LLYNNOEDD HENDRE CAERDYDD
CARDIFF HENDRE LAKES
Gwasanaethir gan Parcfforddd Caerdydd
Served by Cardiff Parkway

ARUP

CARDIFF HENDRE LAKES

Transport Assessment : Appendices

August 2020

Appendix A

Hendre Lakes Business District
Framework Travel Plan

Cardiff Parkway Development Ltd

Cardiff Hendre Lakes

Business District Framework Travel Plan

HDL-ARP-EZ-XX-REP-EEN-000004

Issue | 31 July 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 252199

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1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of Cardiff Hendre Lakes. The development proposals include the construction of a business park (up to 90,000m^2 - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes. Together with the construction of a new transport hub facility, comprising railway station buildings (up to 2,500m^2 - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 650 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park.

Two principle areas of the proposed development include the business district and the Transport Interchange. The business district is proposed to the north of the mainline railway and will comprise 90,000m^2 of employment space. The Transport Interchange, which includes a mainline railway station (Cardiff Parkway), a station park & ride with up to 650 spaces, taxi rank, bus stops and cycle parking, aims to provide a seamless transition between various modes of travel.

Separate Travel Plans (TP) are proposed for the business district and the railway station, given the differing land uses and travel characteristics. This Framework Travel Plan (FTP) has been prepared for the for the business district and developed in conjunction with the Framework Station Travel Plan (STP) for the proposed Cardiff Parkway railway station.

To allow for effective travel planning, separate detailed or unit specific Travel Plans will be developed for each of the specific land uses and/or buildings. This Framework Travel Plan sets out a range of site wide strategic objectives, targets, measures and monitoring systems which will inform the individual Travel Plans.

The Illustrative Masterplan is presented in Figure 1. The proposals aim to deliver a sensitive and sustainable development that offers long-term benefits for the community and the environment.

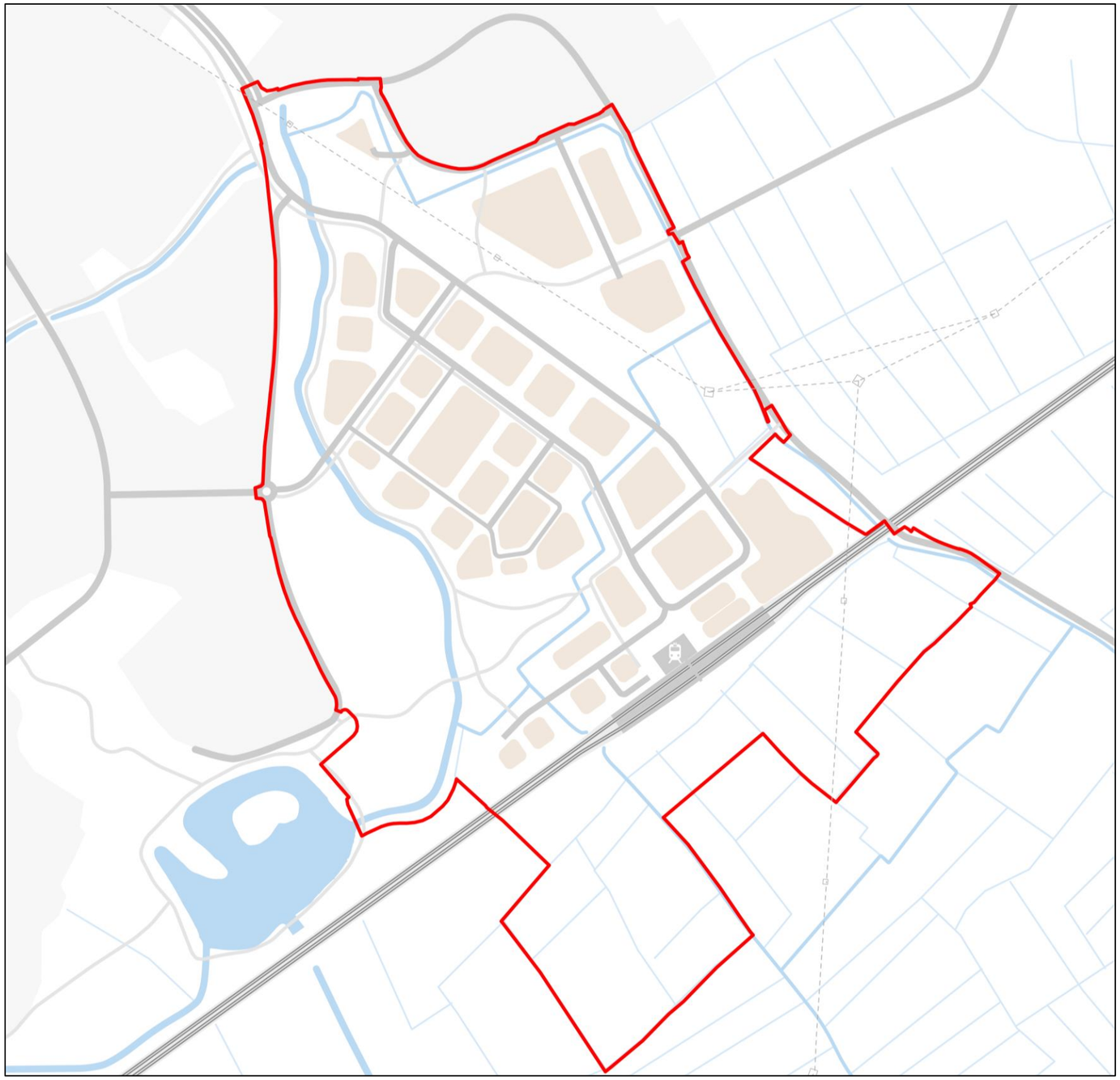

Figure 1: Cardiff Hendre Lakes Illustrative Masterplan

Scoping and Methodology

As part of the Transport Assessment (TA) scoping exercise with Cardiff Council (CC) Highways on 26th October 2017, it was agreed that a Framework Travel Plan should be prepared and submitted as part of the outline planning application.

The content of this FTP was established through collaboration between key stakeholders such as CC, Newport City Council (NCC) and Welsh Government.

1.2 Site Location

The development site is in the St Mellons area of Cardiff, approximately 8km to the east of the city centre and to the south of the M4 and A48(M).

The site is bounded to the north by St Mellons Business Park, Heol Las to the east, open countryside to the south and to the west by Cypress Drive and residential development beyond. The station will provide access to the South Wales branch of the Great Western Main Line which crosses the site east to west and is used by intercity trains between London and Swansea, as well as local and regional services to destinations including Cardiff, Newport, Bridgend and Bristol. The geographical context of the site is presented in Figure 2.

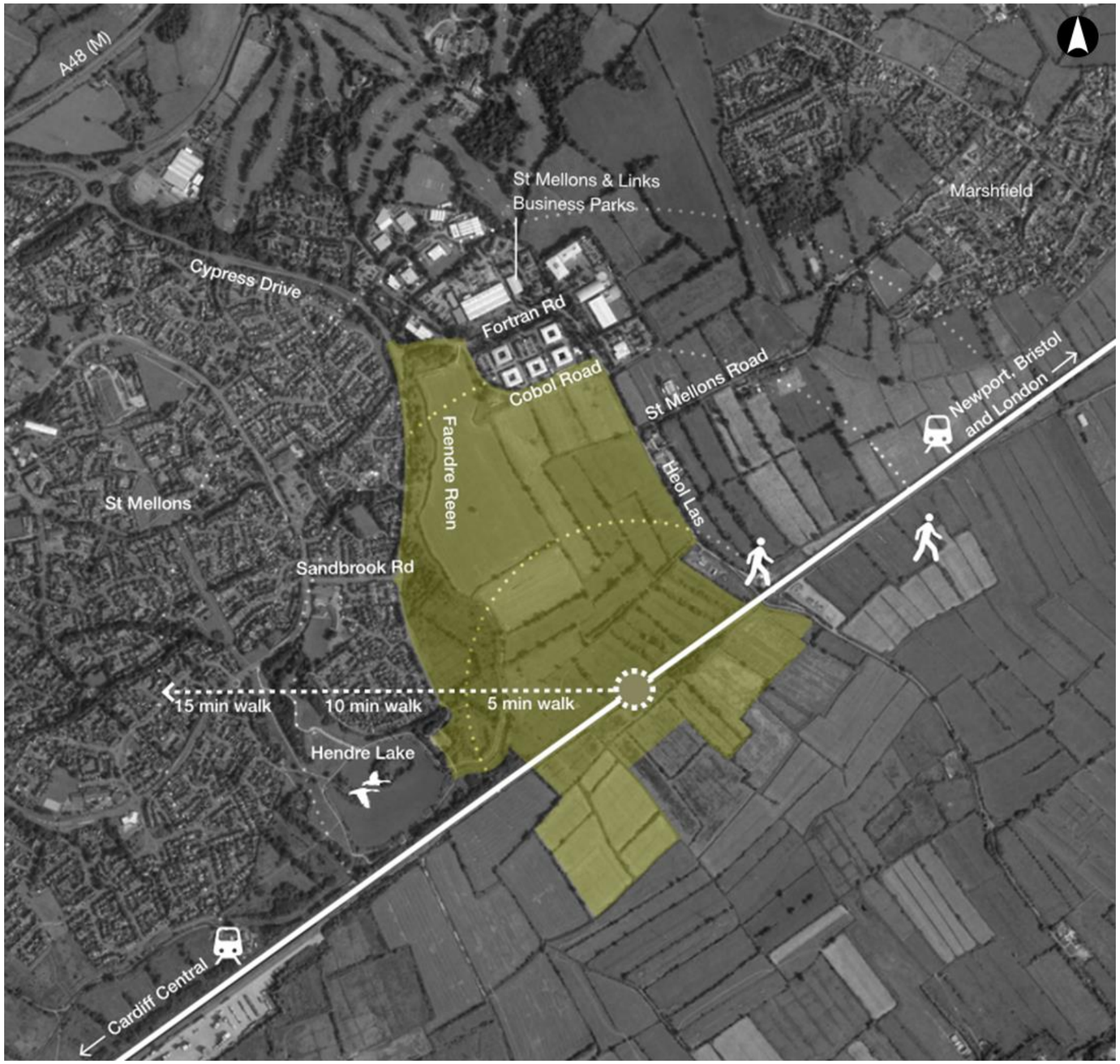

Figure 2: Site Context

2 Travel Plan Principles

2.1 What is a Travel Plan?

A TP provides a site occupier with the opportunity to actively commit towards creating a development that encourages modal shift towards sustainable transport.

A TP sets achievable targets for applicants and occupiers to pursue within a defined timescale. The most successful TPs are live documents that evolve with a development and in which several stakeholders including the developer, management company, tenants and local authority have a role in developing and monitoring.

Where an 'end user' or 'users' are not known a FTP is produced which sets out the above in a format which will be used to devise subsequent individual plans for each element of the development. This type of Plan is primarily used for large scale mixed-use developments where several different uses and occupiers are proposed but may not be known at the time of the planning application submission.

A FTP represents the first stage in sustainable travel planning. Whilst it has a format similar to a site-specific plan, this FTP will consider the strategic objectives and targets, propose site wide measures and set out monitoring proposals and strategy, which in turn will be used to inform the individual plans.

2.2 Benefits of a Travel Plan

The UK Government has cited TPs as an important tool in reducing the number of single occupancy car trips, made to and from a particular business, organisation, or facility, in favour of more sustainable modes of transport. such as public transport, cycling or walking.

A reduction in the number of private vehicle journeys has the potential to reduce the type and volume of pollutants released into the atmosphere, which are contributing to climate change and having a detrimental effect on health. TPs seek to influence travel behaviour and achieve an increased use of sustainable transport modes including car-sharing. They are tailored to reflect the needs and aspirations of the occupants, development characteristics and National and Local Policy Guidance.

TPs also aim to benefit employers, employees, visitors and the environment, by supporting national policy in the objective to provide sustainable development. A modest reduction in single occupancy car trips can result in a reduction in peak period traffic congestion.

It is considered that modal shift away from reliance on the private car would also result in a reduction in road traffic accidents, reduced stress, healthier lifestyles, better productivity, environmental protection, improved access for employees/visitors/deliveries and reduction in social exclusion through the provision of choice between modes of transport.

TPs are important mechanisms for instigating and maintaining travel behaviour change. Figure 3 provides examples of some of the benefits of implementing a Travel Plan.

Employees and Passengers

- Health improvements from increased cycling and walking.
- Ability to carry out work whilst travelling on public transport for business travel (where appropriate).
- Time savings due to shorter journey times which enables more time for increasing work productivity, leisure and family.
- Health and lifestyle improvements from increased cycling and walking.

Businesses and Organisations

- Healthier workforce and reduced absenteeism, resulting in a more productive workforce.
- Opportunities for staff networking, as car sharing enables staff to socialise as well as discuss work-related issues.
- Meeting an organisation’s environmental standards.
- Improved image: environmentally and socially aware for employees.

Wider Community

- Reduced congestion on the local highway network surrounding the site.
- Improved air quality surrounding the site.
- Sets an example to the wider community.

Figure 3: Benefits of a Travel Plan

3 Travel Plan Policy Context

3.1 National Policy

This FTP supports policy objectives throughout national policy such as:

- Planning Policy Wales: Edition 10
- Technical Advice Note 18: Transport (March 2007)
- The Well-being of Future Generations (Wales) Act 2015
- Active Travel (Wales) Act 2013
- Wales Spatial Plan (2008)
- Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)

National policy objectives include enhancing transport connectivity, encouraging sustainable modes of travel, improving national health and wellbeing and tackling climate change. National policy objectives will be met as outlined below.

The proposed development is supported by a Transport Interchange which include a railway station, bus stops and a park and ride facility. This will encourage a modal shift towards sustainable modes of transport and should reduce the level of carbon emissions produced and therefore Wales' impact on climate change.

The proposed business district will also be accessible by active modes of travel such as walking and cycling. The development site will include a network of highway quality active travel routes. It is anticipated that this will provide wide-ranging health benefits by encouraging more active lifestyles.

The proposed development seeks to integrate the whole site with existing residential and employment sites in St Mellons, thus enhancing connectivity within the local area. This will provide existing residents and employees in St Mellons with alternatives modes of travel to the private car, reducing the negative impacts that arise from single occupancy car trips.

3.1.1 Planning Policy Wales: Edition 10 (December 2018)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs).

Chapter 8 (Transport) of PPW identifies choice in transport and secure accessibility as important in supporting sustainable development and tackling the causes of climate change. The application of a transport hierarchy that prioritises the needs of pedestrians, cyclists and public transport users forms part of an integrated approach to land use planning.

3.1.2 Technical Advice Note (TAN) 18: Transport (March 2007)

TAN 18 elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted to ensure that economic development can create a basis for sustainable travel patterns.

Paragraph 9.15 indicates that Travel Plans can be prepared individually or jointly by the owners or operators of a proposed development. Joint travel plans can be part of a Transport Implementation Strategy, with both setting out proposals for the delivery of more sustainable travel patterns.

3.2 Local Policy

Local policy related to this FTP includes:

- Cardiff Council Local Development Plan (2016)
- Managing Transportation Impacts Supplementary Planning Guidance (July 2018)
- Cardiff Transport and Clean Air Green Paper (Draft 2018)
- Cardiff Cycling Strategy (Draft March 2017)

Policy objectives include enhancing connectivity to Cardiff and the wider region, encouraging active and sustainable travel and improving local air quality. This station aligns with these goals in the following ways:

The proposed development includes a transport interchange facility will be designed to integrate all modes of travel associated with the proposed Cardiff Parkway railway station, which will improve connectivity to the wider region and encourage station users to travel sustainably.

The business district will be accessible by active modes of travel, benefiting both existing residents and future employees in St Mellons. This will enhance local health and wellbeing and tackle inequalities.

The Cardiff Hendre Lakes masterplan supports the prioritisation of pedestrians, cyclists and public transport users over private motor vehicle users. This will be achieved through the provision of high-quality pedestrian and cycle infrastructure within the site. Charging points for both electric cars and cycles, will also be included within the development site to encourage the use of electric vehicles.

4 Development Proposals

4.1 The Proposal

The development proposals include the construction of a business park (up to 90,000m^2 - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes. Together with the construction of a new transport hub facility, comprising railway station buildings (up to 2,500m^2 - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 650 no. spaces), and associated infrastructure works

It is intended that Cardiff Parkway station will be served by frequent train services to key destinations such as Cardiff, Swansea, Bristol and London. The station strives to be a catalyst for growth, contributing to the regeneration of East Cardiff and the wider Cardiff Capital Region by helping to attract high quality businesses and investment.

4.2 Indicative Programme

The proposed Business District will be constructed in response to market conditions and therefore there will be some flexibility in the timing of building construction based on floorplate specifications and total market demand. Based on discussions with property agents and the current understanding on construction phasing and timescales, the build-out profile shown in Table 1 has been proposed to provide a robust basis for assessment in the planning application.

Table 1: Cardiff Hendre Lakes Indicative Programme

Year	Completed Works
2023	Completed Railway Station; Business District Phase 1 (22,500sqm)
2024-2027	Annual release of Business District office space (11,250sqm per annum)
2028	Completed Business District (90,000sqm)

4.3 Outline Transport Strategy

The key principles of the Transport Strategy for the site are set out below:

- Through physical measures and a Travel Plan, to actively promote modal shift away from single occupancy car trips;
- Create a permeable, welcoming and attractive development that encourages and supports pedestrians and cyclists;
- Identify opportunities for potential connectivity benefits between the proposed development and existing neighbouring communities; and
- Develop a safe environment for all road users by ensuring the safe coexistence of all transport users through the prioritisation and careful management of space to minimise pedestrian, cycle and vehicular conflict, to be agreed as part of the reserved matters application.

The adoption of these key principles ensures that the proposed development maximises trips made by sustainable transport and provides a safe environment for all users.

4.4 Business District Measures

4.4.1 Walking and Cycling

The Business District aims to provide an attractive pedestrian-friendly environment, with improved local routes and infrastructure to support people being able to walk to and from the transport interchange and other important local amenities. In addition, appropriate crossing facilities will be provided within the Business District, giving pedestrians priority over other modes such as the car.

The Business District will also provide a high-quality active travel network within the site to encourage employees to cycle to work. It is anticipated that this network will be integrated with the Transport Interchange to encourage multi-modal sustainable travel. This network will provide direct links to offsite cycle routes managed by others, such as Route 88 of the National Cycle Network (NCN) and Route 2 of the planned Cardiff Cycleway scheme, which will form key parts of the strategic cycle network for Cardiff. It is understood that work will start Route 2 of the Cardiff Cycleway in the period 2020-2021[1].

The Nextbike bike share scheme was launched in Cardiff in May 2018 with 50 stations. Since May, Nextbike has been expanding the network of stations and number of bikes to link with strategic housing, employment and Transport Interchange sites. It is anticipated that discussions will be held with Nextbike with a view to introducing stations at Hendre Lakes on a commercial basis. Therefore, land should be safeguarded for a Nextbike station within the grounds of the proposed Business District. The number of Nextbike cycle spaces provided would be similar to other locations across the Cardiff region, with monitoring of demand to increase provision if required.

4.4.2 Public Transport

Transport Interchange

A transport interchange facility allows for multiple modes of transport to be connected in a single location and is therefore considered to be central to encouraging travel by sustainable modes.

The transport interchange will be designed in detail during the reserved matters process, should outline planning permission be granted. A draft interchange design has been developed and reviewed by the Network Rail Built Environment Accessibility Panel and this is presented in Figure 4 below. The railway station has also progressed through the Governance for Railway Investment Projects (GRIP) Stage 3.

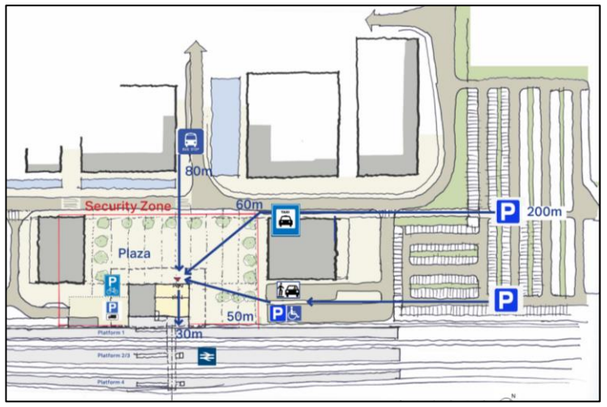

Figure 4: Draft Illustrative Interchange Arrangement (Wilkinson Eyre)

Bus and Coach

Bus stops are proposed at the Transport Interchange serving the station. These will have modern, covered shelters with real time in formation and raised kerbs provided for accessibility. The proposed development will strive to meet relevant guidance by providing bus stops within a 400m catchment of the Business District. The exact location and number of bus stops and nature of bus route changes will be confirmed as part of the reserved matters.

The proposed railway station will provide connectivity benefits for the local area and thus, increase the catchment for local bus services. Logically, it is therefore assumed that some bus services will extend into the site to benefit from this increased catchment. It is reasonable to assume these services will also be used for travel to the business district. These services would complement other modes of transport and provide connections to key locations such as the strategic housing sites in the north east of Cardiff. The waiting facilities proposed will enable local transport users to travel sustainably by easily transitioning between other modes of transport such as walking, cycling and rail services.

Rail

The proposed Railway Station is expected to deliver approximately 8 train services per hour, providing direct links to key destinations such as Cardiff, Bristol and London. The Railway Station will provide an efficient transport link that ensures the Business District is well connected to the surrounding area and wider, providing an attractive sustainable travel option for Business District employees.

4.4.3 Parking

The provision of parking influences choice of transport mode, however insufficient provision can result in obstructions of footways and public spaces. It is therefore important to provide a suitable level of parking within the proposed development.

Cycle

The provision of cycle parking for the proposed business district will either meet or exceed the minimum standards set out in the adopted parking standards for CC, 1 space per 50m^2 of the land use B1(a) office. For 90,000m^2 of this land use, the minimum total quantum of cycle parking required would include 1,800 long-stay cycle parking spaces and 94 visitor parking spaces.

Long-stay cycle parking will be secured, sheltered and step-free. Cycle parking provisions will be provided individually for each building within the business district and reflect the aspirations of the corresponding Travel Plans. The buildings should also be designed to allow for future installation should demand for cycle parking increase.

[1] Cycleways FAQ (2019) Cardiff Council News Room

Car Parking Strategy

Car parking provision for the proposed Business District will be agreed with CC as part of the reserved matters. The non-central parking standard allows a maximum of 1,800 parking spaces to be introduced for 90,000m^2 of office. Subject to the land-use mix being refined in subsequent design stages, up to 1,800 parking spaces will be introduced for the business district.

Accessible parking provision will be provided in accordance with the adopted parking standards. In accordance with Planning Policy Wales (PPW 10), a minimum of 10% of car parking spaces to have Ultra-Low Emission Vehicle (ULEV) charging points. Passive provision, which includes the necessary underlying infrastructure provided to enable installation and activation in the future, is proposed for the other 90% of spaces so they can be easily converted in response to demand.

5 Existing Transport Network

This section of the FTP presents the site connectivity by all modes of transport including walking, cycling, public transport and private vehicles.

5.1 Walking

This section presents a summary of the pedestrian infrastructure surrounding the site. A detailed audit of existing pedestrian and cycle routes to and around the proposed development was prepared following a site visit on Wednesday 21st August 2019.

Figure 5 presents the pedestrian infrastructure near the proposed development site, alongside local facilities and walking travel times. The figure shows services and facilities which are within a 5, 10, 20 and 30-minute walk of the centre of the site. Figure 5 also outlines that St Mellons, which has a population of approximately 13,000, is within a 30-minute walk of the centre of the site.

5.1.1 Physical Improvements

To fully realise the connectivity benefits provided by the proposed railway station, there are opportunities for offsite works to be delivered by others in order for the full connectivity benefits of Cardiff Parkway railway station to be realised, including the following:

- Opportunity for CC to introduce a footway/cycleway through Hendre Lake Park, including the provision of lighting subject to ecological constraints. There are also opportunities to upgrade other leisure routes near the site;
- Opportunity for CC and relevant land owners to enhance the provision of pedestrian infrastructure within the existing business park to provide a continuous route between the proposed station and Pascal Close; and
- There are opportunities for NCC to undertake works on St Mellons Road to reduce traffic speeds and potentially vehicular volumes to improve conditions for pedestrians and cyclists.

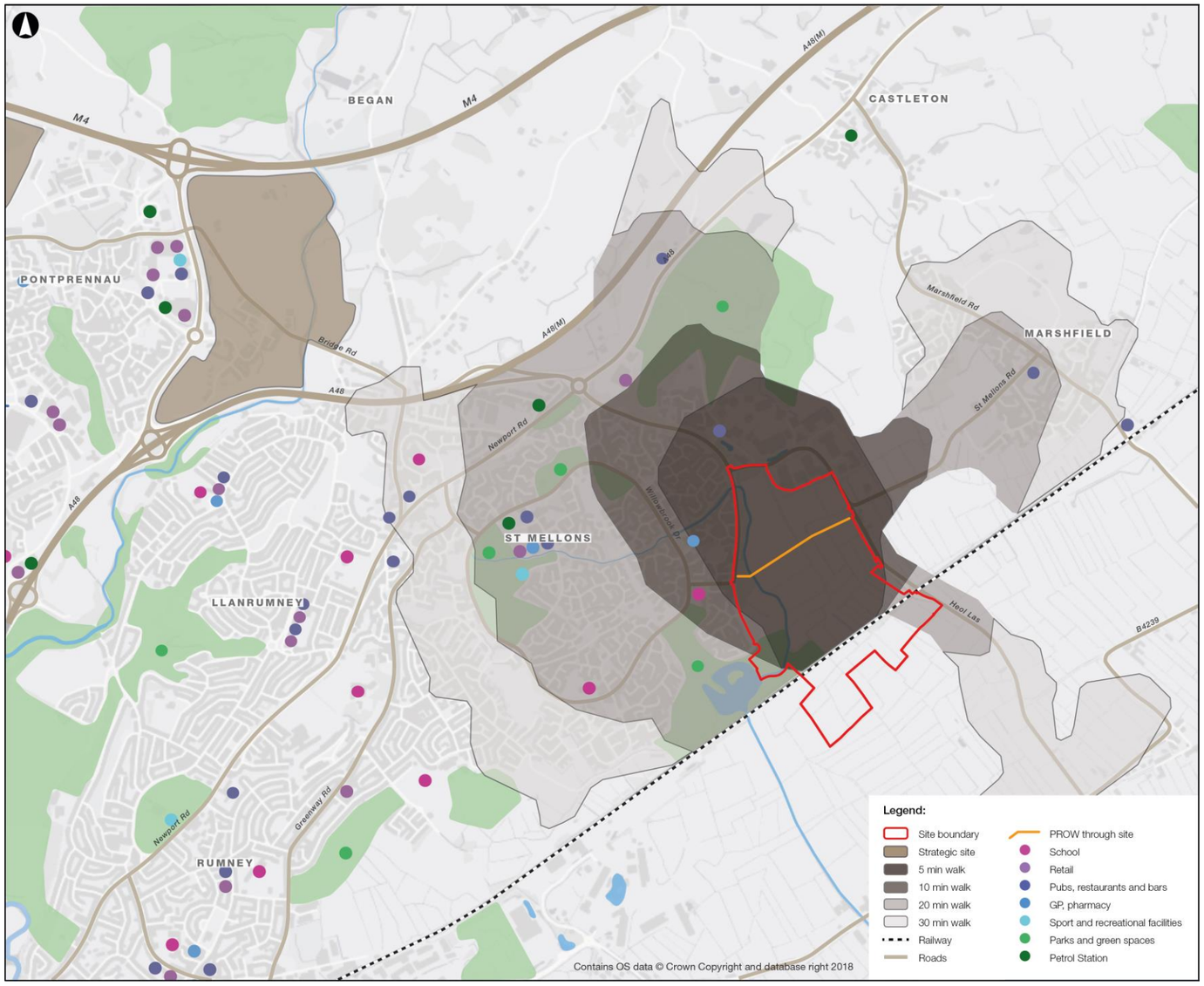

Figure 5: Walking Infrastructure

5.2 Cycling

The existing and future cycle routes proposed by CC are illustrated in Figure 6, as shown on the Integrated Route Plan. In addition, the figure presents the locations and facilities located within 10, 20 and 30-minute cycle from the centre of the site, which includes Trowbridge and St Mellons.

Local facilities including a Tesco Superstore, Post Office, St Mellons Library and a community education centre are all within a 10-minute cycle of the site.

Figure 6 also shows that parts of the strategic housing site at St Edeyrns are anticipated to be within 30 minutes cycle. It is considered that these cycle times may improve with the cycle infrastructure proposed within the site, and the offsite improvements to cycle infrastructure proposed by CC.

Existing National Cycling Network (NCN)

NCN Route 88 adjoins the site's eastern boundary along Fortran Road between the St Mellons Road and Cobol Road junctions as shown in Figure 7. From Fortran Road, Route 88 follows St Mellons Road eastbound as an on-road cycle route for 3.5km through the settlement of Marshfield to Church Lane. Beyond Church Lane, Route 88 continues towards Newport for 3.2km as an off-road cycle route.

At Tredegar Park Route 88 joins Route 4 of the NCN which branches eastwards across Newport or north towards Rhiwderin. These destinations are each accessible within approximately 5km.

Cypress Drive

There is currently no segregated-on road cycle provision along Cypress Drive, however, the road is of adequate width to allow safe cycling. In addition, the road surface is of good quality with a minimal incline towards the A48 both of which are conducive to cycling. However, high traffic volumes and speeds may deter young or less experienced cyclists.

A shared footway/cycleway is provided for 70 metres between the signalised pedestrian crossing across Cypress Drive and the entrance to Fortran Drive.

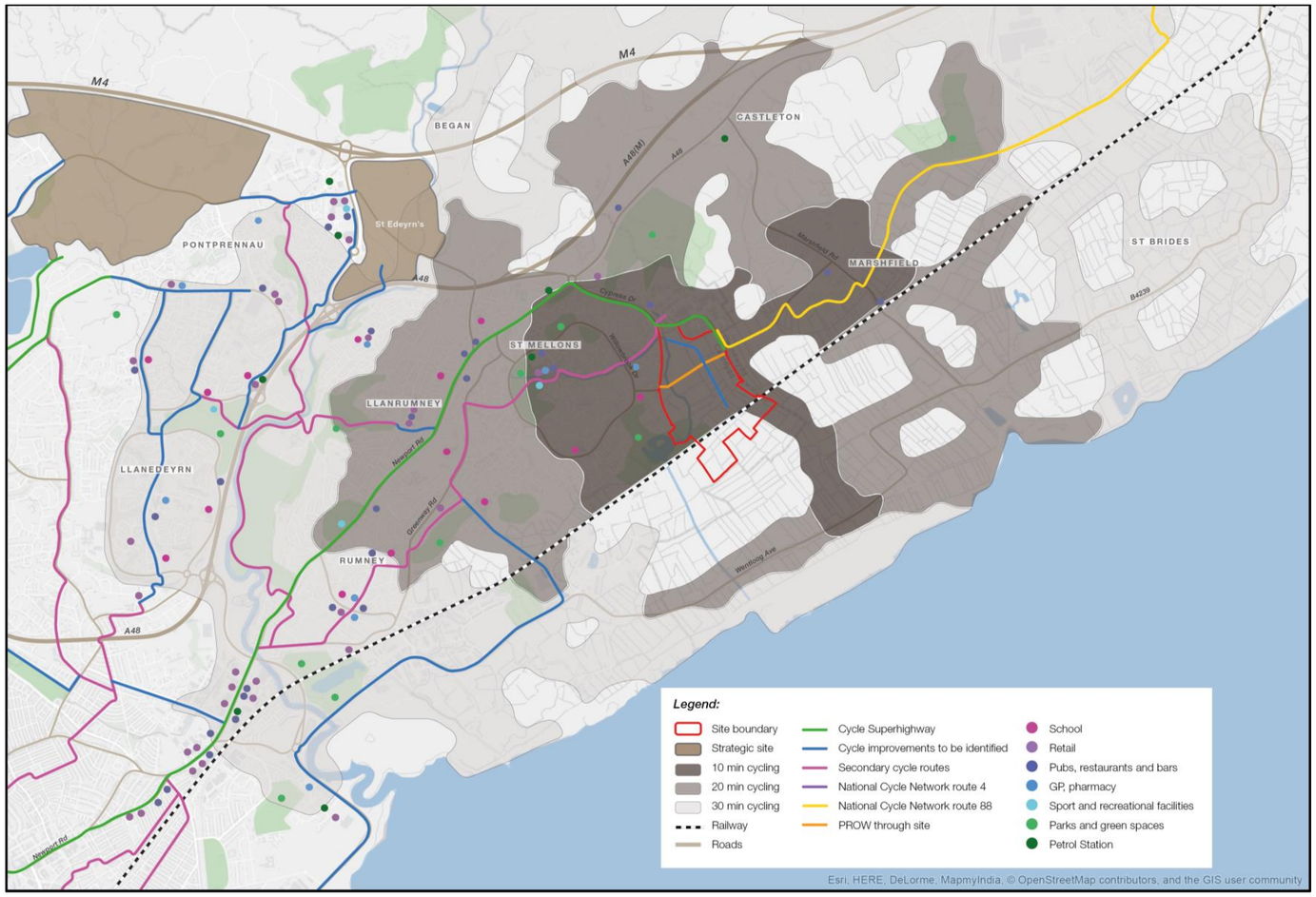

Figure 6: Cycling Routes and Travel Times

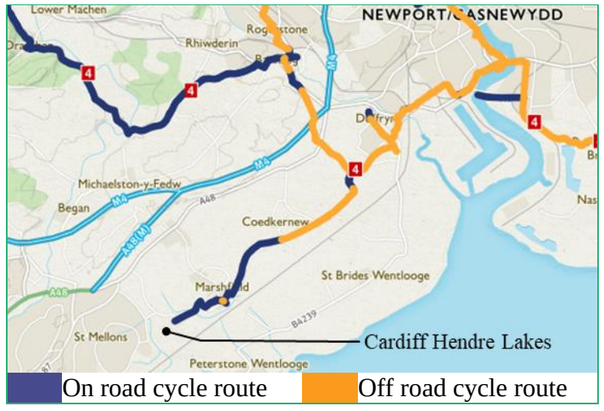

Figure 7: National Cycle Network (Source: Sustrans)

A48

On the A48 demarked on road cycleways adjoin both east and west bound carriageways west of the A48/Cypress Drive roundabout. These cycle lanes continue towards Cardiff for 1.4 miles, however, terminate intermittently. Routes adjoining both carriageways merge with a shared bus and taxi lane at Old Road and terminate before Eastern High.

Travelling east from the A48/Cypress Drive roundabout the cycle lane on the east bound carriageway (west of Cypress Drive) terminates just before the roundabout, directing cyclists south of the roundabout and across Cypress Drive onto the shared footway/cycleway. The shared footway/cycleway then continues adjoining the westbound carriageway of the A48.

Fortran Road/Cobol Road

Intermittent road markings are provided through the existing St Mellons Business Park indicating cyclists should use the road. However, no cycle lanes are provided, and parked vehicles limit road width available for cyclists. Poor visibility caused by overgrown foliage and parked vehicles may deter cyclists from using this route.

Committed Schemes

Cardiff Council have committed to improving cycle infrastructure as part of the Cardiff Cycling Strategy (2017 Draft) by developing five new primary route corridors. These will provide segregated routes along key corridors, connecting to strategic development sites as shown in Figure 8. Route 2 of the Cardiff Cycleway scheme will provide a link along the B4487/Newport Road from Cardiff city centre to St Mellons Business Park and the Cardiff Parkway site. CC are understood to commence work on this route in the period 2020-2021.

Alongside the primary routes proposed, several secondary routes have also been identified. The secondary routes aim to enhance existing discontinuous or poor-quality cycle routes through the city including a preliminary route from Hendre Lakes to the adjacent residential communities of St Mellons and Trowbridge.

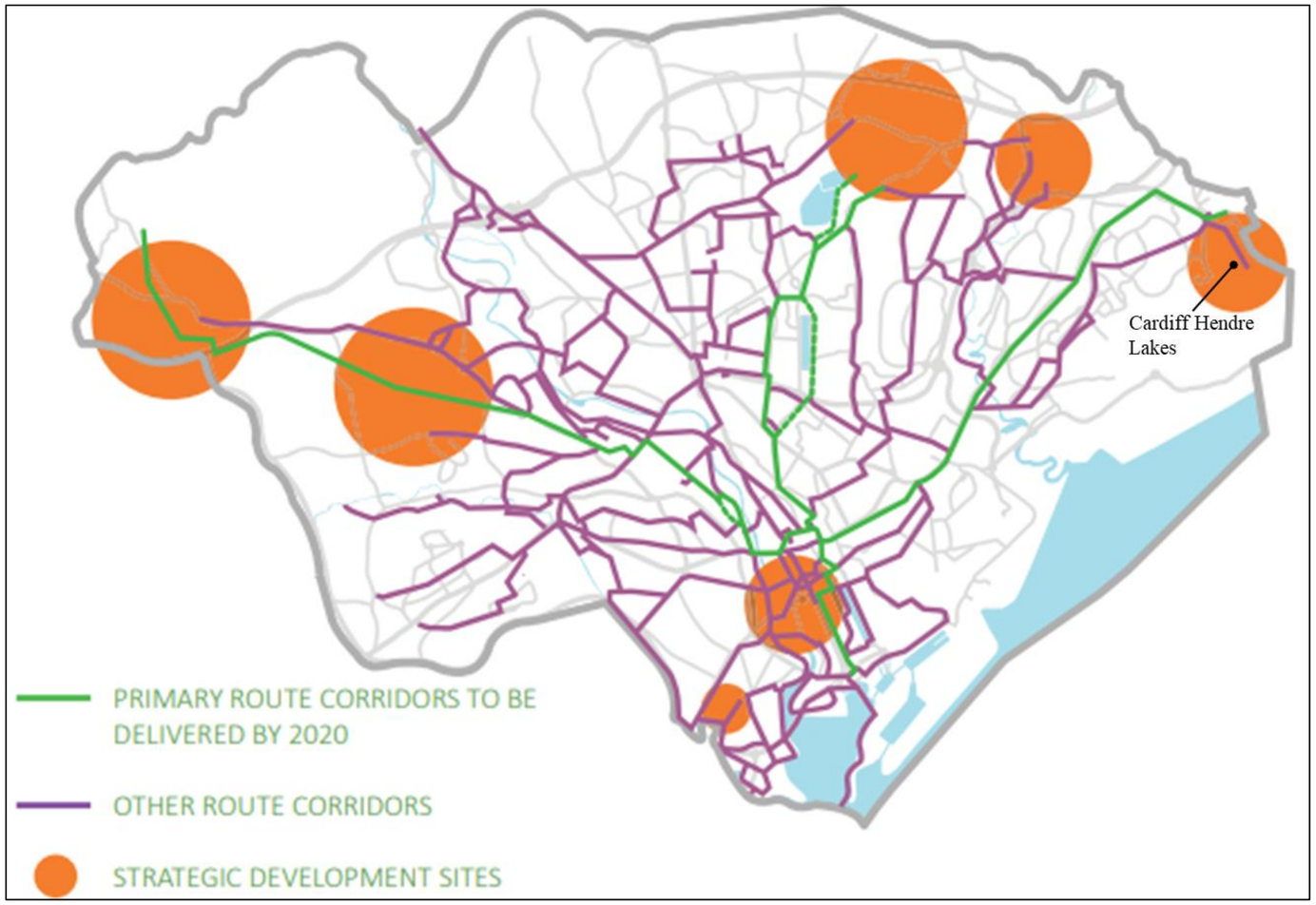

Figure 8: Committed Development Sites[2]

[2] Cardiff Council Cycling Strategy - Draft (2017)

5.3 Bus

Existing bus services near the proposed development are summarised in Table 2 and presented illustratively in Figure 10 overleaf. The closest existing bus stops to the site are located on Fountain Lane, Willowdene Way and the A48. Given the size of the development site, all these stops are located over 400m from the centre of the site as illustrated in Figure 9.

Table 2 shows up to 20 services per hour pass within the vicinity of the site and a further six operate along the A48. The number 30 and X5 routes provide cross city services between Cardiff and Newport with up to seven services combined. Both services stop on the A48 where bus stops with shelters are provided, 120 meters east of the A48/Cypress Drive roundabout.

The 45B is the only service which stops at the Fountain Lane bus stop. This service routes from Cardiff city centre to St Mellons and only operates in the peak periods. This reflects the propensity for commuting trips along this corridor.

A journey time isochrone has been produced to display the accessibility of the site by bus at 17:30 (to reflect the evening peak period) and this is included in Figure 9. The isochrones include the time taken to walk to the closest bus stop, which is between 10 and 25 minutes, and shows that the central areas of both Newport and Cardiff are accessible within a 45-minute journey time based on the existing service. Additionally, there is good provision to residential developments along the B4487 Newport Road into Roath which are accessible within 30 minutes travel time. If local bus services were potentially extended in to the development, these journey time would be reduced considerably. Outside of peak times, there is potential that journey times will be longer as services are less frequent.

Bus stops are proposed at the transport interchange serving the station. These will have high quality waiting facilities including shelters, raised kerbs and real-time information.

Table 2: Local Bus Services[3]

Service	Operator	Route	Nearest Bus Stop (Walking Distance)	Buses per hour (Mon-Fri)
X5	New Adventure Travel	Ringland – Cardiff	Willowdene Way (1 km)	3
		Cardiff – Ringland	Willowdene Way (1 km)	3
44/45	Cardiff Bus	St Mellons – Cardiff City	Willowbrook Drive (800 m)	8
45B	Cardiff Bus	St Mellons – Cardiff City	Fountain Lane (1.1 km)	2 (in peak hours)
X45	Cardiff Bus	Cardiff Bay – St Mellons	Willowbrook Drive (800 m)	3
65	Capital Links/ Cardiff Bus	Llanrumney and St Mellons - Pentrabane – Cardiff	Willowbrook Drive (800 m)	Bihourly
30	Newport Bus/ Cardiff Bus	Newport – Cardiff	A48 (2 km)	3
		Cardiff – Newport	A48 (2 km)	3

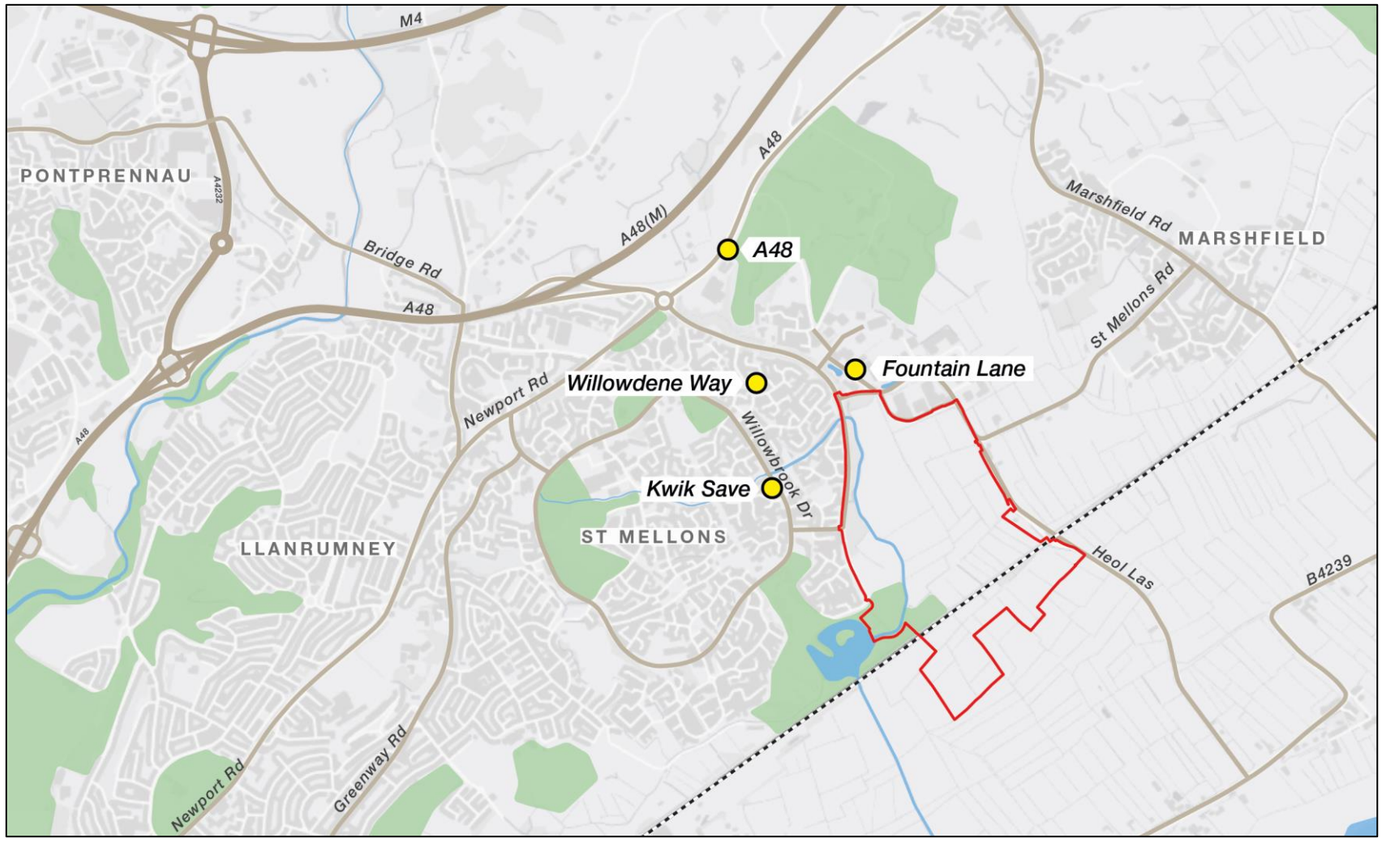

Figure 9: Bus Stop Locations

[3] Source: Traveline.cymru.co.uk (03.01.2020)

It is anticipated that proposed bus infrastructure for the local area will provide an attractive opportunity for local transport users to travel sustainably by easily transitioning between other modes of transport such as walking, cycling and rail services.

The Business District Travel Plan co-ordinator will work in partnership with the local operators and other local stakeholders to seek regular bus connections between the station and the local area. The exact location and number of bus stops will be confirmed following discussions with local bus operators and other relevant stakeholders prior to the opening of the station.

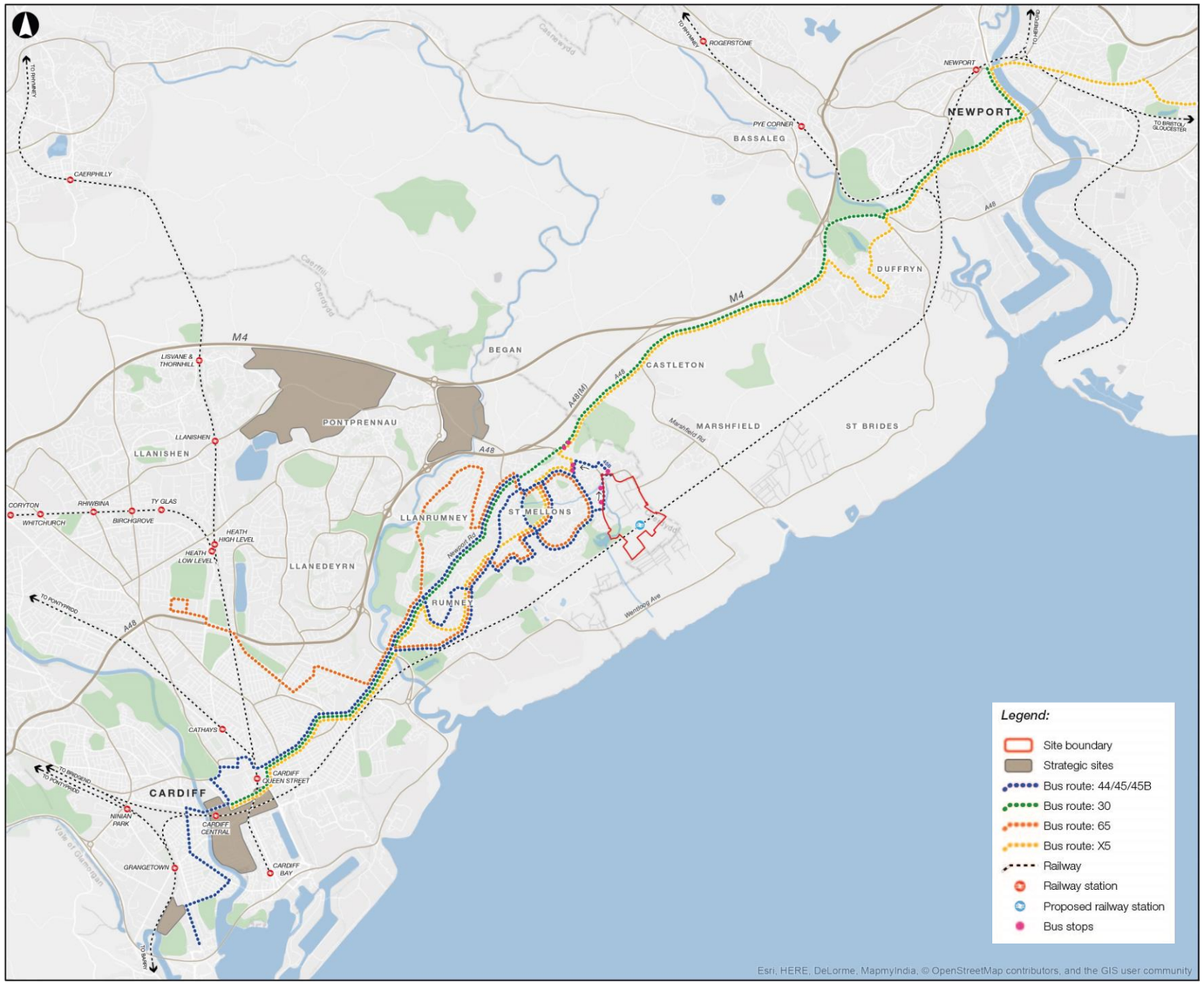

Figure 10: Public Transport Services

5.4 Rail

The closest existing railway station to the site is Cardiff Central, which is approximately 8.4miles west of the site. Cardiff Queen Street is located a similar distance from the Cardiff Hendre Lakes site, however, is only accessible by changing at Cardiff Central.

Cardiff Central is the busiest railway station in Wales, with long distance services operating between London and Swansea and West Wales and Holyhead/ Manchester/ Liverpool. Cardiff Central also operates several local services linking with Cardiff's northern suburbs and into the Valley lines as shown in Figure 11.

Currently, 8-9 trains per hour pass the site. Services are currently provided by three operators: Transport for Wales Rail Services (TfW), Great Western Railway (GWR), and Cross Country (XC). In the future, it is expected that additional TfW services will be added to the timetable in addition to extra peak services to London as part of the Intercity Express Programme (IEP).

Table 3: Local train services

Route	Operator	Frequency
Swansea/Cardiff - London	GWR	2
Cardiff – Bristol – Taunton/Portsmouth	GWR	2
Cardiff – Nottingham	XC	1
Cardiff - Ebbw Vale	TfW	1
Cardiff – Cheltenham	TfW	1
Cardiff/West Wales – Manchester/Holyhead	TfW	1-2

Currently trains run twice per hour to London (three services an hour between 06:00-08:00), up to three per hour towards both Bristol and the Midlands from various routes. There are up to two rail services per hour from Cardiff Central to Cardiff International Airport.

A new mainline station is proposed, as outlined in Section 4.1. It is anticipated that the Station will be served by 8 train services per hour serving the destinations summarised in Table 3. This will improve the connectivity of the local area, creating new socioeconomic opportunities for the local population and those located within the Station catchment area.

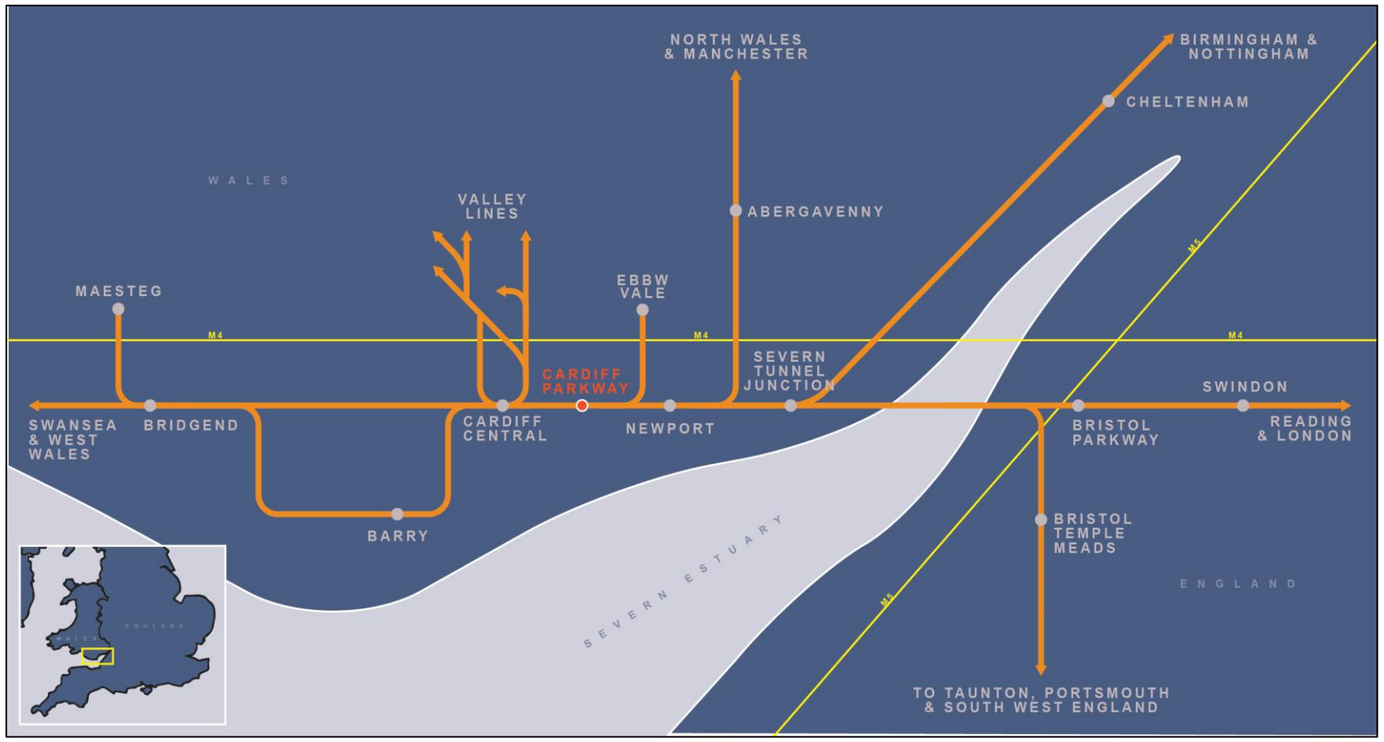

Figure 11: South Wales Railway Services

6 Objectives and Goals of the Travel Plan

The overall objective of the TP will seek to achieve a situation where employees, residents and visitors can make informed travel decisions based on comprehensive information about a range of transport modes.

Those travelling to and from the site can be categorised as either employees (at the site or nearby businesses), residents (from existing communities) or visitors. Given this overarching FTP will be used to inform the site-specific Travel Plans, objectives have been developed for four categories as shown in Figure 12.

All site-occupants will work in conjunction to meet the strategic Travel Plan objectives.

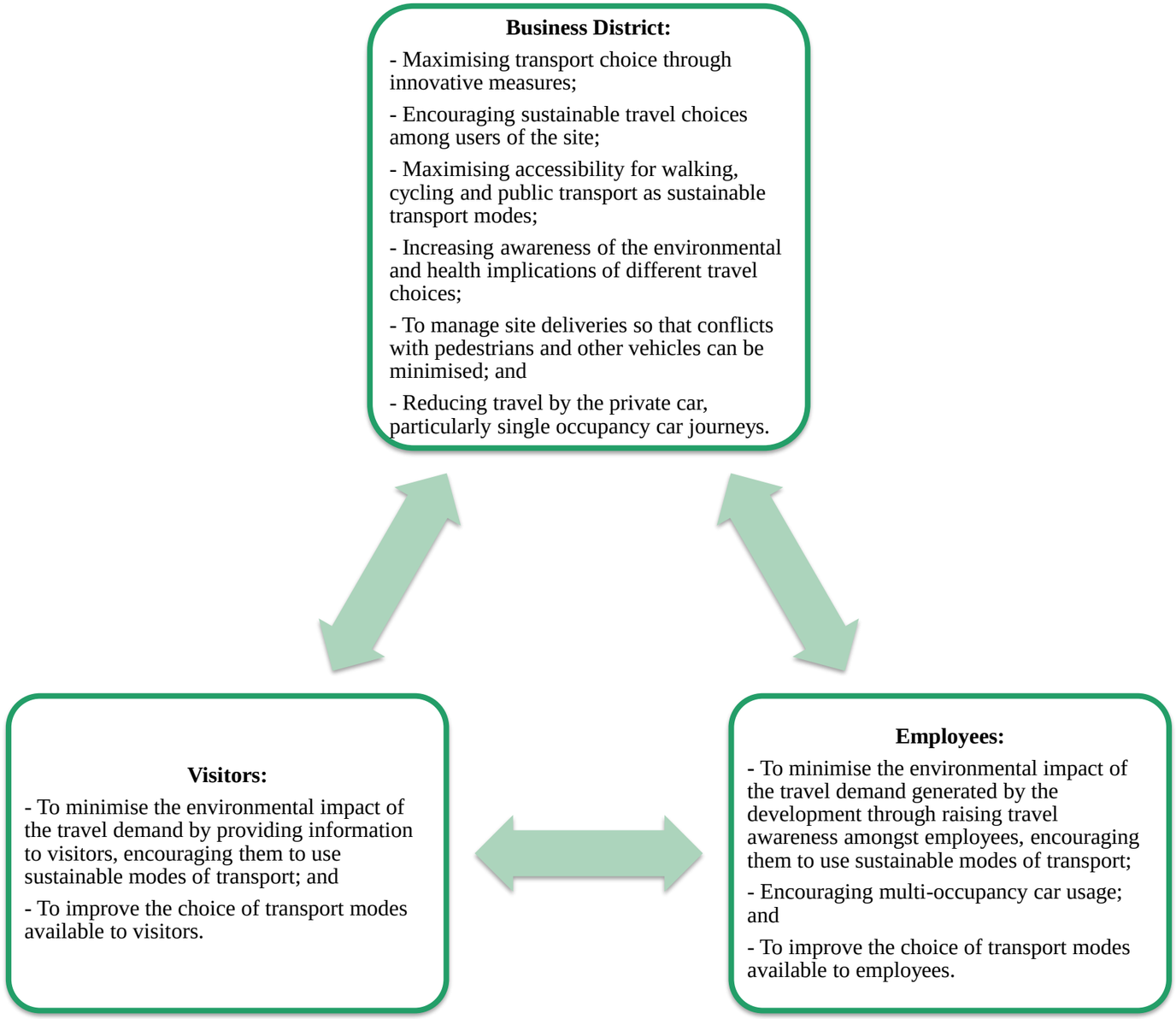

Figure 12: Cardiff Hendre Lakes Business District Travel Plan Objectives

7 Measures

7.1 Introduction

In addition to the physical improvements detailed in Chapter 4 (such as TOUCAN crossings on Cypress Drive), it will be necessary to implement a number of Travel Plan measures to ensure employees and visitors to the site are informed about their travel options and are encouraged to travel by sustainable modes.

It is not possible at this stage to fully define which measures are most appropriate for the site, as the measures need to be tailored to the needs and aspirations of future occupiers. The most appropriate measures will be selected following the initial Travel Plan surveys, although the following section outlines some potential measures which may warrant inclusion in the site-specific Travel Plans. Whilst not all measures identified may be adopted, there is potential that new measures could be identified.

There are expected to be key travel plan measures which will benefit all occupiers at Cardiff Hendre Lakes. In addition to those that could be implemented site wide, specific measures have also been proposed for the individual land uses. These potential measures should be used to inform the site-specific Travel Plans.

7.2 Site Wide Measures

The site wide measures presented below could be implemented upfront as part of the wider scheme, providing benefits including economies of scale. Alternatively, these measures could be included in the individual site/building-specific Travel Plans.

Walking

In order to encourage walking, the following measures are recommended:

- Publicise maps presenting all walking/cycling routes within the site, and internal destinations, as well as recommended walking routes to the site from key external locations. The maps could include indications of walking distances, times and the potential number of calories that could be burned. For maximum attention, this map could be displayed on all central notice boards across all sites. This information will also be provided on the wider site website;
- Ensure footways/cycleways are maintained, well-lit and kept clear. Suitable wayfinding and sign posting should also be installed to guide pedestrians/cyclists;
- Raise awareness of the health benefits of walking/cycling through the provision of leaflets and notice boards, as well as through promotional material and events throughout the year; and
- Wayfinding strategy within the station, wider interchange and on key walking and cycling routes beyond. This could include colour coded walkways and signage within the interchange to key facilities such a cycle parking and bus stops.

Cycling

Site wide initiatives which should encourage cycling include:

- Provide information on cycle routes within the site and connections to routes around the site on the walking/cycling maps to be located on notice boards around the site, as well as on the wider site website;
- Consideration will be given to provision of an onsite Cycle Hub within the Hendre Lakes Business District for staff at the site, offering repairs and new part services, information about cycle security/safety and information relevant to the site. The Cycle Hub could also host free cycle safety training events;
- Consideration will be given to provision of Nextbike stands or provision of pooled cycles to encourage staff to consider cycling, including use for business trips;
- Provision of secured and sheltered cycle parking both in a central parking area, and in accessible locations outside of relevant facilities to allow cycling to the new station. Ensure parking is provided in well-lit areas. Frequently review and ensure the level of cycle parking provision is sufficient to meet demand; and
- The Cycle Hub could also be a focal point for a Bicycle User Group (BUG) for the proposed development to encourage novice cyclists to consider cycling as a transport mode. The BUG may also operate a ‘Bike Buddy’ scheme, where employees and visitors who wish to start cycling regularly can be matched with experienced cyclists living nearby who can advise on safe routes, safe cycling and basic bike maintenance. The BUG could also help to influence improvements to facilities for cyclists.

Public Transport

To maximise the use of public transport, employees and visitors to the site will be made aware of the local public transport network and the benefits of using it. The following initiatives could be implemented to encourage travel by public transport:

- Provision of new/relocated bus stops with high quality waiting facilities, including real-time passenger information, within the site. Effective wayfinding and clear signage to bus stops throughout the site;
- Displaying a map of key bus routes, stops, journey durations and frequency of services, as well as

railway service information for the new station in central notice boards, within individual buildings and on the wider site website to increase awareness of convenient public transport options to travel to the site; and

- Highlight the locations accessible by rail via the proposed Cardiff Parkway railway station.

Personalised Travel Planning (PTP)

- Offer PTP for the existing business parks and the proposed business district;
- PTP to be offered to all employees within the first year of a new office within the Business District becoming occupied.

Cars

To encourage more sustainable use of cars, several measures can be pursued for the site:

- Set up a car parking management strategy and develop parking policies for the wider site. A framework car parking management strategy could be conditioned to the Outline Planning Application (OPA) and include the following potential measures:
  - Offering free or reduced parking charges to low emission vehicles and provide priority parking for car sharers;
  - Only provide car parking on certain days of the week;
  - Allocate car parking to those that reside in less accessible locations or have a need to travel by car (e.g. school run);
- Explore the potential for setting up a Hendre Lakes Business District car share database that could be of benefit to employees. This could also include employees of the existing business park;
- Provision of electric car charging stations positioned closer to buildings[4]; and
- Engagement with car club providers to explore the potential for uptake within the site. These could be used for business trips and as a back-up for car sharers.

[4] 10% of parking spaces will have electric vehicle charging points with passive provision for full conversion of the remaining spaces.

Other

- An overarching proposed measure is to develop a mobile phone application for the wider site, which will include real time journey planning information by sustainable transport modes, as well as notifications advising on events e.g. bike breakfasts, walking challenges etc. The site-specific app can also be used as a tool for employees of the site to feedback on transport provisions and conditions, e.g. report potential service/infrastructure maintenance issues, or opportunities for improvement. The app should be promoted through the official website of the wider site, on noticeboards around the site, and through employee starter packages; and
- Develop a site-wide communication strategy and brand for travel planning initiatives.

7.3 Workplace Measures

This section sets out the measures that could be included in the site/building-specific Travel Plans geared towards employees.

Active Travel

The following measures could be implemented to encourage employees at the site to travel by foot or bike:

- Free bike loans for up to 1 month for staff from the Cycle Hub or Nextbike service. Users of the free bike loan would be required to pay a designated deposit and be able to hire a bike for one month allowing them to try commuting to work with reduced hassle. Alternatively, businesses on the site could provide interest free cycle loans;
- Payment of a cycle mileage allowance for employees using their own cycles for business trips;
- The circulation of a bi-annual newsletter to all site employees, which would detail Travel Plan information and updates;
- Introduce awareness campaigns such a cycle/walk to work week. Support and promote ‘Wellbeing Week’, ‘World Environment Day’ and other regular special events;
- Negotiation of discounts with local cycle shops for staff purchases and maintenance;
- Assisting employees with the purchase of cycles by reference to tax advantages offered by the government;
- The provision of secure, sheltered and safe cycle parking with cloakroom facilities, showers and lockers at each building; and
- The provision of a welcome pack for each new employee in conjunction with local/green travel recruitment policy, which will detail the various travel options available to them and highlight the Travel Plan’s measures and targets, to encourage staff to travel by sustainable modes from the outset.

Public Transport

The following potential initiatives could be implemented to encourage employees to travel by public transport:

- Taster tickets, providing free travel for the first journey;
- The offer of an interest-free season ticket loan scheme for staff to purchase an annual ticket for public transport;
- Include public transport information, promote available public transport ticket deals, publicise national public transport guidance services such as Traveline Cymru, and promote the proposed site-wide mobile phone app on the staff intranet and in employee welcome packs and building noticeboards; and
- Provision of public transport information with invitations to meetings for visitors.

Electric Vehicles

The following initiatives could be implemented to enable more sustainable use of vehicles for work purposes:

- Provision of charging facilities for electric bikes/scooters;
- Electric or hybrid cars could be provided so that any staff needing to travel for work purposes during the day are not required to drive to work. This would reduce emissions and improve local air quality; and
- Measures to encourage bus operators to use cleaner bus fuels and electric buses.

Car Sharing

Car sharing involves two or more people sharing a car for their journey to/from work, education or other regular trip. It promotes sustainable travel patterns by increasing car occupancy, with a consequential reduction in the overall car trips. It also provides an opportunity for social interaction. Car sharing could be encouraged by the following potential measures:

- Holding periodic car share tea/coffee mornings could allow employees to match up with people who undertake a similar journey. This will also demonstrate the social benefits of car sharing and can improve engagement among employees;
- Publicising car sharing websites such as ShareCymru.com or Liftshare.com where users can match up with local drivers or passengers in the area undertaking similar journeys, or the potential car share database of the wider site;
- Provision of a guaranteed lift home in the event of an emergency;
- Potential to introduce reserved car sharing spaces to encourage staff to avoid single occupancy car journeys;
- Advertising the cost savings of car sharing on notice boards in addition to the positive environmental impacts to raise awareness of the benefits; and
- Free or discounted membership of any car clubs based near the station.

Motorcycling

- Allocation of parking spaces for motorcycles; and,
- Provision of information about motorcycle safety, security and motorcycle safety training providers

Deliveries

The following potential measure could be introduced to reduce the number of deliveries made to the business district:

- Encourage occupiers to control deliveries to the site and to minimise the number of service vehicle arrivals by means of shared deliveries as part of the servicing management arrangements.

Working Practices

- Encouraging flexible working to enable employees to adjust their working day to avoid peak travel times;
- Home working to allow employees to work at home when appropriate and thereby reducing commuter travel. Firms would be encouraged to consider assistance in the provision of appropriate computer equipment for this working practice; and
- The use of teleconferencing to allow employees to conduct meetings by video conferencing equipment and to reduce the number of business trips.

8 Implementation and Management

8.1 Introduction

To be successful, the Travel Plan will need to facilitate an understanding of the travel patterns relating to each site through individual Travel Surveys and co-ordinate individual and overarching transport measures which contribute to increasing sustainable travel by all employees within the Business District. The proposed monitoring strategy for the TP is set out in Chapter 9.

To maximise the chances of success, it is important to have a clear implementation strategy identifying roles and responsibilities for stakeholders within each site to maintain the momentum of the Travel Plan.

It is important to remember that the Travel Plan will be a living document, which means that measures excluded at this time could be reconsidered or reintroduced at any time in the future. It is recognised that travel patterns will change, and new measures will become available. It is therefore encouraged that the Travel Plan is reviewed on a frequent basis to ensure that the objectives are up to date, and targets are being achieved.

8.2 Travel Plan Co-ordinator and Steering Group

It is logical to assume a development management company will be required to manage the day-to-day operation and maintenance of the business district.

A site-wide Travel Plan Coordinator will be appointed by the development management company. Contact details of the appointed Travel Plan Co-ordinator will be provided to Cardiff Council. The Travel Plan Co-ordinator will act as the first point of contact for Cardiff Council regarding the implementation of the Travel Plan, or on any other issues relating to the Travel Plan.

The Travel Plan Coordinator role will involve the following:

- Obtaining and maintaining commitment and support from tenant organisations, to ensure that measures to encourage sustainable travel patterns to the site are promoted from the outset;
- Developing and implementing an effective branding strategy and marketing campaign of the plan and its specific measures;
- Liaising with parties within tenant organisations and outside, including stakeholders, bus service providers, the new railway station, Cardiff Council etc;
- Giving advice and information on transport related subjects to staff and visitors;
- Reviewing and updating site-wide parking policies. On-going monitoring of adherence to parking policy;
- Assessment and management of facilities to support cycling including lockers, bike racks / shelters and shower facilities;
- Assessment and management of motorcycle parking facilities and locations, improving convenience to encourage this mode of travel, as well as providing training courses upon request;
- Setting up and facilitating the Travel Plan Group and specific Working Groups such as the Travel Plan Steering Committee;
- Overseeing the implementation of Travel Plan measures in a timely manner; and
- Undertaking ongoing monitoring of the Travel Plan, including coordinating the necessary data collection exercises, any appropriate review and revisions of the Travel Plan.

