge result in a significant improvement in journey time of 88 seconds between 08:00-09:00 in the 2023 August background growth model compared with neutral values. Elsewhere there is little change in journey time between models as shown in table 7-6.

Table 7-6 2016 Base and 2023 background growth, comparison of August model and neutral model AM travel time by simulation hour, Menai Bridge

Location	Hour start	2016 base			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	06:00	106	108	-2	106	107	-1
	07:00	110	109	+1	111	111	0
	08:00	123	134	-11	136	224	-88
Menai Bridge westbound	06:00	82	82	0	82	82	0
	07:00	81	80	+1	81	80	+1
	08:00	83	84	-1	84	86	-2

Menai Bridge, PM peak

7.5.9 Additional vehicles travelling eastbound across Menai Bridge between 17:00-18:00 do not have any further impact on queuing conditions on approach to

the bridge. August 2023 journey times increase slightly in both directions as shown in table 7-7, with a negligible change of not more than 12 seconds on average in the model output.

Table 7-7 2016 Base and 2023 background growth, comparison of August model and neutral model PM travel time by simulation hour, Menai Bridge

Location	Hour start	2016 base			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	15:00	109	109	0	109	108	+1
	16:00	113	113	0	114	115	-1
	17:00	123	127	-4	131	119	+12
Menai Bridge westbound	15:00	88	87	+1	89	87	+2
	16:00	89	89	0	93	92	+1
	17:00	96	95	+1	108	100	+8

7.6 Worker/construction traffic assessment (Direct Buses)

Key locations

Britannia Bridge, AM peak

7.6.1 As noted above, eastbound morning peak commuter traffic is significantly reduced in August. Additional worker/construction traffic has no significant impact and traffic conditions are much improved over neutral months. This is reflected in table 7-8 through significant journey time improvements for eastbound travelling vehicles between 08:00-09:00. A comparison of 2023 August background growth with direct buses in August 2023 also shows that there are negligible changes in journey times.

Table 7-8 2023 background growth and 2023 with project, comparison of August model and neutral model AM travel time by simulation hour, Britannia Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	06:00	124	124	0	124	123	+1
	07:00	134	139	-5	134	137	-3
	08:00	150	339	-189	147	327	-180
Britannia Bridge westbound	06:00	108	108	0	109	109	0
	07:00	114	114	0	115	115	0
	08:00	183	191	-8	172	192	-20

Location	Hour start	2023 August Comparison		
		Background growth	Wylfa Newydd Project direct buses	Background growth – direct buses
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	06:00	124	124	0
	07:00	134	134	0
	08:00	147	150	-3
Britannia Bridge westbound	06:00	109	108	1
	07:00	115	114	1
	08:00	172	183	-11

Britannia Bridge, PM peak

7.6.2 In the evening peak on the westbound A55 approach to Britannia Bridge queues are similar in the 2023 direct buses test with those in the 2023 background growth test. Again, August conditions are improved on the A487 northbound approach to the A55. table 7-9 highlights the similarities between journey times in the 2023 direct buses test and the 2023 background growth test. A comparison of 2023 August background growth with direct buses in August 2023 also shows that there are negligible changes in journey times, a reduction in all cases.

Table 7-9 2023 background growth and 2023 with project, comparison of August model and neutral model PM travel time by simulation hour, Britannia Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	15:00	125	124	+1	124	124	0
	16:00	126	125	+1	126	125	+1
	17:00	145	127	+18	131	126	+5
Britannia Bridge westbound	15:00	125	120	+5	122	120	+2
	16:00	125	131	-6	124	128	-4
	17:00	325	351	-26	290	327	-37

Location	Hour start	2023 August Comparison		
		Background growth	Wylfa Newydd Project direct buses	Background growth – direct buses
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Britannia Bridge eastbound	15:00	124	125	0
	16:00	126	126	0
	17:00	131	145	-3
Britannia Bridge westbound	15:00	122	125	-3
	16:00	124	125	-1
	17:00	290	325	-35

Menai Bridge, AM peak

7.6.3 Similar to the 2023 background growth test the reduced vehicle flows eastbound between 08:00-09:00 result in a significant improvement in journey time of -103 seconds during this hour. Elsewhere there is little difference between the August model and neutral model as shown in table 7-10. A comparison of 2023 August background growth with direct buses in August 2023 also shows that there are negligible changes in journey times.

Table 7-10 2023 background growth and 2023 with project, comparison of August model and neutral model AM travel time by simulation hour, Menai Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	06:00	106	106	0	106	107	-1
	07:00	111	112	-1	111	111	0
	08:00	135	239	-103	136	224	-88
Menai Bridge westbound	06:00	82	83	-1	82	82	0
	07:00	81	81	0	81	80	+1
	08:00	84	88	-4	84	86	-2

Location	Hour start	2023 August Comparison		
		Background growth	Wylfa Newydd Project direct buses	Background growth – direct buses
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	06:00	106	106	0
	07:00	111	111	0
	08:00	136	135	1
Menai Bridge westbound	06:00	82	82	0
	07:00	81	81	0
	08:00	84	84	0

Menai Bridge, PM peak

7.6.4 In the evening peak there is a negligible increase in journey time (table 7-10) eastbound across Menai Bridge between 17:00-18:00 as a result of increased flows. There are also minor changes in journey times between the 2023 direct buses test and 2023 background growth test in the August model as shown in table 7-11. A comparison of 2023 August background growth with direct buses in August 2023 also shows that there are negligible changes in journey times.

Table 7-11 2023 background growth and 2023 with project, comparison of August model and neutral model PM travel time by simulation hour, Menai Bridge

Location	Hour start	2023 Wylfa Newydd Project direct buses			2023 background growth		
		August model	Neutral model	August model - neutral model	August model	Neutral model	August model - neutral model
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)	Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	15:00	109	109	0	109	108	+1
	16:00	117	117	0	114	115	-1
	17:00	126	119	+7	131	119	+12
Menai Bridge westbound	15:00	88	87	+1	89	87	+2
	16:00	93	94	-1	93	92	+1
	17:00	101	98	+3	108	100	+8

Location	Hour start	2023 August Comparison		
		Background growth	Wylfa Newydd Project direct buses	Background growth – direct buses
		Travel time (seconds)	Travel time (seconds)	Travel time diff (seconds)
Menai Bridge eastbound	15:00	109	109	0
	16:00	114	117	-3
	17:00	131	126	5
Menai Bridge westbound	15:00	89	88	1
	16:00	93	93	0
	17:00	108	101	7

7.7 Summary of August sensitivity test

7.7.1 The August sensitivity testing indicates that on an hour by hour basis traffic flows in August are generally greater than in March. However, the peak hour traffic flow in March is not exceeded in any hour in August.

7.7.2 In addition, traffic flows during the AM peak between 08:00 and 09:00 decrease in both directions across Britannia Bridge. This results in reduced queues and much improved journey times eastbound on the A55.

7.7.3 There is also a slight decrease in vehicle flows westbound between 17:00 and 18:00 that results in improved conditions on the A487 approach to junction 9 on the A55 approach to Britannia Bridge. This is also reflected by improved

journey times. Although there is an increased flow eastbound during this hour the effects on journey time are minimal.

7.7.4 The impact on journey times of the Wylfa Newydd Project in August, compared with the August 2023 future background is negligible.

8. Summary and conclusion

8.1 Overview

8.1.1 Jacobs has been commissioned by Horizon to develop a VISSIM microsimulation model of Britannia Bridge, which links Anglesey and the Welsh mainland across the Menai Strait.

8.1.2 The model simulation area has been developed in consultation with stakeholders and includes both Britannia Bridge and Menai Bridge. The road network covers the A55 Junctions 7 to 11, allowing for potential rerouting impacts across the Menai Strait to be assessed. Coverage has also been defined by existing A55 traffic conditions and the anticipated impact of main construction worker traffic. All future year analysis has been undertaken for the forecast future year 2023, which is anticipated to be the peak construction year. The model has undergone a technical review by Welsh Government.

8.2 Calibration/validation

8.2.1 Welsh Government Transport Appraisal Guidance requires the application of WebTAG standards in the development of transport models. The Britannia Bridge VISSIM model has been calibrated to an appropriate standard following the principles outlined in WebTAG (RD2). The calibration of each model period is within the acceptability guidelines for all morning and evening peak modelled hours.

8.3 Future year tests

8.3.1 A series of future year tests have been undertaken to assess the impact of background growth and construction worker traffic. Alternative demand management options for mitigation have then been considered.

Trip generation

Future background traffic growth only

8.3.2 VISSIM modelling show that the biggest driver in changing network conditions by 2023 is background growth. In the morning peak, eastbound traffic from Anglesey must join a longer queue towards Britannia Bridge as commuting traffic travels towards Bangor and the mainland. Queues extend back towards the Junction 8 overbridge with increased merge delays on the A5025 eastbound on-slip.

8.3.3 In the evening peak, the reverse pattern occurs with longer eastbound queues westbound towards Britannia Bridge. While A55 queues are only slightly increased, queues on the A487 merge are forecast to increase significantly, extending through the A487 roundabout, southwards beyond Penrhos Road.

8.3.4 August seasonality adjustment factors have been applied to the matrices to assess the effects of seasonal variation in baseline traffic flows on A55 Britannia Bridge. The adjustment factors have been calculated as a percentage increase or decrease based on March ATC data and August ATC

data crossing Britannia Bridge in both directions.

Construction traffic and direct buses mitigation

8.3.5 Eastbound, the majority of construction worker trips crossing Britannia Bridge occur outside peak periods (04:00-06:00 and 18:00-20:00). Westbound, the morning construction worker shift crosses the bridge before 07:00; however, night shift traffic coincides with evening peak traffic. It is this night shift traffic which has the greatest potential to impact on the operational performance of Britannia Bridge.

8.3.6 Direct buses provide benefits by reducing the number of construction worker vehicle trips crossing between the mainland and Anglesey. This mitigation provides the greatest benefit westbound in the early part of the evening peak.

8.3.7 Approximately 14 LGVs and 18 HGVs cross Britannia Bridge in each direction in each modelled hour period. These vehicles result in a slight increase in eastbound queues and journey times between 08:00 and 09:00.

8.4 Conclusion

8.4.1 In conclusion, the VISSIM modelling illustrates that:

- the primary cause of increased queues and delays in 2023 is forecast growth;
- eastbound, construction worker trips cross Britannia Bridge outside peak periods. The small number of LGV and HGV trips result in a slight increase in journey times and queues eastbound between 08:00 and 09:00;
- westbound, morning construction worker trips cross the bridge before 07:00 avoiding the peak hour. Night shift traffic does coincide with the early part of the evening peak traffic; however, traffic crosses Britannia Bridge before 17:00;
- direct buses reduce construction worker traffic in the early part of the evening peak helping to negate any negative impact these trips have on network performance;
- sensitivity testing indicates that future background traffic in August would generally increase outside the network peak and decrease during network peaks, but that this would not lead to perceptible changes in journey times when compared with the March future background. The exception to this is the A55 Britannia Bridge eastbound, when a significant reduction in journey times is forecast between 08:00-09:00;
- Overall, including in the assessment of August sensitivity, direct buses ensure that the impact on the highway network is negligible compared with the future background traffic growth scenario.

9. References

ID	Reference
RD1	Welsh Assembly Government. (2008). *Welsh Transport Planning Appraisal Guidance.* Retrieved 01 June, 2017 from gov.wales: http://gov.wales/docs/det/policy/140923-weltag-guidance-en.pdf
RD2	Department for Transport. (2014a). *TAG Unit M3.1 Highways Assignment Modelling.* Retrieved 01 June 2017 from gov.uk: https://www.gov.uk/guidance/transport-analysis-guidance-webtag
RD3	Department for Transport. (2014b). *TAG Unit M1.2 Data Sources and Surveys.* Retrieved 01 June 2017 from gov.uk: https://www.gov.uk/guidance/transport-analysis-guidance-webtag
RD4	Department for Transport (2017). *TEMPro downloads Version 7.2*. Retrieved 01 May 2017 from gov.uk: https://www.gov.uk/government/publications/tempro-downloads
RD5	Department for Transport (2015). *Road Traffic Forecasts 2015*. Retrieved 03 April 2017 from gov.uk: https://www.gov.uk/government/publications/road-traffic-forecasts-2015

Appendix A. ATC/turning count data verification

Table A-1 ATC Origin Data Validation

Site	Arm	Time period	Turning count survey data	Average Tuesday 15 and 22 2016 ATC	Difference	% difference	GEH	GEH less than 5	Flow within 100veh/h of counts for flows less than 700veh/h	Flow within 15% of counts for flows from 700 to 2,700 veh/h
1	B	08:00-09:00	597	583.5	-13.5	-2%	0.6	✓	Yes	N/A
1	B	17:00-18:00	528	512	-16	-3%	0.7	✓	Yes	N/A
1	D	08:00-09:00	226	216	-10	-5%	0.7	✓	Yes	N/A
1	D	17:00-18:00	208	198.5	-9.5	-5%	0.7	✓	Yes	N/A
2	A	08:00-09:00	200	210	10	5%	0.7	✓	Yes	N/A
2	A	17:00-18:00	287	274	-13	-5%	0.8	✓	Yes	N/A
2	C	08:00-09:00	789	843	54	6%	1.9	✓	N/A	Yes
2	C	17:00-18:00	327	331	4	1%	0.2	✓	Yes	N/A
4a	C	08:00-09:00	995	1001.5	6.5	1%	0.2	✓	N/A	Yes
4a	C	17:00-18:00	749	707	-42	-6%	1.6	✓	N/A	Yes
4b	A	08:00-09:00	299	295.5	-3.5	-1%	0.2	✓	Yes	N/A
4b	A	17:00-18:00	278	276	-2	-1%	0.1	✓	Yes	N/A
5	A	08:00-09:00	607	452.5	-154.5	-34%	6.7	×	No	N/A
5	A	17:00-18:00	1165	932.5	-232.5	-25%	7.2	×	No	No
5	C	08:00-09:00	470	437.5	-32.5	-7%	1.5	✓	Yes	N/A
5	C	17:00-18:00	339	331	-8	-2%	0.4	✓	Yes	N/A
6	B	08:00-09:00	1245	1246.5	1.5	0%	0.0	✓	N/A	Yes
6	B	17:00-18:00	620	605	-15	-2%	0.6	✓	Yes	N/A
6	D	08:00-09:00	320	333	13	4%	0.7	✓	Yes	N/A
6	D	17:00-18:00	664	676.5	12.5	2%	0.5	✓	Yes	N/A

Table A-2 Destination ATC Validation

Site	Arm	Time period	Turning count survey data	Average Tuesday 15 and 22 2016 ATC	Difference	% difference	GEH	GEH less than 5	Flow within 100veh/h of counts for flows less than 700veh/h	Flow within 15% of counts for flows from 700 to 2,700 veh/h
1	B	08:00-09:00	545	548	3	1%	0.1	✓	Yes	N/A
1	B	17:00-18:00	616	613	-3	0%	0.1	✓	Yes	N/A
1	D	08:00-09:00	233	278	45	16%	2.8	✓	Yes	N/A
1	D	17:00-18:00	241	238	-3	-1%	0.2	✓	Yes	N/A
2	A	08:00-09:00	349	358	9	3%	0.5	✓	Yes	N/A
2	A	17:00-18:00	268	270	2	1%	0.1	✓	Yes	N/A
2	C	08:00-09:00	239	241.5	2.5	1%	0.2	✓	Yes	N/A
2	C	17:00-18:00	427	424	-3	-1%	0.1	✓	Yes	N/A
4a	C	08:00-09:00	563	556.5	-6.5	-1%	0.3	✓	Yes	N/A
4a	C	17:00-18:00	683	689	6	1%	0.2	✓	Yes	N/A
4b	A	08:00-09:00	597	616	19	3%	0.8	✓	Yes	N/A
4b	A	17:00-18:00	487	491.5	4.5	1%	0.2	✓	Yes	N/A
5	A	08:00-09:00	1074	770.5	-303.5	-39%	10.0	×	N/A	No
5	A	17:00-18:00	895	677.5	-217.5	-32%	7.8	×	N/A	No
5	C	08:00-09:00	477	456	-21	-5%	1.0	✓	Yes	N/A
5	C	17:00-18:00	680	676.5	-3.5	-1%	0.1	✓	Yes	N/A
6	B	08:00-09:00	536	531	-5	-1%	0.2	✓	Yes	N/A
6	B	17:00-18:00	1083	1026.5	-56.5	-6%	1.7	✓	N/A	Yes
6	D	08:00-09:00	684	734	50	7%	1.9	✓	Yes	Yes
6	D	17:00-18:00	297	306	9	3%	0.5	✓	Yes	N/A

Appendix B. 15 minute matrix factors

Table B-1 AM and PM 15 minute LGV matrix factors

Period	Start time	End time	Profile factor	Period	Start time	End time	Profile factor
1	05:45	06:00	0.2500	**14**	14:45	15:00	0.2500
2	06:00	06:15	0.1515	**15**	15:00	15:15	0.2356
3	06:15	06:30	0.2100	**16**	15:15	15:30	0.2424
4	06:30	06:45	0.2824	**17**	15.30	15:45	0.2595
5	06:45	07:00	0.3561	**18**	15:45	16:00	0.2625
6	07:00	07:15	0.1307	**19**	16:00	16:15	0.2413
7	07:15	07:30	0.1911	**20**	16:15	16:30	0.2478
8	07:30	07:45	0.2859	**21**	16:30	16:45	0.2557
9	07:45	08:00	0.3923	**22**	16:45	17:00	0.2551
10	08:00	08:15	0.2052	**23**	17:00	17:15	0.2705
11	08:15	08:30	0.2736	**24**	17:15	17:30	0.2663
12	08:30	08:45	0.2728	**25**	17:30	17:45	0.2424
13	08:45	09:00	0.2483	**26**	17:45	18:00	0.2208

Table B-2 AM and PM 15 minute HGV matrix factors

Period	Start time	End time	Profile factor	Period	Start time	End time	Profile factor
1	05:45	06:00	0.2500	**14**	14:45	15:00	0.2500
2	06:00	06:15	0.1515	**15**	15:00	15:15	0.2356
3	06:15	06:30	0.2100	**16**	15:15	15:30	0.2424
4	06:30	06:45	0.2824	**17**	15.30	15:45	0.2595
5	06:45	07:00	0.3561	**18**	15:45	16:00	0.2625
6	07:00	07:15	0.1307	**19**	16:00	16:15	0.2413
7	07:15	07:30	0.1911	**20**	16:15	16:30	0.2478
8	07:30	07:45	0.2859	**21**	16:30	16:45	0.2557
9	07:45	08:00	0.3923	**22**	16:45	17:00	0.2551
10	08:00	08:15	0.2052	**23**	17:00	17:15	0.2705
11	08:15	08:30	0.2736	**24**	17:15	17:30	0.2663
12	08:30	08:45	0.2728	**25**	17:30	17:45	0.2424
13	08:45	09:00	0.2483	**26**	17:45	18:00	0.2208

