

Coed Darcy - Local Highway Network

Operational Assessment Report

St. Modwen Developments Ltd

03 March 2020

Notice

This document and its contents have been prepared and are intended solely as information for St. Modwen Developments Ltd and use in relation to Local Highway Operation Assessment.

Atkins Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 25 pages including the cover.

Document history

Document title: Operational Assessment Report

Document reference: Local Highway Network Operational Assessment

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Draft	CR	DC	PR	TC	28/02/2020
Rev 2.0	For issue	CR	DC	PR	TC	03/03/2020

Client signoff

Client	St. Modwen Developments Ltd
Project	Coed Darcy - Local Highway Network
Job number	5122307
Client signature/date	

Contents

Chapter	Page
1. Introduction	5
1.1. Background	5
1.2. Site Location	5
1.3. Report Purpose and Structure	6
2. Context and Assumptions	8
2.1. Introduction	8
2.2. Delivery Rates	8
2.3. The Northern Access	8
2.4. The Southern Access Road	8
2.5. Public Transport Subsidy	8
2.6. Assumptions	8
3. Local Highway Network Assessment	10
3.1. Introduction	10
3.2. Traffic Flows	10
3.3. Local Highway Network Impact Assessment	14
3.4. Summary	15
4. The SAR	16
5. Parking Analysis	17
5.1. Introduction	17
5.2. Review of Parking Standards	17
5.3. Review of Trip Rates	17
5.4. Analysis	18
6. Connectivity to the North	20
7. Summary and Conclusions	21
Appendices	22
Appendix A. Traffic Flow Diagrams	23
Appendix B. TRANSYT Modelling Outputs	24

Tables

Table 3-1 - Peak Hour Identification	11
Table 3-2 - Coed Darcy Approved Trip Rates	12
Table 3-3 - Committed Development 140 Dwellings Heritage Gate Trip Generation	13
Table 3-4 - Phase 1 NAR Road Network TRANSYT Results	14
Table 5-1 - Coed Darcy Parking Standards	17
Table 5-2 - 2005 TA Residential Trip Rates	17
Table 5-3 - Trip Rate - 03/A Residential Houses Privately owned, minimum 300 dwellings	18
Table 5-4 - 03/A - Survey Sites	18

Figures

Figure 1-1 - Site Location Plan	5
Figure 1-2 - Local Highway Network and NAR Phase I	6
Figure 3-1 - Coed Darcy and Committed Development Sites	10
Figure 3-2 - Traffic Survey Locations	11
Figure 3-3 - Distribution of Development Trips on the NAR	13
Figure 6-1 - Coed Darcy Northern Movement Links	20

1. Introduction

1.1. Background

An application has been made to vary some of the obligations contained on the Section 106 Agreement for the Coed Darcy project. This is known as a section 106a application.

One change proposes a revision to the timing and packaging of the improvement works proposed to Junction 43 of the M4. Another change proposes a revised trigger point for the delivery of the Southern Access Road (the SAR) from the occupation of the 300 homes on the whole site to the occupation of 600 homes. A third change seeks to make provision for a revision to the northern access to the site (but does not seek approval for that access at this time).

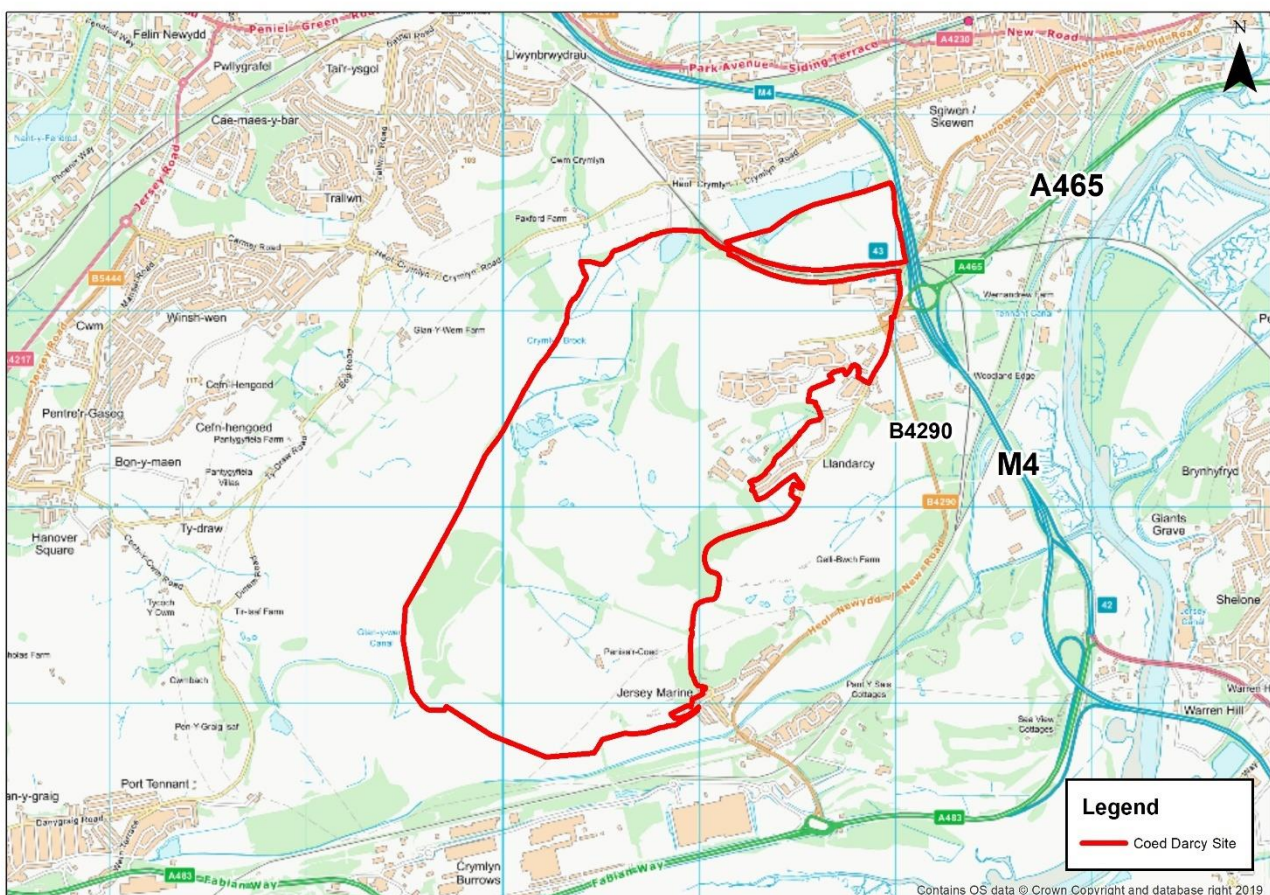
Separately (to the section 106a application), the most recent detailed proposals for the site have raised the issue of parking levels. New general standards have been introduced since the outline planning permission for the site was granted and these could see parking levels change and increase.

Neath and Port Talbot County Borough Council (NPTCBC) has raised a number of questions about the impact of these changes on the operation of the local highway network (see Section 1.3 below) and has asked for a single response to them. This report provides that response.

1.2. Site Location

Figure 1-1 provides an overview of the Coed Darcy site in relation to the local highway network shown in Figure 1-2.

Figure 1-1 - Site Location Plan



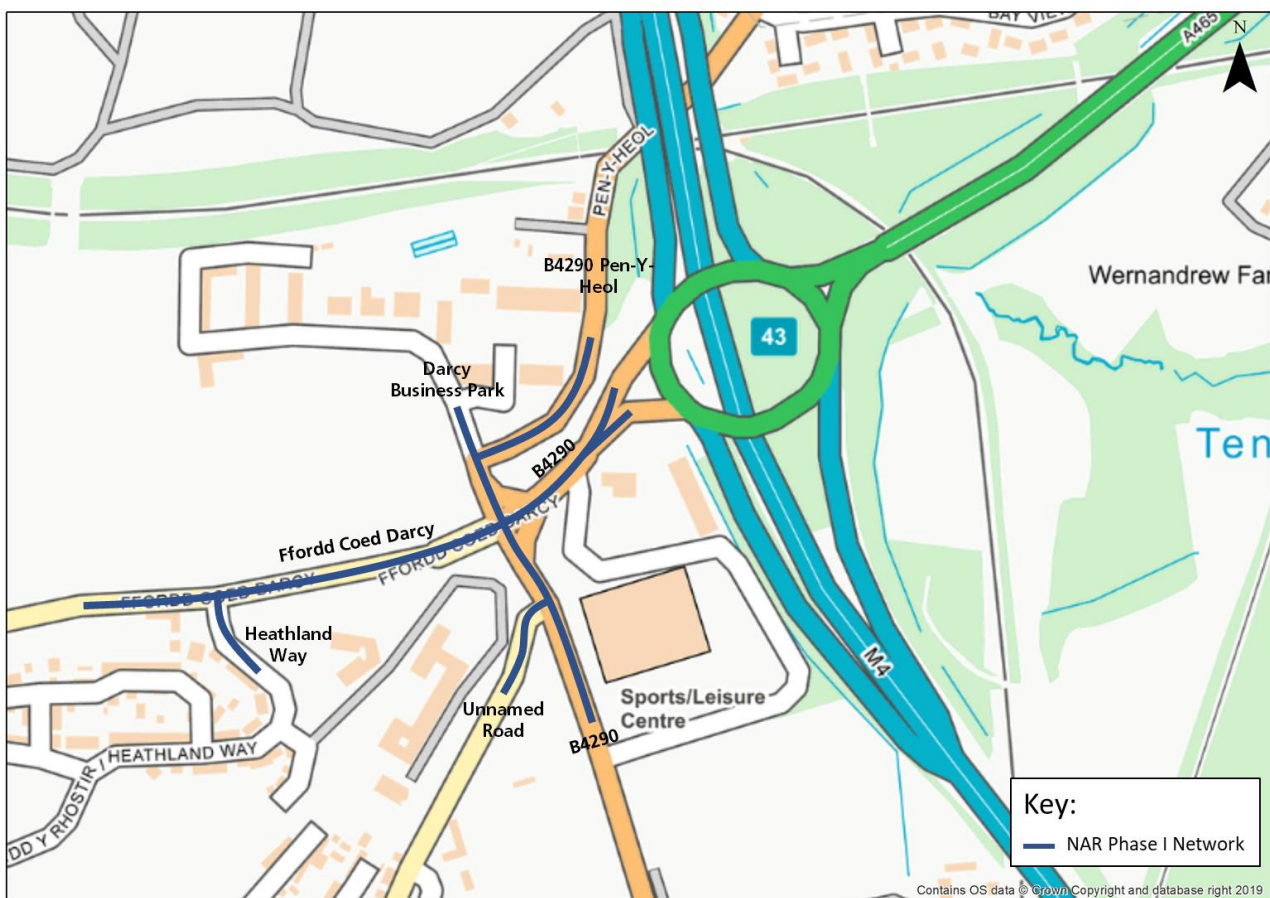
The Coed Darcy site is accessed from the B4290 immediately to the west of M4 Junction 43. Ffordd Coed Darcy is the main site access between Coed Darcy and the local highway network.

The local highway network used in this assessment is defined by the extent of the Northern Access Road (NAR) Phase I Network shown in Figure 1-2. The B4290 is located to the east of Coed Darcy and provides access to Skewen in the north, and Jersey Marine to the south. This report does not assess the impact on the A465 east of M4 Junction 43.

The NAR Phase I Network consisted of the following highway infrastructure:

- B4290 Pen-y-Heol/Darcy Business Park with a signal-controlled junction;
- B4290/ Ffordd Coed Darcy 4-arm signal controlled crossroad; and
- Major/minor priority intersection of Unnamed Road/ B4290 south of Ffordd Coed Darcy.

Figure 1-2 - Local Highway Network and NAR Phase I



1.3. Report Purpose and Structure

NPTCBC has listed a number of issues it wants to see addressed. These are repeated below:

1. M4 Junction 43 works phasing,
2. The impacts of the changes in delivery of the SAR and connection between the SAR and M4 J43. How the phasing to M4 J43 is affected by the revised delivery dates.
3. The impacts of the above of on our highway network, especially as the timing of control on M4 J43 are not in the control of the Local Authority but SWTRA.
4. The impact on all of the above if there is an increase in parking over and above the permitted 1.5 spaces per dwelling.
5. The impact of the new junction to serve the northern site on the above.
6. The sustainable connectivity of the site, now and in the future, to the surrounding area, including the Crymlyn Road link.

This report is structured as follows:

- Chapter 2 sets out the context for the report and the assumptions which have been applied in the local highway network impact assessment. The assumptions will clarify the position on Point 5 of NPTCBC's list (the northern access);
- Chapter 3 records the assessment of the changes proposed on the local highway network (including details of baseline traffic flows, consented trip rates, committed development and assessment scenarios). This section aims to respond to Points 1 and 3 as listed above, but will also respond to the second part of Point 2;
- Chapter 4 covers the first part of Point 2 (on the impacts of the changes proposed to SAR delivery);
- Chapter 5 provides analysis of the potential changes to parking;
- Chapter 6 outlines the approach to connectivity to the north of the site; and
- Chapter 7 provides a summary and conclusion.

