Welsh Government

M4 Junction J28 Improvement

Traffic Forecasting Report

P03 | 18 December 2015

Job number 240226

Ove Arup & Partners Ltd
4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

ARUP

Contents

Appendices

Appendix A

Traffic Flow Matrices

Appendix B

Improvement Scheme Layouts

Appendix C

Examples of VISSIM movie outputs

1 Introduction

1.1 Study Overview

M4 Junction 28 is a key interchange on both the local and strategic highway networks. It provides access to West Newport, a major employments area, the M4 motorway and Newport Southern Distributor Road (SDR) from the western valleys.

Bassaleg Roundabout to the north is linked to Junction 28 via the A467 Forge Road. To the east, Pont Ebbw Roundabout is linked to Junction 28 via the SDR. Junction 28 and Pont Ebbw Roundabouts are part-time signal controlled, triggered by traffic flow and queuing thresholds, such that the junctions are signalised during the AM and PM peak periods but operate as roundabouts during off-peak periods.

The Welsh Government's aim (as set out in the project document 'Volume 2 Works Information') is to provide strategic capacity improvements and alleviate congestion throughout this key corridor – and hence improvements are planned at the A48/A4072/M4 Tredegar Park junction, at the A4072 Bassaleg roundabout to the north, and at the A48 Pont Ebbw roundabout to the east.

This Forecasting Report deals with assessing the future transport impact on the road network with road improvements in place at Junction 28 and adjacent junctions, utilising the output from a validated microsimulation model (using VISSIM software). This Report follows the Local Model Validation Report which set out the process for building the present-day VISSIM model and confirmation of its suitability for use as a modelling tool for testing future road improvements.

1.2 Model Outputs

A digital and visual (movie) model of each scenario (in VISSIM format) is stored in the form of electronic files, and are provided the client organisation for checking / approval processes (separate to this Report).

1.3 Report Structure

This report summarises the development of the base year transport model and its subsequent validation.

Following this introduction, the report structure is as follows:

- Chapter 2 provides an overview of the modelling approach and traffic scenarios to be tested with the model;
- Chapter 3 discusses the traffic growth forecast;
- Chapter 4 presents the road improvement measures,
- Chapter 5 provides details of the modelled scenarios results, from which conclusions can be drawn in respect of the impact of the proposed improvements;
- Chapter 6 shows visual outputs from the VISSIM model
- Chapter 7 provides a summary of conclusions.

2 Forecast Model Overview

2.1 VISSIM Model Area

The model area is shown in Figure 2.1, and includes Bassaleg Roundabout to the north, Junction 28, and, to the east, Pont Ebbw Roundabout, as well as the A467 and A48 between the three junctions.

The VISSIM model also included the Cleppa Park / Pencarn Way signal crossroads on the A48 just south of Junction 28. This junction was not subject to full validation, but was included in order to ensure that the VISSIM model includes the 'platooning' effect of northbound traffic leaving the Cleppa Park signal control junction (ref. LMVR Report M4J28-ARP-HGN-SWG-RP-YT-100005.docx issued in August 2015).

The individual junctions to be improved are presently configured as shown in Figures 2.2 to 2.4.

Figure 2.1: M4 Junction 28 Traffic Model Area Copyright GoogleMaps

Figure 2.2: Aerial Photo of Junction 28 Copyright GoogleMaps

Figure 2.3: Aerial Photo of Pont Ebbw Junction Copyright GoogleMaps

Figure 2.4: Aerial Photo of Bassaleg Junction Copyright GoogleMaps

2.2 VISSIM Modelling Process

A micro-simulation **VISSIM** model (Version 7.00) has been produced for current and future traffic conditions (for validation and forecasting purposes respectively). The VISSIM model adopts a 'Dynamic' modelling approach which allows lane choice for journeys within the network (since in this case the modelled network does not include alternative routes). In respect of Vehicle Classification, the VISSIM model includes for modelling of buses 'paths' (and local bus stops), and also distinguishes between light and heavy vehicles.

The VISSIM model requires inputs in respect of traffic signal staging and timings (since all three junctions to be improved are to be fully signal controlled). Input data in respect of signal timings was taken from LinSig models (using Version 3.2.22) produced for each of the three improved junctions for the Design Options investigations (see Design Options Report; M4J28-ARP-HGN-SWG-RP-YT-000004). For VISSIM modelling, the LinSig modelling outputs for the preferred option (for each individual junction) was utilised in respect of initial signal timings and offsets between each signal installation. These *preliminary* timings were then modified (in VISSIM) on an iterative basis to produce optimum signal timings for the combined 'whole network' VISSIM model.

2.3 Scenarios Modelled

The VISSIM modelling scenarios produced are as shown in Table 2.1, and include for 2017 'Year of Opening' and 2032 '15 Years after Opening'. The VISSIM models cover the weekday AM and PM peak hour, and a typical Interpeak hour (12.00 – 13.00) hour – giving confidence that the junction has been comprehensively tested for a range of turning and tidal flow scenarios. It should be noted that the VISSIM modelling includes for two M4CaN scenarios – namely:

- Without a new M4 motorway south of Newport (with motorway interchange junctions on the east and west side of the Usk) – for 'Do Minimum 1' and 'Do Something 1' scenarios
- With a new M4 motorway (referenced as for 'Do Minimum 2' and 'Do Something 2' scenarios).

Table 2.1: VISSIM modelling scenarios

Scenarios	Junction Improvement Scenario	New M4 Around Newport Scenarios	Year
Do Nothing (for Validation)	Without improvements at Bassaleg, J28, Pont Ebbw	Without New M4 Around Newport	2014
Do Minimum 1	Without improvements at Bassaleg, J28, Pont Ebbw	Without New M4 Around Newport	2017, 2032
Do Minimum 2	Without improvements at Bassaleg, J28, Pont Ebbw	**With New M4** Around Newport	2032
Do-Something 1	**With improvements** at Bassaleg, J28, Pont Ebbw	Without New M4 Around Newport	2017, 2032
Do-Something 2	**With improvements** at Bassaleg, J28, Pont Ebbw	**With New M4** Around Newport	2032

2.4 Impact of Blocking Back

The VISSIM microsimulation model presents all three ‘improved’ junctions within a single comprehensive model, and consequently includes traffic interactions between the three junctions, and hence any blocking back of queues between junctions can be observed and quantified in the model.

3 Traffic Growth Forecasts

3.1 Flow Data

M4CaN SATURN model: The M4 Motorway Junction 28 is located within the road network being investigated and modelled (using the area-wide road network modelling software SATURN) in the M4 Corridor around Newport (M4CaN) project (a Welsh Government project). The M4CaN project has produced a validated SATURN model to test future M4 improvement scenarios, and this SATURN model has been utilised as the basis for providing forecast traffic flows for testing the traffic impact for the Junction 28 scheme (as set out in the Work Programme Report M4J28-ARP-HGN-SWG-RP-YT-000001).

SATURN output data in the form of turning flows has been provided for 2017 and 2032, which represent 'Opening Year' and '15 Years after Opening' respectively. Flow data for Do Something junction modelling was produced by coding the improvements at Basseleg, Junction 28, and Pont Ebbw within the SATURN model. Data for Do Minimum scenarios was extracted from the unaltered M4CaN SATURN forecast models for the 'with' and 'without' new M4' cases.

2014 Traffic Counts: Current traffic flows at the junctions have been recorded in 2014. The Traffic Survey report (M4J28-ARP-HGN-SWG-RP-YT-000002, issued 05.05.15) sets out a review of the survey data used for the Junction 28 improvement investigations. This 'existing' data forms the start point for producing forecast Design Flows.

3.2 Development of Design Flows:

As set out in the Work Programme Report (M4J28-ARP-HGN-SWG-RP-YT-000001 Rev P03, issued to Welsh Government on 8 May 2015), Design Flows are based on use of 2014 traffic count data , which have then been manipulated to represent future traffic scenarios by adding the difference between current and future SATURN flows, as follows:

- The 15 x 15 base matrix was developed from the 2014 traffic counts and base SATURN cordon matrix as set out in the LMVR.
- Forecast traffic flows for 2017/2032 VISSIM modelling scenarios were produced by 'growthing' the 2014 base matrix according to the changes in forecast flows produced by the 2012 M4 SATURN model outputs for the relevant 2017 or 2032 scenario.

The SATURN model has a base year of 2012, while the VISSIM model has a base year of 2014. However, the differences in totals between the two sets of matrices is small, and show both an increase and a decrease in different time periods, as highlighted in Table 3.1. As such, in applying the forecast changes from the 2012 to 2017/2032 SATURN models, no amendments has been made to adjust for the 2014 base year in the VISSIM model.

Table 3.1 Comparison of 2012 SATURN and 2014 VISSIM Matrix Totals

	2012 SATURN	2014 VISSIM	Difference
AM Peak	15,973	16,506	3.3%
Interpeak	10,518	10,359	-1.5%
PM Peak	16,100	15,958	-0.9%

Figure 3.1 shows in diagrammatic format the process for identifying Design Flows, and how these flows feed into the VISSIM model tests.

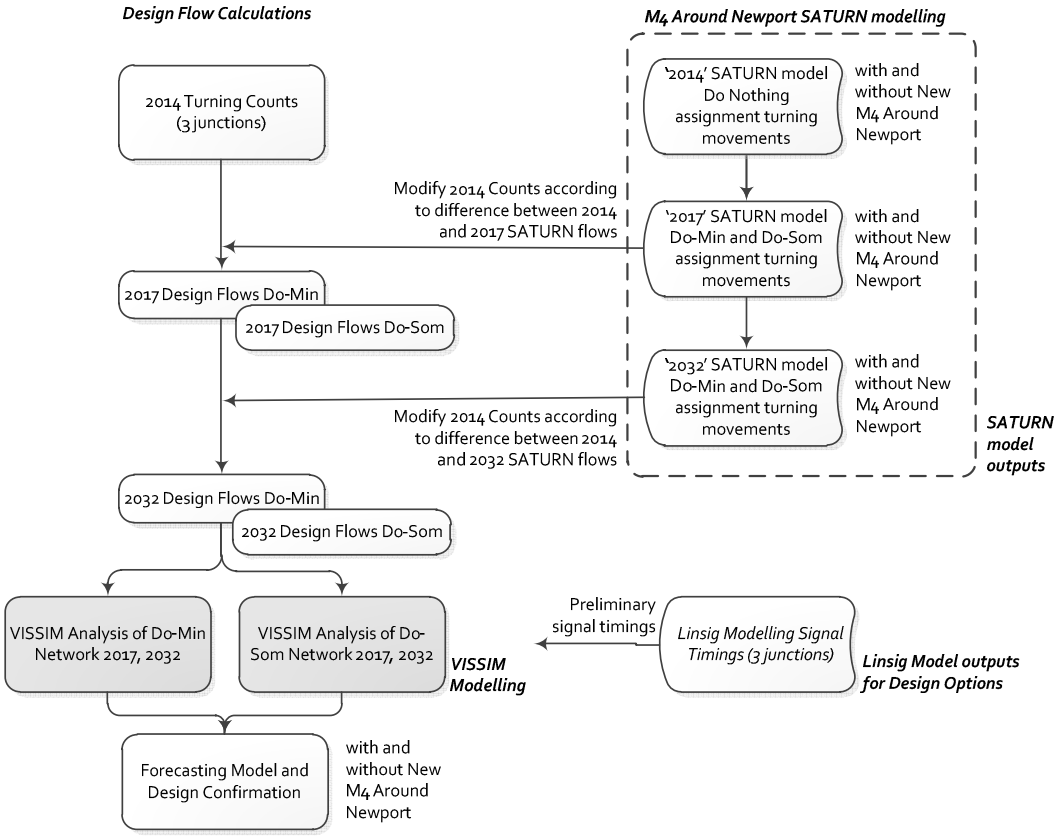

Figure 3.1: Development of Design Flows

3.3 Design Flow Matrix for VISSIM

VISSIM utilises matrices for modelling of traffic flow movements across a network; that is, for the Junction 28 scheme, it was necessary to provide a matrix covering all four modelled junctions rather than a separate turning count at each junction (which was the basis of LinSig modelling in the Design Options Report). For creation of Design Flows, traffic across the 'improvement' network was arranged as a 15 x 15 matrix; that is, there are 15 entry / exit points (or 'zones') on the network under consideration. The matrix origin / destination zones are as follows:

1. A467 to/from Risca
2. Park View
3. M4 East (entry and exit slip roads)
4. B4237 Cardiff Road to Newport city centre
5. A48 East Docks Way to southern Newport
6. B4239 Lighthouse Road to Duffryn, St Brides and Wentlooge
7. Access road to International Rectifier (IR).
8. Pencarn Way
9. A48 Castleton / Cardiff
10. Cleppa Park
11. M4 West (entry and exit slip roads)
12. Court Crescent, a residential access M4 eastbound entry and exit slip roads
13. A468 Caerphilly Road to Caerphilly
14. Access road to Office of National Statistics (ONS), Intellectual Property Office (IPO)
15. Tredegar Park access

An example calculation is set out below for a single Origin-Destination pair (in this case M4 West to A48 East, AM Peak 2032 DS1).