Appendix C. Turning count calibration results

Table C-1 Turning count calibration results for AM hour 06:00-07:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	14	22	34	45	20	143%	✓	23	105%	✓	4.08	✓	3.97	✓
A55 EB	To	A55 EB	224	410	208	405	-16	-7%	✓	-5	-1%	✓	1.09	✓	0.25	✓
A5	To	A55 EB	66	114	66	121	0	0%	✓	7	6%	✓	0.00	✓	0.65	✓
A55 WB	To	A5	32	66	31	69	-1	-3%	✓	3	5%	✓	0.18	✓	0.37	✓
A55 WB	To	A55 WB	112	258	106	259	-6	-5%	✓	1	0%	✓	0.57	✓	0.06	✓
A55 WB	To	A5 WB	10	18	10	18	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5 EB	22	48	21	45	-1	-5%	✓	-3	-6%	✓	0.22	✓	0.44	✓
A5 EB	To	A55 EB	6	8	6	8	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5 EB	29	44	29	43	0	0%	✓	-1	-2%	✓	0.00	✓	0.15	✓
A55 EB	To	A55 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A5 WB	20	26	17	23	-3	-15%	✓	-3	-12%	✓	0.70	✓	0.61	✓
A55 EB	To	A5 EB	31	63	32	63	1	3%	✓	0	0%	✓	0.18	✓	0.00	✓
A5 WB	To	A5 WB	101	158	103	168	2	2%	✓	10	6%	✓	0.20	✓	0.78	✓
A5 WB	To	A55 WB	70	89	68	86	-2	-3%	✓	-3	-3%	✓	0.24	✓	0.32	✓
A5	To	A55 WB	80	102	78	99	-2	-3%	✓	-3	-3%	✓	0.23	✓	0.30	✓
A55 EB	To	A5	52	90	50	86	-2	-4%	✓	-4	-4%	✓	0.28	✓	0.43	✓
A55 EB	To	A55 EB	233	441	216	413	-17	-7%	✓	-28	-6%	✓	1.13	✓	1.36	✓
A4087 SB	To	A55 EB	28	44	18	30	-10	-36%	✓	-14	-32%	✓	2.09	✓	2.30	✓
A55 EB	To	A55 EB	257	487	255	477	-2	-1%	✓	-10	-2%	✓	0.13	✓	0.46	✓
A55 WB	To	A4087	65	118	61	107	-4	-6%	✓	-11	-9%	✓	0.50	✓	1.04	✓
A55 WB	To	A55 WB	127	242	120	225	-7	-6%	✓	-17	-7%	✓	0.63	✓	1.11	✓
A55 EB	To	A4087 NB	77	92	73	88	-4	-5%	✓	-4	-4%	✓	0.46	✓	0.42	✓
A4087 NB	To	A4087 NB	104	139	90	117	-14	-13%	✓	-22	-16%	✓	1.42	✓	1.94	✓
A4087 SB	To	A55 EB	28	44	18	30	-10	-36%	✓	-14	-32%	✓	2.09	✓	2.30	✓
A4087 SB	To	A4087 SB	45	68	43	65	-2	-4%	✓	-3	-4%	✓	0.30	✓	0.37	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A4087 NB	38	56	36	50	-2	-5%	✓	-6	-11%	✓	0.33	✓	0.82	✓
A55 WB	To	A4087 SB	27	62	26	57	-1	-4%	✓	-5	-8%	✓	0.19	✓	0.65	✓
A4087 SB	To	A55 WB	23	34	19	29	-4	-17%	✓	-5	-15%	✓	0.87	✓	0.89	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 SB	To	A4087 SB	22	34	23	34	1	5%	✓	0	0%	✓	0.21	✓	0.00	✓
A4087 NB	To	A55 WB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A4087 NB	To	A4087 NB	66	83	54	66	-12	-18%	✓	-17	-20%	✓	1.55	✓	1.97	✓
A4087 NB	To	A4087 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A4087 NB	77	92	72	88	-5	-6%	✓	-4	-4%	✓	0.58	✓	0.42	✓
A55 EB	To	A55 EB	257	487	256	478	-1	0%	✓	-9	-2%	✓	0.06	✓	0.41	✓
A55 WB	To	A55 WB	127	242	121	227	-6	-5%	✓	-15	-6%	✓	0.54	✓	0.98	✓
A4087	To	A55 WB	23	35	20	30	-3	-13%	✓	-5	-14%	✓	0.65	✓	0.88	✓
A55 WB	To	A487 SB	3	3	4	4	1	33%	✓	1	33%	✓	0.53	✓	0.53	✓
A55 WB	To	No name WB	7	7	8	8	1	14%	✓	1	14%	✓	0.37	✓	0.37	✓
A55 WB	To	A487 NB	23	27	18	18	-5	-22%	✓	-9	-33%	✓	1.10	✓	1.90	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	A487 SB	88	117	87	118	-1	-1%	✓	1	1%	✓	0.11	✓	0.09	✓
A487 SB	To	No name WB	19	25	20	23	1	5%	✓	-2	-8%	✓	0.23	✓	0.41	✓
A487 SB	To	A487 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A487 SB	To	A55 WB	23	28	16	18	-7	-30%	✓	-10	-36%	✓	1.59	✓	2.09	✓
No name EB	To	A487 SB	3	4	2	2	-1	-33%	✓	-2	-50%	✓	0.63	✓	1.15	✓
No name EB	To	A487 NB	4	7	4	7	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name EB	To	A55 WB	2	5	2	2	0	0%	✓	-3	-60%	✓	0.00	✓	1.60	✓
A487 NB	To	No name WB	6	7	7	7	1	17%	✓	0	0%	✓	0.39	✓	0.00	✓
A487 NB	To	A487 NB	56	87	69	104	13	23%	✓	17	20%	✓	1.64	✓	1.74	✓
A487 NB	To	A55 WB	58	75	64	81	6	10%	✓	6	8%	✓	0.77	✓	0.68	✓
A 487	To	A55 EB	73	105	79	111	6	8%	✓	6	6%	✓	0.69	✓	0.58	✓
A55 EB	To	A55 EB	261	474	250	455	-11	-4%	✓	-19	-4%	✓	0.69	✓	0.88	✓
A487 NB	To	A55 EB	50	76	55	84	5	10%	✓	8	11%	✓	0.69	✓	0.89	✓
A487 NB	To	A487 NB	13	21	12	18	-1	-8%	✓	-3	-14%	✓	0.28	✓	0.68	✓
A487 NB	To	No name EB	21	25	24	29	3	14%	✓	4	16%	✓	0.63	✓	0.77	✓
A55 EB	To	A487 SB	83	112	66	89	-17	-20%	✓	-23	-21%	✓	1.97	✓	2.29	✓
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A487 NB	9	10	9	9	0	0%	✓	-1	-10%	✓	0.00	✓	0.32	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	27	31	27	31	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	A487 SB	27	32	37	44	10	37%	✓	12	38%	✓	1.77	✓	1.95	✓
A487 SB	To	A55 EB	10	14	11	11	1	10%	✓	-3	-21%	✓	0.31	✓	0.85	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	No name EB	2	2	4	4	2	100%	✓	2	100%	✓	1.15	✓	1.15	✓
No name WB	To	A487 SB	23	30	20	27	-3	-13%	✓	-3	-10%	✓	0.65	✓	0.56	✓
No name WB	To	A55 EB	13	15	14	16	1	8%	✓	1	7%	✓	0.27	✓	0.25	✓
No name WB	To	A487 NB	6	6	8	8	2	33%	✓	2	33%	✓	0.76	✓	0.76	✓
A55 WB	To	A55 WB	117	240	112	225	-5	-4%	✓	-15	-6%	✓	0.47	✓	0.98	✓
A487	To	A55 WB	83	108	82	104	-1	-1%	✓	-4	-4%	✓	0.11	✓	0.39	✓
A55 EB	To	A487	119	153	100	126	-19	-16%	✓	-27	-18%	✓	1.82	✓	2.29	✓
A55 EB	To	A55 EB	261	474	250	455	-11	-4%	✓	-19	-4%	✓	0.69	✓	0.88	✓
A55 WB	To	A5 EB	6	8	11	11	5	83%	✓	3	38%	✓	1.71	✓	0.97	✓
A55 WB	To	A5 WB	9	13	2	2	-7	-78%	✓	-11	-85%	✓	2.98	✓	4.02	✓
A5 WB	To	A55 EB	17	26	19	27	2	12%	✓	1	4%	✓	0.47	✓	0.19	✓
A5 WB	To	A5 WB	14	17	13	15	-1	-7%	✓	-2	-12%	✓	0.27	✓	0.50	✓
A5 EB	To	A55 EB	25	26	13	13	-12	-48%	✓	-13	-50%	✓	2.75	✓	2.94	✓
A55 WB	To	A5	15	21	13	13	-2	-13%	✓	-8	-38%	✓	0.53	✓	1.94	✓
A55 WB	To	A55 WB	185	327	177	311	-8	-4%	✓	-16	-5%	✓	0.59	✓	0.90	✓
A55 WB	To	A5025	30	43	15	18	-15	-50%	✓	-25	-58%	✓	3.16	✓	4.53	✓
A55 WB	To	A55 WB	155	284	161	293	6	4%	✓	9	3%	✓	0.48	✓	0.53	✓
A55 WB	To	A5025 NB	23	35	13	16	-10	-43%	✓	-19	-54%	✓	2.36	✓	3.76	✓
A55 WB	To	A5025 SB	5	5	3	3	-2	-40%	✓	-2	-40%	✓	1.00	✓	1.00	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5025 NB	To	A5025 NB	20	24	13	16	-7	-35%	✓	-8	-33%	✓	1.72	✓	1.79	✓
A5025 NB	To	A55 WB	9	10	0	0	-9	-100%	✓	-10	-100%	✓	4.24	✓	4.47	✓
A5025 SB	To	A5025 SB	3	5	5	5	2	67%	✓	0	0%	✓	1.00	✓	0.00	✓
A5025 SB	To	A55 EB	84	120	80	111	-4	-5%	✓	-9	-8%	✓	0.44	✓	0.84	✓
A5025 SB	To	A55 WB	21	27	31	43	10	48%	✓	16	59%	✓	1.96	✓	2.70	✓
A55 EB	To	A5025 NB	13	21	28	37	15	115%	✓	16	76%	✓	3.31	✓	2.97	✓
A55 EB	To	A5025 SB	1	1	4	4	3	300%	✓	3	300%	✓	1.90	✓	1.90	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A55 WB	117	240	112	225	-5	-4%	✓	-15	-6%	✓	0.47	✓	0.98	✓
A55 WB	To	A487	33	37	29	29	-4	-12%	✓	-8	-22%	✓	0.72	✓	1.39	✓
A55 EB	To	A55 EB	224	410	206	381	-18	-8%	✓	-29	-7%	✓	1.23	✓	1.46	✓
A 5025	To	A55 EB	98	136	93	129	-5	-5%	✓	-7	-5%	✓	0.51	✓	0.61	✓
A55 EB	To	A55 EB	322	546	300	511	-22	-7%	✓	-35	-6%	✓	1.25	✓	1.52	✓
A5	To	A55 EB	58	81	54	75	-4	-7%	✓	-6	-7%	✓	0.53	✓	0.68	✓
A55 WB	To	A55 WB	155	284	160	293	5	3%	✓	9	3%	✓	0.40	✓	0.53	✓
A5025	To	A55 WB	31	38	31	43	0	0%	✓	5	13%	✓	0.00	✓	0.79	✓
A55 EB	To	A55 EB (off/on)	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A55 EB	To	A5152 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 EB	To	A5152 SB	15	18	17	20	2	13%	✓	2	11%	✓	0.50	✓	0.46	✓
A5152 NB	To	A55 WB	14	19	15	19	1	7%	✓	0	0%	✓	0.26	✓	0.00	✓
A5152 NB	To	A55 EB	26	49	44	67	18	69%	✓	18	37%	✓	3.04	✓	2.36	✓
A5152 NB	To	A5152 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A5152 SB	To	A55 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5152 SB	To	A55 EB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A5152 SB	To	A5152 SB	100	100	17	20	-83	-83%	✓	-80	-80%	✓	10.85	×	10.33	×
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5152 SB	29	50	30	39	1	3%	✓	-11	-22%	✓	0.18	✓	1.65	✓
A55 EB	To	A55 EB	197	358	207	374	10	5%	✓	16	4%	✓	0.70	✓	0.84	✓
A55 EB	To	A5152	16	21	17	21	1	6%	✓	0	0%	✓	0.25	✓	0.00	✓
A5152	To	A55 WB	14	19	15	18	1	7%	✓	-1	-5%	✓	0.26	✓	0.23	✓
A55 WB	To	A55 WB	157	272	152	280	-5	-3%	✓	8	3%	✓	0.40	✓	0.48	✓
A55 EB	To	A55 EB	197	358	206	371	9	5%	✓	13	4%	✓	0.63	✓	0.68	✓
A5152	To	A55 EB	27	52	44	67	17	63%	✓	15	29%	✓	2.85	✓	1.94	✓
A55 WB	To	A55 WB	157	272	152	280	-5	-3%	✓	8	3%	✓	0.40	✓	0.48	✓
A55 WB	To	A5152	29	50	32	41	3	10%	✓	-9	-18%	✓	0.54	✓	1.33	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	B5420 WB	1	1	3	3	2	200%	✓	2	200%	✓	1.41	✓	1.41	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	15	19	10	10	-5	-33%	✓	-9	-47%	✓	1.41	✓	2.36	✓
A5 EB	To	B5420 EB	5	6	6	6	1	20%	✓	0	0%	✓	0.43	✓	0.00	✓
B5420 EB	To	A5 WB	1	6	5	5	4	400%	✓	-1	-17%	✓	2.31	✓	0.43	✓
B5420 EB	To	B5420 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
B5420 EB	To	A5 EB	50	60	67	73	17	34%	✓	13	22%	✓	2.22	✓	1.59	✓
B5420 EB	To	B5420 EB	6	9	7	7	1	17%	✓	-2	-22%	✓	0.39	✓	0.71	✓
A5 WB	To	A5 WB	9	13	6	9	-3	-33%	✓	-4	-31%	✓	1.10	✓	1.21	✓
A5 WB	To	B5420 WB	19	25	22	22	3	16%	✓	-3	-12%	✓	0.66	✓	0.62	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	B5420 EB	2	2	4	4	2	100%	✓	2	100%	✓	1.15	✓	1.15	✓
B5420 WB	To	A5 WB	13	15	13	13	0	0%	✓	-2	-13%	✓	0.00	✓	0.53	✓
B5420 WB	To	B5420 WB	3	7	5	6	2	67%	✓	-1	-14%	✓	1.00	✓	0.39	✓
B5420 WB	To	A5 EB	7	8	2	2	-5	-71%	✓	-6	-75%	✓	2.36	✓	2.68	✓
B5420 WB	To	B5420 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5 EB	53	60	62	66	9	17%	✓	6	10%	✓	1.19	✓	0.76	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A545 NB	3	3	7	7	4	133%	✓	4	133%	✓	1.79	✓	1.79	✓
A5 EB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	A5 EB	42	45	38	40	-4	-10%	✓	-5	-11%	✓	0.63	✓	0.77	✓
A545 SB	To	A5 WB	2	3	3	3	1	50%	✓	0	0%	✓	0.63	✓	0.00	✓
A545 SB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	14	19	19	21	5	36%	✓	2	11%	✓	1.23	✓	0.45	✓
A5 WB	To	A545 NB	8	10	5	5	-3	-38%	✓	-5	-50%	✓	1.18	✓	1.83	✓
A5 WB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	8	12	7	8	-1	-13%	✓	-4	-33%	✓	0.37	✓	1.26	✓
A487 NB	To	A5 WB	12	14	14	15	2	17%	✓	1	7%	✓	0.55	✓	0.26	✓
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	56	61	58	64	2	4%	✓	3	5%	✓	0.26	✓	0.38	✓
A5 EB	To	A5 EB	42	46	41	41	-1	-2%	✓	-5	-11%	✓	0.16	✓	0.76	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A487 SB	7	10	2	3	-5	-71%	✓	-7	-70%	✓	2.36	✓	2.75	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	9	17	10	11	1	11%	✓	-6	-35%	✓	0.32	✓	1.60	✓
A5 WB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	0	3	0	0	0	0%	✓	-3	-100%	✓	0.00	✓	2.45	✓
A4087 WB	To	A487 SB	42	74	43	77	1	2%	✓	3	4%	✓	0.15	✓	0.35	✓
A4087 WB	To	B4547 WB	6	9	6	7	0	0%	✓	-2	-22%	✓	0.00	✓	0.71	✓
A487 SB	To	A4087 EB	2	4	0	0	-2	-100%	✓	-4	-100%	✓	2.00	✓	2.83	✓
A487 SB	To	A487 SB	93	132	81	108	-12	-13%	✓	-24	-18%	✓	1.29	✓	2.19	✓
A487 SB	To	B4547 WB	10	19	6	10	-4	-40%	✓	-9	-47%	✓	1.41	✓	2.36	✓
B4547 EB	To	A4087 EB	28	31	24	26	-4	-14%	✓	-5	-16%	✓	0.78	✓	0.94	✓
B4547 EB	To	A487 NB	36	52	32	39	-4	-11%	✓	-13	-25%	✓	0.69	✓	1.93	✓
B4547 EB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A4087 EB	34	38	30	30	-4	-12%	✓	-8	-21%	✓	0.71	✓	1.37	✓
A487 NB	To	A487 NB	79	124	67	90	-12	-15%	✓	-34	-27%	✓	1.40	✓	3.29	✓
A487 NB	To	B4547 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	11	19	5	6	-6	-55%	✓	-13	-68%	✓	2.12	✓	3.68	✓
A5 WB	To	A4081	5	8	7	9	2	40%	✓	1	13%	✓	0.82	✓	0.34	✓
A4080	To	A5 WB	3	8	4	8	1	33%	✓	0	0%	✓	0.53	✓	0.00	✓
A4081	To	A5 EB	24	27	23	25	-1	-4%	✓	-2	-7%	✓	0.21	✓	0.39	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	3	5	0	0	-3	-100%	✓	-5	-100%	✓	2.45	✓	3.16	✓
A5 EB	To	A5 EB	29	39	17	21	-12	-41%	✓	-18	-46%	✓	2.50	✓	3.29	✓
Lon Graig SB	To	A5 WB	0	2	4	5	4	0%	✓	3	150%	✓	2.83	✓	1.60	✓
Lon Graig SB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	Lon Graig NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	16	25	7	8	-9	-56%	✓	-17	-68%	✓	2.65	✓	4.19	✓
A5 EB	To	Lon Graig NB	2	3	7	8	5	250%	✓	5	167%	✓	2.36	✓	2.13	✓
A5 EB	To	A5 EB	51	63	32	39	-19	-37%	✓	-24	-38%	✓	2.95	✓	3.36	✓
A5 EB	To	A5 EB	8	9	0	0	-8	-100%	✓	-9	-100%	✓	4.00	✓	4.24	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5152 NB	32	55	41	62	9	28%	✓	7	13%	✓	1.49	✓	0.92	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	16	19	9	10	-7	-44%	✓	-9	-47%	✓	1.98	✓	2.36	✓
A5 WB	To	A5152 NB	11	18	10	14	-1	-9%	✓	-4	-22%	✓	0.31	✓	1.00	✓
A5152 SB	To	A5 EB	12	15	3	3	-9	-75%	✓	-12	-80%	✓	3.29	✓	4.00	✓
A5152 SB	To	A5 WB	33	55	41	62	8	24%	✓	7	13%	✓	1.32	✓	0.92	✓
A5152 SB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	233	441	216	439	-17	-7%	✓	-2	0%	✓	1.13	✓	0.10	✓
A55 WB	To	A55 WB	112	258	108	239	-4	-4%	✓	-19	-7%	✓	0.38	✓	1.21	✓
A5 EB	To	A55 EB	41	56	35	48	-6	-15%	✓	-8	-14%	✓	1.00	✓	1.11	✓
									100%			100%		100%		100%