To ensure that the Travel Plan measures are effectively implemented and made known to employees at the site, all incoming occupiers will be required to:

- Cooperate with the site-wide Travel Plan Co-ordinator; and
- Participate in Travel Plan Steering Committee.

Incoming companies will be required to undertake the above actions as a condition of lease, and individual company Travel Plan representatives will be responsible for implementing Travel Plan measures within their own organisations.

Site-specific Travel Plans will need to be developed for each building within Hendre Lakes, prior to occupation, based on this wider-site Framework Travel Plan, and under the supervision of the site-wide Travel Plan Coordinator. Site-wide quantitative, realistic and achievable targets are set out in the following section of this Framework Travel Plan, towards the overarching goal of increasing sustainable travel of all staff and visitors to and from the Business District.

It is proposed that full staff travel surveys are undertaken in Years 1, 3 and 5 following occupation of each building to inform the review and update the targets and measures of the individual Travel Plans, as part of the Travel Plan monitoring process, undertaken/managed by the site-wide Travel Plan Coordinator. The Travel Plan monitoring process could be conditioned.

In addition to staff travel survey findings, the Travel Plan Co-ordinator will also use other indicators to monitor the progress of the Travel Plan such as usage of cycle parking facilities (e.g. using feedback from the proposed site-wide mobile phone app), feedback on uptake of Travel Plan initiatives via the Travel Plan Group, Bicycle User Group, and others.

9 Targets, Monitoring and Review

9.1 Introduction

The Travel Plan sets out actions for individual site operators to recognise and address the transport requirements of staff, patients and visitors, whilst considering the environmental impact of movements to and from the site. Its overall aim is to enable a modal shift toward sustainable travel to and from the Business District. This will make a positive contribution to local communities, preserve the natural environment and use resources more sustainably and efficiently.

9.2 Targets

To meet the overarching aim of reducing unsustainable travel to and from the Hendre Lakes Business District development, a set of outline targets have been developed. These targets are derived from modal split data collected as part of the 2011 Census.

Going forward, additional site-specific targets will be developed for each use within the site. These site-specific targets will be informed by initial travel surveys. It should be recognised that for the targets to be effective in reducing unsustainable travel, they need to be 'SMART' as set out in Figure 13 below.

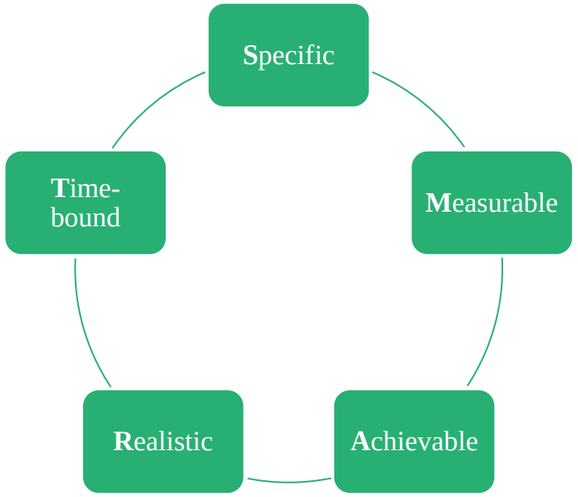

Figure 13: SMART Targets

Quantitative, realistic and achievable targets should be set out in site specific Travel Plans. The TPC for the site should endeavour to develop overview targets, which would be subject to periodic reviews and should reflect the targets set out in policy guidance.

Existing Travel Behaviour

The existing travel characteristics of employees in the local area can be obtained from census data. The mode split breakdown of existing journeys has been derived using 2011 Census Travel to Work Data. The Mid-layer Super Output Area (MSOA) Cardiff 011 includes the development site and St Mellons Business Park, as illustrated in Figure 14. It can also be seen that MSOA Cardiff 011 includes the industrial parks located directly north of Wentloog Avenue.

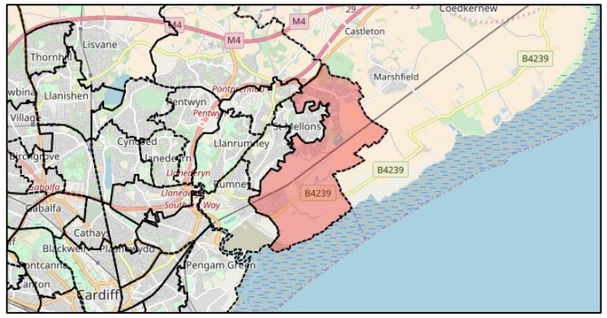

Figure 14: MSOA Cardiff 011

The modal split data for journeys to employment sites within Cardiff 011 is presented in Table 4 below.

Table 4: Modal Split (MSOA Cardiff 011)

Method of Travel to Work	All Categories	Modal Split
Driving a car or van	4,472	80.0%
Passenger in a car or van	364	6.5%
Train	37	0.6%
Bus, minibus or coach	305	5.5%
Bicycle	73	1.3%
On foot	283	5.1%
Motorcycle, scooter or moped	39	0.7%
Taxi	16	0.3%
Total	5,589	100.0%

The census data presented in Table 4 indicates 80% of trips to work in the MSOA Cardiff 011 were made by car in 2011. This modal split is not considered to be reflective of the proposed development for several reasons including the following:

- The MSOA Cardiff 011 includes industrial parks located directly north of Wentloog Avenue. In comparison to the proposed development, these industrial parks are in a less accessible location which encourage a higher proportion of trips to be made by car;
- The development proposals include a Railway Station, providing an opportunity to arrive by an alternative mode of transport;
- Route 2 of the Cardiff Cycleway is planned to link the city centre and the site; and
- A Travel Plan and Parking Strategy will be prepared to encourage travel by sustainable modes and seek to reduce the number of trips made to the site by car.

Alternative assumptions have therefore been developed for each mode of transport that better reflect the sustainable credentials of the site.

Based on these alternative assumptions, the proportion of people estimated to arrive by car is presented in Table 5 below.

Table 5: Business District (Employment) Modal Split

Mode	Modal Split
On foot	6%
Bicycle	4%
Motorcycle, scooter or moped	1%
Train	13%
Bus	9%
Car (All Trips)	67%
Car (Passenger) (9% of Car)	6%
Car (Driver) (91% or Car)	61%

As summarised in the table above, 67% of trips to the proposed Business District are estimated to be made by car. Based on the care share assumptions presented above, 61% are estimated to be car drivers and 6% will be passengers.

Whilst the above gives an indication of the likely mode split of the proposed development, it will be necessary to establish targets for each occupier within Cardiff Parkway Business District following initial travel surveys of employees. It is likely that staggered targets will be made, increasing the mode share of sustainable forms of transport through the reduction of trips made by single car occupancy journeys.

Considering the existing and proposed sustainable transport infrastructure within and near the site and the potential Travel Plan measures set out within this document, a large reduction in the proportion of single occupant car trips is achievable when compared with existing travel behaviour.

Baseline Targets

It is important to set realistic targets to measure the success of travel plans. Developing modal share targets for employees ensures that the travel plan is monitored and reviewed and there is a benchmark on which to judge its success. At this stage, only outline targets have been set for the Business District overall. Comprehensive targets will be set once the first travel surveys have been completed and analysed as a greater understanding of the travel behaviour of the occupants is obtained. This also give final users and TPCs ownership of the targets set.

A target of a reduction of 10% over five years in the number of trips made to and from the site by car drivers is proposed for the CPW Business District:

- An increase of 2% in the proportion of car passenger journeys made to the site as a result of the measures set out in the Framework Travel Plan to encourage car sharing;
- An increase of 5% in the proportion of journeys made by public transport given proposals for high quality waiting facilities;
- A 2% increase in the number trips made by cycle reflecting the proposed links between the site and Cardiff's proposed primary and secondary cycle ways; and
- An increase of 1% in the proportion of trips made by foot as a result of the proposed good quality links around and through the site.

As the staff shift times are not known it is not possible to set targets based upon peak hours (as this will be subject to changes in shift patterns). The targets are therefore based upon daily staff movements, which are more defined at this stage.

Table 6: Target Modal Split per Travel Plan Year

Mode	TS Modal Split	Travel Plan Year					Target Modal Split
		1	2	3	4	5	
On foot	6%	6%	6%	7%	7%	7%	7%
Bicycle	4%	4%	5%	5%	6%	6%	6%
Motorcycle, scooter or moped	1%	1%	1%	1%	1%	1%	1%
Train	13%	14%	14%	15%	15%	16%	16%
Bus	9%	9%	10%	10%	10%	11%	11%
Car (All Trips)	67%	66%	64%	62%	61%	59%	59%
Car (Passenger) (9% of Car)	6%	6%	7%	7%	8%	8%	8%
Car (Driver) (91% or Car)	61%	60%	57%	55%	53%	51%	51%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

9.3 Monitoring

An important part of any Travel Plan document is the continual monitoring and review of its effectiveness. It is essential that a Travel Plan document is not a one-off event but evolves over time. Regular monitoring and review led by each TPC will help to gauge progress towards targets and objectives set for each site and the development overall. If necessary, this will enable the Travel Plan document to be refined and adapted in order to improve its progression.

As a living document, there will be the need to update the Travel Plan as required. This requirement should be linked to monitoring of the Travel Plan which will take place in year's one, three and five following the implementation of the plan. The criteria for monitoring will need to understand the travel needs of staff, and visitors so that transport measures can be adapted or added to provide for their needs.

The monitoring will be the responsibility of the Travel Plan Co-ordinator and will review:

- Travel patterns (via a travel survey) - comprehensive travel surveys will be undertaken for each site with a commitment to review the Travel Plan targets at the conclusion of each monitoring phase. This review will identify elements of the Plan that are not working as well as others, and also allow the plan coordinator to further strengthen the measures that are performing well;
- Full site audit – undertaken by the Travel Plan Steering Group, the audit will identify any barriers that obstruct walking, cycling and using public transport and make recommendations for improvements; and
- Parking counts (all vehicles including bicycles).

9.4 Analysis and Reporting of Monitoring

Each Travel Plan Coordinator will lead the development of the monitoring exercise and will be responsible for analysing the data collected. A full monitoring report will be produced, led by the Travel Plan Steering Group Chair. The report will summarise the monitoring data collected, report on progress of measures that have been implemented and suggest any changes to existing measures or new measures required. Identified targets for the next review period will also be established.

Following the production of the monitoring report, each Travel Plan Coordinator will be responsible for disseminating its findings to the relevant stakeholder and user groups including CC.

10 Summary and Conclusions

Ove Arup and Partners Ltd (Arup) has been instructed by CC to prepare a FTP for the proposed Cardiff Hendre Lakes Business District. This forms part of the Cardiff Hendre Lakes proposed development that includes a Transport Interchange comprising a railway station and Park & Ride, in St Mellons, Cardiff.

The proposed development incorporates a business district and the construction of a new transport interchange facility, which includes the proposed Cardiff Parkway railway station. To allow for effective travel planning, separate detailed Travel Plans will be developed for each of the specific land uses and occupiers following initial site surveys.

This FTP sets out the strategic objectives and targets, site wide measures and monitoring systems which will inform the individual TPs. Several potential site wide measures have been identified which encourage walking, cycling and public transport use. The site will also be integrated with existing local infrastructure and provide for future connections to the wider network. Potential measures include introducing a car share scheme and creating a Bicycle User Group.

The overall goal of the FTP is to reduce the number of single occupancy car journeys to the site and subsequently increase the use of more sustainable modes of transport. A Travel Plan Steering Group for the proposed development will review progress towards the targets of the TP and ensure these are kept up to date.

Appendix B

Cardiff Parkway Railway Station
Framework Travel Plan

Cardiff Parkway Developments Ltd

Cardiff Hendre Lakes

Cardiff Parkway Railway Station Framework Travel Plan

HDL-ARP-EZ-XX-REP-EEN-000005

Issue | 31 July 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 252199

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1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of Cardiff Hendre Lakes. The development proposals include the construction of a business park (up to 90,000m^2 - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes. Together with the construction of a new transport hub facility, comprising railway station buildings (up to 2,500m^2 - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 650 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park.

Two principle areas of the proposed development include the Transport Interchange and the business district. The Transport Interchange, which includes a mainline railway station (Cardiff Parkway), a station park & ride with up to 650 spaces, taxi rank, bus stops and cycle parking, will provide a seamless transition between various modes of travel. The business district is proposed to the north of the mainline railway and will comprise 90,000m^2 of employment space.

Separate Travel Plans (TP) are proposed for the business district and the railway station, given the differing land uses and travel characteristics. This Framework Travel Plan (FTP) has been prepared for the for the business district and developed in conjunction with the Framework Station Travel Plan (STP) for the proposed Cardiff Parkway railway station.

To allow for effective travel planning, separate detailed or unit specific Travel Plans will be developed for each of the specific land uses and/or buildings. This Framework Travel Plan sets out a range of site wide strategic objectives, targets, measures and monitoring systems which will inform the individual Travel Plans.

The illustrative masterplan is presented in Figure 1. The proposals aim to deliver a sensitive and sustainable development that offers long-term benefits for the community and the environment.

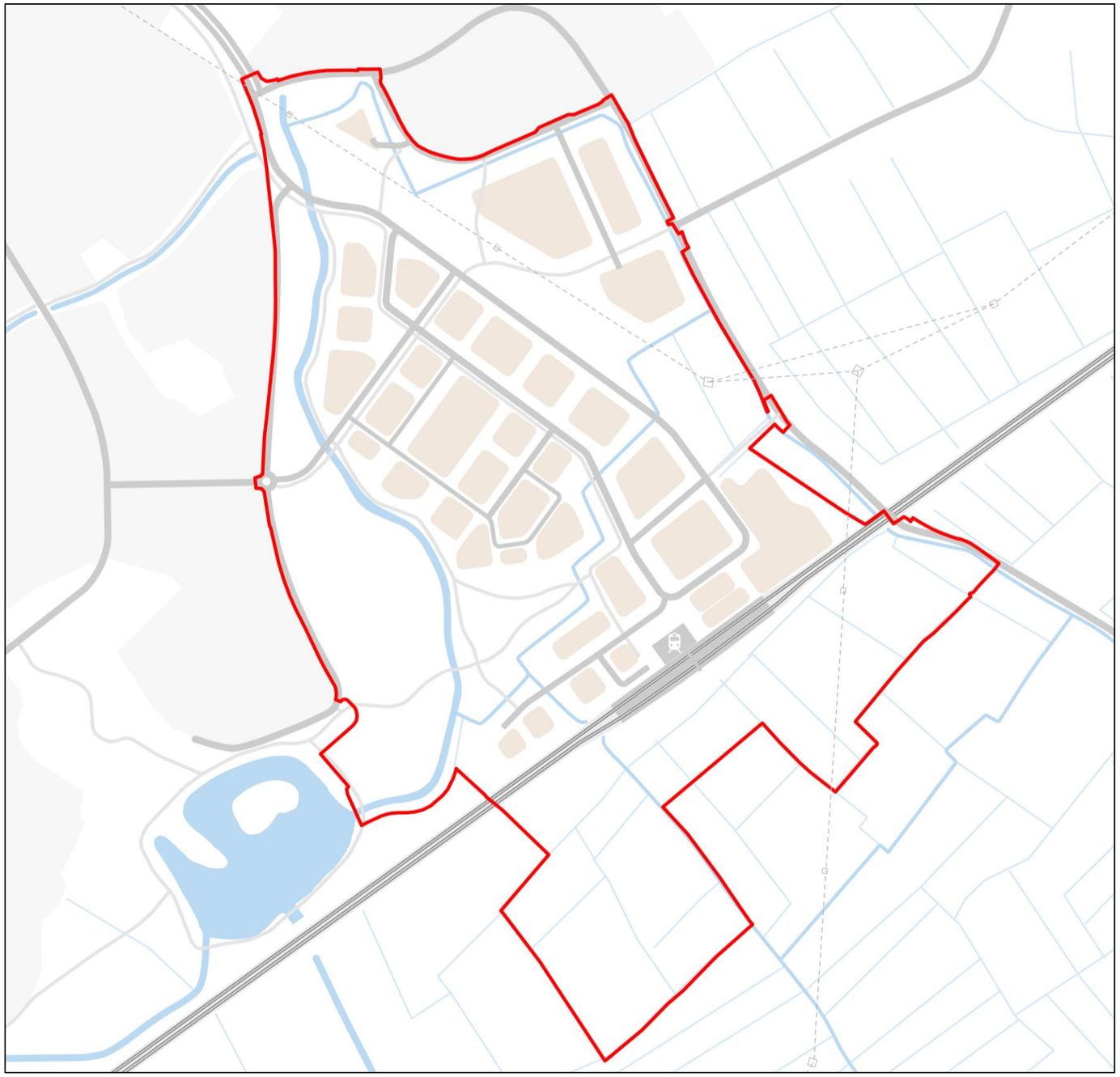

Figure 1: Cardiff Hendre Lakes Illustrative Masterplan

Scoping and Methodology

At a pre-application meeting with Cardiff Council (CC) Highways on 26th October 2017, it was agreed that a Framework Travel Plan should be prepared and submitted as part of the outline planning application.

The full STP will be delivered by the station operator, based on this framework which is to be agreed.

1.2 Location

The development site is in the St Mellons area of Cardiff, approximately 8km to the east of the city centre and to the south of the M4 and A48(M), as presented in Figure 2 below.

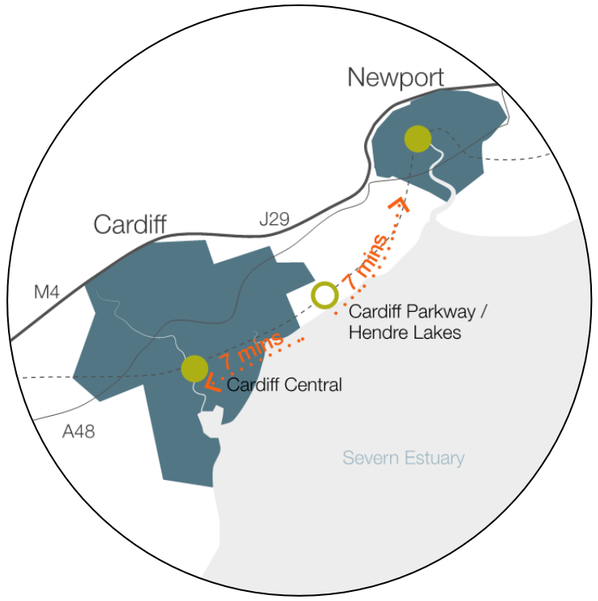

Figure 2: Site Location

The site is bounded to the north by St Mellons Business Park, Heol Las to the east, open countryside to the south and to the west by Cypress Drive and residential development beyond. The railway station will be bisected by the South Wales branch of the Great Western Main Line which crosses the site east to west and is used by intercity trains between London and Swansea, as well as local and regional services to destinations including Cardiff, Newport, Bridgend and Bristol. The geographical context of the site is presented in Figure 3.

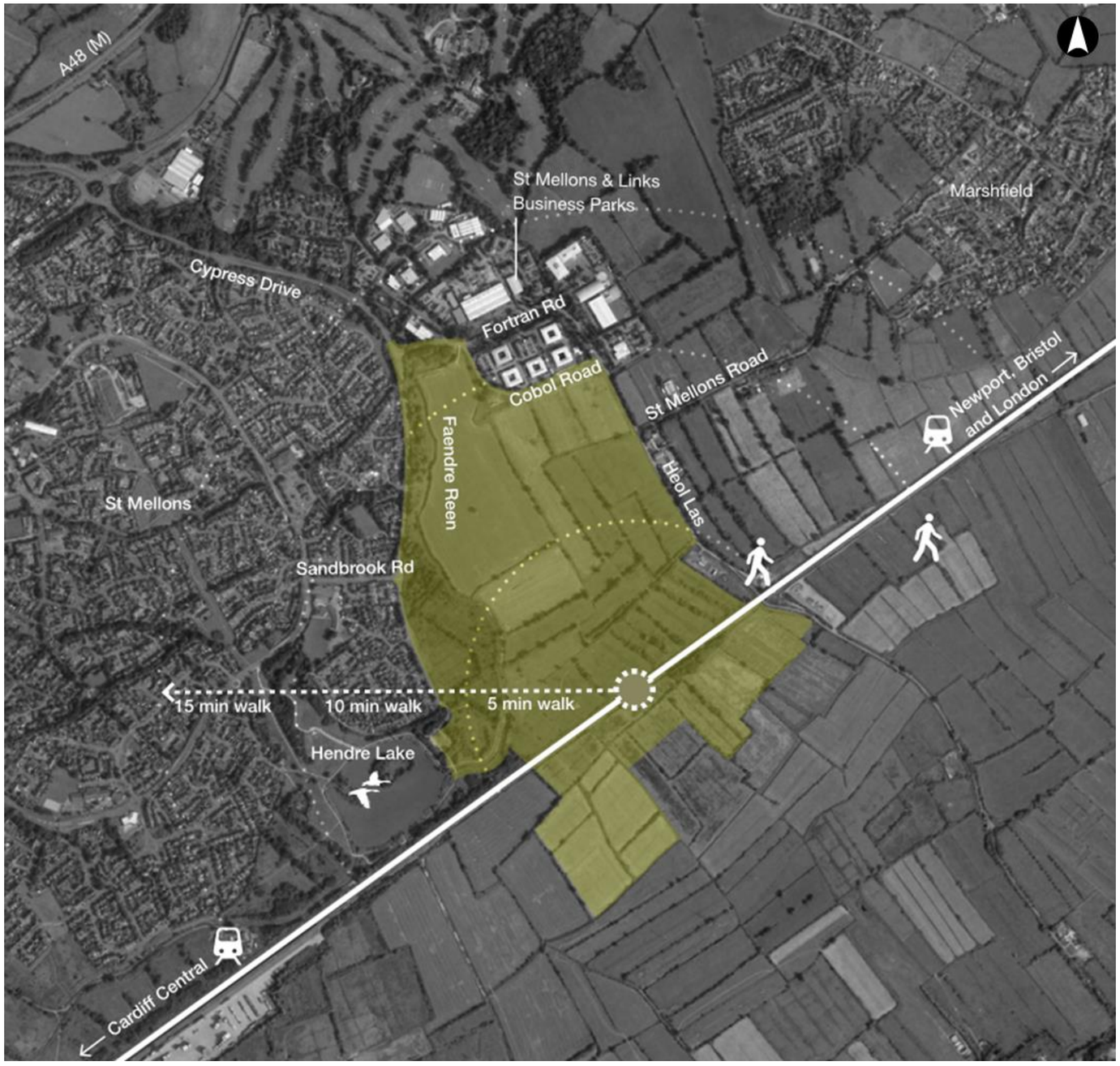

Figure 3: Site Context

2 Travel Plan Principles

2.1 What is a Travel Plan?

A Travel Plan provides a developer with the opportunity to actively commit towards creating a development that encourages modal shift towards sustainable transport.

Travel Plans set achievable targets for developers and occupiers to pursue within a defined timescale. The most successful Travel Plans are live documents that evolve with a development and in which several stakeholders including the developer, Transport for Wales, Network Rail, the local authority and the rail operator, Transport for Wales Rail Services, have a role in developing and monitoring.

A Framework Travel Plan represents the first stage in sustainable Travel Planning. Whilst it has a format similar to a full Travel Plan, this Framework Travel Plan will consider the strategic objectives and targets, outline potential measures and set out monitoring proposals, which in turn will be used to inform the full STP.

The full STP will developed in partnership with key local stakeholders including Transport for Wales Rail Services. A successful STP will support the mitigation of local transport and parking problems through supporting sustainable rail travel and the strategic objectives of the rail industry.

2.2 Benefits of a Travel Plan

The UK Government has cited Travel Plans as an important tool in reducing the number of single occupancy car trips, made to and from a particular business, organisation, or facility, in favour of more sustainable modes of transport such as public transport, cycling or walking[1].

A reduction in the number of private vehicle journeys has the potential to reduce the type and volume of pollutants released into the atmosphere, which are contributing to climate change and having a detrimental effect on health. Travel Plans seek to influence travel behaviour and achieve an increased use of sustainable transport modes including car-sharing. They are tailored to reflect the needs and aspirations of the occupants, development characteristics and national and local policy guidance.

STPs also aim to benefit passengers, employees, visitors and the environment, by supporting national policy in the objective to provide sustainable development. A modest reduction in single occupancy car trips can result in a reduction in peak period traffic congestion.

It is considered that modal shift away from reliance on the private car would also result in a reduction in road traffic accidents, reduced stress, healthier lifestyles, better productivity, environmental protection, improved access for employees/visitors/deliveries and reduction in social exclusion through the provision of choice between modes of transport.

Travel Plans are important mechanisms for instigating and maintaining travel behaviour change. Figure 4 provides examples of some of the benefits of implementing a Travel Plan.

Employees and Passengers

- Health improvements from increased cycling and walking.
- Ability to carry out work whilst travelling on public transport for business travel (where appropriate).
- Time savings due to shorter journey times which enables more time for increasing work productivity, leisure and family.
- Health and lifestyle improvements from increased cycling and walking.

Businesses and Organisations

- Healthier workforce and reduced absenteeism, resulting in a more productive workforce.
- Opportunities for staff networking, as car sharing enables staff to socialise as well as discuss work-related issues.
- Meeting an organisation's environmental standards.
- Improved image: environmentally and socially aware for employees.

Wider Community

- Reduced congestion on the local highway network surrounding the site.
- Cleaner air surrounding the site.
- Sets an example to the wider community.
- Improved social image for the wider community.

Figure 4: Benefits of a Travel Plan

[1] Ministry for Housing, Communities and Local Government (2014) Travel Pans, Transport Assessments and Statements

3 Policy Context

3.1 National Policy

This STP supports policy objectives throughout national policy such as:

- Planning Policy Wales: Edition 10
- Technical Advice Note 18: Transport (March 2007)
- The Well-being of Future Generations (Wales) Act 2015
- Active Travel (Wales) Act 2013
- Wales Spatial Plan (2008)
- Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)

National policy objectives include enhancing transport connectivity, encouraging sustainable modes of travel, improving national health and well-being and tackling climate change. National policy objectives will be met in the following ways:

The proposed Cardiff Parkway Railway Station will encourage a modal shift away from single occupancy car trips towards sustainable modes of transport, specifically rail. This should reduce the level of carbon emissions produced and therefore Wales' impact on climate change.

Furthermore, the railway station will also be accessible by active modes of travel such as walking and cycling. There will be direct links through the proposed development to strategic cycle networks such as Route 88 of the National Cycle Network and the proposed Cardiff Cycleway, enhancing national active travel connectivity. It is anticipated that this will provide wide-ranging health benefits by encouraging more active lifestyles.

The Cardiff Parkway transport strategy seeks to integrate the Railway Station with existing residential and employment sites in St Mellons, thus enhancing connectivity within the local area. The proposed Railway Station will provide existing residents and employees in St Mellons with alternatives modes of travel to the private car, reducing the negative impacts that arise from single occupancy car trips.

3.2 Local Policy

Local policy related to this STP includes:

- Cardiff Council Local Development Plan (2016)
- Managing Transportation Impacts Supplementary Planning Guidance (July 2018)
- Cardiff Transport and Clean Air Green Paper (Draft 2018)
- Cardiff Cycling Strategy (Draft March 2017)

Policy objectives include enhancing connectivity to Cardiff and the wider region, encouraging active and sustainable travel and improving local air quality. This Station aligns with these goals in the following ways:

The Transport Interchange proposed near the Station will be designed to integrate all modes of travel associated with the proposed Cardiff Parkway Station, which will improve connectivity to the wider region and encourage Station users to travel sustainably.

This Station will also promote sustainable modes of travel through liaising with the proposed Cardiff Hendre Lakes business district, existing local businesses and community groups.

The Station will be accessible by active modes of travel, benefiting both existing and future residents and employees in St Mellons. This will enhance local health and well-being and tackle inequalities.

This Railway Station will support the prioritisation of pedestrians, cyclists and public transport users over private motor vehicle users. This will be achieved through the provision of high-quality pedestrian and cycle infrastructure. Charging points for both electric cars and cycles, will also be included within the development site to encourage the use of electric vehicles.

It is envisaged that existing car trips to central Cardiff will be reduced and redistributed to Cardiff Parkway as a result of this proposed Station. This will reduce congestion and improve air quality within Cardiff City Centre, creating a more people-friendly urban environment.

3.3 Travel Plan Policy Context

Planning Policy Wales: Edition 10 (December 2018)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs).

Chapter 8 (Transport) of PPW identifies choice in transport and secure accessibility as important in supporting sustainable development and tackling the causes of climate change. The application of a transport hierarchy that prioritises the needs of pedestrians, cyclists and public transport users forms part of an integrated approach to land use planning.

Technical Advice Note (TAN) 18: Transport (March 2007)

TAN 18 elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted to ensure that economic development can create a basis for sustainable travel patterns.

Paragraph 9.15 indicates that Travel Plans can be prepared individually or jointly by the owners or operators of a proposed development. Joint Travel Plans can be part of a Transport Implementation Strategy, with both setting out proposals for the delivery of more sustainable travel patterns.

4 Cardiff Parkway Railway Station

4.1 The Proposal

The Cardiff Parkway Railway Station is proposed as part of the wider Cardiff Hendre Lakes proposals, which consist of:

- Construction of a Business District (90,000sqm) and associated infrastructure, such as biodiversity, landscaping, drainage, walking, cycling and other transport modes.
- Construction of a Transport Interchange facility, comprising of a new Railway Station, Bus Interchange, Park and Ride facility (up to 650 spaces), cycle parking, and associated infrastructure works.

It is intended that Cardiff Parkway railway will be served by frequent train services to key destinations such as Cardiff, Swansea, Bristol and London. The proposed station strives to be a catalyst for growth, contributing to the regeneration of East Cardiff and the wider Cardiff Capital Region by helping to attract high quality businesses and investment.

Table 1 outlines the indicative programme for the proposed development.

Table 1: Cardiff Hendre Lakes Estimated Programme

Year	Completed Works
2023	Completed Railway Station; Business District Phase 1 (22,500sqm)
2024-2027	Annual release of Business District office space (11,250sqm per annum)
2028	Completed Business District (90,000sqm)

4.2 Patronage

The proposed Railway Station will serve Cardiff and the wider geographical region. However, it is anticipated that the majority of Station users will originate from neighbourhoods located within close proximity of the development area to the east of the Cardiff city region. Figure 5 shows the catchment area of the Station in greater detail.

This Station will be an attractive opportunity for local residents and commuters travelling to destinations such as Cardiff and Newport city centres, due to proposed high levels of accessibility by sustainable modes of transport and Park and Ride facilities incorporated as part of the development proposals.

It is anticipated that the proposed Railway Station will serve as both an origin and destination for local residents, Park and Ride users, existing local employees and future employees of the proposed Business District.

Therefore, Station users will primarily consist of commuters travelling both to and from the local area, Cardiff city centre and the wider region.

As outlined previously, the proposed development will be a phased opening between 2023 and 2028. Therefore, it is anticipated that Station demand will gradually rise during this interim period up to 2028 when the Business District is complete.

In summary, the proposed Station will have a high level of functionality, serving a variety of origins and destinations.

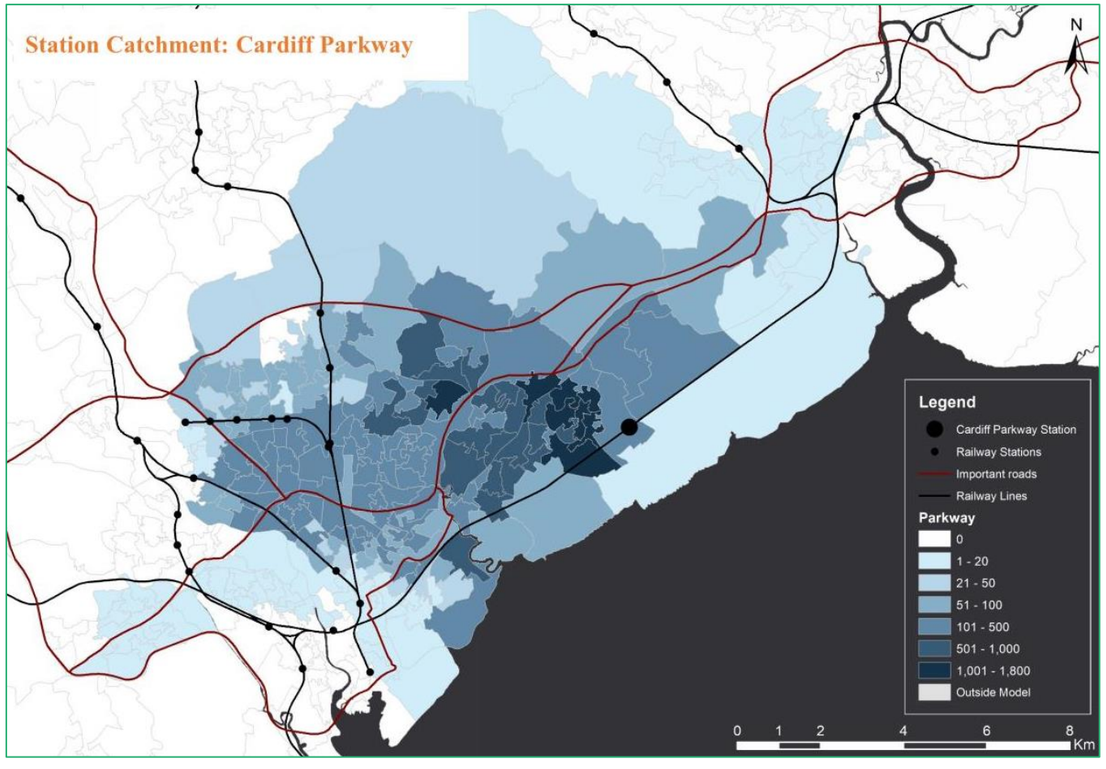

Figure 5: Station Catchment Area (Car Trips)

4.3 Station Facilities

A transport interchange facility allows for multiple modes of transport to be connected in a single location and is therefore considered to be central to encouraging travel by sustainable modes.

The Transport Interchange will be designed in detail during the reserved matters process, should outline planning permission be granted. A draft interchange design has been developed and reviewed by the Network Rail Built Environment Accessibility Panel and this is presented in Figure 6 below. The railway station has also progressed through the Governance for Railway Investment Projects (GRIP) Stage 3.

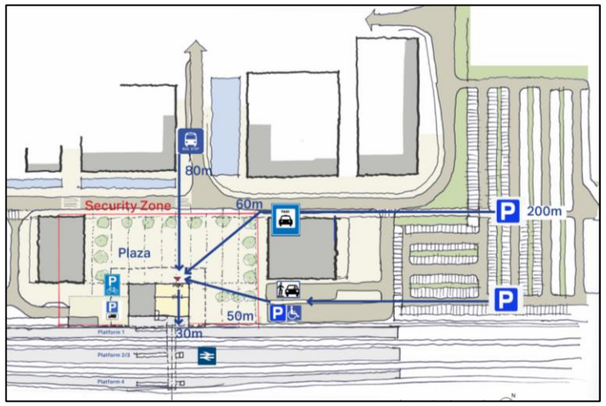

Figure 6: Draft Illustrative Interchange Arrangement (Wilkinson Eyre)

The proposed interchange will include the following facilities:

- Cycle parking;
- Blue Badge car parking;
- Electric vehicle charging points;
- Bus stops; and
- Taxi/private hire drop-off zone.

Cycle Parking

CC parking standards require cycle parking for 5% of adjoining passengers. Cycle parking provision will be similar to existing provision at Bristol Parkway, which has 156 storage spaces[2]. The exact provision will be agreed as part of the reserved matters.

Cycle parking will be weather protected, lit, located in a highly visible location with CCTV coverage in a location directly accessible from a cycle lane or shared footway/cycleway. This will ensure that cycle security is a key consideration to support cycling as an attractive option for Station users. Electric charging points will also be provided for electric cycles.

Cycle paths around the railway station will be accessible from cycle routes connecting to the wider area, with access paths designed to limit conflict with pedestrians and vehicles.

Bus and Coach

Bus stops are proposed within the Transport Interchange and will have modern, covered shelters with real time in formation and raised kerbs provided for accessibility.

The proposed railway station will provide connectivity benefits for the local area and thus, increase the catchment for local bus services. Logically, it is therefore assumed that some bus services will extend into the site to benefit from this increased catchment.

These services would complement other modes of transport and provide connections to key locations such as the strategic housing sites in the north east of Cardiff.

Taxi/Private Hire

For passengers and staff being dropped off and collected at the Railway Station by Taxi/Private Hire, spaces will be provided near the railway station, ideally within 100-200m walking distance. The number of spaces provided will be based on Bristol Parkway provision.

Station Park and Ride

Design of the proposed Transport Interchange will ensure vehicular traffic is not detrimental to active travel and public transport users, ensuring they have priority over private vehicles, in accordance with the transport hierarchy. Private vehicle travel to and from the Station will be accommodated for through the Station Park and Ride facility part of the development, which will be within walking distance of the Station.

There will be up to 650 parking spaces provided as part of the Park and Ride car park, including short-stay, drop-off areas and accessible parking. It is therefore expected that there will be less than 600 long-stay parking spaces serving the station. Parking for Blue Badge Holders should be located as close as possible to the facility it serves, preferably within 50m of the Station main entrance. At Railway Stations, Code of Practice BS8300 states that 5% of parking should be accessible and a further 5% should be suitable for future conversion. The standards do note that for larger car parks, this can result in some accessible parking typically left unused and therefore it may be appropriate to seek derogation to these standards.

In accordance with Planning Policy Wales (PPW 10), it is proposed for the Park & Ride to have a minimum of 10% of car parking spaces to have Ultra-Low Emission Vehicle (ULEV) charging points. Passive provision, which includes the necessary underlying infrastructure provided to enable installation and activation in the future, is proposed for the other 90% of spaces so they can be easily converted in response to potential future demand.

The car park will also include electric charging points, which will be prioritised over regular parking by locating these charging points as close proximity to the Station as possible. This will provide an incentive for electric vehicle users to use the Park and Ride facility. Furthermore, free or reduced parking charges will be considered for low emission vehicles to incentivise the use of vehicles which have minimal environmental impact.

The feasibility of locating car club vehicles at the station car club or interchange will be discussed with commercial operators.

[2] https://www.thetrainline.com/stations/bristol-parkway

Where possible, the car park should be located where direct pedestrian access to the Station can be achieved without the need to conflict with road traffic. Suitable crossing points will be provided where there is a road between the car park and Station. Furthermore, where appropriate, points to stop, wait and rest will be provided between the Park and Ride facility and the Station.[3]

Future Improvements

To support future growth in sustainable travel, it is recommended that land in the immediate vicinity of the Station building should be set aside for the provision of additional cycle parking at a future date.

The STP co-ordinator will investigate the extension of the Nextbike cycle share scheme to include Cardiff Parkway Station. This would further promote the use of active travel by improving linkages from the proposed Station to key destinations across the Cardiff region by bike.

Parking Management Plan

It is understood that there will likely be a parking charge associated with the long-stay car park for Cardiff Parkway. In the event that parking charges are imposed, this may lead to some users parking on the residential streets in St Mellons including Cypress Drive. In this situation it will be necessary to manage the parking in the affected streets. Any management proposals, such as issuing resident permits or the introduction of double yellow lines, would need to be discussed and agreed with CC.

A Parking Management Plan is therefore proposed to monitor on-street car parking near the site over a five-year period from the date of the start of the station operation. This could involve an on-street car parking survey that is undertaken before this station is operational, and then annually for five years after it becomes operational.

It is proposed for the Parking Management Plan to be secured via a planning condition and developed in consultation with CC.

[3] Department for Transport (2015) Design Standards for Accessible Railway Stations

5 Existing Transport Network

This section of the STP presents the site's current connectivity by all modes of transport including walking, cycling, public transport and private vehicles.

5.1 Walking

A detailed audit of existing pedestrian and cycle routes to, from, and around the development site was prepared following a site visit on Wednesday 21st August 2019. Figure 7 presents a map of the pedestrian infrastructure within the vicinity of the proposed railway station, alongside local facilities and travel times. The figure shows services and facilities which are within a 5, 10, 20 and 30-minute walk of the centre of the site.

The pedestrian network that provides access to local amenities includes Cypress Drive, St Mellons Business Park, Willowbrook Drive and the A48 shared footway and cycleway. The majority of St Mellons, which has a population of approximately 13,000, is within a 30-minute walk of the proposed development.

To fully realise the connectivity benefits provided by the proposed railway station, there are opportunities for offsite works to be delivered by others for the full connectivity benefits of the railway station to be realised, including the following:

- Opportunity for CC to introduce a footway/cycleway through Hendre Lake Park, including the provision of lighting subject to ecological constraints. There are also opportunities to upgrade other leisure routes near the site;
- Opportunity for CC and relevant land owners to enhance the provision of pedestrian infrastructure within the existing business park to provide a continuous route between the proposed station and Pascal Close; and
- There are opportunities for Newport City Council (NCC) to undertake works on St Mellons Road to reduce traffic speeds and potentially vehicular volumes to improve conditions for pedestrians and cyclists.

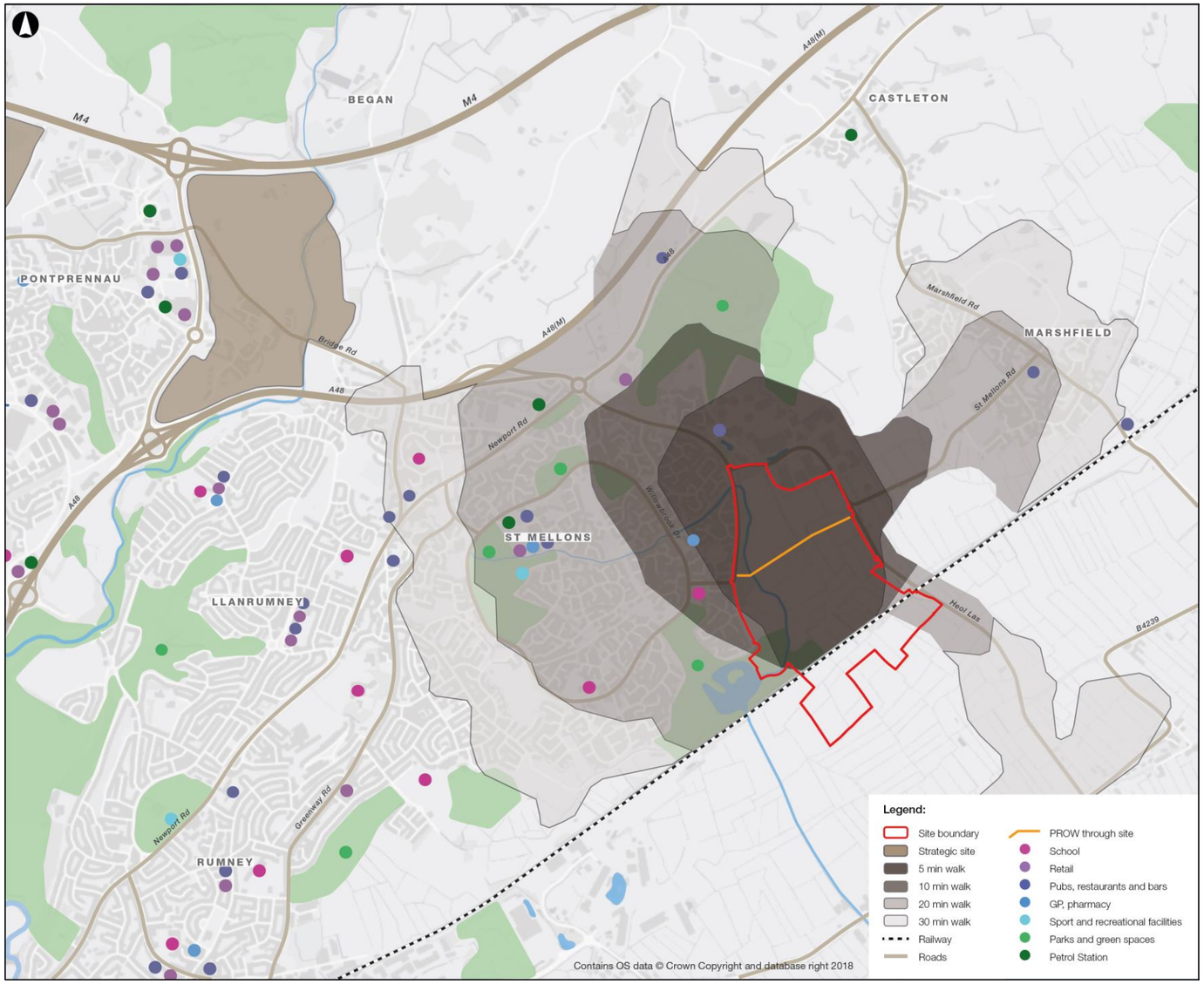

Figure 7: Walking Infrastructure

5.2 Cycling

The existing and future cycle routes proposed by CC, as shown on the Integrated Route Map, are illustrated in Figure 9 alongside cycling journey times from the centre of the site. The figure presents the locations and facilities located within 10, 20 and 30-minute cycle from the centre of the site, including Trowbridge and St Mellons.

The figure also shows that parts of the strategic housing site at St Edeyrns are anticipated to be within 30 minutes cycle of the station. These cycle times are anticipated to improve following the introduction of the committed cycleways, as shown on the CC Integrated Route Map.

Existing National Cycling Network (NCN)

NCN Route 88 adjoins the site's eastern boundary along Fortran Road between the St Mellons Road and Cobol Road junctions as shown in Figure 8.

From Fortran Road Route 88 follows St Mellons Road eastbound as an on-road cycle route for 3.5km through the settlement of Marshfield to Church Lane. Beyond Church Lane, Route 88 continues towards Newport for 3.2km as an off-road cycle route.

At Tredegar Park Route 88 joins Route 4 of the NCN which branches eastwards across Newport or north towards Rhiwderin. These destinations are each accessible within approximately 5km.

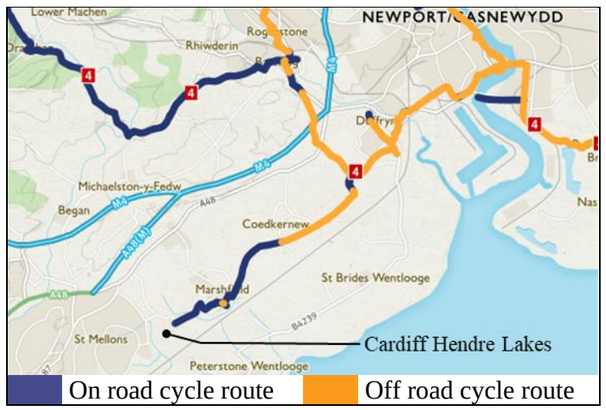

Figure 8: National Cycle Network (source: Sustrans)

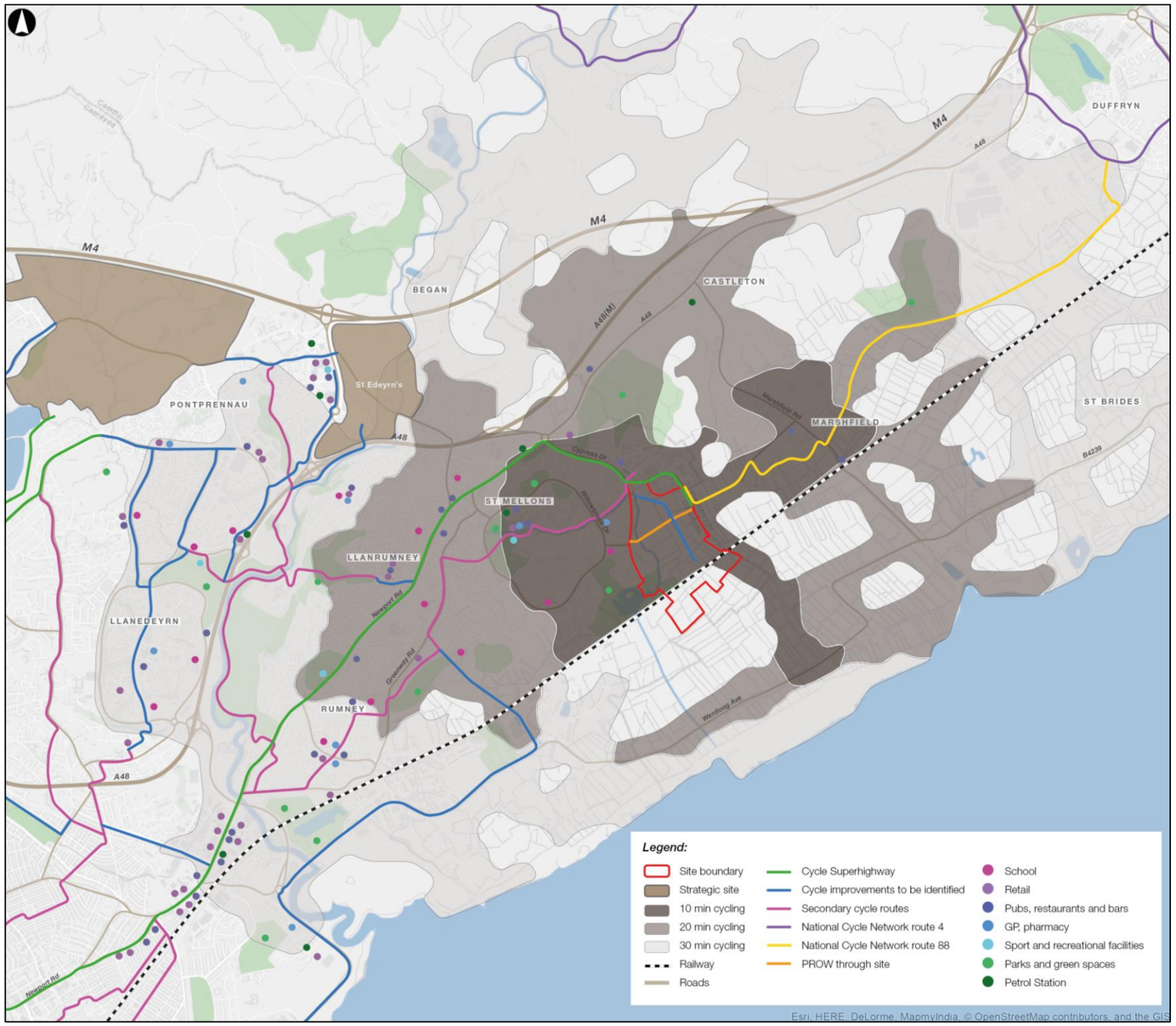

Figure 9: Cycling Routes and Travel Times

5.2.1 Committed Schemes

CC have committed to improving cycle infrastructure as part of the Cardiff Cycling Strategy (2017 Draft) by developing five new primary route corridors. These will provide segregated routes along key corridors, connecting to strategic development sites as shown in Figure 10. One of the proposed routes will provide a link along the B4487/Newport Road from Cardiff city centre to St Mellons Business Park and Cardiff Parkway Railway Station.

Alongside the primary routes proposed, several secondary routes have also been identified. The secondary routes aim to enhance existing discontinuous or poor-quality cycle routes through the city including a preliminary route from the Cardiff Hendre Lakes and Cardiff Parkway Railway Station to the adjacent residential communities of St Mellons and Trowbridge.

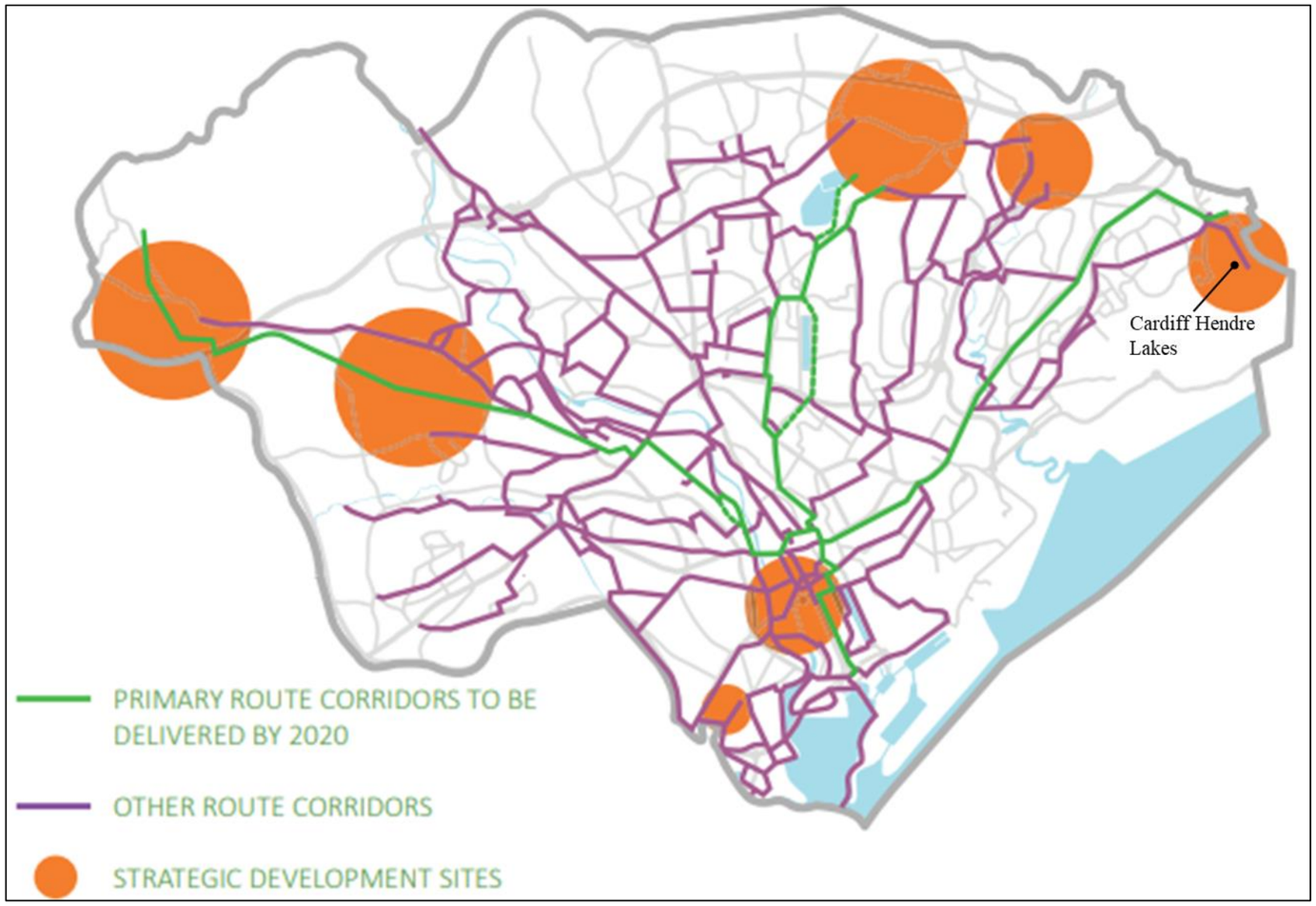

Figure 10: Cardiff Council Proposed Cycle Network[4]

[4] Source: Cardiff Council Cycling Strategy (2017 Draft)

5.3 Bus

Existing bus services operating near the proposed development are summarised in Table 2 and displayed in Figure 12 overleaf.

The closest bus stops to the site are located on Fountain Lane, Willowdene Way and the A48. Given the size of the development site, all these stops are located over 400m from the centre of the site and at least 750m from the station.

Table 2 shows up to 20 services per hour pass within the vicinity of the site and a further six operate along the A48. The number 30 and X5 routes provide cross city services between Cardiff and Newport with up to seven services combined. Both services stop on the A48 where bus stops with shelters are provided, 120 meters east of the A48/Cypress Drive roundabout.

The 45B is the only service which stops at the Fountain Lane bus stop. This service routes from Cardiff city centre to St Mellons and only operates in the peak periods. This reflects the propensity for commuting trips along this corridor.

A journey time isochrone has been produced to display the accessibility of the site by bus at 17:30 (to reflect the evening peak period) and this is included in Figure 11. The isochrones include the time taken to walk to the closest bus stop, which is between 10 and 25 minutes, and shows that the central areas of both Newport and Cardiff are accessible within a 45-minute journey time based on the existing service. Additionally, there is good provision to residential developments along the B4487 Newport Road into Roath which are accessible within 30 minutes travel time. If local bus services were potentially extended in to the development, these journey time would be reduced considerably. Outside of peak times, there is potential that journey times will be longer as services are less frequent.

Bus stops are proposed within the Transport Interchange and will have modern, covered shelters with real time in formation and raised kerbs provided for accessibility.

Table 2: Local Bus Services[5]

Service	Operator	Route	Nearest Bus Stop (Walking Distance)	Buses per hour (Mon-Fri)
X5	New Adventure Travel	Ringland – Cardiff	Willowdene Way (1 km)	3
		Cardiff – Ringland	Willow Grove, Willowdene Way (1 km)	3
44/45	Cardiff Bus	St Mellons – Cardiff City	Willowbrook Drive (800 m)	8
45B	Cardiff Bus	St Mellons – Cardiff City	Fountain Lane (1.1 km)	2 (in peak hours)
X45	Cardiff Bus	Cardiff Bay – St Mellons	Willowbrook Drive (800 m)	3
64/64A/65	Capital Links/ Cardiff Bus	Llanrumney and St Mellons - Pentrebane – Cardiff	Willowbrook Drive (800 m)	Bihourly
30	Newport Bus/ Cardiff Bus	Newport – Cardiff	A48 (2 km)	3
		Cardiff – Newport	A48 (2 km)	3

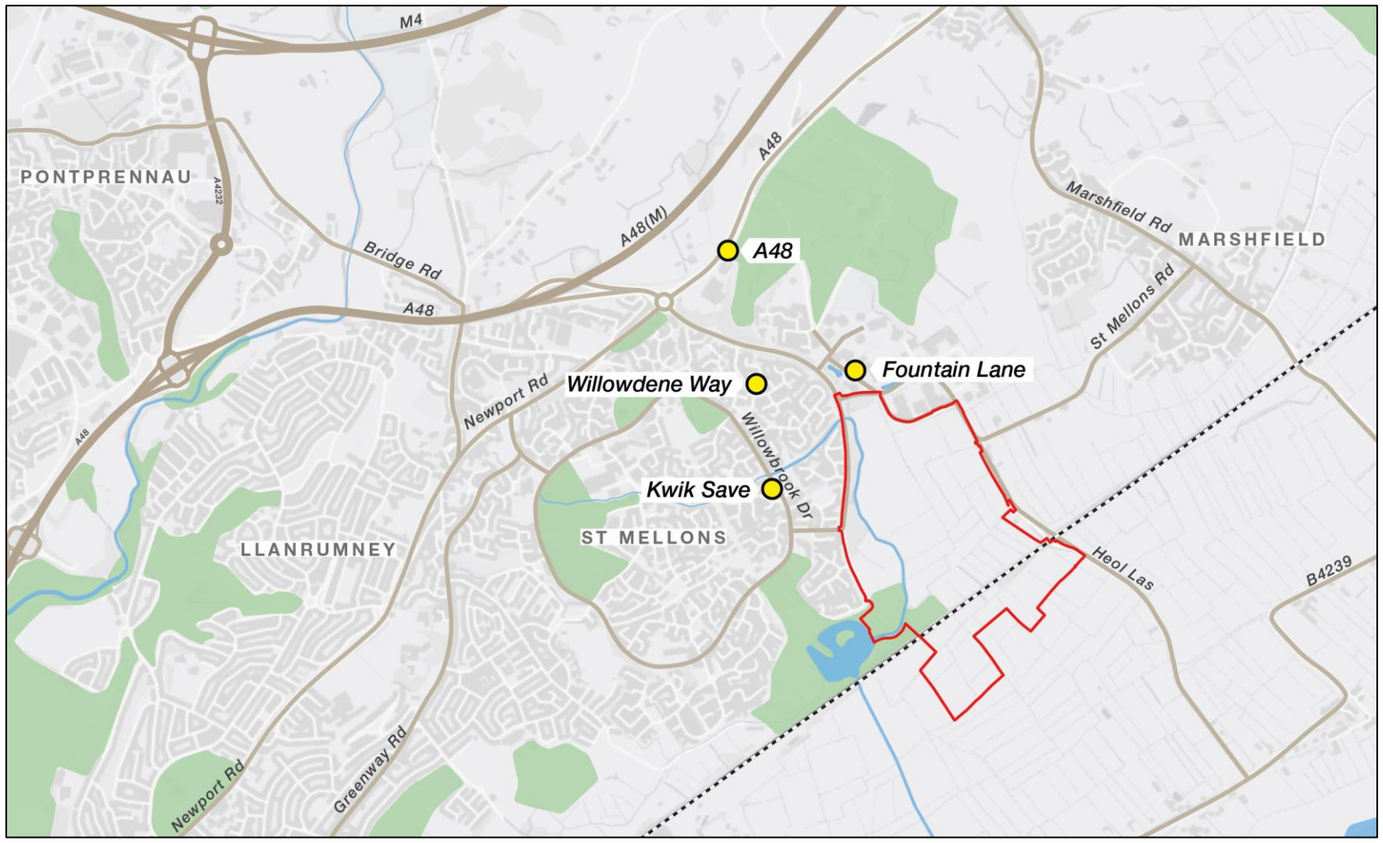

Figure 11: Bus Stop Locations

[5] Source: Traveline.cymru.co.uk (03.01.2020)

It is anticipated that proposed bus infrastructure for the local area will provide an attractive opportunity for local transport users to travel sustainably by easily transitioning between other modes of transport such as walking, cycling and rail services.

The STP co-ordinator will work in partnership with the local operators and other local stakeholders to seek regular bus connections between the station and the local area. The exact location and number of bus stops will be confirmed following discussions with local bus operators and other relevant stakeholders prior to the opening of the station.

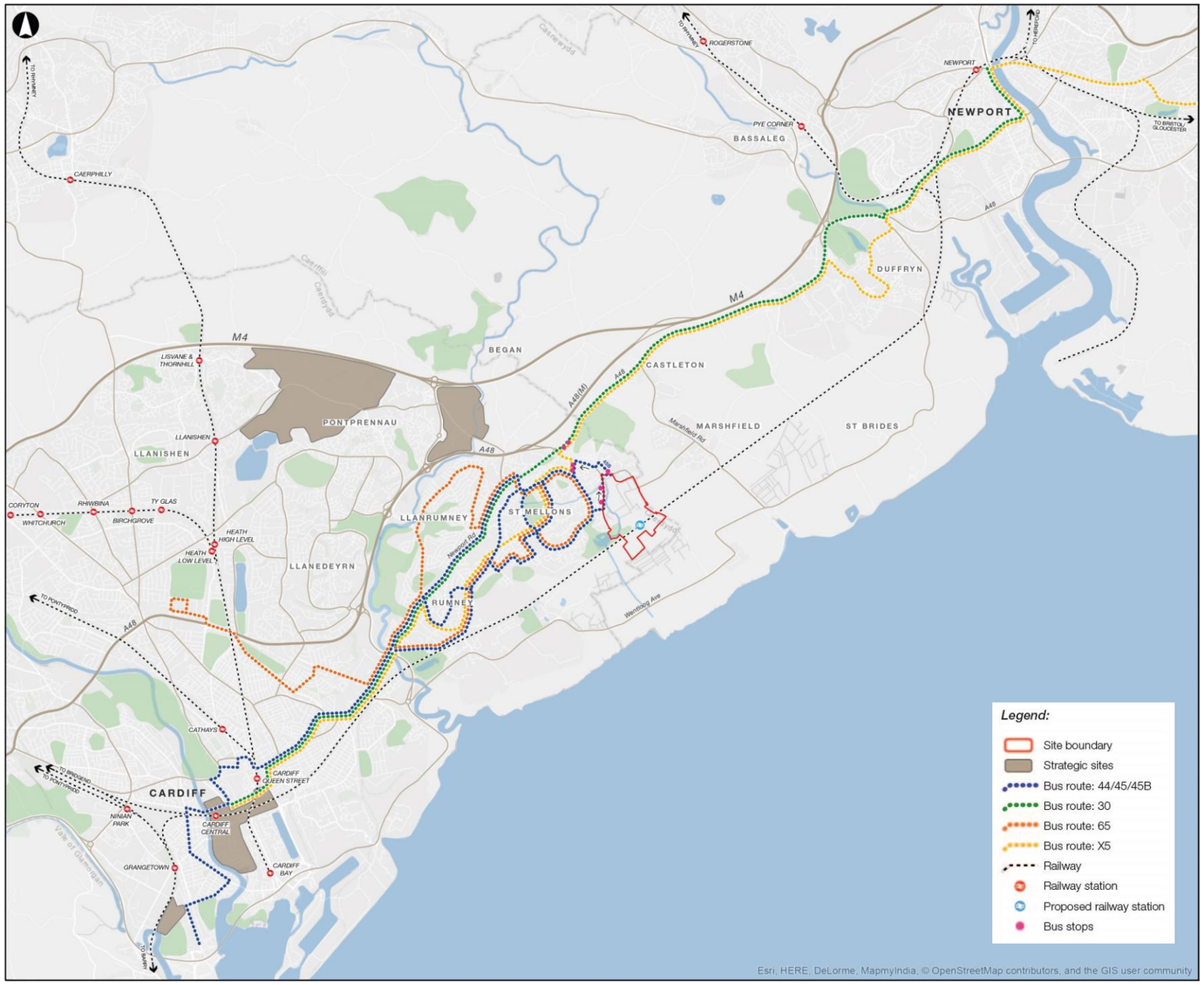

Figure 12: Public Transport Services

5.4 Rail

The closest existing railway station to the site is Cardiff Central, which is approximately 8.4miles west of the site. Cardiff Queen Street is located a similar distance from the Cardiff Hendre Lakes site, however, is only accessible by changing at Cardiff Central.

Cardiff Central is the busiest railway station in Wales, with long distance services operating between London and Swansea and West Wales and Holyhead/ Manchester/ Liverpool. Cardiff Central also operates several local services linking with Cardiff's northern suburbs and into the Valley lines as shown in Figure 13.

Currently, 8-9 trains per hour pass the site. Services are currently provided by three operators: Transport for Wales Rail Services (TfW), Great Western Railway (GWR), and Cross Country (XC). In the future, it is expected that additional TfW services will be added to the timetable in addition to extra peak services to London as part of the Intercity Express Programme (IEP).

Table 3: Local train services

Route	Operator	Frequency
Swansea/Cardiff - London	GWR	2
Cardiff – Bristol – Taunton/Portsmouth	GWR	2
Cardiff – Nottingham	XC	1
Cardiff - Ebbw Vale	TfW	1
Cardiff – Cheltenham	TfW	1
Cardiff/West Wales – Manchester/Holyhead	TfW	1-2

Currently trains run twice per hour to London (three services an hour between 06:00-08:00), up to three per hour towards both Bristol and the Midlands from various routes. There are up to two rail services per hour from Cardiff Central to Cardiff International Airport.

A new mainline Station is proposed as outlined in Section 4.1. It is anticipated that the Station will be served by approximately 8 train services per hour serving the destinations summarised in Table 3. This will improve the connectivity of the local area, creating new socioeconomic opportunities for the local population and those located within the Station catchment area (refer to Figure 5).

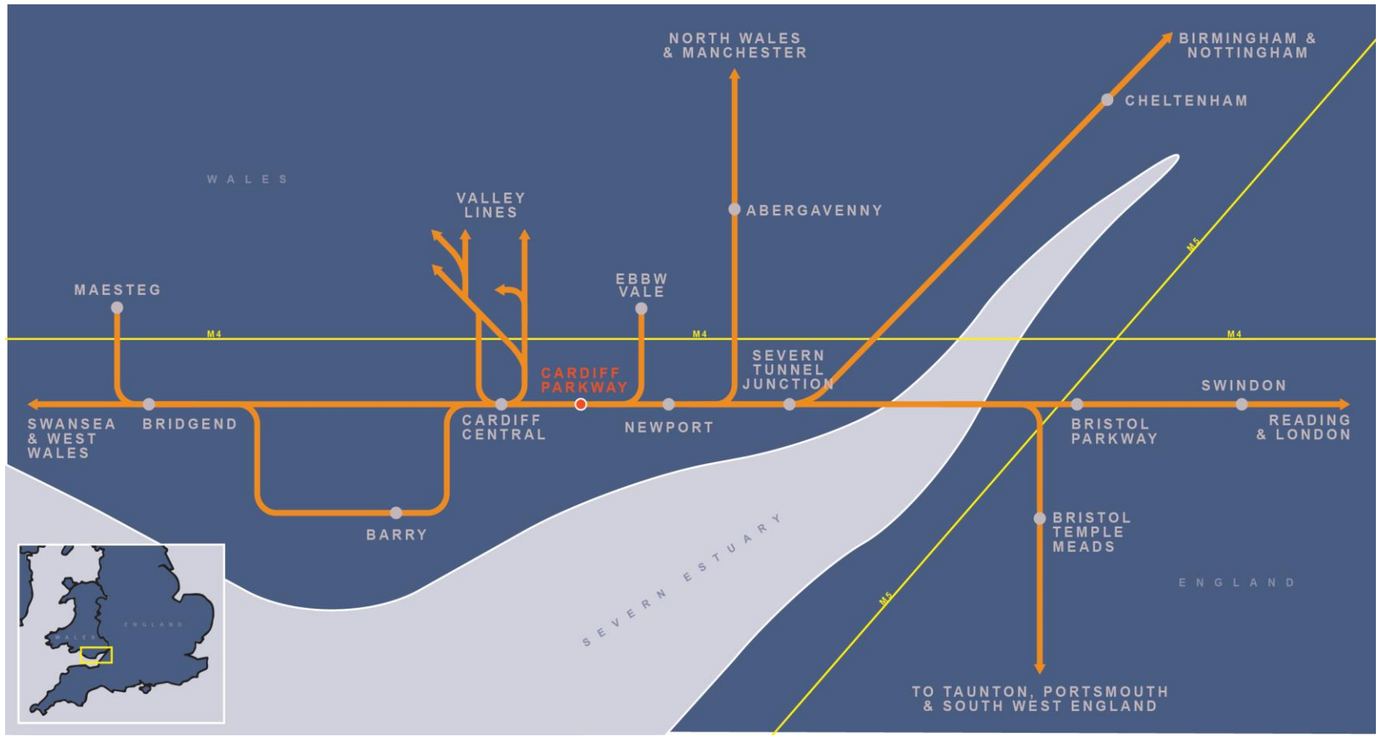

Figure 13: South Wales Railway Services

6 Objectives and Goals of the Travel Plan

The overall objective of the Travel Plans developed for Cardiff Hendre Lakes should be to achieve a situation where employees, residents and visitors can make informed travel decisions based on comprehensive information about a range of transport modes.