VISSIM Base Matrix	368 Cars 26 HGVs
SATURN Base Matrix	323 Cars 41 HGVs
SATURN Forecast Matrix	573 Cars 47 HGVs
SATURN Forecast change	573 – 323 = 250 Cars 47 – 41 = 6 HGVs
Resultant VISSIM matrix value	368 + 250 = 618 Cars 26 + 6 = 32 HGVs

The above process is followed to create traffic matrices for each Do Minimum and Do Something scenario. The resultant matrices for each scenario are provided in Appendix A: Traffic Flow Matrices.

3.4 Details of Design Flow Matrices

Further details of the VISSIM matrices are as follows:

- Matrices were produced for Light vehicles (Cars and LGVs) and Heavy vehicles (HGVs) for the AM, Interpeak, and PM peak hours
- In order to represent the variation in demand over the course of the modelled period, matrices were created for each 15 minute period of the model, taking the hourly matrices described above, and applying a factor to match the variation in observed demand in 15 minute intervals from the traffic surveys.
- The VISSIM models include the 'main' modelled hour, but also include a one hour 'warm up period' and a half hour 'cool down' period; thus a total of 10 matrices are included in the overall model (for each of the two vehicle classes), and for each of the AM, Interpeak, and PM peak periods. The modelled period in the VISSIM model is thus 2.5 hours, representing the

following periods: AM Peak: 07:00 to 09:30; Interpeak: 11:00 to 13:30; PM Peak: 16:00 to 18:30

- Bus demand was not included in the matrices, however bus services were individually coded using static routes in the model using data from published bus timetables. No changes have been made to the bus services in future years as there is insufficient information to make assumptions, and such changes would have minimal impact on the operation of the junctions.

3.5 Basis of Traffic Growth

As discussed above, the traffic forecasts are based on cordoned data from the M4CaN SATURN model provided as an input to this project. As such, the detailed basis for these forcasts falls outside the scope of this report, but the principles are outlined below:

National Trip End Model: The M4CaN SATURN model includes local NTEM (National Trip End Model) growth factors (according to DfT's TEMPRO dataset). Traffic growth for the 2017 and 2032 scenarios (for Junction 28) are based directly on the growth scenarios already included in the M4 SATURN forecast model, and agreed with Welsh Government.

Local Developments included in the M4CaN model: The future 2017 and 2032 Design Flows include for all committed and proposed developments in the Newport area. In particular, the SATURN model includes local development at the Bassaleg roundabout, namely the Jubilee Park development as follows:

- 600 residential units in 2022,
- Additional 600 residential units in 2037,
- 150 residential units at Old Tredegar Park Golf Club are assumed to in place by 2022.

In practice (for these local developments), the 2017 scenario will have traffic generated by '0' units (i.e. nil), and the 2032 scenario will include traffic generated from an interpolated development quantity of between the 2022 and 2037 scenarios (roughly 2032).

Section 6 of this report, in particular Table 6.1, outlines the traffic growth forecasts for the scenarios considered.

4 Road Improvement Measures

4.1 Option Development Process

For each junction, improvement measures have been devised through an iterative design process. The development of a 'preferred' option for each of the three junctions is described in detail in the Design Options Report (M4J28-ARP-HGN-SWG-RP-YT-000004 Rev P05, dated August 2015).

The key objective for the overall improvement scheme is improving traffic management and capacity – with supporting objectives related to safety and environmental issues. These key objectives were supplemented with other factors to enable an appraisal of the options. In addition, the improvement schemes were designed from the outset with an aim that land acquisition is avoided. The options were appraised against the following considerations:

- traffic analysis,
- safety & departure from standards,
- non-motorised users,
- bus routes,
- environmental impacts,
- programme,
- costs – capital construction costs and whole life maintenance costs, and
- utility diversions.

4.2 Improvement Schemes

The following sections describe in outline terms the preferred improvement option for each of the three junctions.

4.2.1 Pont Ebbw Junction Improvement

The proposed improvement scheme is shown in Appendix B: Improvement Scheme Layouts, and consists of:

- Full-time signal control at all gyratory/entry lane junctions
- Two through-lanes (signal controlled) in each direction (on the SDR/A48) through the centre of the gyratory
- A combined 3-stage junction at the IPO/ONS Entry (with the Gyratory and SDR Westbound Through-about lanes forming the other two stages).

4.2.2 Junction 28 (Tredegar Park) Improvement

The proposed improvement scheme is shown in Appendix B: Improvement Scheme Layouts, and consists of:

- an extended gyratory (to the west) which passes beneath the existing westbound motorway entry slip road, retaining the existing bridge,
- an eastbound through link between the M4 eastbound exit slip and the A48 eastbound from Castleton to the A48 eastbound towards Newport;
- Full-time signal control at all gyratory/entry lane junctions

4.2.3 Bassaleg Junction Improvement

The proposed improvement scheme is shown in Appendix B: Improvement Scheme Layouts, and consists of:

- Signalised roundabout with extended footprint to southwest
- Signal control at the main entry/gyratory junctions; namely at A467 Forge Road southbound, A467 northbound, A468 Caerphilly Road.
- Give-way access onto the roundabout will be operated at the Park View and Court Crescent entry lanes.
- The existing pedestrian crossing on the A468 Caerphilly Road will be retained, and operated in co-ordination with the main gyratory signals.

4.2.4 Pedestrians and Buses

The improvement scheme includes for retention and improvement of pedestrian facilities:

- Retention of the signal-controlled crossing on the A468 Caerphilly Road north of Basseleg junction
- New controlled crossing across the A467 Forge Road southbound exit from the Bassaleg junction
- New signal controlled crossing of the eastbound exit to the M4 East on-slip, and Junction 28;
- New signal controlled crossing of the A48 westbound to Castleton / Cardiff
- Retention of the signal controlled staggered crossing of the A48/SDR just west of Pont Ebbw.

Cyclists are also able to use the crossing facilities described.

In respect of buses, there are no specific bus priority measures provided within the improvement scheme. Buses are however considered within the design as follows:

- Bus movement in and out of the ONS/IPO access at Pont Ebbw has been catered for with inbound and outbound bus stops (which is a re-arrangement of the current provision)
- Bus stops are provided on the A48 / SDR westbound just west of Pont Ebbw, and at the northern side of Pont Ebbw junction (as at present).

Pedestrians and buses have been included in the VISSIM model, on the basis that pedestrian stages are operated every 2 signal cycles, and that buses stop at bus stops according to current timetable data. This approach is appropriate in order to establish a comprehensive view of the junction improvement proposals for all road users. Cyclists travelling on the roadway have not been explicitly included within the model.

5 VISSIM Model Forecast Results

5.1 VISSIM Model Traffic Queue Results

Tables 5.1 to 5.3 show the modelled queues for each scenario. The queues shown are the average queues from VISSIM-modelled results for each 15 minute modelled period (08:00-08:15, 08:15-08:30 etc.). The tabulations highlight queues (in ***italics***) which are likely to block back to the upstream junction and hence affect its operation.

Conclusions can be drawn from the modelled results for queues:

- Queues in the Do Minimum scenarios are significantly long – at over 100 vehicles at each of the three junctions.
- Some queues in the Do Minimum are blocking back to affect upstream junctions
- With the 'Do Something' improvements in place, queues are significantly less than the Do Minimum, with queues typically less than 20 vehicles.

Table 5.1: Modelled Average Queues AM Peak (08:00 to 09:00)

Approach		Average Queues in PCUs							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
Bassaleg	Park View	4	1	1	2	0	1	1	2
	A467-N	89	163	171	3	114	20	157	19
	A468	5	5	5	13	3	0	7	0
	Court Cres.	3	0	0	0	0	3	0	3
	A467-S	7	2	2	2	5	0	4	0
J28	A467	34	10	76	0	68	53	49	18
	M4-N	26	10	72	51	141	7	86	10
	SDR-E	27	33	53	3	**170**	2	**169**	2
	M4-S	16	9	42	2	172	4	158	2
Pont Ebbw	SDR-W	6	1	52	3	41	9	2	11
	B4237	29	3	4	16	115	20	108	5
	SDR-E	5	1	1	3	90	3	51	3
	B4239	6	2	21	2	36	1	35	1
	ONS		1	2	1	18	0	5	0

Note: Queues which back up to upstream junction are shown in ***italic***

Table 5.2: Modelled Average Queues Interpeak (12:00 to 13:00)

Approach		Average Queues in PCUs							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
Bassaleg	Park View	2	0	0	0	8	0	5	0
	A467-N	5	0	1	1	13	1	4	1
	A468	2	0	1	0	7	0	3	0
	Court Cres.	0	0	0	1	0	1	0	1
	A467-S	1	0	0	0	0	0	0	0
J28	A467	6	43	72	1	140	1	124	1
	M4-N	4	1	2	2	8	3	4	3
	SDR-E	8	3	29	1	**160**	1	**165**	1
	M4-S	7	2	3	1	7	1	1	1
Pont Ebbw	SDR-W	3	0	0	0	1	0	1	0
	B4237	6	1	1	1	13	1	22	1
	SDR-E	4	1	1	0	72	0	68	0
	B4239	2	0	0	0	29	0	34	0
	ONS		1	1	0	3	0	1	0

Note: Queues which back up to upstream junction are shown in ***italic***

Table 5.3: Modelled Average Queues PM Peak (17:00 to 18:00)

Approach		Average Queues in PCUs							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
Bassaleg	Park View	6	19	25	2	24	11	25	26
	A467-N	5	1	5	3	169	8	117	6
	A468	6	5	4	0	8	0	10	0
	Court Cres.	1	1	0	4	0	59	0	41
	A467-S	9	4	2	0	7	1	1	1
J28	A467	16	12	61	19	16	4	17	2
	M4-N	7	12	6	3	130	7	48	6
	SDR-E	50+	102	**171**	3	**166**	11	**170**	7
	M4-S	18	26	**172**	3	**173**	2	**174**	2
Pont Ebbw	SDR-W	6	1	9	2	12	13	6	4
	B4237	17	1	112	3	112	1	112	3
	SDR-E	10	1	110	3	110	0	110	13
	B4239	4	0	38	2	34	3	33	3
	ONS		4	67	1	30	1	29	1

Note: Queues which back up to upstream junction are shown in ***italic***

5.2 VISSIM Journey Time Results

5.2.1 Journey Time Paths

Journey times have been extracted from VISSIM model outputs for the AM and PM peaks, and the Inter-peak – for the Do Minimum and Do Something scenarios. The journey time routes (A to H) are shown in Figure 5.1 and represent a range of journeys across the network (in all directions).