Table C-2 Turning count calibration results for AM hour 07:00-08:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	99	128	125	173	26	26%	✓	45	35%	✓	2.46	✓	3.67	✓
A55 EB	To	A55 EB	575	773	584	769	9	2%	✓	-4	-1%	✓	0.37	✓	0.14	✓
A5	To	A55 EB	220	316	218	314	-2	-1%	✓	-2	-1%	✓	0.14	✓	0.11	✓
A55 WB	To	A5	117	186	115	182	-2	-2%	✓	-4	-2%	✓	0.19	✓	0.29	✓
A55 WB	To	A55 WB	432	732	412	682	-20	-5%	✓	-50	-7%	✓	0.97	✓	1.88	✓
A55 WB	To	A5 WB	40	61	38	59	-2	-5%	✓	-2	-3%	✓	0.32	✓	0.26	✓
A55 WB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A5 EB	76	124	76	123	0	0%	✓	-1	-1%	✓	0.00	✓	0.09	✓
A5 EB	To	A55 EB	12	27	11	26	-1	-8%	✓	-1	-4%	✓	0.29	✓	0.19	✓
A5 EB	To	A5 EB	86	141	83	137	-3	-3%	✓	-4	-3%	✓	0.33	✓	0.34	✓
A55 EB	To	A55 EB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A55 EB	To	A5 WB	113	153	97	131	-16	-14%	✓	-22	-14%	✓	1.56	✓	1.85	✓
A55 EB	To	A5 EB	68	120	88	130	20	29%	✓	10	8%	✓	2.26	✓	0.89	✓
A5 WB	To	A5 WB	347	485	347	486	0	0%	✓	1	0%	✓	0.00	✓	0.05	✓
A5 WB	To	A55 WB	219	297	216	286	-3	-1%	✓	-11	-4%	✓	0.20	✓	0.64	✓
A5	To	A55 WB	263	371	254	350	-9	-3%	✓	-21	-6%	✓	0.56	✓	1.11	✓
A55 EB	To	A5	182	275	187	265	5	3%	✓	-10	-4%	✓	0.37	✓	0.61	✓
A55 EB	To	A55 EB	541	730	468	641	-73	-13%	✓	-89	-12%	✓	3.25	✓	3.40	✓
A4087 SB	To	A55 EB	106	141	81	107	-25	-24%	✓	-34	-24%	✓	2.59	✓	3.05	✓
A55 EB	To	A55 EB	617	864	597	827	-20	-3%	✓	-37	-4%	✓	0.81	✓	1.27	✓
A55 WB	To	A4087	185	319	180	302	-5	-3%	✓	-17	-5%	✓	0.37	✓	0.96	✓
A55 WB	To	A55 WB	510	784	460	692	-50	-10%	✓	-92	-12%	✓	2.27	✓	3.39	✓
A55 EB	To	A4087 NB	126	155	110	135	-16	-13%	✓	-20	-13%	✓	1.47	✓	1.66	✓
A4087 NB	To	A4087 NB	246	334	206	279	-40	-16%	✓	-55	-16%	✓	2.66	✓	3.14	✓
A4087 SB	To	A55 EB	106	141	82	108	-24	-23%	✓	-33	-23%	✓	2.48	✓	2.96	✓
A4087 SB	To	A4087 SB	128	184	126	179	-2	-2%	✓	-5	-3%	✓	0.18	✓	0.37	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A4087 NB	101	150	96	141	-5	-5%	✓	-9	-6%	✓	0.50	✓	0.75	✓
A55 WB	To	A4087 SB	83	168	81	156	-2	-2%	✓	-12	-7%	✓	0.22	✓	0.94	✓
A4087 SB	To	A55 WB	71	96	68	87	-3	-4%	✓	-9	-9%	✓	0.36	✓	0.94	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 SB	To	A4087 SB	57	88	56	89	-1	-2%	✓	1	1%	✓	0.13	✓	0.11	✓
A4087 NB	To	A55 WB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A4087 NB	To	A4087 NB	145	184	109	137	-36	-25%	✓	-47	-26%	✓	3.19	✓	3.71	✓
A4087 NB	To	A4087 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A4087 NB	126	155	110	135	-16	-13%	✓	-20	-13%	✓	1.47	✓	1.66	✓
A55 EB	To	A55 EB	617	864	599	830	-18	-3%	✓	-34	-4%	✓	0.73	✓	1.17	✓
A55 WB	To	A55 WB	510	784	455	687	-55	-11%	✓	-97	-12%	✓	2.50	✓	3.58	✓
A4087	To	A55 WB	73	99	67	87	-6	-8%	✓	-12	-12%	✓	0.72	✓	1.24	✓
A55 WB	To	A487 SB	11	25	12	15	1	9%	✓	-10	-40%	✓	0.29	✓	2.24	✓
A55 WB	To	No name WB	83	94	87	100	4	5%	✓	6	6%	✓	0.43	✓	0.61	✓
A55 WB	To	A487 NB	147	173	110	132	-37	-25%	✓	-41	-24%	✓	3.26	✓	3.32	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 SB	To	A487 SB	297	384	288	368	-9	-3%	✓	-16	-4%	✓	0.53	✓	0.83	✓
A487 SB	To	No name WB	112	127	96	106	-16	-14%	✓	-21	-17%	✓	1.57	✓	1.95	✓
A487 SB	To	A487 NB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 SB	To	A55 WB	58	75	38	45	-20	-34%	✓	-30	-40%	✓	2.89	✓	3.87	✓
No name EB	To	A487 SB	11	17	7	15	-4	-36%	✓	-2	-12%	✓	1.33	✓	0.50	✓
No name EB	To	A487 NB	20	23	42	47	22	110%	✓	24	104%	✓	3.95	✓	4.06	✓
No name EB	To	A55 WB	11	19	7	11	-4	-36%	✓	-8	-42%	✓	1.33	✓	2.07	✓
A487 NB	To	No name WB	64	73	76	86	12	19%	✓	13	18%	✓	1.43	✓	1.46	✓
A487 NB	To	A487 NB	180	224	185	228	5	3%	✓	4	2%	✓	0.37	✓	0.27	✓
A487 NB	To	A55 WB	185	286	187	272	2	1%	✓	-14	-5%	✓	0.15	✓	0.84	✓
A 487	To	A55 EB	239	300	201	243	-38	-16%	✓	-57	-19%	✓	2.56	✓	3.46	✓
A55 EB	To	A55 EB	504	719	514	722	10	2%	✓	3	0%	✓	0.44	✓	0.11	✓
A487 NB	To	A55 EB	138	174	70	86	-68	-49%	✓	-88	-51%	✓	6.67	×	7.72	×
A487 NB	To	A487 NB	81	98	101	128	20	25%	✓	30	31%	✓	2.10	✓	2.82	✓
A487 NB	To	No name EB	129	151	159	190	30	23%	✓	39	26%	✓	2.50	✓	2.99	✓
A55 EB	To	A487 SB	322	402	276	335	-46	-14%	✓	-67	-17%	✓	2.66	✓	3.49	✓
A55 EB	To	A55 EB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A487 NB	18	23	21	26	3	17%	✓	3	13%	✓	0.68	✓	0.61	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	200	208	159	164	-41	-21%	✓	-44	-21%	✓	3.06	✓	3.23	✓
A487 SB	To	A487 SB	74	94	84	105	10	14%	✓	11	12%	✓	1.13	✓	1.10	✓
A487 SB	To	A55 EB	38	50	46	56	8	21%	✓	6	12%	✓	1.23	✓	0.82	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	No name EB	11	14	11	13	0	0%	✓	-1	-7%	✓	0.00	✓	0.27	✓
No name WB	To	A487 SB	71	86	67	82	-4	-6%	✓	-4	-5%	✓	0.48	✓	0.44	✓
No name WB	To	A55 EB	62	75	84	102	22	35%	✓	27	36%	✓	2.57	✓	2.87	✓
No name WB	To	A487 NB	16	24	17	24	1	6%	✓	0	0%	✓	0.25	✓	0.00	✓
A55 WB	To	A55 WB	341	590	308	517	-33	-10%	✓	-73	-12%	✓	1.83	✓	3.10	✓
A487	To	A55 WB	255	381	230	327	-25	-10%	✓	-54	-14%	✓	1.61	✓	2.87	✓
A55 EB	To	A487	541	634	460	530	-81	-15%	✓	-104	-16%	×	3.62	✓	4.31	✓
A55 EB	To	A55 EB	504	719	516	723	12	2%	✓	4	1%	✓	0.53	✓	0.15	✓
A55 WB	To	A5 EB	33	52	40	59	7	21%	✓	7	13%	✓	1.16	✓	0.94	✓
A55 WB	To	A5 WB	48	77	20	24	-28	-58%	✓	-53	-69%	✓	4.80	✓	7.46	×
A5 WB	To	A55 EB	34	56	22	34	-12	-35%	✓	-22	-39%	✓	2.27	✓	3.28	✓
A5 WB	To	A5 WB	32	37	21	23	-11	-34%	✓	-14	-38%	✓	2.14	✓	2.56	✓
A5 EB	To	A55 EB	53	63	38	38	-15	-28%	✓	-25	-40%	✓	2.22	✓	3.52	✓
A55 WB	To	A5	81	129	59	82	-22	-27%	✓	-47	-36%	✓	2.63	✓	4.58	✓
A55 WB	To	A55 WB	514	841	465	741	-49	-10%	✓	-100	-12%	✓	2.21	✓	3.56	✓
A55 WB	To	A5025	95	159	36	50	-59	-62%	✓	-109	-69%	×	7.29	×	10.66	×
A55 WB	To	A55 WB	419	682	427	689	8	2%	✓	7	1%	✓	0.39	✓	0.27	✓
A55 WB	To	A5025 NB	85	148	34	48	-51	-60%	✓	-100	-68%	×	6.61	×	10.10	×
A55 WB	To	A5025 SB	9	10	2	2	-7	-78%	✓	-8	-80%	✓	2.98	✓	3.27	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5025 NB	To	A5025 NB	104	122	45	59	-59	-57%	✓	-63	-52%	✓	6.84	×	6.62	×
A5025 NB	To	A55 WB	35	39	0	0	-35	-100%	✓	-39	-100%	✓	8.37	×	8.83	×
A5025 SB	To	A5025 SB	24	24	29	44	5	21%	✓	20	83%	✓	0.97	✓	3.43	✓
A5025 SB	To	A55 EB	218	268	240	289	22	10%	✓	21	8%	✓	1.45	✓	1.26	✓
A5025 SB	To	A55 WB	70	94	92	116	22	31%	✓	22	23%	✓	2.44	✓	2.15	✓
A55 EB	To	A5025 NB	85	113	110	143	25	29%	✓	30	27%	✓	2.53	✓	2.65	✓
A55 EB	To	A5025 SB	13	14	15	30	2	15%	✓	16	114%	✓	0.53	✓	3.41	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A55 WB	341	590	309	516	-32	-9%	✓	-74	-13%	✓	1.78	✓	3.15	✓
A55 WB	To	A487	242	293	211	252	-31	-13%	✓	-41	-14%	✓	2.06	✓	2.48	✓
A55 EB	To	A55 EB	575	773	571	756	-4	-1%	✓	-17	-2%	✓	0.17	✓	0.61	✓
A 5025	To	A55 EB	283	339	297	351	14	5%	✓	12	4%	✓	0.82	✓	0.65	✓
A55 EB	To	A55 EB	858	1112	843	1073	-15	-2%	✓	-39	-4%	✓	0.51	✓	1.18	✓
A5	To	A55 EB	187	241	153	205	-34	-18%	✓	-36	-15%	✓	2.61	✓	2.41	✓
A55 WB	To	A55 WB	419	682	426	685	7	2%	✓	3	0%	✓	0.34	✓	0.11	✓
A5025	To	A55 WB	105	133	91	115	-14	-13%	✓	-18	-14%	✓	1.41	✓	1.62	✓
A55 EB	To	A55 EB (off /on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A5152 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 EB	To	A5152 SB	38	55	46	67	8	21%	✓	12	22%	✓	1.23	✓	1.54	✓
A5152 NB	To	A55 WB	29	40	19	28	-10	-34%	✓	-12	-30%	✓	2.04	✓	2.06	✓
A5152 NB	To	A55 EB	88	141	146	224	58	66%	✓	83	59%	✓	5.36	×	6.14	×
A5152 NB	To	A5152 NB	2	2	3	3	1	50%	✓	1	50%	✓	0.63	✓	0.63	✓
A5152 SB	To	A55 WB	0	2	0	0	0	0%	✓	-2	-100%	✓	0.00	✓	2.00	✓
A5152 SB	To	A55 EB	1	2	0	1	-1	-100%	✓	-1	-50%	✓	1.41	✓	0.82	✓
A5152 SB	To	A5152 SB	102	103	49	73	-53	-52%	✓	-30	-29%	✓	6.10	×	3.20	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5152 NB	1	2	3	3	2	200%	✓	1	50%	✓	1.41	✓	0.63	✓
A55 WB	To	A5152 SB	58	114	30	35	-28	-48%	✓	-79	-69%	✓	4.22	✓	9.15	×
A55 EB	To	A55 EB	484	626	597	754	113	23%	×	128	20%	×	4.86	✓	4.87	✓
A55 EB	To	A5152	38	56	47	68	9	24%	✓	12	21%	✓	1.38	✓	1.52	✓
A5152	To	A55 WB	29	42	20	29	-9	-31%	✓	-13	-31%	✓	1.82	✓	2.18	✓
A55 WB	To	A55 WB	463	695	449	716	-14	-3%	✓	21	3%	✓	0.66	✓	0.79	✓
A55 EB	To	A55 EB	484	626	591	749	107	22%	×	123	20%	×	4.62	✓	4.69	✓
A5152	To	A55 EB	91	147	146	224	55	60%	✓	77	52%	✓	5.05	×	5.65	×
A55 WB	To	A55 WB	463	695	455	725	-8	-2%	✓	30	4%	✓	0.37	✓	1.13	✓
A55 WB	To	A5152	61	120	34	40	-27	-44%	✓	-80	-67%	✓	3.92	✓	8.94	×
A5 EB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 EB	To	B5420 WB	16	22	13	14	-3	-19%	✓	-8	-36%	✓	0.79	✓	1.89	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	39	47	45	48	6	15%	✓	1	2%	✓	0.93	✓	0.15	✓
A5 EB	To	B5420 EB	22	38	12	24	-10	-45%	✓	-14	-37%	✓	2.43	✓	2.51	✓
B5420 EB	To	A5 WB	20	27	21	24	1	5%	✓	-3	-11%	✓	0.22	✓	0.59	✓
B5420 EB	To	B5420 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
B5420 EB	To	A5 EB	199	227	221	259	22	11%	✓	32	14%	✓	1.52	✓	2.05	✓
B5420 EB	To	B5420 EB	20	28	18	25	-2	-10%	✓	-3	-11%	✓	0.46	✓	0.58	✓
A5 WB	To	A5 WB	20	26	3	3	-17	-85%	✓	-23	-88%	✓	5.01	×	6.04	×
A5 WB	To	B5420 WB	45	62	57	80	12	27%	✓	18	29%	✓	1.68	✓	2.14	✓
A5 WB	To	A5 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	B5420 EB	1	3	10	19	9	900%	✓	16	533%	✓	3.84	✓	4.82	✓
B5420 WB	To	A5 WB	29	37	25	29	-4	-14%	✓	-8	-22%	✓	0.77	✓	1.39	✓
B5420 WB	To	B5420 WB	20	26	30	35	10	50%	✓	9	35%	✓	2.00	✓	1.63	✓
B5420 WB	To	A5 EB	23	26	13	13	-10	-43%	✓	-13	-50%	✓	2.36	✓	2.94	✓
B5420 WB	To	B5420 EB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A5 EB	To	A5 EB	224	251	233	263	9	4%	✓	12	5%	✓	0.60	✓	0.75	✓
A5 EB	To	A5 WB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A5 EB	To	A545 NB	2	5	15	19	13	650%	✓	14	280%	✓	4.46	✓	4.04	✓
A5 EB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	A5 EB	136	152	117	134	-19	-14%	✓	-18	-12%	✓	1.69	✓	1.51	✓
A545 SB	To	A5 WB	14	18	19	23	5	36%	✓	5	28%	✓	1.23	✓	1.10	✓
A545 SB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	50	67	53	82	3	6%	✓	15	22%	✓	0.42	✓	1.74	✓
A5 WB	To	A545 NB	33	44	66	73	33	100%	✓	29	66%	✓	4.69	✓	3.79	✓
A5 WB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	65	78	60	74	-5	-8%	✓	-4	-5%	✓	0.63	✓	0.46	✓
A487 NB	To	A5 WB	51	67	74	95	23	45%	✓	28	42%	✓	2.91	✓	3.11	✓
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	214	238	196	221	-18	-8%	✓	-17	-7%	✓	1.26	✓	1.12	✓
A5 EB	To	A5 EB	132	155	135	157	3	2%	✓	2	1%	✓	0.26	✓	0.16	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	No name NB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A487 SB	23	25	18	18	-5	-22%	✓	-7	-28%	✓	1.10	✓	1.51	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	47	60	58	72	11	23%	✓	12	20%	✓	1.52	✓	1.48	✓
A5 WB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 EB	1	1	1	1	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	2	3	0	0	-2	-100%	✓	-3	-100%	✓	2.00	✓	2.45	✓
A4087 WB	To	A487 SB	102	206	99	194	-3	-3%	✓	-12	-6%	✓	0.30	✓	0.85	✓
A4087 WB	To	B4547 WB	26	33	26	31	0	0%	✓	-2	-6%	✓	0.00	✓	0.35	✓
A487 SB	To	A4087 EB	3	5	0	0	-3	-100%	✓	-5	-100%	✓	2.45	✓	3.16	✓
A487 SB	To	A487 SB	189	274	192	260	3	2%	✓	-14	-5%	✓	0.22	✓	0.86	✓
A487 SB	To	B4547 WB	87	109	73	88	-14	-16%	✓	-21	-19%	✓	1.57	✓	2.12	✓
B4547 EB	To	A4087 EB	50	67	39	50	-11	-22%	✓	-17	-25%	✓	1.65	✓	2.22	✓
B4547 EB	To	A487 NB	247	296	194	231	-53	-21%	✓	-65	-22%	✓	3.57	✓	4.00	✓
B4547 EB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A4087 EB	82	96	63	73	-19	-23%	✓	-23	-24%	✓	2.23	✓	2.50	✓
A487 NB	To	A487 NB	327	454	259	360	-68	-21%	✓	-94	-21%	✓	3.97	✓	4.66	✓
A487 NB	To	B4547 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	52	73	9	9	-43	-83%	✓	-64	-88%	✓	7.79	×	10.00	×
A5 WB	To	A4081	40	60	45	47	5	13%	✓	-13	-22%	✓	0.77	✓	1.78	✓
A4080	To	A5 WB	13	15	13	16	0	0%	✓	1	7%	✓	0.00	✓	0.25	✓
A4081	To	A5 EB	96	108	101	109	5	5%	✓	1	1%	✓	0.50	✓	0.10	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	10	13	0	0	-10	-100%	✓	-13	-100%	✓	4.47	✓	5.10	×
A5 EB	To	A5 EB	131	178	112	124	-19	-15%	✓	-54	-30%	✓	1.72	✓	4.39	✓
Lon Graig SB	To	A5 WB	19	21	22	24	3	16%	✓	3	14%	✓	0.66	✓	0.63	✓
Lon Graig SB	To	A5 EB	60	61	0	10	-60	-100%	✓	-51	-84%	✓	10.95	×	8.56	×
A5 WB	To	Lon Graig NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	73	112	32	32	-41	-56%	✓	-80	-71%	✓	5.66	×	9.43	×
A5 EB	To	Lon Graig NB	30	33	48	52	18	60%	✓	19	58%	✓	2.88	✓	2.91	✓
A5 EB	To	A5 EB	197	253	163	180	-34	-17%	✓	-73	-29%	✓	2.53	✓	4.96	✓
A5 EB	To	A5 EB	46	71	0	0	-46	-100%	✓	-71	-100%	✓	9.59	×	11.92	×
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5152 NB	101	156	158	240	57	56%	✓	84	54%	✓	5.01	×	5.97	×
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	33	51	8	9	-25	-76%	✓	-42	-82%	✓	5.52	×	7.67	×
A5 WB	To	A5152 NB	21	28	10	12	-11	-52%	✓	-16	-57%	✓	2.79	✓	3.58	✓
A5152 SB	To	A5 EB	29	44	0	0	-29	-100%	✓	-44	-100%	✓	7.62	×	9.38	×
A5152 SB	To	A5 WB	65	123	66	92	1	2%	✓	-31	-25%	✓	0.12	✓	2.99	✓
A5152 SB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	541	730	465	637	-76	-14%	✓	-93	-13%	✓	3.39	✓	3.56	✓
A55 WB	To	A55 WB	432	732	408	676	-24	-6%	✓	-56	-8%	✓	1.17	✓	2.11	✓
									99%			98%		92%		91%