Those travelling to and from the site can be categorised as either employees (at Hendre Lakes or nearby businesses), residents (from existing communities) or visitors. Given the STP will be implemented alongside the Business District and site specific FTPs, objectives have been developed for three categories, as shown in Figure 14.

The site-specific STP will work in conjunction with the Business District TP to deliver these objectives.

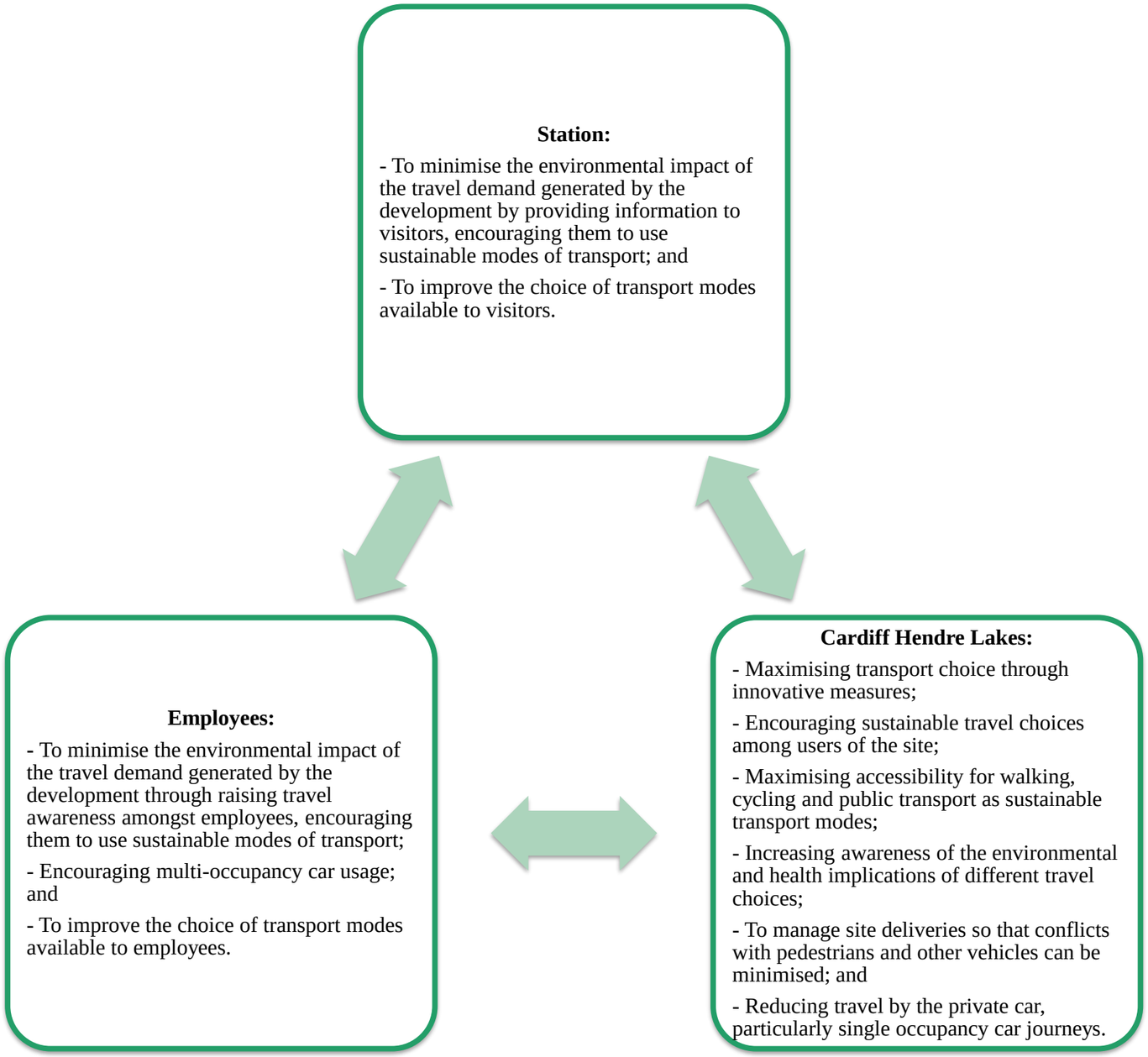

Figure 14: Cardiff Hendre Lakes Travel Plan objectives

7 Measures

7.1 Introduction

STP measures will be tailored to employees and passengers. Other measures will be tailored to visitors and occupiers of the Cardiff Hendre Lakes business district and will be included in the relevant TP.

This Framework Travel Plan sets out a broad range of potential measures, the most appropriate of which will be selected following the initial Travel Plan survey and identified in the full STP. Whilst not all measures identified may be adopted, there is potential that new measures could be identified.

There are expected to be key Travel Plan measures which will benefit passengers using the station and some that are geared towards station employees. In addition, there are side-wide measures that would benefit all occupiers at Cardiff Hendre Lakes and it is envisaged that these would be introduced in conjunction with the Business District Framework Travel Plan.

7.2 Passenger Measures

This section presents a range of potential measures that could be adopted to encourage passengers to travel to and from the station by sustainable modes of transport. These measures have been successfully implemented at other stations in the UK.

Information and Wayfinding

These potential measures could be introduced to improve passengers understanding of how journeys could be made to and from the station by sustainable modes of transport.

- Improving outward journey information with a Parkway Travel Guide that can be made available at the station and online. The guide would include routes to key locations by walking, cycling and bus;
- Providing an information board within the station that outlines how you can travel to the station by sustainable modes of transport, identify key walking routes, cycle paths and bus routes with timetable information;
- Customer facing staff or those sited in an information kiosk are trained to provide onward journey advice, for example bus timetables and local cycling routes;
- Real-time passenger information displays could be introduced for bus services from the interchange; and
- Wayfinding strategy within the station, wider interchange and on key walking and cycling routes beyond. This could include colour coded walkways and signage within the interchange to key facilities such a cycle parking and bus stops.

Active Travel

The following measures could be introduced to encourage passengers to the travel to and from the station by foot and cycle.

- Explore the potential for introducing covered walkways via shelters or building colonnades near the station, linking to key facilities including cycle parking and bus stops;
- Introduce additional facilities beyond cycle stands for cyclists such as lockers, or e-bike charging facilities;
- The feasibility of introducing Nextbike stations to enable passengers to hire a bike and cycle form the station will be considered with the operator;
- The feasibility of introducing a fold-up bike hire scheme such as Brompton Docks which allows passengers to register and hire a Brompton bicycle for a day will be considered with the operator;
- Monitor demand for cycle parking and cycle hire facilities and increase provision where appropriate; and
- Review the quality of pedestrian and cycle routes to the station and arrange for damaged/obstructed infrastructure to be repaired.

Motorcycling

These initiatives could be introduced as part of the STP to encourage more journeys to and from the station to be made by motorcycle:

- Review and monitor the parking facilities for motorcyclists, ensuring there is sufficient provision;
- Monitor the access to the motorcycle parking is safe and convenient of motorcyclists; and
- Provide safe and secure lockers for the storage of helmets and other clothing and accessories.

Local Bus Services

To encourage more journeys to and from the station are made by bus, several initiatives have been identified that improve passengers' knowledge of available services. In addition, the following measures could be considered:

- Potential to introduce Plus Bus style ticket offers for employees, or to reduce monthly season tickets to encourage travel to/from the station by bus;
- Explore the potential for a shuttle bus service that links the station with the existing business parks and local communities in St Mellons and Marshfield;
- Review the timetabling of bus services that operate via the interchange, particularly in busy periods, to attempt to improve frequency and journey time reliability; and
- Coordination of bus timetables with the rail timetable; and
- Encouragement of bus operators to use cleaner and more sustainable bus fuels.

Car, Taxi and Ride Sharing

For those passengers traveling to and from the site by car, these measures seek to reduce the overall impact;

- Introduce a taxi/ride sharing initiative in peak priority that encourages passengers to share rides;
- Review the location of the taxi rank and drop-off with regards to potential congestion near the station entrance; and
- Provide incentives to travel using ultra-low emission vehicles such as reduced price car parking or taxi licences.

7.3 Workplace Measures

This section sets out the measures that could be included in the STP geared towards employees of the station.

Active Travel

To encourage walking and cycling, the following potential measures could be included:

- Free or discounted access to Nextbike services. Alternatively, businesses on the site could provide interest-free cycle loans;
- Payment of a cycle mileage allowance for employees using their own cycles for business trips;
- The circulation of a bi-annual newsletter to all site employees, which would detail Travel Plan information and updates;
- Introduce awareness campaigns such a cycle/walk to work week. Support and promote 'Wellbeing Week', 'World Environment Day' and other regular special events;
- Negotiation of discounts with local cycle shops for staff purchases and maintenance;
- Assisting employees with the purchase of cycles by reference to tax advantages offered by the government;
- The provision of secure, sheltered and safe cycle parking with associated facilities; and
- The provision of a welcome pack for each new employee in conjunction with local/green travel recruitment policy, which will detail the various travel options available to them and highlight the Travel Plan's measures and targets, to encourage staff to travel by sustainable modes from the outset.

Public Transport

The following initiatives could be implemented to encourage employees to travel by public transport:

- Discounted ticketing;
- The offer of an interest-free season ticket loan scheme for staff to purchase an annual ticket for public transport;
- Include public transport information, promote available public transport ticket deals, publicise national public transport guidance services such as Traveline Cymru, and promote the proposed site-wide mobile phone app on the staff intranet and in employee welcome packs and building noticeboards; and
- Provision of public transport information with invitations to meetings for visitors.

Electric Vehicles

The following initiative could be implemented to enable more sustainable use of vehicles for work purposes:

- Provision of charging facilities for electric bikes/scooters and cars; and
- Electric or hybrid cars could be provided so that any staff needing to travel for work purposes during the day are not required to drive to work. This would reduce emissions and improve local air quality.

Car Sharing

Car sharing involves two or more people sharing a car for their journey to/from work, education or other regular trip. It promotes sustainable travel patterns by increasing car occupancy, with a consequential reduction in car trips. It also provides an opportunity for social interaction. Car sharing could be encouraged by:

- Holding periodic car share tea/coffee mornings could allow employees to match up with people who undertake a similar journey. This will also demonstrate the social benefits of car sharing and can improve engagement among employees;
- Publicising car sharing websites such as ShareCymru.com or Liftshare.com where users can match up with local drivers or passengers in the area

undertaking similar journeys, or the potential car share database of the wider site;

- Provision of a guaranteed lift home in the event of an emergency;
- Potential to introduce reserved car sharing spaces that are given priority over regular car parking spaces, encouraging staff to avoid single occupancy car journeys;
- Advertising the cost savings of car sharing on notice boards in addition to the positive environmental impacts to raise awareness of the benefits; and
- Free or discounted membership of any car clubs based near the station.

Motorcycling

- Allocation of parking spaces for motorcycles; and
- Provision of information about motorcycle safety, security and motorcycle safety training providers

Deliveries

- Encourage occupiers to control deliveries to the site and to minimise the number of service vehicle arrivals. This could be done by means of shared deliveries, as part of servicing management arrangements.

Working Practices

- Encouraging flexible working to enable employees, where possible, to adjust their working day to avoid peak travel times;
- Home working to allow employees to work at home when appropriate and thereby reducing commuter travel. Where appropriate, support of this initiative should consider assistance in the provision of appropriate computer equipment for this working practice; and
- The use of teleconferencing to allow employees to conduct meetings by video conferencing equipment and to reduce the number of business trips.

7.4 Site Wide Measures

There are also several initiatives that could be delivered. These measures have also been identified in the FTP for the Business District and it is envisaged that these would be considered for, and if suitable taken forward as part of that development Travel Plan.

Active Travel

To encourage walking and cycling, the following measures are recommended:

- Publicise maps presenting all walking/cycling routes within the site, and internal destinations, as well as recommended walking routes to the site from key external locations. The maps could include indications of walking distances, times and the potential number of calories that could be burned. For maximum attention, this map could be displayed on all central notice boards across all sites. This information will also be provided on the wider site website;
- Ensure footways/cycleways are maintained, well-lit and kept clear. Suitable wayfinding and sign posting should also be installed to guide pedestrians/cyclists; and
- Raise awareness of the health benefits of walking/cycling through the provision of leaflets and notice boards, as well as through promotional material and events throughout the year.
- Provision of an onsite Cycle Hub within the Hendre Lakes Business District for staff at the site, offering repairs and new part services, information about cycle security/safety and information relevant to the site. The Cycle Hub could also host free cycle safety training events;
- Provision of Nextbike stands at or near the Station, with clear sign posting to their location;
- Provision of secure cycle parking spaces for staff and sheltered cycle parking spaces for visitors at the Station; Ensure these are provided in well-lit areas. Frequently review and ensure the level of cycle parking provision is sufficient to meet demand; and
- The Cycle Hub could also be a focal point for a Bicycle User Group (BUG) for the proposed development to encourage novice cyclists to consider cycling as a transport mode. The BUG may also operate a ‘Bike Buddy’ scheme, where employees and visitors who wish to start cycling regularly can be matched with experienced cyclists living nearby who can advise on safe routes, safe cycling and basic bike maintenance. The BUG could also help to influence improvements to facilities for cyclists.

Public Transport

To maximise the use of public transport, employees and visitors to the site should be aware of the local public transport network and the benefits of using it. The following initiatives could be implemented to encourage travel by public transport:

- Discussions will be progressed with the local bus operators to provide new services/extend existing services to connect the proposed Railway Station to the surrounding areas and to the proposed Cardiff Parkway Business District.
- Provision of new/relocated bus stops with high quality waiting facilities, including real-time passenger information, within the site. Effective wayfinding and clear signage to bus stops throughout the site;
- Provide real time bus information at bus stops.
- Displaying bus and railway service information for the new Station on central notice boards in the Business District, within individual buildings and on the wider site website to increase awareness of convenient public transport options to travel to the site; and
- Highlight the locations accessible by rail via Cardiff Parkway Station.

Personalised Travel Planning (PTP)

- Offer PTP for employees working at the railway station; and
- PTP to be offered to all employees on a regular basis as the Business District becomes occupied.

Cars

To encourage more sustainable use of cars, a number of measures could be pursued for the site:

- Provision of electric car charging points positioned closer to buildings;
- Set up a car parking management strategy and develop parking policies for the wider site. A framework car parking management strategy could be conditioned to the OPA and include the following measures:
- Offering free or reduced parking charges to low emission vehicles and provide priority parking for car sharers;
- Only provide car parking on certain days of the week; and
- Explore the potential for setting up a Cardiff Hendre Lakes car share database that could be of benefit to all employees.

Other

- Develop a site-wide communication strategy and brand for Travel Planning initiatives; and
- One overarching measure which could be adopted is to design a mobile phone application. This could include real time journey planning information for sustainable transport modes, as well as notifications advising on events e.g. bike breakfasts, walking challenges etc. The site-specific app could be used by employees of the site to provide feedback on transport provisions and conditions, e.g. report potential service/infrastructure maintenance issues, or opportunities for improvement. The app could be promoted through the official website of the wider site, on noticeboards around the site, and through employee starter packages.

8 Implementation and Management

The Travel Plans for the Railway Station and Business District will be informed by an understanding of the travel patterns relating to each site. This will be gained through Travel Surveys and coordinating the implementation of the measures. Collectively the measures will lead to more sustainable travel by all employees and visitors at Cardiff Hendre Lakes.

It is important to remember that the Travel Plan will be a live document, which means that measures not included at this time may be included at a later date. It is recognised that travel patterns will change and new measures will become available. It is therefore encouraged that the Travel Plan is reviewed on a frequent basis to ensure that the objectives are up to date and targets are being achieved.

A Travel Plan Co-ordinator will be appointed by the station operator and their contact details will be provided to CC.

Separately, a site-wide Travel Plan Coordinator will be appointed by the Cardiff Hendre Lakes Development Management Company for the Business District. Contact details of the appointed Travel Plan Co-ordinator will be provided to CC. The Travel Plan Co-ordinators for the Station and Business District will act as the first point of contact for CC regarding the implementation of the Travel Plan, or on any other issues relating to the Travel Plan.

The Travel Plan Coordinator role will involve the following:

- Giving advice and information on transport-related subjects to staff and passengers;
- Reviewing and updating parking policies, with on-going monitoring of adherence to parking policy;
- Assessment and management of facilities to support cycling including lockers, bike racks/shelters and shower facilities;
- Assessment and management of motorcycle parking facilities and locations, improving convenience to encourage this mode of travel, as well as providing training courses upon request;
- Where appropriate, join the Travel Plan Group and specific Working Groups such as the Travel Plan Steering Committee;
- Overseeing the implementation of Travel Plan measures in a timely manner; and
- Undertaking ongoing monitoring of the Travel Plan, including coordinating the necessary data collection exercises, any appropriate review and revisions of the Travel Plan.

Quantitative, realistic and achievable targets are set out in the following section of this Framework Travel Plan with the overarching goal of increasing sustainable travel of all staff and passengers to and from the Business District.

It is proposed that full travel surveys are undertaken in Years 1, 3 and 5 to inform the review and update the targets and measures of the individual Travel Plans. In addition to the findings of the travel survey, the Travel Plan Co-ordinator will also use other indicators to monitor the progress of the Travel Plan such as usage of cycle parking.

9 Targets, Monitoring and Review

9.1 Introduction

The Travel Plan sets out actions for individual site operators to recognise and address the transport requirements of staff and passengers, whilst considering the environmental impact of movements to and from the site. Its overall aim is to enable a modal shift toward sustainable travel to and from the Cardiff Parkway Railway Station. This should help make a positive contribution to local communities, preserve the natural environment and use resources sustainably and efficiently.

9.2 Targets

In order to meet the overarching aim of ensuring sustainable travel to and from the Cardiff Hendre Lakes development, a set of outline targets have been developed. These targets are derived from modal split data collected as part of the 2011 Census. The Railway Station will form a key part of meeting these targets and promoting sustainable travel.

Going forward, further specific targets will be developed for each use within the site. These site-specific targets will be informed by initial travel surveys. It should be recognised that in order for the targets to be effective in reducing unsustainable travel, they need to be 'SMART' as set out in Figure 15 below.

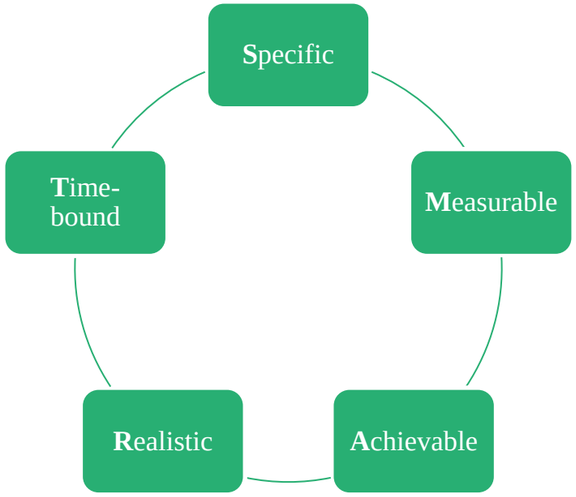

Figure 15: SMART targets

Quantitative, realistic and achievable targets should be set out in site-specific Travel Plans. The TPC for the site should endeavour to develop overview targets, which would be subject to periodic reviews and should reflect the targets set out in policy guidance.

9.3 Monitoring

An important part of any Travel Plan document is the continual monitoring and review of its effectiveness. It is essential that a Travel Plan document is not a one-off event and evolves over time. Regular monitoring and review led by each TPC will help to gauge progress towards targets and objectives set for each site and the development overall. If necessary, this will enable the Travel Plan document to be refined and adapted in order to improve its progression.

As a live document, there will be the need to update the Travel Plan as required. This requirement should be linked to monitoring of the Travel Plan which will take place in year's one, three and five following implementation of the plan. The criteria for monitoring will need to understand the travel needs of staff, and visitors so that transport measures can be adapted or added to provide for their needs.

The monitoring will be the responsibility of the Travel Plan Co-ordinator and will review:

- Travel patterns (via a travel survey) - comprehensive travel surveys will be undertaken for each site with a commitment to review the Travel Plan targets at the conclusion of each monitoring phase. This review will identify elements of the Plan that are not working as well as others, and also allow the plan coordinator to further strengthen the measures that are performing well;
- Full Site audit – undertaken by the Travel Plan Steering Group, the audit will identify any barriers that obstruct walking, cycling and using public transport and make recommendations for improvements; and
- Parking counts (all vehicles including bicycles).

9.4 Analysis and Reporting of Monitoring

Each Travel Plan Coordinator will lead the development of the monitoring exercise and will be responsible for analysing the data collected. A full monitoring report will be produced, led by the Travel Plan Steering Group Chair. The report will summarise the monitoring data collected, report on progress of measures that have been implemented and suggest any changes to existing measures or new measures required. Identified targets for the next review period will also be established.

Following the production of the monitoring report, each Travel Plan Coordinator will be responsible for disseminating its findings to the relevant stakeholder and user groups including CC.

10 Summary and Conclusions

Arup has been instructed by Cardiff Parkway Developments Limited to prepare a Framework Station Travel Plan (STP) for the proposed Cardiff Parkway Railway Station. This forms part of the Cardiff Hendre Lakes development proposals that comprise 90,000m^2 of employment space and a Transport Interchange with a railway station and station park & ride, in St Mellons, Cardiff.

Full Travel Plans for the Business District and Railway Station will be developed from these frameworks in subsequent design stages as the proposals progress.

This Framework STP sets out the strategic objectives and targets, site-wide measures and monitoring systems. Several measures have been identified which will encourage passengers to travel to the station by walking, cycling and public transport. The site will also be integrated with existing local infrastructure and provide for future connections to the wider network. Proposed measures include a car share scheme and creating a Bicycle User Group.

The overall goal of the STP will be to reduce the number of single occupancy car journeys to the site and subsequently increase the use of more sustainable modes of transport in order to reduce environmental impact. A Travel Plan Steering Group for Cardiff Hendre Lakes will review progress towards the targets of the Travel Plan and ensure these are kept up to date.

Appendix C

Transport Assessment Scoping Note

Cardiff Parkway Developments Ltd

Cardiff Parkway

Transport Assessment Scoping Note

Issue | 20 August 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 252199

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1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals that will comprise a railway station, park and ride, transport interchange and business park. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

The development proposals are currently at a formative stage and a masterplan is under preparation. The vision for Cardiff Parkway is of a vibrant, mixed-use development, a development for recreation as well as a place where people work. The development site will be accessible by a variety of transport modes and will be an amenity for those currently residing within the Cardiff city region.

The purpose of this scoping report is to provide an initial outline of the development proposal and to agree with CC the key methodology assumptions which will be used to prepare a detailed Transport Assessment. It is also anticipated that the Scoping Note will form the basis for further discussion with CC.

1.2 The Site

The site location is presented in Figure 1 overleaf. It is located in the St Mellons area of Cardiff to the east of the city centre and to the south of the M4 and A48(M). The site covers an area of approximately 44 hectares.

The site is bounded to the north by St Mellons Business Park, Heol Las to the east, open countryside to the south and to the west by Cypress Drive and residential development beyond. The southern section of the site is bisected by the Great Western Mainline railway line which crosses the site east to west and is used by intercity trains between London and Swansea as well as local and regional services to destinations including Cardiff, Newport, Bridgend and Bristol.

1.3 Development Proposals

The proposal is to develop the site to provide new transport infrastructure and employment led development in a manner consistent with the Council's emerging LDP.

This proposed land use mix is intended to maximise the potential of the site and result in a proportion of overall trip demand to be accommodated by internal walking and cycling journeys which a result reduce the requirement for internal and external highway capacity..

An initial plan outlining the extents of various developments parcels within the site is shown in Figure 2.

Figure 2: Indicative Site Layout (Cardiff Parkway Spatial Framework)

The development proposals include up to 90,000m^2 of development including, B1, B2 and B8 uses and a number of transport improvements as listed below:

- Transport hub including new railway station;
- Park and Ride facility;
- Bus priority measures;
- Enhancements to Cypress Drive with vehicular access to the west;
- Internal vehicle loop restricted to public transport and servicing;
- Network of attractive and safe pedestrian routes;
- Traffic-free cycle routes.

Key

Site Boundary

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Job Title:
Cardiff Parkway

Drawing Title:
Figure 1: Site Location Plan

Suitability:
S0 – Work in Progress

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Rev:
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2 Policy Context

2.1 National Policy

Planning Policy Wales: Edition 9

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs).

Chapter 4 (Planning for Sustainability) of PPW suggests development plans should promote sustainable patterns of development, identifying previously developed land and buildings, and indicating locations for higher density development at hubs and interchanges and close to route corridors where accessibility on foot and by bicycle and public transport is good.

Chapter 7 (Economic Development) of PPW identifies that sufficient existing transport infrastructure is needed to support employment. Promotion of sustainable employment growth is made through locating employment sites next to existing housing to reduce the need for travel, specifically by car.

Chapter 8 (Transport) of PPW identifies choice in transport and secure accessibility as important in supporting sustainable development and tackling the causes of climate change. The application of a transport hierarchy that prioritises the needs of pedestrians, cyclists and public transport users' forms part of an integrated approach to land use planning that can assist in achieving the following key transport objectives:

- reducing the need to travel, especially by private car, by locating development where there is good access by public transport, walking and cycling;
- locating development near other related uses to encourage multi-purpose trips and reduce the length of journeys;
- improving accessibility by walking, cycling and public transport;
- ensuring that transport is accessible to all, taking into account the needs of disabled and other less mobile people;
- promoting walking and cycling;
- supporting the provision of high quality public transport;
- supporting traffic management measures;
- supporting sustainable travel options in rural areas;
- supporting necessary infrastructure improvements; and
- ensuring that, as far as possible, transport infrastructure does not contribute to land take, urban sprawl or neighbourhood severance.

Decision making on planning applications is expected to take account of accessibility, the impact of travel demand on the environment and safety, and the measures taken to promote sustainable forms of transport.

Technical Advice Note 18: Transport (March 2007)

The Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted in ensuring that economic development can create a basis for sustainable travel patterns. These include the following:

- ensuring new development is located where there is, or will be, good access by public transport, walking and cycling, thereby minimising the need for travel and fostering social inclusion;
- managing parking provision;
- ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;
- encouraging the location of development near other related uses to encourage multi-purpose trips;
- promoting cycling and walking; and
- supporting the provision of high quality, inclusive public transport.

The Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act (2015) requires public bodies in Wales to consider the long-term impacts of decision making and improve working with local communities to prevent persistent problems in Wales such as poverty, health inequalities and climate change.

Seven well-being goals have been identified within the Act to ensure public bodies are working towards the same goals. The Act indicates that public bodies must work to achieve all of the following seven goals:

- A Prosperous Wales that has an innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately;
- A resilient Wales that maintains and enhances a biodiverse natural environment which has the capacity to adapt to change;
- A healthier Wales in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood;
- A more equal Wales where people are able to achieve their full potential regardless of their background or circumstances;
- A Wales of cohesive communities which are attractive, viable, safe and well-connected;
- A Wales of vibrant culture and Welsh language; and

- A globally responsible Wales which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

Active Travel (Wales) Act 2013

The Active Travel (Wales) Act 2013 aims to make active travel the most attractive option for most shorter journeys. The Act requires local authorities in Wales to produce active travel maps and deliver year on year improvements in active travel routes and facilities. It requires highways authorities in Wales to make enhancements to routes and facilities for pedestrians and cyclists in all new road schemes and to have regard to the needs of walkers and cyclists in a range of other highway authority functions.

In line with this Act, CC have prepared the Existing Route Map that identifies current walking and cycling routes. CC have subsequently commenced the next stage of implementation, developing the Integrated Network Map.

To supplement the Active Travel (Wales) Act, the Welsh Government published statutory Design Guidance in December 2014. This Guidance provides advice on the planning, design, construction and maintenance of active travel networks.

Wales Spatial Plan (2008)

The 2008 update to the Wales Spatial Plan (WSP) sets out the planning agenda at a spatial level. There are five guiding themes, which underpin the national vision:

- building sustainable communities;
- promoting a sustainable economy;
- valuing our environment;
- achieving sustainable accessibility; and
- respecting distinctiveness.

The WSP makes clear links between sustainable development and transport, stating that development should increase access to rail and bus services where possible, and provide priority for these modes.

The document states that developments should aim to make better use of existing transport infrastructure to achieve sustainable access to jobs and services. This encompasses the need to ensure that communities are well connected to main public transport corridors, are provided with safe walking and cycling routes and use existing road capacity with maximum efficiency. It does not however advocate road building stating that road building in general is not a sustainable solution to the pattern of traffic growth.

Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)

In informing the strategic priorities of the National Transport Plan (NTP), the Wales Transport Strategy identifies a range of outcomes that should be achieved over the longer term. These include the need for improved connectivity and reliability across networks. The following key principles are identified as critical to the future transport policy agenda:

- achieving a more effective and efficient transport system;
- achieving greater use of the more sustainable and healthy forms of travel;
- minimising demands on the transport system; and
- reducing the impact of transport on greenhouse gas emissions.

Among the range of intended strategy outcomes is improved access to healthcare, education, shopping and leisure facilities and the encouragement of healthy lifestyles.

2.2 Local Policy

Cardiff Council Local Development Plan (2016)

Cardiff Council adopted a Local Development Plan (LDP) in 2016 for the period 2006-2026.

The Cardiff Parkway site is allocated by the plan as strategic employment site H under policy KP2 and illustrated in the LDP as shown in Figure 3 overleaf. The LDP uses the name 'South of St Mellons Business Park' to describe the site.

The LDP vision fully recognises economic, social, environmental, as well as sustainability issues. The aim of the LDP objectives is to respond to the evidenced economic and social needs of Cardiff in a co-ordinated manner that respects and enhances Cardiff's environment and sets out a framework for delivering the sustainable neighbourhoods of the future. The LDP aims to deliver sustainable development locally and improve the long term economic, social and environmental wellbeing of people and communities in Cardiff. In this way, the LDP states that it can help to create sustainable neighbourhoods that form part of a sustainable city that lies at the heart of a sustainable city-region.

The LDP objectives are set out under 4 main headings:

1. *To respond to evidenced economic needs and provide the necessary infrastructure to deliver development;*
2. *To respond to evidenced social needs;*
3. *To deliver economic and social needs in a co-ordinated way that respects and enhances Cardiff's environment; and*
4. *To create sustainable neighbourhoods that form part of a sustainable city.*

The development site is described in the LDP as '*an important employment site which contributes to the necessary range and choice of types of employment opportunities in the city'*.

Policy KP2 (H): South of St Mellons Business Park sets out that land is allocated for the development of a strategic employment site south of St Mellons Business Park including:

- *44ha of business land capable of accommodating up to 90,000m^2 development;*
- *Provision of a transport hub including new rail station served by relief rail services connecting the city centre and services to Cardiff Airport and London via Cardiff Central;*
- *Provision of park and ride facility;*
- *Off-site infrastructure including bus priority measures to develop bus-based Rapid Transit Corridors and other routes within the North Eastern/Eastern Rapid Transit Corridor including services linked to the City Centre and Strategic Sites G and F;*
- *High quality on and off-site walking and cycling links and facilities to maximise walking and cycling access to the site from neighbouring communities;*
- *Retention of land to the east of Cypress Drive and Faendre Reen as green space linked with Hendre Lake Park;*
- *Integrating the site with local facilities in the surrounding area and;*
- *Effectively responding to landscape and biodiversity assets.*

Policy KP8 Sustainable Transport within the LDP has the central goal of achieving a 50:50 modal split between private car use and sustainable transport. The policy states that the location and form of developments are major determinants of the distance people travel and how they travel, to combat this it will be necessary to integrate land use with transport provision to avoid car dependent developments.

Policy T2 Strategic Transit and Bus Corridors identifies four transport corridors which provide key connections into Cardiff. Of these the Eastern Bus Corridor runs from Newport along the A48 towards Cardiff. There are planned improvements along each of these corridors which will give buses priority over general traffic and improved accessibility to the wider transport network alongside potential for provision of new bus routes and services. It is envisaged that links will be made between the identified Eastern corridor to the strategic employment site H and additional strategic sites identified within the LDP.

Figure 3: LDP Policy KP2 Site H

City of Cardiff Council Parking Standards 2016

The Parking Strategy for CC was adopted in September 2016 and sets out the approach to managing parking on the public highway and the off-road car parks. The strategy includes a number of actions, including;

- Parking for cars, cycles, powered-two wheelers, taxis and coaches;
- On-street and off-street parking, including public off-street parking and private non-residential parking;
- Parking in the City Centre, District and Local Centres and Residential areas;
- Parking enforcement;
- Parking charges;
- Parking policy related to planning proposals;
- Park and Ride; and
- New Technology.

The overarching goal of the strategy is to contribute to CC's overall Transport Strategy which aims to achieve a 50:50 modal split with sustainable travel modes.

Managing Transportation Impacts Supplementary Planning Guidance (Draft November 2017)

The SPG sets out additional information regarding CC's approach to assessing and managing the transport impacts of developments and supplements the transport and related policies in Cardiff's Local Development Plan 2006-2026.

The SPG provides guidance on:

- Managing the impacts of development on the highway network;
- Information which is required within Transport Assessments, Transport Statements and Travel Plans and how this is quantified and assessed;
- Planning Conditions, Planning Obligations and Technical Standards;
- Parking guidance and Technical Standards and;
- Public Rights of way.

The SPG applies to all categories of new developments, extensions, redevelopments and material changes of use.

Cardiff Transport and Clean Air Green Paper (Draft 2018)

CC have recently consulted on the Cardiff Transport and Clean Air Green Paper. The Green Paper covers six themes relating to the future of transport and air quality in Cardiff as listed below:

- The future of the Metro and Buses;
- Active Healthy city;
- Clean air city;
- Business, work and culture;
- The future cars; and
- The smart city.

Each of the themes is accompanied by a number of potential ideas and proposals for discussion which are taken from best practice examples from across the world.

Within the theme 'Business, Work and Culture' Point 11 'Developing the South-East corridor' recognises the east of the city as one of the most deprived and disconnected within Cardiff. This provides a major opportunity for improving the transport infrastructure including provision of a new park and ride railway station for St Mellons increasing accessibility to residents and businesses in this part of the city.

Cardiff Cycling Strategy (Draft March 2017)

The Cardiff Cycling Strategy 2016-2026 draft was issued for public consultation in November 2017. The Strategy sets out the vision for Cardiff to be a city where cycling is a normal and practical choice for short trips for people of all ages and abilities. With the specific goal of doubling cycling trips in the city by 2026. Actions required for this include; improving the integration of cycling into transport planning and urban space; provide infrastructure of the right quality in the right place for all ages and abilities.

The Cardiff Parkway development site is identified within the document as a strategic development site which be connected to Cardiff city centre by one of two primary route corridors as part of a key east to west corridor.

3 Existing Conditions

3.1 Introduction

There are facilities enabling travel to and from the site by a variety of transport modes including walking and cycling and public transport . The site is well placed in relation to a range of nearby local facilities, including the St Mellons business park, Tesco Superstore, Willowbrook primary school and Willowbrook surgery.

This section provides a summary of the existing conditions and the further analysis proposed to be included within the Transport Assessment. This could take the form or an Active Travel Audit

3.2 Walking and Cycling

This section presents a summary of the pedestrian and cycle infrastructure surrounding the site. A detailed audit will be provided within the TA for these proposals.

The site is bounded to the west by Cypress Drive which has a footpath adjoining the western carriage way which runs south of the junction with Fortran Drive to Water Avens Close. Immediately before the access to Fortran Drive there is a signalised pedestrian crossing where the western footpath terminates and a footpath begins on the eastern side of the road continuing into Fortran Road. There is no existing footway on the eastern carriageway south of Fortran Road.

Just south of Fortran Road a pedestrian footway heads west from Cypress Drive towards the residential developments of St Mellon's. Several footways adjoin Cypress Drive south of Fortran Road giving access to residential developments within St Mellons, including at Sandbrook Drive, Maes-Y-Crochan and Meadow Sweet Drive.

North of Fortran Road a pedestrian underpass provides access under Cypress Drive to Brython Drive and further residential developments in St Mellons.

To the north Cypress Drive forms a roundabout with A48, B4487 and A48(M) slips. The footpath on the western carriageway of Cypress Drive resumes north of Willowdene Way and continues to this roundabout. There is an uncontrolled pedestrian crossing across Cypress Drive this gives pedestrian access to a footway along the south side of the A48 into Cardiff and Wyevale garden centre. There is a signalised pedestrian crossing across the A48 to the east of the garden centre providing access to a new residential development north of the A48 from which point footways continue along both the north and south side of the carriageway.

To the west of the Cypress Drive roundabout, footways continue along both sides of the B4487.

There is a Public Right of Way that crosses the site in an east/west alignment between Cypress Drive and the St Mellons Road/Heol Las junction. It is envisaged that this footpath will be improved as part of these proposals.

Route 88 of the National Cycle Network follows an on-street route east from the site along St Mellons Road to Marshfield and Newport beyond. To the west of Cypress Drive there is a network of relatively flat residential streets that are considered to be conducive to cycling.

3.3 Public Transport

There are a number of bus services near the site summarised in Table 1. Services provide access to both central Cardiff to the west and Newport to the east.

The closest bus stops to the site are located on Willowbrook Drive, Fountain Lane and Willowdene Way. Given the size of the development site, all these stops are located over 400m from the centre of the site.

Table 1: Local Bus Services

Service	Operator	Route	Nearest Bus Stop	Typical number of Buses per hour (Mon-Fri)
X5	New Adventure Travel	Ringland – Cardiff	Willowdene Way	4
		Cardiff – Ringland	Willow Grove, Willowdene Way	4
44/45/45B	Cardiff Bus	St Mellons – Cardiff City, loop	Fountain Lane	8
X45	Cardiff Bus	Cardiff Bay – St Mellons	Willowdene Way	2-3
64/64A/ 65	Capital Links/ Cardiff Bus	Llanrumney and St Mellons - Pentrabane – Cardiff	Willowdene Way	1
30	Newport Bus/ Cardiff Bus	Newport – Cardiff	Vaindre Lane	3
		Cardiff – Newport	Wern Fawr Lane	3

The local area is served by a number of frequent services to Cardiff and Newport, however as set out above, owing the size of the development, some of these service would need to be diverted into site.

3.4 Local Highway Network

The local highway network is illustrated in Figure 4 overleaf and described below.

Cypress Drive bounds the eastern edge of the primary settlement of St Mellons and has a speed limit of 30mph. Adjacent to the site, there are two junctions with Cypress Drive which provide access to the existing residential development and St Mellons community centre. Sandbrook Road forms a three-arm roundabout with Cypress Drive, providing access towards Willowbrook Primary School and St Mellons community centre to the west. To the north, Maes-Y-Cochan forms a priority junction with Cypress Drive.

Directly northwest of the development site, Fortran Road forms a priority junction with Cypress Drive which provides access into St Mellons Business Park and Marshfield beyond. Cypress Drive is a single carriageway road adjacent to the site which widens to a dual carriageway directly to the north of the junction with Fortran Road. A right-turn lane is provided at this junction for traffic turning from Cypress Drive to Fortran Road.

Fortran Road continues through St Mellons Business Park and becomes Heol Las which bounds the sites eastern edge. Heol Las is a narrow road with no central markings, this road continues south beyond the southern site boundary. St Mellons Road forms a priority junction with Heol Las at the eastern boundary of the site and provides access towards Marshfield

To the north of Fortran Road, several roads form priority junctions with Cypress Drive providing access to St Mellons Business Park and the neighbouring residential developments. Further northwest, Cypress Drive forms the southern arm of a four-arm roundabout; the other arms are the the A48 to the east towards Newport, the B4487 Newport Road to the west and the A48 west facing slips to the north. Both the B4487 and A48 provide routes towards Cardiff. The A48 can also be used to travel to Junction 30 of the M4 via the A4232 Pentwyn Link Road.

3.5 Existing Traffic Flows

Classified turning count surveys were undertaken at 22 junctions and the A48 slips as presented in Figure 5 overleaf. In agreement with CC, the surveys were undertaken on 7th June 2018, outside of school holidays and in a neutral month. Due to an oversight by the surveyor, the A48/Coal Pitt Lane priority junction was not surveyed at the same time as the other sites and was subsequently surveyed on 10th July 2018.

To validate the survey data at this junction, the surveyed two-way traffic flow on the A48 was compared with the following:

- Eastbound traffic on the A48 at the roundabout with Cypress Drive and the A48 slips; and
- Westbound traffic on the A48 at the priority junction with Marshfield Road.

The assessment indicates the recorded traffic flow was higher on the A48 in July. To provide constancy within the traffic model, it is proposed to utilise turning count data from June on the A48 at the priority junction with Coal Pitt Lane.

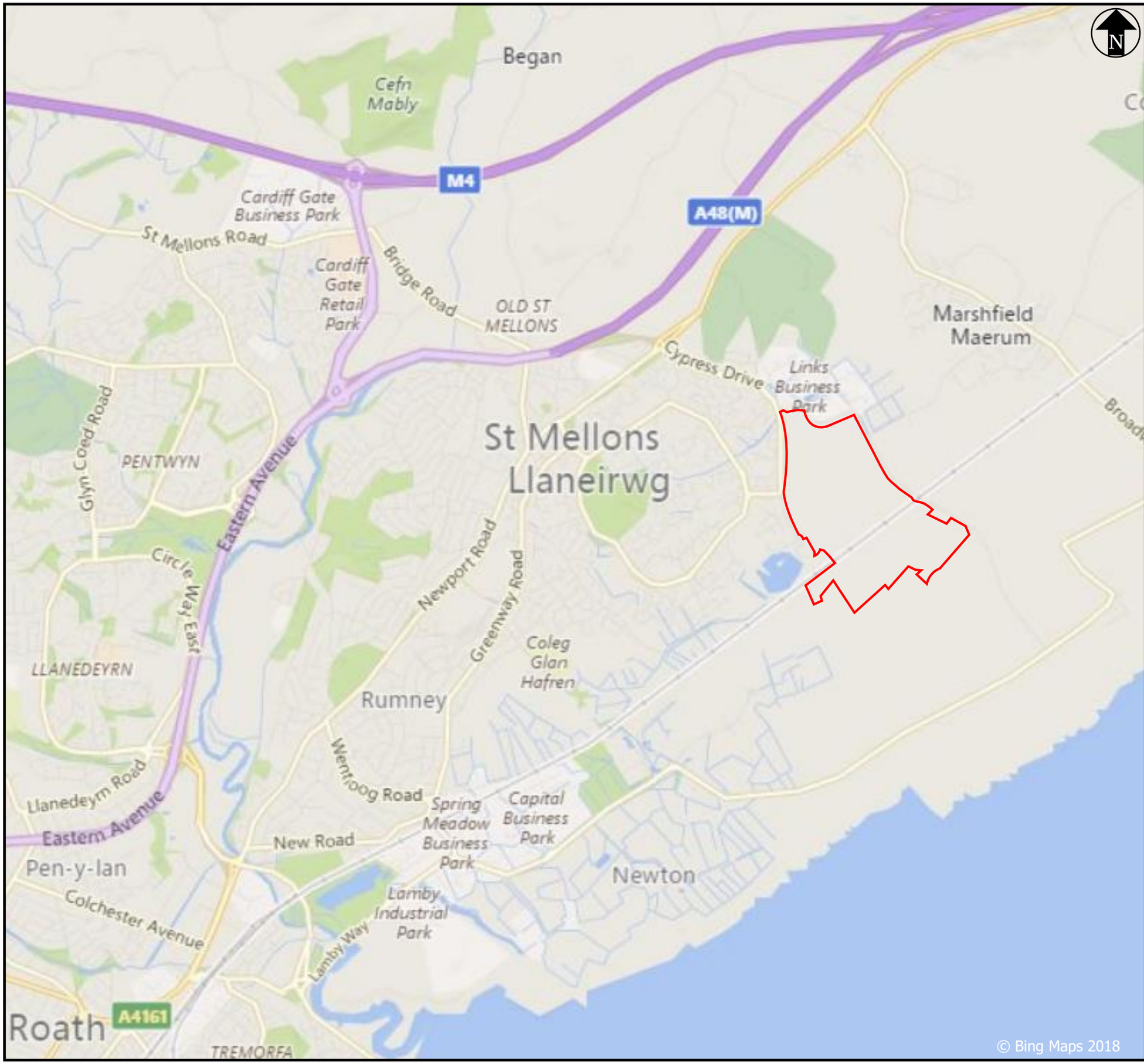
Table 3 overleaf provides details of the total flows at each study area junction. The AM and PM peak hours have been identified as 07:45-08:45 and 16:30-17:30 respectively. Subject to agreement with CC, these peak periods will be assessed as part of the traffic impact assessment.

In addition to the classified turning counts, Automatic Traffic Count (ATC) seven-day survey data was collected at five locations near the site. These surveys were undertaken during the W/C 4th June 2018 to coincide with the classified turning counts. The equipment for Site B was stolen/damaged during this period and therefore this site was resurveyed during the W/C 25th June 2018.

The ATC survey locations are presented in Figure 6 overleaf and summarised in Table 2 below, alongside the recorded seven-day 85th percentile speeds. The survey results indicate vehicles typically exceed the speed limit at all locations.

Table 2: ATC Location and Recorded 85th Percentile Speeds

Site	Location	Speed Limit (mph)	Direction	Recorded 85th Percentile Speeds (mph)
A	Cypress Drive (north of the roundabout with Sandbrook Road)	30 mph	Northbound	36.0
			Southbound	35.0
B	Cypress Drive (south of the junction with Fortran Road)	30 mph	Northbound	44.0
			Southbound	42.9
C	Cypress Drive (south of the roundabout with the A48)	30 mph	Westbound	41.7
			Eastbound	39.4
D	The A48 (east of the roundabout with Cypress Drive and the B4487)	30 mph	Westbound	38.3
			Eastbound	39.9
E	The B4487 Newport Road (west of the roundabout with the A48)	30 mph	Westbound	35.0
			Eastbound	36.0



Key

Site Boundary

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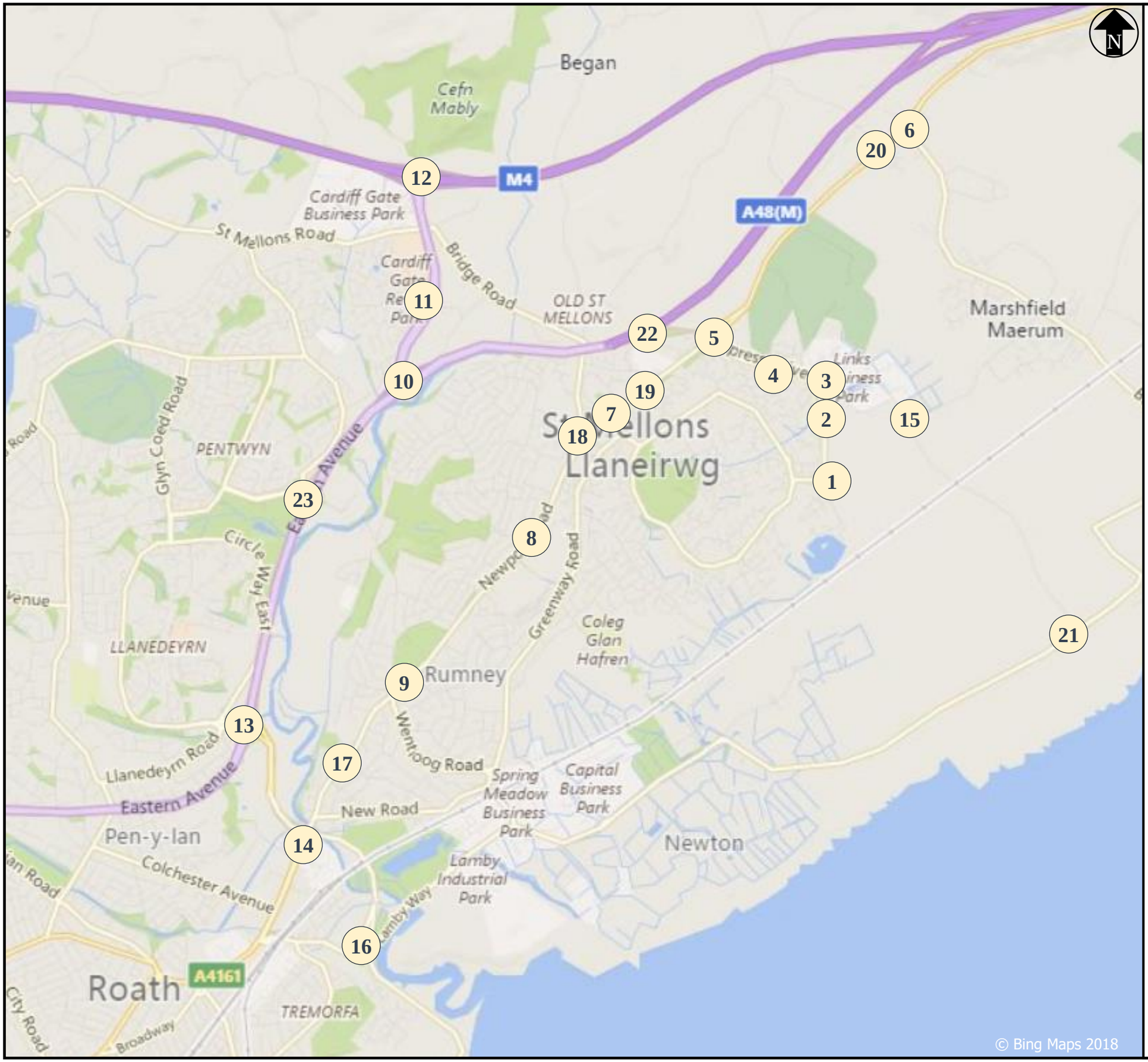
Client:
Cardiff Parkway Developments Ltd

Job Title:
Cardiff Parkway

Drawing Title:
Figure 4: Local Highway Network

Suitability:
S0 – Work in Progress

Job Number:	Rev:
252199	**P01.1**



Key

MCC Survey Location

Note

All sites surveyed on 7th June 2018 aside from Junction 20 which was surveyed on 10th July 2018.

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Job Title:
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Drawing Title:
Figure 5: Study Area

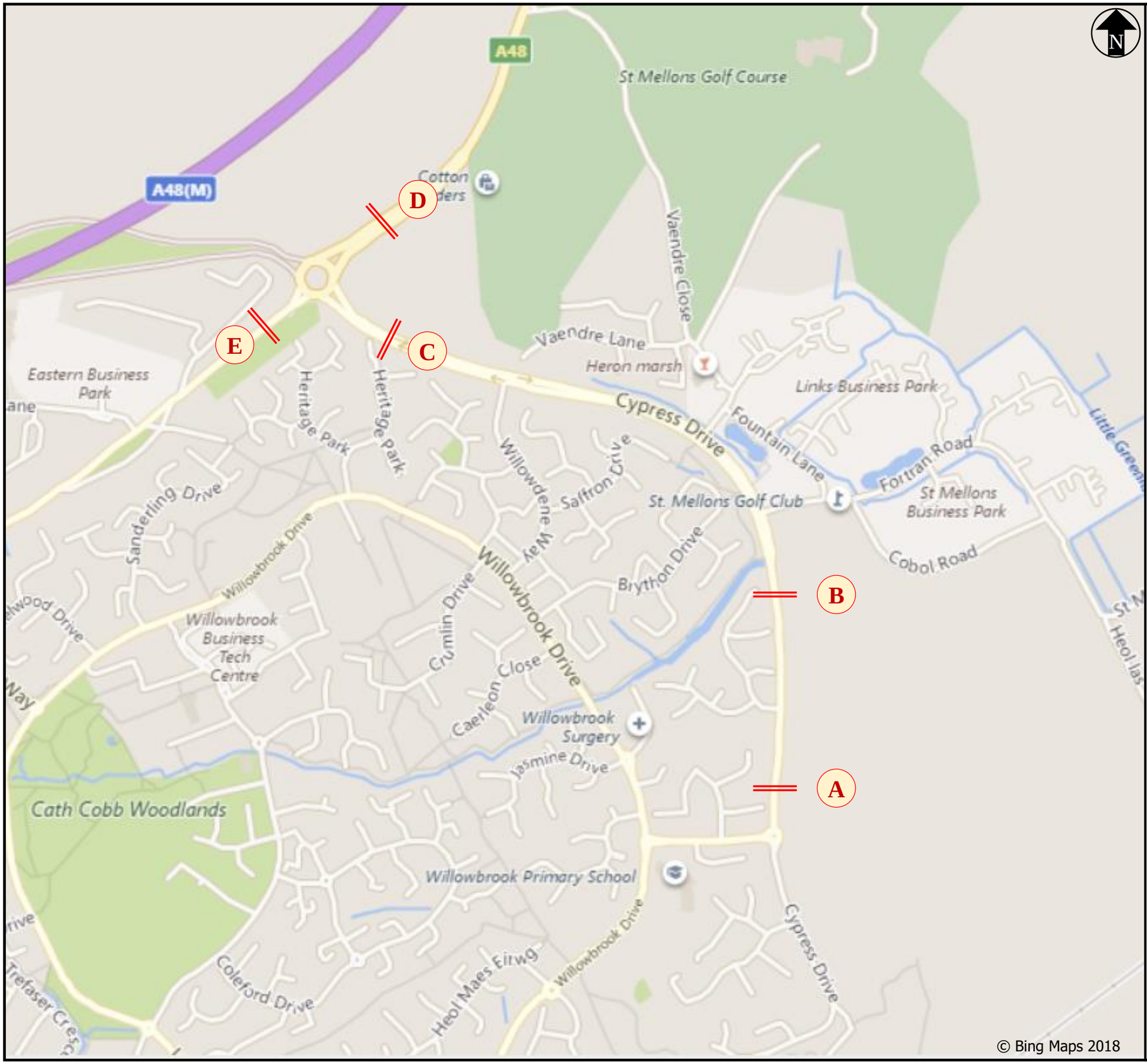
Suitability:
S0 – Work in Progress

Job Number:
252199

Rev:
P01.1

Table 3: Peak Period Analysis

Junction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	23	Total
Time Period	**AM Peak Hour**																						
7:00-8:00	371	886	1013	1473	3875	2262	1634	1509	1874	3241	3760	3805	5673	3419	134	3519	1705	1319	1498	2216	396	1900	**52193**
7:15-8:15	414	963	1119	1547	4032	2448	1803	1699	2148	3627	4126	4153	6008	3788	176	3606	1977	1484	1597	2421	487	2148	**56279**
7:30-8:30	439	1217	1217	1614	4130	2466	1959	1821	2246	3820	4260	4280	6109	3977	208	3648	2083	1575	1705	2464	541	2331	**58212**
7:45-8:45	427	1065	1274	1630	4105	2362	2065	1851	2296	3878	4281	4289	6133	4078	227	3676	2128	1622	1785	2387	539	2425	**58279**
8:00-9:00	439	1041	1267	1621	3911	2182	2126	1855	2284	3726	4089	4150	6107	4022	257	3641	1989	1635	1779	2215	491	2458	**56876**
8:15-9:15	408	979	1205	1534	3644	1930	1994	1726	2185	3362	3724	3713	5953	3951	252	3570	1834	1511	1679	1924	423	2387	**53313**
8:30-9:30	363	882	1103	1401	3267	1704	1782	1622	2085	2972	3326	3289	5731	3807	234	3396	1693	1425	1495	1675	354	2161	**49125**
8:45-9:45	327	738	943	1219	2890	1450	1576	1499	1962	2570	2902	2810	5383	3603	210	3147	1544	1296	1340	1410	298	1865	**44270**
9:00-10:00	270	595	774	1037	2560	1221	1361	1323	1808	2306	2619	2418	5008	3502	172	2975	1480	1139	1217	1161	280	1631	**40053**
Peak Hour	427	1065	1274	1630	4105	2362	2065	1851	2296	3878	4281	4289	6133	4078	227	3676	2128	1622	1785	2387	539	2425	
Actual Peak	439	1065	1274	1630	4130	2466	2126	1855	2296	3878	4281	4289	6133	4078	257	3676	2128	1635	1785	2464	541	2458	
% Difference	2.7%	0.0%	0.0%	0.0%	0.6%	4.2%	2.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.7%	0.0%	0.0%	0.8%	0.0%	3.1%	0.4%	1.3%	
Time Period	**PM Peak Hour**																						
15:00-16:00	401	780	883	1282	3260	1426	2364	1869	2264	2760	3658	2615	5475	3830	225	3270	1954	1671	1673	1389	263	2094	**49101**
15:15-16:15	409	871	994	1361	3502	1610	2476	1906	2373	2930	3985	2843	5555	3910	254	3368	2077	1693	1835	1544	308	2158	**51978**
15:30-16:30	433	923	1068	1433	3835	1802	2542	1883	2310	3164	3658	3163	5673	4000	265	3476	2086	1761	1924	1725	349	2307	**53963**
15:45-16:45	463	979	1143	1503	3995	1907	2512	1819	2335	3391	3985	3537	5770	4043	277	3597	2134	1763	1927	1813	397	2349	**56093**
16:00-17:00	462	970	1169	1482	4058	1971	2522	1837	2354	3509	4196	3823	5848	4132	300	3613	2172	1782	1947	1890	444	2406	**57454**
16:15-17:15	465	961	1139	1446	4035	2001	2482	1838	2396	3565	4258	3973	5853	4274	316	3577	2203	1785	1902	1954	504	2482	**57981**
16:30-17:30	494	970	1119	1431	3992	2037	2463	1849	2401	3639	4320	4036	5921	4238	354	3553	2240	1769	1876	2011	534	2470	**58270**
16:45-17:45	514	946	1093	1391	3863	2007	2387	1830	2343	3551	4238	3887	5915	4106	360	3505	2116	1715	1837	1993	560	2429	**57066**
17:00-18:00	510	895	1032	1406	3710	1943	2294	1768	2309	3429	4072	3571	5916	4029	343	3571	2073	1684	1763	1888	566	2415	**55549**
17:15-18:15	498	838	998	1401	3520	1778	2188	1718	2312	3211	3785	3201	5878	3776	303	3524	1939	1588	1661	1739	482	2287	**52905**
17:30-18:30	458	776	949	1347	3230	1609	2076	1617	2347	2872	3419	2781	5695	3710	252	3425	1889	1486	1567	1544	414	2128	**49555**
17:45-18:45	405	681	850	1258	3025	1459	2026	1555	2403	2622	3091	2373	5570	3771	216	3260	1939	1462	1498	1376	321	2004	**46752**
18:00-19:00	369	613	765	1125	2737	1311	1891	1457	2242	2398	2782	2085	5132	3552	181	2915	1752	1372	1377	1278	244	1798	**42538**
Peak Hour	494	970	1119	1431	3992	2037	2463	1849	2401	3639	4320	4036	5921	4238	354	3553	2240	1769	1876	2011	534	2470	
Actual Peak	514	979	1169	1503	4058	2037	2542	1906	2403	3639	4320	4036	5921	4274	360	3613	2240	1785	1947	2011	566	2482	
% Difference	3.9%	0.9%	4.3%	4.8%	1.6%	0.0%	3.1%	3.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.8%	1.7%	1.7%	0.0%	0.9%	3.6%	0.0%	5.7%	0.5%	



Key

ATC Survey Location

Note

All sites surveyed during the W/C 4th June 2018 aside from Site B which was surveyed during the W/C 25th June 2018.

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Client:
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Job Title:
Cardiff Parkway

Drawing Title:
Figure 6: ATC Survey Locations

Suitability:
S0 – Work in Progress

Job Number: **252199**

Rev: **P01.1**

3.6 Road Traffic Collision Analysis

Road Traffic Collision (RTC) data has been collected from Crashmap.com to display collisions which have occurred in the area surrounding the proposed site over the last five years. Overall there were 119 accidents recorded, of which 104 were slight, 12 were serious and 3 fatal as show in Figure 7.

There are several clusters of collisions, the largest of these is at the Cypress Drive/A48/B4487 roundabout where 24 incidents were recorded. Of these the majority were slight, only three were serious and none were fatal.

Additional clusters are located on the A48(M) slip from the Cypress Drive roundabout with five accidents, all of which were of a slight severity. At the Fortran Road junction with Cypress Drive six collisions were recorded, of which two were serious with the remainder being slight.

Overall there is a higher proportion of collisions recorded on the major road networks passing to the north of the site along the A48, A48(M) and Newport Road.

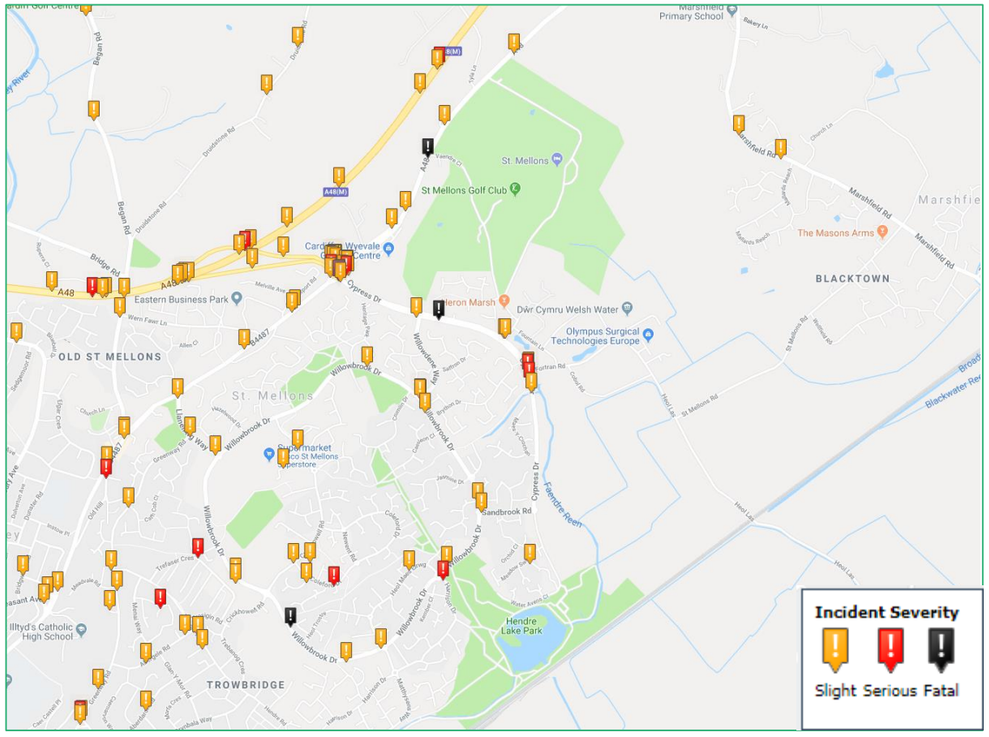


Figure 7: Road Traffic Collision Data obtained from Crashmap

It is proposed to request RTC data from CC for the most recent five years. The proposed study area is presented in Figure 8, subject to be agreement with CC. A detailed analysis of this data will be undertaken and included within the Transport Assessment.

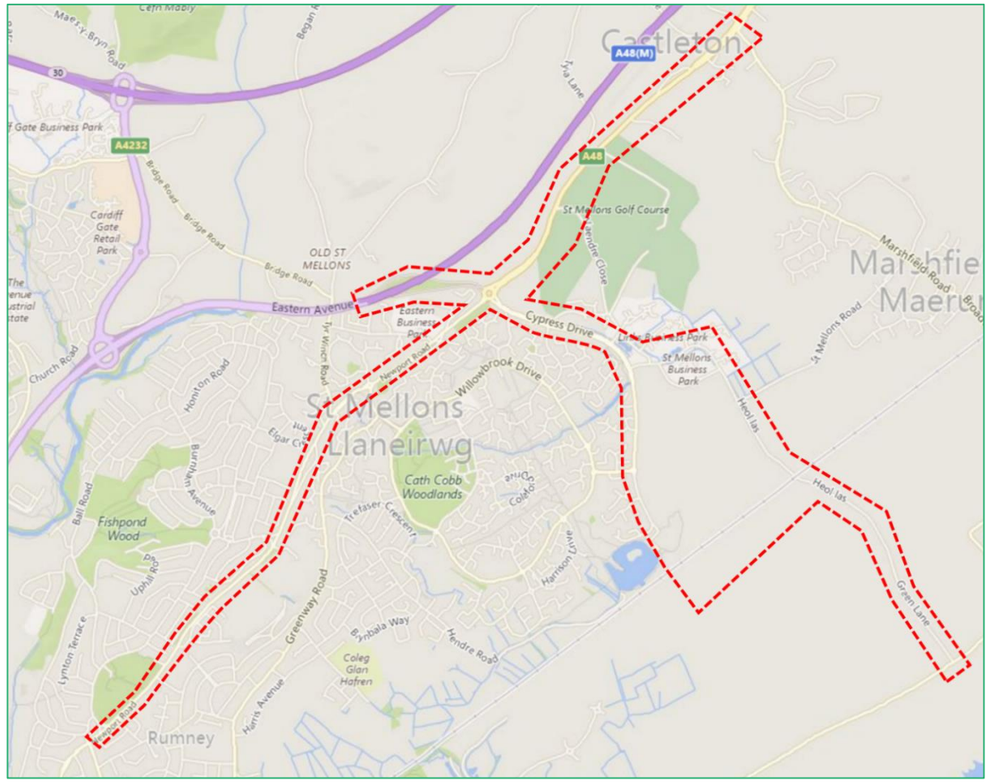


Figure 8: Proposed Road Traffic Collision Study Area

4 Transport Assessment Methodology

4.1 Introduction

Following a review of the transport principles underpinning the development proposal, a number of key working assumptions have been identified. These are outlined here to provide a basis for agreeing an approach to assessment with CC.

4.2 Study Area

The study area covers an area spanning from the site access on Cypress Drive to Castleton and the M4 in the north, the A4232 to the west and the A48/A4232 in the south. From discussion with CC, 23 junctions have been identified for assessment, presented in Figure 5 and listed below:

1. Cypress Drive/Sandbrook Road Roundabout
2. Cypress Drive/Fortran Road Priority Junction
3. Cypress Drive/Pascal Close Priority Junction
4. Cypress Drive/Willowdene Way Priority Junction
5. A48/Cypress Drive/Newport Road Roundabout
6. A48/Marshfield Road Priority Junction
7. B4487/Llaneirwg Way Roundabout
8. B4487/Mount Pleasant Ave Traffic Signals
9. B4487/Llanrumney Ave Traffic Signals
10. A48/A4232 Roundabout
11. A4232/Church Road/Heol Pontprennau Roundabout
12. M4/A4232 Partially Signalised Roundabout
13. A48/Southern Way Partially Signalised Roundabout
14. B4487/A4161 Newport Road/A4232 Signalised Roundabout
15. Heol Las/St Mellons Road Priority Junction
16. Rover Way/Lamby Way priority roundabout
17. B4487 Newport Road/Ty-Mawr Road signalised junction
18. B4487 Newport Road/Tyr Winch Road priority junction
19. B4487 Newport Road/Wern Fawr Lane signalised junction
20. A48 Newport Road/Coal Pit Lane priority junction
21. B4239 Wentloog Avenue/Heol Las priority junction
22. M4/A48(M) J29A (St Mellons Interchange) Slips
23. A48 Pentwyn Interchange priority roundabout

4.3 Junction Assessment

The junctions highlighted in the previous section would be the subject of a two-stage assessment.

Stage 1: Initially, the percentage impact of trips associated with the proposed development compared to existing traffic would be calculated. Additionally, base junction models will be developed to understand whether the junction is operating within theoretical capacity (RFC 1.0 or PRC -10%). These junction models will be assessed with the traffic data collected in 2018 and where necessary, calibrated using queue length surveys.

Stage 2: A detailed capacity analysis of individual junctions will subsequently be undertaken if either:

- The percentage impact of trips associated with the proposed development is more than 10% of the total peak hour traffic at the junction; or
- The base junction model estimates the junction is exceeding theoretical capacity in either peak hour in the 2018 base year.

If the junction is estimated to be operating within theoretical capacity in the base junction model and the percentage impact of the development is below 10%, no further assessment is proposed. It is considered that if any of these junctions are forecast to exceed theoretical capacity in the future year scenarios, this can be principally attributed to background traffic growth and not a direct impact of the development.

There is also potential to include an intermediary step involving junction assessment tools as outlined in Appendix 3 of CC Managing Transportation Impacts SPG to establish which junctions are performing within capacity before full junction modelling takes place. Given that it is proposed to develop base junction models for all junctions, the above methodology is unlikely to provide any time savings and therefore it is not proposed to adopt this method.

In scoping discussions with CC Highways, it was noted that there is not an appropriate pre-existing traffic model encompassing any of the junctions within the study area. It was also indicated that individual junction models would be acceptable to assess the traffic impacts of the development proposals. Where there are a adjacent signalised junctions, it is proposed to assess these junctions as a single network within a LinSig model.

Providing it is agreed that all junctions can be assessed using individual models, assessments will be undertaken using LinSig for signalised junctions, Junctions 9 ARCADY module for roundabouts and Junctions 9 PICADY module for priority junctions.

Junction capacity in the above software packages is measured as the Ratio of Flow to Capacity (RFC) (ARCADY and PICADY) and Practical Reserve Capacity (PRC) (LinSig). RFC is a measure of the volume of traffic making a turning movement at the junction, divided by the capacity of that movement; ascertained from the geometric measurements of the junction. PRC is a measure of how much additional traffic could pass through a junction and is calculated from the maximum degree of saturation on each lane.