The position on the public transport subsidy – NPTCBC Point 7 – will be discussed separately – with the focus being on the staged payments of the full sum. The general proposed approach is covered in the assumptions listed in Chapter 2.

2. Context and Assumptions

2.1. Introduction

This chapter provides the context for the report and the assumptions behind the assessment that follows in Chapter 3.

2.2. Delivery Rates

Predicting delivery rates for such a large development is difficult, and an assessment for the next five years is likely to provide a more realistic forecast for modelling purposes. Based on current interest in the site from housebuilders, it is predicted that up to 850 new dwellings could be built over the period to the end of 2024. The figure could be higher if development gets underway in the southern and northern areas during that period (which is possible).

With this in mind and in the light of the general support for the regeneration of the site (and the need to make any assessment robust) the assessment has assumed that a total of 1500 dwellings could be occupied on the site by the end of 2024. The figure breaks down as follows:

- 290 dwellings already built and occupied as part of Phase 1 (Persimmon);
- 140 dwellings at Heritage Gate;
- 850 new dwellings to be built on the central area of the site; and
- 220 dwellings flexibility allowance for additional development on the northern and southern areas.

The 1500 dwellings figure also aligns with the improvement packages proposed to M4 Junction 43.

St Modwen has committed to carry out a full review of the Transportation Assessment for the scheme over the next 12 months. Subject to the agreement and approval of the NPTCBC and other consultees, this will cover the remaining parts of the Coed Darcy development (which will provide about 66% or a little under two thirds of the total number of homes expected from the scheme).

2.3. The Northern Access

For the purposes of this report, it is assumed that there is no change to the access strategy into the area north of the railway line. The section 106a application only seeks provision for a revised access to be considered at a later date should it be agreed with NPTCBC following detailed assessment and analysis.

2.4. The Southern Access Road

To keep the assessment simple (and robust) no allowance has been made for the installation of the SAR in the modelling carried out for this report. This does not mean that the SAR will not be implemented (the revised obligations will ensure that it is), but it does mean that the assessment represents a worst-case scenario. This is because the SAR will provide an additional route into and out of the site and will therefore reduce the amount of development traffic using the Northern Access Road.

2.5. Public Transport Subsidy

Over the five-year period – and subject to the agreement of the Council - it is likely that a substantial part (if not all) of the Public Transport Subsidy will be paid for the scheme. This will see the introduction of a bus service to and through Coed Darcy. At this stage no allowance has been made for this in the assessment of the local highway impact (which underscores that it presents a worst-case scenario). It will, however, be assessed in the review of the Transport Assessment for the site referred to at the end of Section 2.3 above.

2.6. Assumptions

The following assumptions have been made in the modelling of this assessment:

- Existing dwellings accessed from Heathland Way/Phase 1 (for the purpose this assessment assumed to be 300 dwellings) included;
- Committed development of 140 dwellings at Heritage Gate included;

- Residential land use only has been considered on the Coed Darcy site;
- Only external residential trips are considered;
- As stated above, it is assumed that any development from the northern area will utilise the existing access strategy (the crossing of the railway line);
- Also as stated above and to make the assessment robust (and simple), the SAR and Crymlyn Link have not been included in the assessment for robustness and simplicity;
- Trips have been distributed in alignment with the 2005 Arup TA with the exception of trips forecast to use the SAR. The proportion of SAR trips have been re-distributed to M4 J43 as it is not considered that the B4290 south to Jersey Marine is a feasible route (see Section 5.3.3 of the 2005 Arup TA);
- Local highway network impact assessment has been assessed using Phase I NAR network as per the 2005 Arup TA shown in Figure 1-2; and
- No allowance has been made for improved public transport (again this is likely to improve the position recorded in the report by lowering the trips taken by car).

3. Local Highway Network Assessment

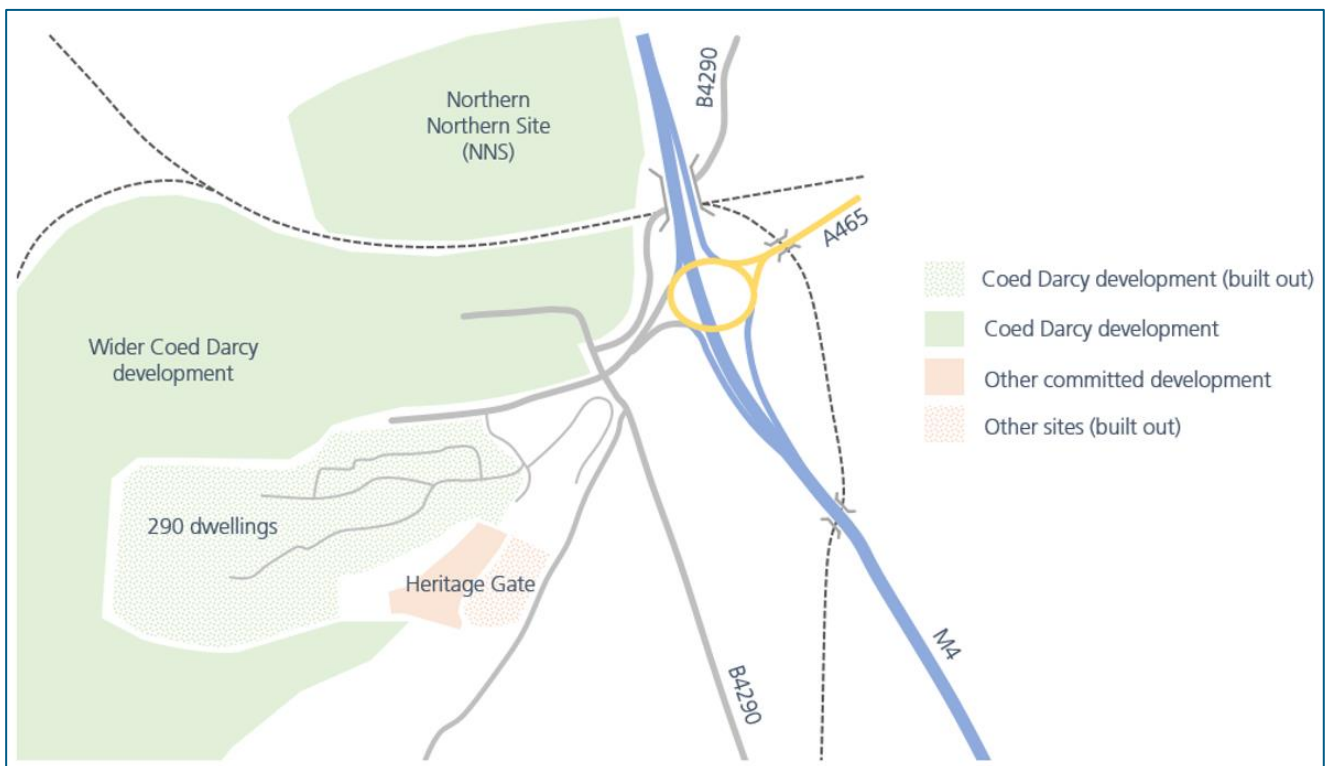
3.1. Introduction

This chapter provides details of the methodology, traffic flows and junction capacity modelling results for the assessment carried out to ascertain the impact of the next five years of the Coed Darcy development on the Local Highway Network.

3.2. Traffic Flows

This section provides details of the baseline traffic data used, and the traffic generated by the wider Coed Darcy development and committed development. The locations referred to in this section are shown in Figure 3-1.

Figure 3-1 - Coed Darcy and Committed Development Sites



3.2.1. Baseline Traffic

3.2.1.1. Survey Data

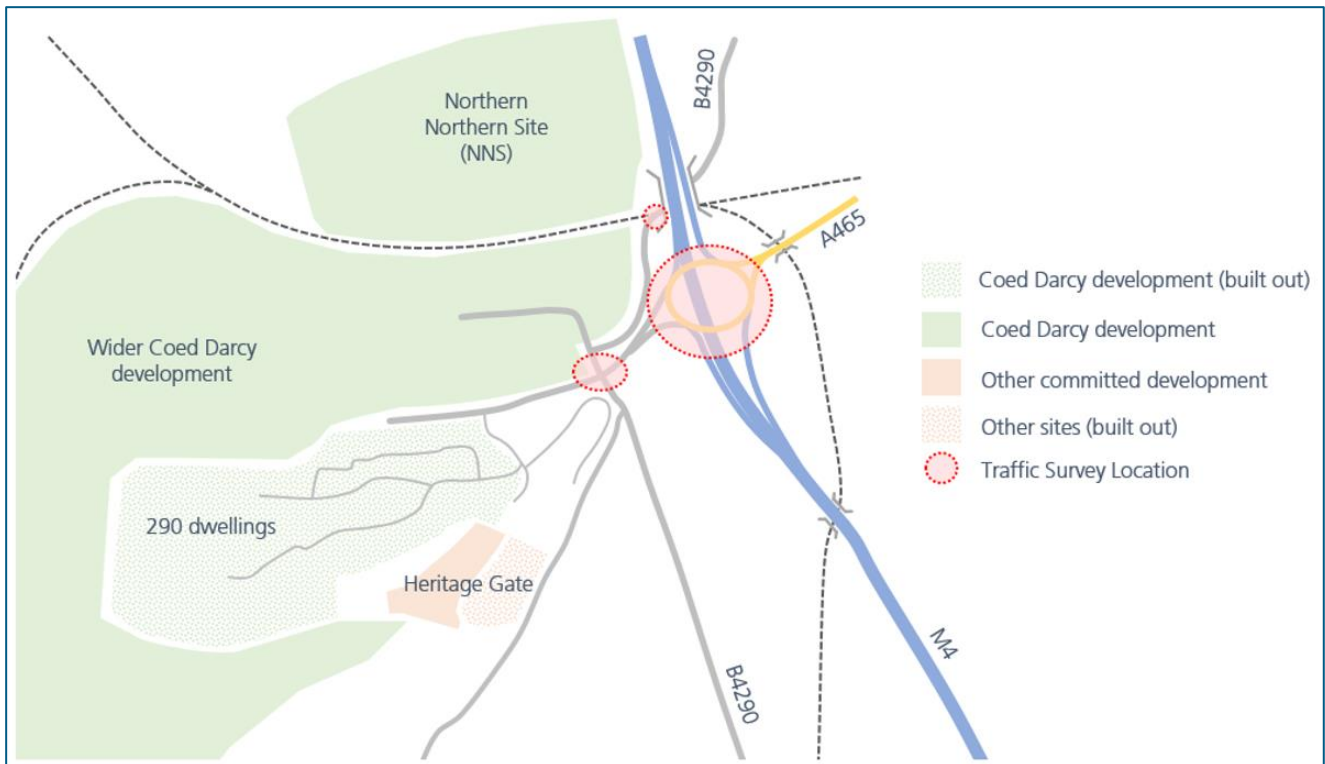
Manual classified turning counts (CTC) were undertaken at the following junctions on Tuesday 4th December 2018:

- M4 Junction 43 – M4 (North)/ A465/ M4 (South)/ B4290; and
- B4290/ B4290 (South)/ Ffordd Coed Darcy/ Darcy Business Park.

In addition, an automatic traffic count (ATC) was undertaken on B4290 Pen-Y-Heol for a one-week period starting Tuesday 4th December 2018.

The locations are shown in Figure 3-2.

Figure 3-2 - Traffic Survey Locations



3.2.1.2. Peak Hours

Survey data for the M4 Junction 43 has been utilised to calculate the peak hour for the baseline traffic. The total traffic flows (PCUs) through the junction are summarised in Table 3-1. The table shows that for the purposes of this assessment the AM peak hour is 08:00 to 09:00 and PM peak hour is 16:00 to 17:00.

Table 3-1 - Peak Hour Identification

AM Peak Period		PM Peak Period	
Hour Ending	Total Junction Flows	Hour Ending	Total Junction Flows
08:00	4,565	17:00	5,096
08:15	4,919	17:15	5,054
08:30	5,037	17:30	5,086
08:45	5,145	17:45	4,944
09:00	5,157	18:00	4,841
09:15	4,980	18:15	4,742
09:30	4,776	18:30	4,392
09:45	4,391	18:45	3,978
10:00	3,996	19:00	3,586

3.2.2. Development Traffic

This section of the report provides details of the methodology used to calculate the traffic generated by the Coed Darcy development.

There are 300 dwellings already built out at the Coed Darcy site, accessed via Heathland Way onto Ffordd Coed Darcy. Trips generated by these dwellings have been accounted for within the surveys conducted in December 2018.

3.2.2.1. Trip Rates

Table 7.1 within the 2005 Arup Transport Assessment provides residential peak hour vehicular trip rates. The residential trip rate which has been utilised in this assessment has been duplicated in Table 3-2.