Table C-3 Turning count calibration results for AM hour 08:00-09:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	233	288	245	308	12	5%	✓	20	7%	✓	0.78	✓	1.16	✓
A55 EB	To	A55 EB	665	842	660	830	-5	-1%	✓	-12	-1%	✓	0.19	✓	0.42	✓
A5	To	A55 EB	299	382	298	379	-1	0%	✓	-3	-1%	✓	0.06	✓	0.15	✓
A55 WB	To	A5	210	320	211	320	1	0%	✓	0	0%	✓	0.07	✓	0.00	✓
A55 WB	To	A55 WB	767	1,050	715	1,001	-52	-7%	✓	-49	-5%	✓	1.91	✓	1.53	✓
A55 WB	To	A5 WB	74	125	75	124	1	1%	✓	-1	-1%	✓	0.12	✓	0.09	✓
A55 WB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5 EB	137	196	139	199	2	1%	✓	3	2%	✓	0.17	✓	0.21	✓
A5 EB	To	A55 EB	25	43	25	42	0	0%	✓	-1	-2%	✓	0.00	✓	0.15	✓
A5 EB	To	A5 EB	188	274	190	276	2	1%	✓	2	1%	✓	0.15	✓	0.12	✓
A55 EB	To	A55 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A5 WB	102	155	109	160	7	7%	✓	5	3%	✓	0.68	✓	0.40	✓
A55 EB	To	A5 EB	147	199	148	202	1	1%	✓	3	2%	✓	0.08	✓	0.21	✓
A5 WB	To	A5 WB	604	733	603	730	-1	0%	✓	-3	0%	✓	0.04	✓	0.11	✓
A5 WB	To	A55 WB	423	501	419	500	-4	-1%	✓	-1	0%	✓	0.19	✓	0.04	✓
A5	To	A55 WB	517	637	516	638	-1	0%	✓	1	0%	✓	0.04	✓	0.04	✓
A55 EB	To	A5	249	354	257	366	8	3%	✓	12	3%	✓	0.50	✓	0.63	✓
A55 EB	To	A55 EB	639	842	756	974	117	18%	×	132	16%	×	4.43	✓	4.38	✓
A4087 SB	To	A55 EB	160	227	126	181	-34	-21%	✓	-46	-20%	✓	2.84	✓	3.22	✓
A55 EB	To	A55 EB	728	969	884	1150	156	21%	×	181	19%	×	5.49	×	5.56	×
A55 WB	To	A4087	448	597	444	592	-4	-1%	✓	-5	-1%	✓	0.19	✓	0.21	✓
A55 WB	To	A55 WB	836	1,090	789	1,051	-47	-6%	✓	-39	-4%	✓	1.65	✓	1.19	✓
A55 EB	To	A4087 NB	253	300	182	227	-71	-28%	✓	-73	-24%	✓	4.81	✓	4.50	✓
A4087 NB	To	A4087 NB	657	768	591	689	-66	-10%	✓	-79	-10%	✓	2.64	✓	2.93	✓
A4087 SB	To	A55 EB	160	227	125	182	-35	-22%	✓	-45	-20%	✓	2.93	✓	3.15	✓
A4087 SB	To	A4087 SB	281	376	281	344	0	0%	✓	-32	-9%	✓	0.00	✓	1.69	✓
A55 WB	To	A55 WB (off/on)	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A55 WB	To	A4087 NB	254	306	253	306	-1	0%	✓	0	0%	✓	0.06	✓	0.00	✓
A55 WB	To	A4087 SB	192	289	187	282	-5	-3%	✓	-7	-2%	✓	0.36	✓	0.41	✓
A4087 SB	To	A55 WB	139	193	141	153	2	1%	✓	-40	-21%	✓	0.17	✓	3.04	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A4087 SB	To	A4087 SB	141	182	142	192	1	1%	✓	10	5%	✓	0.08	✓	0.73	✓
A4087 NB	To	A55 WB	2	2	48	51	46	2,300 %	✓	49	2450 %	✓	9.20	×	9.52	×
A4087 NB	To	A4087 NB	402	461	338	383	-64	-16%	✓	-78	-17%	✓	3.33	✓	3.80	✓
A4087 NB	To	A4087 SB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A55 EB	To	A4087 NB	253	300	183	227	-70	-28%	✓	-73	-24%	✓	4.74	✓	4.50	✓
A55 EB	To	A55 EB	728	969	883	1,150	155	21%	×	181	19%	×	5.46	×	5.56	×
A55 WB	To	A55 WB	836	1,090	788	1,052	-48	-6%	✓	-38	-3%	✓	1.68	✓	1.16	✓
A4087	To	A55 WB	143	197	188	203	45	31%	✓	6	3%	✓	3.50	✓	0.42	✓
A55 WB	To	A487 SB	38	42	37	40	-1	-3%	✓	-2	-5%	✓	0.16	✓	0.31	✓
A55 WB	To	No name WB	208	228	167	183	-41	-20%	✓	-45	-20%	✓	2.99	✓	3.14	✓
A55 WB	To	A487 NB	274	305	249	277	-25	-9%	✓	-28	-9%	✓	1.55	✓	1.64	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 SB	To	A487 SB	402	492	419	507	17	4%	✓	15	3%	✓	0.84	✓	0.67	✓
A487 SB	To	No name WB	314	328	282	295	-32	-10%	✓	-33	-10%	✓	1.85	✓	1.87	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	A55 WB	147	166	114	125	-33	-22%	✓	-41	-25%	✓	2.89	✓	3.40	✓
No name EB	To	A487 SB	17	26	33	43	16	94%	✓	17	65%	✓	3.20	✓	2.89	✓
No name EB	To	A487 NB	64	86	71	96	7	11%	✓	10	12%	✓	0.85	✓	1.05	✓
No name EB	To	A55 WB	19	27	9	13	-10	-53%	✓	-14	-52%	✓	2.67	✓	3.13	✓
A487 NB	To	No name WB	192	209	257	275	65	34%	✓	66	32%	✓	4.34	✓	4.24	✓
A487 NB	To	A487 NB	298	357	313	388	15	5%	✓	31	9%	✓	0.86	✓	1.61	✓
A487 NB	To	A55 WB	327	421	314	394	-13	-4%	✓	-27	-6%	✓	0.73	✓	1.34	✓
A 487	To	A55 EB	353	439	312	404	-41	-12%	✓	-35	-8%	✓	2.25	✓	1.70	✓
A55 EB	To	A55 EB	628	830	751	972	123	20%	×	142	17%	×	4.68	✓	4.73	✓
A487 NB	To	A55 EB	163	221	154	218	-9	-6%	✓	-3	-1%	✓	0.71	✓	0.20	✓
A487 NB	To	A487 NB	295	334	282	328	-13	-4%	✓	-6	-2%	✓	0.77	✓	0.33	✓
A487 NB	To	No name EB	191	206	198	213	7	4%	✓	7	3%	✓	0.50	✓	0.48	✓
A55 EB	To	A487 SB	518	600	443	513	-75	-14%	✓	-87	-15%	✓	3.42	✓	3.69	✓
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A487 NB	161	170	145	158	-16	-10%	✓	-12	-7%	✓	1.29	✓	0.94	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	199	206	140	147	-59	-30%	✓	-59	-29%	✓	4.53	✓	4.44	✓
A487 SB	To	A487 SB	164	190	194	225	30	18%	✓	35	18%	✓	2.24	✓	2.43	✓
A487 SB	To	A55 EB	79	90	83	93	4	5%	✓	3	3%	✓	0.44	✓	0.31	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	No name EB	11	12	17	17	6	55%	✓	5	42%	✓	1.60	✓	1.31	✓
No name WB	To	A487 SB	187	202	176	189	-11	-6%	✓	-13	-6%	✓	0.82	✓	0.93	✓
No name WB	To	A55 EB	111	128	74	91	-37	-33%	✓	-37	-29%	✓	3.85	✓	3.54	✓
No name WB	To	A487 NB	74	84	91	102	17	23%	✓	18	21%	✓	1.87	✓	1.87	✓
A55 WB	To	A55 WB	458	711	519	751	61	13%	✓	40	6%	✓	2.76	✓	1.48	✓
A487	To	A55 WB	494	615	439	536	-55	-11%	✓	-79	-13%	✓	2.55	✓	3.29	✓
A55 EB	To	A487	878	976	733	822	-145	-17%	×	-154	-16%	×	5.11	×	5.14	×
A55 EB	To	A55 EB	628	830	749	969	121	19%	×	139	17%	×	4.61	✓	4.63	✓
A55 WB	To	A5 EB	78	113	117	153	39	50%	✓	40	35%	✓	3.95	✓	3.47	✓
A55 WB	To	A5 WB	102	147	53	82	-49	-48%	✓	-65	-44%	✓	5.57	×	6.07	×
A5 WB	To	A55 EB	92	108	142	161	50	54%	✓	53	49%	✓	4.62	✓	4.57	✓
A5 WB	To	A5 WB	72	87	50	63	-22	-31%	✓	-24	-28%	✓	2.82	✓	2.77	✓
A5 EB	To	A5 EB	198	230	226	243	28	14%	✓	13	6%	✓	1.92	✓	0.85	✓
A55 WB	To	A5	180	260	170	238	-10	-6%	✓	-22	-8%	✓	0.76	✓	1.39	✓
A55 WB	To	A55 WB	771	1,065	787	1,054	16	2%	✓	-11	-1%	✓	0.57	✓	0.34	✓
A55 WB	To	A5025	163	235	120	145	-43	-26%	✓	-90	-38%	✓	3.61	✓	6.53	×
A55 WB	To	A55 WB	608	830	669	912	61	10%	✓	82	10%	✓	2.41	✓	2.78	✓
A55 WB	To	A5025 NB	135	198	105	127	-30	-22%	✓	-71	-36%	✓	2.74	✓	5.57	×
A55 WB	To	A5025 SB	28	37	15	17	-13	-46%	✓	-20	-54%	✓	2.80	✓	3.85	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5025 NB	To	A5025 NB	126	150	109	131	-17	-13%	✓	-19	-13%	✓	1.57	✓	1.60	✓
A5025 NB	To	A55 WB	60	71	15	15	-45	-75%	✓	-56	-79%	✓	7.35	×	8.54	×
A5025 SB	To	A5025 SB	132	142	95	115	-37	-28%	✓	-27	-19%	✓	3.47	✓	2.38	✓
A5025 SB	To	A55 EB	220	262	163	216	-57	-26%	✓	-46	-18%	✓	4.12	✓	2.98	✓
A5025 SB	To	A55 WB	136	180	138	174	2	1%	✓	-6	-3%	✓	0.17	✓	0.45	✓
A55 EB	To	A5025 NB	188	232	176	225	-12	-6%	✓	-7	-3%	✓	0.89	✓	0.46	✓
A55 EB	To	A5025 SB	43	52	70	85	27	63%	✓	33	63%	✓	3.59	✓	3.99	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	2	4	0	0	-2	-100%	✓	-4	-100%	✓	2.00	✓	2.83	✓
A55 WB	To	A55 WB	458	711	519	751	61	13%	✓	40	6%	✓	2.76	✓	1.48	✓
A55 WB	To	A487	521	576	455	502	-66	-13%	✓	-74	-13%	✓	2.99	✓	3.19	✓
A55 EB	To	A55 EB	665	842	673	843	8	1%	✓	1	0%	✓	0.31	✓	0.03	✓
A 5025	To	A55 EB	259	307	245	307	-14	-5%	✓	0	0%	✓	0.88	✓	0.00	✓
A55 EB	To	A55 EB	924	1,149	927	1,162	3	0%	✓	13	1%	✓	0.10	✓	0.38	✓
A5	To	A55 EB	582	657	569	642	-13	-2%	✓	-15	-2%	✓	0.54	✓	0.59	✓
A55 WB	To	A55 WB	608	830	667	912	59	10%	✓	82	10%	✓	2.34	✓	2.78	✓
A5025	To	A55 WB	196	251	151	187	-45	-23%	✓	-64	-25%	✓	3.42	✓	4.32	✓
A55 EB	To	A55 EB (off/on)	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A55 EB	To	A5152 NB	2	3	2	5	0	0%	✓	2	67%	✓	0.00	✓	1.00	✓
A55 EB	To	A5152 SB	97	118	97	127	0	0%	✓	9	8%	✓	0.00	✓	0.81	✓
A5152 NB	To	A55 WB	70	79	46	54	-24	-34%	✓	-25	-32%	✓	3.15	✓	3.07	✓
A5152 NB	To	A55 EB	83	137	232	323	149	180%	×	186	136%	×	11.87	×	12.26	×
A5152 NB	To	A5152 NB	3	3	1	1	-2	-67%	✓	-2	-67%	✓	1.41	✓	1.41	✓
A5152 SB	To	A55 WB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A5152 SB	To	A55 EB	6	9	7	7	1	17%	✓	-2	-22%	✓	0.39	✓	0.71	✓
A5152 SB	To	A5152 SB	107	108	104	133	-3	-3%	✓	25	23%	✓	0.29	✓	2.28	✓
A55 WB	To	A55 WB (off/on)	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 WB	To	A5152 NB	0	1	1	1	1	0%	✓	0	0%	✓	1.41	✓	0.00	✓
A55 WB	To	A5152 SB	88	160	65	104	-23	-26%	✓	-56	-35%	✓	2.63	✓	4.87	✓
A55 EB	To	A55 EB	574	693	651	788	77	13%	✓	95	14%	✓	3.11	✓	3.49	✓
A55 EB	To	A5152	101	123	100	132	-1	-1%	✓	9	7%	✓	0.10	✓	0.80	✓
A5152	To	A55 WB	70	81	47	56	-23	-33%	✓	-25	-31%	✓	3.01	✓	3.02	✓
A55 WB	To	A55 WB	716	918	712	950	-4	-1%	✓	32	3%	✓	0.15	✓	1.05	✓
A55 EB	To	A55 EB	574	693	653	791	79	14%	✓	98	14%	✓	3.19	✓	3.60	✓
A5152	To	A55 EB	91	149	239	331	148	163%	×	182	122%	×	11.52	×	11.75	×
A55 WB	To	A55 WB	716	918	712	949	-4	-1%	✓	31	3%	✓	0.15	✓	1.01	✓
A55 WB	To	A5152	88	163	68	107	-20	-23%	✓	-56	-34%	✓	2.26	✓	4.82	✓
A5 EB	To	A5 WB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A5 EB	To	B5420 WB	78	90	117	120	39	50%	✓	30	33%	✓	3.95	✓	2.93	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	142	161	256	279	114	80%	×	118	73%	×	8.08	×	7.96	×
A5 EB	To	B5420 EB	63	83	58	72	-5	-8%	✓	-11	-13%	✓	0.64	✓	1.25	✓
B5420 EB	To	A5 WB	56	62	126	147	70	125%	✓	85	137%	✓	7.34	×	8.31	×
B5420 EB	To	B5420 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
B5420 EB	To	A5 EB	529	571	430	469	-99	-19%	✓	-102	-18%	×	4.52	✓	4.47	✓
B5420 EB	To	B5420 EB	35	51	37	52	2	6%	✓	1	2%	✓	0.33	✓	0.14	✓
A5 WB	To	A5 WB	55	64	35	37	-20	-36%	✓	-27	-42%	✓	2.98	✓	3.80	✓
A5 WB	To	B5420 WB	178	202	231	261	53	30%	✓	59	29%	✓	3.71	✓	3.88	✓
A5 WB	To	A5 EB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A5 WB	To	B5420 EB	18	24	34	42	16	89%	✓	18	75%	✓	3.14	✓	3.13	✓
B5420 WB	To	A5 WB	47	62	28	40	-19	-40%	✓	-22	-35%	✓	3.10	✓	3.08	✓
B5420 WB	To	B5420 WB	85	95	102	109	17	20%	✓	14	15%	✓	1.76	✓	1.39	✓
B5420 WB	To	A5 EB	19	22	16	16	-3	-16%	✓	-6	-27%	✓	0.72	✓	1.38	✓
B5420 WB	To	B5420 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5 EB	619	664	569	611	-50	-8%	✓	-53	-8%	✓	2.05	✓	2.10	✓
A5 EB	To	A5 WB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A5 EB	To	A545 NB	15	20	53	63	38	253%	✓	43	215%	✓	6.52	×	6.67	×
A5 EB	To	New Street SB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A545 SB	To	A5 EB	295	322	344	368	49	17%	✓	46	14%	✓	2.74	✓	2.48	✓
A545 SB	To	A5 WB	28	36	30	35	2	7%	✓	-1	-3%	✓	0.37	✓	0.17	✓
A545 SB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	215	236	276	314	61	28%	✓	78	33%	✓	3.89	✓	4.70	✓
A5 WB	To	A545 NB	88	112	56	70	-32	-36%	✓	-42	-38%	✓	3.77	✓	4.40	✓
A5 WB	To	New Street SB	2	3	0	0	-2	-100%	✓	-3	-100%	✓	2.00	✓	2.45	✓
New Street NB	To	A5 EB	90	90	98	98	8	9%	✓	8	9%	✓	0.83	✓	0.83	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	269	290	295	323	26	10%	✓	33	11%	✓	1.55	✓	1.88	✓
A487 NB	To	A5 WB	127	149	155	187	28	22%	✓	38	26%	✓	2.36	✓	2.93	✓
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	402	428	278	310	-124	-31%	×	-118	-28%	×	6.72	×	6.14	×
A5 EB	To	A5 EB	504	546	706	738	202	40%	×	192	35%	×	8.21	×	7.58	×
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A487 SB	92	104	85	95	-7	-8%	✓	-9	-9%	✓	0.74	✓	0.90	✓
A5 WB	To	A5 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	181	205	188	206	7	4%	✓	1	0%	✓	0.52	✓	0.07	✓
A5 WB	To	No name NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
No name SB	To	A487 SB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
No name SB	To	A5 EB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
No name SB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	3	8	0	0	-3	-100%	✓	-8	-100%	✓	2.45	✓	4.00	✓
A4087 WB	To	A487 SB	243	351	236	348	-7	-3%	✓	-3	-1%	✓	0.45	✓	0.16	✓
A4087 WB	To	B4547 WB	45	60	45	60	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	A4087 EB	6	7	0	0	-6	-100%	✓	-7	-100%	✓	3.46	✓	3.74	✓
A487 SB	To	A487 SB	406	491	345	420	-61	-15%	✓	-71	-14%	✓	3.15	✓	3.33	✓
A487 SB	To	B4547 WB	147	172	105	125	-42	-29%	✓	-47	-27%	✓	3.74	✓	3.86	✓
B4547 EB	To	A4087 EB	160	179	190	208	30	19%	✓	29	16%	✓	2.27	✓	2.08	✓
B4547 EB	To	A487 NB	452	508	345	393	-107	-24%	×	-115	-23%	×	5.36	×	5.42	×
B4547 EB	To	A487 SB	2	2	3	3	1	50%	✓	1	50%	✓	0.63	✓	0.63	✓
A487 NB	To	A4087 EB	235	259	191	210	-44	-19%	✓	-49	-19%	✓	3.01	✓	3.20	✓
A487 NB	To	A487 NB	663	782	542	648	-121	-18%	×	-134	-17%	×	4.93	✓	5.01	×
A487 NB	To	B4547 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	129	156	59	64	-70	-54%	✓	-92	-59%	✓	7.22	×	8.77	×
A5 WB	To	A4081	95	134	73	109	-22	-23%	✓	-25	-19%	✓	2.40	✓	2.27	✓
A4080	To	A5 WB	23	23	21	21	-2	-9%	✓	-2	-9%	✓	0.43	✓	0.43	✓
A4081	To	A5 EB	179	201	147	169	-32	-18%	✓	-32	-16%	✓	2.51	✓	2.35	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	9	11	0	0	-9	-100%	✓	-11	-100%	✓	4.24	✓	4.69	✓
A5 EB	To	A5 EB	365	421	379	404	14	4%	✓	-17	-4%	✓	0.73	✓	0.84	✓
Lon Graig SB	To	A5 WB	50	57	28	36	-22	-44%	✓	-21	-37%	✓	3.52	✓	3.08	✓
Lon Graig SB	To	A5 EB	50	52	35	42	-15	-30%	✓	-10	-19%	✓	2.30	✓	1.46	✓
A5 WB	To	Lon Graig NB	20	20	14	14	-6	-30%	✓	-6	-30%	✓	1.46	✓	1.46	✓
A5 WB	To	A5 WB	174	233	104	138	-70	-40%	✓	-95	-41%	✓	5.94	×	6.98	×
A5 EB	To	Lon Graig NB	39	52	54	60	15	38%	✓	8	15%	✓	2.20	✓	1.07	✓
A5 EB	To	A5 EB	505	570	474	513	-31	-6%	✓	-57	-10%	✓	1.40	✓	2.45	✓
A5 EB	To	A5 EB	158	196	60	64	-98	-62%	✓	-132	-67%	×	9.39	×	11.58	×
A5 EB	To	A5 WB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A5 EB	To	A5152 NB	109	166	193	278	84	77%	✓	112	67%	×	6.84	×	7.52	×
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	55	77	49	55	-6	-11%	✓	-22	-29%	✓	0.83	✓	2.71	✓
A5 WB	To	A5152 NB	48	52	18	18	-30	-63%	✓	-34	-65%	✓	5.22	×	5.75	×
A5152 SB	To	A5 EB	85	100	63	72	-22	-26%	✓	-28	-28%	✓	2.56	✓	3.02	✓
A5152 SB	To	A5 WB	112	188	149	241	37	33%	✓	53	28%	✓	3.24	✓	3.62	✓
A5152 SB	To	A5152 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 EB	To	A55 EB	639	842	757	977	118	18%	×	135	16%	×	4.47	✓	4.48	✓
A55 WB	To	A55 WB	767	1,050	715	1,002	-52	-7%	✓	-48	-5%	✓	1.91	✓	1.50	✓
									93%			92%		91%		89%