These parameters have been used to summarise the operational effectiveness of individual junctions in accordance with the following pre-determined thresholds:

	Within Practical Capacity – *junctions with an RFC below 0.85 or PRC above 0% have been deemed to operate within practical capacity.*
	Over Practical Capacity, Approaching Theoretical Capacity – *junctions with an RFC of between 0.85-0.99 or PRC of between -10% and 0%.*
	Over Theoretical Capacity - *junctions with an RFC over 1.00 or PRC below -10% have been deemed to operate over theoretical capacity with substantial queuing delays.*

The generally agreed operational capacity of a junction is at a ratio of 0.85 for roundabouts and priority junctions. This is to account for a standard error of prediction of ±15% due to site variances. Given the models for all existing junctions will be validated and calibrated using queue length surveys, the likelihood for standard error due to site variances is reduced.

Whilst an RFC of 0.85 is the recognised standard, it is considered reasonable that with a busy highway network a RFC of 1.00 should be adopted as the point at which mitigation should be considered. Therefore, if a junction is forecast to have a RFC under 1.00, no mitigation will be considered.

4.4 Assessment Periods

As set out in Section 3.5, the assessment periods proposed to be assessed:

- Weekday AM Peak (07:45 – 08:00); and
- Weekday PM Peak (16:30 – 17:30).

The development programme for the Cardiff Parkway scheme has not yet been finalised, although it is estimated that the railway station and the first phase of the business park will be fully operational in 2021. It has been agreed with CC that the anticipated year of opening will be tested for all junctions, for both with and without development scenarios. Additionally, CC have requested that a sensitivity test is undertaken for the year 2026 which coincides with the end of the LDP period. The sensitivity test will be provided for information and will not inform the need for any potential mitigation.

Subject to the two-stage assessment approach proposed in the previous section, the following scenarios will therefore be used for assessment purposes:

- 2018 Base;
- 2021 with Committed Development;
- 2021 with Committed Development and Cardiff Parkway; and
- 2026 with Committed Development and Cardiff Parkway (sensitivity test).

4.5 Background Traffic Growth

Background traffic growth factors will be derived from the Department for Transport's Trip End Model Presentation Program (TEMPro v6.2).

As there are a number of committed developments within the local area, these will be included within the relevant scenarios. The TEMPro planning assumptions will therefore be modified by removing the committed development households and jobs from the traffic growth estimates in order to eliminate double counting. Given the Cardiff Parkway proposals are identified as a strategic employment site within the local plan, it is proposed to remove jobs associated with the proposed development from the traffic growth estimates to further eliminate double counting.

4.6 Committed Developments

In initial scoping discussions with CC Highways it was indicated that the committed developments would principally encompass the strategic sites identified in the Local Plan. It is proposed to request a full list of committed development from CC's Planning Department for agreement with Highways.

4.7 Travel Characteristics

The existing travel characteristics of employees in the local area can be obtained from census data. The mode split breakdown of existing journeys can be derived from 2011 Census Travel to Work Data. The Mid-layer Super Output Area (MSOA) Cardiff 011 includes the development site and St Mellons Business Park, as illustrated in Figure 9. It can also be seen that MSOA Cardiff 011 includes the industrial parks located directly north of Wentloog Avenue.

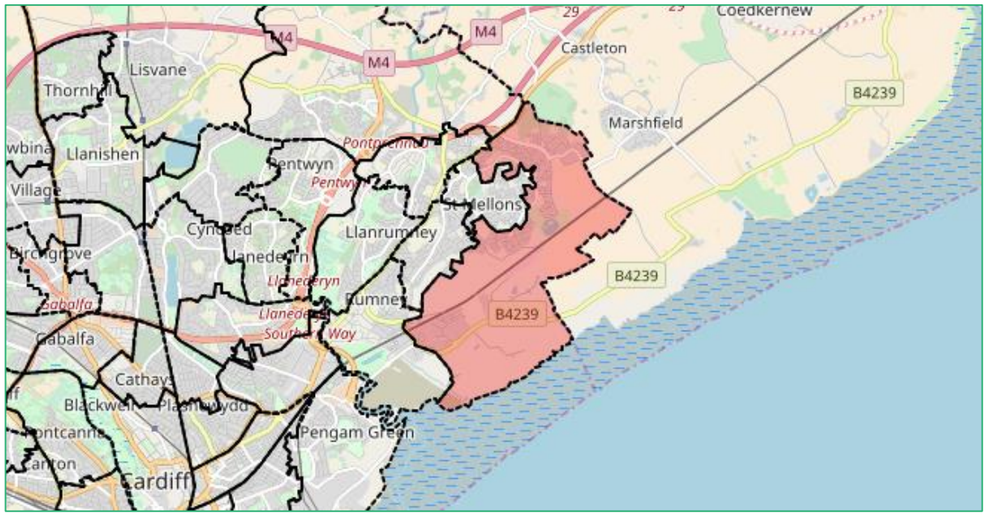


Figure 9: MSOA Cardiff 011

The modal split data for journeys to employment sites within Cardiff 011 is presented in Table 4 below.

Table 4: Modal Split (MSOA Cardiff 011)

Method of Travel to Work	All Categories	Modal Split
Driving a car or van	4,472	80.0%
Passenger in a car or van	364	6.5%
Train	37	0.6%
Bus, minibus or coach	305	5.5%
Bicycle	73	1.3%
On foot	283	5.1%
Motorcycle, scooter or moped	39	0.7%
Taxi	16	0.3%
Total	5,589	100.0%

The census data presented in Table 4 indicates 80% of trips to work in the MSOA Cardiff 011 were made by car in 2011. As set out below, this modal split is not considered to be reflective of the travel characteristics of the future employees of the proposed development.

The MSOA Cardiff 011 includes industrial parks located directly north of Wentloog Avenue. In comparison to the proposed development, these industrial parks are in a less accessible location which encourage a higher proportion of trips to be made by car.

Furthermore, several significant sustainable transport interventions will be introduced as part of the Cardiff Parkway development, including the provision of a railway station with a transport interchange facility. Improvements are also anticipated to be made to the existing bus services and a Travel Plan is proposed to further reduce the number of trips made by car.

In discussions with CC and Welsh Government, it was considered that with the above improvements to the sustainable transport infrastructure and services, the modal split for the development site will closer reflect that of the city centre. The MSOAs Cardiff 032, 033 and 049 are all within walking distance of either Cardiff Central or Cardiff Queen Street railway station, as shown in Figure 10.

For comparison purposes, the modal split of MSOAs Cardiff 032, 033 and 049 are presented in Table 5. The MSOA Cardiff 032 incorporates the city centre and is therefore considered to be slightly less reflective of the Cardiff Parkway proposals than Cardiff 033 that encompasses employment on City Road and Cardiff 049 which includes the offices south of Cardiff Central Railway Station.

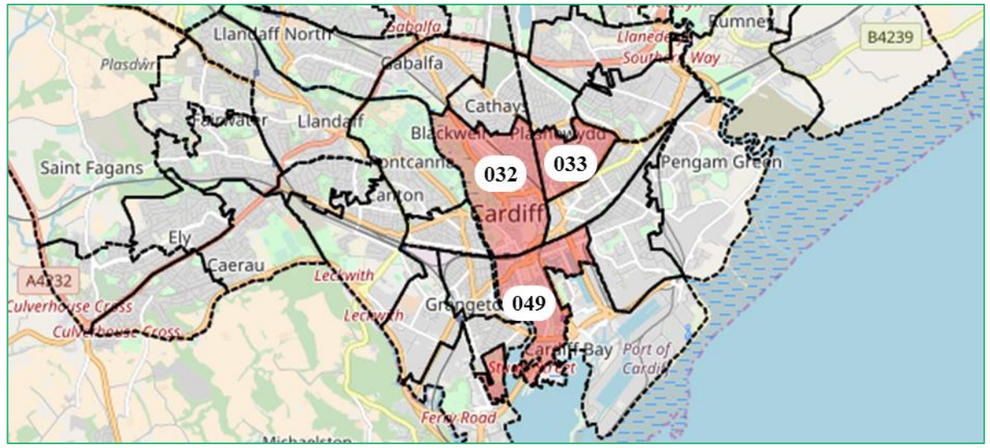


Figure 10: MSOAs Cardiff 032, 033 and 049 – add to plan

As shown in Table 5 below, the modal split of the MSOAs in the centre of the Cardiff differ significantly from the current journey to work characteristics of employment in St Mellons.

Table 5: Modal Split for MSOAs Cardiff 032, 033 and 049

Method of Travel to Work	Cardiff 032 (City Centre)	Cardiff 033 (City Road)	Cardiff 049 (Dumballs Road)
Driving a car or van	36.2%	51.6%	52.0%
Passenger in a car or van	5.0%	4.7%	5.3%
Train	17.3%	10.3%	18.6%
Bus, minibus or coach	16.0%	9.9%	9.4%
Bicycle	4.3%	4.3%	3.1%
On foot	20.3%	18.7%	10.9%
Motorcycle, scooter or moped	0.5%	0.3%	0.5%
Taxi	0.4%	0.2%	0.2%
Total	100.0%	100.0%	100.0%

Several assumptions have therefore been made to estimate a modal split that is considered to better reflect the travel characteristics of the future site. These assumptions include the following:

- With the provision of a new railway station, it is estimated that 15.0% of all employment trips will arrive by train;
- With the proposed transport interchange served by high frequency bus services and the bus corridor proposals outlined in the Local Plan, it is estimated that the proportion of employees travelling to the site by bus will increase from 5.5% to 15.0%;
- The provision of cycle hub and links to the proposed Cardiff Cycle Superhighway will increase the proportion of trips made by cycle from 1.3% to 3.0%; and
- Employees traveling to the site by car will reduce from 80.0% to 54.4%.

These modal split assumptions could potentially be enforced through travel plan interventions and controlling the quantum of parking provided within the development site. The resulting forecast modal split for the employment element of the Cardiff Parkway development proposals is detailed in Table 6 below and summarised in Figure 11.

Table 6: Forecast Modal Split for Cardiff Parkway (Employees)

Method of Travel to Work	Modal Split
Driving a car or van	54.4%
Passenger in a car or van	6.5%
Train	15.0%
Bus, minibus or coach	15.0%
Bicycle	3.0%
On foot	5.1%
Motorcycle, scooter or moped	0.7%
Taxi	0.3%
Total	100.0%

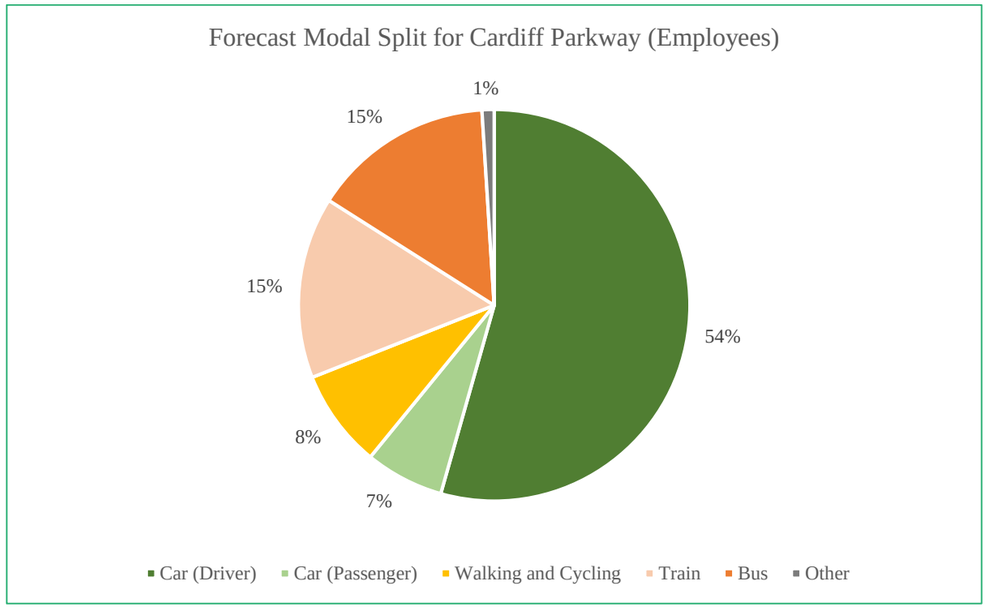


Figure 11: Forecast Modal Split for Cardiff Parkway (Employees)

4.8 Trip Generation

Due to the rural nature of the current land use, no allowance will be made for any existing trip generation to the site. The Transport Assessment will consider the level of trips likely to be generated by the site taking the following into account:

- Sustainable transport proposals;
- Internal and linked trips; and
- The proposed railway station and transport interchange.

The key vehicle trip generators are considered to be:

- Business park;
- Railway station car park (Park and Ride); and
- Transport Interchange.

4.8.1 Business Park

Development Mix

As set out in the introduction, several different land uses could be included within the development mix for the business park that also satisfy the requirements of the Local Plan (Policy KE2), and include the following:

- Office;
- Research and development;
- Storage and distribution; and
- Ancillary uses such as hotels, retail, food and beverage.

For the purposes of this scoping note, trips rates have been prepared for the office, research & development and storage and distribution.

Trip associated with ancillary facilities such as hotels, retail, food and beverage elements of the site are anticipated to be predominantly internal trips which do not result in significant additional traffic on the highways network, particularly in the peak hours. Trip rates for these land uses will be calculated as the development proposals mature.

Person Trip Rates

Comparable sites have been identified in the TRICS (v7.5.2) database to obtain trip rates for the proposed land uses. Due regard has been given to the scale, location and accessibility of the site in determining suitable site selection parameters.

The interrogation of the TRICS database has been focused on those sites with multi-modal survey data to derive total person trips that can then be broken down across the various transport modes through reference to the calculated modal split for the site, as detailed below.

Office

The category Employment -Office has been selected within TRICS to estimate a total person trip rate for the land use B1 (a) Office. Within the category Employment-Office, council offices have been removed as they are considered to have different characteristics to private sector offices.

Location	Population <5 miles	Sites Removed	Sites Included
Town centre excluded	No filtering (Person trips)	Council Offices (x3)	6

Research and Development

The TRICS database was interrogated to identify the research and development sites. The only site identified was a pharmaceuticals company. The trip rates for this development was very similar to the trip rates for the Office land use set out in Table 7 below. This is not considered to be reflective of typical Research and Development sites that include both offices and laboratories/workshops.

To avoid using a unreflective single site to inform the forecast trip rates, it is proposed to use a combination of the categories Employment-Office and Employment-Industrial Unit. Using an average of trip rates for offices and industrial units is considered to reflect typical research and development sites which have a mix of offices and laboratories/workshops.

The parameters used to obtain a trip rate for the category Employment-Industrial Unit are presented below.

Location	Population <5 miles	Sites Removed	Sites Included
Suburban and Edge of Town	No filtering (Person trips)	Bakery	3

Storage and distribution

There is potential that some warehousing (B8) development could be proposed to the northern fringe of the development site. The category Employment -Warehousing (Commercial) TRICS has been selected within TRICS and the chosen parameters are outlined below.

Location	Population <5 miles	Sites Removed	Sites Included
Suburban and Edge of Town	No filtering (Person trips)	None	3

Summary

The person trip rates for the land uses that could be proposed as part of the business park are presented in Table 7 below.

Table 7 Business Park Total Person Trip Rates

Land Use	Factor	AM Peak Hour		PM Peak Hour		Daily	
		In	Out	In	Out	In	Out
Office	100 sqm	0.931	0.117	0.074	0.867	3.705	3.596
Research and Development	100 sqm	0.585	0.121	0.047	0.505	2.942	2.907
B8 Storage and Distribution	100 sqm	0.148	0.048	0.033	0.061	1.865	1.488

The person trip rates provide a basis from which to determine the expected vehicle trip rates, subject to modal split.

Vehicular Trips

Based on the above assumptions and analysis, Table 8 presents the forecast vehicle trip generation rates for each of the land uses associated with the business park.

Table 8: Vehicle Trip Rates by Land Use

Land Use	Factor	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Office	100 sqm	0.506	0.064	0.040	0.472
Research and development	100 sqm	0.318	0.066	0.025	0.275
Storage and distribution	100 sqm	0.081	0.026	0.018	0.033

4.8.2 Railway Station and Park & Ride

The principle attractor of vehicle trips associated with the proposed railway station will be the car park for the Park & Ride. Whilst the railway station will generate a limited number of service vehicle trips, it can be assumed that these will be principally outside of the peak hours and have a minimal traffic impact.

To assess the potential traffic impact of the proposed railway station car park, a daily profile has been calculated using the proportion of arrivals and departures across the day for employment uses using the TRICS database. The daily profile has been manually adjusted to account for the journey time from the railway station to the place of employment as set out below.

It is anticipated that the car park will typically serve commuters travelling from Cardiff to destinations in the east such as Bristol and London. In addition, the car park will also be used as a Park and Ride for commuters travelling to Cardiff from the east.

The daily profile has therefore been based on an office with the following adjustments made:

- The proportion of commuter trips travelling to Cardiff will arrive 30 minutes earlier
- For journeys to London, commuters will arrive two hours earlier; and
- Commuters travelling to Bristol and the South West will arrive 60 minutes earlier.

To further refine these assumption, further forecasting exercises are currently being undertaken involving the use of the SEWTA (South East Wales Transport Alliance) model. In future assessments these methods will be will be used to derive the likely number of journeys being made to either Cardiff or London. This data will be used in conjunction with TRICS data to inform the likely number of trips generated by the P&R in addition to their likely time of arrival and departure.

4.8.3 Transport Interchange

The transport interchange is envisaged to provide a gateway between the proposed railway station and business park. As such it will include a number of integrated sustainable transport interventions bringing together bus, taxi P&R, walking, cycling and potentially LRT services in the future.

The traffic impacts of the transport interchange can be calculated using first principles, as set out below.

Bus Stops

Initial assessments of the existing bus services near the proposed site indicate the transport interchange could be served by the following services:

- Extension of the 44/45 services providing four-five services per hour;
- Extension of the new NAT X5 service operating between Newport and Cardiff centres at a frequency of four per hour; and
- Extension of the 64/65 service which would operate via Heath hospital at an upgraded frequency of two per hour.

If these services were implemented the site could be served by up to ten services per hour providing access to both Cardiff and Newport. Given any increase in bus services would likely result in an overall reduction in background traffic, it is not proposed to include these additional trips within the model.

Taxi rank

The transport interchange is envisaged to have a taxi rank for up to ten taxis. Assuming each taxi is parked within the taxi rank for approximately 20 minutes, the taxi rank can be assumed to generate up to 60 two-way vehicle trips in the peak hours.

It is envisaged that the taxi rank will have the same daily trip profile of arrivals and departures as the P&R as both serve the railway station.

Drop-off

Current proposals indicate ten short-stay parking spaces will be provided for drop-off and pick-up from the railway station. As with the taxi rank, it is envisaged that the short-stay parking will have the same daily profile as the Park & Ride car park.

Summary

As set out above, the methodologies for calculating the traffic impact of the Transport Interchange will need to be finessed as more forecasting and demand data becomes available from sources such as the South East Wales Transport Model SEWTM.

4.9 Trip Distribution and Assignment

4.9.1 Introduction

To inform the highway capacity assessment, the additional vehicle trips generated by the proposed development need to be distributed onto the local highway network in a manner which is likely to be representative of the movement patterns from the site.

4.9.2 Business Park

An initial trip distribution has been formulated based on likely commuting trips to the employment site through reference to 2011 origin/destination census data from the *WU03EW Location of usual residence and place of work by method of travel to work* census category.

To interrogate the data to determine distribution of trips, place of work was set to Cardiff 011 MSOA. Trips from usual residences in other MSOA's in Cardiff, Newport and Vale of Glamorgan were identified, along with other relevant Local Authorities in Wales.

The assignment of development traffic has been determined by examination of the highway network. This exercise has been undertaken by attributing each set of trips to the destination via the most likely route within the assessment area. Where a number of feasible routes could be used, the development trips have been split accordingly.

A preliminary investigation has been undertaken using Google maps to establish the variation in route durations to the M4/A48/Cypress Drive roundabout from Newport. It is possible to take three routes from the M4 junction 28 which is north east of Newport. The three identified routes are as follows:

- A48 directly from M4 J28 Tredegar Roundabout to Cypress Drive;
- M4 turning onto theA48 (M) at Junction 29 and making a a U-turn at the Pentwyn junction returning east on the A48 to access the site via the St Mellons offslip; and
- M4 to J30 using the Pentwyn Link Road to the A48.

Table 9 below displays data obtained for various arrival times within the peak period.

Table 9: Journey times from Newport M4 J28

Route	Journey time			
	Arrive by 7:30am	Arrive by 8:00am	Arrive by 8:30am	Arrive by 9:00am
A48	6 – 10 mins	6 – 12 mins	7 – 12 mins	6 – 12 mins
M4/A48(M)	10 – 16 mins	12 – 22 mins	12 – 22 mins	10 – 20 mins
M4 to junction 30	8 – 14 mins	9 – 18 mins	9 – 18 mins	9 – 16 mins
	Depart at 16:00	16:30	17:00	17:30
A48	9 – 18 mins	10 – 22 mins	10 – 22 mins	9 – 22 mins
M4/A48(M)	9 – 14 mins	9 – 18 mins	10 – 18 mins	10 -20 mins
M4 to junction 30	10 – 18 mins	10 – 20 mins	12 – 22 mins	10 – 22 mins

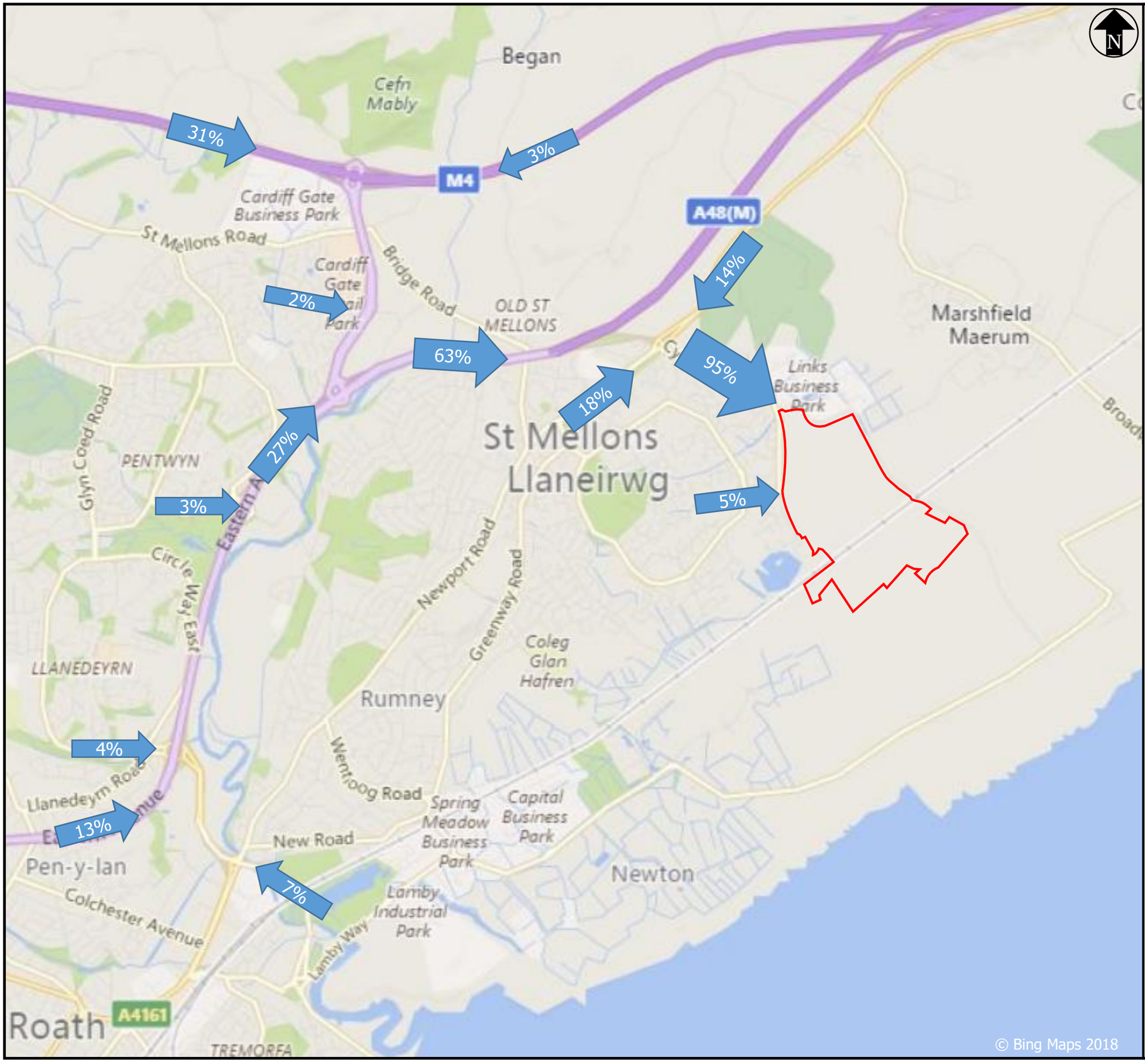
The journey times presented in Table 9 indicates the M4/A48(M) is the slowest route by a relatively large margin. Based on this it has currently been assumed that 80% of vehicles coming from Newport and locations further east (such as Bristol, south Gloucestershire) will use the A48 from Tredegar Roundabout and 20% will route via M4 J30. It is proposed to undertake similar exercises to estimate other distributions where multiple routes are available.

Using the above assumptions, the likely distribution of employment trips into the site is illustrated in Figure 12 overleaf and laid out in more detail in Table 10 below. The distribution presented below indicates the likely points in which traffic would enter the study area.

Table 10: Employment Distribution

Link Assignment	Distribution
M4 West	31.0%
M4 East	3.4%
A48 West	13.1%
A48 East	13.7%
Maes-Y-Bryn Road	0.9%
Heol Pontprennau	2.0%
Capel Edeyrn	1.4%
Pentwyn Road	0.3%
Bryn Celyn Road	2.9%
Circle Way	4.2%
A4161 Newport Road South	1.8%
Rover Way South	6.7%
Lanrumney Avenue	0.8%
Mount Pleasant Avenue	2.6%
Tyr Winch Road	1.1%
Llaneirwig Way	3.5%
Wern Fawr Lane	0.8%
Marshfield Road	0.4%
Coal Pit Lane	0.4%
Willowdene Way	3.5%
Sandbrook Road	5.1%
Wentlong Avenue West	0.4%
Total	**100%**

The data currently presented can be used to gauge the primary routes likely to be taken into the site and will be refined in subsequent pieces of work based on outputs from the SEWTA model.



Key

Site Boundary

ARUP

4 Pierhead St, Capital Waterside
Cardiff, CF10 4QP
T +44(0)29 20473727 F +44(0)29 20472277
www.arup.com

Client:
Cardiff Parkway Developments Ltd

Job Title:
Cardiff Parkway

Drawing Title:
Figure 12: Cardiff Parkway Employment Distribution

Suitability:
S0 – Work in Progress

Job Number:	Rev:
252199	**P01.1**

4.10 Car Parking Methodology

Business Park

It is proposed to adopt a two-stage methodology to calculate the parking requirements for each of the land uses associated with the Business Park:

1. Calculate the requirements based on CC's draft non-central parking standards[1]; and
2. Using the vehicle trip rates obtained using TRICS and the agreed modal split, calculate the cumulative number of vehicles that will be parked at the site on a typical day. If this calculation indicates less car parking is required, this lower provision will be proposed.

Given the desire to develop a sustainable site that prioritises active travel and public transport over the private car, the methodology set out above seeks to provide the lowest suitable provision of car parking that reflects standards and demand.

Railway Station Car Park (Park & ride)

As set out in Section 4.8.2, the quantum of parking proposed for the railway station will be informed by other forecasting exercises for the station involving the use of the SEWTM.

[1] Cardiff Council (2017) Supplementary Planning Guidance: Managing Transportation Impacts

5 Summary and Conclusions

5.1 Summary

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals. The development site of approximately 44 hectares is located in the St Mellons district of Cardiff to the east of the city centre, south of the M4 and A48(M).

The site is allocated as a strategic employment site in the Cardiff Council Local Development Plan (LDP) under Policy KP2 Site H.

The Cardiff Parkway development is proposed to comprise up to 90,000m^2 of employment (B1, B2 and B8) and a transport hub including a new railway station. This land use mix is intended to maximise the potential of the site and result in a proportion of the overall trip demand being internal to the site and undertaken by walking and cycling.

A review of the existing traffic data indicates the AM and PM peak hours have been identified as 07:45-08:45 and 16:30-17:30 respectively. Subject to agreement with CC, these peak periods will be assessed as part of the traffic impact assessment.

The study area for the Traffic Impact Assessment has been agreed with CC and includes 23 junctions and the A48 west-facing slips. These junctions are proposed to be subject to a two-stage assessment which considers the existing capacity and the traffic impact of the development proposals.

The existing modal split for employees working near the site has been calculated using Census data. This is not considered to be reflective of the site given the proposed improvement to sustainable travel such as the provision of a railway station. Several assumptions have therefore been made to estimate a revised modal split that is considered to better reflect the future travel characteristics of the site.

Alongside TRICS, this modal split has been used to forecast the vehicle trip rates for land uses that could be introduced as part of the business park. The methodology for calculating the trip generation of the railway station car park and transport interchange will be developed as more forecasting and demand data becomes available from sources such as the SEWTM.

5.2 Next Steps

To progress the preparation of the Transport Assessment, it is requested that CC provide the following:

- Accident records for the identified study area, or details of how to request this data; and
- Approval or comment relating to this Scoping Report.

Following provision of this information it is intended that the Scoping Report will be updated with any agreed modifying comments and issued as a final version. This agreed document will then form the basis of the Transport Assessment prepared in support of the proposed development.

As set out in this Scoping Report, some elements of the traffic impacts assessment are reliant on the findings of the SEWTM outputs which will not be available within the timescale it is anticipated the Scoping Report can be otherwise finalised. As such, the approach to trip making and distribution cannot be confirmed at this time. It is therefore proposed to submit a series of technical notes to CC Highways prior to the submission of a planning application for these proposals to seek agreement on the following matters:

- Trip Generation and Distribution;
- Background Traffic Growth;
- Car Parking; and
- Base Junction Models.

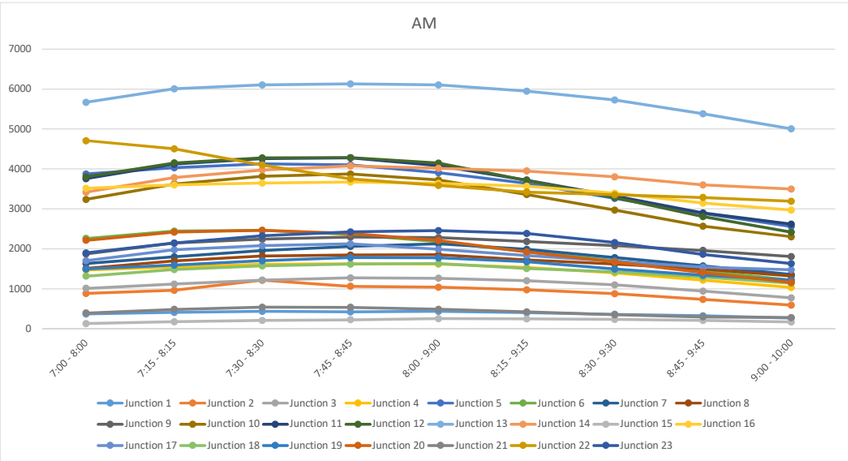
In addition, it is anticipated there will be periodic meetings with CC Highways to discuss the progress of the development proposals.

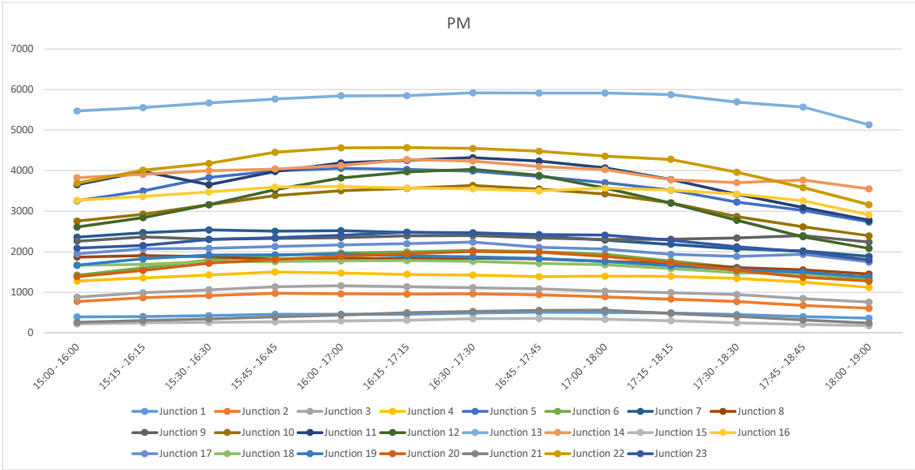
Appendix A

Peak Hour Analysis

TIME	Junction 1	Junction 2	Junction 3	Junction 4	Junction 5	Junction 6	Junction 7	Junction 8	Junction 9	Junction 10	Junction 11	Junction 12	Junction 13	Junction 14	Junction 15	Junction 16	Junction 17	Junction 18	Junction 19	Junction 20	Junction 21	Junction 22	Junction 23	TOTAL
07:00	78	166	183	308	811	403	340	286	322	605	720	733	1203	632	22	839	292	240	339	441	60	1203	358	10584
07:15	77	179	211	330	936	527	407	344	462	811	960	960	1451	841	25	889	399	310	367	512	88	1326	466	12878
07:30	111	248	274	402	1020	648	437	423	517	886	1017	1059	1492	913	40	893	468	363	376	607	123	1235	514	14066
07:45	105	293	345	433	1108	684	450	456	573	939	1063	1053	1527	1033	47	898	546	406	416	656	125	947	562	14665
08:00	121	243	289	382	968	589	509	476	596	991	1086	1081	1538	1001	64	926	564	405	438	646	151	1000	606	14670
08:15	102	254	309	397	1034	545	563	466	560	1004	1094	1087	1552	1030	57	931	505	401	475	555	142	920	649	14632
08:30	99	275	331	418	995	544	543	453	567	944	1038	1068	1516	1014	59	921	513	410	456	530	121	889	608	14312
08:45	117	269	338	424	914	504	511	460	561	787	871	914	1501	977	77	863	407	419	410	484	77	782	595	13262
09:00	90	181	227	295	701	337	377	347	497	627	721	644	1384	930	59	855	409	281	338	355	83	834	535	11107
09:15	57	157	207	264	657	319	351	362	460	614	696	663	1330	886	39	757	364	315	291	306	73	853	423	10444
09:30	63	131	171	236	618	290	337	330	444	542	614	589	1168	810	35	672	364	281	301	265	65	819	312	9457
09:45	60	126	169	242	584	275	296	284	407	523	588	522	1126	876	39	691	343	262	287	235	59	690	361	9045
15:00	111	170	202	320	749	320	539	414	470	665	738	644	1371	919	49	812	419	416	348	317	50	801	499	11343
15:15	88	162	200	283	714	303	559	478	631	634	700	602	1342	950	49	810	487	402	395	285	66	952	490	11582
15:30	79	191	206	317	854	393	648	512	570	699	760	652	1377	986	61	796	520	440	456	398	75	909	572	12471
15:45	123	257	275	362	943	410	618	465	593	762	861	717	1385	975	66	852	528	413	474	389	72	1033	533	13106
16:00	119	261	313	399	991	504	651	451	579	835	1009	872	1451	999	78	910	542	438	510	472	95	1122	563	14164
16:15	112	214	274	355	1047	495	625	455	568	868	1028	922	1460	1040	60	918	496	470	484	466	107	1119	639	14222
16:30	109	247	281	387	1014	498	618	448	595	926	1087	1026	1474	1029	73	917	568	442	459	486	123	1180	614	14601
16:45	122	248	301	341	1006	474	628	483	612	880	1072	1003	1463	1064	89	868	566	432	494	466	119	1146	590	14467
17:00	122	252	283	363	968	534	611	452	621	891	1071	1022	1456	1141	94	874	573	441	465	536	155	1127	639	14691
17:15	141	223	254	340	1004	531	606	466	573	942	1090	985	1528	1004	98	894	533	454	458	523	137	1100	627	14511
17:30	129	223	255	347	885	468	542	429	537	838	1005	877	1468	897	79	869	444	388	420	468	149	1107	573	13397
17:45	118	197	240	356	853	410	535	421	578	758	906	687	1464	987	72	934	523	401	420	361	125	1028	576	12950
18:00	110	195	249	358	778	369	505	402	624	673	784	652	1418	888	54	827	439	345	363	387	71	1045	511	12047
18:15	101	161	205	286	714	362	494	365	608	603	724	565	1345	938	47	795	483	352	364	328	69	784	468	11161
18:30	76	128	156	258	680	318	492	367	593	588	677	469	1343	958	43	704	494	364	351	300	56	730	449	10594
18:45	82	129	155	223	565	262	400	323	417	534	597	399	1026	768	37	589	336	311	299	263	48	603	370	8736

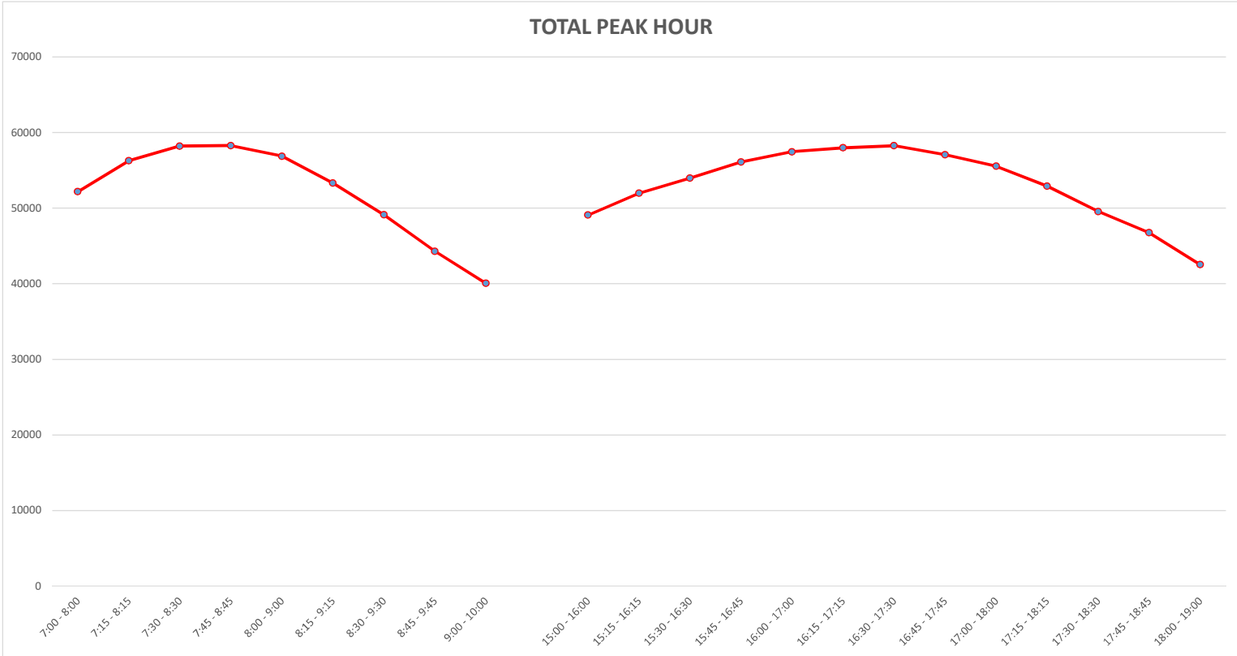
	TIME INTERVAL	Junction 1	Junction 2	Junction 3	Junction 4	Junction 5	Junction 6	Junction 7	Junction 8	Junction 9	Junction 10	Junction 11	Junction 12	Junction 13	Junction 14	Junction 15	Junction 16	Junction 17	Junction 18	Junction 19	Junction 20	Junction 21	Junction 22	Junction 23	TOTAL
	7:00 - 8:00	371	886	1013	1473	3875	2262	1634	1509	1874	3241	3760	3805	5673	3419	134	3519	1705	1319	1498	2216	396	4711	1900	52193
	7:15 - 8:15	414	963	1119	1547	4032	2448	1803	1699	2148	3627	4126	4153	6008	3788	176	3606	1977	1484	1597	2421	487	4508	2148	56279
	7:30 - 8:30	439	1217	1217	1614	4130	2466	1959	1821	2246	3820	4260	4280	6109	3977	208	3648	2083	1575	1705	2464	541	4102	2331	58212
	7:45 - 8:45	427	1065	1274	1630	4105	2362	2065	1851	2296	3878	4281	4289	6133	4078	227	3676	2128	1622	1785	2387	539	3756	2425	58279
AM	8:00 - 9:00	439	1041	1267	1621	3911	2182	2126	1855	2284	3726	4089	4150	6107	4022	257	3641	1989	1635	1779	2215	491	3591	2458	56876
	8:15 - 9:15	408	979	1205	1534	3644	1930	1994	1726	2185	3362	3724	3713	5953	3951	252	3570	1834	1511	1679	1924	423	3425	2387	53313
	8:30 - 9:30	363	882	1103	1401	3267	1704	1782	1622	2085	2972	3326	3289	5731	3807	234	3396	1693	1425	1495	1675	354	3358	2161	49125
	8:45 - 9:45	327	738	943	1219	2890	1450	1576	1499	1962	2570	2902	2810	5383	3603	210	3147	1544	1296	1340	1410	298	3288	1865	44270
	9:00 - 10:00	270	595	774	1037	2560	1221	1361	1323	1808	2306	2619	2418	5008	3502	172	2975	1480	1139	1217	1161	280	3196	1631	40053
	15:00 - 16:00	401	780	883	1282	3260	1426	2364	1869	2264	2760	3658	2615	5475	3830	225	3270	1954	1671	1673	1389	263	3695	2094	49101
	15:15 - 16:15	409	871	994	1361	3502	1610	2476	1906	2373	2930	3985	2843	5555	3910	254	3368	2077	1693	1835	1544	308	4016	2158	51978
	15:30 - 16:30	433	923	1068	1433	3835	1802	2542	1883	2310	3164	3658	3163	5673	4000	265	3476	2086	1761	1924	1725	349	4183	2307	53963
	15:45 - 16:45	463	979	1143	1503	3995	1907	2512	1819	2335	3391	3985	3537	5770	4043	277	3597	2134	1763	1927	1813	397	4454	2349	56093
	16:00 - 17:00	462	970	1169	1482	4058	1971	2522	1837	2354	3509	4196	3823	5848	4132	300	3613	2172	1782	1947	1890	444	4567	2406	57454
	16:15 - 17:15	465	961	1139	1446	4035	2001	2482	1838	2396	3565	4258	3973	5853	4274	316	3577	2203	1785	1902	1954	504	4572	2482	57981
PM	16:30 - 17:30	494	970	1119	1431	3992	2037	2463	1849	2401	3639	4320	4036	5921	4238	354	3553	2240	1769	1876	2011	534	4553	2470	58270
	16:45 - 17:45	514	946	1093	1391	3863	2007	2387	1830	2343	3551	4238	3887	5915	4106	360	3505	2116	1715	1837	1993	560	4480	2429	57066
	17:00 - 18:00	510	895	1032	1406	3710	1943	2294	1768	2309	3429	4072	3571	5916	4029	343	3571	2073	1684	1763	1888	566	4362	2415	55549
	17:15 - 18:15	498	838	998	1401	3520	1778	2188	1718	2312	3211	3785	3201	5878	3776	303	3524	1939	1588	1661	1739	482	4280	2287	52905
	17:30 - 18:30	458	776	949	1347	3230	1609	2076	1617	2347	2872	3419	2781	5695	3710	252	3425	1889	1486	1567	1544	414	3964	2128	49555
	17:45 - 18:45	405	681	850	1258	3025	1459	2026	1555	2403	2622	3091	2373	5570	3771	216	3260	1939	1462	1498	1376	321	3587	2004	46752
	18:00 - 19:00	369	613	765	1125	2737	1311	1891	1457	2242	2398	2782	2085	5132	3552	181	2915	1752	1372	1377	1278	244	3162	1798	42538





TIME	PEAK HOUR
AM	7:45 - 8:45
PM	16:30 - 17:30

		Junction 1	Junction 2	Junction 3	Junction 4	Junction 5	Junction 6	Junction 7	Junction 8	Junction 9	Junction 10	Junction 11	Junction 12	Junction 13	Junction 14	Junction 15	Junction 16	Junction 17	Junction 18	Junction 19	Junction 20	Junction 21	Junction 22	Junction 23
AM	PEAK HOUR	427	1065	1274	1630	4105	2362	2065	1851	2296	3878	4281	4289	6133	4078	227	3676	2128	1622	1785	2387	539	3756	2425
	ACTUAL PEAK	439	1217	1274	1630	4130	2466	2126	1855	2296	3878	4281	4289	6133	4078	257	3676	2128	1635	1785	2464	541	4711	2458
	PERCENTAGE DIFFERENCE	2.7%	12.5%	0.0%	0.0%	0.6%	4.2%	2.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.7%	0.0%	0.0%	0.8%	0.0%	3.1%	0.4%	20.3%	1.3%
PM	PEAK HOUR	494	970	1119	1431	3992	2037	2463	1849	2401	3639	4320	4036	5921	4238	354	3553	2240	1769	1876	2011	534	4553	2470
	ACTUAL PEAK	514	979	1169	1503	4058	2037	2542	1906	2403	3639	4320	4036	5921	4274	360	3613	2240	1785	1947	2011	566	4572	2482
	PERCENTAGE DIFFERENCE	3.9%	0.9%	4.3%	4.8%	1.6%	0.0%	3.1%	3.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.8%	1.7%	1.7%	0.0%	0.9%	3.6%	0.0%	5.7%	0.4%	0.5%



Appendix B

TRICS Output Files

Calculation Reference: AUDIT-701009-180726-0727

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : A - OFFICE
MULTI-MODAL VEHICLES

Selected regions and areas:

02	SOUTH EAST		
	HF	HERTFORDSHIRE	1 days
	SC	SURREY	1 days
04	EAST ANGLIA		
	NF	NORFOLK	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	WY	WEST YORKSHIRE	1 days
08	NORTH WEST		
	LC	LANCASHIRE	1 days
11	SCOTLAND		
	DU	DUNDEE CITY	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter:	Gross floor area
Actual Range:	2600 to 39230 (units: sqm)
Range Selected by User:	2500 to 70291 (units: sqm)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 12/09/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Tuesday	3 days
Thursday	3 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	6 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Edge of Town Centre	3
Suburban Area (PPS6 Out of Centre)	2
Edge of Town	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Commercial Zone	2
Development Zone	1
Residential Zone	2
Built-Up Zone	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

B1	6 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

5,001 to 10,000	2 days
15,001 to 20,000	1 days
25,001 to 50,000	3 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

25,001 to 50,000	1 days
75,001 to 100,000	1 days
125,001 to 250,000	3 days
500,001 or More	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	3 days
1.1 to 1.5	2 days
1.6 to 2.0	1 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	5 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	6 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 DU-02-A-01 OFFICES DUNDEE CITY
GREENMARKET
DUNDEE

Edge of Town Centre
Development Zone
Total Gross floor area: 3200 sqm
Survey date: THURSDAY *27/04/17* *Survey Type: MANUAL*

2 HF-02-A-04 OFFICES HERTFORDSHIRE
STATION WAY
ST ALBANS

Edge of Town Centre
Residential Zone
Total Gross floor area: 5000 sqm
Survey date: THURSDAY *02/10/14* *Survey Type: MANUAL*

3 LC-02-A-09 OFFICES LANCASHIRE
FURTHERGATE
BLACKBURN

Suburban Area (PPS6 Out of Centre)
Built-Up Zone
Total Gross floor area: 2600 sqm
Survey date: TUESDAY *04/06/13* *Survey Type: MANUAL*

4 NF-02-A-03 OFFICES NORFOLK
NORTH QUAY
GREAT YARMOUTH

Edge of Town Centre
Commercial Zone
Total Gross floor area: 5500 sqm
Survey date: TUESDAY *12/09/17* *Survey Type: MANUAL*

5 SC-02-A-16 BANK OF AMERICA SURREY
STANHOPE ROAD
CAMBERLEY

Edge of Town
Commercial Zone
Total Gross floor area: 39230 sqm
Survey date: TUESDAY *10/05/11* *Survey Type: MANUAL*

6 WY-02-A-03 OFFICE WEST YORKSHIRE
VICTORIA ROAD
LEEDS
HEADINGLEY
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Gross floor area: 2696 sqm
Survey date: THURSDAY *17/06/10* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
ES-02-A-12	Council Offices
KC-02-A-10	Council Offices
MT-02-A-02	Council Offices
NF-02-A-01	Council Offices
PS-02-A-01	Council Offices
SC-02-A-17	R&D

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.077	6	9704	0.003	6	9704	0.080
07:30 - 08:00	6	9704	0.177	6	9704	0.009	6	9704	0.186
08:00 - 08:30	6	9704	0.285	6	9704	0.034	6	9704	0.319
08:30 - 09:00	6	9704	0.331	6	9704	0.052	6	9704	0.383
09:00 - 09:30	6	9704	0.246	6	9704	0.060	6	9704	0.306
09:30 - 10:00	6	9704	0.101	6	9704	0.050	6	9704	0.151
10:00 - 10:30	6	9704	0.069	6	9704	0.050	6	9704	0.119
10:30 - 11:00	6	9704	0.053	6	9704	0.053	6	9704	0.106
11:00 - 11:30	6	9704	0.041	6	9704	0.038	6	9704	0.079
11:30 - 12:00	6	9704	0.048	6	9704	0.043	6	9704	0.091
12:00 - 12:30	6	9704	0.046	6	9704	0.076	6	9704	0.122
12:30 - 13:00	6	9704	0.086	6	9704	0.100	6	9704	0.186
13:00 - 13:30	6	9704	0.070	6	9704	0.070	6	9704	0.140
13:30 - 14:00	6	9704	0.088	6	9704	0.067	6	9704	0.155
14:00 - 14:30	6	9704	0.040	6	9704	0.048	6	9704	0.088
14:30 - 15:00	6	9704	0.043	6	9704	0.074	6	9704	0.117
15:00 - 15:30	6	9704	0.041	6	9704	0.058	6	9704	0.099
15:30 - 16:00	6	9704	0.026	6	9704	0.074	6	9704	0.100
16:00 - 16:30	6	9704	0.024	6	9704	0.160	6	9704	0.184
16:30 - 17:00	6	9704	0.046	6	9704	0.143	6	9704	0.189
17:00 - 17:30	6	9704	0.024	6	9704	0.330	6	9704	0.354
17:30 - 18:00	6	9704	0.017	6	9704	0.187	6	9704	0.204
18:00 - 18:30	6	9704	0.005	6	9704	0.101	6	9704	0.106
18:30 - 19:00	6	9704	0.003	6	9704	0.053	6	9704	0.056
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.987			1.933			3.920

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	2600 - 39230 (units: sqm)
Survey date date range:	01/01/10 - 12/09/17
Number of weekdays (Monday-Friday):	6
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	3
Surveys manually removed from selection:	6

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TAXIS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
07:30 - 08:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
08:00 - 08:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
08:30 - 09:00	6	9704	0.009	6	9704	0.007	6	9704	0.016
09:00 - 09:30	6	9704	0.007	6	9704	0.010	6	9704	0.017
09:30 - 10:00	6	9704	0.003	6	9704	0.003	6	9704	0.006
10:00 - 10:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
10:30 - 11:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
11:00 - 11:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
11:30 - 12:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
12:00 - 12:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:30 - 13:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:00 - 13:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:30 - 14:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:00 - 14:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:30 - 15:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:00 - 15:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
15:30 - 16:00	6	9704	0.005	6	9704	0.005	6	9704	0.010
16:00 - 16:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
16:30 - 17:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
17:00 - 17:30	6	9704	0.010	6	9704	0.007	6	9704	0.017
17:30 - 18:00	6	9704	0.002	6	9704	0.005	6	9704	0.007
18:00 - 18:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:30 - 19:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.046			0.047			0.093

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
07:30 - 08:00	6	9704	0.002	6	9704	0.000	6	9704	0.002
08:00 - 08:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
08:30 - 09:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
09:00 - 09:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
09:30 - 10:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
10:00 - 10:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
10:30 - 11:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
11:00 - 11:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
11:30 - 12:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:00 - 12:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:30 - 13:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:00 - 13:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:30 - 14:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:00 - 14:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
14:30 - 15:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:00 - 15:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:30 - 16:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
16:00 - 16:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
16:30 - 17:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
17:00 - 17:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
17:30 - 18:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:00 - 18:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:30 - 19:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.014			0.014			0.028

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL PSVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
07:30 - 08:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
08:00 - 08:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
08:30 - 09:00	6	9704	0.003	6	9704	0.000	6	9704	0.003
09:00 - 09:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
09:30 - 10:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
10:00 - 10:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
10:30 - 11:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
11:00 - 11:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
11:30 - 12:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:00 - 12:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:30 - 13:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:00 - 13:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:30 - 14:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:00 - 14:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:30 - 15:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:00 - 15:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:30 - 16:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
16:00 - 16:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
16:30 - 17:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
17:00 - 17:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
17:30 - 18:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:00 - 18:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:30 - 19:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.007			0.004			0.011

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL CYCLISTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
07:30 - 08:00	6	9704	0.005	6	9704	0.002	6	9704	0.007
08:00 - 08:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
08:30 - 09:00	6	9704	0.022	6	9704	0.000	6	9704	0.022
09:00 - 09:30	6	9704	0.005	6	9704	0.000	6	9704	0.005
09:30 - 10:00	6	9704	0.002	6	9704	0.000	6	9704	0.002
10:00 - 10:30	6	9704	0.003	6	9704	0.000	6	9704	0.003
10:30 - 11:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
11:00 - 11:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
11:30 - 12:00	6	9704	0.003	6	9704	0.002	6	9704	0.005
12:00 - 12:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
12:30 - 13:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
13:00 - 13:30	6	9704	0.003	6	9704	0.000	6	9704	0.003
13:30 - 14:00	6	9704	0.000	6	9704	0.003	6	9704	0.003
14:00 - 14:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
14:30 - 15:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
15:00 - 15:30	6	9704	0.003	6	9704	0.002	6	9704	0.005
15:30 - 16:00	6	9704	0.000	6	9704	0.003	6	9704	0.003
16:00 - 16:30	6	9704	0.002	6	9704	0.005	6	9704	0.007
16:30 - 17:00	6	9704	0.000	6	9704	0.003	6	9704	0.003
17:00 - 17:30	6	9704	0.000	6	9704	0.007	6	9704	0.007
17:30 - 18:00	6	9704	0.000	6	9704	0.010	6	9704	0.010
18:00 - 18:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
18:30 - 19:00	6	9704	0.002	6	9704	0.003	6	9704	0.005
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.056			0.052			0.108

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.081	6	9704	0.003	6	9704	0.084
07:30 - 08:00	6	9704	0.196	6	9704	0.005	6	9704	0.201
08:00 - 08:30	6	9704	0.313	6	9704	0.031	6	9704	0.344
08:30 - 09:00	6	9704	0.380	6	9704	0.057	6	9704	0.437
09:00 - 09:30	6	9704	0.261	6	9704	0.055	6	9704	0.316
09:30 - 10:00	6	9704	0.112	6	9704	0.052	6	9704	0.164
10:00 - 10:30	6	9704	0.082	6	9704	0.055	6	9704	0.137
10:30 - 11:00	6	9704	0.058	6	9704	0.060	6	9704	0.118
11:00 - 11:30	6	9704	0.045	6	9704	0.038	6	9704	0.083
11:30 - 12:00	6	9704	0.058	6	9704	0.050	6	9704	0.108
12:00 - 12:30	6	9704	0.052	6	9704	0.094	6	9704	0.146
12:30 - 13:00	6	9704	0.106	6	9704	0.113	6	9704	0.219
13:00 - 13:30	6	9704	0.081	6	9704	0.089	6	9704	0.170
13:30 - 14:00	6	9704	0.108	6	9704	0.069	6	9704	0.177
14:00 - 14:30	6	9704	0.057	6	9704	0.062	6	9704	0.119
14:30 - 15:00	6	9704	0.043	6	9704	0.081	6	9704	0.124
15:00 - 15:30	6	9704	0.045	6	9704	0.070	6	9704	0.115
15:30 - 16:00	6	9704	0.024	6	9704	0.088	6	9704	0.112
16:00 - 16:30	6	9704	0.033	6	9704	0.175	6	9704	0.208
16:30 - 17:00	6	9704	0.053	6	9704	0.158	6	9704	0.211
17:00 - 17:30	6	9704	0.038	6	9704	0.385	6	9704	0.423
17:30 - 18:00	6	9704	0.012	6	9704	0.210	6	9704	0.222
18:00 - 18:30	6	9704	0.007	6	9704	0.103	6	9704	0.110
18:30 - 19:00	6	9704	0.002	6	9704	0.058	6	9704	0.060
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			2.247			2.161			4.408

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL PEDESTRIANS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.017	6	9704	0.007	6	9704	0.024
07:30 - 08:00	6	9704	0.034	6	9704	0.000	6	9704	0.034
08:00 - 08:30	6	9704	0.048	6	9704	0.007	6	9704	0.055
08:30 - 09:00	6	9704	0.064	6	9704	0.010	6	9704	0.074
09:00 - 09:30	6	9704	0.058	6	9704	0.015	6	9704	0.073
09:30 - 10:00	6	9704	0.046	6	9704	0.014	6	9704	0.060
10:00 - 10:30	6	9704	0.022	6	9704	0.026	6	9704	0.048
10:30 - 11:00	6	9704	0.021	6	9704	0.029	6	9704	0.050
11:00 - 11:30	6	9704	0.027	6	9704	0.022	6	9704	0.049
11:30 - 12:00	6	9704	0.027	6	9704	0.060	6	9704	0.087
12:00 - 12:30	6	9704	0.098	6	9704	0.160	6	9704	0.258
12:30 - 13:00	6	9704	0.158	6	9704	0.182	6	9704	0.340
13:00 - 13:30	6	9704	0.172	6	9704	0.117	6	9704	0.289
13:30 - 14:00	6	9704	0.143	6	9704	0.070	6	9704	0.213
14:00 - 14:30	6	9704	0.098	6	9704	0.048	6	9704	0.146
14:30 - 15:00	6	9704	0.036	6	9704	0.034	6	9704	0.070
15:00 - 15:30	6	9704	0.026	6	9704	0.012	6	9704	0.038
15:30 - 16:00	6	9704	0.019	6	9704	0.021	6	9704	0.040
16:00 - 16:30	6	9704	0.003	6	9704	0.027	6	9704	0.030
16:30 - 17:00	6	9704	0.005	6	9704	0.033	6	9704	0.038
17:00 - 17:30	6	9704	0.009	6	9704	0.081	6	9704	0.090
17:30 - 18:00	6	9704	0.012	6	9704	0.082	6	9704	0.094
18:00 - 18:30	6	9704	0.005	6	9704	0.033	6	9704	0.038
18:30 - 19:00	6	9704	0.005	6	9704	0.015	6	9704	0.020
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.153			1.105			2.258

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL BUS/TRAM PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
07:30 - 08:00	6	9704	0.017	6	9704	0.000	6	9704	0.017
08:00 - 08:30	6	9704	0.038	6	9704	0.000	6	9704	0.038
08:30 - 09:00	6	9704	0.017	6	9704	0.000	6	9704	0.017
09:00 - 09:30	6	9704	0.021	6	9704	0.005	6	9704	0.026
09:30 - 10:00	6	9704	0.014	6	9704	0.002	6	9704	0.016
10:00 - 10:30	6	9704	0.005	6	9704	0.003	6	9704	0.008
10:30 - 11:00	6	9704	0.000	6	9704	0.005	6	9704	0.005
11:00 - 11:30	6	9704	0.002	6	9704	0.003	6	9704	0.005
11:30 - 12:00	6	9704	0.002	6	9704	0.005	6	9704	0.007
12:00 - 12:30	6	9704	0.007	6	9704	0.005	6	9704	0.012
12:30 - 13:00	6	9704	0.002	6	9704	0.005	6	9704	0.007
13:00 - 13:30	6	9704	0.002	6	9704	0.009	6	9704	0.011
13:30 - 14:00	6	9704	0.003	6	9704	0.005	6	9704	0.008
14:00 - 14:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
14:30 - 15:00	6	9704	0.002	6	9704	0.007	6	9704	0.009
15:00 - 15:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
15:30 - 16:00	6	9704	0.003	6	9704	0.002	6	9704	0.005
16:00 - 16:30	6	9704	0.002	6	9704	0.009	6	9704	0.011
16:30 - 17:00	6	9704	0.003	6	9704	0.015	6	9704	0.018
17:00 - 17:30	6	9704	0.000	6	9704	0.029	6	9704	0.029
17:30 - 18:00	6	9704	0.000	6	9704	0.022	6	9704	0.022
18:00 - 18:30	6	9704	0.000	6	9704	0.009	6	9704	0.009
18:30 - 19:00	6	9704	0.002	6	9704	0.000	6	9704	0.002
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.144			0.144			0.288

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.003	6	9704	0.003	6	9704	0.006
07:30 - 08:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
08:00 - 08:30	6	9704	0.015	6	9704	0.010	6	9704	0.025
08:30 - 09:00	6	9704	0.033	6	9704	0.002	6	9704	0.035
09:00 - 09:30	6	9704	0.012	6	9704	0.000	6	9704	0.012
09:30 - 10:00	6	9704	0.010	6	9704	0.003	6	9704	0.013
10:00 - 10:30	6	9704	0.002	6	9704	0.002	6	9704	0.004
10:30 - 11:00	6	9704	0.000	6	9704	0.003	6	9704	0.003
11:00 - 11:30	6	9704	0.005	6	9704	0.000	6	9704	0.005
11:30 - 12:00	6	9704	0.003	6	9704	0.002	6	9704	0.005
12:00 - 12:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:30 - 13:00	6	9704	0.002	6	9704	0.002	6	9704	0.004
13:00 - 13:30	6	9704	0.002	6	9704	0.000	6	9704	0.002
13:30 - 14:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
14:00 - 14:30	6	9704	0.007	6	9704	0.002	6	9704	0.009
14:30 - 15:00	6	9704	0.000	6	9704	0.002	6	9704	0.002
15:00 - 15:30	6	9704	0.000	6	9704	0.007	6	9704	0.007
15:30 - 16:00	6	9704	0.003	6	9704	0.010	6	9704	0.013
16:00 - 16:30	6	9704	0.000	6	9704	0.009	6	9704	0.009
16:30 - 17:00	6	9704	0.000	6	9704	0.005	6	9704	0.005
17:00 - 17:30	6	9704	0.003	6	9704	0.026	6	9704	0.029
17:30 - 18:00	6	9704	0.000	6	9704	0.015	6	9704	0.015
18:00 - 18:30	6	9704	0.000	6	9704	0.002	6	9704	0.002
18:30 - 19:00	6	9704	0.002	6	9704	0.005	6	9704	0.007
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.104			0.114			0.218

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL COACH PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
07:30 - 08:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
08:00 - 08:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
08:30 - 09:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
09:00 - 09:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
09:30 - 10:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
10:00 - 10:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
10:30 - 11:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
11:00 - 11:30	6	9704	0.002	6	9704	0.022	6	9704	0.024
11:30 - 12:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:00 - 12:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
12:30 - 13:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:00 - 13:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
13:30 - 14:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:00 - 14:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
14:30 - 15:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:00 - 15:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
15:30 - 16:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
16:00 - 16:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
16:30 - 17:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
17:00 - 17:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
17:30 - 18:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:00 - 18:30	6	9704	0.000	6	9704	0.000	6	9704	0.000
18:30 - 19:00	6	9704	0.000	6	9704	0.000	6	9704	0.000
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.002			0.022			0.024

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.005	6	9704	0.003	6	9704	0.008
07:30 - 08:00	6	9704	0.019	6	9704	0.002	6	9704	0.021
08:00 - 08:30	6	9704	0.053	6	9704	0.010	6	9704	0.063
08:30 - 09:00	6	9704	0.050	6	9704	0.002	6	9704	0.052
09:00 - 09:30	6	9704	0.033	6	9704	0.005	6	9704	0.038
09:30 - 10:00	6	9704	0.024	6	9704	0.005	6	9704	0.029
10:00 - 10:30	6	9704	0.007	6	9704	0.005	6	9704	0.012
10:30 - 11:00	6	9704	0.000	6	9704	0.009	6	9704	0.009
11:00 - 11:30	6	9704	0.009	6	9704	0.026	6	9704	0.035
11:30 - 12:00	6	9704	0.005	6	9704	0.007	6	9704	0.012
12:00 - 12:30	6	9704	0.007	6	9704	0.005	6	9704	0.012
12:30 - 13:00	6	9704	0.003	6	9704	0.007	6	9704	0.010
13:00 - 13:30	6	9704	0.003	6	9704	0.009	6	9704	0.012
13:30 - 14:00	6	9704	0.003	6	9704	0.007	6	9704	0.010
14:00 - 14:30	6	9704	0.007	6	9704	0.003	6	9704	0.010
14:30 - 15:00	6	9704	0.002	6	9704	0.009	6	9704	0.011
15:00 - 15:30	6	9704	0.000	6	9704	0.009	6	9704	0.009
15:30 - 16:00	6	9704	0.007	6	9704	0.012	6	9704	0.019
16:00 - 16:30	6	9704	0.002	6	9704	0.017	6	9704	0.019
16:30 - 17:00	6	9704	0.003	6	9704	0.021	6	9704	0.024
17:00 - 17:30	6	9704	0.003	6	9704	0.055	6	9704	0.058
17:30 - 18:00	6	9704	0.000	6	9704	0.038	6	9704	0.038
18:00 - 18:30	6	9704	0.000	6	9704	0.010	6	9704	0.010
18:30 - 19:00	6	9704	0.003	6	9704	0.005	6	9704	0.008
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.248			0.281			0.529

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	6	9704	0.105	6	9704	0.014	6	9704	0.119
07:30 - 08:00	6	9704	0.254	6	9704	0.009	6	9704	0.263
08:00 - 08:30	6	9704	0.416	6	9704	0.048	6	9704	0.464
08:30 - 09:00	6	9704	0.515	6	9704	0.069	6	9704	0.584
09:00 - 09:30	6	9704	0.357	6	9704	0.076	6	9704	0.433
09:30 - 10:00	6	9704	0.184	6	9704	0.070	6	9704	0.254
10:00 - 10:30	6	9704	0.115	6	9704	0.086	6	9704	0.201
10:30 - 11:00	6	9704	0.079	6	9704	0.100	6	9704	0.179
11:00 - 11:30	6	9704	0.081	6	9704	0.086	6	9704	0.167
11:30 - 12:00	6	9704	0.094	6	9704	0.119	6	9704	0.213
12:00 - 12:30	6	9704	0.158	6	9704	0.261	6	9704	0.419
12:30 - 13:00	6	9704	0.268	6	9704	0.304	6	9704	0.572
13:00 - 13:30	6	9704	0.259	6	9704	0.215	6	9704	0.474
13:30 - 14:00	6	9704	0.254	6	9704	0.149	6	9704	0.403
14:00 - 14:30	6	9704	0.161	6	9704	0.115	6	9704	0.276
14:30 - 15:00	6	9704	0.081	6	9704	0.125	6	9704	0.206
15:00 - 15:30	6	9704	0.074	6	9704	0.093	6	9704	0.167
15:30 - 16:00	6	9704	0.050	6	9704	0.124	6	9704	0.174
16:00 - 16:30	6	9704	0.040	6	9704	0.225	6	9704	0.265
16:30 - 17:00	6	9704	0.062	6	9704	0.215	6	9704	0.277
17:00 - 17:30	6	9704	0.050	6	9704	0.527	6	9704	0.577
17:30 - 18:00	6	9704	0.024	6	9704	0.340	6	9704	0.364
18:00 - 18:30	6	9704	0.012	6	9704	0.148	6	9704	0.160
18:30 - 19:00	6	9704	0.012	6	9704	0.082	6	9704	0.094
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			3.705			3.600			7.305

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Calculation Reference: AUDIT-701009-180726-0704

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : C - INDUSTRIAL UNIT
MULTI-MODAL VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	DV	DEVON	1 days
06	WEST MIDLANDS		
	HE	HEREFORDSHIRE	1 days
	WM	WEST MIDLANDS	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area
Actual Range: 1880 to 5070 (units: sqm)
Range Selected by User: 1068 to 43325 (units: sqm)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 06/07/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Tuesday	2 days
Thursday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	3 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	1
Edge of Town	2

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Industrial Zone	2
Commercial Zone	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

B1	1 days
B2	2 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Secondary Filtering selection (Cont.):

Population within 1 mile:

10,001 to 15,000	2 days
15,001 to 20,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

50,001 to 75,000	1 days
125,001 to 250,000	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	3 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	3 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 DV-02-C-02 ENERGY RECOVERY FACILITY DEVON
GRACE ROAD SOUTH
EXETER
MARSH BARTON TRAD. EST.
Suburban Area (PPS6 Out of Centre)
Industrial Zone
Total Gross floor area: 3513 sqm
Survey date: THURSDAY 06/07/17 Survey Type: MANUAL

2 HE-02-C-02 THERMAL PROCESSING HEREFORDSHIRE
COLLEGE ROAD
HEREFORD
BURCOTT
Edge of Town
Commercial Zone
Total Gross floor area: 1880 sqm
Survey date: TUESDAY 22/10/13 Survey Type: MANUAL

3 WM-02-C-03 INDUSTRIAL GLASS WEST MIDLANDS
DOWNING STREET
SMETHWICK

Edge of Town
Industrial Zone
Total Gross floor area: 5070 sqm
Survey date: TUESDAY 06/11/12 Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
CF-02-C-02	Bakery