Table 3-2 - Coed Darcy Approved Trip Rates

Land Use	AM peak hour		PM peak hour	
	Arrivals	Departures	Arrivals	Departures
Residential	0.12	0.46	0.41	0.19

3.2.2.2. Trip Generation

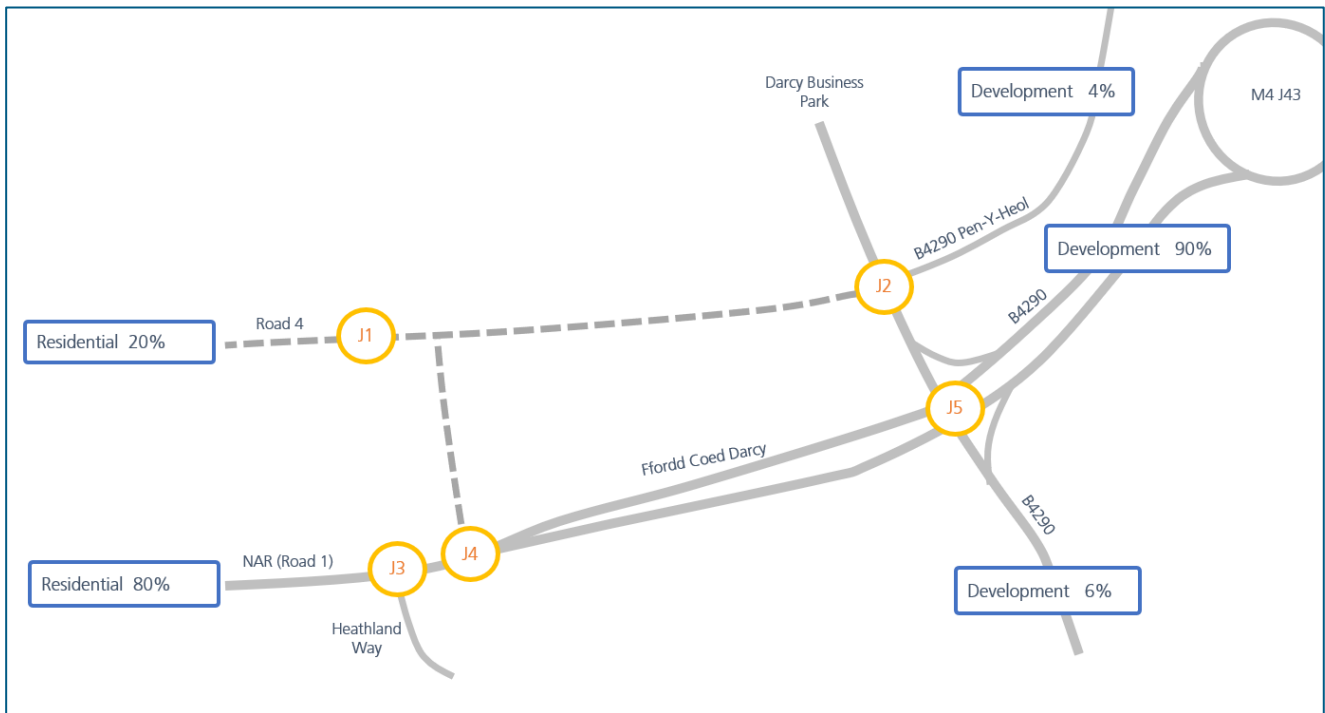
The Coed Darcy development will accommodate 4,000 dwellings. To determine the trip generation associated with 1,500 dwellings, the number of dwellings has been multiplied by the trip rates set out in Table 3-2 to calculate the peak hour residential trip generation. The Arup 2005 TA states that 85% of residential trips are external, and 15% of trips are internal (trip start and end within Coed Darcy development). Only external trips have been considered in this assessment.

3.2.2.3. Trip Distribution

For this assessment the trip distribution set out within the 2005 Arup TA has been utilised with the exception of 15% of traffic using the SAR. As stated at the beginning of this report, and although it will be provided, it is assumed that the SAR is not open for the purposes of this assessment, therefore an additional 15% of traffic has been added to M4 Junction 43 external trip distribution route. The proportion of SAR trips have been re-distributed to M4 Junction 43 for simplicity and robustness as it is not considered that the B4290 south to Jersey Marine is a feasible 'southern access' route as per Section 5.3.3 2005 Arup TA.

The trip distribution used in this assessment is shown in Figure 3-3. Figure 3-3 shows that 90% of the trips are distributed via M4 J43, 6% on the B4290 south, and 4% on the B4290 north.

Figure 3-3 - Distribution of Development Trips on the NAR



3.2.3. Committed Development Trip Generation

There is committed development of 140 dwellings at Heritage Gate (P2019/0021). The trip generation for this site, provided within the submitted Transport Statement, has been based on Arup TA trip rates displayed in Table 3-2. The resultant trip generation for the Heritage Gate 140 dwellings is presented in Table 3-3.

Table 3-3 - Committed Development 140 Dwellings Heritage Gate Trip Generation

Land Use	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
Residential	17	64	57	27

The committed development trips have been distributed as 70% from/to B4290/ Unnamed Road junction south of B4290/ Ffordd Coed Darcy signalised junction and 30% from/to Heathland Way.

3.2.4. Traffic Growth

The traffic growth assumptions which have been used in this assessment are consistent with those outlined in Section 9.3.5 of the Arup 2005 TA and are still relevant and applicable.

3.2.5. Assessment Scenario

The following scenario has been assessed using the Phase I NAR network for the local highway network impact assessment for the AM and PM peak to be consistent with the phasing strategy of M4 Junction 43:

- 1500 dwellings composed of - 2018 Base (300) + Committed Development (140) + Coed Darcy (1060)

Traffic flow diagrams for the assessment scenario is presented in Appendix A.

3.3. Local Highway Network Impact Assessment

This section of the report presents the methodology and junction capacity modelling results for the assessment carried out to ascertain the impact of Coed Darcy development on the Local Highway Network.

The local highway network used in this assessment is defined by the extent of the NAR Phase I Network shown in Figure 1-2 and assumes appropriate mitigation at M4 Junction 43.

3.3.1. Junction Capacity Assessment

The assessment of the impact Coed Darcy development has on the local highway network has been modelled using TRANSYT 16. This section provides a commentary of the junction capacity assessment conducted for the Phase I NAR network. The Phase 1 NAR network was tested for 1,500 dwellings composed of – 2018 Base (300) + Committed Development (140) + Coed Darcy Development (1060).

Results are provided in terms of Degree of Saturation (DoS) and Mean Maximum Queue (MMQ). The DoS is a measure of how much demand a junction experiences compared to its total capacity. A junction is typically considered to be operating within acceptable thresholds of capacity with a DoS of below 90% (shown in green) and over acceptable thresholds of capacity between 90% and 100% (shown in amber). A DoS of over 100% would indicate an approach operates over capacity (shown in red). The Mean Maximum Queue length on the links represents the average queue over the model period to provide a relative assessment of where queues occur and their length.

The scenario presented in Table 3-4 presents the TRANSYT model results for 1,500 dwellings composed of – 2018 Base (300) + Committed Development (140) + Coed Darcy Development (1060).

Full TRANSYT model outputs are provided in Appendix B.

Table 3-4 - Phase 1 NAR Road Network TRANSYT Results

Link	Jct.	Road	AM Peak			PM Peak		
			DoS (%)	MMQ (PCUs)	Storage Capacity (PCUs)	DoS (%)	MMQ (PCUs)	Storage Capacity (PCUs)
1500 Dwellings – 2018 Base (300) + Committed Development (140) + Coed Darcy Development (1060)								
200	2	NE Junction - Darcy Business Park	5	0.40	36.83	33	1.85	36.83
210	2	NE Junction - B4290 Pen-y-Heol - Lane 1	52	7.41	8.21	24	3.38	8.21
211	2	NE Junction - B4290 Pen-y-Heol - Lane 2 (Flare)	0	0.00	9.41	0	0.00	9.41
212	2	NE Junction - B4290 Pen-y-Heol - Approach	38	9.78	32.98	17	0.00	32.98
220	2	NE Junction - B4290 (south)	31	6.15	8	47	4.52	8
300	3	Boiler House Road (east) - Lane 1	13	0.07	16.51	29	7.67	16.51
310	3	Road EA	38	0.31	34.78	21	0.13	34.78
320	3	Boiler House Road (west) - Lane 1	68	2.15	34.78	33	1.14	34.78
391	3	Boiler House Road (west) Pedestrian Crossing - Lane 1	7	0.04	33.84	24	0.16	33.84

392	3	Boiler House Road (west) Pedestrian Crossing - Lane 2	17	0.10	25.27	7	0.04	25.27
500	5	SE Junction - B4290 (north) - Segregated Left	22	0.14	14.89	12	0.07	14.89
501	5	SE Junction - B4290 (north)	83	8.61	14.49	54	3.17	14.49
510	5	SE Junction - B4290 (east) - Lane 1 (Flare)	5	0.53	6.23	49	4.17	6.23
511	5	SE Junction - B4290 (east) - Lane 2	8	1.85	6.83	34	2.96	6.83
512	5	SE Junction - B4290 (east) - Lane 3	16	1.92	16.05	69	6.86	16.05
513	5	SE Junction - B4290 (east) - Lane 4 (Flare)	79	5.74	15.58	82	8.16	15.58
514	5	SE Junction - B4290 (east) - Approach - Lane 1	5	0.02	33.22	18	0.11	33.22
515	5	SE Junction - B4290 (east) - Approach - Lane 2	13	0.08	26.66	29	0.21	26.66
520	5	SE Junction - B4290 (south) - Lane 1 (Flare)	65	5.77+	5.76	81	6.83+	5.76
521	5	SE Junction - B4290 (south) - Lane 2	41	3.26	5.47	44	2.92	5.47
522	5	SE Junction - B4290 (south) - Approach	23	1.50	33.9	37	3.46	33.9
530	5	SE Junction - Boiler House Road (west) - Lane 1	62	7.23	30.68	57	3.47	30.68
531	5	SE Junction - Boiler House Road (west) - Lane 2	49	5.40	6.09	46	2.72	6.09
532	5	SE Junction - Boiler House Road (west) - Lane 3 (Flare)	30	1.84	5.54	8	0.55	5.54
533	5	SE Junction - Boiler House Road (west) - Approach	18	0.11	15.35	8	0.04	15.35

The results presented in Table 3-4 show that the local highway network is forecast to operate within capacity in the AM and PM peak.

Though the Mean Maximum Queue of Link 520 in the AM and PM Peak exceed the Storage Capacity of the link, the upstream links have the capacity to accommodate the queue.

3.4. Summary

This chapter has provided details of the baseline traffic survey, trip generation and distribution for the committed development and Coed Darcy development to inform the traffic modelling of the local highway network. An assessment scenario of 1,500 dwellings at Coed Darcy has been considered in line with mitigation thresholds at M4 Junction 43 to determine what impact this quantum of development has on the local highway network. The TRANSYT modelling has determined that the local highway network can accommodate 1,500 dwellings comprised of – 2018 Base (300) + Committed Development (140) + Coed Darcy Development (1060) and operate within capacity.

4. The SAR

Whilst the SAR will be provided within the next five years, to keep the assessment simple (and to present a worst case scenario) no allowance has been made for the installation of the SAR in the modelling carried out for this report on the assessment of the local highway network. From the results provided in the previous section it can therefore be concluded that the revised timing of the SAR proposed in the section 106a application (which moves opening of the road from the occupation of the 300th unit to the 600th unit on the main Coed Darcy site) has no significant detrimental impact on the operation of the local highway network.

5. Parking Analysis

5.1. Introduction

NPTCBC have raised concerns about current parking standards and their application to the Coed Darcy site. The current NPTCBC parking standards have increased the maximum number of parking spaces per dwelling compared to the parking standards applied at the time of the Transport Assessment for Coed Darcy in 2005 (2005 Arup TA), specifically NPTCBC have concerns that increasing the number of spaces at future phases of Coed Darcy will result in additional trips being generated by the site, over and above those agreed in the 2005 TA.

In order to demonstrate if trip generation of a site is a function of the land use rather than the number of parking spaces provided, a review of recent trip rates for similar residential sites has been undertaken. A comparison is then made against the 2005 TA and current NPTCBC parking standards.

5.2. Review of Parking Standards

The 2005 TA utilised the local authority car parking standards current at the time to determine parking provision for Coed Darcy, presented in Table 5-1. These were the Parking Guidelines of the Standing Conference on Regional Policy in South Wales (1993), and an Addendum published in 2002.

Since Outline Planning Permission was granted, there have been a number of changes in policy and guidance on car parking in Wales.

The CCS Wales Standards for Parking Provision were first published in 2008 and have been revised since then the latest standards published in 2014. The CCS Wales Standards for Parking Provision set out the maximum levels of parking for broad classes of development, by geographical setting, and a threshold size of development above which levels should apply. The main change in standards is reflected in the way the number of spaces for residential development is calculated, which is now per bedroom (up to 3 maximum) rather than per dwelling.

NPTCBC applies these standards as their maximum parking standards as set out in their 2016 Parking Standards Supplementary Planning Guidance document. According to the document, Coed Darcy is located within geographical setting Zone 4. The parking standard for Zone 4 is presented in Table 5-1. The parking standards are provided as maximums, the maximum stated number of parking spaces does not necessarily have to be applied to residential developments.

Table 5-1 - Coed Darcy Parking Standards

Land Use	Local Authority Parking standards (2002)	2005 TA Coed Darcy Parking Standard	NPTCBC Parking Standards (2016)
Residential (per large dwelling)	Central area 1.0; non-central 2.5 av.	1.5	Zone 4 – 1 space per bedroom (maximum requirement 3 spaces)

5.3. Review of Trip Rates

A comparison has been made between the residential trip rates from the 2005 TA, and current trip rate data obtained from TRICS 7.6.4 for comparable sites.