Table C-4 Turning count calibration results for PM hour 15:00-16:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	129	165	204	244	75	58%	✓	79	48%	✓	5.81	×	5.52	×
A55 EB	To	A55 EB	418	579	425	587	7	2%	✓	8	1%	✓	0.34	✓	0.33	✓
A5	To	A55 EB	159	214	158	212	-1	-1%	✓	-2	-1%	✓	0.08	✓	0.14	✓
A55 WB	To	A5	159	213	158	206	-1	-1%	✓	-7	-3%	✓	0.08	✓	0.48	✓
A55 WB	To	A55 WB	490	604	475	585	-15	-3%	✓	-19	-3%	✓	0.68	✓	0.78	✓
A55 WB	To	A5 WB	56	75	58	76	2	4%	✓	1	1%	✓	0.26	✓	0.12	✓
A55 WB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A5 EB	102	137	102	133	0	0%	✓	-4	-3%	✓	0.00	✓	0.34	✓
A5 EB	To	A55 EB	51	63	51	62	0	0%	✓	-1	-2%	✓	0.00	✓	0.13	✓
A5 EB	To	A5 EB	381	467	378	462	-3	-1%	✓	-5	-1%	✓	0.15	✓	0.23	✓
A55 EB	To	A55 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A5 WB	98	145	83	126	-15	-15%	✓	-19	-13%	✓	1.58	✓	1.63	✓
A55 EB	To	A5 EB	281	336	276	329	-5	-2%	✓	-7	-2%	✓	0.30	✓	0.38	✓
A5 WB	To	A5 WB	265	346	267	346	2	1%	✓	0	0%	✓	0.12	✓	0.00	✓
A5 WB	To	A55 WB	204	251	200	248	-4	-2%	✓	-3	-1%	✓	0.28	✓	0.19	✓
A5	To	A55 WB	351	430	346	425	-5	-1%	✓	-5	-1%	✓	0.27	✓	0.24	✓
A55 EB	To	A5	380	482	358	455	-22	-6%	✓	-27	-6%	✓	1.15	✓	1.25	✓
A55 EB	To	A55 EB	466	637	450	612	-16	-3%	✓	-25	-4%	✓	0.75	✓	1.00	✓
A4087 SB	To	A55 EB	211	247	174	197	-37	-18%	✓	-50	-20%	✓	2.67	✓	3.36	✓
A55 EB	To	A55 EB	635	872	640	878	5	1%	✓	6	1%	✓	0.20	✓	0.20	✓
A55 WB	To	A4087	322	384	333	395	11	3%	✓	11	3%	✓	0.61	✓	0.56	✓
A55 WB	To	A55 WB	519	650	488	612	-31	-6%	✓	-38	-6%	✓	1.38	✓	1.51	✓
A55 EB	To	A4087 NB	231	264	253	286	22	10%	✓	22	8%	✓	1.41	✓	1.33	✓
A4087 NB	To	A4087 NB	458	524	395	442	-63	-14%	✓	-82	-16%	✓	3.05	✓	3.73	✓
A4087 SB	To	A55 EB	211	247	175	198	-36	-17%	✓	-49	-20%	✓	2.59	✓	3.28	✓
A4087 SB	To	A4087 SB	722	779	728	786	6	1%	✓	7	1%	✓	0.22	✓	0.25	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A4087 NB	182	213	181	210	-1	-1%	✓	-3	-1%	✓	0.07	✓	0.21	✓
A55 WB	To	A4087 SB	139	170	156	188	17	12%	✓	18	11%	✓	1.40	✓	1.35	✓
A4087 SB	To	A55 WB	373	396	347	370	-26	-7%	✓	-26	-7%	✓	1.37	✓	1.33	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A4087 SB	To	A4087 SB	349	382	380	414	31	9%	✓	32	8%	✓	1.62	✓	1.60	✓
A4087 NB	To	A55 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A4087 NB	To	A4087 NB	276	311	213	230	-63	-23%	✓	-81	-26%	✓	4.03	✓	4.92	✓
A4087 NB	To	A4087 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A4087 NB	231	264	251	285	20	9%	✓	21	8%	✓	1.29	✓	1.27	✓
A55 EB	To	A55 EB	635	872	642	880	7	1%	✓	8	1%	✓	0.28	✓	0.27	✓
A55 WB	To	A55 WB	519	650	490	614	-29	-6%	✓	-36	-6%	✓	1.29	✓	1.43	✓
A4087	To	A55 WB	375	398	347	369	-28	-7%	✓	-29	-7%	✓	1.47	✓	1.48	✓
A55 WB	To	A487 SB	25	27	30	32	5	20%	✓	5	19%	✓	0.95	✓	0.92	✓
A55 WB	To	No name WB	35	46	41	52	6	17%	✓	6	13%	✓	0.97	✓	0.86	✓
A55 WB	To	A487 NB	177	189	95	104	-82	-46%	✓	-85	-45%	✓	7.03	×	7.02	×
A55 WB	To	A55 WB (off/on)	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A487 SB	To	A487 SB	294	386	370	460	76	26%	✓	74	19%	✓	4.17	✓	3.60	✓
A487 SB	To	No name WB	59	69	57	63	-2	-3%	✓	-6	-9%	✓	0.26	✓	0.74	✓
A487 SB	To	A487 NB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A487 SB	To	A55 WB	211	236	176	195	-35	-17%	✓	-41	-17%	✓	2.52	✓	2.79	✓
No name EB	To	A487 SB	67	77	83	92	16	24%	✓	15	19%	✓	1.85	✓	1.63	✓
No name EB	To	A487 NB	111	126	135	150	24	22%	✓	24	19%	✓	2.16	✓	2.04	✓
No name EB	To	A55 WB	56	63	35	39	-21	-38%	✓	-24	-38%	✓	3.11	✓	3.36	✓
A487 NB	To	No name WB	18	26	23	34	5	28%	✓	8	31%	✓	1.10	✓	1.46	✓
A487 NB	To	A487 NB	196	273	283	383	87	44%	✓	110	40%	×	5.62	×	6.07	×
A487 NB	To	A55 WB	229	289	246	307	17	7%	✓	18	6%	✓	1.10	✓	1.04	✓
A 487	To	A55 EB	430	526	458	561	28	7%	✓	35	7%	✓	1.33	✓	1.50	✓
A55 EB	To	A55 EB	436	610	441	610	5	1%	✓	0	0%	✓	0.24	✓	0.00	✓
A487 NB	To	A55 EB	186	257	231	317	45	24%	✓	60	23%	✓	3.12	✓	3.54	✓
A487 NB	To	A487 NB	173	198	133	161	-40	-23%	✓	-37	-19%	✓	3.23	✓	2.76	✓
A487 NB	To	No name EB	131	142	150	162	19	15%	✓	20	14%	✓	1.60	✓	1.62	✓
A55 EB	To	A487 SB	202	280	176	237	-26	-13%	✓	-43	-15%	✓	1.89	✓	2.67	✓
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A487 NB	71	77	93	103	22	31%	✓	26	34%	✓	2.43	✓	2.74	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	94	107	84	95	-10	-11%	✓	-12	-11%	✓	1.06	✓	1.19	✓
A487 SB	To	A487 SB	147	176	201	237	54	37%	✓	61	35%	✓	4.09	✓	4.24	✓
A487 SB	To	A55 EB	91	106	67	74	-24	-26%	✓	-32	-30%	✓	2.70	✓	3.37	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	No name EB	28	30	37	40	9	32%	✓	10	33%	✓	1.58	✓	1.69	✓
No name WB	To	A487 SB	224	241	228	248	4	2%	✓	7	3%	✓	0.27	✓	0.45	✓
No name WB	To	A55 EB	153	163	159	169	6	4%	✓	6	4%	✓	0.48	✓	0.47	✓
No name WB	To	A487 NB	90	99	93	101	3	3%	✓	2	2%	✓	0.31	✓	0.20	✓
A55 WB	To	A55 WB	657	785	673	800	16	2%	✓	15	2%	✓	0.62	✓	0.53	✓
A487	To	A55 WB	496	589	457	544	-39	-8%	✓	-45	-8%	✓	1.79	✓	1.89	✓
A55 EB	To	A487	367	464	354	439	-13	-4%	✓	-25	-5%	✓	0.68	✓	1.18	✓
A55 EB	To	A55 EB	436	610	441	608	5	1%	✓	-2	0%	✓	0.24	✓	0.08	✓
A55 WB	To	A5 EB	116	131	162	170	46	40%	✓	39	30%	✓	3.90	✓	3.18	✓
A55 WB	To	A5 WB	137	157	96	113	-41	-30%	✓	-44	-28%	✓	3.80	✓	3.79	✓
A5 WB	To	A55 EB	69	88	113	123	44	64%	✓	35	40%	✓	4.61	✓	3.41	✓
A5 WB	To	A5 WB	165	192	117	139	-48	-29%	✓	-53	-28%	✓	4.04	✓	4.12	✓
A5 EB	To	A55 EB	147	163	104	110	-43	-29%	✓	-53	-33%	✓	3.84	✓	4.54	✓
A55 WB	To	A5	256	292	257	279	1	0%	✓	-13	-4%	✓	0.06	✓	0.77	✓
A55 WB	To	A55 WB	897	1,081	872	1,059	-25	-3%	✓	-22	-2%	✓	0.84	✓	0.67	✓
A55 WB	To	A5025	279	315	258	286	-21	-8%	✓	-29	-9%	✓	1.28	✓	1.67	✓
A55 WB	To	A55 WB	618	766	614	775	-4	-1%	✓	9	1%	✓	0.16	✓	0.32	✓
A55 WB	To	A5025 NB	218	245	232	258	14	6%	✓	13	5%	✓	0.93	✓	0.82	✓
A55 WB	To	A5025 SB	61	69	26	27	-35	-57%	✓	-42	-61%	✓	5.31	×	6.06	×
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5025 NB	To	A5025 NB	152	177	277	310	125	82%	×	133	75%	×	8.53	×	8.52	×
A5025 NB	To	A55 WB	23	25	2	2	-21	-91%	✓	-23	-92%	✓	5.94	×	6.26	×
A5025 SB	To	A5025 SB	96	109	114	126	18	19%	✓	17	16%	✓	1.76	✓	1.57	✓
A5025 SB	To	A55 EB	149	197	93	134	-56	-38%	✓	-63	-32%	✓	5.09	×	4.90	✓
A5025 SB	To	A55 WB	154	184	225	258	71	46%	✓	74	40%	✓	5.16	×	4.98	✓
A55 EB	To	A5025 NB	115	146	131	166	16	14%	✓	20	14%	✓	1.44	✓	1.60	✓
A55 EB	To	A5025 SB	14	18	73	78	59	421%	✓	60	333%	✓	8.95	×	8.66	×