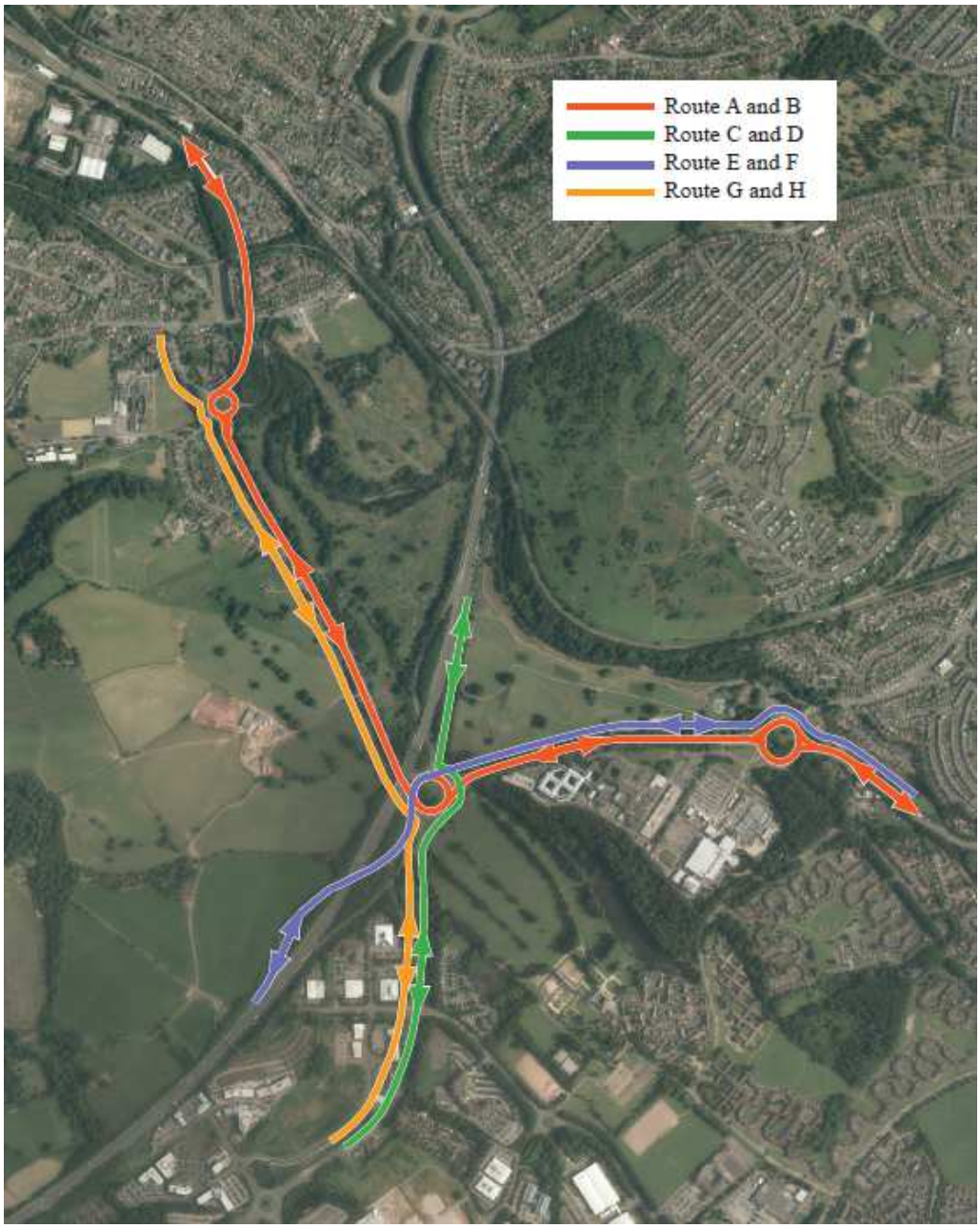

Figure 5.1: Journey Time Routes

5.2.2 Journey Time Results

Tables 5.4 to 5.6 show the modelled journey times for each scenario (for the three modelled periods), based on the journey paths set out in Section 5.2.1. A further tabulation is shown in Table 5.7, which summarises the journey time outputs in the form of 'averages' of the modelled journey times.

From Table 5.7, a summary of conclusions for journey times is:

- Current peak journey times average around 5-6 minutes.
- For Do Minimum scenarios, journey times around 10-15 minutes (i.e. an increase of up to 10 minutes over the present day)
- With the 'Do Something' improvements in place, typically average journey times are less than 5 minutes, and hence much lower than Do Minimum, and marginally less than the present day.

Table 5.4: Modelled Journey times AM Peak (08:00 to 09:00)

Route Ref.	Route	Average Journey time in minutes							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
A	A467 to SDR Eastbound	13.8	13.2	21.3	5.6	10.8	4.6	11.1	4.6
B	SDR to A467 westbound	6.8	7.2	7.1	5.9	23.1	6.8	21.8	6.6
C	A48 Cardiff Road to M4 north slip road	4.2	5.1	7.8	2.8	15.1	4.2	7.7	4.4
D	M4 north slip road to A48 Cardiff Road	3.0	2.7	5.8	4.9	7.9	5.2	5.4	3.9
E	M4 west slip road to SDR eastbound	4.3	3.9	8.5	3.4	10.1	3.7	9.6	3.0
F	SDR to M4 west slip road	5.0	5.1	4.2	2.9	18.2	3.7	18.5	3.2
G	A468 to M4 Slip road southbound	7.8	3.5	12.1	6.2	6.6	6.1	5.5	4.8
H	M4 slip road to A468 northbound	2.7	2.1	2.2	2.4	2.8	2.5	2.8	2.5

Table 5.5: Modelled Journey times Interpeak (12:00 to 13:00)

Route Ref.	Route	Average Journey time in minutes							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
A	A467 to SDR Eastbound	3.8	5.0	6.3	3.8	9.6	4.0	8.7	4.0
B	SDR to A467 westbound	3.8	4.3	5.7	4.8	13.4	5.0	15.7	5.1
C	A48 Cardiff Road to M4 north slip road	2.7	2.4	2.6	2.7	2.6	2.7	2.6	2.7
D	M4 north slip road to A48 Cardiff Road	2.0	2.4	2.4	2.5	2.9	2.6	2.7	2.5
E	M4 west slip road to SDR eastbound	3.0	3.7	3.9	2.9	4.1	2.9	3.8	2.8
F	SDR to M4 west slip road	2.0	2.7	3.4	2.5	15.7	2.6	12.2	2.5
G	A468 to M4 Slip road southbound	2.0	5.0	7.8	2.6	11.5	3.2	10.0	3.0
H	M4 slip road to A468 northbound	2.0	1.8	1.9	2.4	1.9	2.4	1.9	2.4

Table 5.6: Modelled Journey times PM Peak (17:00 to 18:00)

Route Ref.	Route	Average Journey time in minutes							
		2014		2017		2032			
		Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
A	A467 to SDR Eastbound	3.9	4.1	7.0	4.1	13.5	4.8	8.1	5.6
B	SDR to A467 westbound	12.5	9.3	26.3	5.7	23.0	7.3	27.8	7.1
C	A48 Cardiff Road to M4 north slip road	5.0	3.6	14.5	3.1	13.2	3.9	14.6	3.4
D	M4 north slip road to A48 Cardiff Road	2.0	3.1	3.1	4.2	7.6	3.0	6.2	2.8
E	M4 west slip road to SDR eastbound	4.7	3.7	10.6	3.5	8.3	3.2	11.3	3.4
F	SDR to M4 west slip road	10.3	10.2	29.8	3.0	26.4	3.0	23.3	3.0
G	A468 to M4 Slip road southbound	2.2	3.5	5.3	3.2	3.5	3.6	4.0	3.2
H	M4 slip road to A468 northbound	4.0	3.3	9.3	2.5	7.9	3.8	11.6	3.5

Table 5.7: Average Speed (km/h)

Route	Overall Average Speed in kilometres per hour							
	2014		2017		2032			
	Observed	Base	DM1	DS1	DM1	DS1	DM2	DS2
AM Peak hour	54.0	29.3	61.4	12.6	53.6	17.7	46.1	54.0
Interpeak hour	73.6	67.7	76.5	40.1	75.0	31.9	66.8	73.6
PM Peak hour	56.3	13.5	63.2	10.6	60.9	10.3	56.0	56.3

5.3 VISSIM Network Delays

Output results (from VISSIM modelling) for overall average network delay per vehicle is shown in Table 5.8. The results shown that delays with the improvements in place are less than 2 minutes in 2017, and less than 2.5 minutes in 2032. Delays without the scheme are significantly higher, at over 10 minutes per vehicle in 2032.

Table 5.8: Average Delay per Vehicle (minutes)

Period	2014	2017		2032			
	Base	DM1	DS1	DM1	DS1	DM2	DS2
AM Peak hour	1.7	5.5	1.4	13.5	1.8	9.7	2.1
Interpeak hour	0.7	0.9	0.5	3.9	0.6	3.7	0.7
PM Peak hour	1.6	12.5	1.2	16.7	1.9	16.2	2.1

5.4 VISSIM Movie Outputs

VISSIM output movies (in .avi format) have been produced for each Do Something scenario as indicated in the file storage image below – and are issued separately from this report.. 'Before' and 'After' stills from VISSIM outputs for the 2014 and 2032 DS1 scenarios are also shown for each junction in Appendix C: Examples of VISSIM movie outputs.

6 Review of Traffic Forecasts

6.1 Introduction

This section reviews the change in flows which occur as a result of the removal of the congestion 'bottleneck' at Junction 28 and adjacent junctions. The forecast traffic flows are based on the change which occurs in SATURN modelled flows as a result of introducing the junction improvements into the model (to create Do Something scenarios).

The M4 SATURN model is a valuable tool for this study of junctions at Tredegar Park, since it allows for reassignment of traffic to take place in response to the change in capacity, and is a significantly more appropriate method of forecasting traffic than simply applying traffic growth to the current junction traffic flows. It should be noted however that junction modelling in SATURN is less accurate than VISSIM or LinSig, and hence the changes in flows due to junction improvements are necessarily approximate, and are also affected by congestion impacts on other parts of the network.

The SATURN model includes reassignment of traffic on the wider modelled area, however the results discussed in this section relate only to the traffic demands on the local network of Pont Ebbw, Bassaleg, and Junction 28, and excludes the flows on the M4 mainline.

6.2 Local Network Total Traffic Flow

The forecast Design Flows for the Junction 28 road network has been reviewed. Table 6.1 summarises the changes in traffic flows which result from implementing the improvement scheme. It can be seen that 'Do Something 1' (without a new M4) is the 'worst-case'; that is, there are has higher flows without the new M4 in place. In summary, the changes in flows show the following:

- Peak hour flows on the network in 2032 increase by around 30% with the scheme in place (compared to 2014 flows); this is equivalent to around 2500 to 3000 pcu/hour.
- Without the scheme in place, flows are lower in the AM peak (by around 10%, or 900 pcu / hour. In the PM peak, flows are stable with or without the improvement scheme (although flows are in any case 28-29% higher than in 2014).
- In the interpeak period, flows increase by around 20-30% by 2032. However, flows without the scheme (Do Minimum) are higher than with the scheme. This is likely to reflect a network effect whereby at off-peak periods (when the overall network is less congested), traffic routing settles on a different pattern due to, for example, the introduction of delays to some movements at the new traffic signals.

Overall therefore, the reassignment effects (modelled in SATURN) indicate that the throughput at the junctions increases by around 20-30% with the improvements in place (compared to the present day).

Increases in forecast flow (based on SATURN reassignments) occur in the Do Minimum scenarios at a lesser level than for Do Something in the AM peak.

However, the Do Something and Do Minimum forecast flows are at a similar level for the PM peak, and Interpeak flows for the Do Minimum scenario are higher than for Do Something. This is likely be due to marginally lengthened SATURN-modelled journey times for some journeys due to the introduction of signals at each junction (which leads to some re-routing away from Junction 28). However, it is clear from the more detailed analysis using VISSIM microsimulation software that the relatively high forecast traffic flows for some Do Minimum scenarios are unable to be accommodated within capacity (see Section 5).

Table 6.1: Network Forecast Traffic Changes

Scenario	Vehicle Type	AM Peak hour		Interpeak hour		PM Peak hour	
		Flow/hr	Change [1]	Flow/hr	Change [1]	Flow/hr	Change [1]
2014 Base	Cars&LGVs	8541	-	5354	-	8639	-
	HGVs	438	-	430	-	243	-
	Total Vehs	**8979**	**-**	**5784**	**-**	**8882**	**-**
2017 DM1	Cars&LGVs	9422	10.3%	5858	9.4%	9908	14.7%
	HGVs	443	1.3%	480	11.7%	277	14.3%
	Total Vehs	**9865**	**9.9%**	**6338**	**9.6%**	**10185**	**14.7%**
2017 DS1	Cars&LGVs	9939	16.4%	5488	2.5%	9884	14.4%
	HGVs	447	2.2%	480	11.6%	277	14.1%
	Total Vehs	**10386**	**15.7%**	**5968**	**3.2%**	**10161**	**14.4%**
2032 DM1	Cars&LGVs	10629	24.4%	6982	30.4%	11182	29.4%
	HGVs	468	6.9%	552	28.4%	295	21.6%
	Total Vehs	**11097**	**23.6%**	**7534**	**30.3%**	**11477**	**29.2%**
2032 DS1	Cars&LGVs	11461	34.2%	6493	21.3%	11088	28.3%
	HGVs	487	11.3%	551	28.2%	299	23.2%
	Total Vehs	**11948**	**33.1%**	**7044**	**21.8%**	**11387**	**28.2%**
2032 DM2	Cars&LGVs	10382	21.6%	6616	23.6%	10477	21.3%
	HGVs	429	-1.9%	510	18.5%	252	3.8%
	Total Vehs	**10812**	**20.4%**	**7126**	**23.2%**	**10729**	**20.8%**
2032 DS2	Cars&LGVs	10468	22.6%	6060	13.2%	10473	21.2%
	HGVs	432	-1.2%	509	18.3%	257	5.9%
	Total Vehs	**10900**	**21.4%**	**6568**	**13.6%**	**10730**	**20.8%**

Note: 1. Flow change compared to 2014 counts

6.3 Link Flow Traffic Changes

The forecast Design Flows for the Junction 28 road network has been reviewed in respect of hourly flows at the **mid-point between Bassaleg and Junction 28** (on the A467) and **between Junction 28 and Pont Ebbw** (on the A48). Table 6.2 summarises the changes in traffic flows which result from implementing the improvement scheme. It can be seen that 'Do Something 1' (without a new M4) is

the ‘worst-case’; that is, there are has higher flows than with a new M4 in place). In summary, the changes in flows show the following:

- Peak hour AM flows on the A467 in 2032 increase by around 40-50% with the scheme in place (compared to 2014 flows); this is equivalent to over 1000 pcu/hour. In the PM period, flows increase by a lesser amount at between 20% and 40%.
- Without the scheme in place, flows are lower in the AM peak (by around 30%), whereas in the PM peak flows are around 20%-40% higher with or without the improvement scheme.