The agreed residential trip rates from the 2005 TA are outlined in Table 5-2. The trip rates were obtained for 03/K – Residential Mixed Private Housing (Flats and Houses). However, no further details are available in the TA about what filters were applied in the generation of this trip rate.

Table 5-2 - 2005 TA Residential Trip Rates

	AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Coed Darcy	0.12	0.46	0.58	0.41	0.19	0.60

TRICS 7.6.4 was used to calculate a revised residential trip rate for Coed Darcy based on up to date TRICS surveys, taking into account the size and location of developments. Residential trip rates are calculated in TRICS based on the number of dwellings, rather than number of parking spaces onsite.

The most appropriate and robust TRICS residential trip rate for Coed Darcy based on current data is 03/A – Residential Houses Privately Owned. To obtain a trip rate which is representative of the size of residential development at Coed Darcy, a minimum 300 dwelling development size was applied so that small residential developments were not included in the trip rate calculation as they have different operational characteristics. The trip rate presented in Table 5-3 has been calculated using three sites which were surveyed in either 2018 or 2019, are out of town, close to a main road, have unrestricted on-street parking, and have comparable access to public transport facilities. The peak hour trip rates provided by TRICS are presented in Table 5-3 and are lower overall than the 2005 TA trip rate by 15% (AM) and 18% (PM). In addition, Coed Darcy includes a portion of affordable housing and trip rates for this type of residential land use are typically lower than that of residential houses privately owned. Therefore, the peak hour trip rate presented in Table 5-3 is likely to be lower for Coed Darcy due to affordable housing and economies of scale.

Table 5-3 - Trip Rate - 03/A Residential Houses Privately owned, minimum 300 dwellings

Test		AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00-18:00)			Number of surveys used in trip rate
		Arrivals	Departures	Total	Arrivals	Departures	Total	
03/A	Residential – Houses Privately Owned	0.137	0.358	0.495	0.341	0.15	0.491	3

The three sites included in the TRICS trip rate calculation for 03/A Residential Houses Privately owned are considered appropriate and comparable to Coed Darcy. Details about these sites are presented in Table 5-4.

Table 5-4 - 03/A - Survey Sites

Site Location	Planning Authority	Number of dwellings surveyed	Reasons for inclusion
Ellis Road, Broadbridge Heath, West Horsham, RH12 3LN	West Sussex Council	918	Surveyed within last two years Edge of Town Location Located next to main 'A road' Comparable access to public transport facilities Large residential development
Round House Way, Cringleford, Norwich, NR4 7JR	Norwich City Council	984	Surveyed within last two years Edge of Town Location Located near to two main 'A roads' Large residential development
Radbourne Lane, Derby, DE22 4HH	Derby City Council	371	Surveyed within last two years Comparable access to public transport facilities Edge of Town Location

5.4. Analysis

The parking review undertaken shows there is no demonstrable link between parking standards and trip generation. Changing the parking provision alone does not impact on peak hour traffic generation.

The comparable sites considered have unconstrained on-street parking in addition to on plot parking, and were found to have peak hour trip rates 15% and 18% less than assumed for Coed Darcy for the AM and PM peak hours respectively.

Based on the evidence presented it suggests that the residential trip rates used in the 2005 TA were higher than would be used for a similar site today, and the updated residential trip rates presented in Table 5-3 provide robust residential trip rate for Coed Darcy. However, it should be noted the trip rates from the 2005 TA have been utilised in the assessments in this report.

6. Connectivity to the North

Discussions with the Council have raised the need to consider how the site can be better connected to the surrounding area to the north. At this stage a high level assessment has been carried out and this section reviews what can be realistically achieved. It should be noted that the proposals cross land that is not in control of St Modwen Development Ltd, and as a result – and subject to the reaction of the Council - it will be necessary to consider how and when these measures can be installed. One option may be to consider a financial contribution to fund the works – which will be carried out by the Council or others – and add this to the revisions proposed to the section 106.

The main opportunity to promote and encourage better connectivity for non-motorised users, is the improvement of the existing 750m long link between the B4290 in the south and Crymlyn Road in the north, parallel to the M4. Improvements to this link will also create links into and through the proposed development in the site north of the railway and include connections to the railway crossing and access to the Education Campus.

A number of improvements can be made to this route – but the most effective will be the introduction of lighting, improved legibility of the route through refreshed signing and markings, improved street furniture at each extent and the introduction of ‘user features’ (e.g. informal seating locations and viewpoints along the route).

The proposed pedestrian and cycle improvements are shown in Figure 6-1.

Figure 6-1 - Coed Darcy Northern Movement Links

5041216-ATK-GEN-NS-SK-C-0004179
27 February 2020



7. Summary and Conclusions

NPTCBC have raised a number of questions about the variations to some of the obligations contained in the Section 106 Agreement for the Coed Darcy development in relation to the impact on the local highway network. This report has provided a single response to NPTCBC's queries which it wants to see addressed. These are listed below and confirmation of where they have been addressed is provided in brackets:

1. M4 Junction 43 works phasing (Chapter 2.2 and 3.3),
2. The impacts of the changes in delivery of the SAR and connection between the SAR and M4 J43. How the phasing to M4 J43 is affected by the revised delivery dates (Chapters 2.4, 2.6 and 4).
3. The impacts of the above of on the local highway network, especially as the timing of control on M4 J43 are not in the control of the Local Authority but SWTRA (Chapters 2.2, 2.4, 2.6, 3.3 and 4).
4. The impact on all of the above if there is an increase in parking over and above the permitted 1.5 spaces per dwelling (Chapter 5).
5. The impact of the new junction to serve the northern site on the above (Chapter 2.3).
6. The sustainable connectivity of the site, now and in the future, to the surrounding area, including the Crymlyn Road link (Chapter 6).
7. Public transport subsidy (Chapter 2.5).

This report addresses these points. It has assessed the local highway network based on the next five years of development (which has the potential to deliver 1,500 dwellings which is consistent with the M4 J43 works phasing assessment scenarios, covered in a separate report). A commitment has been made to carry out a full review of the Transportation Assessment for the remaining (approximately) two thirds of the scheme.

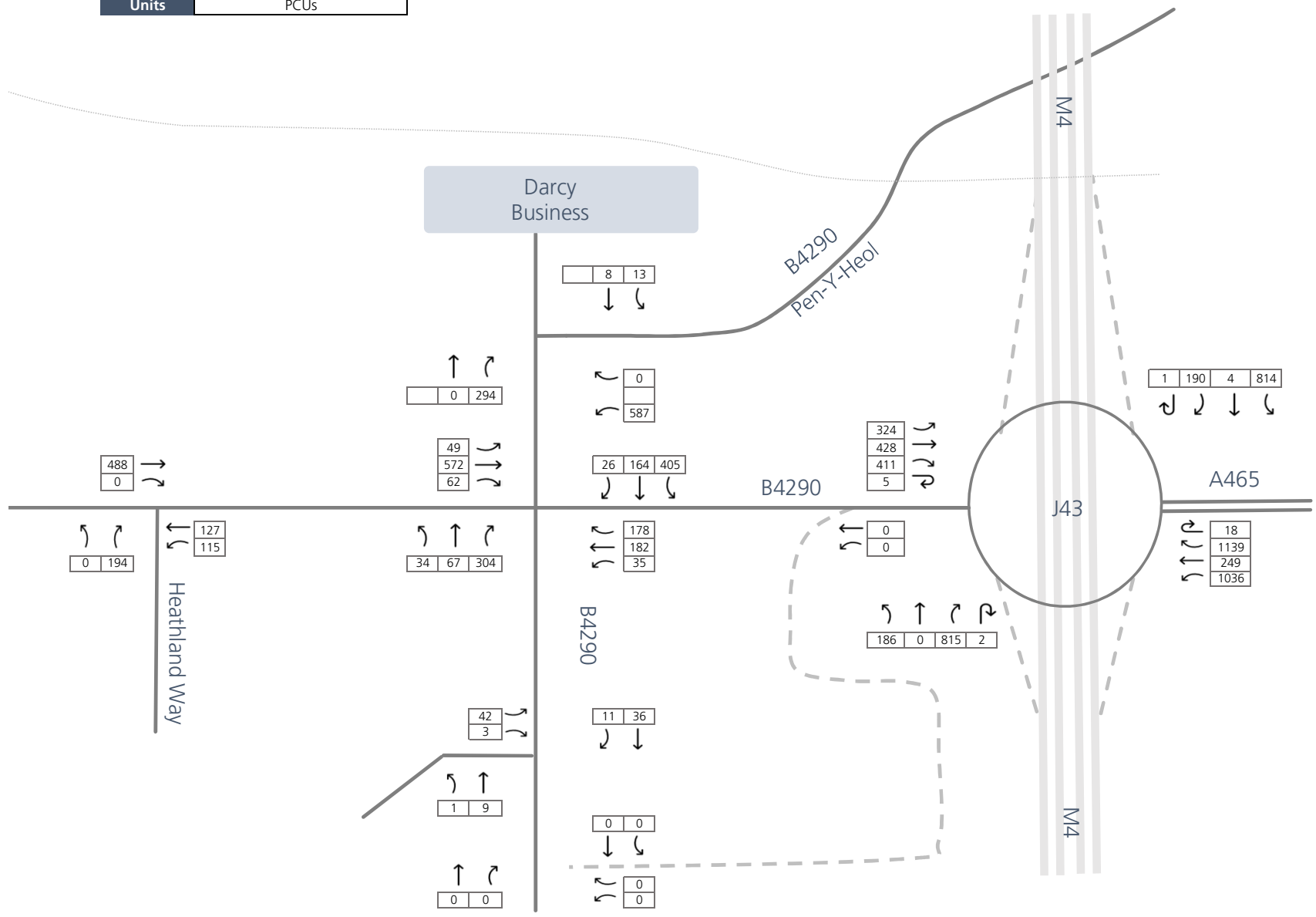
The TRANSYT modelling within this report determined that the local highway network can accommodate 1,500 dwellings comprised of – 2018 Base (300) + Committed Development (140) + Coed Darcy Development (1,060) and operate within capacity. No change is proposed to the northern access in the assessment and – whilst it will be provided over the next five years - the SAR has not been included in this assessment of the local highway network. It therefore presents a worst-case scenario as when the SAR opens it will provide an additional route for traffic to take. This also means that the revised trigger for the opening of the SAR does not impact the findings of this assessment.

The parking review undertaken shows there is no demonstrable link between parking standards and trip generation. Changing the parking provision alone does not impact on peak hour traffic generation. In addition, future for connectivity of the site by walking and cycling such as the Crymlyn Road link, and public transport provision will reduce the need to travel by car.

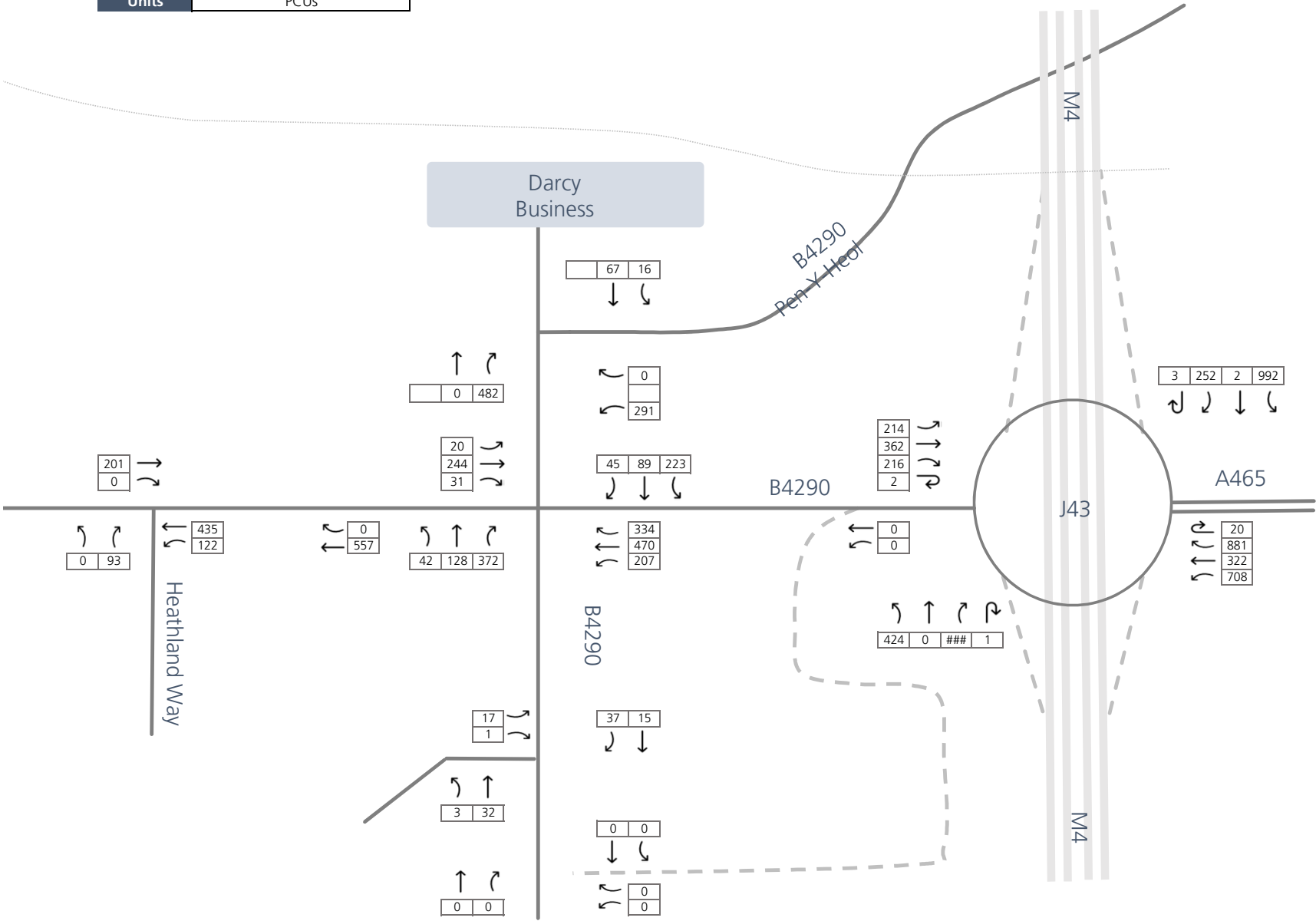
Appendices

Appendix A. Traffic Flow Diagrams

Scenario	2018 B+ C(140) + D(1060) AMPeak
Units	PCUs



Scenario	2018 B + C(140) +D(1060) PMPeak
Units	PCUs



Appendix B. TRANSYT Modelling Outputs

TRANSYT 16

Version: 16.0.0.8411
© Copyright TRL Limited, 2019

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Results are NOT up to date. You should run the file and then refresh this report.