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 WB	To	A55 WB	657	785	672	798	15	2%	✓	13	2%	✓	0.58	✓	0.46	✓
A55 WB	To	A487	237	263	175	198	-62	-26%	✓	-65	-25%	✓	4.32	✓	4.28	✓
A55 EB	To	A55 EB	418	579	428	591	10	2%	✓	12	2%	✓	0.49	✓	0.50	✓
A 5025	To	A55 EB	200	257	144	193	-56	-28%	✓	-64	-25%	✓	4.27	✓	4.27	✓
A55 EB	To	A55 EB	618	836	570	783	-48	-8%	✓	-53	-6%	✓	1.97	✓	1.86	✓
A5	To	A55 EB	185	238	231	272	46	25%	✓	34	14%	✓	3.19	✓	2.13	✓
A55 WB	To	A55 WB	618	766	613	773	-5	-1%	✓	7	1%	✓	0.20	✓	0.25	✓
A5025	To	A55 WB	177	210	227	260	50	28%	✓	50	24%	✓	3.52	✓	3.26	✓
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A5152 NB	2	2	2	2	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A5152 SB	81	96	61	76	-20	-25%	✓	-20	-21%	✓	2.37	✓	2.16	✓
A5152 NB	To	A55 WB	77	87	57	66	-20	-26%	✓	-21	-24%	✓	2.44	✓	2.40	✓
A5152 NB	To	A55 EB	100	143	234	301	134	134%	×	158	110%	×	10.37	×	10.60	×
A5152 NB	To	A5152 NB	2	3	1	1	-1	-50%	✓	-2	-67%	✓	0.82	✓	1.41	✓
A5152 SB	To	A55 WB	2	2	4	4	2	100%	✓	2	100%	✓	1.15	✓	1.15	✓
A5152 SB	To	A55 EB	4	4	2	2	-2	-50%	✓	-2	-50%	✓	1.15	✓	1.15	✓
A5152 SB	To	A5152 SB	102	103	61	77	-41	-40%	✓	-26	-25%	✓	4.54	✓	2.74	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5152 NB	2	2	1	1	-1	-50%	✓	-1	-50%	✓	0.82	✓	0.82	✓
A55 WB	To	A5152 SB	88	128	168	208	80	91%	✓	80	63%	✓	7.07	×	6.17	×
A55 EB	To	A55 EB	313	431	394	530	81	26%	✓	99	23%	✓	4.31	✓	4.52	✓
A55 EB	To	A5152	86	101	62	76	-24	-28%	✓	-25	-25%	✓	2.79	✓	2.66	✓
A5152	To	A55 WB	82	92	60	69	-22	-27%	✓	-23	-25%	✓	2.61	✓	2.56	✓
A55 WB	To	A55 WB	704	845	591	739	-113	-16%	×	-106	-13%	✓	4.44	✓	3.77	✓
A55 EB	To	A55 EB	313	431	392	530	79	25%	✓	99	23%	✓	4.21	✓	4.52	✓
A5152	To	A55 EB	105	148	237	305	132	126%	×	157	106%	×	10.09	×	10.43	×
A55 WB	To	A55 WB	704	845	593	739	-111	-16%	×	-106	-13%	✓	4.36	✓	3.77	✓
A55 WB	To	A5152	91	131	169	209	78	86%	✓	78	60%	✓	6.84	×	5.98	×
A5 EB	To	A5 WB	4	4	0	0	-4	-100%	✓	-4	-100%	✓	2.83	✓	2.83	✓
A5 EB	To	B5420 WB	59	65	97	101	38	64%	✓	36	55%	✓	4.30	✓	3.95	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	117	126	43	48	-74	-63%	✓	-78	-62%	✓	8.27	×	8.36	×
A5 EB	To	B5420 EB	108	118	77	77	-31	-29%	✓	-41	-35%	✓	3.22	✓	4.15	✓
B5420 EB	To	A5 WB	49	56	124	130	75	153%	✓	74	132%	✓	8.06	×	7.67	×
B5420 EB	To	B5420 WB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
B5420 EB	To	A5 EB	257	287	280	312	23	9%	✓	25	9%	✓	1.40	✓	1.44	✓
B5420 EB	To	B5420 EB	56	67	96	114	40	71%	✓	47	70%	✓	4.59	✓	4.94	✓
A5 WB	To	A5 WB	171	186	46	53	-125	-73%	×	-133	-72%	×	12.00	×	12.17	×
A5 WB	To	B5420 WB	326	353	368	401	42	13%	✓	48	14%	✓	2.25	✓	2.47	✓
A5 WB	To	A5 EB	9	10	0	0	-9	-100%	✓	-10	-100%	✓	4.24	✓	4.47	✓
A5 WB	To	B5420 EB	23	23	12	12	-11	-48%	✓	-11	-48%	✓	2.63	✓	2.63	✓
B5420 WB	To	A5 WB	79	97	56	68	-23	-29%	✓	-29	-30%	✓	2.80	✓	3.19	✓
B5420 WB	To	B5420 WB	88	105	116	134	28	32%	✓	29	28%	✓	2.77	✓	2.65	✓
B5420 WB	To	A5 EB	20	24	18	19	-2	-10%	✓	-5	-21%	✓	0.46	✓	1.08	✓
B5420 WB	To	B5420 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 EB	To	A5 EB	294	327	241	267	-53	-18%	✓	-60	-18%	✓	3.24	✓	3.48	✓
A5 EB	To	A5 WB	9	11	0	0	-9	-100%	✓	-11	-100%	✓	4.24	✓	4.69	✓
A5 EB	To	A545 NB	71	78	81	89	10	14%	✓	11	14%	✓	1.15	✓	1.20	✓
A5 EB	To	New Street SB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A545 SB	To	A5 EB	188	210	176	194	-12	-6%	✓	-16	-8%	✓	0.89	✓	1.13	✓
A545 SB	To	A5 WB	93	99	93	99	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A545 SB	To	A545 NB	3	3	0	0	-3	-100%	✓	-3	-100%	✓	2.45	✓	2.45	✓
A545 SB	To	New Street SB	4	4	0	0	-4	-100%	✓	-4	-100%	✓	2.83	✓	2.83	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	406	435	326	358	-80	-20%	✓	-77	-18%	✓	4.18	✓	3.87	✓
A5 WB	To	A545 NB	192	218	174	188	-18	-9%	✓	-30	-14%	✓	1.33	✓	2.11	✓
A5 WB	To	New Street SB	7	7	0	0	-7	-100%	✓	-7	-100%	✓	3.74	✓	3.74	✓
New Street NB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	3	4	0	0	-3	-100%	✓	-4	-100%	✓	2.45	✓	2.83	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	124	134	146	164	22	18%	✓	30	22%	✓	1.89	✓	2.46	✓
A487 NB	To	A5 WB	207	222	115	136	-92	-44%	✓	-86	-39%	✓	7.25	×	6.43	×
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	239	264	195	225	-44	-18%	✓	-39	-15%	✓	2.99	✓	2.49	✓
A5 EB	To	A5 EB	247	274	213	230	-34	-14%	✓	-44	-16%	✓	2.24	✓	2.77	✓
A5 EB	To	A5 WB	3	4	0	0	-3	-100%	✓	-4	-100%	✓	2.45	✓	2.83	✓
A5 EB	To	No name NB	4	4	2	2	-2	-50%	✓	-2	-50%	✓	1.15	✓	1.15	✓
A5 WB	To	A487 SB	138	151	128	141	-10	-7%	✓	-10	-7%	✓	0.87	✓	0.83	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	396	435	388	414	-8	-2%	✓	-21	-5%	✓	0.40	✓	1.02	✓
A5 WB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
No name SB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	8	9	6	6	-2	-25%	✓	-3	-33%	✓	0.76	✓	1.10	✓
A4087 WB	To	A487 SB	443	509	402	459	-41	-9%	✓	-50	-10%	✓	1.99	✓	2.27	✓
A4087 WB	To	B4547 WB	141	154	127	137	-14	-10%	✓	-17	-11%	✓	1.21	✓	1.41	✓
A487 SB	To	A4087 EB	41	45	4	4	-37	-90%	✓	-41	-91%	✓	7.80	×	8.28	×
A487 SB	To	A487 SB	366	434	278	342	-88	-24%	✓	-92	-21%	✓	4.90	✓	4.67	✓
A487 SB	To	B4547 WB	226	263	171	206	-55	-24%	✓	-57	-22%	✓	3.90	✓	3.72	✓
B4547 EB	To	A4087 EB	107	117	87	92	-20	-19%	✓	-25	-21%	✓	2.03	✓	2.45	✓
B4547 EB	To	A487 NB	182	210	144	170	-38	-21%	✓	-40	-19%	✓	2.98	✓	2.90	✓
B4547 EB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A4087 EB	145	187	117	124	-28	-19%	✓	-63	-34%	✓	2.45	✓	5.05	×
A487 NB	To	A487 NB	455	567	344	433	-111	-24%	×	-134	-24%	×	5.55	×	5.99	×
A487 NB	To	B4547 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	228	252	57	62	-171	-75%	×	-190	-75%	×	14.32	×	15.16	×
A5 WB	To	A4081	127	147	163	183	36	28%	✓	36	24%	✓	2.99	✓	2.80	✓
A4080	To	A5 WB	29	29	28	28	-1	-3%	✓	-1	-3%	✓	0.19	✓	0.19	✓
A4081	To	A5 EB	160	183	155	174	-5	-3%	✓	-9	-5%	✓	0.40	✓	0.67	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	37	39	0	0	-37	-100%	✓	-39	-100%	✓	8.60	×	8.83	×
A5 EB	To	A5 EB	230	257	111	115	-119	-52%	×	-142	-55%	×	9.11	×	10.41	×
Lon Graig SB	To	A5 WB	34	38	59	63	25	74%	✓	25	66%	✓	3.67	✓	3.52	✓
Lon Graig SB	To	A5 EB	1	1	29	30	28	2,800 %	✓	29	2900 %	✓	7.23	×	7.37	×
A5 WB	To	Lon Graig NB	3	3	1	1	-2	-67%	✓	-2	-67%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	321	361	162	184	-159	-50%	×	-177	-49%	×	10.23	×	10.72	×
A5 EB	To	Lon Graig NB	66	75	58	65	-8	-12%	✓	-10	-13%	✓	1.02	✓	1.20	✓
A5 EB	To	A5 EB	324	365	208	223	-116	-36%	×	-142	-39%	×	7.11	×	8.28	×
A5 EB	To	A5 EB	81	101	0	3	-81	-100%	✓	-98	-97%	✓	12.73	×	13.59	×
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5152 NB	120	163	208	268	88	73%	✓	105	64%	×	6.87	×	7.15	×
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	104	124	30	36	-74	-71%	✓	-88	-71%	✓	9.04	×	9.84	×
A5 WB	To	A5152 NB	69	76	22	22	-47	-68%	✓	-54	-71%	✓	6.97	×	7.71	×
A5152 SB	To	A5 EB	68	76	4	8	-64	-94%	✓	-68	-89%	✓	10.67	×	10.49	×
A5152 SB	To	A5 WB	107	156	178	239	71	66%	✓	83	53%	✓	5.95	×	5.91	×
A5152 SB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	466	637	449	610	-17	-4%	✓	-27	-4%	✓	0.79	✓	1.08	✓
A55 WB	To	A55 WB	490	604	473	584	-17	-3%	✓	-20	-3%	✓	0.77	✓	0.82	✓
									95%			95%		85%		85%

Table C-5 Turning count calibration results for PM hour 16:00-17:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	168	203	231	277	63	38%	✓	74	36%	✓	4.46	✓	4.78	✓
A55 EB	To	A55 EB	574	780	554	743	-20	-3%	✓	-37	-5%	✓	0.84	✓	1.34	✓
A5	To	A55 EB	214	255	211	248	-3	-1%	✓	-7	-3%	✓	0.21	✓	0.44	✓
A55 WB	To	A5	193	241	191	235	-2	-1%	✓	-6	-2%	✓	0.14	✓	0.39	✓
A55 WB	To	A55 WB	527	655	546	652	19	4%	✓	-3	0%	✓	0.82	✓	0.12	✓
A55 WB	To	A5 WB	53	62	50	58	-3	-6%	✓	-4	-6%	✓	0.42	✓	0.52	✓
A55 WB	To	A5 WB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A55 WB	To	A5 EB	141	179	142	179	1	1%	✓	0	0%	✓	0.08	✓	0.00	✓
A5 EB	To	A55 EB	57	72	57	73	0	0%	✓	1	1%	✓	0.00	✓	0.12	✓
A5 EB	To	A5 EB	409	484	409	484	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A5 WB	92	126	92	132	0	0%	✓	6	5%	✓	0.00	✓	0.53	✓
A55 EB	To	A5 EB	331	413	329	385	-2	-1%	✓	-28	-7%	✓	0.11	✓	1.40	✓
A5 WB	To	A5 WB	285	357	283	355	-2	-1%	✓	-2	-1%	✓	0.12	✓	0.11	✓
A5 WB	To	A55 WB	215	268	212	262	-3	-1%	✓	-6	-2%	✓	0.21	✓	0.37	✓
A5	To	A55 WB	357	436	354	430	-3	-1%	✓	-6	-1%	✓	0.16	✓	0.29	✓
A55 EB	To	A5	424	540	420	516	-4	-1%	✓	-24	-4%	✓	0.19	✓	1.04	✓
A55 EB	To	A55 EB	708	892	642	834	-66	-9%	✓	-58	-7%	✓	2.54	✓	1.97	✓
A4087 SB	To	A55 EB	281	318	256	281	-25	-9%	✓	-37	-12%	✓	1.53	✓	2.14	✓
A55 EB	To	A55 EB	851	1,114	813	1,072	-38	-4%	✓	-42	-4%	✓	1.32	✓	1.27	✓
A55 WB	To	A4087	327	401	332	404	5	2%	✓	3	1%	✓	0.28	✓	0.15	✓
A55 WB	To	A55 WB	557	690	559	676	2	0%	✓	-14	-2%	✓	0.08	✓	0.54	✓
A55 EB	To	A4087 NB	294	316	318	341	24	8%	✓	25	8%	✓	1.37	✓	1.38	✓
A4087 NB	To	A4087 NB	403	480	399	463	-4	-1%	✓	-17	-4%	✓	0.20	✓	0.78	✓
A4087 SB	To	A55 EB	281	318	254	279	-27	-10%	✓	-39	-12%	✓	1.65	✓	2.26	✓
A4087 SB	To	A4087 SB	728	809	756	834	28	4%	✓	25	3%	✓	1.03	✓	0.87	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A4087 NB	173	201	171	201	-2	-1%	✓	0	0%	✓	0.15	✓	0.00	✓
A55 WB	To	A4087 SB	154	200	162	206	8	5%	✓	6	3%	✓	0.64	✓	0.42	✓
A4087 SB	To	A55 WB	356	390	355	385	-1	0%	✓	-5	-1%	✓	0.05	✓	0.25	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 SB	To	A4087 SB	372	419	400	449	28	8%	✓	30	7%	✓	1.43	✓	1.44	✓
A4087 NB	To	A55 WB	4	4	3	3	-1	-25%	✓	-1	-25%	✓	0.53	✓	0.53	✓
A4087 NB	To	A4087 NB	230	279	228	264	-2	-1%	✓	-15	-5%	✓	0.13	✓	0.91	✓
A4087 NB	To	A4087 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A4087 NB	294	316	318	340	24	8%	✓	24	8%	✓	1.37	✓	1.33	✓
A55 EB	To	A55 EB	851	1,114	814	1,072	-37	-4%	✓	-42	-4%	✓	1.28	✓	1.27	✓
A55 WB	To	A55 WB	557	690	557	674	0	0%	✓	-16	-2%	✓	0.00	✓	0.61	✓
A4087	To	A55 WB	360	394	357	388	-3	-1%	✓	-6	-2%	✓	0.16	✓	0.30	✓
A55 WB	To	A487 SB	16	24	17	27	1	6%	✓	3	13%	✓	0.25	✓	0.59	✓
A55 WB	To	No name WB	37	41	38	44	1	3%	✓	3	7%	✓	0.16	✓	0.46	✓
A55 WB	To	A487 NB	143	161	119	134	-24	-17%	✓	-27	-17%	✓	2.10	✓	2.22	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 SB	To	A487 SB	400	511	464	574	64	16%	✓	63	12%	✓	3.08	✓	2.70	✓
A487 SB	To	No name WB	52	63	50	61	-2	-4%	✓	-2	-3%	✓	0.28	✓	0.25	✓
A487 SB	To	A487 NB	3	5	0	0	-3	-100%	✓	-5	-100%	✓	2.45	✓	3.16	✓
A487 SB	To	A55 WB	224	245	180	196	-44	-20%	✓	-49	-20%	✓	3.10	✓	3.30	✓
No name EB	To	A487 SB	114	122	132	139	18	16%	✓	17	14%	✓	1.62	✓	1.49	✓
No name EB	To	A487 NB	218	231	201	218	-17	-8%	✓	-13	-6%	✓	1.17	✓	0.87	✓
No name EB	To	A55 WB	106	117	84	93	-22	-21%	✓	-24	-21%	✓	2.26	✓	2.34	✓
A487 NB	To	No name WB	24	30	26	36	2	8%	✓	6	20%	✓	0.40	✓	1.04	✓
A487 NB	To	A487 NB	231	289	364	448	133	58%	×	159	55%	×	7.71	×	8.28	×
A487 NB	To	A55 WB	332	407	364	427	32	10%	✓	20	5%	✓	1.72	✓	0.98	✓
A 487	To	A55 EB	541	625	551	643	10	2%	✓	18	3%	✓	0.43	✓	0.71	✓
A55 EB	To	A55 EB	604	805	583	774	-21	-3%	✓	-31	-4%	✓	0.86	✓	1.10	✓
A487 NB	To	A55 EB	246	295	247	305	1	0%	✓	10	3%	✓	0.06	✓	0.58	✓
A487 NB	To	A487 NB	253	278	329	369	76	30%	✓	91	33%	✓	4.46	✓	5.06	×
A487 NB	To	No name EB	98	113	106	122	8	8%	✓	9	8%	✓	0.79	✓	0.83	✓
A55 EB	To	A487 SB	270	364	228	306	-42	-16%	✓	-58	-16%	✓	2.66	✓	3.17	✓
A55 EB	To	A55 EB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A487 NB	54	64	84	100	30	56%	✓	36	56%	✓	3.61	✓	3.98	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	82	94	74	87	-8	-10%	✓	-7	-7%	✓	0.91	✓	0.74	✓
A487 SB	To	A487 SB	183	216	248	290	65	36%	✓	74	34%	✓	4.43	✓	4.65	✓
A487 SB	To	A55 EB	104	114	107	118	3	3%	✓	4	4%	✓	0.29	✓	0.37	✓
A487 SB	To	A487 NB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 SB	To	No name EB	18	20	22	25	4	22%	✓	5	25%	✓	0.89	✓	1.05	✓
No name WB	To	A487 SB	232	252	216	233	-16	-7%	✓	-19	-8%	✓	1.07	✓	1.22	✓
No name WB	To	A55 EB	191	216	196	218	5	3%	✓	2	1%	✓	0.36	✓	0.14	✓
No name WB	To	A487 NB	113	119	150	159	37	33%	✓	40	34%	✓	3.23	✓	3.39	✓
A55 WB	To	A55 WB	720	857	742	859	22	3%	✓	2	0%	✓	0.81	✓	0.07	✓
A487	To	A55 WB	673	780	630	716	-43	-6%	✓	-64	-8%	✓	1.68	✓	2.34	✓
A55 EB	To	A487	406	522	389	496	-17	-4%	✓	-26	-5%	✓	0.85	✓	1.15	✓
A55 EB	To	A55 EB	604	805	584	777	-20	-3%	✓	-28	-3%	✓	0.82	✓	1.00	✓
A55 WB	To	A5 EB	101	114	145	161	44	44%	✓	47	41%	✓	3.97	✓	4.01	✓
A55 WB	To	A5 WB	188	208	93	110	-95	-51%	✓	-98	-47%	✓	8.01	×	7.77	×
A5 WB	To	A55 EB	71	93	150	176	79	111%	✓	83	89%	✓	7.52	×	7.16	×
A5 WB	To	A5 WB	167	188	120	136	-47	-28%	✓	-52	-28%	✓	3.92	✓	4.09	✓
A5 EB	To	A55 EB	119	137	104	109	-15	-13%	✓	-28	-20%	✓	1.42	✓	2.52	✓
A55 WB	To	A5	293	327	237	269	-56	-19%	✓	-58	-18%	✓	3.44	✓	3.36	✓
A55 WB	To	A55 WB	1,099	1,309	1,128	1,299	29	3%	✓	-10	-1%	✓	0.87	✓	0.28	✓
A55 WB	To	A5025	349	392	273	305	-76	-22%	✓	-87	-22%	✓	4.31	✓	4.66	✓
A55 WB	To	A55 WB	750	917	854	991	104	14%	✓	74	8%	✓	3.67	✓	2.40	✓
A55 WB	To	A5025 NB	263	302	243	275	-20	-8%	✓	-27	-9%	✓	1.26	✓	1.59	✓
A55 WB	To	A5025 SB	86	90	28	28	-58	-67%	✓	-62	-69%	✓	7.68	×	8.07	×
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5025 NB	To	A5025 NB	126	138	292	328	166	132%	×	190	138%	×	11.48	×	12.45	×
A5025 NB	To	A55 WB	26	30	2	6	-24	-92%	✓	-24	-80%	✓	6.41	×	5.66	×
A5025 SB	To	A5025 SB	80	94	151	169	71	89%	✓	75	80%	✓	6.61	×	6.54	×
A5025 SB	To	A55 EB	164	216	85	129	-79	-48%	✓	-87	-40%	✓	7.08	×	6.62	×
A5025 SB	To	A55 WB	175	215	159	211	-16	-9%	✓	-4	-2%	✓	1.24	✓	0.27	✓
A55 EB	To	A5025 NB	139	170	120	154	-19	-14%	✓	-16	-9%	✓	1.67	✓	1.26	✓
A55 EB	To	A5025 SB	26	28	110	122	84	323%	✓	94	336%	✓	10.19	×	10.85	×