It is concluded that introduction of junction improvements increases traffic throughput along the A467-A48 corridor by around 40% compared to the present day, and that these increased flows can be accommodated without the extensive blocking back that is currently observed at peak times.

Table 6.2: Selected Link Flows and Scenarios

Period (Hour)	Scenario	A467 (between Bassaleg and Junction 28) [2-way]		A48 (between Pont Ebbw and Junction 28) [2-way]	
		Flow/hr	Change	Flow/hr	Change
AM peak	2014	2491	-	2572	-
	DM1 2017	2281	-8%	2660	3%
	DS1 2017	3125	25%	3152	23%
	DM1 2032	2496	0%	2848	11%
	DM2 2032	2746	10%	2685	4%
	DS1 2032	3484	40%	3841	49%
	DS2 2032	3541	42%	3048	19%
Interpeak	2014	2249	-	2173	-
	DM1 2017	2356	5%	2343	8%
	DS1 2017	2141	-5%	2147	-1%
	DM1 2032	2807	25%	2740	26%
	DM2 2032	2846	27%	2531	16%
	DS1 2032	2540	13%	2634	21%
	DS2 2032	2635	17%	2369	9%
PM peak	2014	3180	-	2170	-
	DM1 2017	3110	-2%	3147	45%
	DS1 2017	3522	11%	2763	27%
	DM1 2032	3202	1%	3246	50%
	DM2 2032	3447	8%	2917	34%
	DS1 2032	3958	24%	3068	41%
	DS2 2032	4094	29%	2653	22%

7 Summary

7.1 Queuing

It is concluded that queues are significantly reduced with the improvement schemes in place (compared to the Do Minimum layouts), and particular conclusions are:

- Queues in the Do Minimum scenarios are significantly long – at over 100 vehicles at each of the three junctions.
- Some queues in the Do Minimum are blocking back to affect upstream junctions.
- With improvements in place, queues are significantly less than the Do Minimum, with queues typically up to 20 vehicles in places.

7.2 Journey times

With improvements in place, journey times in 2032 will be at a similar level to the present-day. Particular conclusions for journey times are:

- Current peak journey times average around 5-6 minutes.
- For 2032 Do Minimum scenarios, average journey times are around 10-15 minutes (i.e. an increase of up to 10 minutes over the present day)
- With improvements in place, average journey times in 2032 are typically less than 5 minutes, and hence much lower than Do Minimum, and marginally less than the present day.

7.3 Network Delays

Output results (from VISSIM modelling) for overall average network delay per vehicle show that delays with the improvements in place are less than 2 minutes in 2017, and less than 2.5 minutes in 2032. Delays without the scheme are significantly higher, at over 10 minutes per vehicle in 2032. The benefit in terms of reduced delays with the scheme in place is thus significant.

7.4 Traffic Flow Throughput

The reassignment effects (modelled in SATURN) indicate the following:

- There are higher flows on the local road network without the new M4 in place; that is, the ‘without new M4’ scenario is the worst-case traffic scenario.
- SATURN modelling indicates that the traffic throughput at the local road network connecting the three junctions increases by around 20-30% (in 2032) with the improvements in place (compared to the present day).
- The Do Something VISSIM model tests for 2032 show that the forecast flow increases to 2032 (of 20-30%) can be accommodated within junction capacity. VISSIM tests show clearly that increases in flow cannot be accommodated within the Do Minimum (i.e. existing) junction arrangements, and that queues including blocking back between junctions would occur.

Appendix A

Traffic Flow Matrices

2014 AM Base

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	102	3	65	222	3	5	106	73	17	155	17	256	52	0	**1076**
2 - Park View	43	0	2	0	1	0	0	0	1	0	9	36	215	0	0	**307**
3 - M4N	0	0	0	72	65	11	12	367	612	78	3421	11	197	132	0	**4977**
4 - B4237	7	0	0	0	72	286	11	5	10	2	41	0	5	121	5	**566**
5 - A48E	169	2	4	124	0	41	22	0	45	9	204	2	56	247	4	**929**
6 - B4239	26	0	13	149	74	0	16	0	9	1	34	0	15	181	2	**520**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	54	0	184	0	0	0	0	0	200	47	34	2	24	0	0	**546**
9 - A48W	109	0	283	46	94	0	1	233	0	18	5	4	10	6	0	**809**
10 - Cleppa Park	10	0	17	14	6	0	1	26	4	0	0	0	0	11	0	**90**
11 - M4W	207	1	3461	160	368	12	6	70	14	39	0	3	32	69	0	**4443**
12 - Court Crescent	32	24	8	0	0	0	0	0	0	0	0	0	21	0	0	**86**
13 - A468	217	500	93	19	24	1	0	10	3	2	29	8	2	5	0	**913**
14 - ONS	6	0	7	66	68	7	0	0	0	0	1	0	0	0	1	**155**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**881**	**629**	**4075**	**718**	**996**	**361**	**75**	**817**	**972**	**213**	**3932**	**83**	**833**	**823**	**13**	**15422**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	33	0	0	0	0	0	28	0	5	0	0	**70**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	2	0	0	**6**
3 - M4N	8	3	0	7	8	2	0	5	31	3	339	2	6	0	0	**414**
4 - B4237	4	0	4	0	2	4	0	0	0	0	12	0	0	0	0	**26**
5 - A48E	36	0	1	3	0	0	0	0	0	0	39	0	5	0	0	**83**
6 - B4239	0	0	3	7	2	0	0	0	0	0	1	0	1	1	0	**15**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	**3**
9 - A48W	0	0	27	0	0	0	0	2	0	0	0	0	0	0	0	**30**
10 - Cleppa Park	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	**21**
11 - M4W	28	0	307	1	26	0	0	0	0	0	0	0	20	0	0	**382**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	5	4	17	0	1	0	0	0	0	0	2	0	0	0	0	**29**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**84**	**7**	**367**	**18**	**73**	**6**	**0**	**7**	**52**	**4**	**421**	**2**	**41**	**1**	**0**	**1084**

2014 IP Base

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	45	38	110	143	2	1	40	26	12	238	3	94	8	1	**762**
2 - Park View	46	0	5	0	5	0	0	0	1	0	37	9	153	0	5	**260**
3 - M4N	0	0	0	32	34	9	1	93	118	31	1815	3	121	9	1	**2267**
4 - B4237	30	0	15	0	139	161	4	12	43	17	94	0	17	38	10	**581**
5 - A48E	167	0	44	75	0	21	3	17	105	3	165	2	63	26	7	**699**
6 - B4239	4	0	31	151	62	0	2	0	6	0	6	0	3	16	2	**284**
7 - IR	5	0	14	16	22	9	0	0	0	0	3	0	2	1	1	**74**
8 - Pencarn Way	32	15	115	0	0	0	0	0	76	47	15	0	17	0	1	**319**
9 - A48W	37	9	169	15	50	1	0	105	0	11	27	0	9	0	1	**435**
10 - Cleppa Park	5	0	23	2	8	0	0	41	9	0	11	0	1	0	1	**102**
11 - M4W	215	1	2110	128	267	8	1	38	11	12	0	3	64	9	2	**2868**
12 - Court Crescent	2	6	4	0	1	0	0	0	0	0	2	0	3	0	1	**20**
13 - A468	131	165	113	23	41	0	0	10	3	0	36	7	0	0	1	**530**
14 - ONS	4	0	11	12	18	7	0	0	0	0	2	0	2	0	1	**58**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**679**	**240**	**2693**	**573**	**799**	**220**	**12**	**357**	**397**	**133**	**2452**	**29**	**550**	**111**	**35**	**9279**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	32	0	0	0	0	0	29	0	0	0	0	**72**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
3 - M4N	11	1	0	8	12	0	0	3	12	2	321	0	16	0	0	**386**
4 - B4237	0	0	7	0	3	1	0	0	0	0	3	0	0	0	1	**16**
5 - A48E	24	0	8	3	0	1	0	0	0	0	38	0	4	0	0	**78**
6 - B4239	0	0	2	6	1	0	0	0	0	0	0	0	0	0	0	**9**
7 - IR	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
8 - Pencarn Way	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	**4**
9 - A48W	0	0	22	0	0	0	0	1	0	1	0	0	0	0	0	**24**
10 - Cleppa Park	0	0	4	0	0	0	0	0	21	0	0	0	0	0	0	**25**
11 - M4W	35	0	329	6	53	0	0	0	0	0	0	0	7	0	0	**431**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	18	0	1	0	0	0	0	0	1	0	0	0	0	**32**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**82**	**2**	**403**	**24**	**103**	**2**	**0**	**4**	**33**	**5**	**393**	**0**	**28**	**0**	**1**	**1080**

2014 PM Base

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	54	22	79	294	5	0	81	39	0	291	2	177	10	2	**1057**
2 - Park View	102	0	3	1	13	0	0	0	31	0	8	0	427	0	4	**589**
3 - M4N	0	0	0	44	0	6	0	176	336	47	3445	4	188	3	1	**4251**
4 - B4237	58	0	0	0	120	374	0	0	15	6	45	1	12	12	6	**648**
5 - A48E	227	1	2	107	0	26	0	0	0	0	388	1	35	7	7	**800**
6 - B4239	11	0	0	97	56	0	0	0	0	0	9	0	1	109	2	**286**
7 - IR	10	0	14	37	35	1	0	0	0	0	4	0	2	0	1	**105**
8 - Pencarn Way	113	5	248	0	0	0	0	0	178	25	80	1	38	0	1	**690**
9 - A48W	132	5	467	32	47	0	0	146	0	12	42	1	27	0	1	**912**
10 - Cleppa Park	47	4	60	41	19	0	0	32	7	0	16	0	18	0	2	**245**
11 - M4W	594	2	3135	76	205	9	0	54	9	0	0	4	161	7	1	**4258**
12 - Court Crescent	11	7	1	0	1	0	0	0	0	0	1	0	8	0	1	**30**
13 - A468	257	200	139	45	31	0	0	12	3	2	18	12	0	0	1	**720**
14 - ONS	59	0	81	210	202	9	0	0	0	0	25	0	9	0	3	**598**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**1621**	**277**	**4172**	**783**	**1037**	**431**	**0**	**502**	**618**	**93**	**4373**	**26**	**1103**	**148**	**33**	**15219**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	17	0	1	0	0	**43**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**4**
3 - M4N	19	0	0	2	3	0	0	0	14	1	233	0	5	0	1	**277**
4 - B4237	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	**4**
5 - A48E	10	0	0	3	0	2	0	0	0	0	6	0	1	0	0	**23**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	4	0	0	0	0	0	4	0	0	0	0	0	0	**8**
9 - A48W	3	0	14	0	0	0	0	1	0	0	0	0	0	0	0	**18**
10 - Cleppa Park	0	0	0	0	0	0	0	1	21	0	0	0	0	0	0	**22**
11 - M4W	10	0	263	2	30	0	0	0	0	0	0	0	8	0	0	**314**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	0	14	0	1	0	0	0	0	0	4	0	0	0	0	**23**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**49**	**0**	**305**	**12**	**46**	**4**	**0**	**2**	**39**	**1**	**262**	**0**	**17**	**1**	**1**	**739**