Filename: Coed Darcy - Phase 1_additional test-HP_v2.t15

Path: P:\INGUAIH & T\TP\Projects\5122307 - Coed Darcy\Technical\New test_query

Report generation date: 05/02/2020 17:14:32

»A1 - 2018 AM B+C(140)+D400 : D1 - 2020_D400, AM :
 »A2 - 2018 PM B+C(140)+D400 : D2 - 2020_D400, PM :
 »A3 - 2018 AM B+C(140)+D600 : D3 - 2020_D600, AM :
 »A4 - 2018 PM B+C(140)+D600 : D4 - 2020_D600, PM :
 »A5 - 2018 AM B+C(140)+D810 : D5 - 2020_D810, AM :
 »A6 - 2018 PM B+C(140)+D810 : D6 - 2020_D810, PM :
 »A7 - 2018 AM B+C(140)+D1060 : D7 - 2020_D1060, AM :
 »A8 - 2018 PM B+C(140)+D1060 : D8 - 2020_D1060, PM :

Summary of network performance

AM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 AM B+C(140)+D400 - 2020_D400					
Network	A1 D1	274.01	18.79	81% (L 501)	0 (0%)

PM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 PM B+C(140)+D400 - 2020_D400					
Network	A2 D2	331.60	22.27	78% (L 513)	0 (0%)

AM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 AM B+C(140)+D600 - 2020_D600					
Network	A3 D3	306.26	20.87	82% (L 501)	0 (0%)

PM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 PM B+C(140)+D600 - 2020_D600					
Network	A4 D4	362.32	24.31	81% (L 513)	0 (0%)

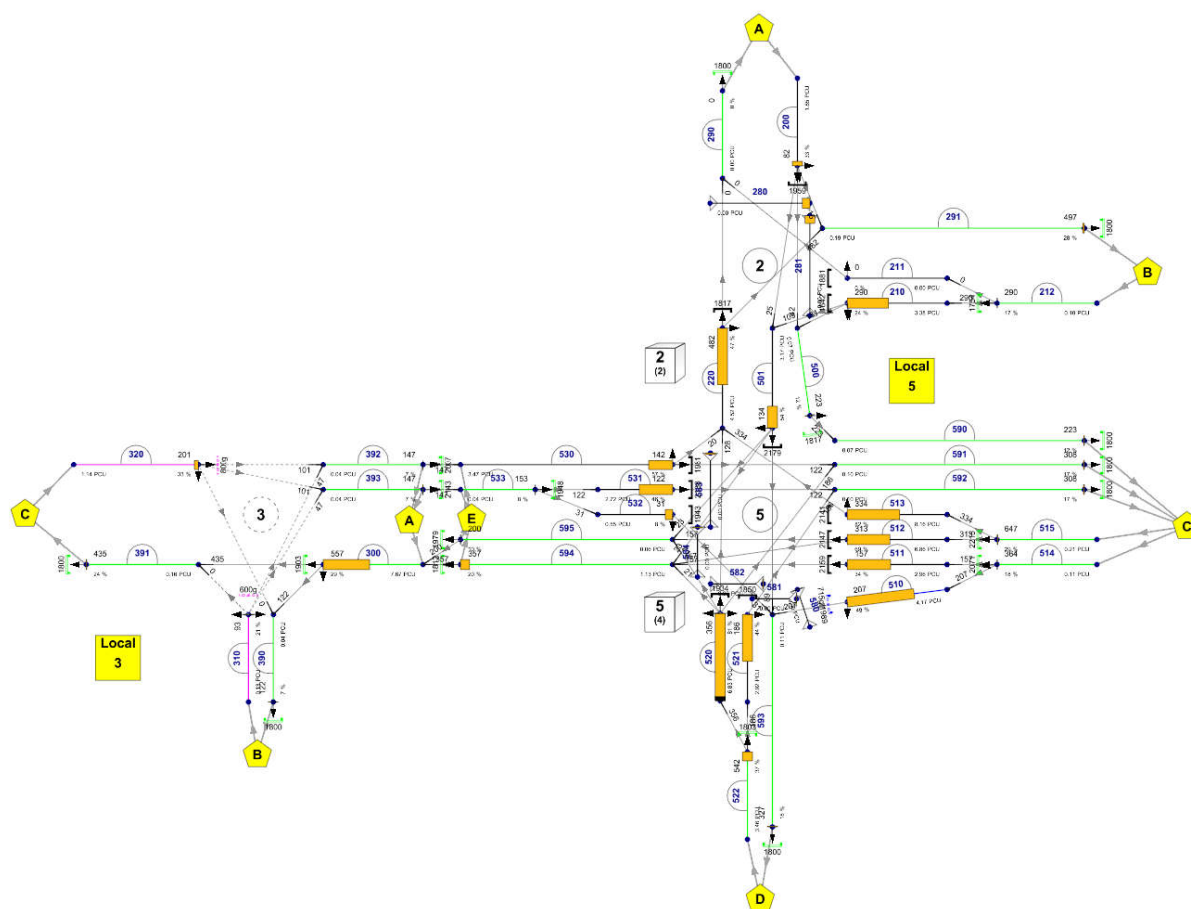
AM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 AM B+C(140)+D810 - 2020_D810					
Network	A5 D5	335.93	22.46	82% (L 501)	0 (0%)

PM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 PM B+C(140)+D810 - 2020_D810					
Network	A6 D6	390.86	26.11	81% (L 520)	0 (0%)

AM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 AM B+C(140)+D1060 - 2020_D1060					
Network	A7 D7	580.27	28.04	83% (L 501)	0 (0%)

PM					
	Set ID	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
2018 PM B+C(140)+D1060 - 2020_D1060					
Network	A8 D8	430.45	28.59	82% (L 513)	0 (0%)

Network Diagrams



Coed Darcy - NAR (Revised) Phase I
Cyclotime 0s / 280s
Timesteps 279 / 280
8, 8
Diagram produced using TRANSYT 16.0.0.8411

A7 - 2018 AM B+C(140)+D1060

D7 - 2020_D1060, AM

Network Options

Network timings

Network cycle time (s)	Minimum possible cycle time (s)	Absolute minimum possible cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
304	248	248		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)	Missing stage transition options
10000.00	10000.00	10000.00	2	Assume banned

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from traffic model	Exclude pedestrians from results calculation	Random delay mode	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		✓	Simplified (TRANSYT 12)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	OUTProfile accuracy (%)	SASStart temperature	SACooling factor	Random seed	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Simulated Annealing	10, 10, 1, 1, 0.1, 0.1, 0.01, 0.01	300.00	100.00	1		✓	2, 5			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
2		
3	(untitled)	
5		

Links

Links

Link	Name	Description	Traffic node	Length (m)	Has Saturation Flow	Use RR67	Saturation flow (PCU/hr)	Cell saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Is minor shared	Allow Nearside Turn On Red
200			2	200.00	✓		1959		✓		Normal		
210			2	53.19	✓		1642	1642	✓		Normal		
211			2	53.19	✓		1881	1881	✓		Normal		
212			2	200.00	✓		1754				Normal		
220			2	73.99	✓		1817		✓		Normal		
280			2	8.11	✓		10000		✓		Pedestrian		
281			2	12.50	✓		10000		✓		Pedestrian		
290			2	200.00	✓		1800				Normal		
291			2	200.00	✓		1800				Normal		
300	(untitled)		3	92.33	✓		1903				Normal		
310	(untitled)		3	200.00						✓	Normal		
320			3	200.00						✓	Normal		
390	(untitled)		3	200.00	✓		1800				Normal		
391	(untitled)		3	200.00	✓		1800				Normal		
392	(untitled)		3	133.93	✓		2007				Normal		
393	(untitled)		3	92.42	✓		2143				Normal		
500			5	87.15	✓		1817				Normal		
501			5	70.75	✓		2179		✓		Normal		
510			5	33.33	✓		1989	1989	✓	✓	Normal		
511			5	33.67	✓		2159	2159	✓		Normal		
512			5	79.51	✓		2147	2147	✓		Normal		
513			5	77.39	✓		2141	2141	✓		Normal		
514			5	170.65	✓		2071				Normal		
515			5	128.04	✓		2215				Normal		
520			5	31.69	✓		1934	1934	✓		Normal		
521			5	31.47	✓		1850	1850	✓		Normal		
522			5	200.00	✓		1803				Normal		
530			5	164.74	✓		1981		✓		Normal		
531			5	30.30	✓		2138	2138	✓		Normal		
532			5	30.35	✓		1943	1943	✓		Normal		
533			5	83.83	✓		1948	1948			Normal		
580			5	4.00	✓		10000		✓		Pedestrian		
581			5	8.31	✓		10000		✓		Pedestrian		
582			5	4.00	✓		10000		✓		Pedestrian		
583			5	10.07	✓		10000		✓		Pedestrian		
584			5	6.51	✓		10000		✓		Pedestrian		
590			5	200.00	✓		1800				Normal		
591			5	200.00	✓		1800				Normal		
592			5	200.00	✓		1800				Normal		
593			5	200.00	✓		1800				Normal		
594			5	156.15	✓		1812				Normal		
595			5	156.15	✓		1979	1979			Normal		

Modelling

Link	Traffic model	Stop weighting (%)	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Queue limit (PCU)	Excess queue penalty (£)	Has degree of saturation limit
200	NetworkDefault	100	100	100		0.00				
210	CTM	100	100	100		0.00				
211	CTM	100	100	100		0.00				
212	NetworkDefault	100	100	100		0.00				
220	NetworkDefault	100	100	100		8.00	✓	6.00	1000.00	
280	NetworkDefault	100	100	100		0.00				
281	NetworkDefault	100	100	100		0.00				
290	NetworkDefault	100	100	100		0.00				
291	NetworkDefault	100	100	100		0.00				
300	NetworkDefault	100	100	100		0.00				
310	NetworkDefault	100	100	100		0.00				
320	NetworkDefault	100	100	100		0.00				
390	NetworkDefault	100	100	100		0.00				
391	NetworkDefault	100	100	100		0.00				
392	NetworkDefault	100	100	100		0.00				
393	NetworkDefault	100	100	100		0.00				
500	NetworkDefault	100	100	100		0.00				
501	NetworkDefault	100	100	100		0.00				
510	CTM	100	100	100		0.00				
511	CTM	100	100	100		0.00				
512	CTM	100	100	100		0.00				
513	CTM	100	100	100		0.00				
514	NetworkDefault	100	100	100		0.00				
515	NetworkDefault	100	100	100		0.00				
520	CTM	100	100	100		0.00				
521	CTM	100	100	100		0.00				
522	NetworkDefault	100	100	100		0.00				
530	NetworkDefault	100	100	100		0.00				
531	CTM	100	100	100		0.00	✓	4.00	1000.00	
532	CTM	100	100	100		0.00				
533	CTM	100	100	100		0.00				
580	NetworkDefault	100	100	100		0.00				
581	NetworkDefault	100	100	100		0.00				
582	NetworkDefault	100	100	100		0.00				
583	NetworkDefault	100	100	100		0.00				
584	NetworkDefault	100	100	100		0.00				
590	NetworkDefault	100	100	100		0.00				
591	NetworkDefault	100	100	100		0.00				
592	NetworkDefault	100	100	100		0.00				
593	NetworkDefault	100	100	100		0.00				
594	NetworkDefault	100	100	100		0.00				
595	CTM	100	100	100		0.00				

Modelling - Normal traffic - Advanced

Link	Dispersion type for Normal Traffic	Initial queue (PCU)	Auto cycle time	Cycle time
(ALL)	NetworkDefault	0.00	✓	304