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	2	4	0	0	-2	-100%	✓	-4	-100%	✓	2.00	✓	2.83	✓
A55 WB	To	A55 WB	720	857	740	857	20	3%	✓	0	0%	✓	0.74	✓	0.00	✓
A55 WB	To	A487	197	227	174	203	-23	-12%	✓	-24	-11%	✓	1.69	✓	1.64	✓
A55 EB	To	A55 EB	574	780	552	750	-22	-4%	✓	-30	-4%	✓	0.93	✓	1.08	✓
A 5025	To	A55 EB	208	265	124	176	-84	-40%	✓	-89	-34%	✓	6.52	×	5.99	×
A55 EB	To	A55 EB	782	1,045	676	928	-106	-14%	✓	-117	-11%	✓	3.93	✓	3.73	✓
A5	To	A55 EB	228	282	298	349	70	31%	✓	67	24%	✓	4.32	✓	3.77	✓
A55 WB	To	A55 WB	750	917	852	990	102	14%	✓	73	8%	✓	3.60	✓	2.36	✓
A5025	To	A55 WB	202	247	161	216	-41	-20%	✓	-31	-13%	✓	3.04	✓	2.04	✓
A55 EB	To	A55 EB (off/on)	4	4	0	0	-4	-100%	✓	-4	-100%	✓	2.83	✓	2.83	✓
A55 EB	To	A5152 NB	2	2	1	1	-1	-50%	✓	-1	-50%	✓	0.82	✓	0.82	✓
A55 EB	To	A5152 SB	103	126	105	127	2	2%	✓	1	1%	✓	0.20	✓	0.09	✓
A5152 NB	To	A55 WB	70	83	56	64	-14	-20%	✓	-19	-23%	✓	1.76	✓	2.22	✓
A5152 NB	To	A55 EB	110	136	256	307	146	133%	×	171	126%	×	10.79	×	11.49	×
A5152 NB	To	A5152 NB	5	6	3	3	-2	-40%	✓	-3	-50%	✓	1.00	✓	1.41	✓
A5152 SB	To	A55 WB	1	1	4	4	3	300%	✓	3	300%	✓	1.90	✓	1.90	✓
A5152 SB	To	A55 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5152 SB	To	A5152 SB	104	104	107	129	3	3%	✓	25	24%	✓	0.29	✓	2.32	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 WB	To	A5152 NB	2	3	1	1	-1	-50%	✓	-2	-67%	✓	0.82	✓	1.41	✓
A55 WB	To	A5152 SB	144	189	127	179	-17	-12%	✓	-10	-5%	✓	1.46	✓	0.74	✓
A55 EB	To	A55 EB	460	640	535	734	75	16%	✓	94	15%	✓	3.36	✓	3.59	✓
A55 EB	To	A5152	111	134	107	128	-4	-4%	✓	-6	-4%	✓	0.38	✓	0.52	✓
A5152	To	A55 WB	73	86	59	67	-14	-19%	✓	-19	-22%	✓	1.72	✓	2.17	✓
A55 WB	To	A55 WB	806	972	794	933	-12	-1%	✓	-39	-4%	✓	0.42	✓	1.26	✓
A55 EB	To	A55 EB	460	640	534	731	74	16%	✓	91	14%	✓	3.32	✓	3.48	✓
A5152	To	A55 EB	114	140	255	307	141	124%	×	167	119%	×	10.38	×	11.17	×
A55 WB	To	A55 WB	806	972	792	931	-14	-2%	✓	-41	-4%	✓	0.50	✓	1.33	✓
A55 WB	To	A5152	146	192	127	178	-19	-13%	✓	-14	-7%	✓	1.63	✓	1.03	✓
A5 EB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 EB	To	B5420 WB	28	33	80	92	52	186%	✓	59	179%	✓	7.08	×	7.46	×

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	104	113	124	131	20	19%	✓	18	16%	✓	1.87	✓	1.63	✓
A5 EB	To	B5420 EB	92	105	60	68	-32	-35%	✓	-37	-35%	✓	3.67	✓	3.98	✓
B5420 EB	To	A5 WB	24	31	115	126	91	379%	✓	95	306%	✓	10.92	×	10.72	×
B5420 EB	To	B5420 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
B5420 EB	To	A5 EB	250	275	272	299	22	9%	✓	24	9%	✓	1.36	✓	1.42	✓
B5420 EB	To	B5420 EB	55	69	64	76	9	16%	✓	7	10%	✓	1.17	✓	0.82	✓
A5 WB	To	A5 WB	191	209	129	136	-62	-32%	✓	-73	-35%	✓	4.90	✓	5.56	×
A5 WB	To	B5420 WB	491	538	593	647	102	21%	×	109	20%	×	4.38	✓	4.48	✓
A5 WB	To	A5 EB	10	10	0	0	-10	-100%	✓	-10	-100%	✓	4.47	✓	4.47	✓
A5 WB	To	B5420 EB	41	45	66	72	25	61%	✓	27	60%	✓	3.42	✓	3.53	✓
B5420 WB	To	A5 WB	100	118	75	84	-25	-25%	✓	-34	-29%	✓	2.67	✓	3.38	✓
B5420 WB	To	B5420 WB	61	83	91	113	30	49%	✓	30	36%	✓	3.44	✓	3.03	✓
B5420 WB	To	A5 EB	31	32	17	17	-14	-45%	✓	-15	-47%	✓	2.86	✓	3.03	✓
B5420 WB	To	B5420 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 EB	To	A5 EB	316	347	303	335	-13	-4%	✓	-12	-3%	✓	0.74	✓	0.65	✓
A5 EB	To	A5 WB	6	7	0	0	-6	-100%	✓	-7	-100%	✓	3.46	✓	3.74	✓
A5 EB	To	A545 NB	76	80	102	105	26	34%	✓	25	31%	✓	2.76	✓	2.60	✓
A5 EB	To	New Street SB	9	9	0	0	-9	-100%	✓	-9	-100%	✓	4.24	✓	4.24	✓
A545 SB	To	A5 EB	195	228	191	222	-4	-2%	✓	-6	-3%	✓	0.29	✓	0.40	✓
A545 SB	To	A5 WB	78	85	80	84	2	3%	✓	-1	-1%	✓	0.23	✓	0.11	✓
A545 SB	To	A545 NB	4	4	0	0	-4	-100%	✓	-4	-100%	✓	2.83	✓	2.83	✓
A545 SB	To	New Street SB	3	3	0	0	-3	-100%	✓	-3	-100%	✓	2.45	✓	2.45	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	600	654	709	772	109	18%	×	118	18%	×	4.26	✓	4.42	✓
A5 WB	To	A545 NB	241	266	196	213	-45	-19%	✓	-53	-20%	✓	3.04	✓	3.42	✓
A5 WB	To	New Street SB	2	4	0	0	-2	-100%	✓	-4	-100%	✓	2.00	✓	2.83	✓
New Street NB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	148	166	164	182	16	11%	✓	16	10%	✓	1.28	✓	1.21	✓
A487 NB	To	A5 WB	350	388	408	450	58	17%	✓	62	16%	✓	2.98	✓	3.03	✓
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	274	305	268	303	-6	-2%	✓	-2	-1%	✓	0.36	✓	0.11	✓
A5 EB	To	A5 EB	246	280	217	243	-29	-12%	✓	-37	-13%	✓	1.91	✓	2.29	✓
A5 EB	To	A5 WB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
A5 EB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A487 SB	152	175	128	149	-24	-16%	✓	-26	-15%	✓	2.03	✓	2.04	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	500	541	506	544	6	1%	✓	3	1%	✓	0.27	✓	0.13	✓
A5 WB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	13	13	10	10	-3	-23%	✓	-3	-23%	✓	0.88	✓	0.88	✓
A4087 WB	To	A487 SB	438	502	397	460	-41	-9%	✓	-42	-8%	✓	2.01	✓	1.92	✓
A4087 WB	To	B4547 WB	193	213	171	189	-22	-11%	✓	-24	-11%	✓	1.63	✓	1.69	✓
A487 SB	To	A4087 EB	39	43	0	2	-39	-100%	✓	-41	-95%	✓	8.83	×	8.64	×
A487 SB	To	A487 SB	439	519	340	414	-99	-23%	✓	-105	-20%	×	5.02	×	4.86	✓
A487 SB	To	B4547 WB	337	385	252	293	-85	-25%	✓	-92	-24%	✓	4.95	✓	5.00	✓
B4547 EB	To	A4087 EB	111	129	69	81	-42	-38%	✓	-48	-37%	✓	4.43	✓	4.68	✓
B4547 EB	To	A487 NB	190	220	160	185	-30	-16%	✓	-35	-16%	✓	2.27	✓	2.46	✓
B4547 EB	To	A487 SB	1	3	0	0	-1	-100%	✓	-3	-100%	✓	1.41	✓	2.45	✓
A487 NB	To	A4087 EB	166	190	98	117	-68	-41%	✓	-73	-38%	✓	5.92	×	5.89	×
A487 NB	To	A487 NB	550	692	546	646	-4	-1%	✓	-46	-7%	✓	0.17	✓	1.78	✓
A487 NB	To	B4547 WB	4	4	0	0	-4	-100%	✓	-4	-100%	✓	2.83	✓	2.83	✓
A5 WB	To	A5 WB	241	276	71	80	-170	-71%	×	-196	-71%	×	13.61	×	14.69	×
A5 WB	To	A4081	152	176	158	182	6	4%	✓	6	3%	✓	0.48	✓	0.45	✓
A4080	To	A5 WB	32	34	32	35	0	0%	✓	1	3%	✓	0.00	✓	0.17	✓
A4081	To	A5 EB	149	177	147	173	-2	-1%	✓	-4	-2%	✓	0.16	✓	0.30	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	27	30	0	0	-27	-100%	✓	-30	-100%	✓	7.35	×	7.75	×
A5 EB	To	A5 EB	238	268	182	188	-56	-24%	✓	-80	-30%	✓	3.86	✓	5.30	×
Lon Graig SB	To	A5 WB	62	64	50	54	-12	-19%	✓	-10	-16%	✓	1.60	✓	1.30	✓
Lon Graig SB	To	A5 EB	3	3	65	72	62	2,067 %	✓	69	2300 %	✓	10.63	×	11.27	×
A5 WB	To	Lon Graig NB	1	1	1	5	0	0%	✓	4	400%	✓	0.00	✓	2.31	✓
A5 WB	To	A5 WB	361	418	178	209	-183	-51%	×	-209	-50%	×	11.15	×	11.80	×
A5 EB	To	Lon Graig NB	72	85	54	62	-18	-25%	✓	-23	-27%	✓	2.27	✓	2.68	✓
A5 EB	To	A5 EB	325	370	274	295	-51	-16%	✓	-75	-20%	✓	2.95	✓	4.11	✓
A5 EB	To	A5 EB	87	107	8	10	-79	-91%	✓	-97	-91%	✓	11.46	×	12.68	×
A5 EB	To	A5 WB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A5 EB	To	A5152 NB	131	163	212	259	81	62%	✓	96	59%	✓	6.19	×	6.61	×
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	112	143	37	50	-75	-67%	✓	-93	-65%	✓	8.69	×	9.47	×
A5 WB	To	A5152 NB	58	67	31	33	-27	-47%	✓	-34	-51%	✓	4.05	✓	4.81	✓
A5152 SB	To	A5 EB	80	94	25	31	-55	-69%	✓	-63	-67%	✓	7.59	×	7.97	×
A5152 SB	To	A5 WB	175	229	242	308	67	38%	✓	79	34%	✓	4.64	✓	4.82	✓
A5152 SB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	708	892	642	825	-66	-9%	✓	-67	-8%	✓	2.54	✓	2.29	✓
A55 WB	To	A55 WB	527	655	546	661	19	4%	✓	6	1%	✓	0.82	✓	0.23	✓
									96%			95%		88%		87%