2017 AM DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	200	0	27	212	4	5	97	66	45	243	25	452	54	0	**1430**
2 - Park View	44	0	0	0	1	0	0	0	0	0	0	35	173	0	0	**252**
3 - M4N	0	0	0	75	71	17	12	338	658	247	3726	3	38	135	0	**5321**
4 - B4237	15	0	1	0	90	282	10	2	3	10	54	0	4	108	5	**584**
5 - A48E	191	3	2	139	0	48	23	2	64	47	282	2	59	254	4	**1121**
6 - B4239	33	0	16	138	79	0	16	0	13	12	57	0	13	179	2	**560**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	59	2	185	0	0	0	0	0	202	47	37	1	23	0	0	**557**
9 - A48W	131	0	339	56	101	0	1	236	0	20	7	4	10	6	0	**912**
10 - Cleppa Park	11	0	20	10	6	0	1	27	5	0	0	0	0	11	0	**91**
11 - M4W	250	4	3850	186	380	14	7	71	14	78	0	3	33	72	0	**4961**
12 - Court Crescent	38	21	3	0	0	0	0	0	0	0	0	0	21	0	0	**85**
13 - A468	429	393	49	0	22	1	0	8	4	8	32	8	2	4	0	**959**
14 - ONS	7	0	8	66	68	7	0	0	0	0	1	0	0	0	1	**159**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1207**	**623**	**4473**	**702**	**1032**	**373**	**75**	**780**	**1031**	**514**	**4440**	**82**	**830**	**824**	**13**	**16997**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	29	0	0	0	0	1	29	0	3	0	0	**66**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**5**
3 - M4N	8	3	0	7	8	2	0	4	30	4	324	2	6	0	0	**398**
4 - B4237	4	0	4	0	3	4	0	0	0	0	11	0	0	0	0	**26**
5 - A48E	31	0	1	3	0	0	0	0	0	1	39	0	3	0	0	**78**
6 - B4239	1	0	3	5	2	0	0	0	0	0	1	0	1	1	0	**14**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**3**
9 - A48W	2	0	26	0	0	0	0	2	0	0	0	0	0	0	0	**30**
10 - Cleppa Park	4	0	4	3	0	0	0	0	21	0	0	0	0	0	0	**33**
11 - M4W	31	0	294	0	33	0	0	0	0	0	0	0	19	0	0	**377**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	5	5	17	0	0	0	0	0	0	0	1	0	0	0	0	**28**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**88**	**8**	**356**	**18**	**77**	**6**	**0**	**6**	**51**	**6**	**407**	**2**	**35**	**1**	**0**	**1061**

2017 IP DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	45	40	93	197	2	1	41	37	11	234	4	122	7	1	**835**
2 - Park View	79	0	4	1	9	0	0	6	2	0	37	8	118	0	5	**269**
3 - M4N	0	0	0	46	34	7	1	103	204	30	2099	3	129	8	1	**2666**
4 - B4237	18	0	16	0	142	159	4	8	69	15	85	0	13	36	10	**576**
5 - A48E	223	2	42	75	0	21	3	26	110	3	223	2	67	26	7	**830**
6 - B4239	8	0	37	141	68	0	2	0	7	0	9	0	4	16	2	**293**
7 - IR	6	0	15	13	22	9	0	0	0	0	3	0	2	1	1	**72**
8 - Pencarn Way	37	39	89	0	0	0	0	0	71	47	16	0	14	0	1	**316**
9 - A48W	52	10	202	22	72	1	0	99	0	12	32	0	10	0	1	**515**
10 - Cleppa Park	15	3	43	11	9	0	0	41	14	0	14	0	2	0	1	**154**
11 - M4W	249	3	2502	120	272	9	1	39	20	11	0	3	64	9	2	**3305**
12 - Court Crescent	2	6	4	0	1	0	0	0	0	0	2	0	3	0	1	**20**
13 - A468	119	160	144	14	36	0	0	7	3	0	40	7	0	0	1	**532**
14 - ONS	5	0	12	10	18	7	0	0	0	0	3	0	2	0	1	**57**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**813**	**268**	**3150**	**554**	**886**	**216**	**12**	**371**	**537**	**131**	**2798**	**29**	**550**	**108**	**35**	**10458**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	31	0	0	0	0	0	31	0	0	0	0	**73**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
3 - M4N	11	1	0	8	12	3	0	3	0	33	285	0	16	0	0	**370**
4 - B4237	0	0	7	0	3	0	0	0	0	0	4	0	0	0	1	**15**
5 - A48E	23	0	8	2	0	1	0	0	0	0	61	0	4	0	0	**99**
6 - B4239	0	0	2	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	**4**
9 - A48W	0	0	19	0	0	0	0	1	0	1	0	0	0	0	0	**21**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**30**
11 - M4W	35	0	311	6	63	0	0	0	0	0	0	0	7	0	0	**423**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	18	0	1	0	0	0	0	0	0	0	0	0	0	**31**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**81**	**2**	**387**	**22**	**111**	**4**	**0**	**4**	**21**	**36**	**380**	**0**	**27**	**0**	**1**	**1076**

2017 PM DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	56	30	91	304	6	0	78	52	6	328	3	243	11	2	**1210**
2 - Park View	200	0	4	2	17	0	0	0	20	0	17	0	509	0	4	**773**
3 - M4N	0	0	0	82	0	33	0	207	350	95	3694	2	82	4	1	**4550**
4 - B4237	165	1	29	0	138	333	0	0	21	18	176	2	35	10	6	**934**
5 - A48E	239	1	46	107	0	26	0	0	101	14	422	1	37	7	7	**1009**
6 - B4239	58	2	22	212	33	0	0	0	15	8	96	0	5	109	2	**562**
7 - IR	7	0	32	33	28	1	0	0	0	0	6	0	2	0	1	**110**
8 - Pencarn Way	103	0	244	0	0	0	0	0	94	8	83	1	19	0	1	**554**
9 - A48W	158	1	602	72	52	0	0	143	0	12	47	1	31	0	1	**1120**
10 - Cleppa Park	49	1	62	39	22	0	0	36	18	0	9	0	11	0	2	**249**
11 - M4W	494	16	3569	92	226	17	0	62	1	11	0	4	165	8	1	**4666**
12 - Court Crescent	11	7	1	0	1	0	0	0	0	0	1	0	8	0	1	**30**
13 - A468	259	208	160	17	55	0	0	11	2	4	19	12	0	0	1	**748**
14 - ONS	42	1	180	190	157	8	0	0	0	0	36	0	9	0	3	**627**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**1786**	**293**	**4982**	**951**	**1048**	**424**	**0**	**538**	**675**	**174**	**4935**	**27**	**1156**	**149**	**33**	**17171**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	19	0	1	0	0	**44**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**4**
3 - M4N	19	0	0	2	3	0	0	0	13	2	209	0	5	0	1	**253**
4 - B4237	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	**3**
5 - A48E	13	0	0	3	0	2	0	0	0	1	30	0	1	0	0	**49**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	3	0	0	0	0	0	4	0	0	0	0	0	0	**8**
9 - A48W	2	0	9	0	0	0	0	1	0	0	0	0	0	0	0	**12**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**28**
11 - M4W	11	0	240	3	38	0	0	0	0	0	0	0	8	0	0	**300**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	0	14	0	1	0	0	0	0	0	3	0	0	0	0	**21**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**52**	**0**	**282**	**12**	**54**	**2**	**0**	**2**	**38**	**3**	**262**	**0**	**16**	**1**	**1**	**726**

2032 AM DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	301	0	47	197	3	4	116	77	33	255	20	402	43	0	**1497**
2 - Park View	48	0	5	3	2	0	0	1	1	0	8	35	154	0	0	**257**
3 - M4N	0	0	0	18	25	157	11	388	595	188	4081	5	113	116	0	**5697**
4 - B4237	2	0	5	0	311	298	9	8	15	17	99	0	0	97	5	**866**
5 - A48E	157	1	3	124	0	140	22	22	141	56	310	2	58	239	4	**1278**
6 - B4239	39	0	24	150	94	0	20	0	9	7	102	0	13	221	2	**682**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	96	2	180	5	4	0	0	0	244	69	43	1	22	0	0	**666**
9 - A48W	172	23	391	75	121	4	1	299	0	15	4	4	12	6	0	**1127**
10 - Cleppa Park	15	0	18	17	7	0	1	37	8	0	3	0	0	8	0	**115**
11 - M4W	296	22	4336	141	419	9	6	217	8	55	0	3	32	67	0	**5612**
12 - Court Crescent	68	0	0	1	1	0	0	0	0	0	0	0	21	0	0	**92**
13 - A468	584	268	46	10	19	0	0	14	8	6	14	8	2	3	0	**983**
14 - ONS	13	0	3	70	71	7	0	0	0	0	2	0	0	0	1	**167**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1491**	**618**	**5012**	**662**	**1275**	**618**	**73**	**1102**	**1107**	**446**	**4920**	**78**	**831**	**801**	**13**	**19046**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	1	3	0	15	0	0	1	0	1	25	0	1	0	0	**48**
2 - Park View	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**4**
3 - M4N	8	3	0	6	8	1	0	6	28	4	392	2	13	0	0	**471**
4 - B4237	3	0	4	0	5	5	0	0	0	0	13	0	0	0	0	**31**
5 - A48E	17	0	1	3	0	1	0	0	4	0	15	0	2	0	0	**43**
6 - B4239	9	0	3	7	3	0	0	0	0	0	12	0	2	1	0	**36**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	10	0	7	1	0	0	0	0	1	0	1	0	0	0	0	**20**
9 - A48W	7	1	45	1	8	0	0	3	0	0	0	0	0	0	0	**65**
10 - Cleppa Park	2	0	3	2	0	0	0	1	21	0	0	0	0	0	0	**29**
11 - M4W	34	0	339	0	30	0	0	0	0	0	0	0	18	0	0	**421**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	6	7	15	0	0	0	0	0	0	0	0	0	0	0	0	**28**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**98**	**12**	**422**	**20**	**71**	**7**	**0**	**10**	**55**	**5**	**459**	**2**	**38**	**1**	**0**	**1199**

2032 IP DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	44	104	69	217	0	1	64	45	11	277	4	108	5	1	**951**
2 - Park View	118	0	4	1	8	0	0	6	2	0	37	8	116	0	5	**304**
3 - M4N	0	0	0	66	49	11	1	175	293	35	2728	3	152	10	1	**3523**
4 - B4237	23	0	17	0	199	163	4	42	74	14	75	0	13	35	10	**669**
5 - A48E	295	1	41	90	0	21	3	0	118	4	289	2	77	26	7	**975**
6 - B4239	10	0	122	173	91	0	2	0	0	0	15	0	3	16	2	**434**
7 - IR	6	0	15	11	22	9	0	0	0	0	4	0	2	1	1	**71**
8 - Pencarn Way	71	26	70	0	0	0	0	0	110	47	38	1	15	0	1	**378**
9 - A48W	91	23	266	28	67	1	0	114	0	13	41	1	13	0	1	**659**
10 - Cleppa Park	13	3	42	9	9	0	0	41	15	0	16	0	2	0	1	**152**
11 - M4W	311	3	3183	126	325	12	1	55	21	12	0	3	66	10	2	**4131**
12 - Court Crescent	2	5	4	0	1	0	0	0	0	0	2	0	3	0	1	**20**
13 - A468	117	149	182	9	28	0	0	5	4	0	47	7	0	0	1	**549**
14 - ONS	5	0	12	9	18	7	0	0	0	0	3	0	2	0	1	**56**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**1062**	**256**	**4063**	**600**	**1040**	**225**	**12**	**502**	**681**	**136**	**3571**	**29**	**573**	**107**	**35**	**12893**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	32	0	0	0	0	0	36	0	0	0	0	**79**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
3 - M4N	11	1	0	8	12	1	0	18	8	27	333	0	16	0	0	**433**
4 - B4237	0	0	7	0	3	0	0	0	0	0	5	0	0	0	1	**16**
5 - A48E	25	0	8	6	0	1	0	0	0	0	75	0	4	0	0	**119**
6 - B4239	0	0	2	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	1	3	0	0	0	0	0	2	2	0	0	0	0	0	**9**
9 - A48W	1	0	19	0	0	0	0	1	0	1	0	0	0	0	0	**22**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**30**
11 - M4W	42	0	364	5	78	0	0	0	0	0	0	0	6	0	0	**496**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	19	0	3	0	0	0	0	0	0	0	0	0	0	**34**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**90**	**3**	**443**	**25**	**129**	**2**	**0**	**19**	**31**	**30**	**449**	**0**	**28**	**0**	**1**	**1249**

2032 PM DM1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	56	11	93	274	4	0	87	65	6	432	5	358	0	2	**1393**
2 - Park View	254	0	2	2	17	0	0	0	20	0	15	0	505	0	4	**820**
3 - M4N	0	0	0	60	0	65	0	177	459	99	4330	0	3	15	1	**5210**
4 - B4237	108	0	22	0	189	338	0	0	26	16	126	2	25	8	6	**865**
5 - A48E	252	1	20	107	0	26	0	0	92	9	497	0	36	10	7	**1058**
6 - B4239	73	4	48	329	91	0	0	0	5	5	213	1	16	109	2	**896**
7 - IR	8	0	30	35	28	1	0	0	0	0	7	0	1	0	1	**111**
8 - Pencarn Way	127	0	371	0	0	0	0	0	288	7	80	1	22	0	1	**897**
9 - A48W	186	1	653	69	37	0	0	168	0	13	47	1	32	0	1	**1209**
10 - Cleppa Park	60	1	61	26	8	0	0	80	17	0	23	0	10	0	2	**287**
11 - M4W	562	15	4082	113	284	29	0	75	1	12	0	4	170	10	1	**5359**
12 - Court Crescent	11	7	2	0	1	0	0	0	0	0	1	0	8	0	1	**31**
13 - A468	283	231	174	36	12	0	0	12	10	3	22	12	0	0	1	**796**
14 - ONS	45	1	170	198	162	7	0	0	0	0	40	0	8	0	3	**634**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**1969**	**316**	**5645**	**1080**	**1118**	**472**	**0**	**599**	**983**	**172**	**5834**	**27**	**1196**	**151**	**33**	**19594**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	20	0	1	0	0	**45**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**4**
3 - M4N	19	0	0	2	3	0	0	0	14	2	243	0	5	0	1	**288**
4 - B4237	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	**4**
5 - A48E	10	0	0	3	0	2	0	0	1	1	34	0	0	0	0	**51**
6 - B4239	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	**3**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	1	0	6	0	0	0	0	0	4	0	0	0	0	0	0	**10**
9 - A48W	3	0	9	0	0	0	0	1	0	0	0	0	0	0	0	**13**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**27**
11 - M4W	12	0	285	3	44	0	0	0	0	0	0	0	7	0	0	**351**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	0	15	0	2	0	0	0	0	0	3	0	0	0	0	**24**
14 - ONS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**52**	**0**	**333**	**12**	**62**	**2**	**0**	**2**	**40**	**3**	**300**	**0**	**16**	**1**	**1**	**823**