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.162	3	3488	0.057	3	3488	0.219
08:00 - 09:00	3	3488	0.182	3	3488	0.124	3	3488	0.306
09:00 - 10:00	3	3488	0.325	3	3488	0.134	3	3488	0.459
10:00 - 11:00	3	3488	0.096	3	3488	0.086	3	3488	0.182
11:00 - 12:00	3	3488	0.143	3	3488	0.124	3	3488	0.267
12:00 - 13:00	3	3488	0.220	3	3488	0.229	3	3488	0.449
13:00 - 14:00	3	3488	0.105	3	3488	0.124	3	3488	0.229
14:00 - 15:00	3	3488	0.086	3	3488	0.076	3	3488	0.162
15:00 - 16:00	3	3488	0.105	3	3488	0.124	3	3488	0.229
16:00 - 17:00	3	3488	0.048	3	3488	0.306	3	3488	0.354
17:00 - 18:00	3	3488	0.019	3	3488	0.124	3	3488	0.143
18:00 - 19:00	3	3488	0.048	3	3488	0.076	3	3488	0.124
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.539			1.584			3.123

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	1880 - 5070 (units: sqm)
Survey date date range:	01/01/10 - 06/07/17
Number of weekdays (Monday-Friday):	3
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	1

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.057	3	3488	0.048	3	3488	0.105
08:00 - 09:00	3	3488	0.105	3	3488	0.086	3	3488	0.191
09:00 - 10:00	3	3488	0.105	3	3488	0.096	3	3488	0.201
10:00 - 11:00	3	3488	0.010	3	3488	0.029	3	3488	0.039
11:00 - 12:00	3	3488	0.076	3	3488	0.067	3	3488	0.143
12:00 - 13:00	3	3488	0.153	3	3488	0.191	3	3488	0.344
13:00 - 14:00	3	3488	0.096	3	3488	0.086	3	3488	0.182
14:00 - 15:00	3	3488	0.048	3	3488	0.038	3	3488	0.086
15:00 - 16:00	3	3488	0.057	3	3488	0.057	3	3488	0.114
16:00 - 17:00	3	3488	0.019	3	3488	0.048	3	3488	0.067
17:00 - 18:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
18:00 - 19:00	3	3488	0.010	3	3488	0.000	3	3488	0.010
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.736			0.746			1.482

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL CYCLISTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
08:00 - 09:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
09:00 - 10:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
10:00 - 11:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
11:00 - 12:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
12:00 - 13:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
13:00 - 14:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
14:00 - 15:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
15:00 - 16:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
16:00 - 17:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
17:00 - 18:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
18:00 - 19:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.000			0.020			0.020

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.201	3	3488	0.057	3	3488	0.258
08:00 - 09:00	3	3488	0.229	3	3488	0.124	3	3488	0.353
09:00 - 10:00	3	3488	0.459	3	3488	0.201	3	3488	0.660
10:00 - 11:00	3	3488	0.124	3	3488	0.096	3	3488	0.220
11:00 - 12:00	3	3488	0.201	3	3488	0.182	3	3488	0.383
12:00 - 13:00	3	3488	0.392	3	3488	0.363	3	3488	0.755
13:00 - 14:00	3	3488	0.143	3	3488	0.162	3	3488	0.305
14:00 - 15:00	3	3488	0.105	3	3488	0.096	3	3488	0.201
15:00 - 16:00	3	3488	0.153	3	3488	0.229	3	3488	0.382
16:00 - 17:00	3	3488	0.067	3	3488	0.430	3	3488	0.497
17:00 - 18:00	3	3488	0.019	3	3488	0.134	3	3488	0.153
18:00 - 19:00	3	3488	0.067	3	3488	0.076	3	3488	0.143
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.160			2.150			4.310

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL PEDESTRIANS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.010	3	3488	0.010	3	3488	0.020
08:00 - 09:00	3	3488	0.010	3	3488	0.000	3	3488	0.010
09:00 - 10:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
10:00 - 11:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
11:00 - 12:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
12:00 - 13:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
13:00 - 14:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
14:00 - 15:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
15:00 - 16:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
16:00 - 17:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
17:00 - 18:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
18:00 - 19:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.020			0.040			0.060

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL TOTAL RAIL PASSENGERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
08:00 - 09:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
09:00 - 10:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
10:00 - 11:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
11:00 - 12:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
12:00 - 13:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
13:00 - 14:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
14:00 - 15:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
15:00 - 16:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
16:00 - 17:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
17:00 - 18:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
18:00 - 19:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.000			0.010			0.010

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
08:00 - 09:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
09:00 - 10:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
10:00 - 11:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
11:00 - 12:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
12:00 - 13:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
13:00 - 14:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
14:00 - 15:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
15:00 - 16:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
16:00 - 17:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
17:00 - 18:00	3	3488	0.000	3	3488	0.010	3	3488	0.010
18:00 - 19:00	3	3488	0.000	3	3488	0.000	3	3488	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.000			0.010			0.010

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	3488	0.210	3	3488	0.067	3	3488	0.277
08:00 - 09:00	3	3488	0.239	3	3488	0.124	3	3488	0.363
09:00 - 10:00	3	3488	0.459	3	3488	0.201	3	3488	0.660
10:00 - 11:00	3	3488	0.124	3	3488	0.105	3	3488	0.229
11:00 - 12:00	3	3488	0.201	3	3488	0.182	3	3488	0.383
12:00 - 13:00	3	3488	0.392	3	3488	0.373	3	3488	0.765
13:00 - 14:00	3	3488	0.143	3	3488	0.162	3	3488	0.305
14:00 - 15:00	3	3488	0.105	3	3488	0.096	3	3488	0.201
15:00 - 16:00	3	3488	0.153	3	3488	0.229	3	3488	0.382
16:00 - 17:00	3	3488	0.067	3	3488	0.449	3	3488	0.516
17:00 - 18:00	3	3488	0.019	3	3488	0.143	3	3488	0.162
18:00 - 19:00	3	3488	0.067	3	3488	0.086	3	3488	0.153
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.179			2.217			4.396

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Calculation Reference: AUDIT-701009-180726-0748

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : F - WAREHOUSING (COMMERCIAL)
MULTI-MODAL VEHICLES

Selected regions and areas:

05	EAST MIDLANDS		
	LN	LINCOLNSHIRE	1 days
09	NORTH		
	CB	CUMBRIA	1 days
17	ULSTER (NORTHERN IRELAND)		
	AN	ANTRIM	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter:	Gross floor area
Actual Range:	2950 to 32300 (units: sqm)
Range Selected by User:	2950 to 80066 (units: sqm)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 10/06/14

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Tuesday	1 days
Thursday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	3 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	1
Edge of Town	2

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Industrial Zone	2
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

B8	3 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Secondary Filtering selection (Cont.):

Population within 1 mile:

5,001 to 10,000	1 days
10,001 to 15,000	1 days
50,001 to 100,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	1 days
25,001 to 50,000	1 days
250,001 to 500,000	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	2 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	3 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 AN-02-F-02 DISTRIBUTION CENTRE ANTRIM
APOLLO ROAD
BELFAST

Suburban Area (PPS6 Out of Centre)
Industrial Zone
Total Gross floor area: 10832 sqm
Survey date: THURSDAY 29/07/10 Survey Type: MANUAL

2 CB-02-F-01 DOMINO'S PIZZA CUMBRIA
COWPER ROAD
PENRITH
GILWILLY IND. ESTATE
Edge of Town
Industrial Zone
Total Gross floor area: 2950 sqm
Survey date: TUESDAY 10/06/14 Survey Type: MANUAL

3 LN-02-F-01 BOOK SERVICE LINCOLNSHIRE
TRENT ROAD
GRANTHAM

Edge of Town
No Sub Category
Total Gross floor area: 32300 sqm
Survey date: MONDAY 29/11/10 Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.102	1	2950	0.000	1	2950	0.102
06:00 - 06:30	1	2950	0.034	1	2950	0.000	1	2950	0.034
06:30 - 07:00	1	2950	0.102	1	2950	0.034	1	2950	0.136
07:00 - 07:30	3	15361	0.033	3	15361	0.078	3	15361	0.111
07:30 - 08:00	3	15361	0.050	3	15361	0.035	3	15361	0.085
08:00 - 08:30	3	15361	0.052	3	15361	0.028	3	15361	0.080
08:30 - 09:00	3	15361	0.063	3	15361	0.020	3	15361	0.083
09:00 - 09:30	3	15361	0.030	3	15361	0.035	3	15361	0.065
09:30 - 10:00	3	15361	0.030	3	15361	0.033	3	15361	0.063
10:00 - 10:30	3	15361	0.041	3	15361	0.035	3	15361	0.076
10:30 - 11:00	3	15361	0.022	3	15361	0.015	3	15361	0.037
11:00 - 11:30	3	15361	0.017	3	15361	0.033	3	15361	0.050
11:30 - 12:00	3	15361	0.015	3	15361	0.013	3	15361	0.028
12:00 - 12:30	3	15361	0.028	3	15361	0.026	3	15361	0.054
12:30 - 13:00	3	15361	0.033	3	15361	0.015	3	15361	0.048
13:00 - 13:30	3	15361	0.054	3	15361	0.028	3	15361	0.082
13:30 - 14:00	3	15361	0.074	3	15361	0.028	3	15361	0.102
14:00 - 14:30	3	15361	0.046	3	15361	0.089	3	15361	0.135
14:30 - 15:00	3	15361	0.076	3	15361	0.072	3	15361	0.148
15:00 - 15:30	3	15361	0.026	3	15361	0.065	3	15361	0.091
15:30 - 16:00	3	15361	0.013	3	15361	0.030	3	15361	0.043
16:00 - 16:30	3	15361	0.020	3	15361	0.054	3	15361	0.074
16:30 - 17:00	3	15361	0.011	3	15361	0.030	3	15361	0.041
17:00 - 17:30	3	15361	0.013	3	15361	0.026	3	15361	0.039
17:30 - 18:00	3	15361	0.017	3	15361	0.024	3	15361	0.041
18:00 - 18:30	3	15361	0.022	3	15361	0.041	3	15361	0.063
18:30 - 19:00	3	15361	0.011	3	15361	0.015	3	15361	0.026
19:00 - 19:30	1	2950	0.169	1	2950	0.102	1	2950	0.271
19:30 - 20:00	1	2950	0.034	1	2950	0.102	1	2950	0.136
20:00 - 20:30	1	2950	0.034	1	2950	0.034	1	2950	0.068
20:30 - 21:00	1	2950	0.068	1	2950	0.102	1	2950	0.170
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.340			1.242			2.582

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected:	2950 - 32300 (units: sqm)
Survey date date range:	01/01/10 - 10/06/14
Number of weekdays (Monday-Friday):	3
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
MULTI-MODAL OGVS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:00 - 06:30	1	2950	0.034	1	2950	0.000	1	2950	0.034
06:30 - 07:00	1	2950	0.034	1	2950	0.000	1	2950	0.034
07:00 - 07:30	3	15361	0.015	3	15361	0.013	3	15361	0.028
07:30 - 08:00	3	15361	0.009	3	15361	0.026	3	15361	0.035
08:00 - 08:30	3	15361	0.022	3	15361	0.017	3	15361	0.039
08:30 - 09:00	3	15361	0.024	3	15361	0.015	3	15361	0.039
09:00 - 09:30	3	15361	0.007	3	15361	0.020	3	15361	0.027
09:30 - 10:00	3	15361	0.009	3	15361	0.020	3	15361	0.029
10:00 - 10:30	3	15361	0.030	3	15361	0.015	3	15361	0.045
10:30 - 11:00	3	15361	0.009	3	15361	0.011	3	15361	0.020
11:00 - 11:30	3	15361	0.015	3	15361	0.022	3	15361	0.037
11:30 - 12:00	3	15361	0.009	3	15361	0.004	3	15361	0.013
12:00 - 12:30	3	15361	0.007	3	15361	0.009	3	15361	0.016
12:30 - 13:00	3	15361	0.015	3	15361	0.007	3	15361	0.022
13:00 - 13:30	3	15361	0.017	3	15361	0.011	3	15361	0.028
13:30 - 14:00	3	15361	0.028	3	15361	0.011	3	15361	0.039
14:00 - 14:30	3	15361	0.017	3	15361	0.020	3	15361	0.037
14:30 - 15:00	3	15361	0.015	3	15361	0.011	3	15361	0.026
15:00 - 15:30	3	15361	0.022	3	15361	0.017	3	15361	0.039
15:30 - 16:00	3	15361	0.011	3	15361	0.011	3	15361	0.022
16:00 - 16:30	3	15361	0.013	3	15361	0.013	3	15361	0.026
16:30 - 17:00	3	15361	0.007	3	15361	0.004	3	15361	0.011
17:00 - 17:30	3	15361	0.013	3	15361	0.011	3	15361	0.024
17:30 - 18:00	3	15361	0.013	3	15361	0.007	3	15361	0.020
18:00 - 18:30	3	15361	0.004	3	15361	0.009	3	15361	0.013
18:30 - 19:00	3	15361	0.004	3	15361	0.007	3	15361	0.011
19:00 - 19:30	1	2950	0.000	1	2950	0.102	1	2950	0.102
19:30 - 20:00	1	2950	0.000	1	2950	0.102	1	2950	0.102
20:00 - 20:30	1	2950	0.000	1	2950	0.034	1	2950	0.034
20:30 - 21:00	1	2950	0.000	1	2950	0.068	1	2950	0.068
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.403			0.617			1.020

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL CYCLISTS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:00 - 06:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:30 - 07:00	1	2950	0.034	1	2950	0.000	1	2950	0.034
07:00 - 07:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
07:30 - 08:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
08:00 - 08:30	3	15361	0.002	3	15361	0.000	3	15361	0.002
08:30 - 09:00	3	15361	0.007	3	15361	0.000	3	15361	0.007
09:00 - 09:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
09:30 - 10:00	3	15361	0.004	3	15361	0.000	3	15361	0.004
10:00 - 10:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
10:30 - 11:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:00 - 11:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:30 - 12:00	3	15361	0.000	3	15361	0.002	3	15361	0.002
12:00 - 12:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
12:30 - 13:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
13:00 - 13:30	3	15361	0.002	3	15361	0.002	3	15361	0.004
13:30 - 14:00	3	15361	0.002	3	15361	0.002	3	15361	0.004
14:00 - 14:30	3	15361	0.004	3	15361	0.004	3	15361	0.008
14:30 - 15:00	3	15361	0.002	3	15361	0.002	3	15361	0.004
15:00 - 15:30	3	15361	0.000	3	15361	0.007	3	15361	0.007
15:30 - 16:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
16:00 - 16:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
16:30 - 17:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
17:00 - 17:30	3	15361	0.000	3	15361	0.004	3	15361	0.004
17:30 - 18:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
18:00 - 18:30	3	15361	0.000	3	15361	0.004	3	15361	0.004
18:30 - 19:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
19:00 - 19:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
19:30 - 20:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:00 - 20:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:30 - 21:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.057			0.027			0.084

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL VEHICLE OCCUPANTS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.136	1	2950	0.000	1	2950	0.136
06:00 - 06:30	1	2950	0.034	1	2950	0.000	1	2950	0.034
06:30 - 07:00	1	2950	0.169	1	2950	0.034	1	2950	0.203
07:00 - 07:30	3	15361	0.033	3	15361	0.091	3	15361	0.124
07:30 - 08:00	3	15361	0.052	3	15361	0.035	3	15361	0.087
08:00 - 08:30	3	15361	0.056	3	15361	0.028	3	15361	0.084
08:30 - 09:00	3	15361	0.065	3	15361	0.020	3	15361	0.085
09:00 - 09:30	3	15361	0.030	3	15361	0.041	3	15361	0.071
09:30 - 10:00	3	15361	0.035	3	15361	0.033	3	15361	0.068
10:00 - 10:30	3	15361	0.041	3	15361	0.037	3	15361	0.078
10:30 - 11:00	3	15361	0.022	3	15361	0.015	3	15361	0.037
11:00 - 11:30	3	15361	0.020	3	15361	0.033	3	15361	0.053
11:30 - 12:00	3	15361	0.015	3	15361	0.013	3	15361	0.028
12:00 - 12:30	3	15361	0.030	3	15361	0.026	3	15361	0.056
12:30 - 13:00	3	15361	0.033	3	15361	0.015	3	15361	0.048
13:00 - 13:30	3	15361	0.050	3	15361	0.028	3	15361	0.078
13:30 - 14:00	3	15361	0.076	3	15361	0.039	3	15361	0.115
14:00 - 14:30	3	15361	0.050	3	15361	0.100	3	15361	0.150
14:30 - 15:00	3	15361	0.080	3	15361	0.076	3	15361	0.156
15:00 - 15:30	3	15361	0.026	3	15361	0.074	3	15361	0.100
15:30 - 16:00	3	15361	0.013	3	15361	0.035	3	15361	0.048
16:00 - 16:30	3	15361	0.020	3	15361	0.054	3	15361	0.074
16:30 - 17:00	3	15361	0.011	3	15361	0.033	3	15361	0.044
17:00 - 17:30	3	15361	0.013	3	15361	0.028	3	15361	0.041
17:30 - 18:00	3	15361	0.020	3	15361	0.024	3	15361	0.044
18:00 - 18:30	3	15361	0.022	3	15361	0.050	3	15361	0.072
18:30 - 19:00	3	15361	0.013	3	15361	0.015	3	15361	0.028
19:00 - 19:30	1	2950	0.203	1	2950	0.102	1	2950	0.305
19:30 - 20:00	1	2950	0.034	1	2950	0.102	1	2950	0.136
20:00 - 20:30	1	2950	0.034	1	2950	0.034	1	2950	0.068
20:30 - 21:00	1	2950	0.068	1	2950	0.102	1	2950	0.170
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.504			1.317			2.821

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL PEDESTRIANS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.068	1	2950	0.000	1	2950	0.068
06:00 - 06:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:30 - 07:00	1	2950	0.068	1	2950	0.000	1	2950	0.068
07:00 - 07:30	3	15361	0.002	3	15361	0.000	3	15361	0.002
07:30 - 08:00	3	15361	0.009	3	15361	0.000	3	15361	0.009
08:00 - 08:30	3	15361	0.002	3	15361	0.000	3	15361	0.002
08:30 - 09:00	3	15361	0.013	3	15361	0.000	3	15361	0.013
09:00 - 09:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
09:30 - 10:00	3	15361	0.028	3	15361	0.000	3	15361	0.028
10:00 - 10:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
10:30 - 11:00	3	15361	0.004	3	15361	0.000	3	15361	0.004
11:00 - 11:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:30 - 12:00	3	15361	0.002	3	15361	0.000	3	15361	0.002
12:00 - 12:30	3	15361	0.009	3	15361	0.011	3	15361	0.020
12:30 - 13:00	3	15361	0.004	3	15361	0.002	3	15361	0.006
13:00 - 13:30	3	15361	0.000	3	15361	0.002	3	15361	0.002
13:30 - 14:00	3	15361	0.022	3	15361	0.004	3	15361	0.026
14:00 - 14:30	3	15361	0.009	3	15361	0.015	3	15361	0.024
14:30 - 15:00	3	15361	0.028	3	15361	0.007	3	15361	0.035
15:00 - 15:30	3	15361	0.002	3	15361	0.022	3	15361	0.024
15:30 - 16:00	3	15361	0.000	3	15361	0.007	3	15361	0.007
16:00 - 16:30	3	15361	0.000	3	15361	0.007	3	15361	0.007
16:30 - 17:00	3	15361	0.009	3	15361	0.022	3	15361	0.031
17:00 - 17:30	3	15361	0.000	3	15361	0.002	3	15361	0.002
17:30 - 18:00	3	15361	0.000	3	15361	0.002	3	15361	0.002
18:00 - 18:30	3	15361	0.004	3	15361	0.011	3	15361	0.015
18:30 - 19:00	3	15361	0.000	3	15361	0.004	3	15361	0.004
19:00 - 19:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
19:30 - 20:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:00 - 20:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:30 - 21:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.283			0.118			0.401

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL BUS/TRAM PASSENGERS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:00 - 06:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:30 - 07:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
07:00 - 07:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
07:30 - 08:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
08:00 - 08:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
08:30 - 09:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
09:00 - 09:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
09:30 - 10:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
10:00 - 10:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
10:30 - 11:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:00 - 11:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:30 - 12:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
12:00 - 12:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
12:30 - 13:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
13:00 - 13:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
13:30 - 14:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
14:00 - 14:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
14:30 - 15:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
15:00 - 15:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
15:30 - 16:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
16:00 - 16:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
16:30 - 17:00	3	15361	0.000	3	15361	0.002	3	15361	0.002
17:00 - 17:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
17:30 - 18:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
18:00 - 18:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
18:30 - 19:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
19:00 - 19:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
19:30 - 20:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:00 - 20:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:30 - 21:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.000			0.002			0.002

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL PUBLIC TRANSPORT USERS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:00 - 06:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:30 - 07:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
07:00 - 07:30	3	15361	0.002	3	15361	0.000	3	15361	0.002
07:30 - 08:00	3	15361	0.004	3	15361	0.000	3	15361	0.004
08:00 - 08:30	3	15361	0.002	3	15361	0.000	3	15361	0.002
08:30 - 09:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
09:00 - 09:30	3	15361	0.000	3	15361	0.002	3	15361	0.002
09:30 - 10:00	3	15361	0.004	3	15361	0.000	3	15361	0.004
10:00 - 10:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
10:30 - 11:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:00 - 11:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
11:30 - 12:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
12:00 - 12:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
12:30 - 13:00	3	15361	0.007	3	15361	0.000	3	15361	0.007
13:00 - 13:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
13:30 - 14:00	3	15361	0.002	3	15361	0.002	3	15361	0.004
14:00 - 14:30	3	15361	0.000	3	15361	0.004	3	15361	0.004
14:30 - 15:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
15:00 - 15:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
15:30 - 16:00	3	15361	0.000	3	15361	0.002	3	15361	0.002
16:00 - 16:30	3	15361	0.000	3	15361	0.004	3	15361	0.004
16:30 - 17:00	3	15361	0.000	3	15361	0.007	3	15361	0.007
17:00 - 17:30	3	15361	0.000	3	15361	0.000	3	15361	0.000
17:30 - 18:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
18:00 - 18:30	3	15361	0.000	3	15361	0.007	3	15361	0.007
18:30 - 19:00	3	15361	0.000	3	15361	0.000	3	15361	0.000
19:00 - 19:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
19:30 - 20:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:00 - 20:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
20:30 - 21:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			0.021			0.028			0.049

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

MULTI-MODAL TOTAL PEOPLE

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30	1	2950	0.000	1	2950	0.000	1	2950	0.000
05:30 - 06:00	1	2950	0.203	1	2950	0.000	1	2950	0.203
06:00 - 06:30	1	2950	0.034	1	2950	0.000	1	2950	0.034
06:30 - 07:00	1	2950	0.271	1	2950	0.034	1	2950	0.305
07:00 - 07:30	3	15361	0.037	3	15361	0.091	3	15361	0.128
07:30 - 08:00	3	15361	0.065	3	15361	0.035	3	15361	0.100
08:00 - 08:30	3	15361	0.063	3	15361	0.028	3	15361	0.091
08:30 - 09:00	3	15361	0.085	3	15361	0.020	3	15361	0.105
09:00 - 09:30	3	15361	0.030	3	15361	0.043	3	15361	0.073
09:30 - 10:00	3	15361	0.072	3	15361	0.033	3	15361	0.105
10:00 - 10:30	3	15361	0.041	3	15361	0.037	3	15361	0.078
10:30 - 11:00	3	15361	0.026	3	15361	0.015	3	15361	0.041
11:00 - 11:30	3	15361	0.020	3	15361	0.033	3	15361	0.053
11:30 - 12:00	3	15361	0.017	3	15361	0.015	3	15361	0.032
12:00 - 12:30	3	15361	0.039	3	15361	0.037	3	15361	0.076
12:30 - 13:00	3	15361	0.043	3	15361	0.017	3	15361	0.060
13:00 - 13:30	3	15361	0.052	3	15361	0.033	3	15361	0.085
13:30 - 14:00	3	15361	0.102	3	15361	0.048	3	15361	0.150
14:00 - 14:30	3	15361	0.063	3	15361	0.124	3	15361	0.187
14:30 - 15:00	3	15361	0.111	3	15361	0.085	3	15361	0.196
15:00 - 15:30	3	15361	0.028	3	15361	0.102	3	15361	0.130
15:30 - 16:00	3	15361	0.013	3	15361	0.043	3	15361	0.056
16:00 - 16:30	3	15361	0.020	3	15361	0.065	3	15361	0.085
16:30 - 17:00	3	15361	0.020	3	15361	0.061	3	15361	0.081
17:00 - 17:30	3	15361	0.013	3	15361	0.035	3	15361	0.048
17:30 - 18:00	3	15361	0.020	3	15361	0.026	3	15361	0.046
18:00 - 18:30	3	15361	0.026	3	15361	0.072	3	15361	0.098
18:30 - 19:00	3	15361	0.013	3	15361	0.020	3	15361	0.033
19:00 - 19:30	1	2950	0.203	1	2950	0.102	1	2950	0.305
19:30 - 20:00	1	2950	0.034	1	2950	0.102	1	2950	0.136
20:00 - 20:30	1	2950	0.034	1	2950	0.034	1	2950	0.068
20:30 - 21:00	1	2950	0.068	1	2950	0.102	1	2950	0.170
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			1.866			1.492			3.358

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Appendix C

Employment Distribution Calculation

Place of residence	Work in Cardiff 011	M4 West	M4 East	A48(M)E	A48(W)	A48(E)	Maes-Y-Bryn Road	Heol Pontprennau	Church Road	Capel Edeyrn	Pentwyn Road	Bryn Celyn Road	Circle Way	A4161 Newport Road (S)	Rover Way (South)	Ty Mawr Road	Lanrumney Avenue	Mount Pleasant Avenue	Tyr Winch Road	William Nicholls Drive	Llaneirwig Way	Wern Fawr Lane	Marshfield Road	Coal Pit Lane	Willowdene Way	Sandbrook Road	St Mellons Rd	Wentlong Avenue (west)	B4239 (east)
W02000367 : Cardiff 001	42							90%		10%																			
W02000368 : Cardiff 002	39				40%			40%				20%																	
W02000369 : Cardiff 003	83						5%	45%		40%												10%							
W02000370 : Cardiff 004	39	40%			60%																								
W02000371 : Cardiff 005	58				40%			20%				40%																	
W02000372 : Cardiff 006	57	90%			10%																								
W02000373 : Cardiff 007	117																	60%	10%			30%							
W02000374 : Cardiff 008	38										40%	60%																	
W02000375 : Cardiff 009	60									40%		50%	10%																
W02000376 : Cardiff 010	44	60%			40%																								
W02000377 : Cardiff 011	252																								45%	50%		5%	
W02000378 : Cardiff 012	37	30%			70%																								
W02000379 : Cardiff 013	213																				20%				30%	50%			
W02000380 : Cardiff 014	34	70%			30%																								
W02000381 : Cardiff 015	106																40%	60%											
W02000382 : Cardiff 016	117																				80%				5%	15%			
W02000383 : Cardiff 017	61									10%		40%	50%																
W02000384 : Cardiff 018	37				80%					10%		10%																	
W02000385 : Cardiff 019	34											50%	50%																
W02000386 : Cardiff 020	41	30%			70%																								
W02000387 : Cardiff 021	29				100%																								
W02000388 : Cardiff 022	111													5%					40%		40%					15%			
W02000389 : Cardiff 023	43	10%			90%																								
W02000390 : Cardiff 024	43											10%	90%																
W02000391 : Cardiff 025	30				100%																								
W02000392 : Cardiff 026	40	10%			90%																								
W02000393 : Cardiff 027	35	10%			90%																								
W02000394 : Cardiff 028	35				80%								20%																
W02000395 : Cardiff 029	53											10%	70%	20%															
W02000396 : Cardiff 030	51											20%	80%																
W02000397 : Cardiff 031	36				100%																								
W02000398 : Cardiff 032	19				80%										20%														
W02000399 : Cardiff 033	95													50%	50%														
W02000400 : Cardiff 034	28				100%																								
W02000401 : Cardiff 035	22				100%																								
W02000402 : Cardiff 036	52												40%	50%	10%														
W02000403 : Cardiff 037	82												5%		90%													5%	
W02000404 : Cardiff 038	37												5%		90%													5%	
W02000405 : Cardiff 039	24	30%			70%																								
W02000406 : Cardiff 040	46				100%																								
W02000407 : Cardiff 041	17	20%			80%																								
W02000408 : Cardiff 042	22				100%																								
W02000409 : Cardiff 043	29	40%			60%																								
W02000410 : Cardiff 044	40				50%										50%														
W02000411 : Cardiff 045	44	40%			60%																								
W02000412 : Cardiff 046	36				20%										80%														
W02000422 : Cardiff 048	45												10%	10%	80%														
W02000423 : Cardiff 049	33												30%		70%														
Newport	526		20%			80%																							
Vale of Glamorgan	390	70%			10%										20%														
Rhondda Cynon Taf	470	100%																											
Caerphilly	412	80%					10%																5%	5%					
Torfaen	177		20%			80%																							
Monmouthshire	108		20%			80%																							
Bridgend	236	100%																											
Bleanau Gwent	48		20%			80%																							
Neath Port Talbot	43	100%																											
Merthyr Tydfil	67	100%																											
Bristol	24		20%			80%																							
South Gloucestershire	11		20%			80%																							

Place of residence	Work in Cardiff 011	M4 West	M4 East	A48(M)E	A48(W)	A48(E)	Maes-Y-Bryn Road	Heol Pontprenau	Church Road	Capel Edeyrn	Pentwyn Road	Bryn Celyn Road	Circle Way	A4161 Newport Road (S)	Rover Way (South)	Ty Mawr Road	Lanrumney Avenue	Mount Pleasant Avenue	Tyr Winch Road	William Nicholls Drive	Llaneirwig Way	Wern Fawr Lane	Marshfield Road	Coal Pit Lane	Willowdene Way	Sandbrook Road	St Mellons Rd	Wentlong Avenue (west)	B4239 (east)	Total
W02000367 : Cardiff 001	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000368 : Cardiff 002	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000369 : Cardiff 003	2%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000370 : Cardiff 004	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000371 : Cardiff 005	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000372 : Cardiff 006	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000373 : Cardiff 007	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	2%
W02000374 : Cardiff 008	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000375 : Cardiff 009	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000376 : Cardiff 010	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000377 : Cardiff 011	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	5%
W02000378 : Cardiff 012	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000379 : Cardiff 013	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	2%	0%	0%	0%	4%
W02000380 : Cardiff 014	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000381 : Cardiff 015	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000382 : Cardiff 016	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000383 : Cardiff 017	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000384 : Cardiff 018	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000385 : Cardiff 019	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000386 : Cardiff 020	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000387 : Cardiff 021	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000388 : Cardiff 022	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000389 : Cardiff 023	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000390 : Cardiff 024	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000391 : Cardiff 025	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000392 : Cardiff 026	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000393 : Cardiff 027	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000394 : Cardiff 028	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000395 : Cardiff 029	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000396 : Cardiff 030	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000397 : Cardiff 031	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000398 : Cardiff 032	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000399 : Cardiff 033	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000400 : Cardiff 034	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000401 : Cardiff 035	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000403 : Cardiff 037	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000404 : Cardiff 038	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000405 : Cardiff 039	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000407 : Cardiff 041	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000409 : Cardiff 043	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000410 : Cardiff 044	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000411 : Cardiff 045	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000412 : Cardiff 046	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000422 : Cardiff 048	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000423 : Cardiff 049	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Newport	10%	0%	2%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%
Vale of Glamorgan	8%	5%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Rhondda Cynon Taf	9%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Caerphilly	8%	6%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Torfaen	3%	0%	1%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Monmouthshire	2%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Bridgend	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
Bleanau Gwent	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Neath Port Talbot	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Merthyr Tydfil	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Bristol	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South Gloucestershire	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	100%	31%	3%	0%	13%	14%	1%	2%	0%	1%	0%	3%	4%	2%	7%	0%	1%	3%	1%	0%	3%	1%	0%	0%	4%	5%	0%	0%	0%	100%

Appendix D

Correspondence with Cardiff Council

Minutes

ARUP

Project title	Cardiff Parkway	Job number	252199
Meeting name and number	Scoping Discussion with Cardiff Council (Highways)	File reference	Click here to enter text.
Location	Cardiff Council Offices	Time and date	10:00 14 May 2018
Purpose of meeting	Initial discussions regarding the scope of the Transport Assessment for the Cardiff Parkway development proposals		
Present	Chris Hanson (Cardiff Council) Gavin Pelley (Cardiff Council) Alex Welch (Arup) Phill Ayres (Arup)		
Apologies			
Circulation	Those present		

Action

1. Purpose of meeting

- Initial discussions to inform the preparation of the TA Scoping Note.
- Discussions will also be required with Newport CC and there could be benefit in a subsequent meeting with both Council's in attendance.

2. Planning application

- Hybrid planning application with railway station, interchange, P&R and an element of employment, with the remainder of the business park in outline.
- TA would need to assess the full quantum of development proposed, regardless of whether full or outline planning is sought.

3. Traffic surveys and study area

- Additional survey locations have been agreed with Cardiff.
- These were identified to fill in the gaps between the 15 junctions originally proposed.
- These are likely to be undertaken in the first two weeks of June, following the bank holiday.

Prepared by	Phill Ayres
Date of circulation	
Date of next meeting	

4. Background traffic growth

- Background traffic growth was excluded from initial calculations to account for the reduction in existing car trips as a result of the railway station and interchange. This approach is not proposed for the TA.
- Traffic growth factors for the TA will be calculated using TEMPro.
- To avoid double counting, alternative assumptions will be used to account for any committed development.
- Assessment scenarios will include opening year and 2026 (end of LDP period).

5. Trip generation

- TRICS will be interrogated to obtain total person trips for each land use proposed.
- A modal split will be developed for St Mellons to reflect the proposed sustainable transport improvements. A sensitivity test will also be undertaken with a more car intensive scenario.
- The proposed quantum of parking provision could be used to justify/restrict the number of vehicle trips estimated to be generated by the site.
- It is proposed to assume some trips associated with retail, food and beverage land uses are linked. Assumptions will be explained within the appropriate text.
- Park and Ride could have parking for up to 2,000 spaces, although details to be confirmed.

6. Background traffic reduction

- The proposed railway station and transport interchange will reduce the existing number of vehicle trips generated by the surrounding employment and residential development.
- Methodology to account for this will need to be developed by Arup and presented to CC for approval.

7. Distribution

- A number of data sources will be used to inform the distribution calculation including the SEWTM model, census data, surveyed traffic flows and potential travels surveys of the existing employees and St Mellons Business Park.
- SEWTM model outputs will not provide turning counts, but will identify the origin/destination of trips.

8. Committed developments

- Highways/planning will discuss and provide a list in due course.
- All strategic sites in the LDP should be included with full build-out assumed.
- Partial build-out could be assumed for an opening year scenario.
- Potential consideration/inclusion of transport interventions that may be identified in the Peter Brett 'Eastern Corridor Study' although findings may not be in public domain. Any use of the
- Contact details for David Watkins and Damian Barry have been passed to Peter Brett and they should be in contact to discuss the study.

9. Traffic impact assessment

- Two stage approach is considered acceptable and where there is limited impact, junction capacity assessments will not be required.
- The Cardiff Council SPG 'Managing Transport Impacts' includes a section on first principles that should be considered (Appendix 3 Junction Assessment Tools from First Principles).
- Individual junction models are proposed to assess traffic impact, as opposed to Paramics/micro-simulation and this approach was considered appropriate.
- It was noted that Cardiff does not have any existing models that can be utilised by the project.

10. Travel Plan

- Travel Plan will be a key component to assist in achieving a sustainable site.
- Benefit in developing a single Travel Plan for the entire site.
- Given the unknown regarding future occupiers, a Framework Travel Plan would be submitted in support of the Hybrid application.

Minutes

ARUP

Project title		Job number	252199
Meeting name and number	Traffic and Transport Update with Cardiff Council (1/2019)	File reference	
Location	Arup, Cardiff	Time and date	10:00 13 March 2019
Purpose of meeting	Provide an update on programme, deliverables and the Transport Assessment Scoping Report		
Present	Chris Hanson (Cardiff Council) Alex Welch (Arup) Hayley Al-siaidi (Arup) Gavin Pelley (Cardiff Council) Phill Ayres (Arup)		
Apologies			
Circulation	Those present		

Action

1. Programme and Deliverables

- AW provided an update on the estimated programme leading up to the submission of the planning application;
- A series of Technical Notes are proposed to be submitted prior to the submission of the planning application to seek agreement on several topics:
    - Background Traffic Growth and Committed Development
    - Base Junction Models
    - Trip Generation
    - Trip Distribution
    - Future Year Modelling and Proposed Mitigation

Arup to identify potential dates for submission of these documents

- Workshops were identified as a preferred approach to discuss the findings and seek agreement on matters identified within the TNs and discuss other matters such as the bus strategy and infrastructure proposals;
- It was agreed that the formal review periods are not required and would be subject to the content of the TNs; and
- PA noted the Technical Note on Base Junction Models was mostly complete, aside from three partial signalised roundabouts.

PA to request signal data from CC

Prepared by	Phill Ayres
Date of circulation	19 March 2019
Date of next meeting	TBC

	Action
2. Transport Assessment Scoping Report	
• PA proposed to discuss the TA Scoping Report and either agree the contents or identify which elements would need to be further explored with Technical Notes. This allows the TA Scoping exercise to conclude and outstanding matters to be agreed through a series of technical notes.	PA to amend Scoping Report and seek agreement with CC
2.1 Policy Context	
• PA noted that further consideration of the Well-being of Future Generations Act will be required for the TA; and	
• It was noted that the White Paper considering potential extension of the southern bay link road is anticipated to be published in the Spring.	
2.2 Existing Conditions	
• Potential for a walking and cycling distances/journey times to be measured on site;	HA to investigate use for mapping future scenarios
• Arup have a Movement and Insight tool which generates walking, cycling and bus isochrones;	
• Detailed Road Traffic Collisions data required for Cypress Drive and Newport Road; and	Detailed RTC data to be requested from CC
• Crashmap data sufficient for St Mellons and Wentloog Avenue to identify number and severity of collisions.	
2.3 Junction Assessment	
• Technical Note 2 will present the Base Junction Models with calibration;	PA to complete/ submit TN and arrange workshop
• CC will review model outputs in house and it is not expected that an external consultancy will be used. Review to be followed by a workshop;	
• Practical capacity should be set as 80% DoS/0.80 RFC. Junctions forecast to exceed practical capacity should be considered carefully as modelled queues can underestimate future conditions; and	
• Following review of the Base Junction Models and the estimated traffic impacts, there could be potential to remove a few junctions from the study.	
2.4 Assessment Periods	
• Future year assessment scenarios to be agreed at a workshop with CC alongside discussion of the Base Junction Models.	
2.5 Background Traffic Models	
• PA indicated that a TN will be submitted to outline the Background Traffic Growth factors. This note may explore the potential for a factor to not be applied to Cypress Drive; and	

2.6 Committed Developments

- PA presented a plan of all committed developments and indicated TN will be prepared that outlines a justification for which ones will be included/excluded.

2.7 Modal Split

- Railway Patronage Forecast has been prepared, based on outputs from the SEWTM and other sources;
- SEWTM will be used to inform estimated proportion of trips made to the site by rail;
- AW agreed to review demands and parking at Bristol Parkway to help assess modal split and parking demand;
- A bus strategy will need to be prepared to support the TA;
- Recommended first steps is initial workshops/meetings with the operators (Cardiff Bus, NAT, Stagecoach and Newport Bus);
- To be followed by workshop with CC which may include operators; and
- Outline application to identify routes with the s.106 likely to include costs for pump priming – associated with destinations rather than specific bus routes.

2.8 Trip Generation

- TN will be prepared to present and seek agreement on the trip making methodology. It was agreed this will be critical to avoid abortive work; and
- Agreed that trip rates presented in Scoping Note were quite low and will be addressed in the TN.

2.9 Trip Distribution

- SEWTM model results to heavily influence distribution.
- Google mapping exercise will also be used to inform possible routes to the site from the east.

2.10 Car Parking Methodology

- Noted that Travel Planning, proposed parking provision and trip rates/modal split will all need to be considered collectively.
- Parking provision could be used as potential method to limit traffic generation.

	Action
3. Future Workshops	
The following workshops are proposed:	
• Workshop 1: Base Junction Models review, Assessment Scenarios, Committed Developments and the A48/Cypress Drive Roundabout concept design (W/C 22 April 2019)	Date for first workshop to be agreed with CC
• Workshop 2: Background Traffic Growth and Trip Generation & Distribution (W/C 20 May 2019)	
• Workshop 3: Future Year Assessments, Potential Mitigation and Parking Strategy (W/C 17 June 2019)	
• Workshop 4: Bus Strategy, Sustainable Transport Infrastructure and Travel Planning (W/C 8 July 2019)	

Minutes

ARUP

Project title	Cardiff Parkway	Job number	252199
Meeting name and number	Cardiff Council Highways Workshop 1	File reference	
Location	Arup, Cardiff	Time and date	13:00 8 May 2019
Purpose of meeting	To discuss TA matters including: Site Accessibility; Base Junction Models Background Traffic Growth; Committed Development; and the Trip Generation and Distribution Methodology		
Present	Jason Dixon (Cardiff Council) Gavin Pelley (Cardiff Council) Alex Welch (Arup) Hayley Al-Siaidi (Arup) John Gibson (Cardiff Council) Chris Hanson (Cardiff Council) Phill Ayres (Arup)		
Apologies			
Circulation	Those present		

Action

1. Site accessibility

- HA provided an overview of maps and accessibility of the site based on existing conditions.

2. Base junction models

- PA outlined the assessment results of the base junction models presented in Technical Note 2: Base Junction Models.
- JD noted CC have received complaints regarding traffic queuing back from the A48.Cypress Drive roundabout and blocking vehicles exiting Willowdene Way on to Cypress Drive.
- CC advised that A48/Southern Way Partially Signalised Roundabout (junction13) is identified in the LDP constraints map as a strategic junction for improvements, however, no scheme has been committed.
- CC raised that bus priority measures have been implemented at B4487/A4161 Newport Road/A4232 (junction 14) which may increase junction performance since the survey was undertaken.

CC to review TN and supply comments on approach/outputs by 24/05/2019

Arup to consider this in future modelling

CC to advise if resurvey is

Prepared by	Hayley Al-siaidi
Date of circulation	
Date of next meeting	

	Action
• A bus lane is proposed on New Road which will redistribute additional traffic on to Ty-Mawr Road. Additional information required if this scheme is to be included in future year capacity assessments.	necessary to reflect improvements
• PA noted that DMRB guidance (TD 22/06) indicates that the A48 (E/B) upstream of the St Mellons off-slip should be three lanes based on the surveyed traffic flows.	
3. Committed development and background traffic growth	
• HA reviewed the committed development sites which are proposed to be separately included in background traffic growth, based on size and proximity to Cardiff Parkway.	Arup to provide map and list of committed developments for agreement with CC
• PA outlined two possible approaches to establish background traffic growth, utilising either TEMPro or SEWTM.	
• It was identified that SEWTM would not capture the origin/destination of committed development trips as it uses an assumed annual build out rate.	
• It was agreed that TEMPro would be more appropriate for the TA.	Arup to undertake sensitivity test of SEWTM outputs against agreed TEMPro approach
• A comparison between SEWTM and TEMPro outputs would be a useful sensitivity test to include in Technical Note 1: Background Traffic Growth and Committed Developments.	
4. Assessment scenarios	
• PA outlined three approaches which could be taken to identify assessment scenarios.	Arup to identify assessment years/scenarios for agreement with CC
• CH noted the phased approach taken by NE Cardiff would be preferable which included mitigation triggers, although this might not be possible for this scheme.	
• It was agreed that a phased approach would be most appropriate.	
5. Approach to trip generation and distribution (SEWTM) – business park	
• PA talked through proposed methodology for calculating the trip generation and distribution for the business district.	Arup to compare trip rates of business parks with/without ancillary uses
• PA raised possible exclusion of ancillary uses from trip rates as they will be relatively minor and are likely to be internalised. Using office/employment trip rates for these uses would therefore be robust.	Arup to discuss SEWTM bus output with Gwyn Ephraim
• Accuracy of the SEWTM bus modelling was queried.	

	Action
• AW raised the continued need to hold bus service workshops.	JG to send bus contacts to Arup (Provided)
• JD raised that Welsh Government and Leeds University have produced an interactive tool to gauge a populations propensity to cycle if facilities are improved.	JD to provide Arup report/tool
• It was agreed that the mode share for the business district could change over time and this could be reflected in assessment scenarios for each phase of development. PA noted a Travel Plan could be a mechanism for monitoring and delivering mode share targets.	
• It was agreed trips between the committed developments (residential) and the business district would be reviewed to avoid potential double counting.	

6. Railway Station

• PA talked through the proposed methodology for establishing trip generation to the railway station;	
• It was agreed that the next transport workshop should include the assumptions around the size of Park and Ride and relationship to patronage;	
• JD raised that coach operators should be consulted, in addition to local bus operators;	Arup to approach coach operators
• A survey of a similar station (such as Bristol Parkway) is required to inform the P&R / K&R assumptions;	CC to inform Arup if any other stations would be suitable for survey
• JD suggested a gravity model could be used as a high-level tool to estimate the distribution of vehicles trips that will be reassigned to rail as part of the Cardiff Parkway proposals; and	
• Cardiff Council raised that Welsh Government are a statutory consultee and will need to be consulted with prior to submission of the TA.	CC to provide Arup the appropriate WG contact

Minutes

ARUP

Project title	Cardiff Parkway	Job number	252199
Meeting name and number	Cardiff Council Highways Workshop 2	File reference	
Location	Arup, Cardiff	Time and date	10:00 12 June 2019
Purpose of meeting	To discuss TA matters including: Base Junction Models, Background Traffic Growth; Committed Development; and the Trip Generation and Distribution Methodology		
Present	Jason Dixon (Cardiff Council) Alex Welch (Arup) Hayley Al-Siaidi (Arup) John Gibson (Cardiff Council) Chris Hanson (Cardiff Council) Phill Ayres (Arup)		
Apologies	Gavin Pelley (Cardiff Council)		
Circulation	Those present, Gavin Pelley (Cardiff Council) and CPDL		

	Action
1. TN2 Junction modelling	
• No comments from those present, however Gavin Pelley (GP) has reviewed and will provide written comments.	GP to send comments to Arup
2. TN1 Committed development and background traffic growth	
• HA provided an overview of the methodology used to calculate committed development trips and background traffic growth.	
• HA explained the residential distribution calculation has been applied to all land uses associated with the NE Cardiff development as no alternative calculations were provided in the latest version of the TA that has been made available.	
• The upcoming revision to the NE Cardiff TA may include CPW as a committed development and may include more trip distribution information.	Arup to track updates to TA
• CC noted that the Churchlands development was approved following an appeal and that some of the outputs included in the TA may not have been agreed.	CC to confirm if trip rates presented in the TA were agreed

Prepared by	Hayley Al-siaidi
Date of circulation	
Date of next meeting	

	Action
• AW suggested that the trip rates presented in the Churchlands TA could be revised, should CC deem this to be appropriate. A consistent approach should however be adopted with the TA for NE Cardiff.	CC to confirm if trip rates should be revised.
• PA outlined that to eliminate double counting of commuting trips from the committed residential developments to the employment at CPW, the trips produced by CPW will be reduced by an equivalent amount – the methodology for this will be sent to CC for agreement.	PA to provide CC with methodology

• PA set out the current thinking around assessment scenarios, based on
  • 2023 station + 20,000sqm of the Business District; and
  • 2028 full build out station + 90,000sqm BD.
• CH noted that a more incremental approach being taken to the assessment of build out rates may be preferable.
• AW noted that the client may not have sufficient detail at the time of preparing the TA regarding the build-out rate to allow assessment at a more incremental rate to be assessed.
	CC to provide comments on the assessment scenarios

3. TN3 Trip Generation and Trip Distribution	
• PA talked through the trip generation and distribution methodology for the railway station and Business District.	
Railway Station	
• Discussion over possibility for the Station Demand Forecasting Report to be released to some of the CC Highways team. This is a confidential document, however CC may be able to view the document through subject to signing a NDA. • JD noted that there may be limited benefit to CC having access to this document as it could not be a material planning consideration.	CC to inform Arup if they wish to request to view report
• CH queried the proportion of existing residents that would use the station (Table 2). It was explained that park & ride journeys and local residents (arriving by sustainable modes of transport) were captured separately. • JD raised the need for comparison/checking of the peak hour trips produced (Table 2).	CC to provide feedback on sense checks
• PA outlined the use of Cardiff Central as a benchmark for the profile of arrivals/departures in peak hours from the station. • PA outlined the traffic impacts of the park & ride would be based on demand that would result in the car park becoming full at the end of the AM peak period.	Arup to investigate likelihood of this occurring and impact

	Action
• CH questioned the robustness of this assumption, and possible impact which would occur if the car park became full before the end of the AM peak period. • Discussions around the inclusion of Llanwern Station in traffic assumptions as this is likely to reduce demand for westbound park & ride journeys from Cardiff Parkway. • PA noted that the ratio of vehicle trips associated with the park & ride and kiss & ride will be finalised, following a survey of Bristol Parkway.	Arup to confirm if Llanwern Station was included in the Demand Forecasting Report
Park & Ride Distribution	
• PA outlined the SEWTM method for assigning P&R trips to stations does not account for availability of parking at each station. The calculation was therefore updated to reflect the attractiveness of a large car park at Cardiff Parkway.	Arup to present demand for Cardiff Parkway without the revised calculation
• JD questioned the impact of the updated assumption on the demand. • CH questioned the inclusion of growth specifically at the strategic site NE Cardiff, as these are likely to have a significant and concentrated effect on demand. • JD raised the possibility of considering pass by trips to the railway station.	Arup to investigate whether the distribution should be amended to reflect these committed site Arup to sense check
Business District Trip Generation and Modal Split	
• PA outlined that the masterplan has not been fixed and therefore trip rates have been presented for several potential land uses that may be included. • The proposed methodology for forecasting future travel demand included extrapolating total person trips from TRICS and estimating a modal split that reflected the proposals. • HA/PA outlined the method and assumptions used when deriving total person trips for each of the land uses in TRICS and the sites excluded. • CH queried the possibility for understanding the current trip generation of the existing St Mellons business park as a benchmark. • PA noted that the trip rates would likely be based on B1(a) office and not include B1(b) or B8. The inclusion of ancillary facilities will be considered once the masterplan is fixed. • PA outlined that travel patterns associated with the MSOA for the site (011) are not reflective of the future proposals and the rationale that has been used to calculate a revised modal split.	Arup to investigate trip generation of the existing St Mellons business park

	Action
• JD informed that Cycle Superhighways are now to be known as cycleways.	
• PA presented benchmarking exercise undertaken for the mode split with comparable sites in Cardiff.	
Business District Distribution	
• PA outlined how the SEWTM output 'flow bundles' have been used to achieve the vehicular distribution, however the SEWTM model does not pick up on trips from outside of the SEWTM modelled area.	
• PA – as new trips originating from outside of the modelled area are not included in SEWTM, a separate distribution was prepared. These trips have been distributed via M4 J30 which balances the SEWTM model assumption that all vehicles coming from the east would use the A48 via J28.	
• HA outlined that SEWTM assumed vehicles travelling via Newport Road would route via Sandbrook Road and Llaneirwg Way. This assumption has been discounted and vehicles have been rerouted via the A48/Cypress Drive roundabout.	
• CC noted that they have received complaints from residents regarding rat running through St Mellons.	
Changes in Existing Traffic	
• PA outlined how the SEWTM output 'flow difference (vehicles)' has been used to inform a reduction/increase in traffic on the road network.	CC to review outputs, PA available to assist
• PA outlined that there were several drawbacks to the outputs provided by SEWTM and some assumptions have been required, as set out in the Technical Note.	
Major events	
• Discussion around possibility of assessing event scenarios – this would require further surveys to be undertaken on an event day.	CC to inform Arup if they would like to see events modelled

Minutes

ARUP

Project title	Cardiff Parkway	Job number	252199
Meeting name and number	Highways and Access Workshop with Cardiff Council (3)	File reference	
Location	Arup, Cardiff	Time and date	14:00 28 August 2019
Purpose of meeting	Project update, review of Technical Notes 1-3, Access Strategy and Traffic Impact Assessment		
Present	Chris Hanson (Cardiff Council) Gavin Pelley (Cardiff Council) Phill Ayres (Arup)		
Apologies	Alex Welch (Arup)		
Circulation	Those present CPDL		

Action

Programme

PA noted that were some minor delays to the programme and the PAC submission would now likely be in January with the OPA being submitted in March.

North East Cardiff

CH noted that a OPA had been submitted for Cardiff Council and the planning documents should appear on the website shortly. It was noted that the traffic calculations presented in the accompanying TA had not yet been reviewed/agreed with Cardiff Council.

Technical Note 1

PA noted that a short technical note had been prepared to accompany TN1 that outlines how the double counting of trips between the proposed business district and the committed residential developments would be resolved.

GP queried whether committed development was phased for the 2023 scenario.

Post meeting note: all committed development trips (full build out) are included in both the 2023 and 2028 assessment scenarios.

Prepared by	Phill Ayres
Date of circulation	30 August 2019
Date of next meeting	TBC

Minutes

Project title	Job number	Date of Meeting
Cardiff Parkway	252199	28 August 2019

Action

Technical Note 2

GP provided some written comments on the base junction models in TN2. It was also requested that copies of the LinSig models are issued so they could be interrogated.

PA to provide all LinSig models used for TN2.

GP also noted that some junctions are located in close proximity and queries whether a linked model would be better suited to assess these junctions as a network. PA indicated that signalised junction in close proximity would be modelled using LinSig.

Technical Note 3

PA outlined the updates made to TN3 following the previous Workshop (2).

PA also noted that the survey of Bristol Parkway had been undertaken and the results had been reviewed and set out in a stand-alone Technical Note.

PA to send revised note to Cardiff Council

Pedestrian and Cycle Audit

PA noted the key findings from the pedestrian and cycle audit including:

- Footway on west side of Cypress Drive will be improved as part of the Cardiff Cycleway, however there could be benefit in provide a crossing for peds/cycles at Pascal Close;
- There is only a footway on the west side of Cypress Drive, south of the Fortran Road. Given development is not facing Cypress Drive, there is little benefit introducing a footway on the east side;
- PROW through the site cannot be walked in its current state due to reens/hedgerow, however this is proposed to be enhanced as part of the development proposals
- Improvements required to the footway in St Mellons Business Park were discussed, including Fountain Lane and the connections from the site via Cobol Road.
- A number of recreational routes were also identified, however it was noted that these were not ‘all weather’ routes, unlit and not overlooked.

Access Strategy

- **Pedestrians:** PROW to be enhanced, but a rural route will also be required. Route through to St Mellons, the existing business park and directly west of the station. Route to the west of the station will require input from landscape and ecology.

Draft

Action

- **Cycles**: Primary route proposed from the railway station to the Cardiff Cycleway for commuters – this would run through the site but avoid the main spine road. Secondary routes include a leisure route adjacent to the reen/CC land, a link from the station to the existing business park and a further one between St Mellon Road (Route 88 of the NCN) to the Cardiff Cycleway.
- **Vehicles:** Principle spine road proposed with parking accessed directly off it. Remainder of the site to be (mostly) traffic free. PA noted that a second access would not be required. CH indicated that a second access should be provided given the scale of the proposed development. This could be a bus gate which could be used by private vehicles if there was an incident on the main spine road.

Traffic Impact Assessment

Based on the current trip making assumptions, PA outlined the percentage impacts of the proposed development at each junction. As a result of the proposed station, traffic flow is anticipated to reduce at some key junctions.

PA to provide CC with a set of TIA diagrams presenting the traffic impact at each junction

Construction Traffic

PA noted that the development plots would need to be raised 1.5m, resulting in the need for a significant amount of earthwork movements.

CH noted that some junctions may need to be looked at subject to traffic volumes in the peak hours.

PA indicated a preference for a CTMP to be conditioned.

Whilst a CTMP may be conditioned, it was agreed that the TA needs to make the traffic impacts of construction clear.

Workshops

GP queried whether there would be a workshop regarding Travel Plans. PA noted that there is planned to be a workshop that addresses the Travel Plan and potential offsite sustainable infrastructure improvements. It was also noted that the detail of some of the sustainable transport links to and within the site may be considered at the reserved matters.

PA to schedule workshop once the

Appendix E

Technical Note 1: Committed Development and Background Traffic Growth

Cardiff Parkway Developments Ltd

Cardiff Hendre Lakes

Technical Note 1: Background Traffic Growth and Committed Developments

Issue | 12 June 2019

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number

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ARUP

Document verification

ARUP

Job title		Cardiff Hendre Lakes			**Job number**
Document title		Technical Note 1: Background Traffic Growth and Committed Developments			**File reference**
Document ref					
Revision	**Date**	**Filename**	TN1 Background Traffic Growth and Committed Developments.docx		
Draft 1	10 June 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Hayley Al-Siaidi	Phill Ayres	Alex Welch
		Signature			
Issue	12 June 2019	**Filename**	2019-06-12TN1 Background Traffic Growth and Committed Developments.docx		
		Description	Issue to CC		
			Prepared by	Checked by	Approved by
		Name	Hayley Al-Siaidi	Phill Ayres	Alex Welch
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document verification with document	✓

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Appendices

Appendix A

North East Cardiff distribution

Appendix B

Committed developments distribution North East of Cardiff

Appendix C

Committed developments distribution St Mellons/Trowbridge

Appendix D

Cumulative committed developments impact

Appendix E

TEMPro outputs

Appendix F

Sensitivity test % growth 2018-2028

1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals that will comprise a railway station, park and ride, transport interchange and Business District. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

It has been agreed with CC as part of the Transport Assessment scoping exercise that a series of technical notes will be prepared prior to the submission of the outline planning application. It is planned for these notes to act as a mechanism in which technical matters such as trip generation and background traffic growth can be agreed with CC prior to the submission of the planning application.

This Technical Note 1 presents the methodology used to derive background traffic growth factors and committed developments using TEMPro for the future assessment years. Following agreement with CC as the Local Highways Authority, these background traffic growth factors will be used to inform the Traffic Impact Assessment (TIA). In addition to providing information on the committed development trip generation, this note also outlines the network distribution.

1.2 Report Structure

The structure of the remainder of this report is as follows:

- Chapter 2 summarises the agreed committed developments;
- Chapter 3 presents the background traffic growth factors; and
- Chapter 4 provides a summary of the Technical Note.

2 Committed Development

There are several committed developments near the site that are considered appropriate to include in the assessment of CPW. The sites for inclusion as agreed with CC are outlined below in Table 1 and illustrated in Figure 1.

Table 1: Committed developments near Cardiff Parkway

No	Site	Type/quantum
1	West of Willowbrook Drive and south of Crickhowell Road	193 residential units
3	Land off Willowbrook Drive	70 residential units
4	H1.1 Land at areas 9-12, off Harrison Drive	150 residential units
5	H1.6 Land at former St Johns college/Greenway Road	64 residential units
6	Land adjacent to Blooms garden centre	83 residential units
7	Braunton Crescent	106 residential units
8	Land at Church Road/St Edeyrn's	1,020 residential units, ancillary community facilities including primary school and retail of up to 500 m^2
10	Land south of Church Road	150 residential units
11	North East Cardiff	2,500 residential units, schools, up to 11,550 m^2 B1 employment, and 24,000 m^2 district centre including retail, employment, care and leisure uses
12	Maelfa Centre	111 residential units and 1,155m^2 retail
13	Churchlands	1,000 residential units
Total		5,447 residential units + schools and up to 37,205 m^2 retail and employment uses

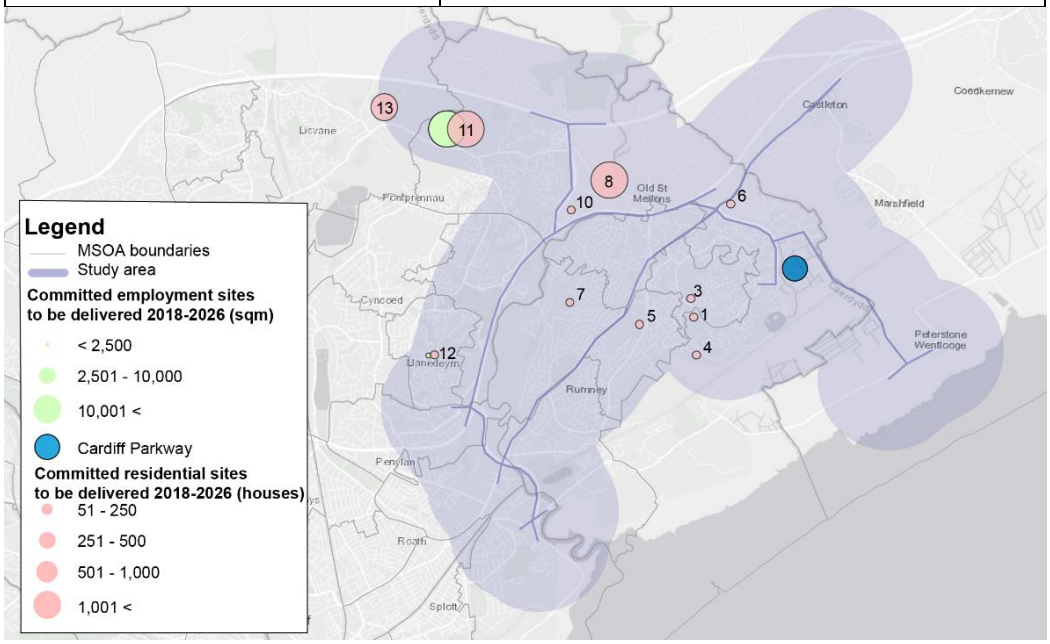


Figure 1 Committed developments near Cardiff Parkway

2.1.1 Committed Development Trip Generation

West of Willowbrook Drive and south of Crickhowell Road

Cambria Consulting prepared the approved Transport Assessment (TA) for the development of 193 residential units west of Willowbrook Drive and south of Crickhowell Road in 2016, under application reference 16/01260/MJR. The development proposals include provision of 132 privately owned dwellings and 61 affordable both of which include a proportion of flats.

The TA produced trip rates using TRICs for each of the types of accommodation to be provided and the output is included below in Table 2.

Table 2 :West of Willowbrook Drive and south of Crickhowell Road vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Privately owned units	22	49	70	36	21	57
Affordable flats	3	4	7	5	3	8
Affordable houses	5	9	13	3	5	8
Total vehicle trips	30	62	90	44	29	73

The residential development is therefore forecast to generate an additional 90 two-way trips in the AM peak hour and 73 two-way trips in the PM peak hour.

Land off Willowbrook Drive

Transport Projects produced the Transport Statement (TS) in support of development of Land off Willowbrook Drive in 2016, under application reference 16/01670/MJR. As the quantum of development was not known at the time that the TS was produced, three options were assessed for 43, 65 or 118 dwellings. For the current assessment the trip generation is based on construction of 70 dwellings as this was consented.

The trip rates included below are based on approach 2 in the TS which used total person trip rates and applied a 76% car mode share factor. This was considered more robust and used for the assessment at the time.

Table 3: Land off Willowbrook Drive vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Total person trips	19	56	76	41	18	59
Vehicle trips 76% car	15	43	58	31	14	45

As set out above, the development is anticipated to result in a net increase of 58 two-way trips in the AM peak hour and 45 two-way trips in the PM peak hour.

Land at H.1.1 Areas 9-12 off Harrison Drive

The site was identified in CC's (2016) and previous Local Plan (1996) as non-strategic housing site H1.1, with potential for development of approximately 150 dwellings. In 2006, an outline application accompanied by a TA for development of approximately 350 dwellings was approved under application reference 06/00524/E. This followed a previous successful application for development of a portion of the site.

The 2006 planning permission expired in 2011 and there is currently no active permission at the site. Therefore, trip rates from the consented Land off Willowbrook Drive have been used to inform the trip generation, and the quantum of development is based on the 150 houses outlined in the LDP.

The sites possible trip generation is included below in Table 4.

Table 4: Land at H1.1 Areas 9-12 vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Total person trips	41	121	162	89	39	128
Vehicle trips 76% car	31	92	123	67	29	96

Based on this the site has potential to attract 123 two-way vehicular trips in the AM peak hour and 97 vehicular trips in the PM peak hour.

H1.6 Land at former St Johns college/Greenway Road

The site was identified in CC's LDP (2016) as non-strategic housing site H1.6, with potential for development of approximately 64 dwellings. A TS was produced for the site by Acstro in 2014 to accompany application reference 14/00504/DCO for development of 64 homes. The application went to committee which advised the development was granted permission subject to agreement of a Section 106 agreement. A 106 agreement was not reached and therefore the permission has lapsed.

No further applications have been made at the site since 2014, and the vehicular trip rates utilised in the 2014 TS are still considered acceptable, therefore the trip rates are included in Table 5.

Table 5: H1.6 Land at former St Johns College/Greenway Road vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Vehicle trips	7	14	21	20	12	32

Based on Table 5 residential development at the site has potential to attract 21 two-way vehicular trips in the AM peak hour and 32 vehicular trips in the PM peak hour.

Land adjacent to Blooms Garden Centre

Vectos produced the TS in support of the outline planning reference 13/01172/DCO (2013) and subsequent reserved matters application reference 16/01150/MJR (2016) for land adjacent to Blooms Garden Centre.

The vehicular trip generation has been informed by the trip rates included in the outline application and development of 83 homes as set out in the reserved matters application. The subsequent vehicular trip rates are included below in Table 6.

Table 6: Land at Blooms Garden Centre vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Vehicle trips	13	38	51	34	13	47

The development is therefore forecast to result in 51 additional trips in the AM peak hour and 47 trips in the PM peak hour.

Braunton Crescent and Clevedon Road

Cambria Consulting prepared the TA for the redevelopment of land at Braunton Crescent and Clevedon Road in 2016 under application reference 16/01106/MJR. The proposals include provision of 40 affordable and 66 private houses, the TA included vehicle trip rates for each of these land uses.

The site was formerly developed as two separate sites comprising 121 council flats, however, the site was under construction at the time of the Cardiff Parkway traffic surveys, therefore, all forecast development trips will be included in the TIA for Cardiff Parkway.

The trip generation for both the two proposed house types and previous use are included below in Table 7.

Table 7: Braunton Crescent and Clevedon Road vehicular trip generation

Development	Quantum (homes)	Number of Vehicle Trips					
		AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Previous Council housing	121	11	14	25	17	11	28
Proposed private homes	66	11	24	35	18	11	29
Proposed affordable homes	40	6	13	19	4	7	11
Total proposed	106	17	37	54	22	18	39
Net impact	-15	6	23	29	5	7	11

The development is anticipated to produce 54 two-way vehicular trips in the AM peak hour and 39 vehicular trips in the PM peak hour.

Land at Church Road/St Edeyrn's

Vectos submitted a TA for development of up to 1,040 homes and a primary school on Land at Church Road/St Edeyrn's in 2013 under application reference 13/00578/DCO. The site was identified in CC's LDP as part of strategic site G which was identified as having potential to deliver 1,300 homes.

The TA considered three scenarios with 1,400 – 2,000 homes, a 10% internalisation factor and 20% mode shift applied. No trip generation was included for the proposed primary school as it was assumed school trips would be largely internal and due to the sustainable transport links provided would not have a significant impact on the external road network.

As the development was permitted for 1,020 homes the trip generation has been calculated based on this using the rates included in the TA, no internalisation factor has been applied. The resultant vehicular trips are included in Table 8.

Table 8: Land at Church Road/St Edeyrn's vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Vehicle trips	183	473	656	427	255	682

The development is anticipated to produce 656 two-way vehicular trips in the AM peak hour and 682 vehicular trips in the PM peak hour.

Land south of Church Road

WYG produced a TA for the development of 150 homes at Land south of Church Road in 2016 under application reference 16/00611/MJR. The TA was based on construction of 80 homes, however, permission was granted for construction of 150 homes under the reserved matters application reference 16/01325/MJR. Therefore, the vehicular trip generation is based on trip rates provided in the TA being applied to the development of 150 homes.

The anticipated trip generation is included below in Table 9.

Table 9: Land south of Church Road vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Vehicle trips	26	78	104	78	28	106

The development is anticipated to produce 104 two-way vehicular trips in the AM peak hour and 106 vehicular trips in the PM peak hour.

North East Cardiff

A TA was prepared by WSP in 2018 to accompany a planning application for development of up to 2,500 dwellings, B1 employment uses, schools, retail, leisure and a new district centre on land North East of Cardiff.

The site makes up part of the land identified in CC LDP as strategic site F. As the planning application has not yet been submitted the current TA was provided to Arup by CC to inform the Cardiff Parkway TIA, therefore, the trip generation included below is subject to change.

The TA includes individual trip generation rates for each of the proposed land uses and has assumed varying levels of internalisation based on each land use. The trip rates also propose a 50/50 mode split in line with CC's aspirations.

The vehicular trip rates for each land use, based on a 50/50 mode split and full build out of the site as set out in the TA have been summarised below in Table 10.

Table 10: North east Cardiff vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Residential	153	715	868	601	279	880
Employment	480	24	504	16	435	451
Primary School	22	5	27	0	1	1
Secondary School	76	30	106	5	8	13
Supermarket	43	34	77	87	90	177
Retail	62	64	126	73	73	146
Leisure	13	14	27	72	73	145

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Community Centre	0	0	0	0	0	0
Total Vehicle trips	849	886	1,735	854	959	1,813

Based on this, the site will produce 1,735 additional vehicular trips in the AM peak hour and 1,813 additional trips in the PM peak hour, the majority of which are related to the residential developments of the site.

When considering the distribution of trips from all uses at this site in section 2.2 all trips were distributed based on residential travel to work data. No alternative assumptions were presented in the TA to outline how trips were anticipated to be distributed, therefore this is a reasonable approach in this instance.

Maelfa Centre

Asbri Transport prepared the TS for redevelopment of the Maelfa Centre in 2015 under reference 15/03158/MJR. The application included redevelopment of the existing shopping centre as 1,155sqm of retail and restaurant/café/takeaway land use and 111 residential dwellings including both privately owned and affordable homes.

The anticipated trip generation rates for each of the land uses has been included below in Table 11.