Flows

Link	Total flow (PCU/hr)	PCU Factor
200	20	1.00
210	588	1.00
211	0	1.00
212	588	1.00
220	294	1.00
280	10	1.00
281	10	1.00
290	0	1.00
291	307	1.00
300	242	1.00
310	194	1.00
320	488	1.00
390	115	1.00
391	127	1.00
392	341	1.00
393	341	1.00
500	405	1.00
501	190	1.00
510	35	1.00
511	61	1.00
512	121	1.00
513	178	1.00
514	96	1.00
515	299	1.00
520	253	1.00
521	152	1.00
522	405	1.00
530	335	1.00
531	286	1.00
532	62	1.00
533	348	1.00
580	10	1.00
581	10	1.00
582	10	1.00
583	10	1.00
584	10	1.00
590	405	1.00
591	438	1.00
592	438	1.00
593	261	1.00
594	151	1.00
595	91	1.00

Flows - Advanced

Link	Detectors
(ALL)	

Signals

Link	Controller stream	Phase	Second phase enabled
200	2	A	
210	2	B	
211	2	C	
220	2	D	
280	2	F	
281	2	G	
501	5	A	
510	5	B	
511	5	B	
512	5	B	
513	5	C	
520	5	D	
521	5	D	
530	5	E	
531	5	E	
532	5	F	
580	5	G	
581	5	K	
582	5	H	
583	5	I	
584	5	J	

Entry Sources

Link	Cruise time (seconds)	Cruise speed (kph)
200	22.50	32.00
212	22.50	32.00
280	7.30	4.00
281	11.25	4.00
310	22.50	32.00
320	22.50	32.00
514	19.20	32.00
515	14.40	32.00
522	22.50	32.00
580	3.60	4.00
581	7.48	4.00
582	3.60	4.00
583	9.06	4.00
584	5.86	4.00

Sources

Link	Source	Source type	Source link	Destination link	Cruise time (seconds)	Cruise speed (kph)	Total flow (PCU/hr)
210	1	Link	212	210	5.98	32.00	588
211	1	Link	212	211	5.98	32.00	0
220	1	Link	520	220	8.32	32.00	67
290	1	Link	220	290	22.50	32.00	0
291	1	Link	220	291	22.50	32.00	294
300	1	Link	594	300	10.39	32.00	151
390	1	Link	300	390	22.50	32.00	115
391	1	Link	310	391	22.50	32.00	0
392	1	Link	320	392	15.07	32.00	244
393	1	Link	320	393	10.40	32.00	244
500	1	Link	210	500	9.80	32.00	400
501	1	Link	200	501	7.96	32.00	2
510	1	Link	514	510	3.75	32.00	35
511	1	Link	514	511	3.79	32.00	61
512	1	Link	515	512	8.94	32.00	121
513	1	Link	515	513	8.71	32.00	178
520	1	Link	522	520	3.57	32.00	253
521	1	Link	522	521	3.54	32.00	152
530	1	Link	392	530	18.53	32.00	341
531	1	Link	533	531	3.41	32.00	286
532	1	Link	533	532	3.41	32.00	62
533	1	Link	393	533	9.43	32.00	341
590	1	Link	500	590	22.50	32.00	405
591	1	Link	530	591	22.50	32.00	286
592	1	Link	531	592	22.50	32.00	286
593	1	Link	510	593	22.50	32.00	35
594	1	Link	501	594	17.57	32.00	13
595	1	Link	501	595	17.57	32.00	13
220	2	Link	530	220	8.32	32.00	49
290	2	Link	211	290	22.50	32.00	0
291	2	Link	200	291	22.50	32.00	13
300	2	Link	595	300	10.39	32.00	91
390	2	Link	320	390	24.00	30.00	0
391	2	Link	300	391	22.50	32.00	127
392	2	Link	310	392	15.07	32.00	97
393	2	Link	310	393	11.09	30.00	97
500	2	Link	200	500	9.80	32.00	5
501	2	Link	210	501	7.96	32.00	188
591	2	Link	520	591	22.50	32.00	152
592	2	Link	521	592	22.50	32.00	152
593	2	Link	532	593	22.50	32.00	62
594	2	Link	520	594	17.57	32.00	17
595	2	Link	520	595	17.57	32.00	17
220	3	Link	513	220	8.32	32.00	178
593	3	Link	501	593	22.50	32.00	164
594	3	Link	511	594	17.57	32.00	61
595	3	Link	512	595	17.57	32.00	61
594	4	Link	512	594	17.57	32.00	61

Give way data

Link	Same as major link	Percentage opposed (%)	Opposed By Conflict 1 Only (%)	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Max congested capacity (PCU/hr)	Use Step-wise Opposed Turn Model	Visibility restricted
310	✓	100	61	600	600			
320	✓	100	1	800	800			
510	✓	100	100	715	1989	0		

Give Way Data - Conflicts

Link	Conflict	Description	Controlling type	Controlling link	Percentage opposing (%)	Slope coefficient	Upstream signals visible
310	1		Link	300	100	0.22	
	2		Link	320	100	0.19	
320	1		Link	300	100	0.35	

Local OD Matrix - Local Matrix: 3

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit	Limit paths by flow	Low path flow threshold
3	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25				

Normal Input Flows (PCU/hr)

	To			
	A	B	C	
From	A	0	115	127
	B	194	0	0
	C	488	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
3	A	(untitled)	300	393, 392	#0000FF
	B	(untitled)	310	390	#FF0000
	C	(untitled)	320	391	#00FF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
3	1		B	C	310, 391	Normal	0
	2		C	B	320, 390	Normal	0
	3		B	A	310, 393	Normal	97
	4		C	A	320, 393	Normal	244
	5		B	A	310, 392	Normal	97
	6		C	A	320, 392	Normal	244
	7		A	B	300, 390	Normal	115
	8		A	C	300, 391	Normal	127

Local OD Matrix - Local Matrix: 5

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit	Limit paths by flow	Low path flow threshold
5	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25				

Normal Input Flows (PCU/hr)

	To					
	A	B	C	D	E	
From	A	0	13	5	2	0
	B	0	0	400	162	26
	C	0	178	0	35	182
	D	0	67	304	0	34
	E	0	49	572	62	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
5	A	(untitled)	200	290	#FFFF00
	B	(untitled)	212	291	#00FFFF
	C	(untitled)	514, 515	592, 591, 590	#FF00FF
	D	(untitled)	522	593	#008000
	E	(untitled)	533, 530	595, 594	#FFA500

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
5	1		A	E	200, 501, 595	Normal	0
	2		A	E	200, 501, 594	Normal	0
	3		E	A	530, 220, 290	Normal	0
	4		A	B	200, 291	Normal	13
	5		E	B	530, 220, 291	Normal	49
	6		B	E	212, 210, 501, 595	Normal	13
	7		B	E	212, 210, 501, 594	Normal	13
	8		B	A	212, 211, 290	Normal	0
	9		E	C	533, 531, 592	Normal	286
	10		E	C	530, 591	Normal	286
	11		A	C	200, 500, 590	Normal	5
	12		B	C	212, 210, 500, 590	Normal	400
	13		C	E	514, 511, 594	Normal	61
	14		C	E	515, 512, 595	Normal	61
	15		C	E	515, 512, 594	Normal	61
	16		C	B	515, 513, 220, 291	Normal	178
	17		C	A	515, 513, 220, 290	Normal	0
	18		D	C	522, 521, 592	Normal	152
	19		D	B	522, 520, 220, 291	Normal	67
	20		D	A	522, 520, 220, 290	Normal	0
	21		D	C	522, 520, 591	Normal	152
	22		D	E	522, 520, 595	Normal	17
	23		D	E	522, 520, 594	Normal	17
	24		A	D	200, 501, 593	Normal	2
	25		B	D	212, 210, 501, 593	Normal	162
	26		C	D	514, 510, 593	Normal	35
	27		E	D	533, 532, 593	Normal	62

Signal Timings

Network Default: 304s cycle time; 304 steps

Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
08:15-09:15	(ALL)	0.00	0.00	0.00	0.00

Collections

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 3

	To		
	A	B	C
From	A	0.0	35.0
	B	42.1	0.0
	C	44.2	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Normal journey dist (m)	Bus journeydist (m)	Tram journey dist (m)	Pedestrian journey dist (m)	Calculated Total Flow (PCU/hr)	Avg journey time (s)	Avg journey dist (m)
1	B	C	0	51.83	400.00	400.00	400.00	400.00	0	0.00	1600.00
2	C	B	0	53.94	400.00	400.00	400.00	400.00	0	0.00	1600.00
3	B	A	97	39.84	292.42	292.42	292.42	292.42	97	39.84	292.42
4	C	A	244	41.97	292.42	292.42	292.42	292.42	244	41.97	292.42
5	B	A	97	44.40	333.93	333.93	333.93	333.93	97	44.40	333.93
6	C	A	244	46.52	333.93	333.93	333.93	333.93	244	46.52	333.93
7	A	B	115	35.04	292.33	292.33	292.33	292.33	115	35.04	292.33
8	A	C	127	35.05	292.33	292.33	292.33	292.33	127	35.05	292.33

Average Journey Time (s) for Local Matrix: 5

	To					
From		A	B	C	D	E
	A	0.0	76.2	87.4	175.2	0.0
	B	0.0	0.0	79.7	167.6	162.5
	C	0.0	140.5	0.0	66.5	62.3
	D	0.0	116.5	89.3	0.0	87.3
	E	0.0	99.2	71.1	81.9	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Normal journey dist (m)	Bus journeydist (m)	Tram journey dist (m)	Pedestrian journey dist (m)	Calculated Total Flow (PCU/hr)	Avg journey time (s)	Avg journey dist (m)
1	A	E	0	170.09	426.90	426.90	426.90	426.90	0	0.00	1707.60
2	A	E	0	170.22	426.90	426.90	426.90	426.90	0	0.00	1707.60
3	E	A	0	75.49	438.73	438.73	438.73	438.73	0	0.00	1754.92
4	A	B	13	76.20	400.00	400.00	400.00	400.00	13	76.20	400.00
5	E	B	49	99.19	438.73	438.73	438.73	438.73	49	99.19	438.73
6	B	E	13	162.45	480.09	480.09	480.09	480.09	13	162.45	480.09
7	B	E	13	162.58	480.09	480.09	480.09	480.09	13	162.58	480.09
8	B	A	0	27.69	453.19	453.19	453.19	453.19	0	0.00	1812.76
9	E	C	286	67.01	314.13	314.13	314.13	314.13	286	67.01	314.13
10	E	C	286	75.21	364.74	364.74	364.74	364.74	286	75.21	364.74
11	A	C	5	87.36	487.15	487.15	487.15	487.15	5	87.36	487.15
12	B	C	400	79.72	540.34	540.34	540.34	540.34	400	79.72	540.34
13	C	E	61	61.62	360.47	360.47	360.47	360.47	61	61.62	360.47
14	C	E	61	62.59	363.70	363.70	363.70	363.70	61	62.59	363.70
15	C	E	61	62.72	363.70	363.70	363.70	363.70	61	62.72	363.70
16	C	B	178	140.54	479.42	479.42	479.42	479.42	178	140.54	479.42
17	C	A	0	116.84	479.42	479.42	479.42	479.42	0	0.00	1917.68
18	D	C	152	86.13	431.47	431.47	431.47	431.47	152	86.13	431.47
19	D	B	67	116.53	505.68	505.68	505.68	505.68	67	116.53	505.68
20	D	A	0	92.82	505.68	505.68	505.68	505.68	0	0.00	2022.72
21	D	C	152	92.54	431.69	431.69	431.69	431.69	152	92.54	431.69
22	D	E	17	87.24	387.84	387.84	387.84	387.84	17	87.24	387.84
23	D	E	17	87.37	387.84	387.84	387.84	387.84	17	87.37	387.84
24	A	D	2	175.24	470.75	470.75	470.75	470.75	2	175.24	470.75
25	B	D	162	167.59	523.94	523.94	523.94	523.94	162	167.59	523.94
26	C	D	35	66.53	403.98	403.98	403.98	403.98	35	66.53	403.98
27	E	D	62	81.91	314.18	314.18	314.18	314.18	62	81.91	314.18