2032 AM DM2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	266	21	61	245	0	2	80	73	19	249	14	315	27	0	**1372**
2 - Park View	48	0	8	4	3	0	0	0	1	0	0	34	163	0	0	**262**
3 - M4N	0	1	0	68	179	168	14	429	560	217	2910	4	129	157	0	**4836**
4 - B4237	19	0	4	0	272	278	10	5	24	19	25	0	4	106	5	**771**
5 - A48E	180	2	4	152	0	264	23	30	126	51	59	5	84	250	4	**1234**
6 - B4239	71	3	38	139	158	0	16	0	65	36	6	3	36	178	2	**753**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	93	2	177	4	4	0	0	0	226	61	50	1	21	0	0	**639**
9 - A48W	150	8	379	56	155	4	1	283	0	14	13	4	12	7	0	**1084**
10 - Cleppa Park	14	0	20	13	8	0	1	38	8	0	2	0	0	10	0	**115**
11 - M4W	329	4	2395	120	46	21	6	223	32	97	0	3	32	70	0	**3379**
12 - Court Crescent	39	7	6	1	5	0	0	0	0	0	0	0	21	0	0	**80**
13 - A468	423	350	109	26	47	0	0	8	7	3	7	8	2	1	0	**990**
14 - ONS	13	0	10	59	76	7	0	0	0	0	2	0	0	0	1	**167**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1378**	**643**	**3173**	**706**	**1200**	**742**	**73**	**1096**	**1121**	**517**	**3323**	**76**	**820**	**805**	**13**	**15688**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	19	0	0	1	0	0	25	0	0	0	0	**49**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**4**
3 - M4N	8	3	0	7	13	2	0	5	24	5	168	2	11	0	0	**246**
4 - B4237	3	0	4	0	4	4	0	0	0	0	10	0	0	0	0	**26**
5 - A48E	23	0	1	3	0	9	0	0	4	0	3	0	4	0	0	**47**
6 - B4239	10	0	3	7	8	0	0	0	2	0	3	0	3	1	0	**37**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	11	0	3	1	1	0	0	0	1	0	1	0	0	0	0	**17**
9 - A48W	7	0	28	1	19	0	0	4	0	0	0	0	0	0	0	**59**
10 - Cleppa Park	2	0	1	2	2	0	0	2	21	0	0	0	0	0	0	**30**
11 - M4W	34	0	122	0	0	0	0	0	0	0	0	0	18	0	0	**174**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	6	6	17	0	0	0	0	0	0	0	0	0	0	0	0	**28**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**104**	**9**	**183**	**21**	**67**	**15**	**0**	**12**	**52**	**5**	**211**	**2**	**39**	**1**	**0**	**720**

2032 IP DM2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	44	126	58	238	0	1	52	40	11	270	4	112	5	1	**962**
2 - Park View	105	0	7	1	8	0	0	6	2	0	37	8	114	0	5	**290**
3 - M4N	0	0	0	62	68	17	1	157	238	34	1474	2	127	11	1	**2193**
4 - B4237	24	0	16	0	213	146	4	68	81	14	87	0	14	35	10	**713**
5 - A48E	347	2	49	105	0	21	3	61	122	4	92	3	111	26	7	**951**
6 - B4239	10	0	54	177	147	0	2	0	7	0	24	0	3	16	2	**443**
7 - IR	6	0	15	11	23	9	0	0	0	0	4	0	2	1	1	**72**
8 - Pencarn Way	66	9	108	0	0	0	0	0	96	47	23	1	14	0	1	**364**
9 - A48W	94	8	234	30	80	1	0	110	0	13	36	1	14	0	1	**622**
10 - Cleppa Park	13	0	44	10	12	0	0	41	15	0	15	0	2	0	1	**152**
11 - M4W	300	3	1601	97	95	11	1	61	21	11	0	3	65	10	2	**2283**
12 - Court Crescent	2	5	5	0	0	0	0	0	0	0	2	0	3	0	1	**20**
13 - A468	116	147	155	10	62	0	0	5	4	0	46	7	0	0	1	**552**
14 - ONS	5	0	12	9	18	7	0	0	0	0	3	0	2	0	1	**56**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**1087**	**219**	**2423**	**576**	**972**	**213**	**12**	**561**	**625**	**135**	**2113**	**30**	**582**	**108**	**35**	9692

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	32	0	0	0	0	0	35	0	0	0	0	**79**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
3 - M4N	11	1	0	8	12	1	0	5	12	1	121	0	16	0	0	**187**
4 - B4237	0	0	7	0	3	0	0	0	0	0	5	0	0	0	1	**16**
5 - A48E	27	0	8	6	0	1	0	0	37	27	45	0	6	0	0	**157**
6 - B4239	0	0	2	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	1	3	0	0	0	0	0	2	2	0	0	0	0	0	**9**
9 - A48W	1	0	17	0	2	0	0	1	0	1	0	0	0	0	0	**22**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**30**
11 - M4W	42	0	115	5	34	0	0	0	0	0	0	0	6	0	0	**202**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	15	0	7	0	0	0	0	0	0	0	0	0	0	**34**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**93**	**3**	**187**	**25**	**91**	**2**	**0**	**6**	**72**	**30**	**208**	**0**	**28**	**0**	**1**	746

2032 PM DM2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	56	145	82	345	3	0	82	66	6	378	4	273	0	2	**1442**
2 - Park View	262	0	10	2	18	0	0	0	20	0	15	0	494	0	4	**824**
3 - M4N	0	0	0	99	14	40	0	230	357	106	2411	1	0	15	1	**3274**
4 - B4237	111	0	38	0	188	335	0	5	26	16	148	2	30	9	6	**913**
5 - A48E	333	2	92	44	0	26	0	0	112	16	57	1	83	8	7	**781**
6 - B4239	58	6	63	178	146	0	0	0	1	1	277	0	16	109	2	**857**
7 - IR	6	0	33	33	30	1	0	0	0	0	7	0	1	0	1	**113**
8 - Pencarn Way	106	0	357	0	0	0	0	0	188	7	80	0	18	0	1	**758**
9 - A48W	186	1	674	67	59	0	0	138	0	12	56	1	31	0	1	**1226**
10 - Cleppa Park	50	1	59	39	24	0	0	35	16	0	14	0	10	0	2	**249**
11 - M4W	527	15	2506	64	29	27	0	97	1	12	0	4	166	10	1	**3457**
12 - Court Crescent	11	6	2	0	1	0	0	0	0	0	1	0	8	0	1	**30**
13 - A468	271	179	229	8	55	0	0	10	8	3	19	12	0	0	1	**797**
14 - ONS	34	1	190	188	173	7	0	0	0	0	38	0	8	0	3	**642**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**1955**	**267**	**4400**	**816**	**1097**	**440**	**0**	**597**	**797**	**178**	**3500**	**26**	**1137**	**151**	**33**	**15394**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	20	0	1	0	0	**45**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**3**
3 - M4N	19	0	0	2	3	0	0	2	12	2	89	0	5	0	1	**134**
4 - B4237	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	**4**
5 - A48E	11	0	0	3	0	2	0	0	3	1	9	0	2	0	0	**30**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	1	0	5	0	0	0	0	0	4	0	0	0	0	0	0	**10**
9 - A48W	3	0	9	0	1	0	0	1	0	0	0	0	0	0	0	**13**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**27**
11 - M4W	12	0	73	2	25	0	0	0	0	0	0	0	7	0	0	**119**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	0	9	0	8	0	0	0	0	0	3	0	0	0	0	**24**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**52**	**0**	**111**	**11**	**51**	**2**	**0**	**4**	**40**	**3**	**121**	**0**	**16**	**1**	**1**	**413**

2017 AM DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	100	19	125	451	5	6	119	128	77	513	20	374	61	0	**1998**
2 - Park View	43	0	0	0	7	0	0	0	0	0	0	36	189	0	0	**276**
3 - M4N	0	0	0	48	50	10	11	308	566	218	3399	4	67	120	0	**4801**
4 - B4237	12	0	1	0	77	328	12	19	3	12	35	0	4	136	5	**643**
5 - A48E	222	4	9	188	0	41	22	0	85	72	342	3	82	237	4	**1311**
6 - B4239	3	0	5	143	76	0	16	0	3	0	0	0	4	179	2	**431**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	57	2	178	0	9	0	0	0	204	47	32	2	23	0	0	**555**
9 - A48W	121	0	306	45	116	0	1	255	0	17	5	4	11	6	0	**887**
10 - Cleppa Park	15	0	21	16	9	0	1	27	4	0	0	0	0	11	0	**105**
11 - M4W	240	4	3582	148	519	13	6	49	2	45	0	3	34	67	0	**4711**
12 - Court Crescent	34	20	6	0	1	0	0	0	0	0	0	0	21	0	0	**84**
13 - A468	327	443	44	20	46	1	0	10	4	9	34	8	2	5	0	**953**
14 - ONS	7	0	0	73	69	7	0	0	0	0	1	0	0	0	1	**159**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1081**	**573**	**4169**	**811**	**1433**	**405**	**75**	**787**	**999**	**497**	**4362**	**80**	**811**	**823**	**13**	**16920**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	30	0	0	0	0	1	30	0	3	0	0	**68**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**5**
3 - M4N	8	3	0	7	8	1	0	4	23	3	325	2	6	0	0	**390**
4 - B4237	4	0	4	0	2	5	0	0	1	1	11	0	0	1	0	**28**
5 - A48E	32	0	1	3	0	0	0	0	6	1	40	0	4	0	0	**87**
6 - B4239	0	0	3	5	1	0	0	0	0	0	0	0	0	1	0	**10**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	**3**
9 - A48W	0	0	24	0	0	0	0	2	0	0	0	0	0	0	0	**26**
10 - Cleppa Park	6	0	6	5	1	0	0	0	21	0	0	0	0	0	0	**40**
11 - M4W	31	0	293	0	34	0	0	0	0	0	0	0	19	0	0	**377**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	5	4	17	0	0	0	0	0	0	0	1	0	0	0	0	**28**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**88**	**7**	**356**	**20**	**78**	**6**	**0**	**6**	**51**	**6**	**408**	**2**	**35**	**2**	**0**	**1065**

2017 IP DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	46	38	100	199	5	1	47	19	35	258	4	119	7	1	**880**
2 - Park View	42	0	4	1	8	0	0	6	1	0	37	10	212	0	5	**326**
3 - M4N	0	0	0	43	32	5	1	98	92	140	1917	1	33	8	1	**2370**
4 - B4237	0	0	1	0	134	161	4	8	10	63	52	0	9	36	10	**489**
5 - A48E	194	1	41	56	0	21	3	25	63	59	222	2	62	26	7	**782**
6 - B4239	4	0	16	164	52	0	2	0	4	0	5	0	2	16	2	**266**
7 - IR	5	0	12	15	22	9	0	0	0	0	3	0	2	1	1	**71**
8 - Pencarn Way	37	10	116	0	3	0	0	0	71	47	16	0	15	0	1	**316**
9 - A48W	29	5	122	18	59	0	0	65	0	4	0	0	9	0	1	**312**
10 - Cleppa Park	20	0	51	13	10	0	0	41	14	0	6	0	3	0	1	**158**
11 - M4W	243	3	2353	119	249	6	1	76	5	34	0	3	64	10	2	**3168**
12 - Court Crescent	2	6	4	0	1	0	0	0	0	0	2	0	3	0	1	**19**
13 - A468	130	165	117	15	41	0	0	8	0	4	35	7	0	0	1	**524**
14 - ONS	4	0	10	12	18	7	0	0	0	0	2	0	2	0	1	**56**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**711**	**236**	**2885**	**563**	**834**	**215**	**12**	**374**	**279**	**386**	**2555**	**29**	**536**	**107**	**35**	**9758**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	31	0	0	0	0	0	31	0	0	0	0	**73**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
3 - M4N	11	1	0	8	12	0	0	3	0	33	284	0	16	0	0	**367**
4 - B4237	0	0	7	0	3	1	0	0	0	0	4	0	0	0	1	**15**
5 - A48E	26	0	8	2	0	1	0	0	0	0	61	0	4	0	0	**102**
6 - B4239	0	0	1	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	**4**
9 - A48W	0	0	19	0	0	0	0	1	0	1	0	0	0	0	0	**21**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**30**
11 - M4W	35	0	312	6	63	0	0	0	0	0	0	0	7	0	0	**424**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	4	15	0	1	0	0	0	0	0	0	0	0	0	0	**31**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**83**	**6**	**383**	**23**	**110**	**2**	**0**	**4**	**21**	**36**	**380**	**0**	**27**	**0**	**1**	**1076**