Table C-6 Turning count calibration results for PM hour 17:00-18:00

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A5025	165	200	254	298	89	54%	✓	98	49%	✓	6.15	×	6.21	×
A55 EB	To	A55 EB	583	707	592	708	9	2%	✓	1	0%	✓	0.37	✓	0.04	✓
A5	To	A55 EB	222	255	220	252	-2	-1%	✓	-3	-1%	✓	0.13	✓	0.19	✓
A55 WB	To	A5	222	271	221	270	-1	0%	✓	-1	0%	✓	0.07	✓	0.06	✓
A55 WB	To	A55 WB	551	681	654	785	103	19%	×	104	15%	×	4.20	✓	3.84	✓
A55 WB	To	A5 WB	44	46	43	43	-1	-2%	✓	-3	-7%	✓	0.15	✓	0.45	✓
A55 WB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A5 EB	177	224	180	227	3	2%	✓	3	1%	✓	0.22	✓	0.20	✓
A5 EB	To	A55 EB	77	82	75	82	-2	-3%	✓	0	0%	✓	0.23	✓	0.00	✓
A5 EB	To	A5 EB	505	576	506	575	1	0%	✓	-1	0%	✓	0.04	✓	0.04	✓
A55 EB	To	A55 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A5 WB	75	98	79	102	4	5%	✓	4	4%	✓	0.46	✓	0.40	✓
A55 EB	To	A5 EB	413	487	364	434	-49	-12%	✓	-53	-11%	✓	2.49	✓	2.47	✓
A5 WB	To	A5 WB	271	318	271	318	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A55 WB	243	294	266	316	23	9%	✓	22	7%	✓	1.44	✓	1.26	✓
A5	To	A55 WB	427	504	451	525	24	6%	✓	21	4%	✓	1.15	✓	0.93	✓
A55 EB	To	A5	489	586	443	535	-46	-9%	✓	-51	-9%	✓	2.13	✓	2.15	✓
A55 EB	To	A55 EB	499	582	510	604	11	2%	✓	22	4%	✓	0.49	✓	0.90	✓
A4087 SB	To	A55 EB	256	303	220	260	-36	-14%	✓	-43	-14%	✓	2.33	✓	2.56	✓
A55 EB	To	A55 EB	732	865	726	874	-6	-1%	✓	9	1%	✓	0.22	✓	0.31	✓
A55 WB	To	A4087	364	427	369	433	5	1%	✓	6	1%	✓	0.26	✓	0.29	✓
A55 WB	To	A55 WB	614	758	744	885	130	21%	×	127	17%	×	4.99	✓	4.43	✓
A55 EB	To	A4087 NB	296	329	346	376	50	17%	✓	47	14%	✓	2.79	✓	2.50	✓
A4087 NB	To	A4087 NB	494	563	452	513	-42	-9%	✓	-50	-9%	✓	1.93	✓	2.16	✓
A4087 SB	To	A55 EB	256	303	220	260	-36	-14%	✓	-43	-14%	✓	2.33	✓	2.56	✓
A4087 SB	To	A4087 SB	772	857	796	879	24	3%	✓	22	3%	✓	0.86	✓	0.75	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A4087 NB	206	237	197	228	-9	-4%	✓	-9	-4%	✓	0.63	✓	0.59	✓
A55 WB	To	A4087 SB	157	189	171	205	14	9%	✓	16	8%	✓	1.09	✓	1.14	✓
A4087 SB	To	A55 WB	341	368	351	376	10	3%	✓	8	2%	✓	0.54	✓	0.41	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A4087 SB	To	A4087 NB	1	2	0	0	-1	-100%	✓	-2	-100%	✓	1.41	✓	2.00	✓
A4087 SB	To	A4087 SB	430	487	449	504	19	4%	✓	17	3%	✓	0.91	✓	0.76	✓
A4087 NB	To	A55 WB	9	14	5	5	-4	-44%	✓	-9	-64%	✓	1.51	✓	2.92	✓
A4087 NB	To	A4087 NB	287	324	256	288	-31	-11%	✓	-36	-11%	✓	1.88	✓	2.06	✓
A4087 NB	To	A4087 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A4087 NB	296	329	345	375	49	17%	✓	46	14%	✓	2.74	✓	2.45	✓
A55 EB	To	A55 EB	732	865	727	875	-5	-1%	✓	10	1%	✓	0.19	✓	0.34	✓
A55 WB	To	A55 WB	614	758	745	886	131	21%	×	128	17%	×	5.03	×	4.46	✓
A4087	To	A55 WB	351	383	357	384	6	2%	✓	1	0%	✓	0.32	✓	0.05	✓
A55 WB	To	A487 SB	21	26	21	25	0	0%	✓	-1	-4%	✓	0.00	✓	0.20	✓
A55 WB	To	No name WB	35	41	29	34	-6	-17%	✓	-7	-17%	✓	1.06	✓	1.14	✓
A55 WB	To	A487 NB	183	198	196	213	13	7%	✓	15	8%	✓	0.94	✓	1.05	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	A487 SB	444	516	544	626	100	23%	×	110	21%	×	4.50	✓	4.60	✓
A487 SB	To	No name WB	91	105	80	91	-11	-12%	✓	-14	-13%	✓	1.19	✓	1.41	✓
A487 SB	To	A487 NB	2	4	0	0	-2	-100%	✓	-4	-100%	✓	2.00	✓	2.83	✓
A487 SB	To	A55 WB	182	198	143	151	-39	-21%	✓	-47	-24%	✓	3.06	✓	3.56	✓
No name EB	To	A487 SB	133	137	159	165	26	20%	✓	28	20%	✓	2.15	✓	2.28	✓
No name EB	To	A487 NB	255	269	212	228	-43	-17%	✓	-41	-15%	✓	2.81	✓	2.60	✓
No name EB	To	A55 WB	131	137	95	100	-36	-27%	✓	-37	-27%	✓	3.39	✓	3.40	✓
A487 NB	To	No name WB	36	44	38	46	2	6%	✓	2	5%	✓	0.33	✓	0.30	✓
A487 NB	To	A487 NB	223	264	346	402	123	55%	×	138	52%	×	7.29	×	7.56	×
A487 NB	To	A55 WB	373	437	497	555	124	33%	×	118	27%	×	5.95	×	5.30	×
A 487	To	A55 EB	532	580	456	509	-76	-14%	✓	-71	-12%	✓	3.42	✓	3.04	✓
A55 EB	To	A55 EB	496	614	610	733	114	23%	×	119	19%	×	4.85	✓	4.59	✓
A487 NB	To	A55 EB	292	327	234	275	-58	-20%	✓	-52	-16%	✓	3.58	✓	3.00	✓
A487 NB	To	A487 NB	262	283	394	433	132	50%	×	150	53%	×	7.29	×	7.93	×
A487 NB	To	No name EB	130	143	130	141	0	0%	✓	-2	-1%	✓	0.00	✓	0.17	✓
A55 EB	To	A487 SB	359	436	346	411	-13	-4%	✓	-25	-6%	✓	0.69	✓	1.21	✓
A55 EB	To	A55 EB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 EB	To	A487 NB	55	63	78	90	23	42%	✓	27	43%	✓	2.82	✓	3.09	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	No name EB	113	130	109	124	-4	-4%	✓	-6	-5%	✓	0.38	✓	0.53	✓
A487 SB	To	A487 SB	162	180	244	270	82	51%	✓	90	50%	✓	5.76	×	6.00	×
A487 SB	To	A55 EB	77	81	85	88	8	10%	✓	7	9%	✓	0.89	✓	0.76	✓
A487 SB	To	A487 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 SB	To	No name EB	13	14	17	19	4	31%	✓	5	36%	✓	1.03	✓	1.23	✓
No name WB	To	A487 SB	197	209	175	182	-22	-11%	✓	-27	-13%	✓	1.61	✓	1.93	✓
No name WB	To	A55 EB	162	171	137	145	-25	-15%	✓	-26	-15%	✓	2.04	✓	2.07	✓
No name WB	To	A487 NB	130	138	160	173	30	23%	✓	35	25%	✓	2.49	✓	2.81	✓
A55 WB	To	A55 WB	726	876	859	1,000	133	18%	×	124	14%	✓	4.72	✓	4.05	✓
A487	To	A55 WB	686	772	733	803	47	7%	✓	31	4%	✓	1.76	✓	1.10	✓
A55 EB	To	A487	528	630	535	629	7	1%	✓	-1	0%	✓	0.30	✓	0.04	✓
A55 EB	To	A55 EB	496	614	610	733	114	23%	×	119	19%	×	4.85	✓	4.59	✓
A55 WB	To	A5 EB	121	131	152	165	31	26%	✓	34	26%	✓	2.65	✓	2.79	✓
A55 WB	To	A5 WB	195	214	216	231	21	11%	✓	17	8%	✓	1.46	✓	1.14	✓
A5 WB	To	A55 EB	63	76	127	142	64	102%	✓	66	87%	✓	6.57	×	6.32	×
A5 WB	To	A5 WB	185	205	157	172	-28	-15%	✓	-33	-16%	✓	2.14	✓	2.40	✓
A5 EB	To	A55 EB	113	129	141	149	28	25%	✓	20	16%	✓	2.48	✓	1.70	✓
A55 WB	To	A5	317	346	369	396	52	16%	✓	50	14%	✓	2.81	✓	2.60	✓
A55 WB	To	A55 WB	1,095	1,302	1,235	1,421	140	13%	✓	119	9%	✓	4.10	✓	3.23	✓
A55 WB	To	A5025	386	447	274	308	-112	-29%	×	-139	-31%	×	6.17	×	7.15	×
A55 WB	To	A55 WB	709	855	963	1,113	254	36%	×	258	30%	×	8.78	×	8.22	×
A55 WB	To	A5025 NB	283	332	208	241	-75	-27%	✓	-91	-27%	✓	4.79	✓	5.38	×
A55 WB	To	A5025 SB	103	115	68	69	-35	-34%	✓	-46	-40%	✓	3.79	✓	4.80	✓
A55 WB	To	A55 WB (off/on)	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5025 NB	To	A5025 NB	154	173	269	312	115	75%	×	139	80%	×	7.91	×	8.93	×
A5025 NB	To	A55 WB	26	32	5	6	-21	-81%	✓	-26	-81%	✓	5.33	×	5.96	×
A5025 SB	To	A5025 SB	77	91	186	208	109	142%	×	117	129%	×	9.51	×	9.57	×
A5025 SB	To	A55 EB	163	211	223	268	60	37%	✓	57	27%	✓	4.32	✓	3.68	✓
A5025 SB	To	A55 WB	206	224	150	178	-56	-27%	✓	-46	-21%	✓	4.20	✓	3.24	✓
A55 EB	To	A5025 NB	138	165	126	153	-12	-9%	✓	-12	-7%	✓	1.04	✓	0.95	✓
A55 EB	To	A5025 SB	27	34	128	145	101	374%	×	111	326%	×	11.47	×	11.73	×

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A55 EB	To	A55 EB (off/on)	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 WB	To	A55 WB	726	876	859	1,000	133	18%	×	124	14%	✓	4.72	✓	4.05	✓
A55 WB	To	A487	239	265	245	274	6	3%	✓	9	3%	✓	0.39	✓	0.55	✓
A55 EB	To	A55 EB	583	707	593	711	10	2%	✓	4	1%	✓	0.41	✓	0.15	✓
A 5025	To	A55 EB	218	271	272	322	54	25%	✓	51	19%	✓	3.45	✓	2.96	✓
A55 EB	To	A55 EB	801	978	864	1,034	63	8%	✓	56	6%	✓	2.18	✓	1.77	✓
A5	To	A55 EB	223	266	274	318	51	23%	✓	52	20%	✓	3.24	✓	3.04	✓
A55 WB	To	A55 WB	709	855	964	1,113	255	36%	×	258	30%	×	8.82	×	8.22	×
A5025	To	A55 WB	232	256	155	185	-77	-33%	✓	-71	-28%	✓	5.54	×	4.78	✓
A55 EB	To	A55 EB (off/on)	0	1	0	0	0	0%	✓	-1	-100%	✓	0.00	✓	1.41	✓
A55 EB	To	A5152 NB	2	4	3	6	1	50%	✓	2	50%	✓	0.63	✓	0.89	✓
A55 EB	To	A5152 SB	97	111	107	122	10	10%	✓	11	10%	✓	0.99	✓	1.02	✓
A5152 NB	To	A55 WB	81	92	62	71	-19	-23%	✓	-21	-23%	✓	2.25	✓	2.33	✓
A5152 NB	To	A55 EB	117	139	250	292	133	114%	×	153	110%	×	9.82	×	10.42	×
A5152 NB	To	A5152 NB	4	5	6	11	2	50%	✓	6	120%	✓	0.89	✓	2.12	✓
A5152 SB	To	A55 WB	1	1	1	1	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5152 SB	To	A55 EB	3	4	0	0	-3	-100%	✓	-4	-100%	✓	2.45	✓	2.83	✓
A5152 SB	To	A5152 SB	103	105	108	126	5	5%	✓	21	20%	✓	0.49	✓	1.95	✓
A55 WB	To	A55 WB (off/on)	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A55 WB	To	A5152 NB	3	5	3	8	0	0%	✓	3	60%	✓	0.00	✓	1.18	✓
A55 WB	To	A5152 SB	130	170	145	177	15	12%	✓	7	4%	✓	1.28	✓	0.53	✓
A55 EB	To	A55 EB	463	563	594	705	131	28%	×	142	25%	×	5.70	×	5.64	×
A55 EB	To	A5152	100	117	109	126	9	9%	✓	9	8%	✓	0.88	✓	0.82	✓
A5152	To	A55 WB	84	95	64	73	-20	-24%	✓	-22	-23%	✓	2.32	✓	2.40	✓
A55 WB	To	A55 WB	807	935	884	1,024	77	10%	✓	89	10%	✓	2.65	✓	2.84	✓
A55 EB	To	A55 EB	463	563	593	706	130	28%	×	143	25%	×	5.66	×	5.68	×
A5152	To	A55 EB	120	144	250	290	130	108%	×	146	101%	×	9.56	×	9.91	×
A55 WB	To	A55 WB	807	935	886	1,028	79	10%	✓	93	10%	✓	2.72	✓	2.97	✓
A55 WB	To	A5152	134	176	147	183	13	10%	✓	7	4%	✓	1.10	✓	0.52	✓
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	B5420 WB	57	70	97	103	40	70%	✓	33	47%	✓	4.56	✓	3.55	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A5 EB	116	124	144	153	28	24%	✓	29	23%	✓	2.46	✓	2.46	✓
A5 EB	To	B5420 EB	103	115	100	108	-3	-3%	✓	-7	-6%	✓	0.30	✓	0.66	✓
B5420 EB	To	A5 WB	34	39	119	124	85	250%	✓	85	218%	✓	9.72	×	9.42	×
B5420 EB	To	B5420 WB	2	2	0	0	-2	-100%	✓	-2	-100%	✓	2.00	✓	2.00	✓
B5420 EB	To	A5 EB	214	238	249	269	35	16%	✓	31	13%	✓	2.30	✓	1.95	✓
B5420 EB	To	B5420 EB	85	92	81	88	-4	-5%	✓	-4	-4%	✓	0.44	✓	0.42	✓
A5 WB	To	A5 WB	207	218	174	182	-33	-16%	✓	-36	-17%	✓	2.39	✓	2.55	✓
A5 WB	To	B5420 WB	623	676	685	766	62	10%	✓	90	13%	✓	2.42	✓	3.35	✓
A5 WB	To	A5 EB	11	11	0	0	-11	-100%	✓	-11	-100%	✓	4.69	✓	4.69	✓
A5 WB	To	B5420 EB	38	39	74	80	36	95%	✓	41	105%	✓	4.81	✓	5.32	×
B5420 WB	To	A5 WB	90	105	60	70	-30	-33%	✓	-35	-33%	✓	3.46	✓	3.74	✓
B5420 WB	To	B5420 WB	87	99	117	132	30	34%	✓	33	33%	✓	2.97	✓	3.07	✓
B5420 WB	To	A5 EB	21	26	12	14	-9	-43%	✓	-12	-46%	✓	2.22	✓	2.68	✓
B5420 WB	To	B5420 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5 EB	271	303	281	303	10	4%	✓	0	0%	✓	0.60	✓	0.00	✓
A5 EB	To	A5 WB	11	11	0	0	-11	-100%	✓	-11	-100%	✓	4.69	✓	4.69	✓
A5 EB	To	A545 NB	65	71	94	99	29	45%	✓	28	39%	✓	3.25	✓	3.04	✓
A5 EB	To	New Street SB	9	10	0	0	-9	-100%	✓	-10	-100%	✓	4.24	✓	4.47	✓
A545 SB	To	A5 EB	172	196	163	184	-9	-5%	✓	-12	-6%	✓	0.70	✓	0.87	✓
A545 SB	To	A5 WB	58	66	59	67	1	2%	✓	1	2%	✓	0.13	✓	0.12	✓
A545 SB	To	A545 NB	3	3	0	0	-3	-100%	✓	-3	-100%	✓	2.45	✓	2.45	✓
A545 SB	To	New Street SB	3	3	0	0	-3	-100%	✓	-3	-100%	✓	2.45	✓	2.45	✓
A5 WB	To	A5 EB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 WB	To	A5 WB	778	842	874	958	96	12%	✓	116	14%	✓	3.34	✓	3.87	✓
A5 WB	To	A545 NB	281	305	295	314	14	5%	✓	9	3%	✓	0.82	✓	0.51	✓
A5 WB	To	New Street SB	8	8	0	0	-8	-100%	✓	-8	-100%	✓	4.00	✓	4.00	✓
New Street NB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	A545 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
New Street NB	To	New Street SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A487 NB	To	A487 SB	3	3	0	0	-3	-100%	✓	-3	-100%	✓	2.45	✓	2.45	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A487 NB	To	A5 EB	100	108	123	138	23	23%	✓	30	28%	✓	2.18	✓	2.71	✓
A487 NB	To	A5 WB	473	515	569	628	96	20%	✓	113	22%	×	4.21	✓	4.73	✓
A487 NB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A487 SB	232	268	245	277	13	6%	✓	9	3%	✓	0.84	✓	0.55	✓
A5 EB	To	A5 EB	206	228	188	203	-18	-9%	✓	-25	-11%	✓	1.28	✓	1.70	✓
A5 EB	To	A5 WB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A5 EB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A487 SB	175	182	140	141	-35	-20%	✓	-41	-23%	✓	2.79	✓	3.23	✓
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	594	639	600	645	6	1%	✓	6	1%	✓	0.25	✓	0.24	✓
A5 WB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A487 SB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
No name SB	To	No name NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A4087 WB	To	A487 NB	11	11	5	5	-6	-55%	✓	-6	-55%	✓	2.12	✓	2.12	✓
A4087 WB	To	A487 SB	453	507	423	478	-30	-7%	✓	-29	-6%	✓	1.43	✓	1.31	✓
A4087 WB	To	B4547 WB	202	217	192	208	-10	-5%	✓	-9	-4%	✓	0.71	✓	0.62	✓
A487 SB	To	A4087 EB	39	41	15	15	-24	-62%	✓	-26	-63%	✓	4.62	✓	4.91	✓
A487 SB	To	A487 SB	468	523	397	447	-71	-15%	✓	-76	-15%	✓	3.41	✓	3.45	✓
A487 SB	To	B4547 WB	366	411	291	328	-75	-20%	✓	-83	-20%	✓	4.14	✓	4.32	✓
B4547 EB	To	A4087 EB	119	134	94	103	-25	-21%	✓	-31	-23%	✓	2.42	✓	2.85	✓
B4547 EB	To	A487 NB	173	197	289	313	116	67%	×	116	59%	×	7.63	×	7.26	×
B4547 EB	To	A487 SB	1	1	0	0	-1	-100%	✓	-1	-100%	✓	1.41	✓	1.41	✓
A487 NB	To	A4087 EB	203	230	161	178	-42	-21%	✓	-52	-23%	✓	3.11	✓	3.64	✓
A487 NB	To	A487 NB	489	565	544	619	55	11%	✓	54	10%	✓	2.42	✓	2.22	✓
A487 NB	To	B4547 WB	4	5	0	0	-4	-100%	✓	-5	-100%	✓	2.83	✓	3.16	✓
A5 WB	To	A5 WB	247	266	202	207	-45	-18%	✓	-59	-22%	✓	3.00	✓	3.84	✓
A5 WB	To	A4081	168	191	200	227	32	19%	✓	36	19%	✓	2.36	✓	2.49	✓
A4080	To	A5 WB	22	24	23	25	1	5%	✓	1	4%	✓	0.21	✓	0.20	✓
A4081	To	A5 EB	166	190	155	176	-11	-7%	✓	-14	-7%	✓	0.87	✓	1.03	✓

Location			Observed		Modelled		Diff	% Difference		Diff	% Difference		GEH			
			Car	Total	Car	Total	Car	Car		Total	Total		Car		Total	
A5 EB	To	A4080	33	38	0	0	-33	-100%	✓	-38	-100%	✓	8.12	×	8.72	×
A5 EB	To	A5 EB	235	271	180	198	-55	-23%	✓	-73	-27%	✓	3.82	✓	4.77	✓
Lon Graig SB	To	A5 WB	23	25	55	61	32	139%	✓	36	144%	✓	5.12	×	5.49	×
Lon Graig SB	To	A5 EB	120	120	76	84	-44	-37%	✓	-36	-30%	✓	4.44	✓	3.56	✓
A5 WB	To	Lon Graig NB	30	30	6	7	-24	-80%	✓	-23	-77%	✓	5.66	×	5.35	×
A5 WB	To	A5 WB	392	432	347	374	-45	-11%	✓	-58	-13%	✓	2.34	✓	2.89	✓
A5 EB	To	Lon Graig NB	73	90	65	75	-8	-11%	✓	-15	-17%	✓	0.96	✓	1.65	✓
A5 EB	To	A5 EB	338	381	269	296	-69	-20%	✓	-85	-22%	✓	3.96	✓	4.62	✓
A5 EB	To	A5 EB	96	108	7	7	-89	-93%	✓	-101	-94%	×	12.40	×	13.32	×
A5 EB	To	A5 WB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 EB	To	A5152 NB	139	163	223	258	84	60%	✓	95	58%	✓	6.24	×	6.55	×
A5 WB	To	A5 EB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A5 WB	To	A5 WB	116	128	56	62	-60	-52%	✓	-66	-52%	✓	6.47	×	6.77	×
A5 WB	To	A5152 NB	60	70	29	34	-31	-52%	✓	-36	-51%	✓	4.65	✓	4.99	✓
A5152 SB	To	A5 EB	65	76	43	47	-22	-34%	✓	-29	-38%	✓	2.99	✓	3.70	✓
A5152 SB	To	A5 WB	175	217	250	302	75	43%	✓	85	39%	✓	5.14	×	5.28	×
A5152 SB	To	A5152 NB	0	0	0	0	0	0%	✓	0	0%	✓	0.00	✓	0.00	✓
A55 EB	To	A55 EB	499	582	512	607	13	3%	✓	25	4%	✓	0.58	✓	1.03	✓
A55 WB	To	A55 WB	551	681	656	787	105	19%	×	106	16%	×	4.27	✓	3.91	✓
									89%			89%		86%		86%