Final Prediction Table

Link Results

Link	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES		we
			Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Mean end of red queue (PCU)	
200		2	2	A	20	1959	56	56.00	5	1640	52.49	29.99	84.95	0.40	0.40	
210		2	2	B	588	1642	204	0.00	52	72	17.15	11.17	30.95	7.41	7.41	
211		2	2	C	0	1881	28	32.00	0	Unrestricted	0.00	0.00	0.00	0.00	0.00	
212		2			588	1754	304	38.64	38	134	27.69	5.19	18.29	9.78		
220		2	2	D	294	1817	153	36.00	31	187	24.10	15.78	52.11	6.15	6.03	
280 P		2	2	F	10	10000	10	0.00	2.764	3157	154.10	146.80	0.00	0.83	0.83	
281 P		2	2	G	10	10000	7	0.00	3.8	2268	162.95	151.70	0.00	0.84	0.84	
290		2			0	1800	304	304.00	0	Unrestricted	0.00	0.00	0.00	0.00		
291		2			307	1800	304	95.00	17	428	23.71	1.21	0.00	0.10		
300	(untitled)	3			242	1903	304	58.00	13	608	11.47	1.08	0.00	0.07		
310	(untitled)	3			194	506	304	0.00	38	135	28.25	5.75	0.00	0.31		
320		3			488	715	304	0.00	68	32	30.37	7.87	11.50	2.15		
390	(untitled)	3			115	1800	304	110.00	6	1308	23.57	1.07	0.00	0.03		
391	(untitled)	3			127	1800	304	93.00	7	1175	23.58	1.08	0.00	0.04		
392	(untitled)	3			341	2007	304	0.00	17	430	16.15	1.08	0.00	0.10		
393	(untitled)	3			341	2143	304	0.00	16	466	11.59	1.00	0.00	0.09		
500		5			405	1817	304	63.00	22	304	11.08	1.27	0.00	0.14		
501		5	5	A	190	2179	28	5.00	83	9	99.08	91.12	113.06	8.61	7.89	
510		5	5	B	35	1989	103	103.00	5	1694	22.76	19.01	68.33	0.53	0.53	
511		5	5	B	61	2159	103	0.00	8	1023	22.86	19.07	68.16	1.85	0.92	
512		5	5	B	121	2147	103	0.00	16	461	28.72	19.78	68.84	1.92	1.86	
513		5	5	C	178	2141	28	0.00	79	14	77.39	68.68	134.47	5.74	5.64	
514		5			96	2071	304	0.00	5	1842	20.11	0.91	0.00	0.02		
515		5			299	2215	304	0.00	13	567	15.34	0.94	0.00	0.08		
520		5	5	D	253 <	1934	57	0.00	65	38	44.73	41.16	100.11	5.77 +	5.77	
521		5	5	D	152	1850	57	0.00	41	120	38.32	34.78	92.04	3.26	3.25	
522		5			405	1803	304	9.96	23	288	23.99	1.49	3.33	1.50		
530		5	5	E	335	1981	79	0.00	62	45	51.38	32.85	95.65	7.23	6.20	
531		5	5	E	286	2138	79	0.00	49	84	32.63	29.22	85.73	5.40	5.25	
532		5	5	F	62	1943	28	1.00	30	197	47.68	44.27	105.40	1.84	1.54	
533		5			348	1948	304	0.00	18	404	10.56	1.12	0.00	0.11		
580 P		5	5	G	10	10000	161	0.00	0.184	48749	12.30	8.70	0.00	0.12	0.12	
581 P		5	5	K	10	10000	208	0.00	0.141	63847	9.47	1.99	0.00	0.03	0.03	
582 P		5	5	H	10	10000	123	0.00	0.239	37499	17.22	13.62	0.00	0.13	0.13	
583 P		5	5	I	10	10000	48	0.00	0.585	15295	36.97	27.90	0.00	0.21	0.21	
584 P		5	5	J	10	10000	20	0.00	1.267	7005	41.08	35.22	0.00	0.23	0.23	
590		5			405	1800	304	46.00	23	300	23.79	1.29	0.00	0.15		
591		5			438	1800	304	47.00	24	270	23.82	1.32	0.00	0.16		
592		5			438	1800	304	58.00	24	270	23.82	1.32	0.00	0.16		
593		5			261	1800	304	95.00	15	520	23.67	1.17	0.00	0.08		
594		5			151	1812	304	113.00	8	977	18.65	1.08	0.00	0.05		
595		5			91	1979	304	132.00	5	1866	18.52	0.95	0.00	0.02		

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1185.28	64.03	18.51	16.06	10.91	382.96	30.76	166.55	580.27
Bus									
Tram									
Pedestrians									
TOTAL	1185.82	65.23	18.18	17.08	10.96	398.18	30.76	166.55	580.27

- *P = link is a pedestrian link*
- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- **P.I. = PERFORMANCE INDEX**

A8 - 2018 PM B+C(140)+D1060

D8 - 2020_D1060, PM

Network Options

Network timings

Network cycle time (s)	Minimum possible cycle time (s)	Absolute minimum possible cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
280	224	224		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)	Missing stage transition options
10000.00	10000.00	10000.00	2	Assume banned

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from traffic model	Exclude pedestrians from results calculation	Random delay mode	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		✓	Simplified (TRANSYT 12)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	OUTProfile accuracy (%)	SASStart temperature	SACooling factor	Random seed	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Simulated Annealing	10, 10, 1, 1, 0.1, 0.1, 0.01, 0.01	300.00	100.00	1		✓	2, 5			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
2		
3	(untitled)	
5		

Links

Links

Link	Name	Description	Traffic node	Length (m)	Has Saturation Flow	Use RR67	Saturation flow (PCU/hr)	Cell saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Is minor shared	Allow Nearside Turn On Red
200			2	200.00	✓		1959		✓		Normal		
210			2	53.19	✓		1642	1642	✓		Normal		
211			2	53.19	✓		1881	1881	✓		Normal		
212			2	200.00	✓		1754				Normal		
220			2	73.99	✓		1817		✓		Normal		
280			2	8.11	✓		10000		✓		Pedestrian		
281			2	12.50	✓		10000		✓		Pedestrian		
290			2	200.00	✓		1800				Normal		
291			2	200.00	✓		1800				Normal		
300	(untitled)		3	92.33	✓		1903				Normal		
310	(untitled)		3	200.00						✓	Normal		
320			3	200.00						✓	Normal		
390	(untitled)		3	200.00	✓		1800				Normal		
391	(untitled)		3	200.00	✓		1800				Normal		
392	(untitled)		3	133.93	✓		2007				Normal		
393	(untitled)		3	92.42	✓		2143				Normal		
500			5	87.15	✓		1817				Normal		
501			5	70.75	✓		2179		✓		Normal		
510			5	33.33	✓		1989	1989	✓	✓	Normal		
511			5	33.67	✓		2159	2159	✓		Normal		
512			5	79.51	✓		2147	2147	✓		Normal		
513			5	77.39	✓		2141	2141	✓		Normal		
514			5	170.65	✓		2071				Normal		
515			5	128.04	✓		2215				Normal		
520			5	31.69	✓		1934	1934	✓		Normal		
521			5	31.47	✓		1850	1850	✓		Normal		
522			5	200.00	✓		1803				Normal		
530			5	164.74	✓		1981		✓		Normal		
531			5	30.30	✓		2138	2138	✓		Normal		
532			5	30.35	✓		1943	1943	✓		Normal		
533			5	83.83	✓		1948	1948			Normal		
580			5	4.00	✓		10000		✓		Pedestrian		
581			5	8.31	✓		10000		✓		Pedestrian		
582			5	4.00	✓		10000		✓		Pedestrian		
583			5	10.07	✓		10000		✓		Pedestrian		
584			5	6.51	✓		10000		✓		Pedestrian		
590			5	200.00	✓		1800				Normal		
591			5	200.00	✓		1800				Normal		
592			5	200.00	✓		1800				Normal		
593			5	200.00	✓		1800				Normal		
594			5	156.15	✓		1812				Normal		
595			5	156.15	✓		1979	1979			Normal		

Modelling

Link	Traffic model	Stop weighting (%)	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Queue limit (PCU)	Excess queue penalty (£)	Has degree of saturation limit
200	NetworkDefault	100	100	100		0.00				
210	CTM	100	100	100		0.00				
211	CTM	100	100	100		0.00				
212	NetworkDefault	100	100	100		0.00				
220	NetworkDefault	100	100	100		8.00	✓	6.00	500.00	
280	NetworkDefault	100	100	100		0.00				
281	NetworkDefault	100	100	100		0.00				
290	NetworkDefault	100	100	100		0.00				
291	NetworkDefault	100	100	100		0.00				
300	NetworkDefault	100	100	100		0.00				
310	NetworkDefault	100	100	100		0.00				
320	NetworkDefault	100	100	100		0.00				
390	NetworkDefault	100	100	100		0.00				
391	NetworkDefault	100	100	100		0.00				
392	NetworkDefault	100	100	100		0.00				
393	NetworkDefault	100	100	100		0.00				
500	NetworkDefault	100	100	100		0.00				
501	NetworkDefault	100	100	100		0.00				
510	CTM	100	100	100		0.00				
511	CTM	100	100	100		0.00				
512	CTM	100	100	100		0.00				
513	CTM	100	100	100		0.00				
514	NetworkDefault	100	100	100		0.00				
515	NetworkDefault	100	100	100		0.00				
520	CTM	100	100	100		0.00				
521	CTM	100	100	100		0.00				
522	NetworkDefault	100	100	100		0.00				
530	NetworkDefault	100	100	100		0.00				
531	CTM	100	100	100		0.00				
532	CTM	100	100	100		0.00				
533	CTM	100	100	100		0.00				
580	NetworkDefault	100	100	100		0.00				
581	NetworkDefault	100	100	100		0.00				
582	NetworkDefault	100	100	100		0.00				
583	NetworkDefault	100	100	100		0.00				
584	NetworkDefault	100	100	100		0.00				
590	NetworkDefault	100	100	100		0.00				
591	NetworkDefault	100	100	100		0.00				
592	NetworkDefault	100	100	100		0.00				
593	NetworkDefault	100	100	100		0.00				
594	NetworkDefault	100	100	100		0.00				
595	CTM	100	100	100		0.00				

Modelling - Normal traffic - Advanced

Link	Dispersion type for Normal Traffic	Initial queue (PCU)	Auto cycle time	Cycle time
(ALL)	NetworkDefault	0.00	✓	280

Flows

Link	Total flow (PCU/hr)	PCU Factor
200	82	1.00
210	290	1.00
211	0	1.00
212	290	1.00
220	482	1.00
280	10	1.00
281	10	1.00
290	0	1.00
291	497	1.00
300	557	1.00
310	93	1.00
320	201	1.00
390	122	1.00
391	435	1.00
392	147	1.00
393	147	1.00
500	223	1.00
501	134	1.00
510	207	1.00
511	157	1.00
512	313	1.00
513	334	1.00
514	364	1.00
515	647	1.00
520	356	1.00
521	186	1.00
522	542	1.00
530	142	1.00
531	122	1.00
532	31	1.00
533	153	1.00
580	10	1.00
581	10	1.00
582	10	1.00
583	10	1.00
584	10	1.00
590	223	1.00
591	308	1.00
592	308	1.00
593	327	1.00
594	357	1.00
595	200	1.00

Flows - Advanced

Link	Detectors
(ALL)	

Signals

Link	Controller stream	Phase	Second phase enabled
200	2	A	
210	2	B	
211	2	C	
220	2	D	
280	2	F	
281	2	G	
501	5	A	
510	5	B	
511	5	B	
512	5	B	
513	5	C	
520	5	D	
521	5	D	
530	5	E	
531	5	E	
532	5	F	
580	5	G	
581	5	K	
582	5	H	
583	5	I	
584	5	J	

Entry Sources

Link	Cruise time (seconds)	Cruise speed (kph)
200	22.50	32.00
212	22.50	32.00
280	7.30	4.00
281	11.25	4.00
310	24.00	30.00
320	24.00	30.00
514	19.20	32.00
515	14.40	32.00
522	22.50	32.00
580	3.60	4.00
581	7.48	4.00
582	3.60	4.00
583	9.06	4.00
584	5.86	4.00

Sources

Link	Source	Source type	Source link	Destination link	Cruise time (seconds)	Cruise speed (kph)	Total flow (PCU/hr)
210	1	Link	212	210	5.98	32.00	290
211	1	Link	212	211	5.98	32.00	0
220	1	Link	520	220	8.32	32.00	128
290	1	Link	220	290	22.50	32.00	0
291	1	Link	220	291	22.50	32.00	482
300	1	Link	594	300	10.39	32.00	357
390	1	Link	300	390	22.50	32.00	122
391	1	Link	310	391	22.50	32.00	0
392	1	Link	320	392	15.07	32.00	101
393	1	Link	320	393	10.40	32.00	101
500	1	Link	210	500	9.80	32.00	181
501	1	Link	200	501	7.96	32.00	25
510	1	Link	514	510	3.75	32.00	207
511	1	Link	514	511	3.79	32.00	157
512	1	Link	515	512	8.94	32.00	313
513	1	Link	515	513	8.71	32.00	334
520	1	Link	522	520	3.57	32.00	356
521	1	Link	522	521	3.54	32.00	186
530	1	Link	392	530	18.53	32.00	147
531	1	Link	533	531	3.41	32.00	122
532	1	Link	533	532	3.41	32.00	31
533	1	Link	393	533	9.43	32.00	147
590	1	Link	500	590	22.50	32.00	223
591	1	Link	530	591	22.50	32.00	122
592	1	Link	531	592	22.50	32.00	122
593	1	Link	510	593	22.50	32.00	207
594	1	Link	501	594	17.57	32.00	23
595	1	Link	501	595	17.57	32.00	23
220	2	Link	530	220	8.32	32.00	20
290	2	Link	211	290	22.50	32.00	0
291	2	Link	200	291	22.50	32.00	15
300	2	Link	595	300	10.39	32.00	200
390	2	Link	320	390	24.00	30.00	0
391	2	Link	300	391	22.50	32.00	435
392	2	Link	310	392	15.07	32.00	47
393	2	Link	310	393	11.09	30.00	47
500	2	Link	200	500	9.80	32.00	42
501	2	Link	210	501	7.96	32.00	109
591	2	Link	520	591	22.50	32.00	186
592	2	Link	521	592	22.50	32.00	186
593	2	Link	532	593	22.50	32.00	31
594	2	Link	520	594	17.57	32.00	21
595	2	Link	520	595	17.57	32.00	21
220	3	Link	513	220	8.32	32.00	334
593	3	Link	501	593	22.50	32.00	89
594	3	Link	511	594	17.57	32.00	157
595	3	Link	512	595	17.57	32.00	157
594	4	Link	512	594	17.57	32.00	157