2017 PM DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	55	23	100	346	5	0	75	50	6	340	1	148	10	2	**1162**
2 - Park View	100	0	2	2	21	0	0	0	20	0	17	0	435	0	4	**602**
3 - M4N	0	0	0	72	7	6	0	231	347	97	3483	4	224	3	1	**4475**
4 - B4237	114	0	3	0	108	359	0	0	13	10	98	2	29	12	6	**753**
5 - A48E	272	1	10	112	0	26	0	0	108	25	477	1	42	7	7	**1089**
6 - B4239	7	1	1	185	81	0	0	0	0	0	93	0	0	109	2	**479**
7 - IR	10	0	6	35	46	1	0	0	0	0	5	0	2	0	1	**107**
8 - Pencarn Way	123	0	245	0	0	0	0	0	132	8	80	1	37	0	1	**627**
9 - A48W	154	1	443	11	90	0	0	191	0	4	16	1	37	0	1	**948**
10 - Cleppa Park	62	1	73	3	26	0	0	129	21	0	14	0	19	0	2	**351**
11 - M4W	764	16	3332	98	248	11	0	18	1	17	0	5	185	8	1	**4704**
12 - Court Crescent	11	7	1	0	1	0	0	0	0	0	1	0	8	0	1	**29**
13 - A468	256	224	134	7	68	0	0	10	2	4	17	12	0	0	1	**735**
14 - ONS	59	1	35	202	264	8	0	0	0	0	28	0	9	0	3	**608**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**1932**	**307**	**4309**	**840**	**1321**	**417**	**0**	**654**	**694**	**172**	**4668**	**28**	**1175**	**149**	**33**	16699

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	19	0	1	0	0	**44**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**4**
3 - M4N	19	0	0	2	3	0	0	0	13	2	209	0	5	0	1	**253**
4 - B4237	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	**3**
5 - A48E	13	0	0	3	0	2	0	0	0	1	31	0	1	0	0	**50**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	3	0	0	0	0	0	4	0	0	0	0	0	0	**7**
9 - A48W	2	0	9	0	0	0	0	1	0	0	0	0	0	0	0	**12**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**28**
11 - M4W	11	0	240	2	39	0	0	0	0	0	0	0	8	0	0	**300**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	6	8	0	1	0	0	0	0	0	3	0	0	0	0	**21**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**52**	**6**	**275**	**12**	**54**	**2**	**0**	**2**	**38**	**3**	**262**	**0**	**16**	**1**	**1**	725

2032 AM DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	153	51	107	477	17	6	190	155	74	33	18	360	66	0	**1708**
2 - Park View	43	0	0	0	2	0	0	0	0	0	0	35	160	0	0	**240**
3 - M4N	0	0	0	43	90	85	7	329	511	150	4132	5	110	77	0	**5539**
4 - B4237	10	0	0	0	131	390	13	0	34	28	32	0	5	144	5	**793**
5 - A48E	242	4	4	191	0	172	25	17	259	128	450	2	83	275	4	**1857**
6 - B4239	7	0	13	162	124	0	16	0	3	0	0	0	5	181	2	**513**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	72	1	177	4	10	0	0	0	250	47	24	1	21	0	0	**607**
9 - A48W	126	0	312	43	124	1	0	353	0	12	0	4	10	3	0	**990**
10 - Cleppa Park	24	0	35	17	12	0	1	37	5	0	4	0	1	7	0	**143**
11 - M4W	330	14	4200	182	618	10	5	140	9	33	0	3	36	57	0	**5638**
12 - Court Crescent	36	18	1	0	2	0	0	1	0	0	0	0	21	0	0	**80**
13 - A468	421	423	40	3	40	1	0	16	9	7	29	8	2	3	0	**1002**
14 - ONS	13	0	0	82	74	7	0	0	0	0	1	0	0	0	1	**177**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1325**	**614**	**4833**	**837**	**1707**	**683**	**74**	**1084**	**1235**	**479**	**4705**	**77**	**815**	**813**	**13**	19293

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	30	0	0	2	0	1	31	0	0	0	0	**67**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	4	0	0	**8**
3 - M4N	8	3	0	7	8	1	0	5	26	4	401	2	6	0	0	**470**
4 - B4237	3	0	4	0	2	5	0	0	0	0	11	0	0	1	0	**28**
5 - A48E	31	0	1	3	0	1	0	0	7	0	30	0	4	0	0	**77**
6 - B4239	0	0	3	9	3	0	0	0	0	0	0	0	0	0	0	**15**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	10	0	5	1	0	0	0	0	2	0	0	0	0	0	0	**19**
9 - A48W	4	0	39	0	8	0	0	3	0	0	0	0	0	0	0	**54**
10 - Cleppa Park	4	0	5	3	1	0	0	1	21	0	0	0	0	0	0	**34**
11 - M4W	35	0	341	0	31	0	0	0	0	0	0	0	18	0	0	**426**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	6	6	15	0	0	0	0	0	0	0	0	0	0	0	0	**28**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**104**	**10**	**418**	**23**	**85**	**7**	**0**	**10**	**56**	**5**	**473**	**2**	**35**	**1**	**0**	1229

2032 IP DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	45	45	97	234	2	1	79	33	34	284	4	123	7	1	**990**
2 - Park View	42	0	4	1	8	0	0	6	1	0	37	9	204	0	5	**316**
3 - M4N	0	0	0	55	38	6	1	160	142	142	2350	2	53	8	1	**2957**
4 - B4237	4	0	4	0	197	149	4	59	23	63	52	0	9	35	10	**610**
5 - A48E	244	1	41	68	0	21	3	65	91	71	303	2	73	26	7	**1018**
6 - B4239	4	0	16	199	84	0	2	0	4	0	6	0	2	16	2	**335**
7 - IR	5	0	12	14	22	9	0	0	0	0	4	0	2	1	1	**71**
8 - Pencarn Way	71	10	163	0	0	0	0	0	94	47	21	1	17	0	1	**425**
9 - A48W	52	5	128	19	45	0	0	82	0	3	0	1	12	0	1	**347**
10 - Cleppa Park	22	0	58	11	11	0	0	41	15	0	5	0	3	0	1	**168**
11 - M4W	298	3	2846	118	319	11	1	96	5	37	0	3	67	11	2	**3818**
12 - Court Crescent	2	6	4	0	1	0	0	0	0	0	2	0	3	0	1	**19**
13 - A468	120	155	154	13	36	0	0	7	1	4	39	7	0	0	1	**538**
14 - ONS	4	0	10	11	18	7	0	0	0	0	3	0	2	0	1	**56**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**871**	**225**	**3484**	**615**	**1019**	**207**	**12**	**596**	**410**	**402**	**3105**	**30**	**569**	**107**	**35**	**11688**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	32	0	0	0	0	0	36	0	0	0	0	**79**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
3 - M4N	11	1	0	8	12	1	0	18	8	27	332	0	16	0	0	**433**
4 - B4237	0	0	7	0	3	0	0	0	0	0	4	0	0	0	1	**15**
5 - A48E	27	0	8	6	0	1	0	0	0	0	75	0	4	0	0	**121**
6 - B4239	0	0	1	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	4	0	0	0	0	0	2	2	0	0	0	0	0	**9**
9 - A48W	0	0	19	0	0	0	0	1	0	1	0	0	0	0	0	**21**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**29**
11 - M4W	42	0	365	5	78	0	0	0	0	0	0	0	6	0	0	**496**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	19	0	3	0	0	0	0	0	0	0	0	0	0	**34**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**92**	**2**	**443**	**25**	**129**	**2**	**0**	**19**	**31**	**30**	**448**	**0**	**28**	**0**	**1**	**1248**

2032 PM DS1

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	55	28	108	365	5	0	84	76	6	446	2	162	10	2	**1347**
2 - Park View	88	0	2	2	19	0	0	0	20	0	15	0	476	0	4	**627**
3 - M4N	0	0	0	74	7	15	0	246	426	100	4089	4	181	3	1	**5145**
4 - B4237	52	0	0	0	131	349	0	0	7	9	0	2	27	9	6	**593**
5 - A48E	334	2	19	45	0	26	0	0	132	23	630	2	54	10	7	**1283**
6 - B4239	51	5	23	344	187	0	0	0	0	0	102	0	14	109	2	**838**
7 - IR	10	0	19	37	33	1	0	0	0	0	5	0	1	0	1	**107**
8 - Pencarn Way	133	0	272	0	0	0	0	0	301	7	80	0	21	0	1	**816**
9 - A48W	191	1	413	26	37	0	0	259	0	12	42	1	42	0	1	**1025**
10 - Cleppa Park	71	1	73	3	9	0	0	168	22	0	4	0	20	0	2	**373**
11 - M4W	886	16	3844	104	298	19	0	24	0	10	0	5	210	9	1	**5428**
12 - Court Crescent	10	7	1	0	1	0	0	0	0	0	1	0	8	0	1	**30**
13 - A468	262	235	157	0	57	0	0	10	9	3	20	12	0	0	1	**766**
14 - ONS	58	1	110	212	186	7	0	0	0	0	27	0	8	0	3	**612**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**2147**	**324**	**4962**	**967**	**1345**	**423**	**0**	**792**	**992**	**171**	**5460**	**27**	**1226**	**150**	**33**	**19021**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	25	0	1	0	0	**50**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**4**
3 - M4N	19	0	0	2	3	0	0	2	14	2	251	0	5	0	1	**298**
4 - B4237	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**3**
5 - A48E	10	0	0	3	0	2	0	0	1	1	34	0	0	0	0	**51**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	1	0	5	0	0	0	0	0	4	0	0	0	0	0	0	**10**
9 - A48W	3	0	9	0	0	0	0	1	0	0	0	0	0	0	0	**13**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**27**
11 - M4W	12	0	281	2	44	0	0	0	0	0	0	0	7	0	0	**347**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	6	8	0	2	0	0	0	0	0	3	0	0	0	0	**23**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**52**	**6**	**319**	**12**	**63**	**2**	**0**	**4**	**40**	**3**	**313**	**0**	**16**	**1**	**1**	**831**

2032 AM DS2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	97	56	112	492	7	6	189	143	67	64	16	363	62	0	**1673**
2 - Park View	43	0	0	0	2	0	0	0	0	0	0	34	182	0	0	**261**
3 - M4N	0	0	0	31	112	62	8	396	413	160	2660	0	6	83	0	**3931**
4 - B4237	17	0	2	0	171	394	13	0	13	16	84	0	5	142	5	**863**
5 - A48E	239	6	10	221	0	73	24	0	342	127	121	10	150	262	4	**1589**
6 - B4239	3	0	6	146	129	0	16	0	3	0	0	0	4	176	2	**485**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	83	2	186	0	0	0	0	0	210	47	6	1	23	0	0	**560**
9 - A48W	127	0	268	46	196	0	0	348	0	13	7	4	11	3	0	**1024**
10 - Cleppa Park	21	0	27	14	13	0	1	27	5	0	1	0	0	11	0	**120**
11 - M4W	313	4	2238	169	53	21	6	132	1	61	0	3	36	68	0	**3104**
12 - Court Crescent	33	17	0	0	10	0	0	1	0	0	0	0	21	0	0	**84**
13 - A468	376	410	13	0	90	1	0	24	13	10	50	8	2	5	0	**1002**
14 - ONS	13	0	1	73	70	7	0	0	0	0	2	0	0	0	1	**166**
15 - Tredegar Park	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	**6**
Destination Total	**1267**	**536**	**2806**	**816**	**1340**	**565**	**74**	**1116**	**1143**	**502**	**2995**	**78**	**803**	**812**	**13**	**14866**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	3	0	34	0	0	2	0	1	32	0	0	0	0	**72**
2 - Park View	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**4**
3 - M4N	8	3	0	7	8	1	0	4	23	3	168	2	6	0	0	**234**
4 - B4237	3	0	4	0	2	5	0	0	0	0	10	0	0	1	0	**25**
5 - A48E	32	0	1	3	0	0	0	0	6	1	17	0	7	0	0	**67**
6 - B4239	0	0	3	7	5	0	0	0	0	0	0	0	0	0	0	**16**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	11	0	3	0	2	0	0	0	0	0	1	0	0	0	0	**17**
9 - A48W	0	0	21	0	19	0	0	3	0	0	0	0	0	0	0	**43**
10 - Cleppa Park	5	0	2	4	4	0	0	0	21	0	0	0	0	0	0	**37**
11 - M4W	37	0	126	0	0	0	0	0	0	0	0	0	18	0	0	**182**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**
13 - A468	6	4	15	0	2	0	0	0	0	0	0	0	0	0	0	**26**
14 - ONS	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**104**	**7**	**180**	**21**	**77**	**6**	**0**	**9**	**51**	**5**	**229**	**2**	**34**	**1**	**0**	**727**