Give way data

Link	Same as major link	Percentage opposed (%)	Opposed By Conflict 1 Only (%)	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Max congested capacity (PCU/hr)	Use Step-wise Opposed Turn Model	Visibility restricted
310	✓	100	0	600	600			
320	✓	100	0	800	800			
510	✓	100	100	715	1989	0		

Give Way Data - Conflicts

Link	Conflict	Description	Controlling type	Controlling link	Percentage opposing (%)	Slope coefficient	Upstream signals visible
310	1		Link	300	100	0.22	
	2		Link	320	100	0.19	
320	1		Link	300	100	0.35	

Local OD Matrix - Local Matrix: 3

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit	Limit paths by flow	Low path flow threshold
3	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25				

Normal Input Flows (PCU/hr)

	To			
	A	B	C	
From	A	0	122	435
	B	93	0	0
	C	201	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
3	A	(untitled)	300	393, 392	#0000FF
	B	(untitled)	310	390	#FF0000
	C	(untitled)	320	391	#00FF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
3	1		B	C	310, 391	Normal	0
	2		C	B	320, 390	Normal	0
	3		B	A	310, 393	Normal	47
	4		C	A	320, 393	Normal	101
	5		B	A	310, 392	Normal	47
	6		C	A	320, 392	Normal	101
	7		A	B	300, 390	Normal	122
	8		A	C	300, 391	Normal	435

Local OD Matrix - Local Matrix: 5

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit	Limit paths by flow	Low path flow threshold
5	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25				

Normal Input Flows (PCU/hr)

	To					
	A	B	C	D	E	
From	A	0	15	42	17	8
	B	0	0	181	72	37
	C	0	334	0	207	470
	D	0	128	372	0	42
	E	0	20	244	31	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
5	A	(untitled)	200	290	#FFFF00
	B	(untitled)	212	291	#00FFFF
	C	(untitled)	514, 515	592, 591, 590	#FF00FF
	D	(untitled)	522	593	#008000
	E	(untitled)	533, 530	595, 594	#FFA500

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
5	1		A	E	200, 501, 595	Normal	4
	2		A	E	200, 501, 594	Normal	4
	3		E	A	530, 220, 290	Normal	0
	4		A	B	200, 291	Normal	15
	5		E	B	530, 220, 291	Normal	20
	6		B	E	212, 210, 501, 595	Normal	19
	7		B	E	212, 210, 501, 594	Normal	19
	8		B	A	212, 211, 290	Normal	0
	9		E	C	533, 531, 592	Normal	122
	10		E	C	530, 591	Normal	122
	11		A	C	200, 500, 590	Normal	42
	12		B	C	212, 210, 500, 590	Normal	181
	13		C	E	514, 511, 594	Normal	157
	14		C	E	515, 512, 595	Normal	157
	15		C	E	515, 512, 594	Normal	157
	16		C	B	515, 513, 220, 291	Normal	334
	17		C	A	515, 513, 220, 290	Normal	0
	18		D	C	522, 521, 592	Normal	186
	19		D	B	522, 520, 220, 291	Normal	128
	20		D	A	522, 520, 220, 290	Normal	0
	21		D	C	522, 520, 591	Normal	186
	22		D	E	522, 520, 595	Normal	21
	23		D	E	522, 520, 594	Normal	21
	24		A	D	200, 501, 593	Normal	17
	25		B	D	212, 210, 501, 593	Normal	72
	26		C	D	514, 510, 593	Normal	207
	27		E	D	533, 532, 593	Normal	31

Signal Timings

Network Default: 280s cycle time; 280 steps

Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
16:15-17:15	(ALL)	0.00	0.00	0.00	0.00

Collections

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 3

	To			
From		A	B	C
	A	0.0	35.7	36.0
	B	43.0	0.0	0.0
	C	42.7	0.0	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Normal journey dist (m)	Bus journeydist (m)	Tram journey dist (m)	Pedestrian journey dist (m)	Calculated Total Flow (PCU/hr)	Avg journey time (s)	Avg journey dist (m)
1	B	C	0	53.01	400.00	400.00	400.00	400.00	0	0.00	1600.00
2	C	B	0	52.48	400.00	400.00	400.00	400.00	0	0.00	1600.00
3	B	A	47	40.71	292.42	292.42	292.42	292.42	47	40.71	292.42
4	C	A	101	40.43	292.42	292.42	292.42	292.42	101	40.43	292.42
5	B	A	47	45.23	333.93	333.93	333.93	333.93	47	45.23	333.93
6	C	A	101	44.94	333.93	333.93	333.93	333.93	101	44.94	333.93
7	A	B	122	35.71	292.33	292.33	292.33	292.33	122	35.71	292.33
8	A	C	435	35.96	292.33	292.33	292.33	292.33	435	35.96	292.33

Average Journey Time (s) for Local Matrix: 5

	To					
	A	B	C	D	E	
From	A	0.0	85.8	96.5	139.3	134.3
	B	0.0	0.0	69.9	112.8	107.7
	C	0.0	116.6	0.0	80.6	78.5
	D	0.0	114.9	90.3	0.0	92.3
	E	0.0	105.7	83.1	66.0	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Normal journey dist (m)	Bus journeydist (m)	Tram journey dist (m)	Pedestrian journey dist (m)	Calculated Total Flow (PCU/hr)	Avg journey time (s)	Avg journey dist (m)
1	A	E	4	134.20	426.90	426.90	426.90	426.90	4	134.20	426.90
2	A	E	4	134.42	426.90	426.90	426.90	426.90	4	134.42	426.90
3	E	A	0	81.81	438.73	438.73	438.73	438.73	0	0.00	1754.92
4	A	B	15	85.79	400.00	400.00	400.00	400.00	15	85.79	400.00
5	E	B	20	105.69	438.73	438.73	438.73	438.73	20	105.69	438.73
6	B	E	19	107.63	480.09	480.09	480.09	480.09	19	107.63	480.09
7	B	E	19	107.85	480.09	480.09	480.09	480.09	19	107.85	480.09
8	B	A	0	23.73	453.19	453.19	453.19	453.19	0	0.00	1812.76
9	E	C	122	78.09	314.13	314.13	314.13	314.13	122	78.09	314.13
10	E	C	122	88.03	364.74	364.74	364.74	364.74	122	88.03	364.74
11	A	C	42	96.49	487.15	487.15	487.15	487.15	42	96.49	487.15
12	B	C	181	69.92	540.34	540.34	540.34	540.34	181	69.92	540.34
13	C	E	157	72.49	360.47	360.47	360.47	360.47	157	72.49	360.47
14	C	E	157	81.44	363.70	363.70	363.70	363.70	157	81.44	363.70
15	C	E	157	81.66	363.70	363.70	363.70	363.70	157	81.66	363.70
16	C	B	334	116.64	479.42	479.42	479.42	479.42	334	116.64	479.42
17	C	A	0	92.76	479.42	479.42	479.42	479.42	0	0.00	1917.68
18	D	C	186	83.23	431.47	431.47	431.47	431.47	186	83.23	431.47
19	D	B	128	114.95	505.68	505.68	505.68	505.68	128	114.95	505.68
20	D	A	0	91.07	505.68	505.68	505.68	505.68	0	0.00	2022.72
21	D	C	186	97.29	431.69	431.69	431.69	431.69	186	97.29	431.69
22	D	E	21	92.16	387.84	387.84	387.84	387.84	21	92.16	387.84
23	D	E	21	92.38	387.84	387.84	387.84	387.84	21	92.38	387.84
24	A	D	17	139.34	470.75	470.75	470.75	470.75	17	139.34	470.75
25	B	D	72	112.77	523.94	523.94	523.94	523.94	72	112.77	523.94
26	C	D	207	80.62	403.98	403.98	403.98	403.98	207	80.62	403.98
27	E	D	31	66.02	314.18	314.18	314.18	314.18	31	66.02	314.18

Final Prediction Table

Link Results

Link	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES		we
			Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Mean end of red queue (PCU)	
200		2	2	A	82	1959	31	0.00	33	169	61.91	39.41	103.61	1.85	1.80	
210		2	2	B	290	1642	205	0.00	24	280	11.61	5.63	29.51	3.38	3.21	
211		2	2	C	0	1881	28	32.00	0	Unrestricted	0.00	0.00	0.00	0.00	0.00	
212		2			290	1754	280	0.00	17	444	23.73	1.23	0.00	0.10		
220		2	2	D	482	1817	154	28.00	47	92	17.49	9.16	38.54	4.52	3.58	
280 P		2	2	F	10	10000	10	0.00	2.545	3436	141.70	134.40	0.00	0.76	0.76	
281 P		2	2	G	10	10000	7	0.00	3.5	2471	150.38	139.13	0.00	0.77	0.77	
290		2			0	1800	280	280.00	0	Unrestricted	0.00	0.00	0.00	0.00		
291		2			497	1800	280	24.00	28	226	23.88	1.38	0.00	0.19		
300	(untitled)	3			557	1903	280	33.00	29	207	12.14	1.75	22.02	7.67		
310	(untitled)	3			93	439	280	0.00	21	325	29.19	5.19	0.00	0.13		
320		3			201	605	280	0.00	33	171	28.91	4.91	20.13	1.14		
390	(untitled)	3			122	1800	280	149.00	7	1228	23.57	1.07	0.00	0.04		
391	(untitled)	3			435	1800	280	0.00	24	272	23.82	1.32	0.00	0.16		
392	(untitled)	3			147	2007	280	0.00	7	1129	16.03	0.97	0.00	0.04		
393	(untitled)	3			147	2143	280	0.00	7	1212	11.52	0.90	0.00	0.04		
500		5			223	1817	280	25.00	12	633	10.93	1.13	0.00	0.07		
501		5	5	A	134	2179	28	0.00	54	67	53.71	45.75	111.84	3.17	3.10	
510		5	5	B	207	1989	55	0.00	49	82	36.65	32.90	94.91	4.17	4.05	
511		5	5	B	157	2159	55	0.00	34	161	33.43	29.65	90.21	2.96	2.92	
512		5	5	B	313	2147	55	0.00	69	30	47.31	38.36	103.23	6.86	6.57	
513		5	5	C	334	2141	49	0.00	82	9	59.72	51.01	121.00	8.16	7.85	
514		5			364	2071	280	0.00	18	412	20.25	1.05	0.00	0.11		
515		5			647	2215	280	0.00	29	208	15.55	1.15	0.00	0.21		
520		5	5	D	356 <	1934	60	0.00	81	12	47.53	43.97	96.66	6.83 +	6.83	
521		5	5	D	186	1850	60	4.00	44	105	33.48	29.94	80.56	2.92	2.92	
522		5			542	1803	280	52.70	37	143	26.04	3.54	25.14	3.46		
530		5	5	E	142	1981	31	0.00	57	57	64.32	45.79	113.68	3.47	3.26	
531		5	5	E	122	2138	31	0.00	46	97	43.95	40.54	107.17	2.72	2.69	
532		5	5	F	31	1943	49	49.00	8	968	31.86	28.45	88.56	0.55	0.55	
533		5			153	1948	280	0.00	8	1046	10.43	1.00	0.00	0.04		
580 P		5	5	G	10	10000	185	0.00	0.148	60650	7.73	4.13	0.00	0.07	0.07	
581 P		5	5	K	10	10000	163	0.00	0.164	54864	10.75	3.27	0.00	0.05	0.05	
582 P		5	5	H	10	10000	75	0.00	0.354	25293	22.72	19.12	0.00	0.15	0.15	
583 P		5	5	I	10	10000	48	0.00	0.538	16614	33.71	24.65	0.00	0.17	0.17	
584 P		5	5	J	10	10000	41	0.00	0.622	14364	32.07	26.21	0.00	0.17	0.17	
590		5			223	1800	280	13.00	12	626	23.64	1.14	0.00	0.07		
591		5			308	1800	280	63.00	17	426	23.71	1.21	0.00	0.10		
592		5			308	1800	280	71.00	17	426	23.71	1.21	0.00	0.10		
593		5			327	1800	280	90.00	18	395	23.72	1.22	0.00	0.11		
594		5			357	1812	280	74.00	20	357	18.80	1.24	0.48	1.13		
595		5			200	1979	280	153.00	10	790	18.58	1.01	0.00	0.06		

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1203.13	65.35	18.41	16.20	11.42	392.20	38.25	0.00	430.45
Bus									
Tram									
Pedestrians									
TOTAL	1203.67	66.46	18.11	17.14	11.46	406.04	38.25	0.00	430.45

- *P = link is a pedestrian link*
- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- **P.I. = PERFORMANCE INDEX**



Tim Colles
Atkins Limited
The Axis
10 Holliday Street
Birmingham
B1 1TF

Tel: +44 (0)121 483 5000
Fax: +44 (0)121 483 5252