2032 IP DS2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	45	40	105	282	2	1	77	28	34	271	4	116	7	1	**1015**
2 - Park View	42	0	4	1	8	0	0	7	1	0	37	9	180	0	5	**293**
3 - M4N	0	0	0	51	58	9	1	133	108	141	1265	2	51	8	1	**1827**
4 - B4237	4	0	5	0	203	155	4	57	21	62	52	0	9	35	10	**617**
5 - A48E	286	1	40	84	0	21	3	85	78	68	102	3	94	26	7	**898**
6 - B4239	4	0	12	191	112	0	2	0	4	0	5	0	2	16	2	**352**
7 - IR	5	0	12	14	23	9	0	0	0	0	4	0	2	1	1	**71**
8 - Pencarn Way	74	10	147	0	0	0	0	0	92	47	23	1	18	0	1	**413**
9 - A48W	55	5	114	21	47	0	0	69	0	3	0	1	12	0	1	**329**
10 - Cleppa Park	21	0	55	11	12	0	0	41	15	0	5	0	3	0	1	**165**
11 - M4W	293	3	1464	92	88	11	1	109	5	37	0	3	67	11	2	**2186**
12 - Court Crescent	2	6	4	0	1	0	0	0	0	0	2	0	3	0	1	**19**
13 - A468	120	155	86	18	87	0	0	8	1	4	40	7	0	0	1	**527**
14 - ONS	4	0	9	11	18	7	0	0	0	0	3	0	2	0	1	**56**
15 - Tredegar Park	0	0	0	8	7	1	0	0	0	0	0	0	0	4	0	**20**
Destination Total	**911**	**225**	**1992**	**607**	**947**	**216**	**12**	**586**	**354**	**398**	**1809**	**30**	**559**	**107**	**35**	**8788**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	11	0	33	0	0	0	0	0	36	0	0	0	0	**80**
2 - Park View	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
3 - M4N	11	1	0	8	12	1	0	5	12	0	121	0	16	0	0	**186**
4 - B4237	0	0	7	0	3	0	0	0	0	0	5	0	0	0	1	**16**
5 - A48E	27	0	8	6	0	1	0	0	37	27	45	0	6	0	0	**158**
6 - B4239	0	0	1	6	1	0	0	0	0	0	0	0	0	0	0	**8**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	0	0	4	0	0	0	0	0	2	2	0	0	0	0	0	**9**
9 - A48W	0	0	17	0	2	0	0	1	0	1	0	0	0	0	0	**21**
10 - Cleppa Park	1	0	7	0	0	0	0	0	21	0	0	0	0	0	0	**29**
11 - M4W	42	0	115	5	34	0	0	0	0	0	0	0	6	0	0	**202**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	11	1	15	0	7	0	0	0	0	0	0	0	0	0	0	**34**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
15 - Tredegar Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Destination Total	**92**	**2**	**187**	**25**	**92**	**2**	**0**	**6**	**72**	**30**	**207**	**0**	**28**	**0**	**1**	**745**

2032 PM DS2

Cars (Car & LGV)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	55	91	110	427	5	0	88	77	6	454	2	164	10	2	**1492**
2 - Park View	88	0	2	2	22	0	0	0	20	0	17	0	470	0	4	**625**
3 - M4N	0	0	0	75	13	19	0	217	258	97	2259	3	82	3	1	**3027**
4 - B4237	74	0	0	0	173	365	0	0	13	10	15	2	28	11	6	**695**
5 - A48E	391	3	24	95	0	26	0	0	109	22	256	1	109	8	7	**1052**
6 - B4239	33	5	15	298	279	0	0	0	0	0	252	1	13	109	2	**1006**
7 - IR	10	0	15	37	37	1	0	0	0	0	6	0	2	0	1	**109**
8 - Pencarn Way	115	0	280	0	0	0	0	0	130	7	80	0	22	0	1	**636**
9 - A48W	196	1	387	0	57	0	0	298	0	12	0	1	43	0	1	**997**
10 - Cleppa Park	69	1	65	3	10	0	0	173	21	0	15	0	19	0	2	**379**
11 - M4W	863	16	2233	68	29	19	0	27	1	11	0	5	212	9	1	**3494**
12 - Court Crescent	10	7	1	0	1	0	0	0	0	0	1	0	8	0	1	**30**
13 - A468	265	244	123	0	88	0	0	11	4	4	21	12	0	0	1	**772**
14 - ONS	59	1	86	210	211	7	0	0	0	0	34	0	9	0	3	**619**
15 - Tredegar Park	0	0	0	13	15	1	0	0	0	0	0	0	0	0	0	**30**
Destination Total	**2175**	**333**	**3323**	**911**	**1362**	**444**	**0**	**815**	**633**	**170**	**3409**	**26**	**1180**	**150**	**33**	**14965**

HGVs (OGV1 & OGV2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Origin Total
1 - A467N	0	0	9	4	11	0	0	0	0	0	25	0	1	0	0	**50**
2 - Park View	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**3**
3 - M4N	19	0	0	2	3	0	0	2	12	2	88	0	5	0	1	**133**
4 - B4237	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	**4**
5 - A48E	12	0	0	3	0	2	0	0	3	1	9	0	2	0	0	**31**
6 - B4239	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
7 - IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8 - Pencarn Way	1	0	5	0	0	0	0	0	4	0	0	0	0	0	0	**10**
9 - A48W	3	0	8	0	1	0	0	1	0	0	0	0	0	0	0	**13**
10 - Cleppa Park	1	0	5	0	0	0	0	1	21	0	0	0	0	0	0	**27**
11 - M4W	12	0	72	2	25	0	0	0	0	0	0	0	7	0	0	**119**
12 - Court Crescent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13 - A468	4	0	8	0	8	0	0	0	0	0	3	0	0	0	0	**23**
14 - ONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
15 - Tredegar Park	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Destination Total	**54**	**0**	**108**	**11**	**51**	**2**	**0**	**4**	**40**	**3**	**126**	**0**	**16**	**1**	**1**	**416**

Appendix B

Improvement Scheme Layouts

A1

Legend

- 10m Mounting height road lighting column complete with 1.0m outreach bracket & zero degree inclined side entry mounted Philips luma2 G4 LED lantern
- Duct & cable route
- Feeder pillar
- Chamber - size & quantity to be confirmed

ADS - (Map type)

ADS - (Lane type)

DS - (Flag type)

DS - (Flag type)

P4 terminal required

ADS - (Lane type)

ADS - (Map type)

DS - (Flag type)

ADS - (Map type)

Notes

1. Lighting designed to BS5489-1:2013 roundabout - CE2

2. Specification of existing lighting to be confirmed to enable tie-in calculations

3. Feeder pillar location to be confirmed

4. Column height, latern types, lighting class & general value engineering to be confirmed within detail design

5. Refer to Drg. No. M4J28-ARP-HSN-BSG-DR-CH-000001 for all proposed signage

6. An allowance to be made for maintenance bays following receipt of traffic signal controllers from specialist sub contractors.

Issue	Date	By	Chkd	Appd
P01	11/09/15	GM	SAW	RJS
First issue for RSA & design review				

ARUP
4 Pierhead Street Capital Waterside
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client: Llywodraeth Cymru Welsh Government

COSTAIN

Project Title: M4 J28 Improvements

Drawing Title: Bassaleg General Arrangement

Scale at A1: 1:500

Role: Civil Engineer - Highways

Suitability: S3 - Fit for internal review and comment

Arup Job No: 240226-00

Rev: P01

Name: M4J28-ARP-HGN-BSG-DR-CH-000001

Do not scale

pw://MCONTSIG4.global.arup.com:PW_ARUP_UK\Documents\M4 Junction 28 Improvements\001 Arup\CH\DRM\4J28-ARP-HSN-BSG-DR-CH-000001

A1

ADS - (Lane type)

ADS - (Lane type)

DS - (Flag type)

DS - (Stack type)

DS - (Flag type)

Realign existing VRS / terminal

ADS - (Lane type)

DS - (Stack type)

Realign existing VRS / terminal

ADS - (Lane type)

ADS - (Map type)

DS - (Flag type)

ADS - (Lane type)

ADS - (Lane type)

New H1 / W3 /A barrier

Realign existing VRS / terminal

DS - (Flag type)

Existing ADS - (Lane type) new destination to be included

Legend

- 12m Mounting height road lighting column complete with 1.0m outreach bracket & zero degree inclined side entry mounted Philips luma2/3 G4 LED lantern
- Duct & cable route
- Feeder pillar
- Chamber - size & quantity to be confirmed
- Pedestrian guardrail
- Vehicle restraint barrier

Notes

1. Lighting designed to BS5489-1:2013 slips & junction - ME3b & CE2

2. Specification of existing lighting to be confirmed to enable tie-in calculations

3. Feeder pillar locations to be confirmed

4. Column height, latern types, lighting class & general value engineering to be confirmed within detail design

5. LED high mast lighting may be a cost effective alternative on this junction - to be evaluated within detailed design as part of value engineering

6. Refer to Drg. No. M4J28-ARP-HSN-J28-DR-CH-000001 for all proposed signage

7. An allowance to be made for maintenance bays following receipt of traffic signal controllers from specialist contractor

Issue	Date	By	Chkd	Appd
P01	11/09/15	GM	SAW	RJS
First issue for RSA & design review				

ARUP
4 Pierhead Street Capital Waterside
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client: Llywodraeth Cymru Welsh Government

COSTAIN

Project Title: M4 J28 Improvements

Drawing Title: Junction 28 General Arrangement

Scale at A1: 1:1000

Role: Civil Engineer - Highways

Suitability: S3 - Fit for internal review and comment

Arup Job No: 240226-00

Rev: P01

Name: M4J28-ARP-HGN-J28-DR-CH-000001

Do not scale

A1

ADS - (Lane type)

DS - (Flag type)

ADS - (Lane type)

ADS - (Lane type)

DS - (Flag type)

ADS - (Lane type)

ADS - (Lane type)

DS - (Flag type)

ADS - (Lane type)

ADS - (Lane type)

DS - (Flag type)

ADS - (Map type)

ADS - (Map type)

Legend

10m Mounting height road lighting column complete with 1.0m outreach bracket & zero degree inclined side entry mounted Philips luma2 G4 LED lantern

Duct & cable route

Feeder pillar

Chamber - size & quantity to be confirmed

Notes

1. Lighting designed to BS5489-1:2013 roundabout - CE2

2. Specification of existing lighting to be confirmed to enable tie-in calculations

3. Feeder pillar locations to be confirmed

4. Column height, latern types, lighting class & general value engineering to be confirmed within detailed design

5. Refer to Drg. No. M4J28-ARP-HSN-EBW-DR-CH-000001 for all proposed signage

6. An allowance to be made for maintenance bays following receipt of traffic signal controllers from specialist sub contractors.

Issue	Date	By	Chkd	Appd
P01	11/09/15	GM	SAW	RJS

First issue for RSA & design review

ARUP
4 Pierhead Street Capital Waterside
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client: Llywodraeth Cymru Welsh Government

COSTAIN

Project Title: M4 J28 Improvements

Drawing Title: Pont Ebbw Junction General Arrangement

Scale at A1	1:500
Role	Civil Engineer - Highways
Suitability	S3 - Fit for internal review and comment
Arup Job No	240226-00
Rev	P01
Name	M4J28-ARP-HGN-EBW-DR-CH-000001

Do not scale

Appendix C

Examples of VISSIM movie outputs

VISSUM Movie Screenshot for Bassaleg Junction PM Peak (2014 and 2032 DS1)

VISSUM Movie Screenshot for Junction 28 PM Peak (2014 and 2032 DS1)

VISSUM Movie Screenshot for Pont Ebbw PM Peak (2014 and 2032 DS1)