Table 11: Maelfa Centre vehicular trip generation

Land use	Quantum	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Houses privately owned	16	11	22	32	20	11	31
Affordable/ local authority houses	38	2	4	6	5	3	8
Affordable/ local authority flats	57	3	3	6	4	3	7
Retail	971sqm	54	50	104	56	59	115
Take-away shops	184sqm	0	0	0	34	34	68

The primary trip generator for the site is projected to be the retail and take-away shop units. The trips associated with these land uses are likely to be localised and drawn from the residential developments to the north and west of the site. Therefore, due to the strategic nature of the A48 and surrounding routes within the Cardiff Parkway study area the retail and take-away shop trips identified will not be included within the Cardiff Parkway TIA.

Based on this, the site will produce 44 additional vehicular trips in the AM peak hour and 46 additional trips in the PM peak hour, relating to the proposed residential uses.

Churchlands

Vectos submitted a TA in support of hybrid planning application, reference 14/02891/MJR, for approximately 1,000 homes a primary school and village centre in 2014. This followed the refused application and subsequent successful appeal to the Welsh Government for construction of 1,200 homes in 2013 application, reference 13/02000/DCO. The Churchlands site makes up a portion of the land identified in CC LDP as strategic site F.

The trip rates used in the revised 2014 TA have been utilised for the CPW assessment as this is the most recent successful application at the site. The updated application includes provision of a primary school and village centre, which will primarily serve the proposed residential development and immediately adjoining communities. Therefore, due to the site's accessibility by sustainable modes of travel these uses are not anticipated to have a significant impact on the local highway network.

Based on this only the residential trip rates are being considered for the current assessment, as based on the sites location in relation to the study area any additional trips are likely to come from the residential areas to the south and west of the site and would not enter the Cardiff Park Way study area.

The vehicular trip generation is based on the provision of 1,000 homes as this was consented in the planning decision, the development forecasts a modal split of 50/50 in line with the CC LDP aspirations. The resultant vehicular trip generation is included in Table 12 below.

Table 12: Churchlands vehicular trip generation

Trip rate	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Vehicle trips	143	457	600	321	210	531

Based on Table 12 the residential trip rates would produce up to 600 additional two-way trips in the AM peak hour and up to 531 additional two-way trips in the PM peak hour.

Summary

The total trips anticipated to be produced by the committed developments are included below in Table 13.

Table 13: Summary of committed development trips

Site	Number of Vehicle Trips					
	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
West of Willowbrook Drive and south of Crickhowell Road	30	62	90	44	29	73
Land off Willowbrook Drive	15	43	58	31	14	45
H1.1 Land at areas 9-12, off Harrison Drive	31	92	123	67	29	96
H1.6 Land at former St Johns college/Greenway Road	7	14	21	20	12	32
Land adjacent to Blooms garden centre	13	38	51	34	13	47
Braunton Crescent	17	37	54	22	18	39
Land at Church Road/St Edeyrn's	183	473	656	427	255	682
Land south of Church Road	26	78	104	78	28	106
North East Cardiff	849	886	1,735	854	959	1,813
Maelfa Centre	16	26	42	29	17	46
Churchlands	143	457	600	321	210	531
Total	1,330	2,206	3,495	1,927	1,584	3,510

The total number of trips produced by committed developments for the Cardiff Parkway TIA is 3,495 two-way trips in the AM peak hour and 3,510 trips in the PM peak hour.

2.2 Trip Distribution and Assignment

A large proportion of vehicular trips associated with the committed developments are likely to be dominated by commuting movements in the peak hours. These trips are made on a regular basis with defined trip patterns. As a result, assumptions on the distribution of the development traffic have been determined through reference to 2011 origin/destination census data from the *WU03EW Location of usual residence and place of work by method of travel to work* census category.

The assignment of development traffic has been determined by examination of the highway network. This exercise has been undertaken by attributing each set of trips to the destination via the most likely route. Where a number of feasible routes could be used, the development trips have been split accordingly.

Given the proximity of many of the sites, several MSOAs were selected to represent the location of usual residence to determine distribution of trips to work and average of locations of work taken between these. Trips to usual residences in other MSOAs in Cardiff were identified, along with other Local Authorities in Wales and regions in England.

The methodology for this and the trip assignment is outlined below.

North east Cardiff

The TA for North East Cardiff has been used as a basis for determining trip distribution for the following sites located north of the A48:

- Land at Church Road/St Edeyrn's (1,020 residential units);
- Church Road (150 residential units);
- North East Cardiff (2,500 residential units)[1];
- Maelfa Centre (84 residential units + 1,155 sqm A1 and A3 retail); and
- Churchlands (1,000 residential units).

In the North East Cardiff TA, a combination of five MSOAs were used in various proportions to identify individual trip distributions for each of the sites four land parcels. The MSOAs used were, Lisvane 001, Pontprennau/St Mellons 003, Llanishen 005, Pont Pontprennau/St Mellons 007 and Cyncoed 008, as shown in Figure 2.

The distribution output for the four sites has been taken directly from the North East Cardiff TA and is included in Appendix A. From this an average of the distribution for the four sites was taken to distribute traffic from the entire site and those near. By taking an average for the North East Cardiff site based on the five MSOAs, it is anticipated to give a representative picture of the commuting patterns for the sites located in this area.

[1] Trip rates to be updated following updated Transport Assessment

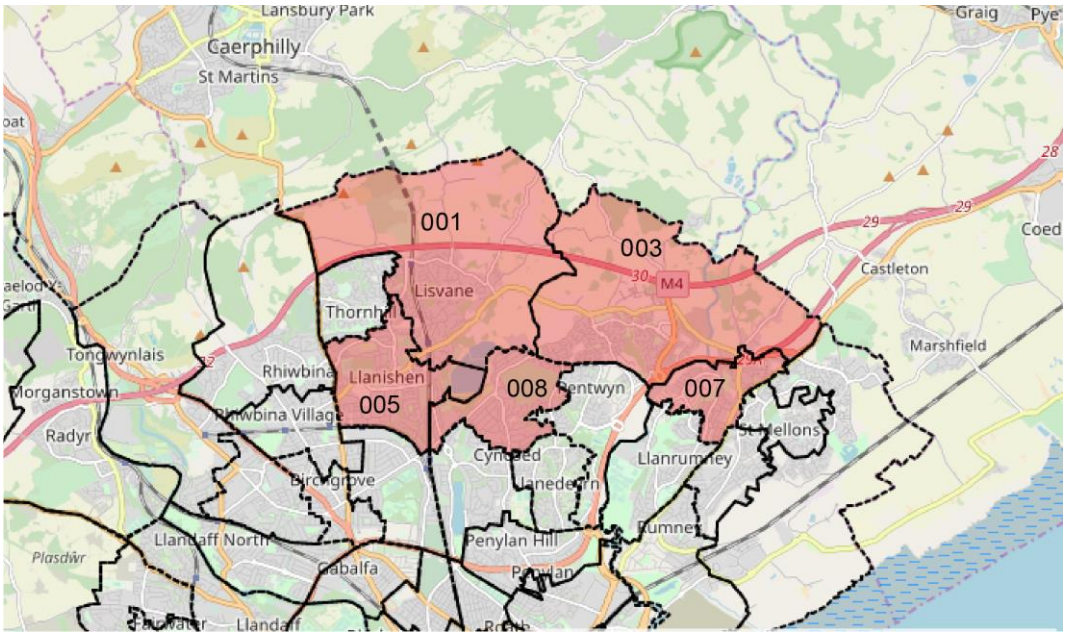


Figure 2 North east Cardiff MSOAs

The same trip distribution was utilised for sites north east of the A48 including North East Cardiff, Maelfa Centre and Churchlands due to their close proximity. When adding trips from the development onto the study area, consideration was given to each developments access and most likely route along the A48/A4232. Where appropriate it was assumed that trips would be distributed across multiple junctions into the study area. This also meant a number of the commuting trips identified do not appear in the study area as they are anticipated to travel directly to west from the development site, either joining the A48 at Gabalfa interchange or utilising the local road network.

A separate distribution calculation was undertaken for Land at Church Road/St Edeyrn's and Church Road to reflect the access road at Church Road and impact on onward trips. Utilising the base travel to work data from North East Cardiff's TA is considered representative of the likely commuting patterns as the MSOA Pontrennau/St Mellons 003 that St Edeyrn's is in, currently has a limited amount of residential development.

The distribution calculations produced for both areas identified is included below in Table 14. Distribution diagrams have also been prepared for each of the sites and are included in Appendix B.

Table 14: Distribution for sites north east Cardiff

Link	North west of A48	St Edryns / Church road	Average for sites north east Cardiff
M4 West	5%	12%	8%
M4 East	13%	13%	13%
A48 East	0%	0%	0%
Cardiff Gate	2%	2%	2%

Link	North west of A48	St Edryns / Church road	Average for sites north east Cardiff
Heol Pontprennau	0%	16%	6%
Church Road (St Edryns)	2%	0%	1%
Capel Edryn	0%	2%	1%
Bryn Celyn	0%	1%	0%
Circular Way	0%	2%	1%
Eastern Avenue (A48W)	14%	33%	21%
Newport Road	5%	8%	6%
Rover Way (west)	0%	0%	0%
Rover Way (south)	5%	5%	5%
Ty Mawr	1%	1%	1%
Lamby Way	1%	1%	1%
Llanrumney Avenue	0%	0%	0%
Mount Pleasant Avenue	0%	0%	0%
William Nicholls Drive	0%	0%	0%
Llaneirwg Way	1%	1%	1%
Wern Fern	1%	1%	1%
Fortran Road	2%	2%	2%
Does not enter study area	48%	0%	29%
Total	**100%**	**100%**	**8%**

St Mellons/Trowbridge

For the remaining committed development sites outlined below, the MSOAs of Capital Business Park 011, St Mellons 013, Llanrumney 015 and Rumney 016, as shown in Figure 3, were identified as location of usual residence:

- West of Willowbrook Drive and south of Crickhowell Road (193 residential units);
- Land off Willowbrook Drive (70 residential units);
- H1.1 Land at areas 9-12, off Harrison Drive (150 residential units);
- H1.6 Land at former St Johns College/Greenway Road (64 residential units);
- Land adjacent to Blooms Garden Centre (83 residential units); and
- Braunton Crescent (106 residential units).

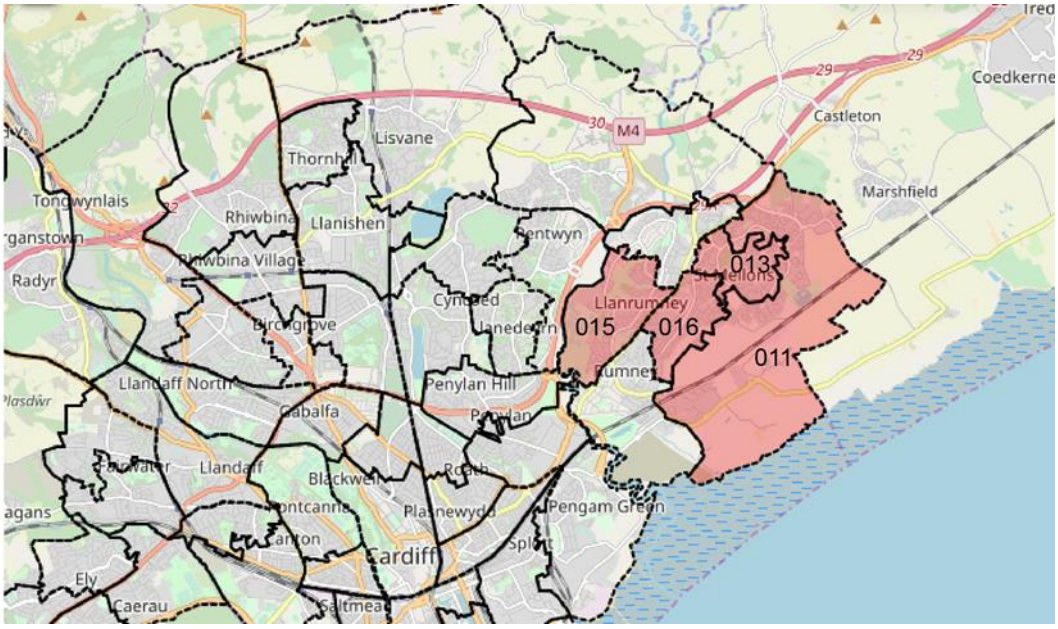


Figure 3 St Mellons/Trowbridge MSOAs

The average location of work was taken from the MSOAs identified. Based on their close location the same distribution was used for most of the sites, excluding Land at Braunton Road and Land Adjacent to Blooms Garden Centre. Each of these sites had a separate distribution prepared based on the location their vehicular traffic would join the study area. The output of the distribution for each of the committed development sites is included in Table 15 and visually represented in Appendix C.

For each of the sites, trips have been assigned to the most likely route to the development based on the existing road network and proposed site access.

Table 15: Distribution for sites in St Mellons/Trowbridge

Link	St Mellons	Braunton Road	Blooms Garden Centre	Average for St Mellons sites
M4 West	12%	12%	12%	12%
M4 East	0%	0%	0%	0%
A48 East	15%	15%	15%	15%
Cardiff Gate	3%	3%	3%	3%
Heol Pontprennau	1%	1%	1%	1%
Church Road (St Edryns)	0%	0%	0%	0%
Capel Edryn	1%	1%	1%	1%
Bryn Celyn	4%	4%	3%	4%
Circular Way	1%	1%	3%	1%
Eastern Avenue (A48W)	30%	30%	33%	30%
Newport Road	9%	9%	6%	9%

Link	St Mellons	Braunton Road	Blooms Garden Centre	Average for St Mellons sites
Rover Way (west)	1%	1%	0%	1%
Rover Way (south)	7%	7%	7%	7%
Ty Mawr	0%	5%	3%	1%
Lamby Way	0%	0%	0%	0%
Llanrumney Avenue	1%	0%	0%	1%
Mount Pleasant Avenue	1%	0%	2%	1%
William Nicholls Drive	1%	1%	1%	1%
Llaneirwg Way	0%	2%	4%	1%
Wern Fern	1%	1%	1%	1%
Fortran Road	5%	5%	5%	5%
Does not enter study area	7%	2%	0%	5%
Total	**100%**	**100%**	**100%**	**100%**

Distribution summary

A summary of the forecast average distribution of the committed developments trips is identified in Table 16 below.

Table 16: Trip distribution

Link	Distribution %
M4 West	10%
M4 East	6%
A48 East	8%
Cardiff Gate	2%
Heol Pontprennau	4%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	2%
Circular Way	1%
Eastern Avenue (A48W)	26%
Newport Road	7%
Rover Way (west)	0%
Rover Way (south)	6%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	4%
Does not enter study area	16%
Total	**100%**

As shown above in Table 16 the committed developments are anticipated to have an impact throughout much of the study area. In particular links and junctions from Eastern Avenue (A48 W) and from M4 junction 30 are anticipated to have the greatest increase in traffic. The cumulative traffic impact of all of the committed development traffic is included in Appendix C.

It is anticipated that a proportion of the commuting trips identified as committed developments in this TN will be travelling to the new Cardiff Parkway Business District. To avoid double counting of these trips, they will be isolated and reduced from the trips produced by the Cardiff Parkway site. The methodology for this will be explored in more detail at a later dated and discussed with CC.

3 Background Traffic Growth

It has been agreed through the TA Scoping Note and discussion with Cardiff Council that background traffic growth factors will be derived from the Department for Transport's Trip End Model Presentation Program (TEMPro v7.2).

Given the committed developments identified for independent inclusion alternative planning assumptions have been applied in TEMPro, removing the committed development households and jobs from the traffic growth estimates to eliminate double counting. As the Cardiff Parkway proposals are identified as a strategic employment site within the Local Plan, the jobs associated with the proposed development have also been excluded from the traffic growth estimates to further eliminate double counting.

The forecast number of jobs created by the Business District in the years 2023 and 2028 is based on the current assumed build out rate with a Net Internal Area (NIA) of 20,000sqm in 2023 and full build out to 90,000sqm in 2028. The ratio of jobs to NIA was established through reference to the Employment Densities Guide (2015) which states there is an average of 1 full time employee for every 12sqm NIA. The results of this are included below in Table 18.

Table 17: Assumed jobs created by Cardiff Parkway Business District

Year	Quantum	Measurement	Jobs
2023	20,000sqm	NIA	1,667
2028	90,000sqm	NIA	7,500

The alternative assumptions included in TEMPro are detailed in Table 18 below. Adjustments have been altered accordingly to avoid a negative growth in either households or jobs between the base and future year.

Table 18: Alternative assumptions applied in TEMPro

Year	Households			Business District Quantum		
	Base	Future	Alternative Assumption	Base	Future	Alternative Assumption
2023	3,078	3,269	3,078 (-191)	6,638	6,749	6,638 (-111)
2028	3,078	3,469	3,078 (-391)	6,638	6,843	6,843 (-205)

To derive growth factors within TEMPro for the assessment years detailed above, the NTM AF15 Dataset (2010-2040) has been used. The area type selected is 'Urban' and the road type 'Principle' was chosen.

The TEMPro growth factors based on the alternative assumptions outlined are set out in Table 19, with the full output and results presented in Appendix E.

Table 19 TEMPro growth factors

Period	Growth Factors	
	AM Peak	PM Peak
2018 – 2023	1.0295	1.0266
2018 – 2028	1.0493	1.0449

To assess the robustness of the method used within this TN a sensitivity test has been undertaken. The sensitivity test compares the average growth achieved by applying alternative growth assumptions in TEMPro and adding committed developments individually to the standard TEMPro growth factor. The proportional increase from the 2018 base data to 2028 is included in Appendix F.

The results of this sensitivity test are included in Table 20 alongside the TEMPro growth factors achieved without any alternative assumptions applied for 2028.

Table 20 Growth comparison no alternative assumptions applied 2018 - 2028

Method	Growth Factors	
	AM Peak	PM Peak
TN1	1.2885	1.2908
TEMPro no alternative assumptions	1.1243	1.1245

As shown in the table above the method utilised within this TN achieves a higher growth rate than would be achieved using TEMPro alone. In addition to this the current method allows the growth identified to be distributed across the highway network in a pattern that reflects the location of developments.

4 Summary

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of Cardiff Parkway. The proposals comprise a 90,000m^2 Business District and a railway station with a park & ride and an interchange.

Technical Note 1 presents the methodology used to derive background traffic growth factors and committed developments using TEMPro for the future assessment years. Following agreement with CC as the Local Highways Authority, these background traffic growth factors will be used to inform the TIA. In addition to providing information on the proposed trip generation, this note also outlines the network distribution.

Following discussions with CC as the planning authority, it has been agreed to include several committed development sites within the TIA. To avoid the double counting of trips associated with these developments and the proposed employment at Cardiff Parkway, alternative assumptions have been applied within TEMPro.

Appendix A

North East Cardiff distribution

Table 10-13 - Vehicular Trip Distribution – Destination Proportions by Land Parcel

Direction	Western Parcel	Central Parcel	Northern Parcel	
Cardiff	76%	73%	72%	74%
M4 East	10%	15%	14%	14%
M4 West	3%	3%	3%	3%
North	8%	7%	8%	6%
Vale	3%	2%	3%	3%
Total	100%	100%	100%	100%

Destination	Carlyle	Husband Trustees	R6 Morgan	R7 Roberts
Cardiff 001_Lisvane	2.1%	1.0%	2.0%	0.8%
Cardiff 002_Thornhill	1.1%	0.2%	0.5%	0.2%
Cardiff 003_Pontprennau	2.3%	6.5%	6.0%	6.5%
Cardiff 004_Rhiwbina	0.6%	0.2%	0.3%	0.1%
Cardiff 005_Llanishen	10.4%	3.2%	4.4%	2.6%
Cardiff 006_Radyr	0.6%	0.5%	0.6%	0.4%
Cardiff 007_Old St Melons	0.5%	0.8%	0.7%	3.0%
Cardiff 008_Cyncoed	0.5%	1.4%	0.7%	0.6%
Cardiff 009_Pentwyn	0.5%	2.0%	1.7%	1.8%
Cardiff 010_Twongwynlais	1.4%	1.1%	1.0%	0.8%
Cardiff 011_Capital Business Park	1.6%	2.0%	2.0%	3.1%
Cardiff 012_Birchgrove	0.8%	0.3%	0.5%	0.2%
Cardiff 013_St Mellons	0.1%	0.2%	0.2%	0.3%
Cardiff 014_St Fagans	0.2%	0.2%	0.2%	0.2%
Cardiff 015_Llanrumney	0.2%	0.3%	0.3%	0.9%
Cardiff 016_Rumney	0.5%	0.6%	0.6%	1.1%
Cardiff 017_Llanedeyrn	0.3%	0.5%	0.4%	0.4%
Cardiff 018_Heath	8.1%	6.3%	5.9%	5.0%
Cardiff 019_Roath Park	0.7%	0.9%	0.8%	0.6%
Cardiff 020_Whitchurch	1.0%	0.6%	0.8%	0.5%
Cardiff 021_Mynachdy	1.6%	1.5%	1.3%	1.1%
Cardiff 022_Rumney	1.0%	1.3%	1.2%	2.4%
Cardiff 023_Llandaff North	0.5%	0.3%	0.4%	0.4%
Cardiff 024_Penylan	0.3%	0.5%	0.4%	0.4%
Cardiff 025_Gabalfa	2.4%	1.7%	1.9%	1.6%
Cardiff 026_Danescourt	1.4%	1.7%	1.5%	1.3%
Cardiff 027_Pentrebane	0.1%	0.1%	0.2%	0.1%
Cardiff 028_Cathays	1.0%	1.1%	0.9%	0.8%
Cardiff 029_Roath	1.0%	1.7%	1.3%	2.3%
Cardiff 030_Cathays	0.7%	0.9%	0.7%	0.7%
Cardiff 031_Fairwater	0.4%	0.3%	0.3%	0.3%
Cardiff 032_Cardiff Centre	12.4%	11.7%	12.0%	10.5%
Cardiff 033_Roath	1.8%	2.1%	2.0%	2.1%
Cardiff 034_Llandaff	1.3%	1.6%	1.4%	1.4%
Cardiff 035_Victoria Park	0.0%	0.1%	0.1%	0.1%
Cardiff 036_Adamstown	2.2%	2.5%	2.3%	2.9%
Cardiff 037_Tremorfa	0.6%	0.7%	0.5%	1.0%
Cardiff 038_Splott	1.7%	2.2%	2.0%	2.4%
Cardiff 039_Ely	0.0%	0.1%	0.1%	0.1%
Cardiff 040_Leckwith	1.7%	1.3%	1.2%	1.3%
Cardiff 041_Trelai	0.5%	0.4%	0.5%	0.4%
Cardiff 042_Riverside	0.7%	0.5%	0.5%	0.4%
Cardiff 043_Ely	0.1%	0.1%	0.1%	0.1%
Cardiff 044_Grangetown	0.1%	0.2%	0.2%	0.3%
Cardiff 045_Caerau	0.1%	0.2%	0.1%	0.2%
Cardiff 046_Grangetown	1.2%	1.1%	1.0%	1.5%
Cardiff 048_Docks/Ferry Court	4.1%	4.2%	3.9%	4.1%
Cardiff 049_Buteown	4.0%	4.1%	4.2%	4.5%

South Ribble	0.0%	0.0%	0.0%	0.0%
East Staffordshire	0.0%	0.0%	0.0%	0.0%
North Warwickshire	0.0%	0.0%	0.0%	0.0%
Dacorum	0.0%	0.0%	0.0%	0.0%
Test Valley	0.0%	0.0%	0.0%	0.0%
Fareham	0.0%	0.0%	0.0%	0.0%
Guildford	0.0%	0.0%	0.0%	0.0%
Brent	0.0%	0.0%	0.0%	0.0%
Ealing	0.0%	0.0%	0.0%	0.0%
Slough	0.0%	0.0%	0.0%	0.0%
Eastleigh	0.0%	0.0%	0.0%	0.0%
Weymouth and Portland	0.0%	0.0%	0.0%	0.0%
Liverpool	0.0%	0.0%	0.0%	0.0%
Calderdale	0.0%	0.0%	0.0%	0.0%
Solihull	0.0%	0.0%	0.0%	0.0%
Bracknell Forest	0.0%	0.0%	0.0%	0.0%
East Devon	0.0%	0.0%	0.0%	0.0%
South Hams	0.0%	0.0%	0.0%	0.0%
Wychavon	0.0%	0.0%	0.0%	0.0%
Peterborough	0.0%	0.0%	0.0%	0.0%
Hillingdon	0.0%	0.0%	0.0%	0.0%
Warwick	0.0%	0.0%	0.0%	0.0%
Lambeth	0.0%	0.0%	0.0%	0.0%
Hart	0.0%	0.0%	0.0%	0.0%
Ceredigion	0.0%	0.0%	0.0%	0.0%
Hounslow	0.0%	0.0%	0.0%	0.0%
Bath and North East Somerset	0.1%	0.0%	0.0%	0.0%
Harrow	0.0%	0.0%	0.0%	0.0%
Windsor and Maidenhead	0.0%	0.0%	0.0%	0.0%
Camden	0.1%	0.1%	0.1%	0.1%
Forest of Dean	0.0%	0.1%	0.1%	0.1%
Isle of Wight	0.1%	0.1%	0.0%	0.0%
Carmarthenshire	0.0%	0.2%	0.1%	0.1%
York	0.0%	0.0%	0.0%	0.0%
South Oxfordshire	0.0%	0.0%	0.0%	0.0%
Stockport	0.0%	0.0%	0.0%	0.0%
Reading	0.0%	0.0%	0.0%	0.0%
Leicester	0.0%	0.0%	0.0%	0.0%
Manchester	0.0%	0.0%	0.0%	0.0%
Wycombe	0.0%	0.0%	0.0%	0.0%
Birmingham	0.1%	0.0%	0.1%	0.0%
Havering	0.1%	0.0%	0.1%	0.0%
Pembrokeshire	0.1%	0.1%	0.1%	0.0%
Wokingham	0.1%	0.0%	0.0%	0.0%
Runnymede	0.0%	0.0%	0.1%	0.0%
Cheltenham	0.0%	0.1%	0.1%	0.1%
Powys	0.1%	0.0%	0.1%	0.0%
Swindon	0.1%	0.0%	0.1%	0.0%
Herefordshire, County of	0.1%	0.1%	0.1%	0.1%
Tower Hamlets	0.1%	0.0%	0.1%	0.0%
Wiltshire	0.2%	0.1%	0.1%	0.1%
Blaenau Gwent	0.2%	0.3%	0.2%	0.2%
North Somerset	0.1%	0.2%	0.2%	0.1%

Westminster,City of London	0.3%	0.2%	0.3%	0.1%
Neath Port Talbot	0.3%	0.4%	0.4%	0.4%
Monmouthshire	0.5%	0.7%	0.7%	0.7%
South Gloucestershire	0.5%	0.7%	0.6%	0.7%
Merthyr Tydfil	0.6%	0.6%	0.6%	0.5%
Swansea	0.5%	0.7%	0.7%	0.6%
Bristol, City of	0.8%	1.0%	1.0%	0.8%
Torfaen	1.1%	1.8%	1.7%	1.6%
Bridgend	1.7%	2.0%	2.0%	1.7%
The Vale of Glamorgan	2.6%	2.4%	2.7%	2.9%
Caerphilly	3.4%	2.6%	3.4%	2.3%
Newport	4.1%	6.5%	6.0%	6.8%
Rhondda Cynon Taf	4.2%	3.5%	4.2%	2.9%
Redcar and Cleveland	0.0%	0.0%	0.0%	0.0%
Cheshire East	0.0%	0.0%	0.0%	0.0%
Harrogate	0.0%	0.0%	0.0%	0.0%
Kirklees	0.0%	0.0%	0.0%	0.0%
Charnwood	0.0%	0.0%	0.0%	0.0%
East Lindsey	0.0%	0.0%	0.0%	0.0%
South Staffordshire	0.0%	0.0%	0.0%	0.0%
Nuneaton and Bedworth	0.0%	0.0%	0.0%	0.0%
Worcester	0.0%	0.0%	0.0%	0.0%
Forest Heath	0.0%	0.0%	0.0%	0.0%
East Hampshire	0.0%	0.0%	0.0%	0.0%
Cherwell	0.0%	0.0%	0.0%	0.0%
Chichester	0.0%	0.0%	0.0%	0.0%
Conwy	0.0%	0.0%	0.0%	0.0%
Carlisle	0.0%	0.0%	0.0%	0.0%
Bradford	0.0%	0.0%	0.0%	0.0%
Rushcliffe	0.0%	0.0%	0.0%	0.0%
South Bucks	0.0%	0.0%	0.0%	0.0%
Stratford-on-Avon	0.0%	0.0%	0.0%	0.0%
Sutton	0.0%	0.0%	0.0%	0.0%
Maidstone	0.0%	0.0%	0.0%	0.0%
Cotswold	0.0%	0.0%	0.0%	0.0%
Gwynedd	0.0%	0.0%	0.0%	0.0%
Colchester	0.0%	0.0%	0.0%	0.0%
Milton Keynes	0.0%	0.0%	0.0%	0.0%
New Forest	0.0%	0.0%	0.0%	0.0%
Coventry	0.0%	0.0%	0.0%	0.0%
Basingstoke and Deane	0.0%	0.0%	0.0%	0.0%
Hammersmith and Fulham	0.0%	0.0%	0.0%	0.0%
Vale of White Horse	0.0%	0.0%	0.0%	0.0%
Northampton	0.0%	0.0%	0.0%	0.0%
Plymouth	0.0%	0.0%	0.0%	0.0%
Trafford	0.0%	0.0%	0.0%	0.0%
St Edmundsbury	0.0%	0.0%	0.0%	0.0%
Croydon	0.0%	0.0%	0.0%	0.0%
Kensington and Chelsea	0.0%	0.0%	0.0%	0.0%
Mid Devon	0.0%	0.0%	0.0%	0.0%
Sandwell	0.0%	0.0%	0.0%	0.0%
Islington	0.0%	0.0%	0.0%	0.0%
Luton	0.0%	0.0%	0.0%	0.0%

Uttlesford	0.0%	0.0%	0.0%	0.0%
South Somerset	0.0%	0.0%	0.0%	0.0%
Exeter	0.0%	0.1%	0.0%	0.0%
Shropshire	0.0%	0.0%	0.0%	0.0%
Tewkesbury	0.0%	0.0%	0.0%	0.1%
Portsmouth	0.0%	0.0%	0.0%	0.0%
Surrey Heath	0.0%	0.0%	0.0%	0.0%
Southwark	0.0%	0.1%	0.0%	0.0%
Sedgemoor	0.0%	0.0%	0.0%	0.0%
Gloucester	0.0%	0.1%	0.0%	0.0%
Harborough	0.0%	0.2%	0.1%	0.1%
North Tyneside	0.0%	0.0%	0.0%	0.0%
Wakefield	0.0%	0.0%	0.0%	0.0%
Amber Valley	0.0%	0.0%	0.0%	0.0%
South Derbyshire	0.0%	0.0%	0.0%	0.0%
Wellingborough	0.0%	0.0%	0.0%	0.0%
Stafford	0.0%	0.0%	0.0%	0.0%
Central Bedfordshire	0.0%	0.0%	0.0%	0.0%
Harlow	0.0%	0.0%	0.0%	0.0%
Bromley	0.0%	0.0%	0.0%	0.0%
Greenwich	0.0%	0.0%	0.0%	0.0%
Rushmoor	0.0%	0.0%	0.0%	0.0%
Swale	0.0%	0.0%	0.0%	0.0%
Crawley	0.0%	0.0%	0.0%	0.0%
Flintshire	0.0%	0.0%	0.0%	0.0%
Stoke-on-Trent	0.0%	0.0%	0.0%	0.0%
Telford and Wrekin	0.0%	0.0%	0.0%	0.0%
Wolverhampton	0.0%	0.0%	0.0%	0.0%
Wrexham	0.0%	0.0%	0.0%	0.0%
Southend-on-Sea	0.0%	0.0%	0.0%	0.0%
Leeds	0.0%	0.0%	0.0%	0.0%
Welwyn Hatfield	0.0%	0.1%	0.1%	0.1%
West Berkshire	0.0%	0.0%	0.0%	0.1%
South Northamptonshire	0.0%	0.0%	0.0%	0.0%
Aylesbury Vale	0.0%	0.0%	0.0%	0.0%
Stroud	0.0%	0.0%	0.0%	0.0%
West Oxfordshire	0.1%	0.0%	0.0%	0.0%
Sunderland	0.0%	0.0%	0.0%	0.0%
Tamworth	0.0%	0.0%	0.0%	0.0%
Basildon	0.0%	0.0%	0.0%	0.0%
Elmbridge	0.0%	0.0%	0.0%	0.0%
Teignbridge	0.0%	0.0%	0.0%	0.0%
Warrington	0.0%	0.0%	0.0%	0.0%
Southampton	0.0%	0.0%	0.0%	0.0%
Sevenoaks	0.0%	0.0%	0.0%	0.0%
Torbay	0.0%	0.0%	0.0%	0.0%
North Dorset	0.0%	0.0%	0.0%	0.0%
Doncaster	0.0%	0.0%	0.0%	0.0%
Newcastle upon Tyne	0.0%	0.0%	0.0%	0.0%
Wigan	0.0%	0.0%	0.0%	0.0%
Richmondshire	0.0%	0.0%	0.0%	0.0%
Selby	0.0%	0.0%	0.0%	0.0%
Sheffield	0.0%	0.0%	0.0%	0.0%

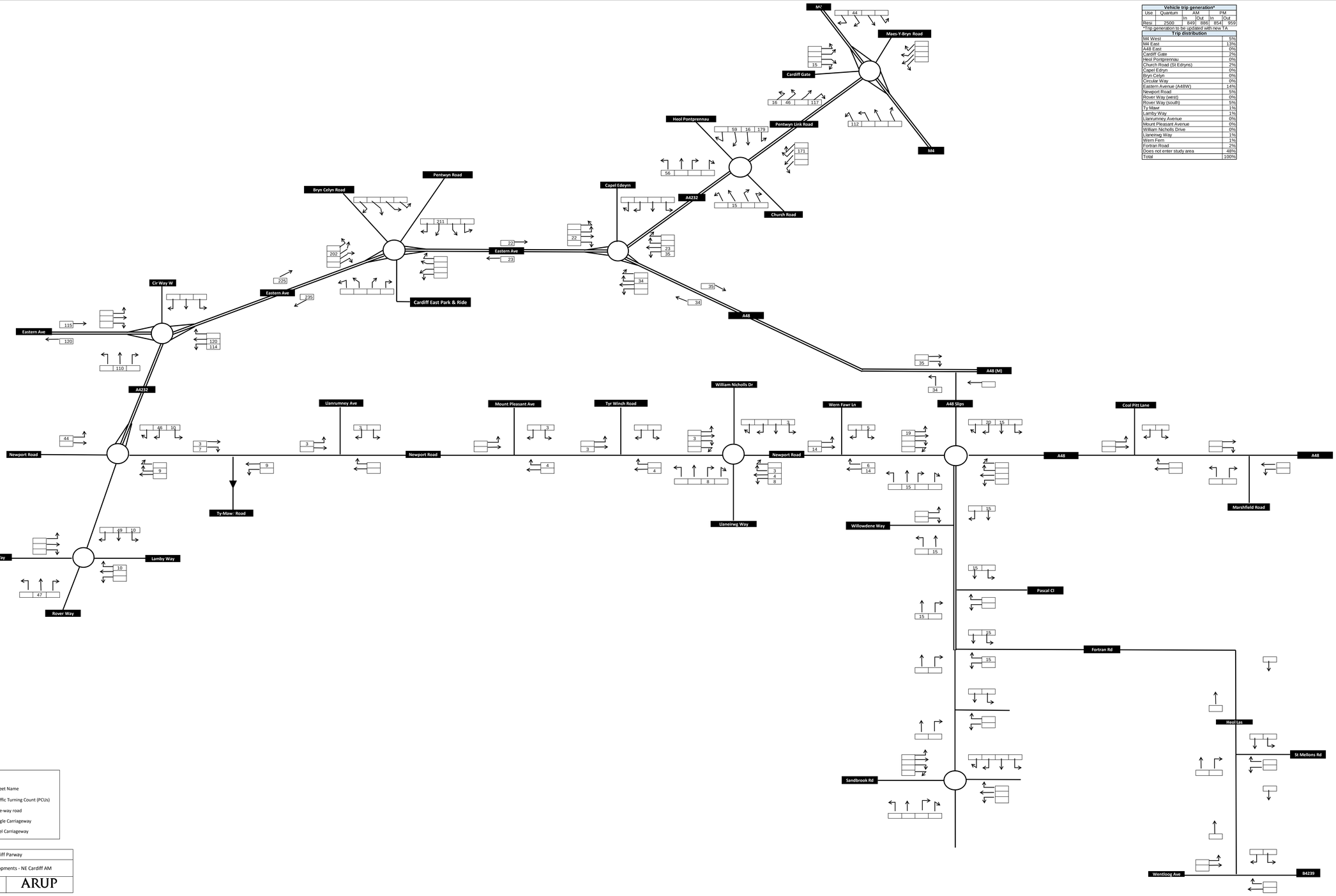
Derby	0.0%	0.0%	0.0%	0.0%
Chesterfield	0.0%	0.0%	0.0%	0.0%
Bromsgrove	0.0%	0.0%	0.0%	0.0%
Thurrock	0.0%	0.0%	0.0%	0.0%
Cambridge	0.0%	0.0%	0.0%	0.0%
East Cambridgeshire	0.0%	0.0%	0.0%	0.0%
South Cambridgeshire	0.0%	0.0%	0.0%	0.0%
Chelmsford	0.0%	0.0%	0.0%	0.0%
Maldon	0.0%	0.0%	0.0%	0.0%
Hertsmere	0.0%	0.0%	0.0%	0.0%
St Albans	0.0%	0.0%	0.0%	0.0%
Stevenage	0.0%	0.0%	0.0%	0.0%
Three Rivers	0.0%	0.0%	0.0%	0.0%
Barking and Dagenham	0.0%	0.0%	0.0%	0.0%
Barnet	0.0%	0.0%	0.0%	0.0%
Hackney	0.0%	0.0%	0.0%	0.0%
Kingston upon Thames	0.0%	0.0%	0.0%	0.0%
Lewisham	0.0%	0.0%	0.0%	0.0%
Redbridge	0.0%	0.0%	0.0%	0.0%
Gosport	0.0%	0.0%	0.0%	0.0%
Canterbury	0.0%	0.0%	0.0%	0.0%
Waverley	0.0%	0.0%	0.0%	0.0%
Arun	0.0%	0.0%	0.0%	0.0%
Worthing	0.0%	0.0%	0.0%	0.0%
Cornwall,Isles of Scilly	0.0%	0.0%	0.0%	0.0%
Poole	0.0%	0.0%	0.0%	0.0%
Purbeck	0.0%	0.0%	0.0%	0.0%
Mendip	0.0%	0.0%	0.0%	0.0%
Taunton Deane	0.0%	0.0%	0.0%	0.0%
Denbighshire	0.0%	0.0%	0.0%	0.0%
County Durham	0.0%	0.0%	0.0%	0.0%
East Riding of Yorkshire	0.0%	0.0%	0.0%	0.0%
North West Leicestershire	0.0%	0.0%	0.0%	0.0%
East Hertfordshire	0.0%	0.0%	0.0%	0.0%
Enfield	0.0%	0.0%	0.0%	0.0%
Waltham Forest	0.0%	0.0%	0.0%	0.0%
Wandsworth	0.0%	0.0%	0.0%	0.0%
Winchester	0.0%	0.0%	0.0%	0.0%
Spelthorne	0.0%	0.0%	0.0%	0.0%
Watford	0.0%	0.0%	0.0%	0.1%

Appendix B

Committed developments distribution North East of Cardiff

NE Cardiff TA Appendix N Census travel to work data **Development trips percentage distribution**

Destination	Carlyle land parcel	Husband Trustees land parcel	R6 Morgan land parcel	R7 Roberts land parcel	Average	M4 West	M4 East	A48 East	Cardiff Gate	Heol Pontprennau	Church Road (St Edryns)	Capel Edryn	Bryn Celyn	Circular Way	Eastern Avenue (A48W)	Newport Road	Rover Way (west)	Rover Way (south)	Ty Mawr	Lamby Way	Llanrumney Ave	Mount Pleasant Ave	William Nicholls Drive	Llaneirwg Way	Wern Fawr	Fortran Road	Total	Do not enter study area
W02000367 : Cardiff 001	2%	1%	2%	1%	1%																						0%	1%
W02000368 : Cardiff 002	1%	0%	1%	0%	1%																						0%	1%
W02000369 : Cardiff 003	2%	7%	6%	7%	5%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	2%
W02000370 : Cardiff 004	1%	0%	0%	0%	0%																						0%	0%
W02000371 : Cardiff 005	10%	3%	4%	3%	5%																						0%	5%
W02000372 : Cardiff 006	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000373 : Cardiff 007	1%	1%	1%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
W02000374 : Cardiff 008	1%	1%	1%	1%	1%																						0%	1%
W02000375 : Cardiff 009	1%	2%	2%	2%	2%																						0%	2%
W02000376 : Cardiff 010	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000377 : Cardiff 011	2%	2%	2%	3%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	0%
W02000378 : Cardiff 012	1%	0%	1%	0%	0%																						0%	0%
W02000379 : Cardiff 013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000380 : Cardiff 014	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000381 : Cardiff 015	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000382 : Cardiff 016	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
W02000383 : Cardiff 017	0%	1%	0%	0%	0%																						0%	0%
W02000384 : Cardiff 018	8%	6%	6%	5%	6%																						0%	6%
W02000385 : Cardiff 019	1%	1%	1%	1%	1%																						0%	1%
W02000386 : Cardiff 020	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000387 : Cardiff 021	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000388 : Cardiff 022	1%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%
W02000389 : Cardiff 023	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000390 : Cardiff 024	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000391 : Cardiff 025	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
W02000392 : Cardiff 026	1%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000393 : Cardiff 027	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000394 : Cardiff 028	1%	1%	1%	1%	1%																						0%	1%
W02000395 : Cardiff 029	1%	2%	1%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000396 : Cardiff 030	1%	1%	1%	1%	1%																						0%	1%
W02000397 : Cardiff 031	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000398 : Cardiff 032	12%	12%	12%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	8%
W02000399 : Cardiff 033	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
W02000400 : Cardiff 034	1%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000401 : Cardiff 035	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	2%	3%	2%	3%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
W02000403 : Cardiff 037	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000404 : Cardiff 038	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
W02000405 : Cardiff 039	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000407 : Cardiff 041	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000409 : Cardiff 043	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000410 : Cardiff 044	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000411 : Cardiff 045	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000412 : Cardiff 046	1%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000422 : Cardiff 048	4%	4%	4%	4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	3%	1%
W02000423 : Cardiff 049	4%	4%	4%	5%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	3%	1%
M4 East	10%	15%	14%	14%	13%	0%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%
M4 West	3%	3%	3%	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
North	8%	7%	8%	6%	7%																						0%	7%
Vale	3%	2%	3%	3%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Total	100%	100%	100%	100%	100%	5%	13%	0%	2%	0%	2%	0%	0%	0%	14%	5%	0%	5%	1%	1%	0%	0%	0%	1%	1%	2%	52%	48%
Does not enter study area	38%	28%	30%	22%	30%																							



Vehicle trip generation*					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	2500	849	886	854	969

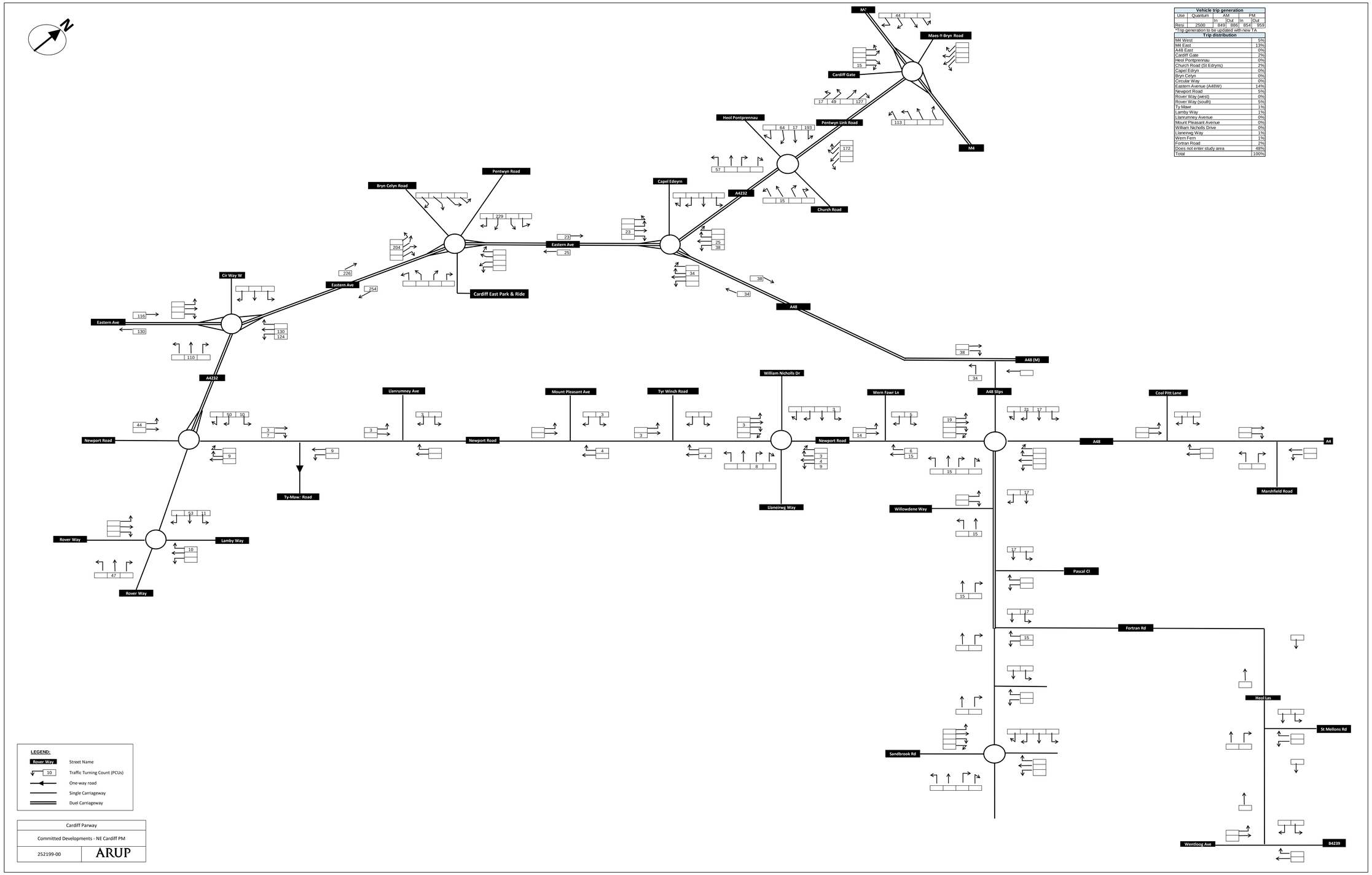
*Trip generation to be updated with new TA

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - NE Cardiff AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	2500	849	886	854	969

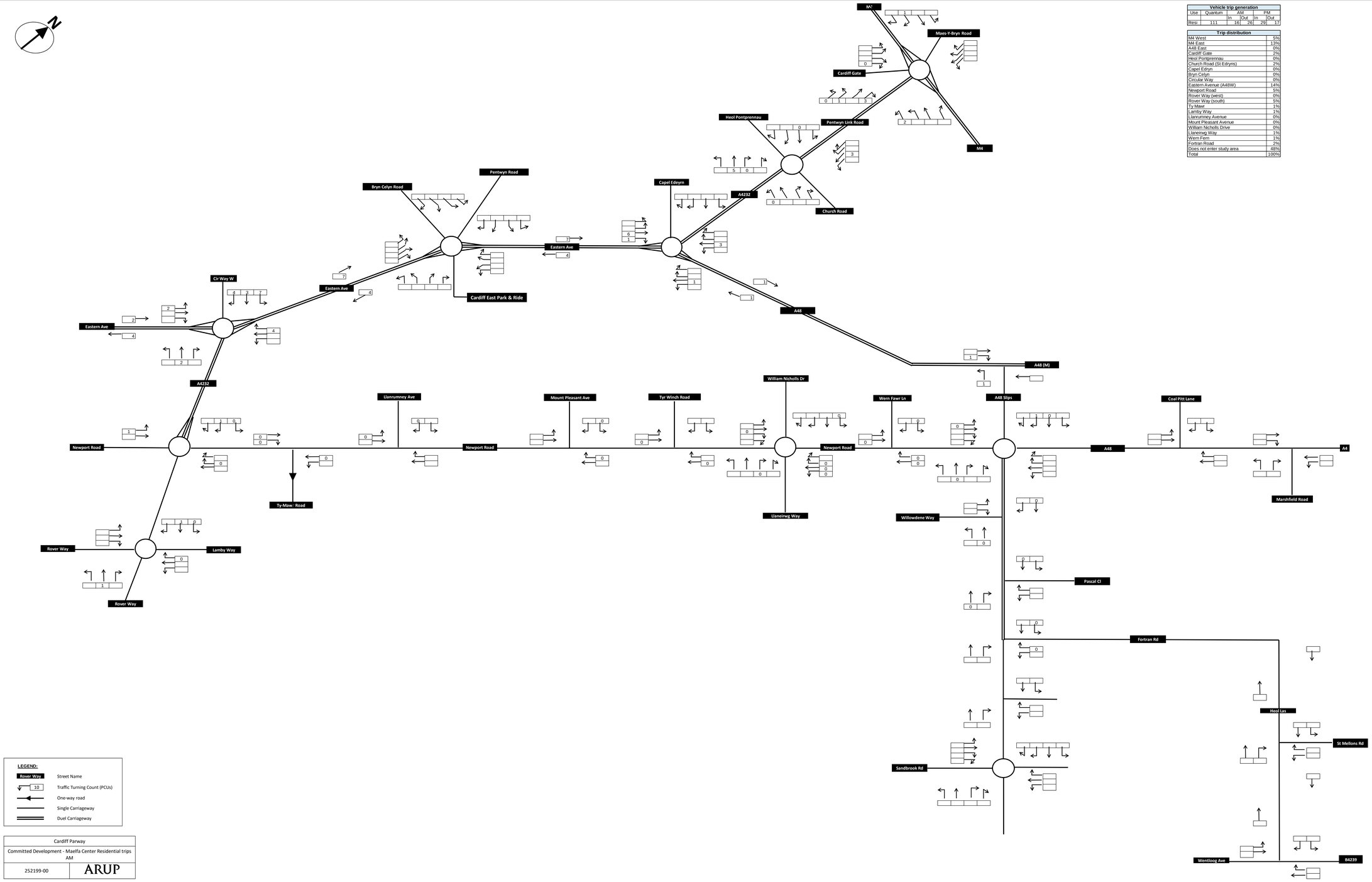
*Trip generation to be updated with new TA

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - NE Cardiff PM	
252199-00	ARUP



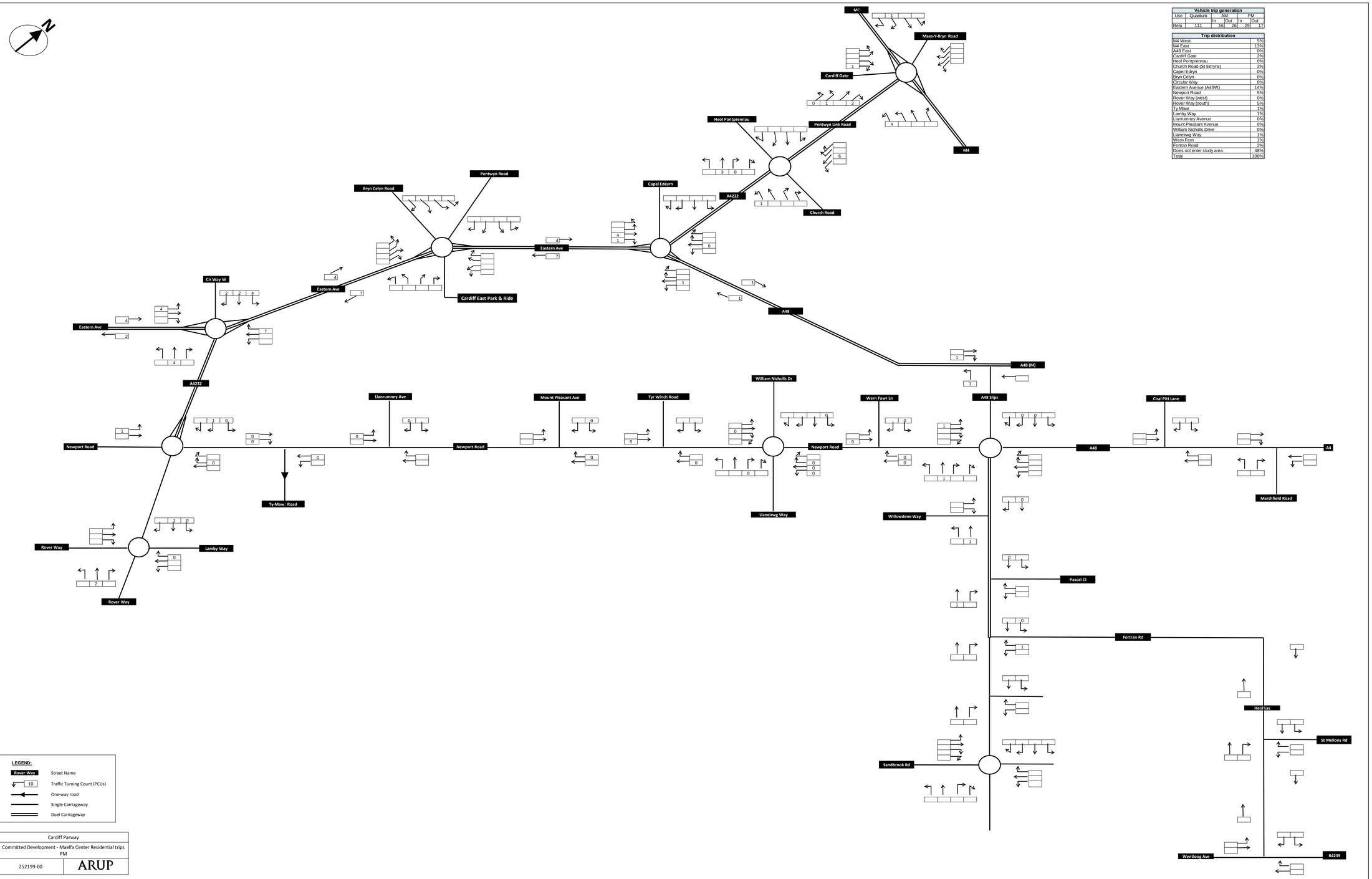
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	111	16	26	29	17

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Development - Maelfa Center Residential trips AM	
252199-00	ARUP



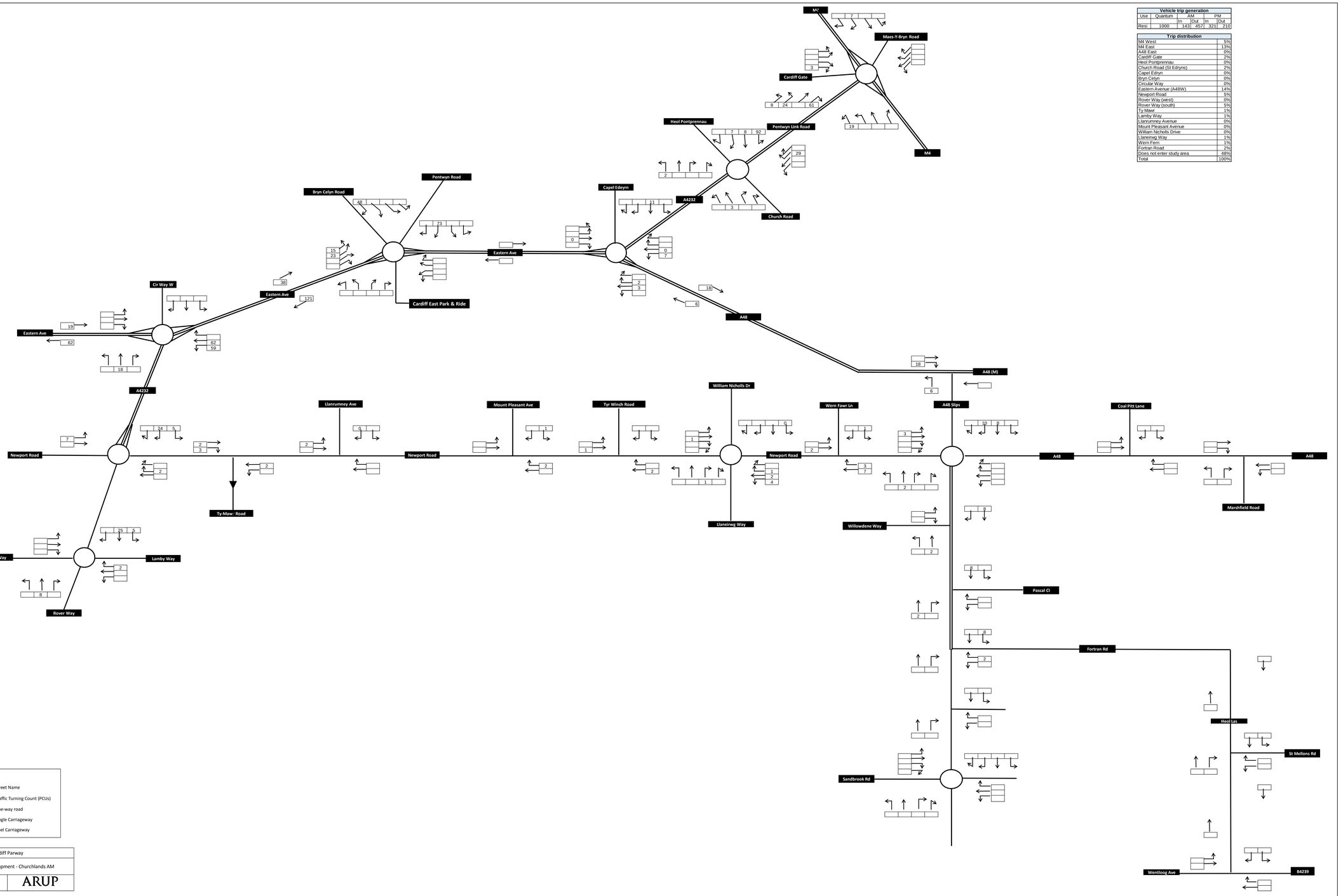
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	111	16	26	29	17

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Development - Maelfa Center Residential trips PM	
252199-00	ARUP



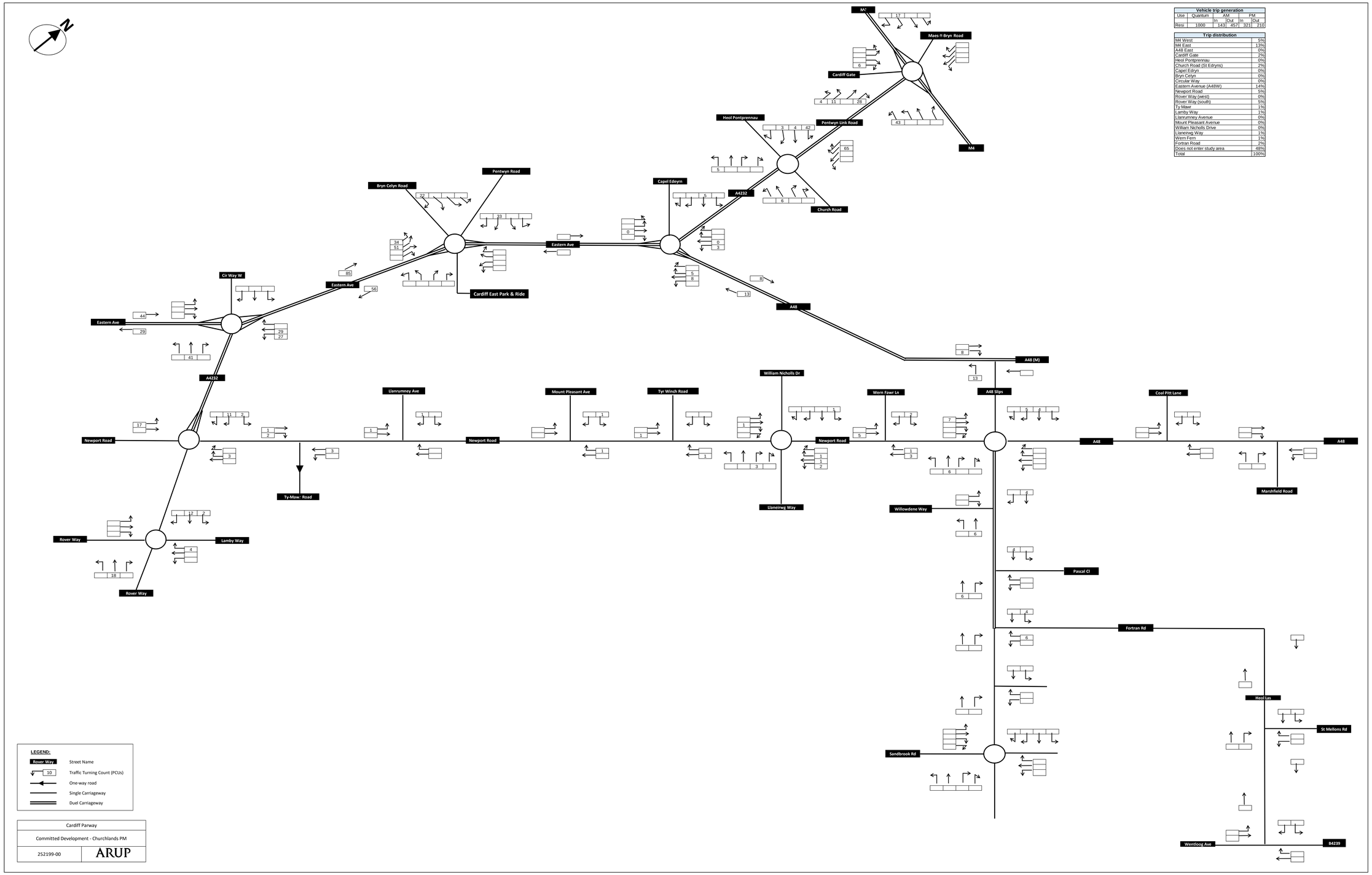
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	1000	143	457	321	210

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Development - Churchlands AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	1000	143	457	321	210

Trip distribution	
M4 West	5%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	0%
Church Road (St Edryns)	2%
Capel Edryn	0%
Bryn Celyn	0%
Circular Way	0%
Eastern Avenue (A48W)	14%
Newport Road	5%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	48%
Total	100%

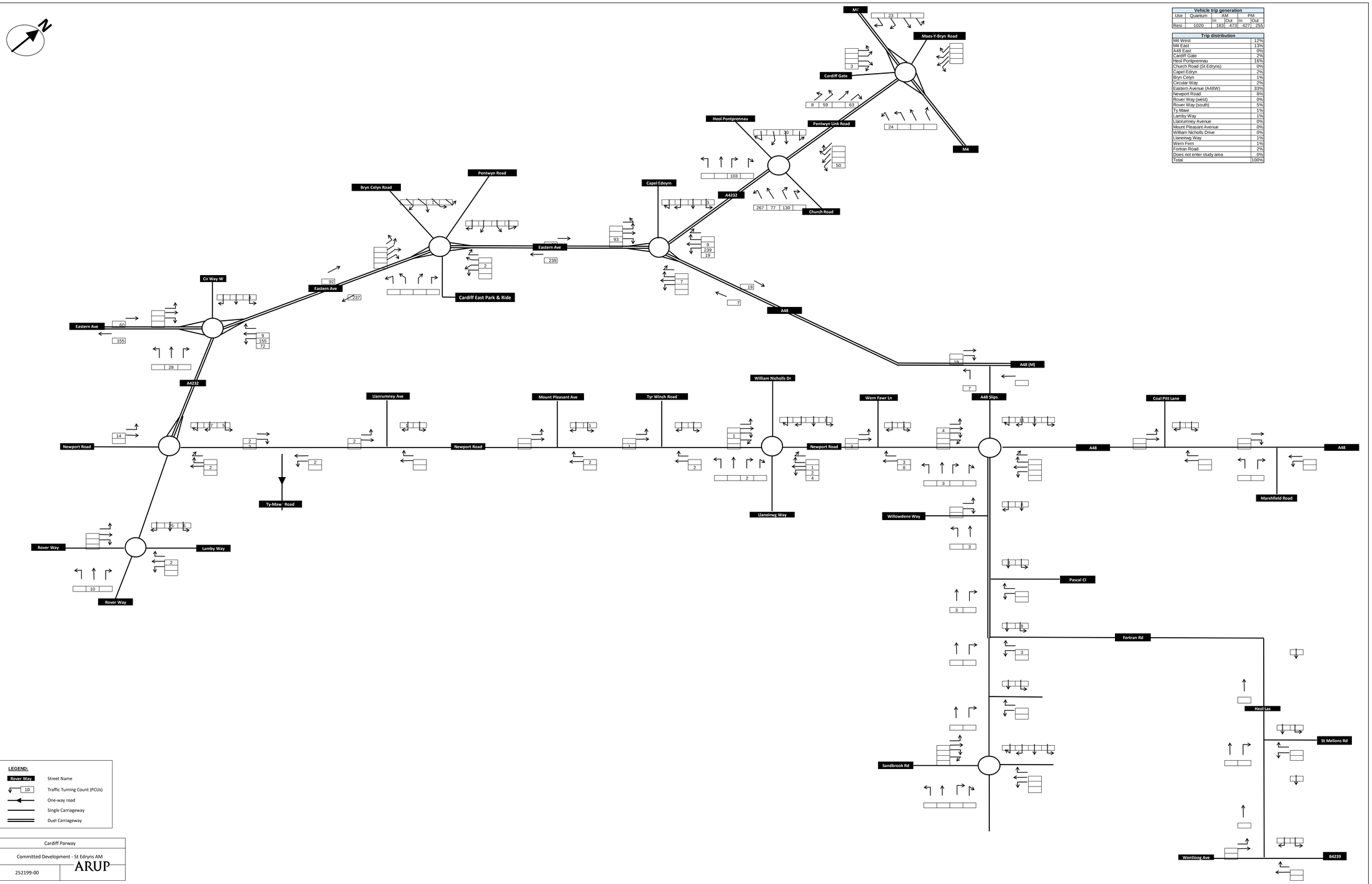
LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Development - Churchlands PM	
252199-00	ARUP

NE Cardiff TA Appendix N Census travel to work data **Development trips percentage distribution**

Destination	Carlyle	Husband Trustees	R6 Morgan	R7 Roberts	Average	M4 West	M4 East	A48 east	Cardiff Gate	Heol Pontprennau	Church Road (St Edryn)	Capel Edryn	Bryn Celyn	Circular Way	Eastern Avenue (A48W)	Newport Road	Rover Way (west)	Rover Way (south)	Ty Mawr	Lamby Way	Llanrumney Ave	Mount Pleasant Ave	William Nicholls Drive	Llaneirwg Way	Wern Fawr	Fortran Road	Total
W02000367 : Cardiff 001	2%	1%	2%	1%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000368 : Cardiff 002	1%	0%	1%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000369 : Cardiff 003	2%	7%	6%	7%	5%	0%	0%	0%	2%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
W02000370 : Cardiff 004	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000371 : Cardiff 005	10%	3%	4%	3%	5%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
W02000372 : Cardiff 006	1%	1%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000373 : Cardiff 007	1%	1%	1%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%
W02000374 : Cardiff 008	1%	1%	1%	1%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000375 : Cardiff 009	1%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000376 : Cardiff 010	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000377 : Cardiff 011	2%	2%	2%	3%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%
W02000378 : Cardiff 012	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000379 : Cardiff 013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000380 : Cardiff 014	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000381 : Cardiff 015	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000382 : Cardiff 016	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%
W02000383 : Cardiff 017	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000384 : Cardiff 018	8%	6%	6%	5%	6%	0%	0%	0%	0%	3%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%
W02000385 : Cardiff 019	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000386 : Cardiff 020	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000387 : Cardiff 021	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000388 : Cardiff 022	1%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%
W02000389 : Cardiff 023	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000390 : Cardiff 024	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000391 : Cardiff 025	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000392 : Cardiff 026	1%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000393 : Cardiff 027	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000394 : Cardiff 028	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000395 : Cardiff 029	1%	2%	1%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000396 : Cardiff 030	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000397 : Cardiff 031	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000398 : Cardiff 032	12%	12%	12%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
W02000399 : Cardiff 033	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000400 : Cardiff 034	1%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000401 : Cardiff 035	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	2%	3%	2%	3%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000403 : Cardiff 037	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000404 : Cardiff 038	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%
W02000405 : Cardiff 039	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000407 : Cardiff 041	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000409 : Cardiff 043	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000410 : Cardiff 044	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000411 : Cardiff 045	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000412 : Cardiff 046	1%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000422 : Cardiff 048	4%	4%	4%	4%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	4%
W02000423 : Cardiff 049	4%	4%	4%	5%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	4%
M4 East	10%	15%	14%	14%	13%	0%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%
M4 West	3%	3%	3%	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
North	8%	7%	8%	6%	7%	4%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
Vale	3%	2%	3%	3%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Total	100%	100%	100%	100%	100%	12%	13%	0%	2%	16%	0%	2%	1%	2%	33%	8%	0%	5%	1%	1%	0%	0%	0%	1%	1%	2%	100%



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	1020	183	473	427	255

Trip distribution	
M4 West	12%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	16%
Church Road (St Edlyns)	0%
Capel Edryn	2%
Bryn Celyn	1%
Circular Way	2%
Eastern Avenue (A48W)	33%
Newport Road	8%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Maw	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	0%
Total	100%

LEGEND:

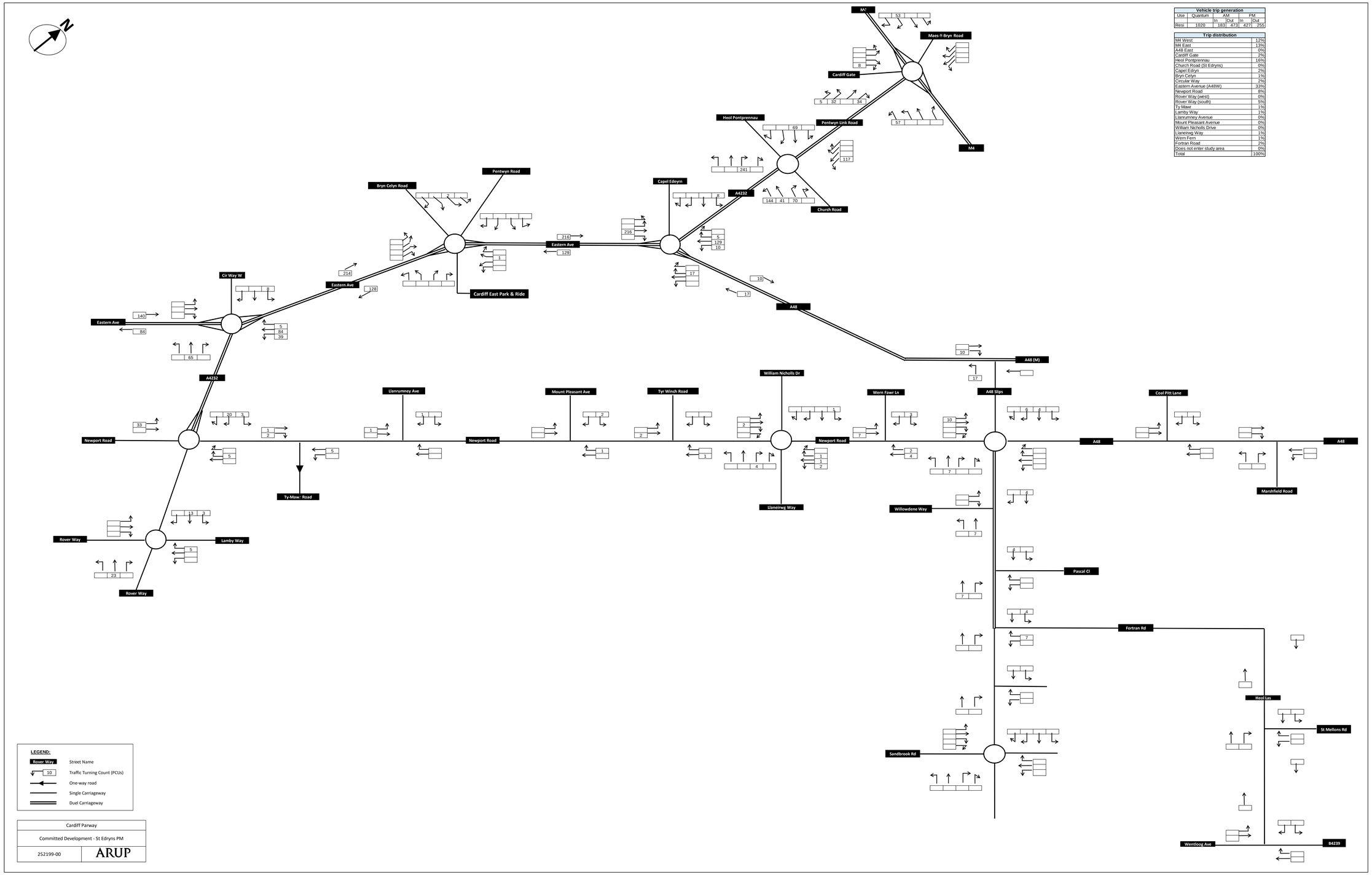
- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway

Committed Development - St Edryns AM

252199-00

ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	1020	183	473	427	255

Trip distribution	
M4 West	12%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	16%
Church Road (St Edryns)	0%
Capel Edryn	2%
Bryn Celyn	1%
Circular Way	2%
Eastern Avenue (A48W)	33%
Newport Road	8%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Maw	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	0%
Total	100%

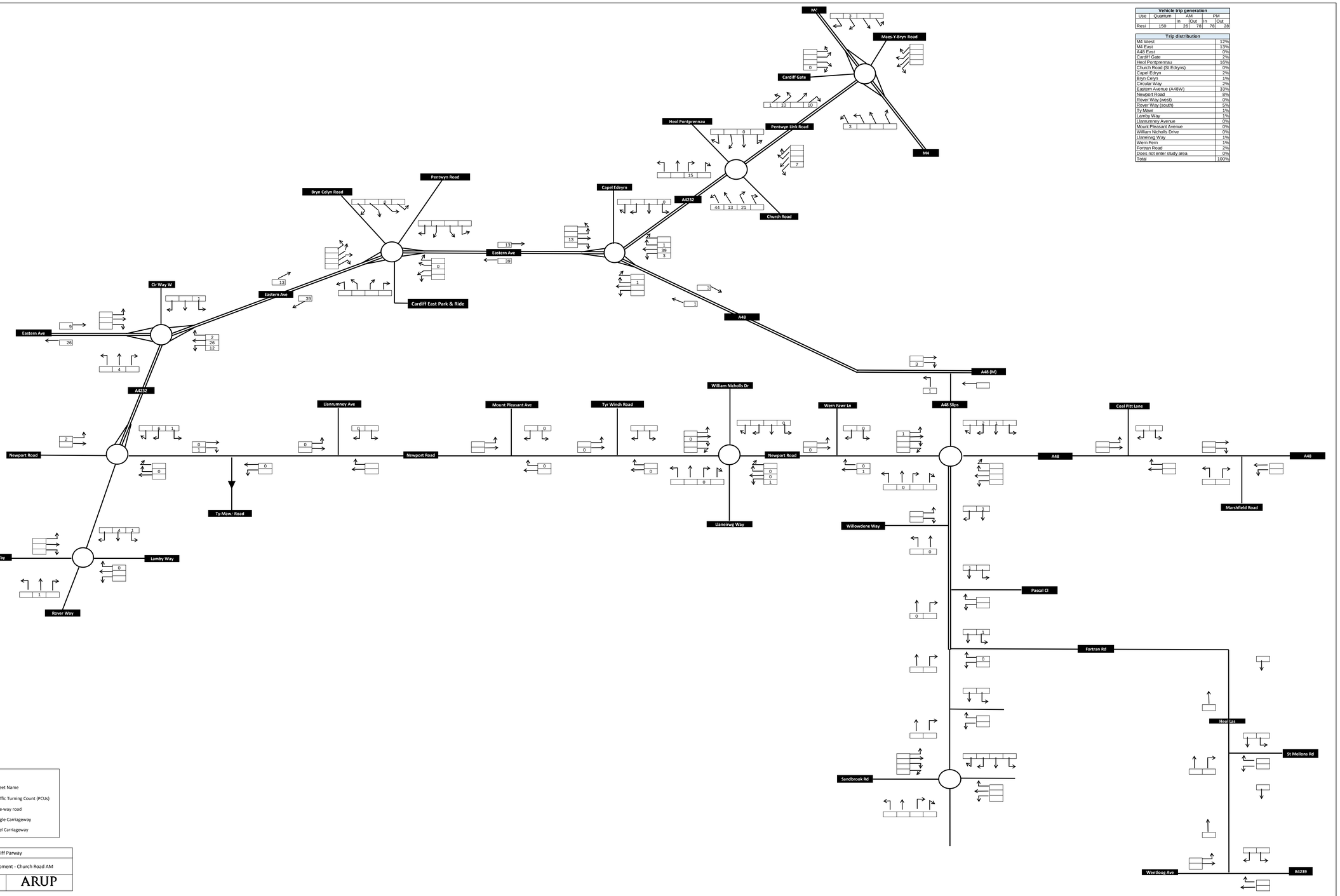
LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway

Committed Development - St Edryns PM

252199-00 ARUP



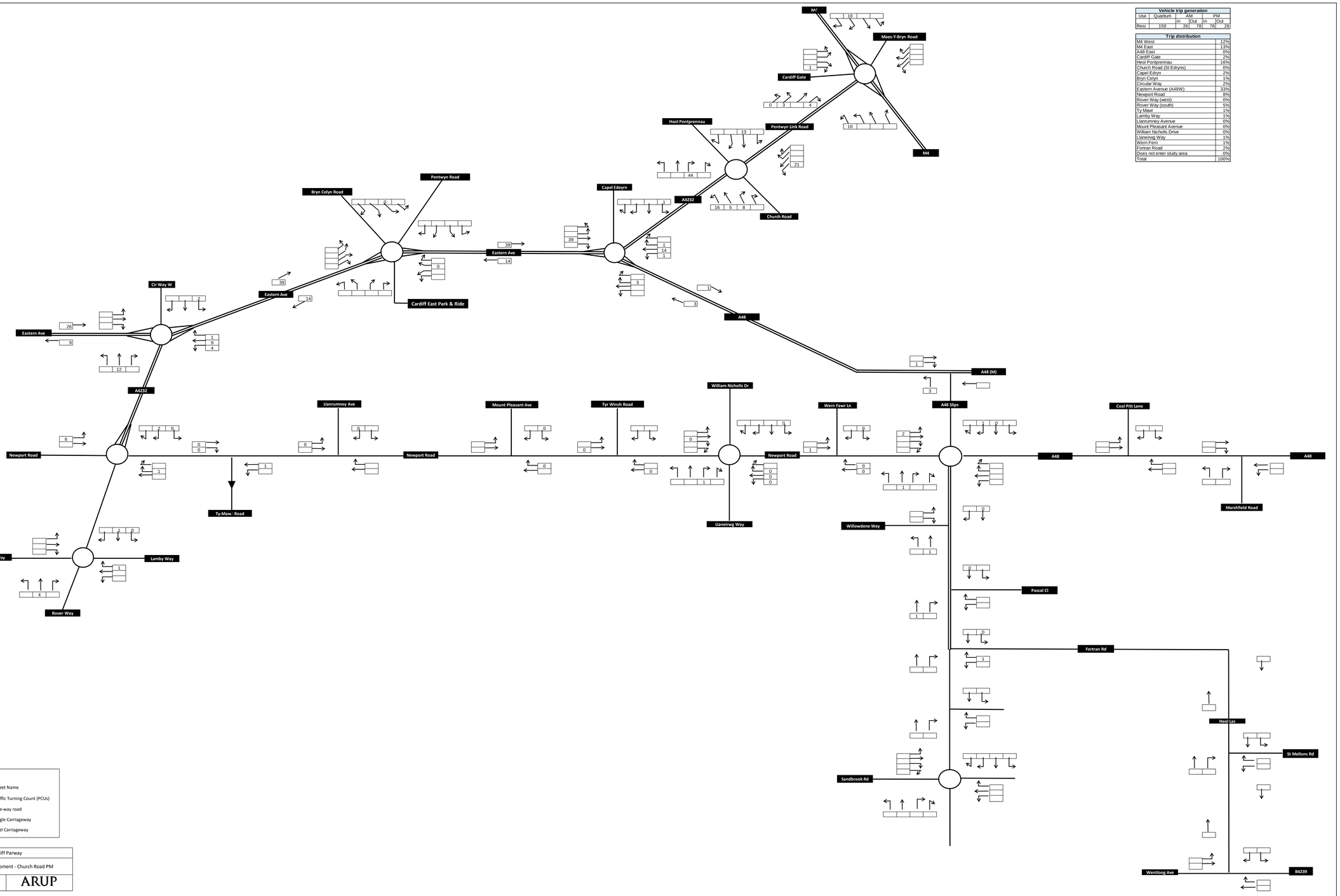
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	150	26	78	78	28

Trip distribution	
M4 West	12%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	16%
Church Road (St Edryns)	0%
Capel Edryn	2%
Bryn Celyn	1%
Circular Way	2%
Eastern Avenue (A48W)	33%
Newport Road	8%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Maw	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	0%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Development - Church Road AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	150	26	78	78	28

Trip distribution	
M4 West	12%
M4 East	13%
A48 East	0%
Cardiff Gate	2%
Heol Pontprennau	16%
Church Road (St Edryns)	0%
Capel Edryn	2%
Bryn Celyn	1%
Circular Way	2%
Eastern Avenue (A48W)	33%
Newport Road	8%
Rover Way (west)	0%
Rover Way (south)	5%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	2%
Does not enter study area	0%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway

Committed Development - Church Road PM

252199-00

ARUP

Appendix C

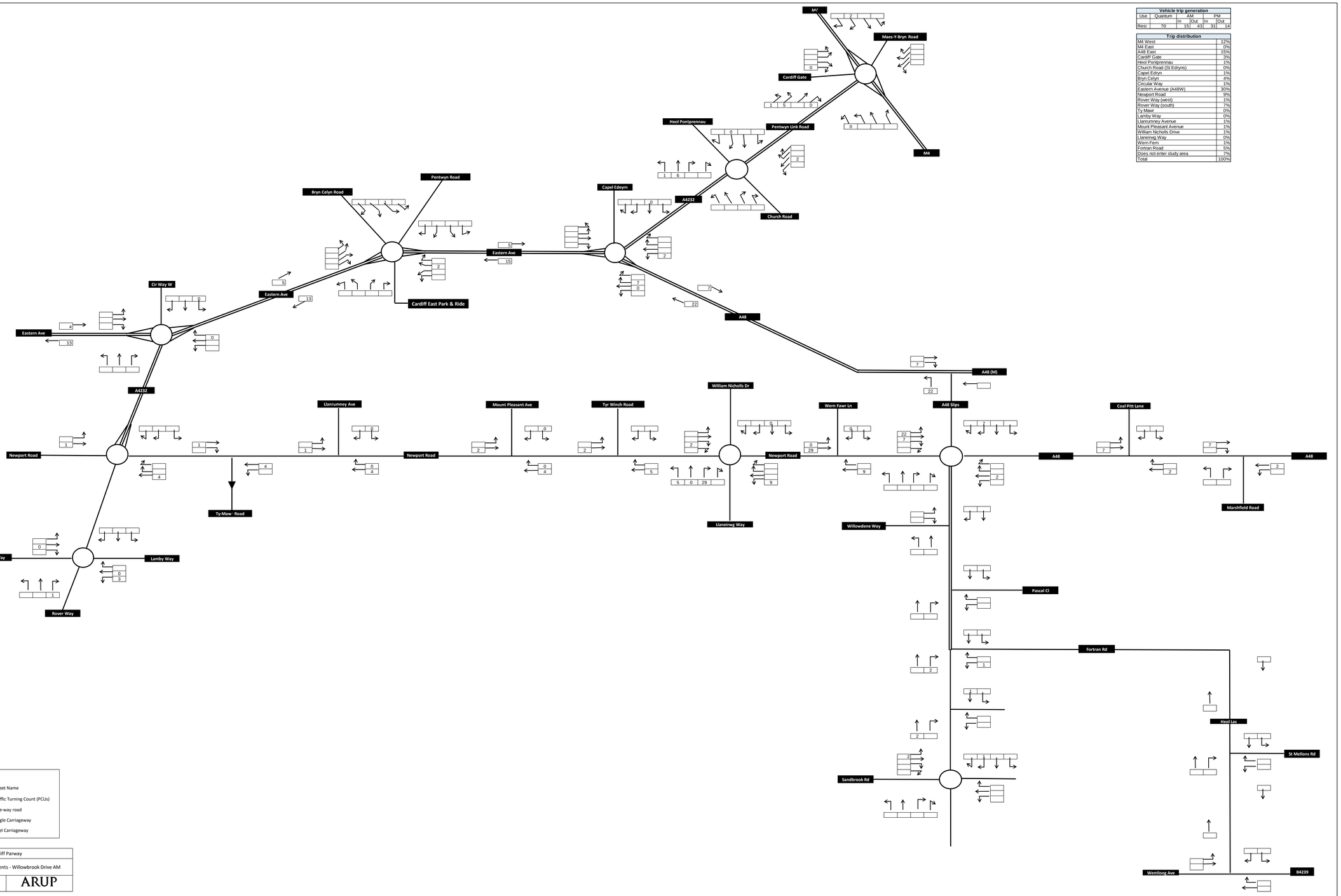
Committed developments distribution St Mellons/Trowbridge

Appendix C

Committed developments distribution St Mellons/Trowbridge

Draft

	Usual Residence					Development trips percentage distribution																					
Destination	**W02000377 : Cardiff 011**	**W02000379 : Cardiff 013**	**W02000381 : Cardiff 015**	**W02000382 : Cardiff 016**	**Average**	M4 West	M4 East	A48 East	Cardiff Gate	Heol Pontprennau	Church Road (St Edryns)	Capel Edryn	Bryn Celyn	Circular Way	Eastern Avenue (A48W)	Newport Road	Rover Way (west)	Rover Way (south)	Ty Mawr	Lamby Way	Llanrumney Ave	Mount Pleasant Ave	William Nicholls Drive	Llaneirwg Way	Wern Fawr	Fortran Road	Total	Do not enter study area
W02000367 : Cardiff 001	7	6	5	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000368 : Cardiff 002	5	3	4	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000369 : Cardiff 003	95	42	44	36	4%	0%	0%	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000370 : Cardiff 004	4	0	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000371 : Cardiff 005	43	18	42	21	2%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000372 : Cardiff 006	2	6	6	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000373 : Cardiff 007	39	29	40	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	1%	0%	2%	0%
W02000374 : Cardiff 008	2	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000375 : Cardiff 009	25	21	9	9	1%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000376 : Cardiff 010	14	13	17	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000377 : Cardiff 011	152	114	73	61	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	1%
W02000378 : Cardiff 012	7	4	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000379 : Cardiff 013	11	16	4	4	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000380 : Cardiff 014	4	2	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000381 : Cardiff 015	19	9	42	11	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%
W02000382 : Cardiff 016	18	16	25	26	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000383 : Cardiff 017	9	4	3	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000384 : Cardiff 018	110	60	66	37	4%	0%	0%	0%	0%	0%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000385 : Cardiff 019	11	2	4	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000386 : Cardiff 020	17	4	7	5	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000387 : Cardiff 021	25	16	4	7	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000388 : Cardiff 022	61	38	85	56	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
W02000389 : Cardiff 023	7	3	4	7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000390 : Cardiff 024	13	7	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000391 : Cardiff 025	33	22	36	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000392 : Cardiff 026	21	14	15	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000393 : Cardiff 027	1	1	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000394 : Cardiff 028	24	11	13	14	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000395 : Cardiff 029	61	40	49	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000396 : Cardiff 030	17	17	14	18	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000397 : Cardiff 031	9	5	5	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000398 : Cardiff 032	174	68	95	87	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%
W02000399 : Cardiff 033	42	22	21	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000400 : Cardiff 034	39	15	8	13	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000401 : Cardiff 035	5	1	1	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	50	18	27	32	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000403 : Cardiff 037	43	31	36	34	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000404 : Cardiff 038	70	32	57	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000405 : Cardiff 039	1	0	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	40	14	30	18	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000407 : Cardiff 041	14	1	11	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	13	9	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000409 : Cardiff 043	3	3	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000410 : Cardiff 044	8	3	2	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000411 : Cardiff 045	9	2	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000412 : Cardiff 046	37	30	32	31	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000422 : Cardiff 048	110	55	93	53	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
W02000423 : Cardiff 049	133	70	53	38	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Blaenau Gwent	7	1	3	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bridgend	49	15	10	17	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Caerphilly	51	26	28	28	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Carmarthenshire	2	1	1	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ceredigion	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Conwy	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Denbighshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Flintshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Gwynedd	1	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Isle of Anglesey	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Merthyr Tydfil	12	4	6	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Monmouthshire	18	5	11	3	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Neath Port Talbot	14	3	4	9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Newport	271	105	95	79	9%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	0%
Pembrokeshire	0	0	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Powys	1	4	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rhondda Cynon Taf	89	40	26	20	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Swansea	11	1	5	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
The Vale of Glamorgan	74	35	43	37	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Torfaen	41	22	22	5	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Wrexham	1	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East	5	9	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East Midlands	4	2	6	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
London	7	5	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North East	0	0	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North West	5	5	0	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Northern Ireland	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Scotland	3	0	0	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South East	15	6	6	6	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
South West	54	16	29	15	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
West Midlands	12	4	1	6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Yorkshire and The Humber	3	3	0	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2407.0	1231.0	1417.0	1084.0	100%	12%	0%	15%	3%	1%	0%	1%	4%	1%	30%	9%	1%	7%	0%	0%	1%	1%	1%	0%	1%	5%	89%	7%



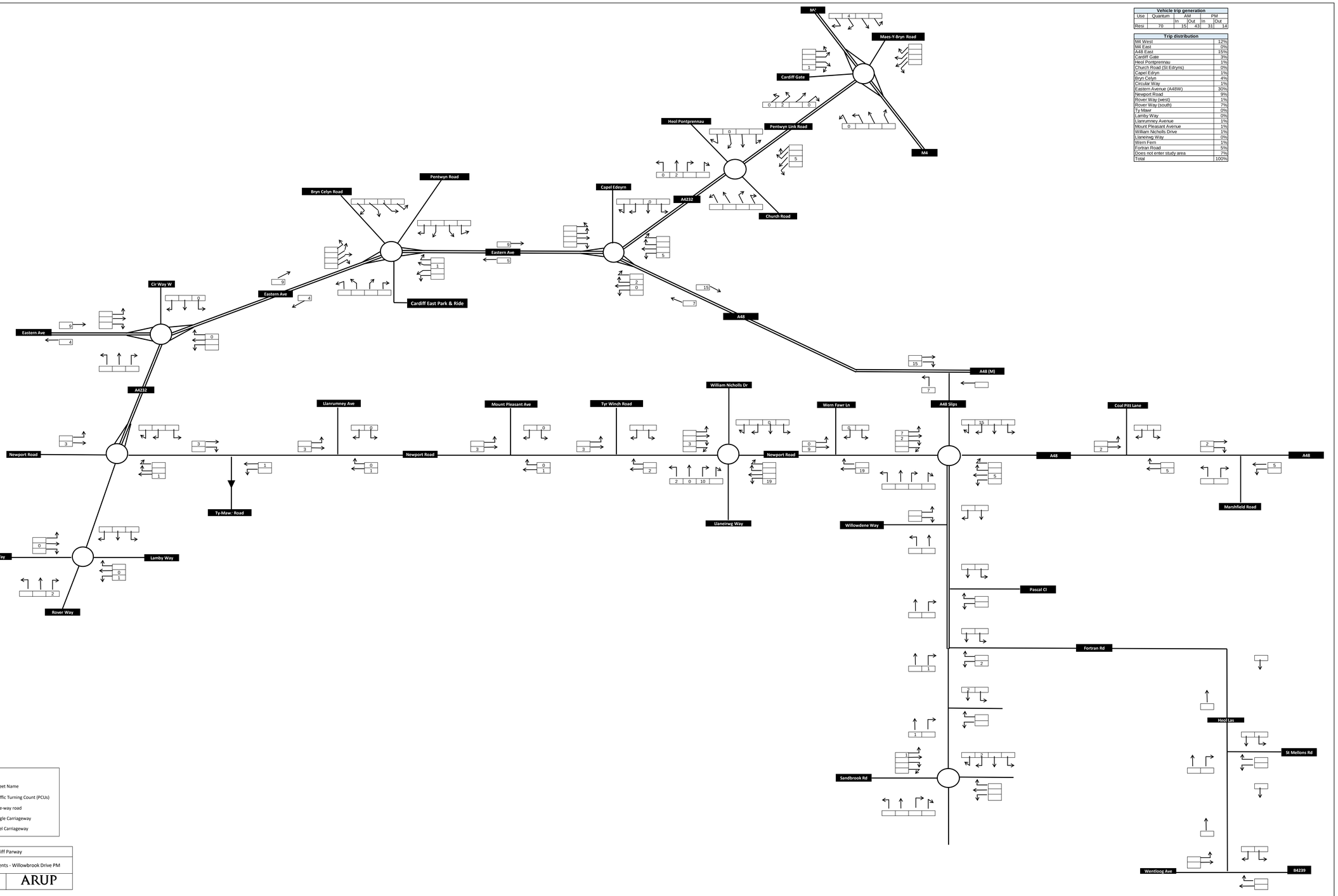
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	70	15	43	31	14

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Developments - Willowbrook Drive AM	
252199-00	ARUP



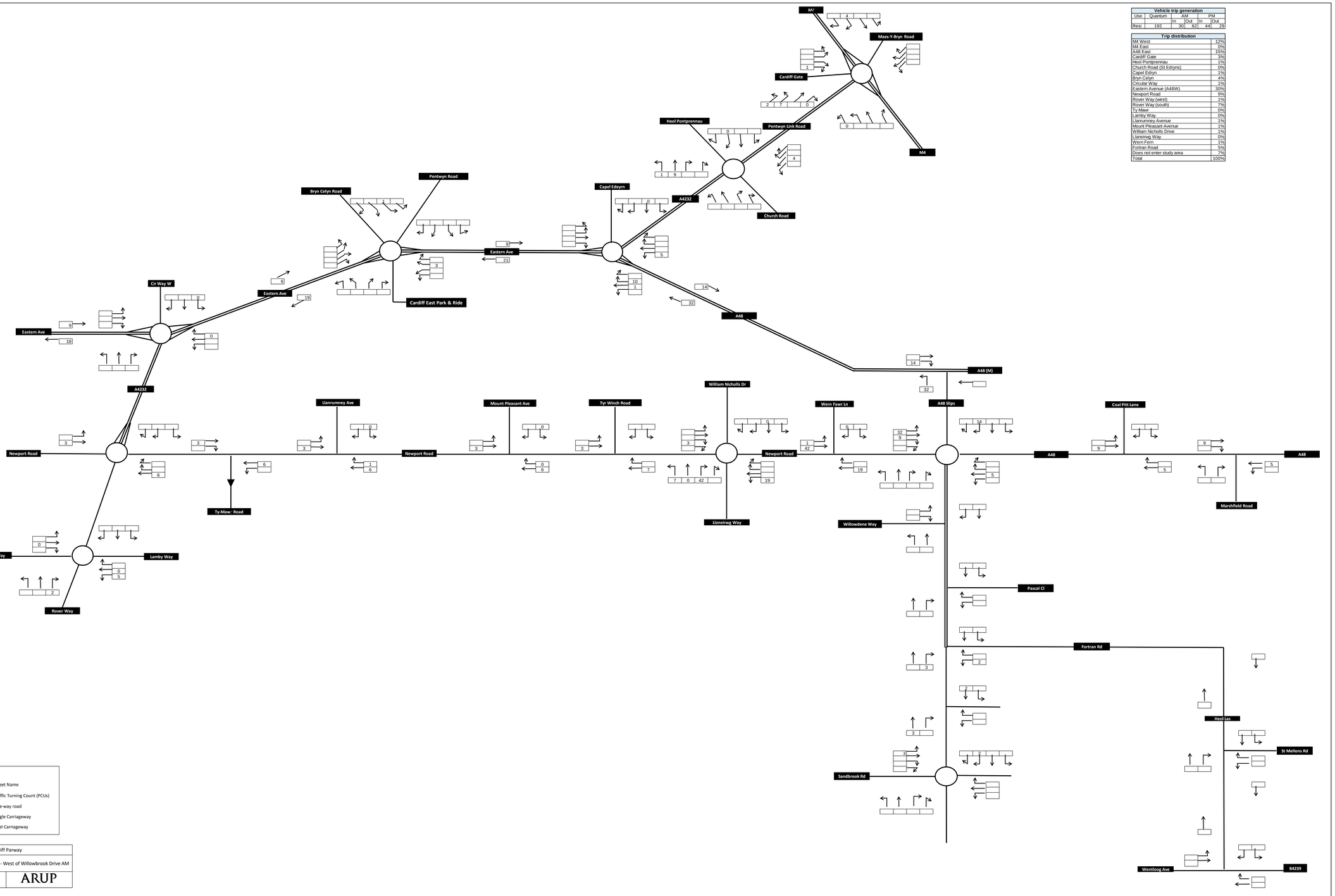
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	70	15	43	31	14

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - Willowbrook Drive PM	
252199-00	ARUP



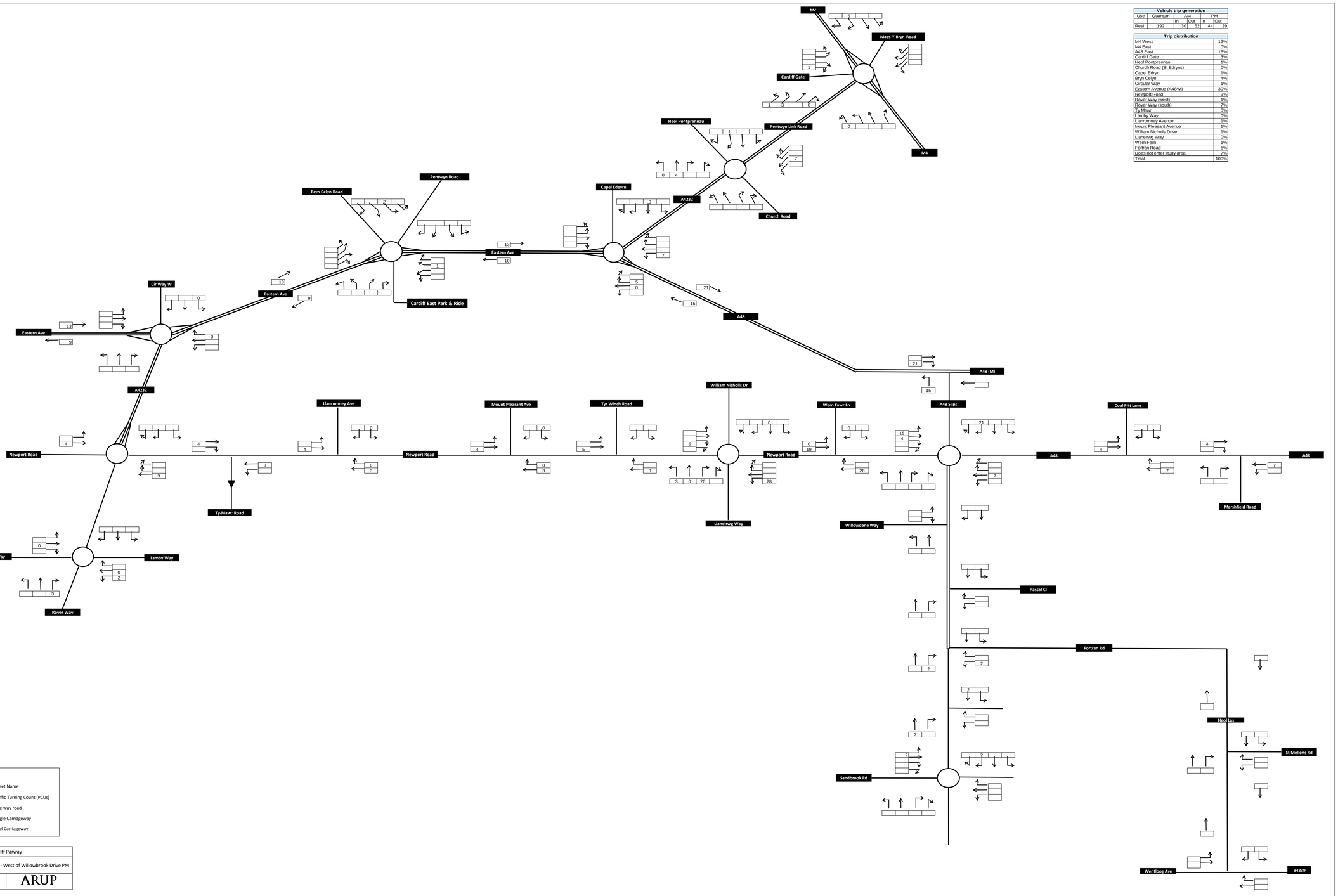
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	192	30	62	44	29

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - West of Willowbrook Drive AM	
252199-00	ARUP



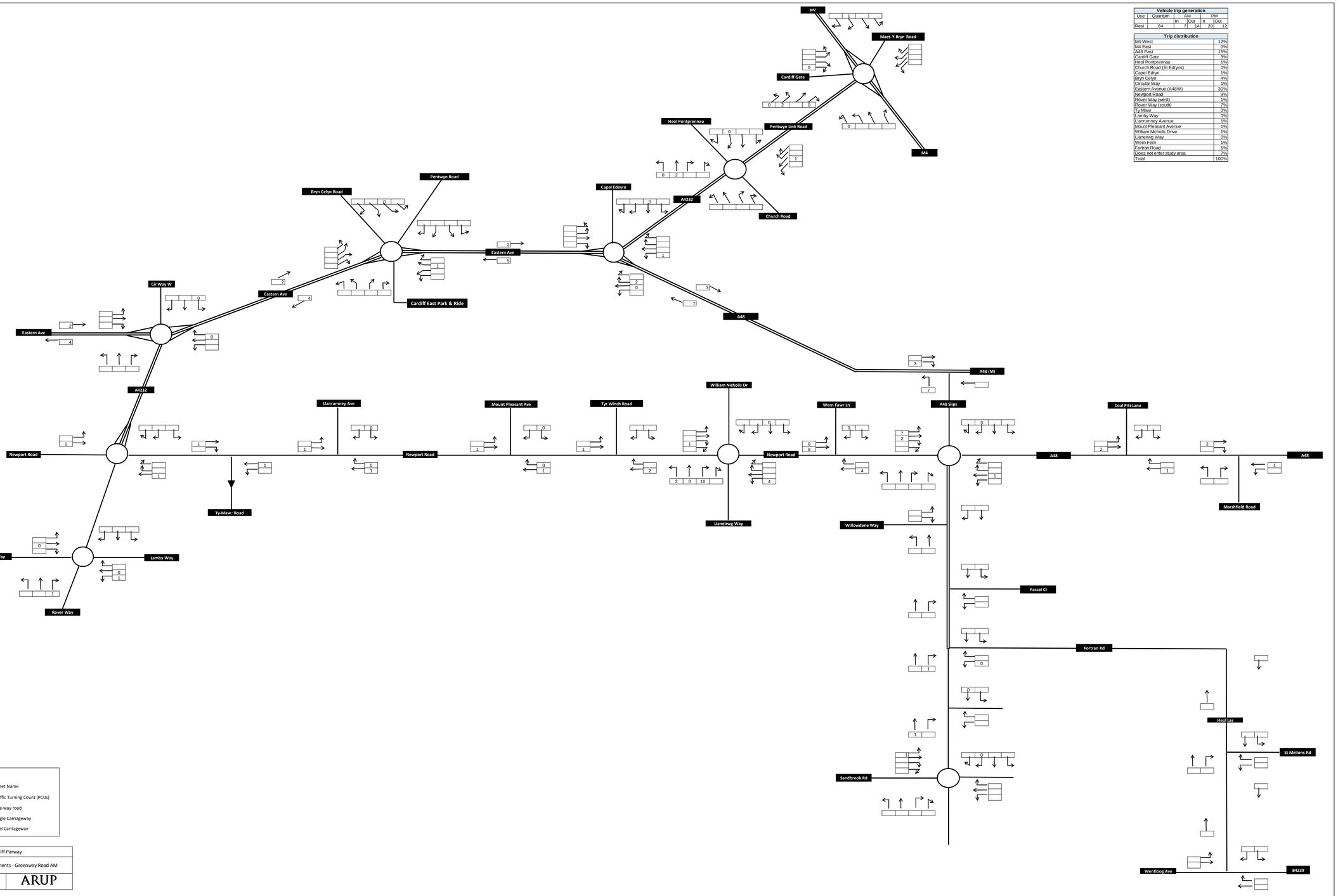
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	192	30	62	44	29

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - West of Willowbrook Drive PM	
252199-00	ARUP



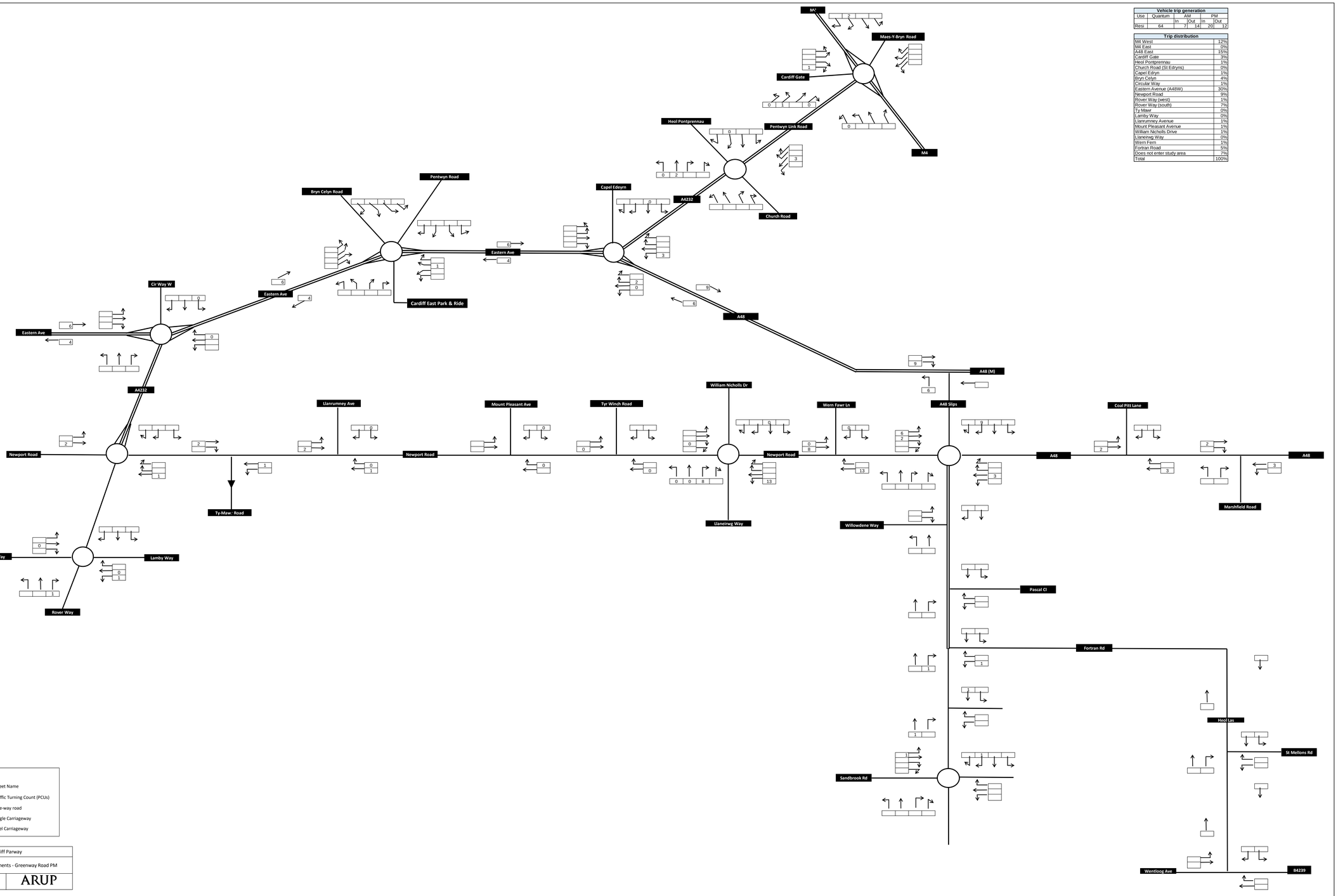
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	64	7	14	20	12

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - Greenway Road AM	
252199-00	ARUP



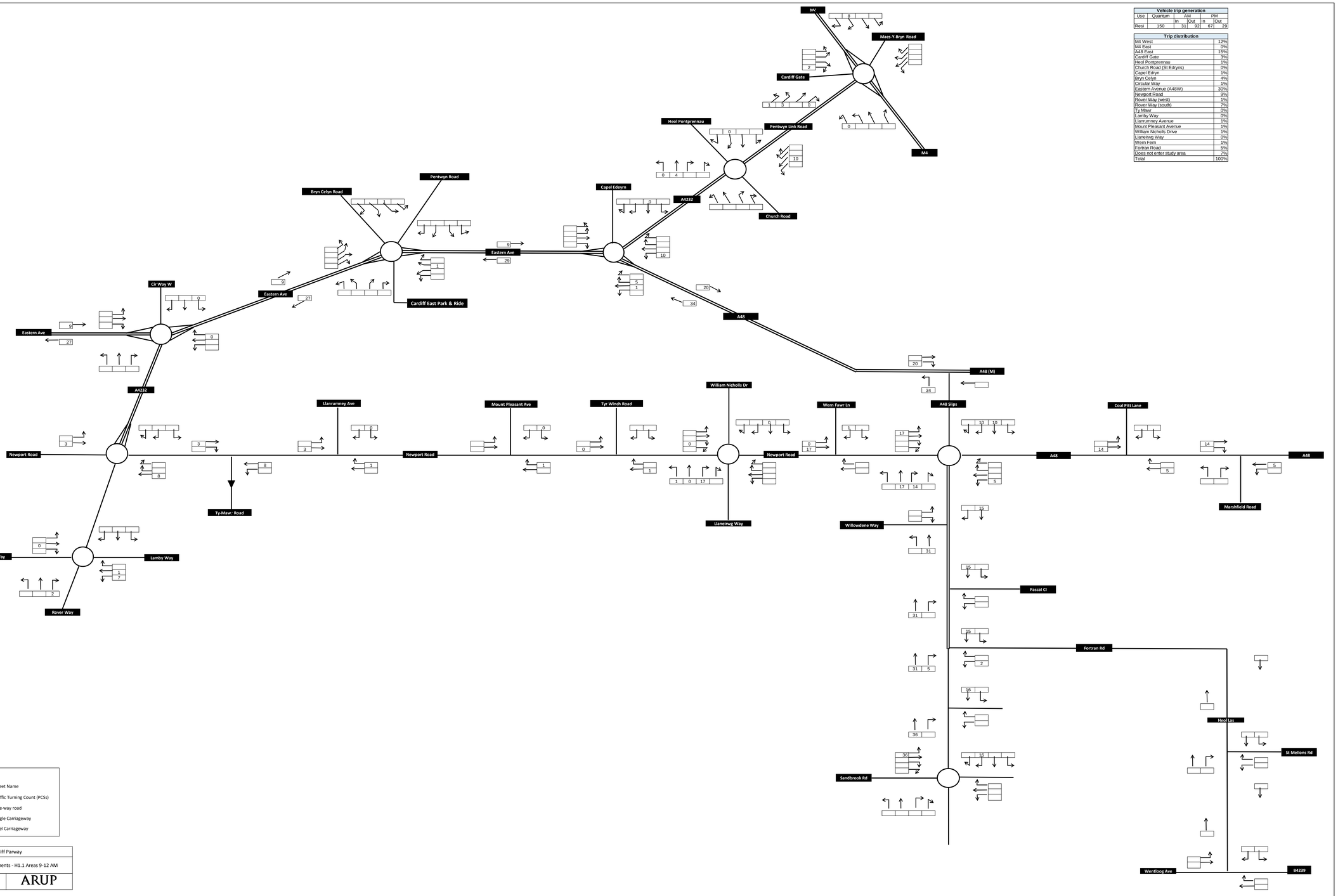
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	64	7	14	20	12

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCUs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - Greenway Road PM	
252199-00	ARUP



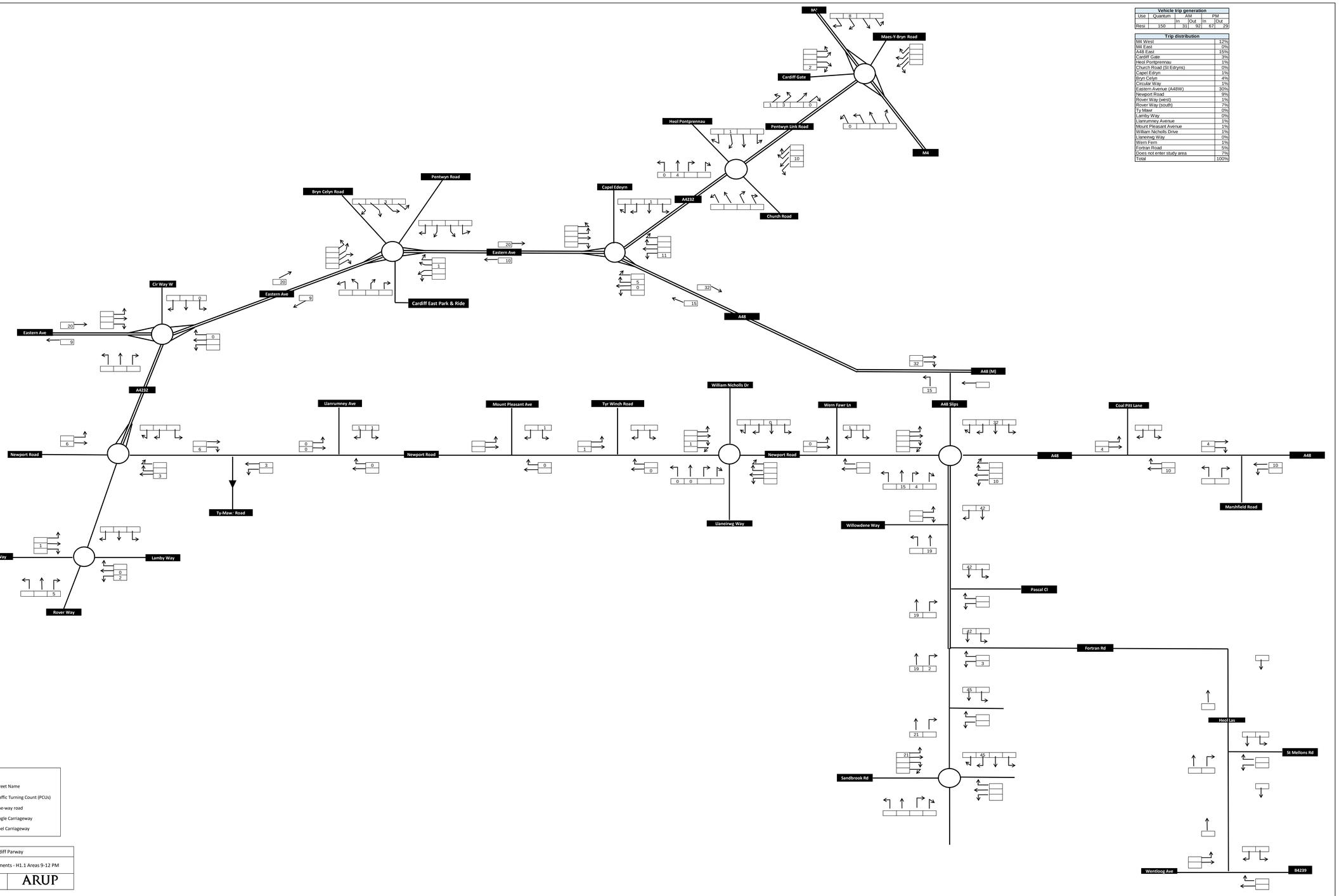
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	150	31	92	67	29

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

- Rover Way — Street Name
- 10 — Traffic Turning Count (PCSs)
- One-way road
- Single Carriageway
- Duel Carriageway

Cardiff Parway	
Committed Developments - H1.1 Areas 9-12 AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	150	31	92	67	29

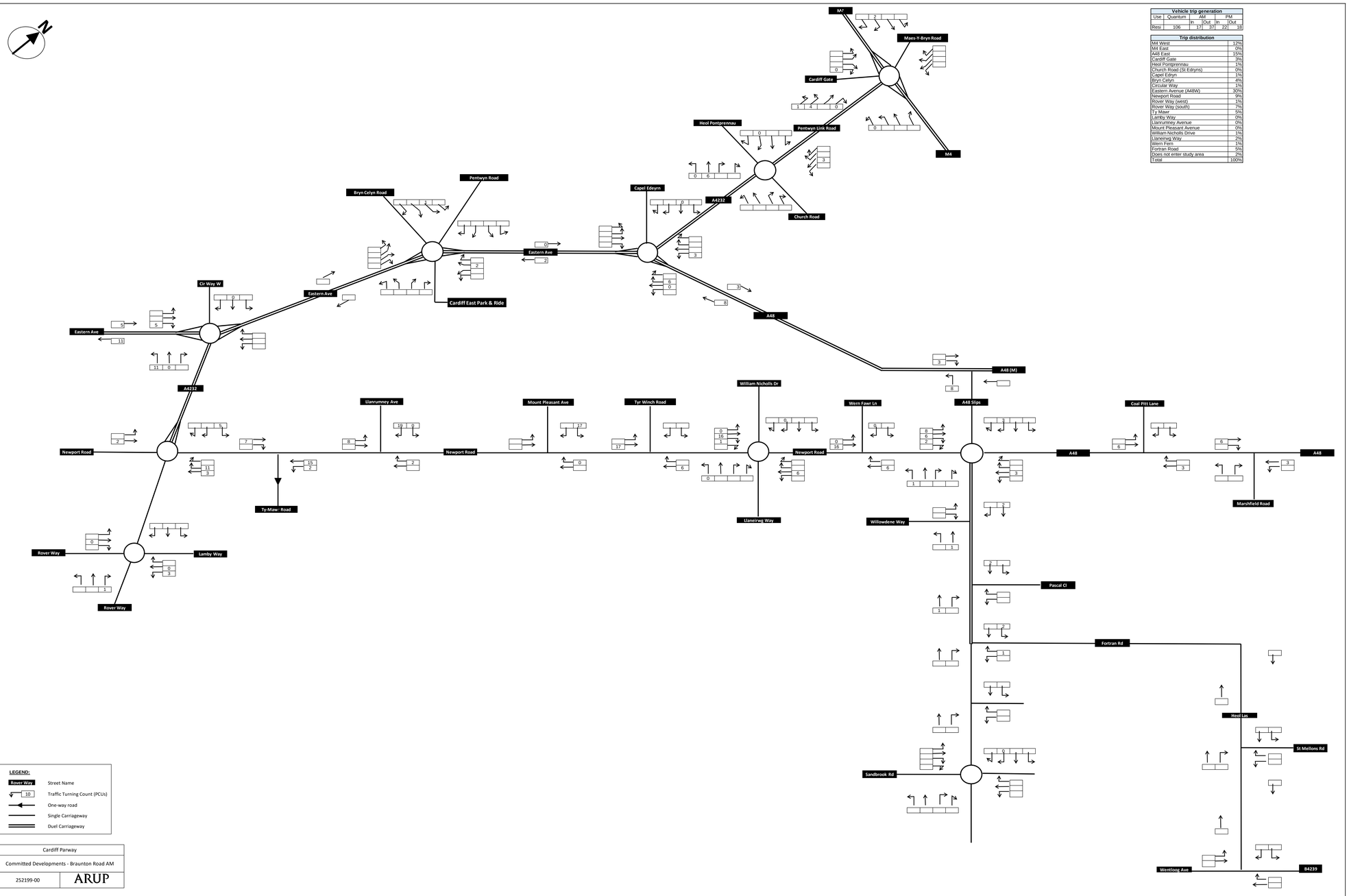
Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	0%
Lamby Way	0%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	0%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	7%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Developments - H1.1 Areas 9-12 PM	
252199-00	ARUP

	Usual Residence				Development trips percentage distribution																							
Destination	**W02000377 : Cardiff 011**	**W02000379 : Cardiff 013**	**W02000381 : Cardiff 015**	**W02000382 : Cardiff 016**	**Average**	M4 West	M4 East	A48 East	Cardiff Gate	Heol Pontprennau	Church Road (St Edryns)	Capel Edryn	Bryn Celyn	Circular Way	Eastern Avenue (A48W)	Newport Road	Rover Way (west)	Rover Way (south)	Ty Mawr	Lamby Way	Llanrumney Ave	Mount Pleasant Ave	William Nicholls Drive	Llaneirwg Way	Wern Fawr	Fortran Road	Total	Do not enter study area
W02000367 : Cardiff 001	7	6	5	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000368 : Cardiff 002	5	3	4	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000369 : Cardiff 003	95	42	44	36	4%	0%	0%	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000370 : Cardiff 004	4	0	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000371 : Cardiff 005	43	18	42	21	2%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000372 : Cardiff 006	2	6	6	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000373 : Cardiff 007	39	29	40	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	1%
W02000374 : Cardiff 008	2	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000375 : Cardiff 009	25	21	9	9	1%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000376 : Cardiff 010	14	13	17	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000377 : Cardiff 011	152	114	73	61	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%	7%	0%
W02000378 : Cardiff 012	7	4	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000379 : Cardiff 013	11	16	4	4	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
W02000380 : Cardiff 014	4	2	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000381 : Cardiff 015	19	9	42	11	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
W02000382 : Cardiff 016	18	16	25	26	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
W02000383 : Cardiff 017	9	4	3	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000384 : Cardiff 018	110	60	66	37	4%	0%	0%	0%	0%	0%	0%	0%	2%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000385 : Cardiff 019	11	2	4	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000386 : Cardiff 020	17	4	7	5	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000387 : Cardiff 021	25	16	4	7	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000388 : Cardiff 022	61	38	85	56	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000389 : Cardiff 023	7	3	4	7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000390 : Cardiff 024	13	7	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000391 : Cardiff 025	33	22	36	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000392 : Cardiff 026	21	14	15	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000393 : Cardiff 027	1	1	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000394 : Cardiff 028	24	11	13	14	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000395 : Cardiff 029	61	40	49	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000396 : Cardiff 030	17	17	14	18	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000397 : Cardiff 031	9	5	5	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000398 : Cardiff 032	174	68	95	87	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%
W02000399 : Cardiff 033	42	22	21	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000400 : Cardiff 034	39	15	8	13	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000401 : Cardiff 035	5	1	1	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	50	18	27	32	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000403 : Cardiff 037	43	31	36	34	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000404 : Cardiff 038	70	32	57	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000405 : Cardiff 039	1	0	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	40	14	30	18	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000407 : Cardiff 041	14	1	11	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	13	9	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000409 : Cardiff 043	3	3	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000410 : Cardiff 044	8	3	2	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000411 : Cardiff 045	9	2	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000412 : Cardiff 046	37	30	32	31	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000422 : Cardiff 048	110	55	93	53	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
W02000423 : Cardiff 049	133	70	53	38	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Blaenau Gwent	7	1	3	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bridgend	49	15	10	17	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Caerphilly	51	26	28	28	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Carmarthenshire	2	1	1	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ceredigion	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Conwy	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Denbighshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Flintshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Gwynedd	1	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Isle of Anglesey	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Merthyr Tydfil	12	4	6	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Monmouthshire	18	5	11	3	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Neath Port Talbot	14	3	4	9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Newport	271	105	95	79	9%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	0%
Pembrokeshire	0	0	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Powys	1	4	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rhondda Cynon Taf	89	40	26	20	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Swansea	11	1	5	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
The Vale of Glamorgan	74	35	43	37	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Torfaen	41	22	22	5	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Wrexham	1	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East	5	9	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East Midlands	4	2	6	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
London	7	5	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North East	0	0	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North West	5	5	0	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Northern Ireland	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Scotland	3	0	0	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South East	15	6	6	6	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
South West	54	16	29	15	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
West Midlands	12	4	1	6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Yorkshire and The Humber	3	3	0	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2407.0	1231.0	1417.0	1084.0	100%	12%	0%	15%	3%	1%	0%	1%	4%	1%	30%	9%	1%	7%	5%	0%	0%	0%	1%	2%	1%	5%	98%	2%



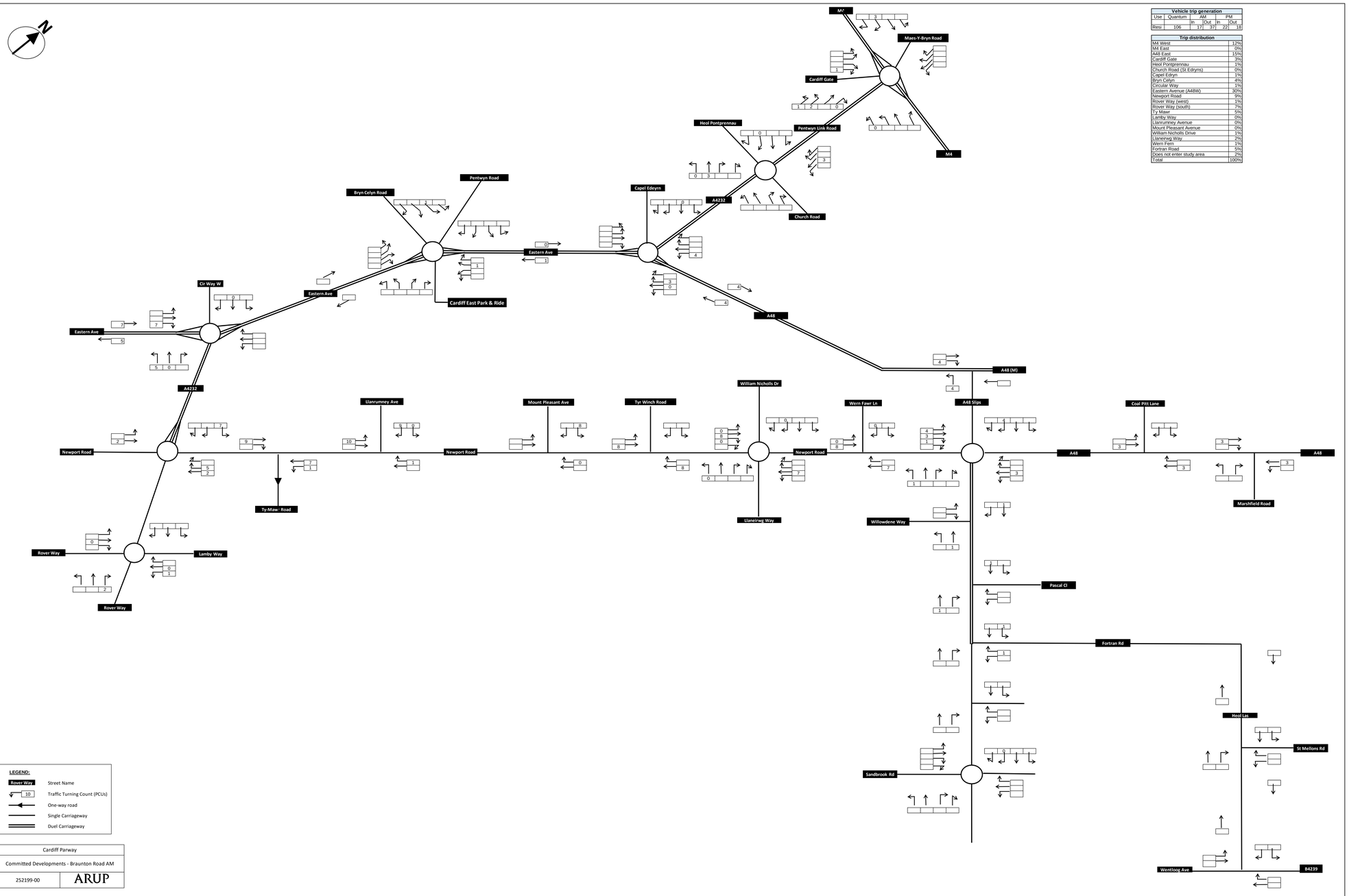
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	106	17	37	22	18

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	5%
Lamby Way	0%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	1%
Llaneirwg Way	2%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	2%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Developments - Braunton Road AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	106	17	37	22	18

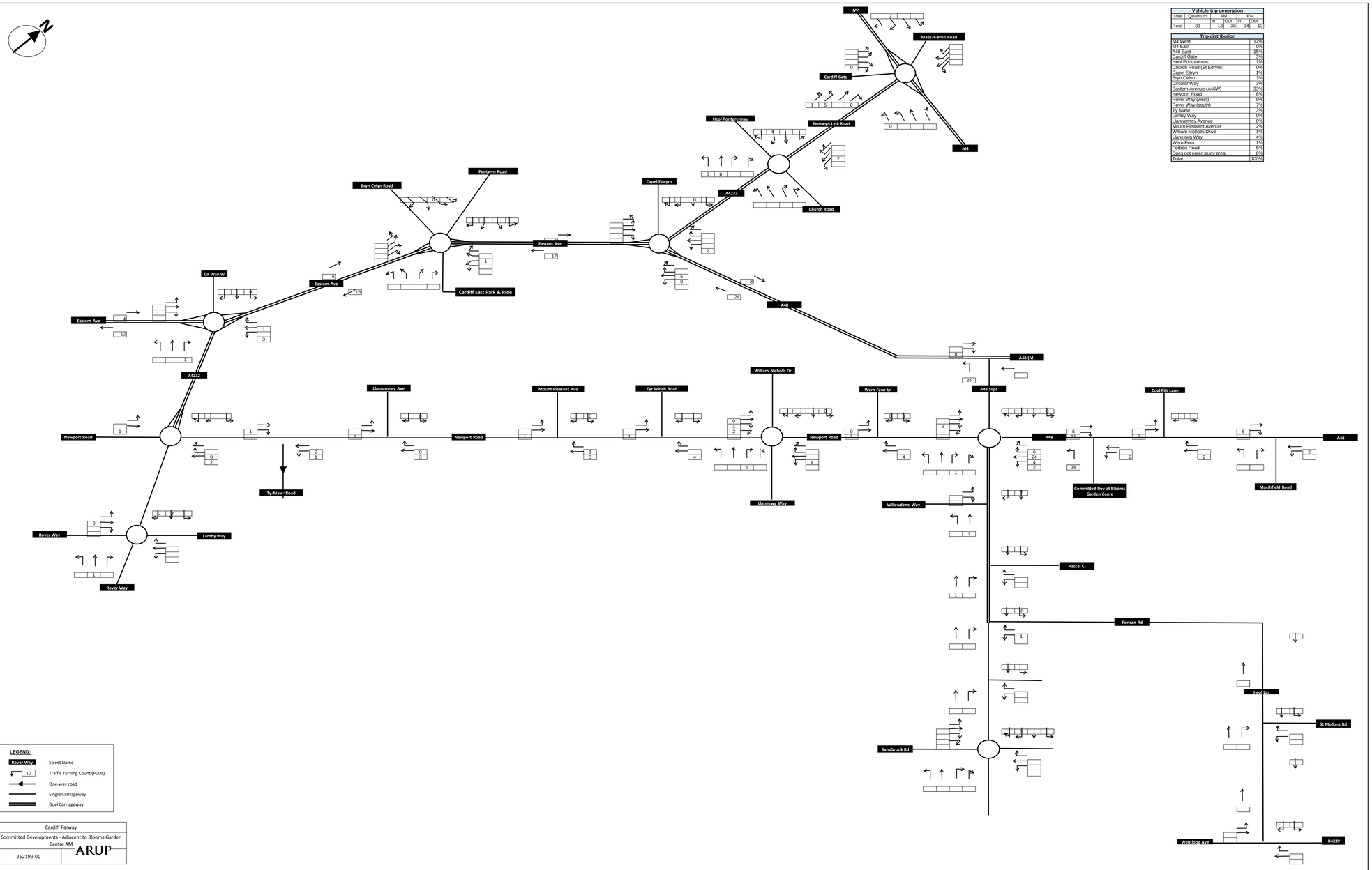
Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	5%
Lamby Way	0%
Llanrumney Avenue	0%
Mount Pleasant Avenue	0%
William Nicholls Drive	1%
Llaneirwg Way	2%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	2%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Developments - Braunton Road AM	
252199-00	ARUP

	Usual Residence					Development trips percentage distribution																					
Destination	**W02000377 : Cardiff 011**	**W02000379 : Cardiff 013**	**W02000381 : Cardiff 015**	**W02000382 : Cardiff 016**	**Average**	M4 West	M4 East	A48 East	Cardiff Gate	Heol Pontprennau	Church Road (St Edryns)	Capel Edryn	Bryn Celyn	Circular Way	Eastern Avenue (A48W)	Newport Road	Rover Way (west)	Rover Way (south)	Ty Mawr	Lamby Way	Llanrumney Ave	Mount Pleasant Ave	William Nicholls Drive	Llaneirwg Way	Wern Fawr	Fortran Road	Total	Do not enter study area
W02000367 : Cardiff 001	7	6	5	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000368 : Cardiff 002	5	3	4	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000369 : Cardiff 003	95	42	44	36	4%	0%	0%	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000370 : Cardiff 004	4	0	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000371 : Cardiff 005	43	18	42	21	2%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000372 : Cardiff 006	2	6	6	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000373 : Cardiff 007	39	29	40	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	1%	0%	2%	0%
W02000374 : Cardiff 008	2	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000375 : Cardiff 009	25	21	9	9	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000376 : Cardiff 010	14	13	17	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000377 : Cardiff 011	152	114	73	61	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	5%	7%	0%
W02000378 : Cardiff 012	7	4	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000379 : Cardiff 013	11	16	4	4	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
W02000380 : Cardiff 014	4	2	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000381 : Cardiff 015	19	9	42	11	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%
W02000382 : Cardiff 016	18	16	25	26	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
W02000383 : Cardiff 017	9	4	3	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000384 : Cardiff 018	110	60	66	37	4%	0%	0%	0%	0%	0%	0%	0%	1%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
W02000385 : Cardiff 019	11	2	4	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000386 : Cardiff 020	17	4	7	5	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000387 : Cardiff 021	25	16	4	7	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000388 : Cardiff 022	61	38	85	56	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	0%	0%	4%	0%
W02000389 : Cardiff 023	7	3	4	7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000390 : Cardiff 024	13	7	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000391 : Cardiff 025	33	22	36	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000392 : Cardiff 026	21	14	15	12	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000393 : Cardiff 027	1	1	3	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000394 : Cardiff 028	24	11	13	14	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000395 : Cardiff 029	61	40	49	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000396 : Cardiff 030	17	17	14	18	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000397 : Cardiff 031	9	5	5	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000398 : Cardiff 032	174	68	95	87	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%
W02000399 : Cardiff 033	42	22	21	20	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000400 : Cardiff 034	39	15	8	13	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
W02000401 : Cardiff 035	5	1	1	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000402 : Cardiff 036	50	18	27	32	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000403 : Cardiff 037	43	31	36	34	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000404 : Cardiff 038	70	32	57	41	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
W02000405 : Cardiff 039	1	0	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000406 : Cardiff 040	40	14	30	18	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000407 : Cardiff 041	14	1	11	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000408 : Cardiff 042	13	9	4	4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000409 : Cardiff 043	3	3	2	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000410 : Cardiff 044	8	3	2	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000411 : Cardiff 045	9	2	1	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
W02000412 : Cardiff 046	37	30	32	31	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
W02000422 : Cardiff 048	110	55	93	53	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
W02000423 : Cardiff 049	133	70	53	38	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
Blaenau Gwent	7	1	3	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bridgend	49	15	10	17	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Caerphilly	51	26	28	28	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Carmarthenshire	2	1	1	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ceredigion	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Conwy	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Denbighshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Flintshire	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Gwynedd	1	1	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Isle of Anglesey	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Merthyr Tydfil	12	4	6	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Monmouthshire	18	5	11	3	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Neath Port Talbot	14	3	4	9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Newport	271	105	95	79	9%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	0%
Pembrokeshire	0	0	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Powys	1	4	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rhondda Cynon Taf	89	40	26	20	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Swansea	11	1	5	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
The Vale of Glamorgan	74	35	43	37	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Torfaen	41	22	22	5	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Wrexham	1	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East	5	9	3	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
East Midlands	4	2	6	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
London	7	5	5	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North East	0	0	1	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North West	5	5	0	5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Northern Ireland	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Scotland	3	0	0	2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South East	15	6	6	6	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
South West	54	16	29	15	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
West Midlands	12	4	1	6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Yorkshire and The Humber	3	3	0	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2407.0	1231.0	1417.0	1084.0	100%	12%	0%	15%	3%	1%	0%	1%	3%	3%	33%	6%	0%	7%	3%	0%	0%	2%	1%	4%	1%	5%	100%	0%



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	83	13	38	34	13

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	3%
Circular Way	3%
Eastern Avenue (A48W)	33%
Newport Road	6%
Rover Way (west)	0%
Rover Way (south)	7%
Ty Mawr	3%
Lamby Way	0%
Llanrumney Avenue	0%
Mount Pleasant Avenue	2%
William Nicholls Drive	1%
Llaneirwg Way	4%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	0%
Total	100%

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	4%
Circular Way	1%
Eastern Avenue (A48W)	30%
Newport Road	9%
Rover Way (west)	1%
Rover Way (south)	7%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	1%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	5%
Total	####

LEGEND:

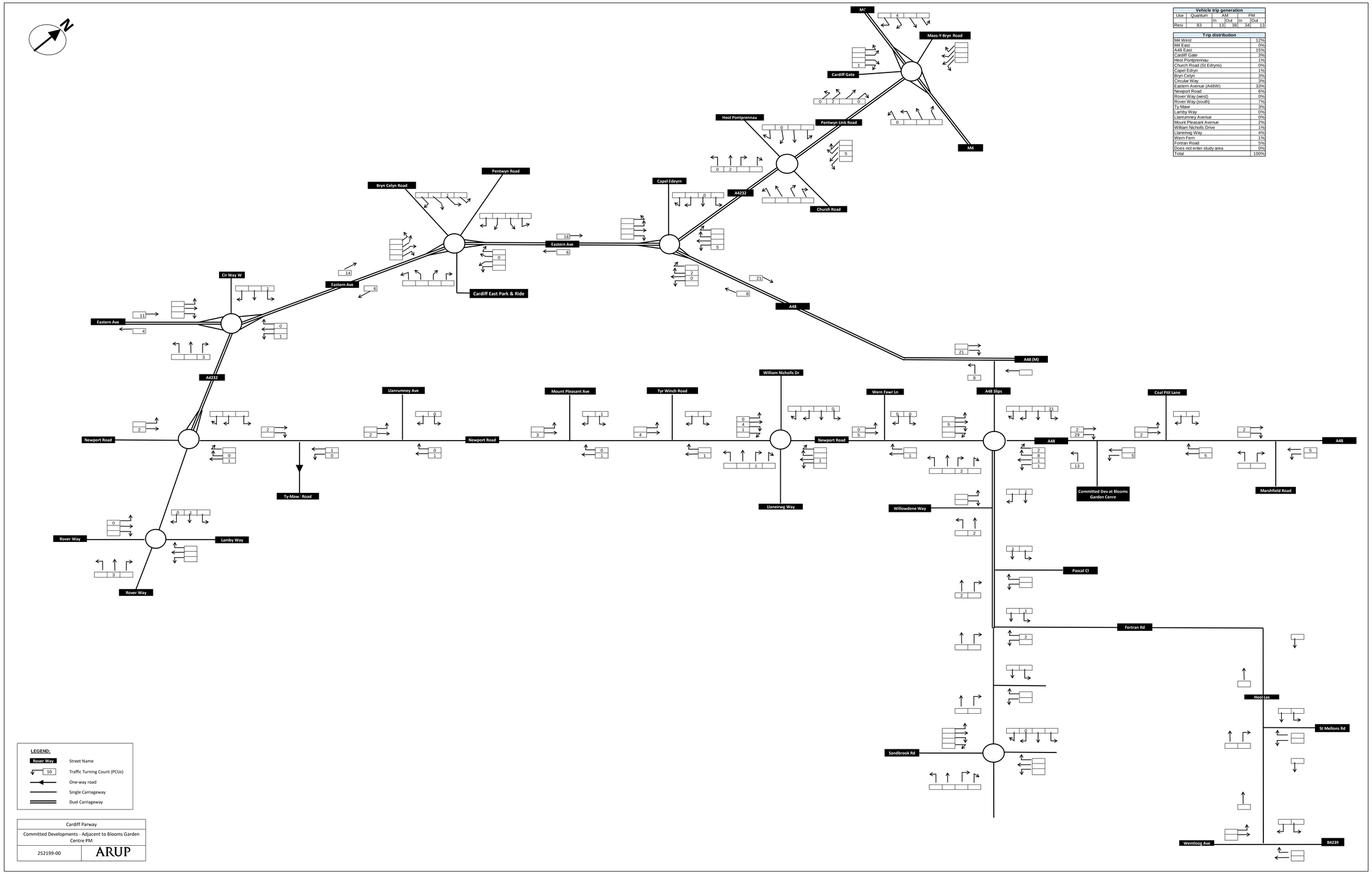
Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway

Committed Developments - Adjacent to Blooms Garden Centre AM

252199-00

ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	83	13	38	34	13

Trip distribution	
M4 West	12%
M4 East	0%
A48 East	15%
Cardiff Gate	3%
Heol Pontprennau	1%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	3%
Circular Way	3%
Eastern Avenue (A48W)	33%
Newport Road	6%
Rover Way (west)	0%
Rover Way (south)	7%
Ty Mawr	3%
Lamby Way	0%
Llanrumney Avenue	0%
Mount Pleasant Avenue	2%
William Nicholls Drive	1%
Llaneirwg Way	4%
Wern Fern	1%
Fortran Road	5%
Does not enter study area	0%
Total	100%

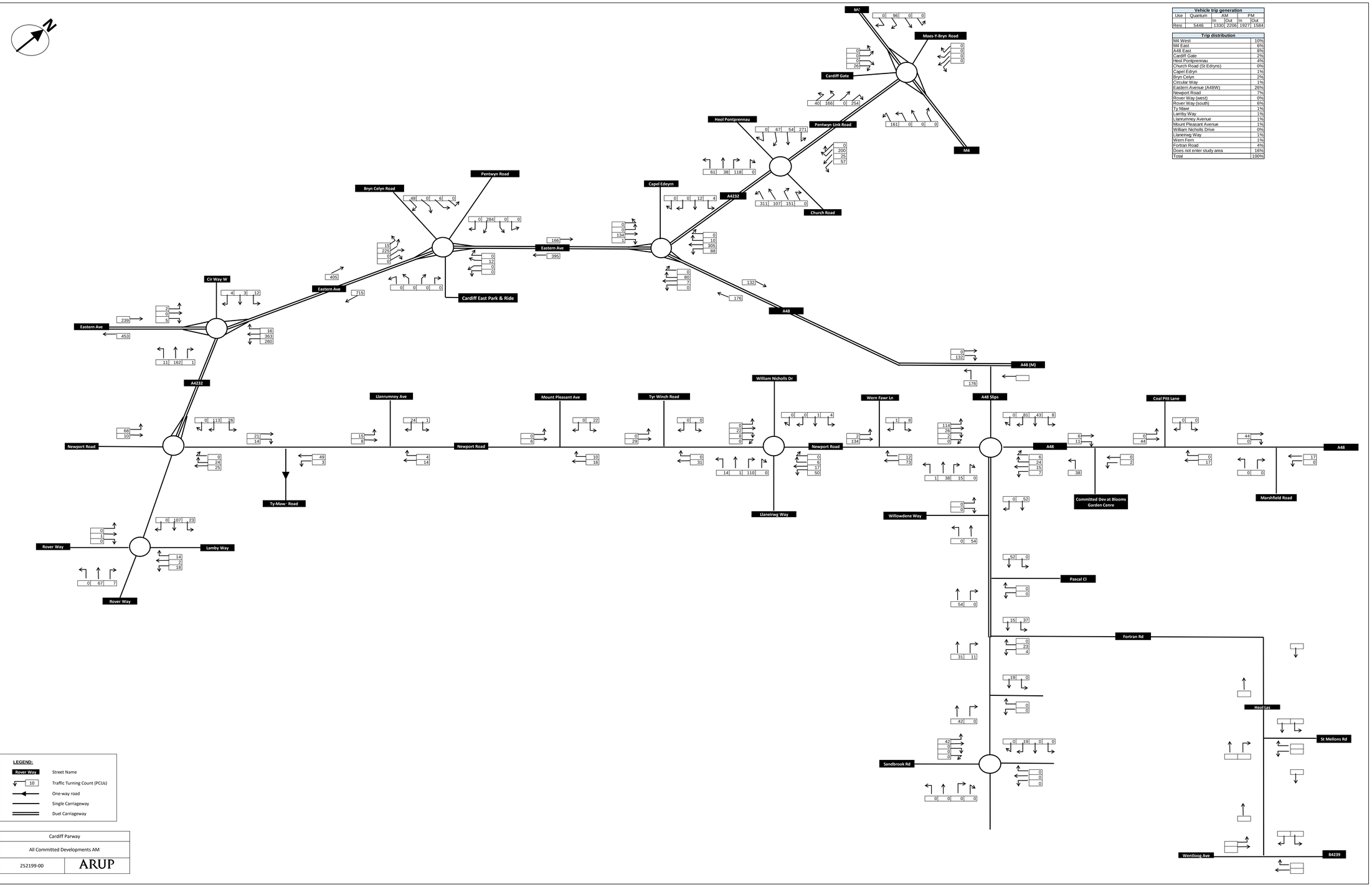
LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Committed Developments - Adjacent to Blooms Garden Centre PM	
252199-00	ARUP

Appendix D

Cumulative committed developments impact



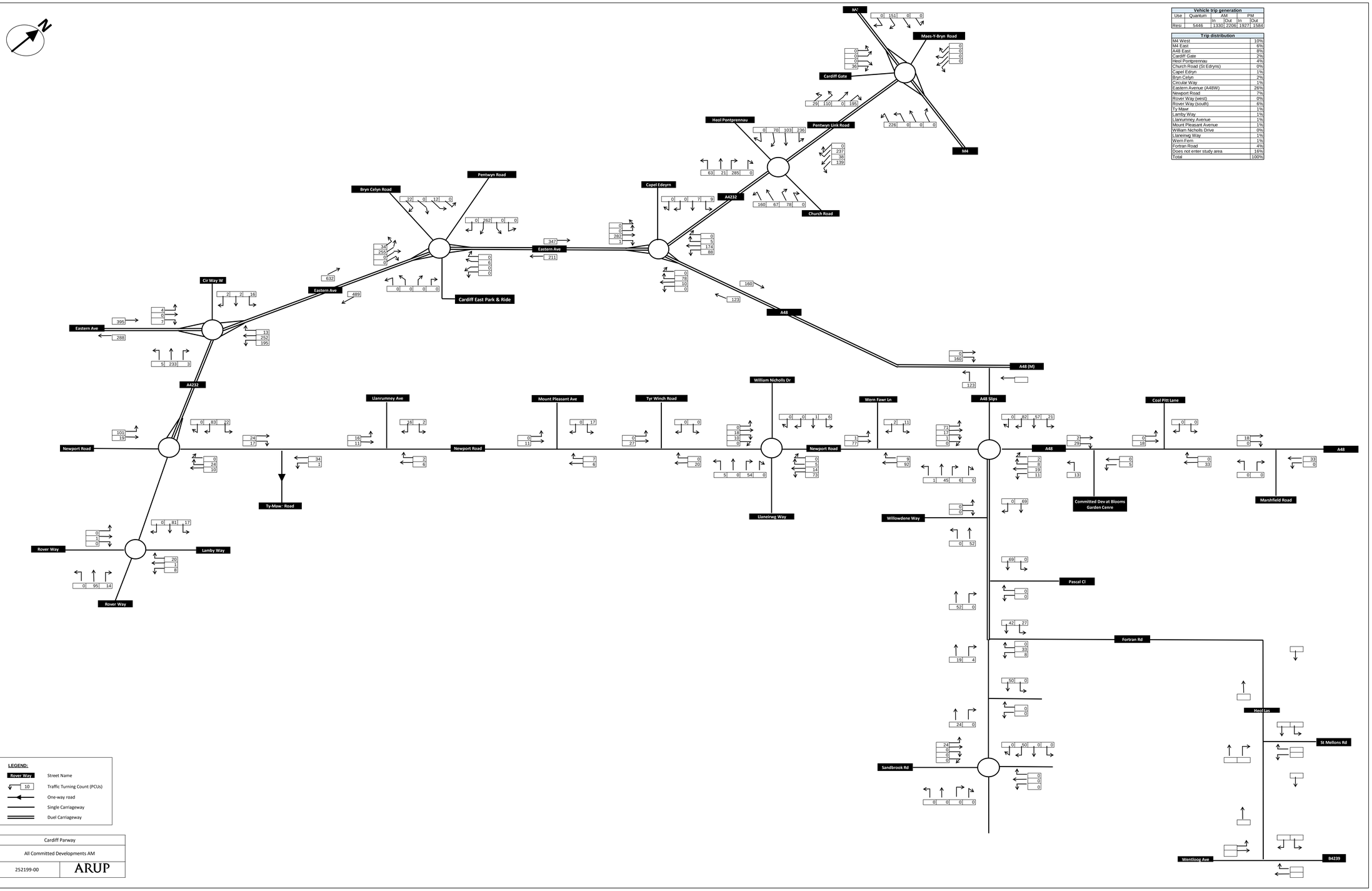
Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	5446	1330	2206	1927	1584

Trip distribution	
M4 West	10%
M4 East	6%
A48 East	8%
Cardiff Gate	2%
Heol Pontprennau	4%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	2%
Circular Way	1%
Eastern Avenue (A48W)	26%
Newport Road	7%
Rover Way (west)	0%
Rover Way (south)	6%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	4%
Does not enter study area	16%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
All Committed Developments AM	
252199-00	ARUP



Vehicle trip generation					
Use	Quantum	AM		PM	
		In	Out	In	Out
Resi	5446	1330	2206	1927	1584

Trip distribution	
M4 West	10%
M4 East	6%
A48 East	8%
Cardiff Gate	2%
Heol Pontprennau	4%
Church Road (St Edryns)	0%
Capel Edryn	1%
Bryn Celyn	2%
Circular Way	1%
Eastern Avenue (A48W)	26%
Newport Road	7%
Rover Way (west)	0%
Rover Way (south)	6%
Ty Mawr	1%
Lamby Way	1%
Llanrumney Avenue	1%
Mount Pleasant Avenue	1%
William Nicholls Drive	0%
Llaneirwg Way	1%
Wern Fern	1%
Fortran Road	4%
Does not enter study area	16%
Total	100%

LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
All Committed Developments AM	
252199-00	ARUP

Appendix E

TEMPro outputs

Dataset Version: 72
Result Type: Trip ends by time period
Base Year: 2018
Future Year: 2023
Trip Purpose Group: All purposes
Time Period: Weekday AM peak period (0700 - 0959)
Trip End Type: Origin/Destination
Alternative Assumptions Applied: Yes

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.0098	1.0242

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	20	65

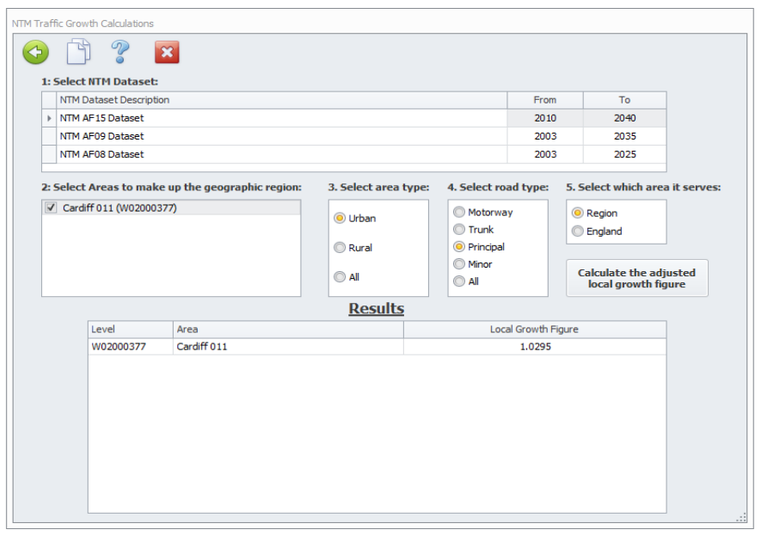
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,043	2,706

Future Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,063	2,772

Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.029461



Dataset Version: 72
Result Type: Trip ends by time period
Base Year: 2018
Future Year: 2023
Trip Purpose Group: All purposes
Time Period: Weekday PM peak period (1600 - 1859)
Trip End Type: Origin/Destination
Alternative Assumptions Applied: Yes

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.0193	1.0091

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	50	18

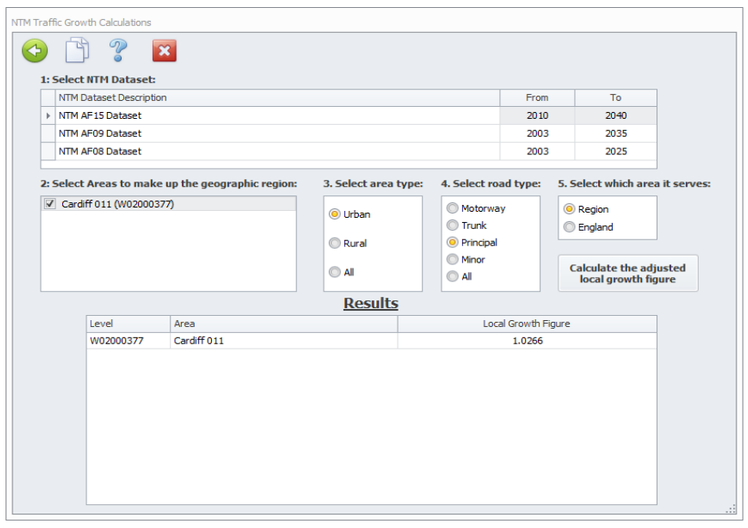
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,618	1,993

Future Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,669	2,011

Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.026627



Dataset Version: 72
Result Type: Trip ends by time period
Base Year: 2018
Future Year: 2028
Trip Purpose Group: All purposes
Time Period: Weekday AM peak period (0700 - 0959)
Trip End Type: Origin/Destination
Alternative Assumptions Applied: Yes

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.0146	1.0397

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	30	107

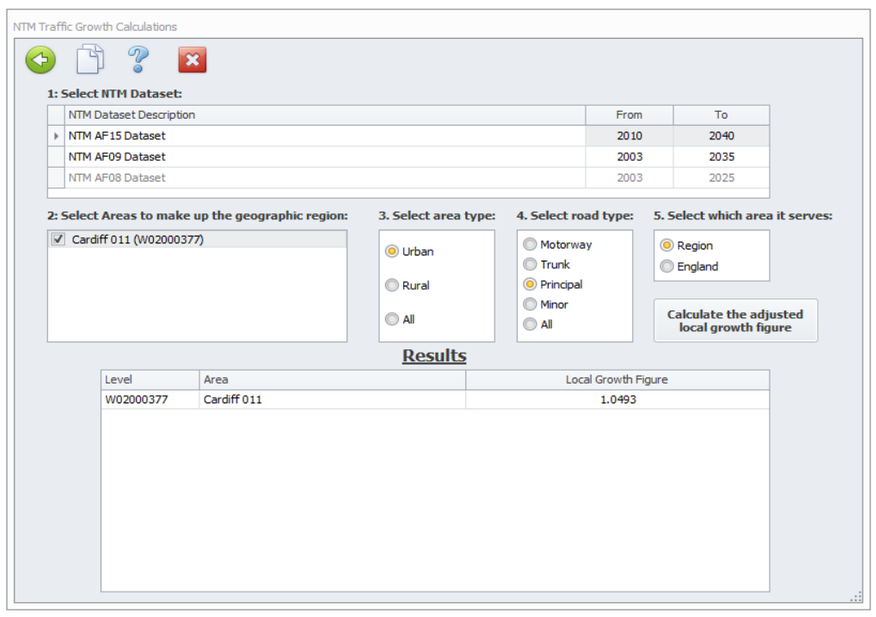
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,043	2,706

Future Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,072	2,814

Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.049279



Dataset Version: 72
Result Type: Trip ends by time period
Base Year: 2018
Future Year: 2028
Trip Purpose Group: All purposes
Time Period: Weekday PM peak period (1600 - 1859)
Trip End Type: Origin/Destination
Alternative Assumptions Applied: Yes

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.0319	1.0139

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	83	28

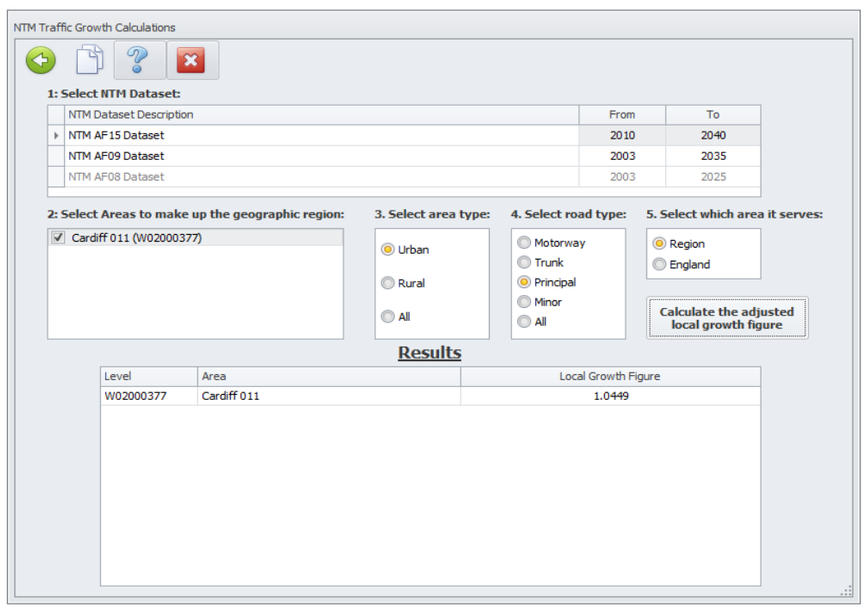
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,618	1,993

Future Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,702	2,020

Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.044938



No alternative assumptions applied for comparison

Dataset Version:	72
Result Type:	Trip ends by time period
Base Year:	2018
Future Year:	2028
Trip Purpose Group:	All purposes
Time Period:	Weekday AM peak period (0700 - 0959)
Trip End Type:	Origin/Destination
Alternative Assumptions Applied:	No

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.1223	1.0788

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	250	213

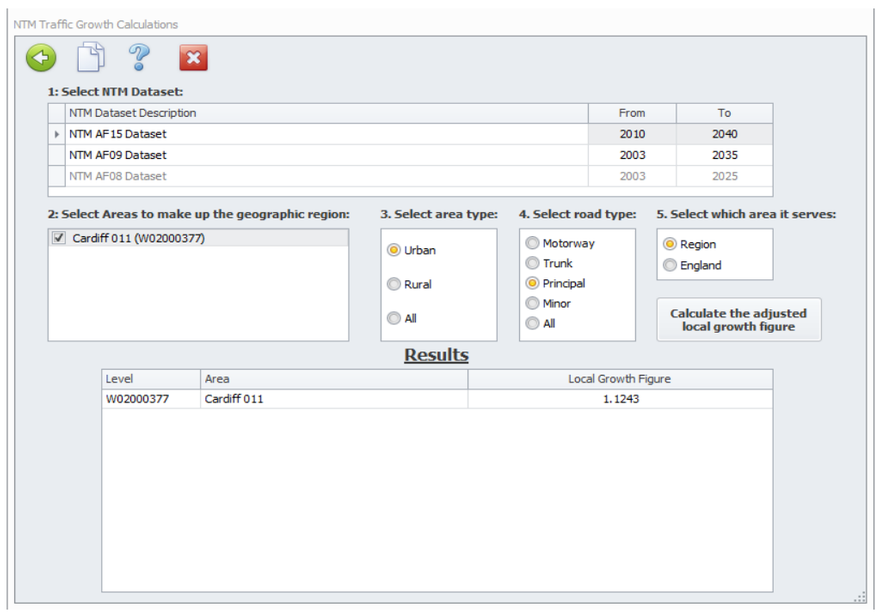
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,043	2,706

Future Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,292	2,920

Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.12426



Dataset Version:	72
Result Type:	Trip ends by time period
Base Year:	2018
Future Year:	2028
Trip Purpose Group:	All purposes
Time Period:	Weekday PM peak period (1600 - 1859)
Trip End Type:	Origin/Destination
Alternative Assumptions Applied:	No

Growth Factor

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	1.0834	1.1182

Future Year - Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	218	235

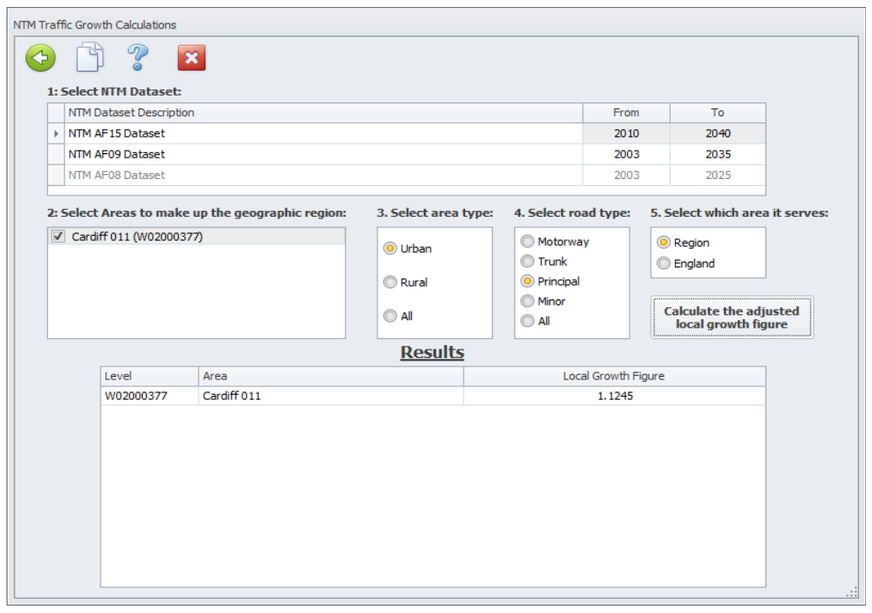
Base Year

Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,618	1,993

Future Year

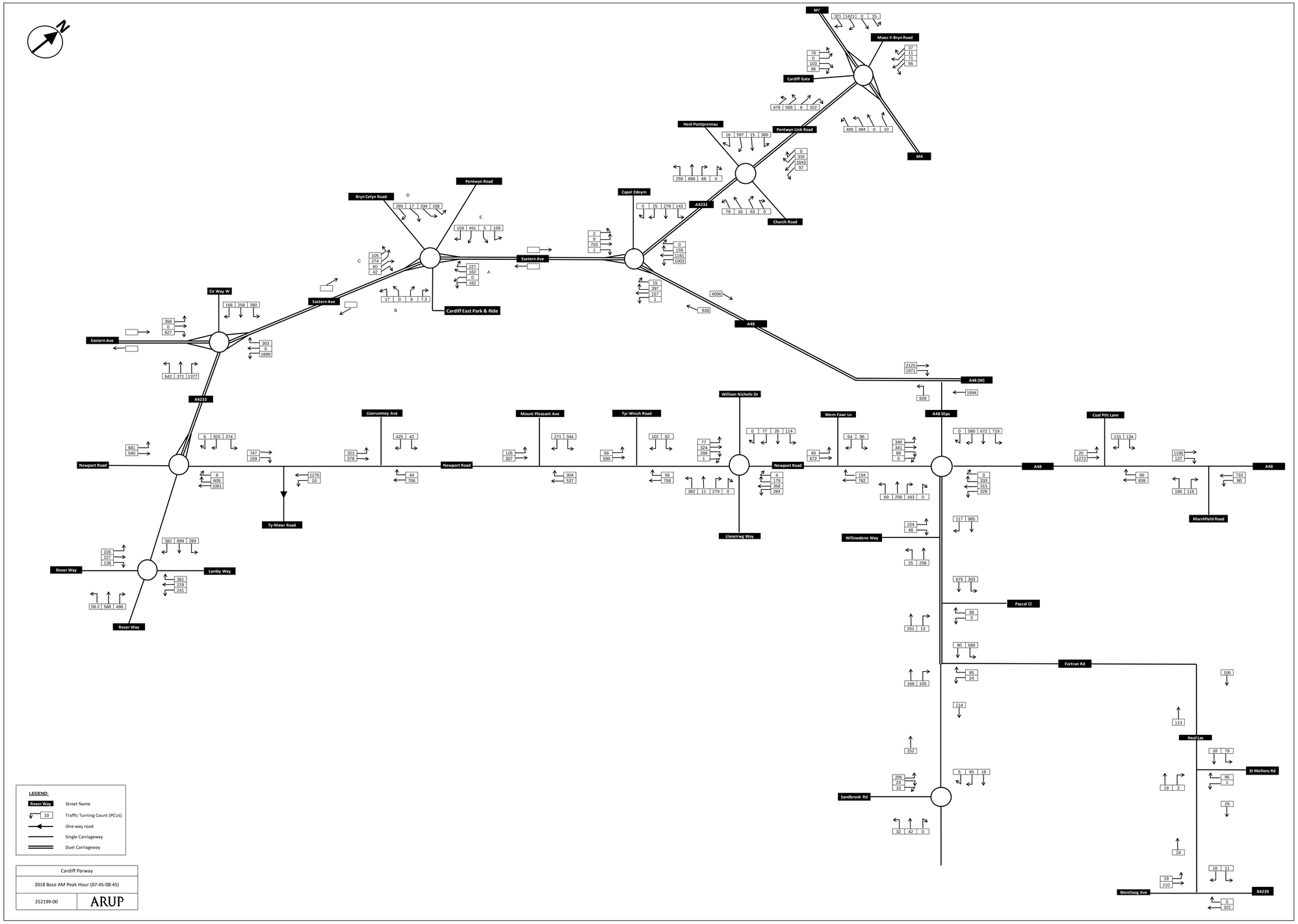
Area Description		All purposes	
Level	Name	Origin	Destination
W02000377	Cardiff 011	2,837	2,228

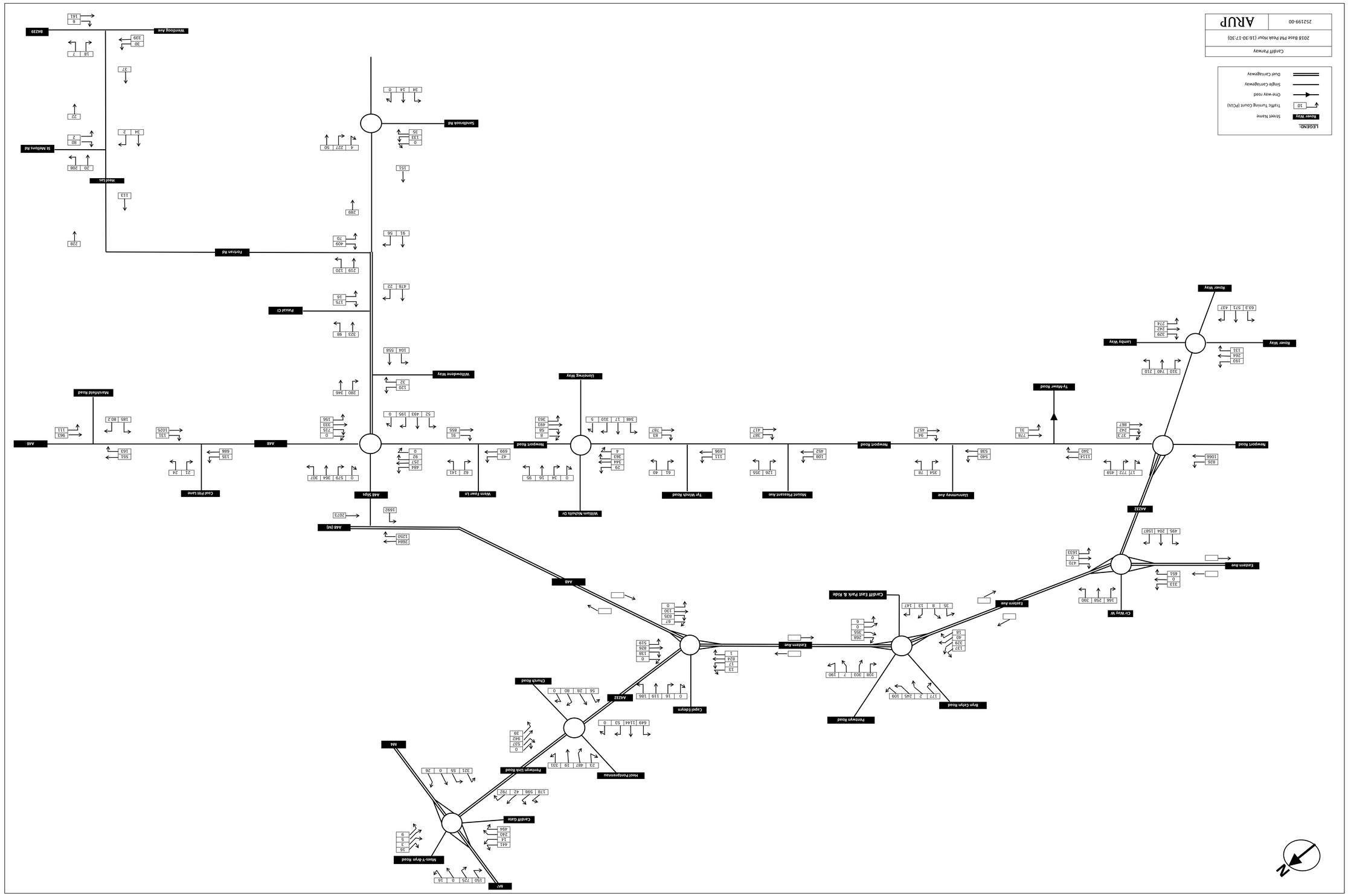
Level	Area	Local Growth Figure
W02000377	Cardiff 011	1.124516



Appendix F

Sensitivity test % growth 2018-2028


N
M4
Maes-Y-Bryn Road
Cardiff Gate
Heol Pontprennau
Pentwyn Link Road
A4232
Church Road
Capel Edeyrn
Pentwyn Road
Bryn Celyn Road
Eastern Ave
Cardiff East Park & Ride
Cir Way W
A48
A48 (M)
A48 Slips
Coal Pitt Lane
Marshfield Road
Llanrumney Ave
Mount Pleasant Ave
Tyr Winch Road
William Nicholls Dr
Wern Fawr Ln
Newport Road
Ty-Mawr Road
Llaneirwg Way
Willowdene Way
Rover Way
Lamby Way
Pascal Cl
Fortran Rd
Heol Las
St Mellons Rd
Sandbrook Rd
Wentloog Ave
B4239
LEGEND:
Rover Way Street Name
10 Traffic Turning Count (PCUs)
One-way road
Single Carriageway
Duel Carriageway
Cardiff Parway
2018 Base AM Peak Hour (07:45-08:45)
252199-00
ARUP



N
M4
Maes-Y-Bryn Road
Cardiff Gate
Pentwyn Link Road
M4
Heol Pontprennau
Church Road
Capel Edeyrn
A4232
Pentwyn Road
Bryn Celyn Road
Eastern Ave
Cardiff East Park & Ride
A48
Cir Way W
Eastern Ave
Eastern Ave
A4232
A48 (M)
Newport Road
Llanrumney Ave
Ty-Mawr Road
Newport Road
Mount Pleasant Ave
Tyr Winch Road
William Nicholls Dr
Newport Road
Llaneirwg Way
Wern Fawr Ln
A48 Slips
A48
Coal Pitt Lane
A48
Marshfield Road
Willowdene Way
Pascal Cl
Fortran Rd
Heol Las
St Mellons Rd
Sandbrook Rd
Wentloog Ave
B4239
Rover Way
Lamby Way
Rover Way
LEGEND:
Rover Way
Street Name
10
Traffic Turning Count (PCUs)
One-way road
Single Carriageway
Duel Carriageway

Cardiff Parway

2018 Base PM Peak Hour (16:30-17:30)

252199-00 ARUP

Subject Cardiff Parkway - Adjustment of Committed Development Traffic Flows

Date 24 June 2019 **Job No/Ref** 237035

1 Introduction

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals.

It has been agreed with CC as part of the Transport Assessment scoping exercise that a series of Technical Notes (TNs) will be prepared prior to the submission of the outline planning application. It is planned for these TNs to act as a mechanism in which technical matters such as trip generation and background traffic growth can be agreed with CC prior to the submission of the planning application.

Three TNs have been submitted to CC for comment, including the following:

- Technical Note 1: Committed Developments and Background Traffic Growth;
- Technical Note 2: Base Junction Models; and
- Technical Note 3: Trip Generation and Distribution.

In discussions with CC, it has been noted that there is potential for vehicle movements between the residential committed developments and the proposed employment site to be double counted. This note outlines the methodology for isolating the vehicle trips that may have been double counted.

2 Methodology

Technical Note 1 presents the number of vehicle trips that are forecast to be generated by the committed developments and how these are likely to be distributed across the local highway network. Table 1 below shows the proportion of these vehicle trips that have been distributed from each committed development to Fortran Road, St Mellons.

These trips have been presented diagrammatically on Figure 1 and Figure 2, appended to this note.

A total of 74 two-way vehicle movements are estimated between the committed developments and Cardiff Parkway in the AM peak hour and PM peak hour. The trips will be removed from the future years assessment scenarios with development to avoid double-counting.

Table 1: Vehicle Trips from Committed Developments to St Mellons

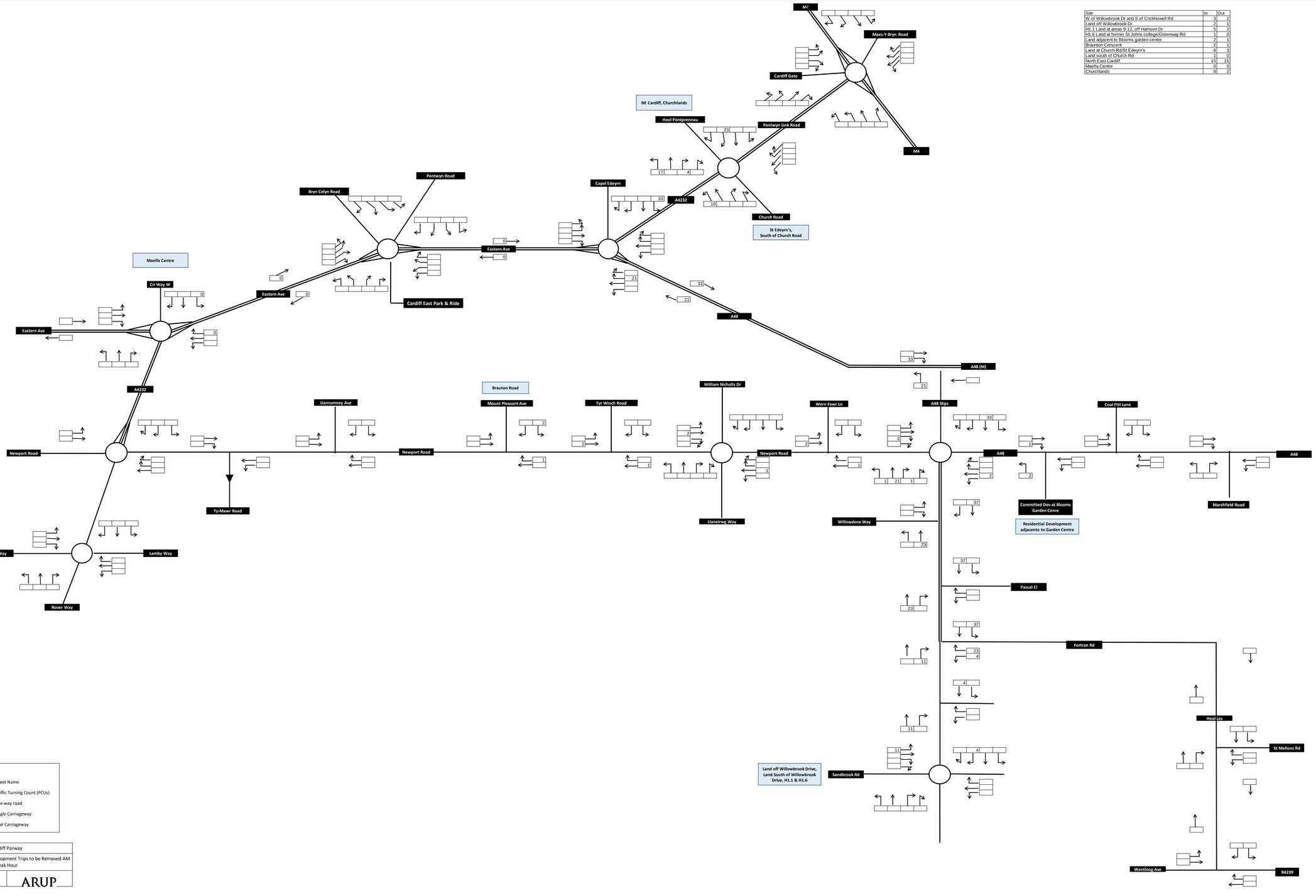
Site	Weekday AM Peak Hour		Weekday PM Peak Hour	
	In	Out	In	Out
W of Willowbrook Dr and S of Crickhowell Rd	3	2	2	2
Land off Willowbrook Dr	2	1	1	2
H1.1 Land at areas 9-12, off Harrison Dr	5	2	2	3
H1.6 Land at former St Johns college/Greenway Rd	1	0	1	1
Land adjacent to Blooms garden centre	2	1	1	2
Braunton Crescent	2	1	1	1
Land at Church Rd/St Edeyrn's	8	3	4	7
Land south of Church Rd	1	0	0	1
North East Cardiff	15	15	17	15
Maelfa Centre	0	0	0	1
Churchlands	8	2	4	6
Total	**47**	**27**	**33**	**41**

3 Summary

Ove Arup & Partners Ltd (Arup) has been instructed to provide traffic and transportation advice in support of the Cardiff Parkway development proposals. This Note outlines the methodology for removing vehicle trips associated with the committed and proposed development that may have been double-counted.

A total of 74 two-way vehicle movements are estimated between the committed developments and Cardiff Parkway in the AM peak hour and PM peak hour. These vehicle trips will be removed from the future year assessment scenarios with development.

Site	In	Out
W of Willowbrook Dr and S of Crickhowell Rd	3	2
Land off Willowbrook Dr	2	1
H1.1 Land at areas 9-12, off Harrison Dr	5	2
H1.6 Land at former St Johns college/Greenway Rd	1	0
Land adjacent to Blooms garden centre	2	1
Braunton Crescent	2	1
Land at Church Rd/St Edeyrn's	8	3
Land south of Church Rd	1	0
North East Cardiff	15	15
Maelfa Centre	0	0
Churchlands	8	2

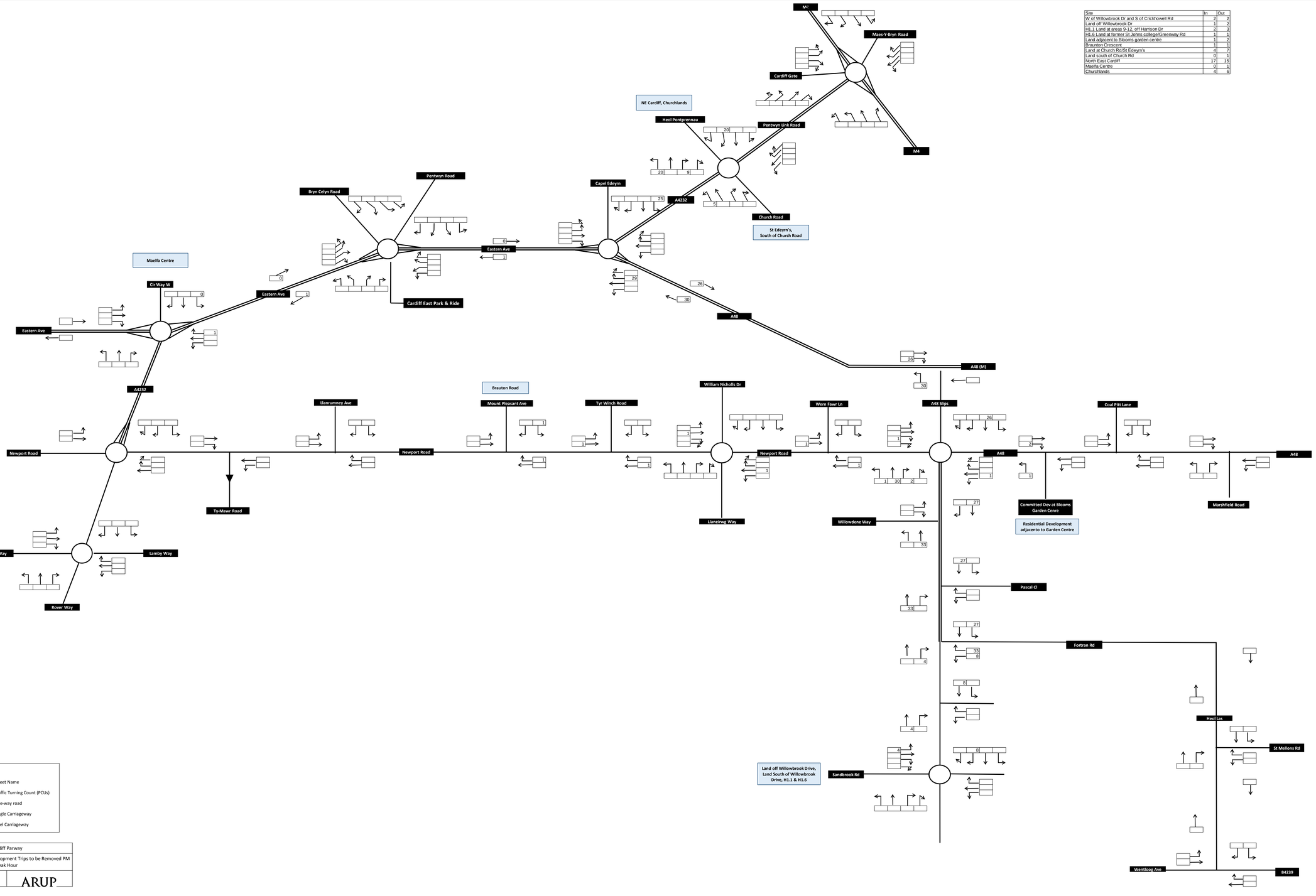


LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway	
Figure 1: Committed Development Trips to be Removed AM Peak Hour	
252199-00	ARUP

Site	In	Out
W of Willowbrook Dr and S of Crickhowell Rd	2	2
Land off Willowbrook Dr	1	2
H1.1 Land at areas 9-12, off Harrison Dr	2	3
H1.6 Land at former St Johns college/Greenway Rd	1	1
Land adjacent to Blooms garden centre	1	2
Braunton Crescent	1	1
Land at Church Rd/St Edeyrn's	4	7
Land south of Church Rd	0	1
North East Cardiff	17	15
Maelfa Centre	0	1
Churchlands	4	6



LEGEND:

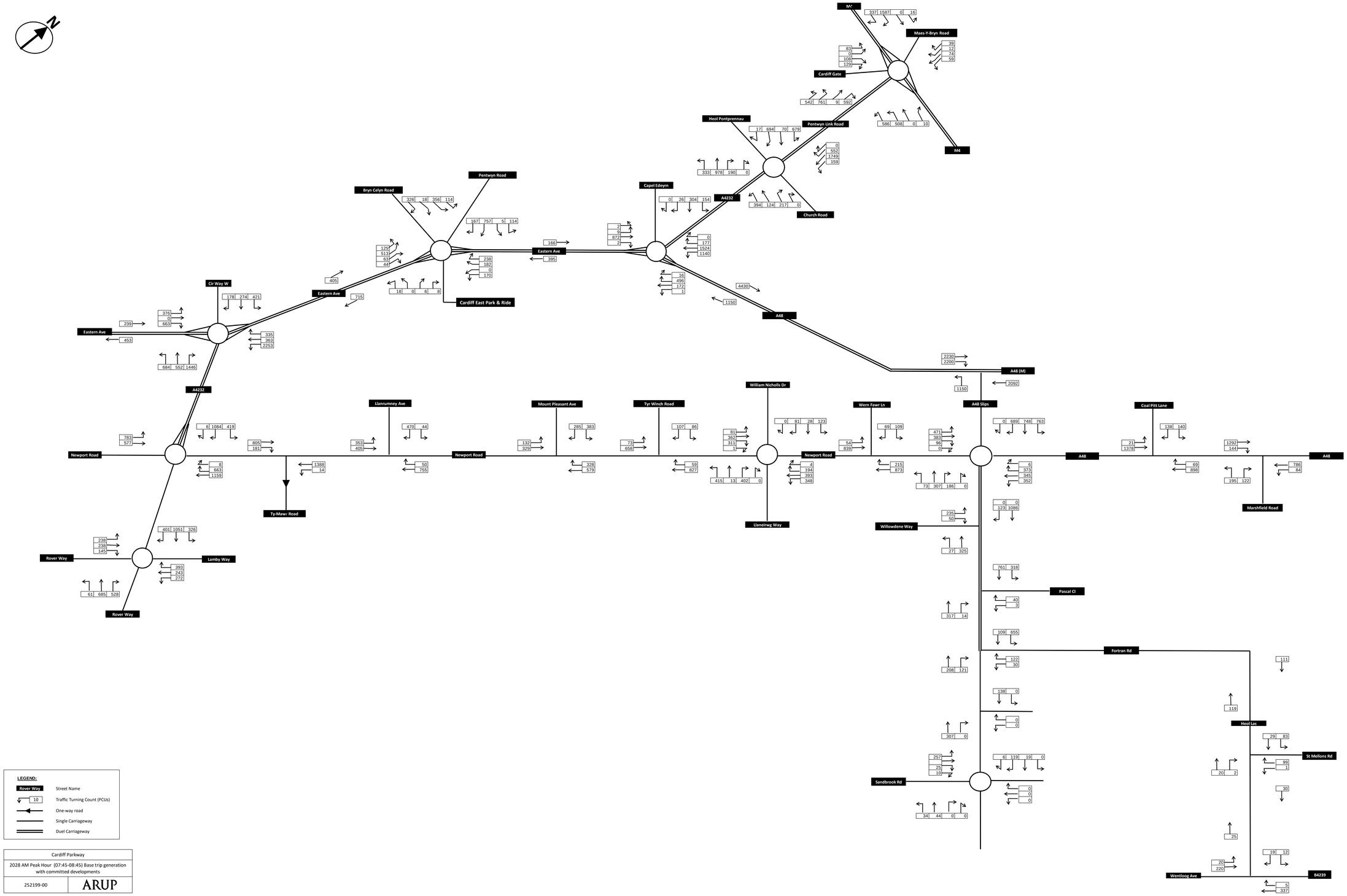
Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parway

Figure 2: Committed Development Trips to be Removed PM Peak Hour

252199-00

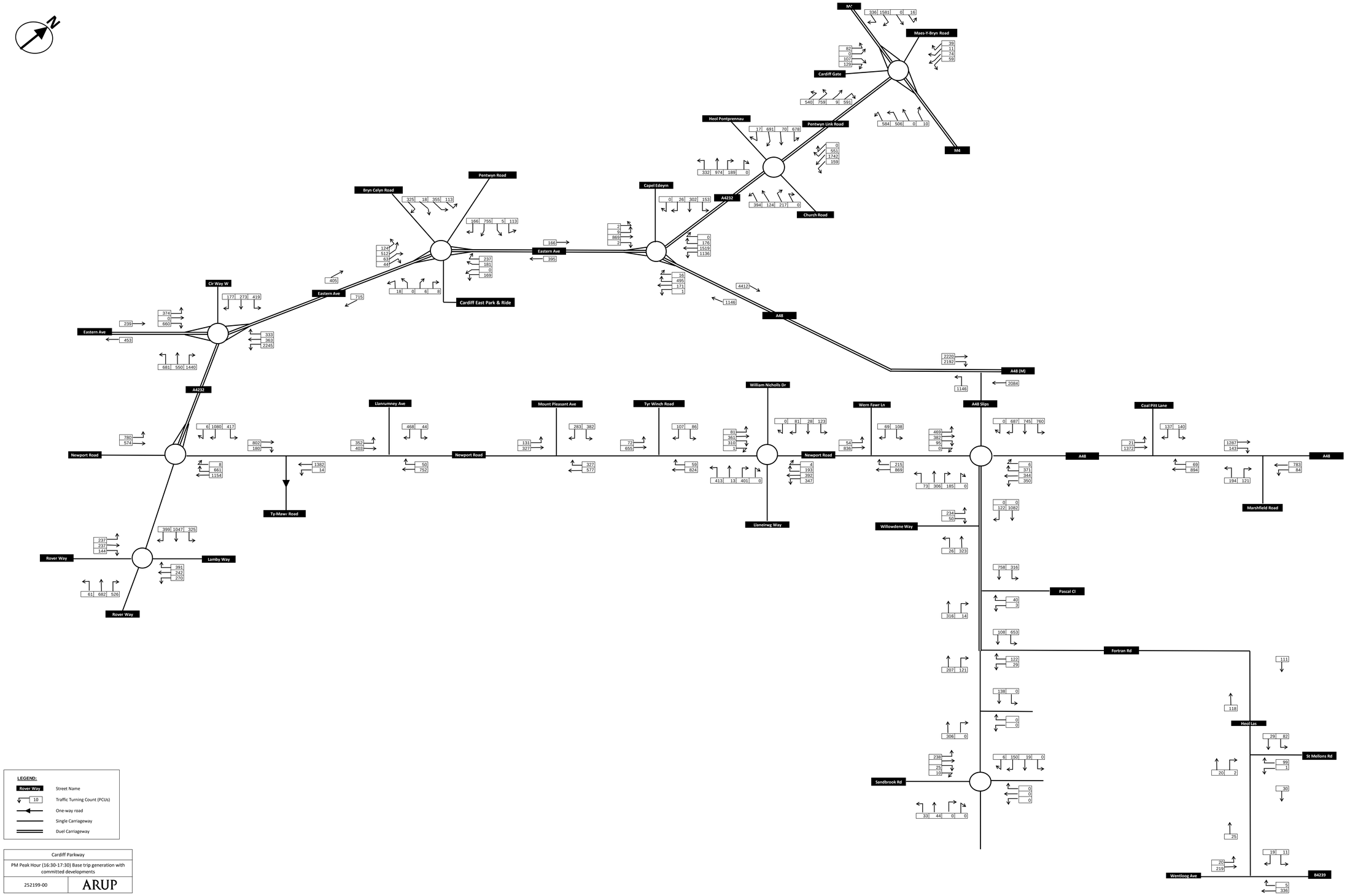
ARUP



LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

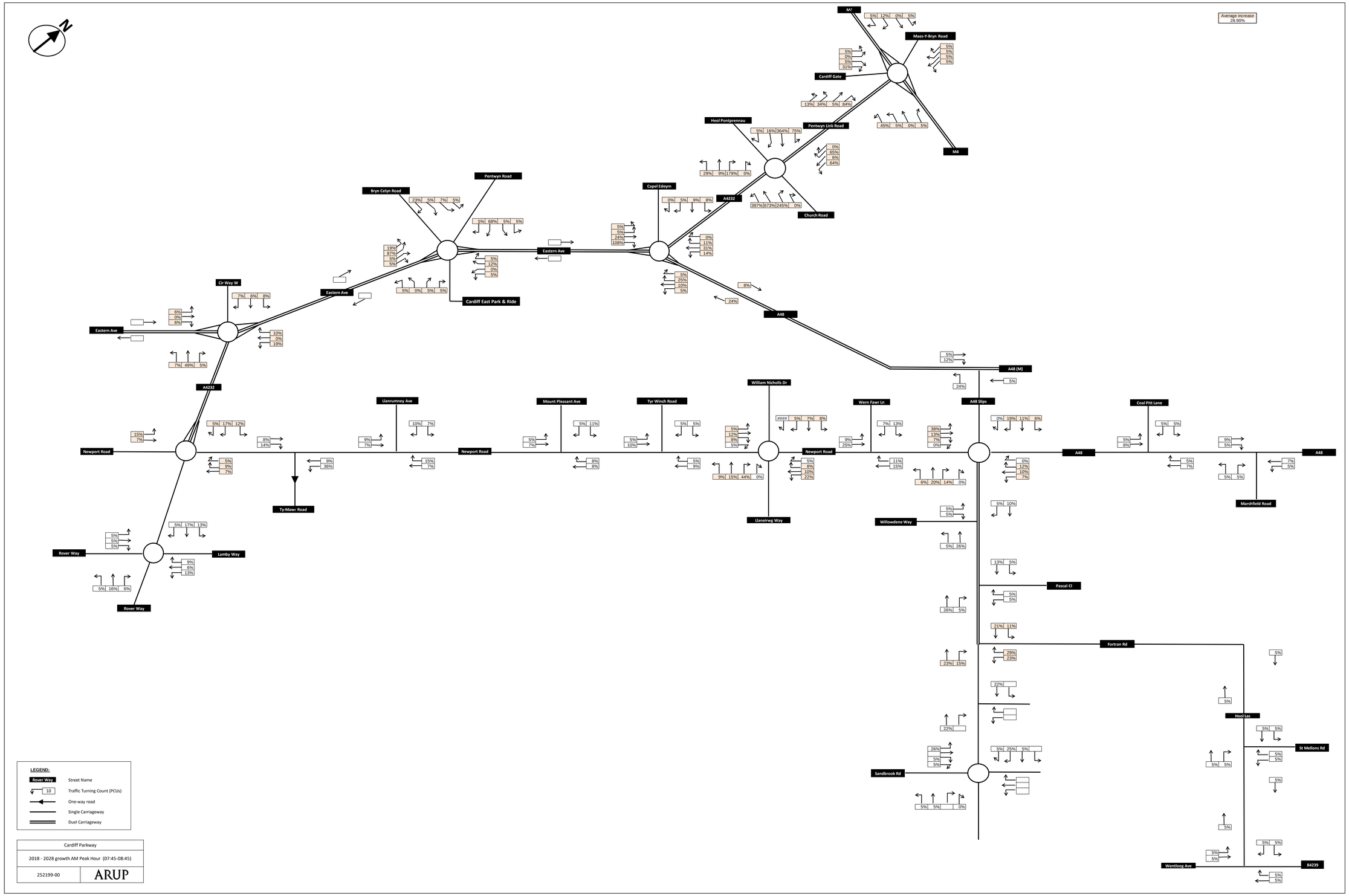
Cardiff Parkway	
2028 AM Peak Hour (07:45-08:45) Base trip generation with committed developments	
252199-00	ARUP



LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

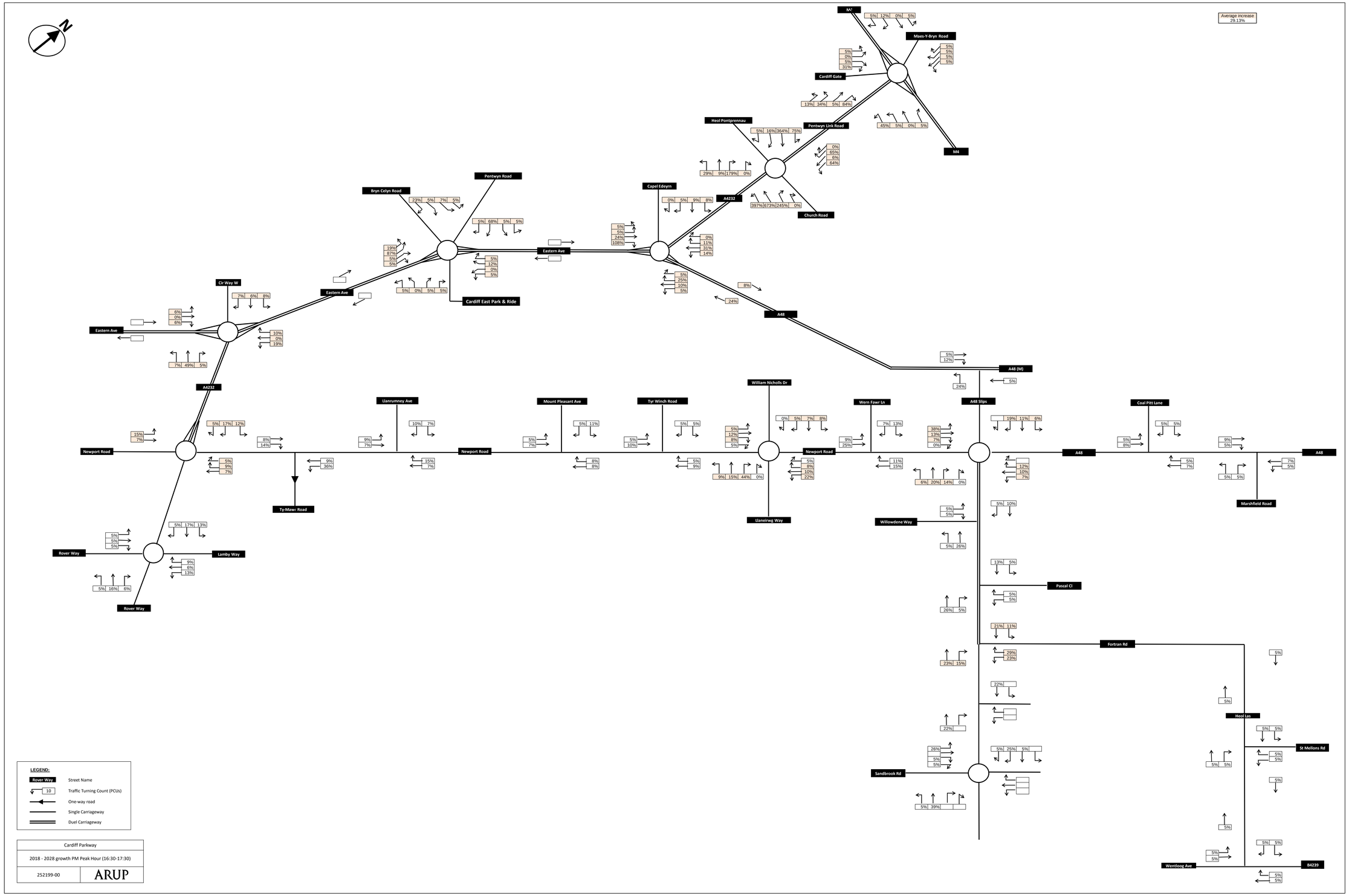
Cardiff Parkway	
PM Peak Hour (16:30-17:30) Base trip generation with committed developments	
252199-00	ARUP



LEGEND:

Rover Way	Street Name
10	Traffic Turning Count (PCUs)
	One-way road
	Single Carriageway
	Duel Carriageway

Cardiff Parkway	
2018 - 2028 growth AM Peak Hour (07:45-08:45)	
252199-00	ARUP



Cardiff Parkway

2018 - 2028 growth PM Peak Hour (16:30-17:30)

252199-00

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Appendix F

Technical Note 2: Base Junction Models

Cardiff Parkway Developments Ltd

Cardiff Parkway

Technical Note 2: Base Junction Models

Issue | 2 May 2019

Confidential – Commercially Sensitive

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 252199

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

ARUP

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1	**Introduction**	**1**
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	1.2 Study Area	1
	1.3 Report Structure	1
2	**Method of Assessment**	**3**
3	**Junction Assessment Results**	**4**
4	**A48 West Facing Slip Roads, St Mellons**	**13**
5	**Summary and Conclusions**	**15**

Figures

Figure 1: Study Area
Figure 2: A48/Marshfield Road Junction Model 1
Figure 3: A48/Marshfield Road Junction Model 2
Figure 4: A48/Marshfield Road Junction Model 3
Figure 5: Merge Lane Arrangement
Figure 6: Diverge Lane Arrangement
Figure 7: Summary of Base Year Junction Capacity Assessment Results

Appendices

Appendix A

2018 Base Traffic Flow Diagrams

1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals that will comprise a railway station, park and ride, transport interchange and business district. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

The vision for Cardiff Parkway is of a vibrant, employment-led development. The development site will be accessible by a variety of transport modes and will be an amenity for those currently residing within the Cardiff city region.

It has been agreed with CC as part of the Transport Assessment scoping exercise that a series of technical notes will be prepared prior to the submission of the outline planning application. It is planned for these notes to act as a mechanism in which technical matters such as trip generation and background traffic growth can be agreed with CC prior to the submission of the planning application.

This Technical Note details the methodology and results of the junction assessments undertaken for the base year 2018. Junction assessments have been undertaken for 22 junctions over 24 models using LinSig for signalised junctions, ARCADY for roundabouts, and PICADY software for priority junctions. Junction models and output files will be made available to CC.

To obtain traffic flow data, classified turning count surveys were undertaken at 22 junctions and the A48 slips as presented in Figure 1 overleaf. In agreement with CC, the surveys were undertaken on 7th June 2018, outside of school holidays and in a neutral month. Due to an oversight by the surveyor, the A48/Coal Pitt Lane priority junction was not surveyed at the same time as the other sites and was subsequently surveyed on 10th July 2018. Stolen equipment resulted in the delay of some junction surveys. The approach to collecting and validating the traffic data was discussed and agreed with CC as part of the scoping exercise for the TA. Traffic flow diagrams for the weekday AM and PM peak hours can be found in Appendix A.

To inform the assessment of the signal-controlled junctions, traffic signal information including specification sheets were provided by CC and used to directly inform the LinSig models.

1.2 Study Area

The Study Area for the Cardiff Parkway Transport Assessment was agreed with CC as part of the initial Scoping discussions. It includes 22 junctions and the A48 slips, as presented in Figure 1 overleaf and summarised in Table 1.

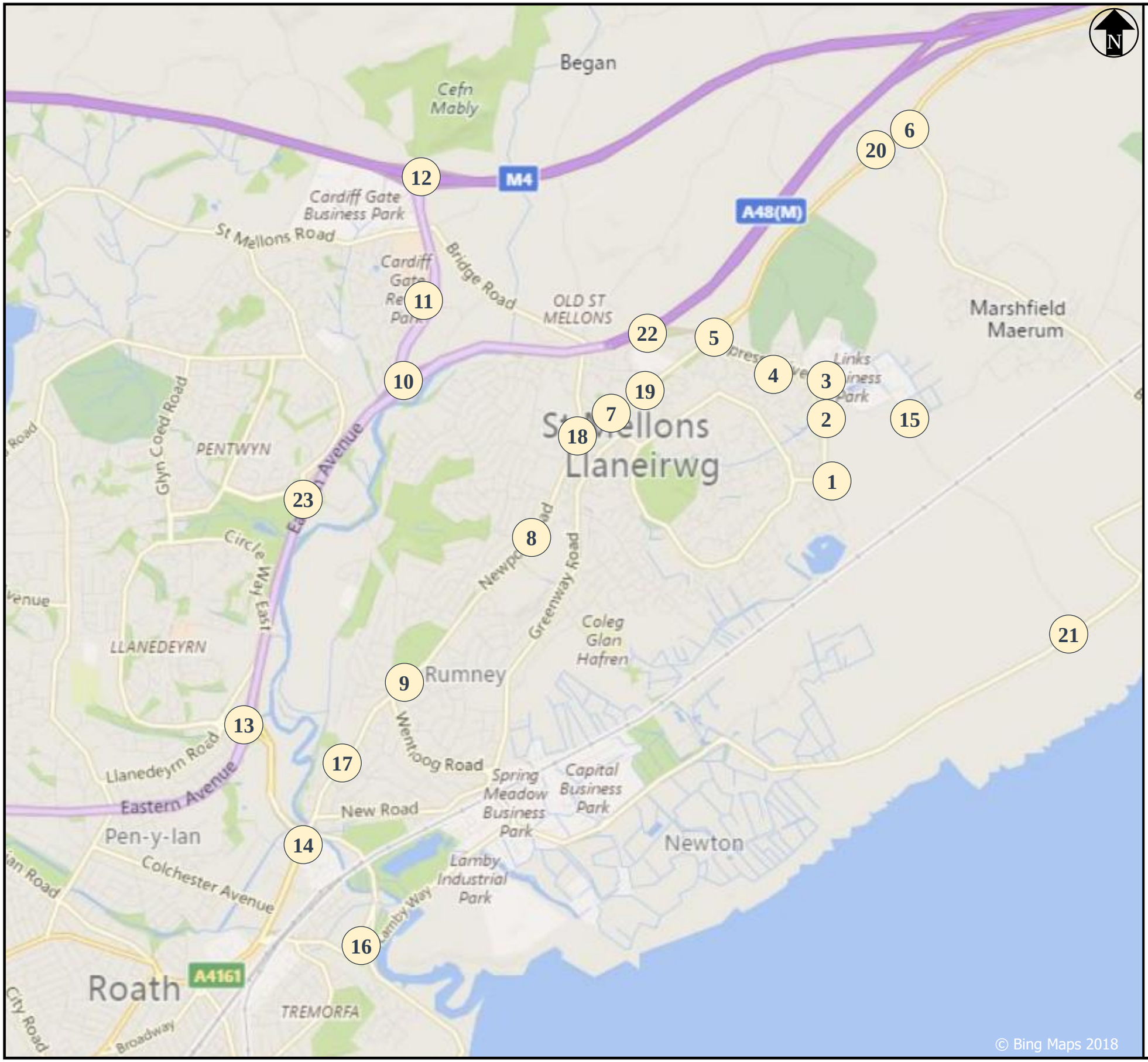
Table 1: Summary of Junctions

Ref	Junction	Modelling Software
1	Cypress Drive/Sandbrook Road Roundabout	ARCADY
2	Cypress Drive/Fortran Road Priority Junction	PICADY
3	Cypress Drive/Pascal Close Priority Junction	PICADY
4	Cypress Drive/Willowdene Way Priority Junction	PICADY
5	A48/Cypress Drive/Newport Road Roundabout	ARCADY
6	A48/Marshfield Road Priority Junction	PICADY
7	B4487/Llaneirwg Way Roundabout	ARCADY
8	B4487/Mount Pleasant Ave Traffic Signals	LinSig
9	B4487/Llanrumney Ave Traffic Signals	LinSig
10	A48/A4232 Roundabout	ARCADY
11	A4232/Church Road/Heol Pontprennau Roundabout	ARCADY
12	M4/A4232 Partially Signalised Roundabout	LinSig
13	A48/Southern Way Partially Signalised Roundabout	LinSig
14	B4487/A4161 Newport Road/A4232 Signalised Roundabout	LinSig
15	Heol Las/St Mellons Road Priority Junction	PICADY
16	Rover Way/Lamby Way Priority Roundabout	ARCADY
17	B4487 Newport Road/Ty-Mawr Road Signalised Junction	LinSig
18	B4487 Newport Road/Tyr Winch Road Priority Junction	PICADY
19	B4487 Newport Road/Wern Fawr Lane Signalised Junction	LinSig
20	A48 Newport Road/Coal Pit Lane Priority Junction	PICADY
21	B4239 Wentloog Avenue/Heol Las Priority Junction	PICADY
22	M4/A48(M) J29A (St Mellons Interchange) Slips	DMRB TD 22/06
23	A48 Pentwyn Interchange priority roundabout	ARCADY

1.3 Report Structure

The remainder of the report is structured as follows:

- Section 2 outlines the method of assessment;
- Section 3 presents the results of the junction assessments;
- Section 4 assesses the capacity of the A48 Slips in St Mellons; and
- Section 5 summarises the findings of the Technical Note.



Key

MCC Survey Location

Note

All sites surveyed on 7th June 2018 aside from Junction 20 which was surveyed on 10th July 2018.

ARUP

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Client:
Cardiff Parkway Developments Ltd

Job Title:
Cardiff Parkway

Drawing Title:
Figure 1: Study Area

Suitability:
S0 – Work in Progress

Job Number:
252199

Rev:
P01.1

2 Method of Assessment

Junction assessments have been undertaken for 22 junctions, using LINSIG for signalised junctions, ARCADY for roundabouts and PICADY software for priority junctions.

Junction capacity in the above software packages is measured as the Ratio of Flow to Capacity (RFC) (ARCADY and PICADY) and Practical Reserve Capacity (PRC) (LINSIG). RFC is a measure of the volume of traffic making a turning movement at the junction, divided by the capacity of that movement; ascertained from the geometric measurements of the junction. The generally agreed operational capacity of a junction is at a ratio of 0.85 for roundabouts and priority junctions. The Cardiff Council SPG[1] indicates the threshold for practical capacity should be 0.80 as forecasting queues becomes less accurate when demand exceeds this capacity. Junctions can still operate within capacity with an RFC value of up to 1, however as practical capacity is exceeded, queuing and delays will increase.

PRC is a measure of how much additional traffic could pass through a junction and is calculated from the maximum degree of saturation on each lane. For signalised junctions, Cardiff Council recommend the threshold for practical capacity is 80% degree of saturation.

These parameters have been used to summarise the operational effectiveness of individual junctions in accordance with the following pre-determined thresholds:

	Within Practical Capacity – *junctions with an RFC below 0.80 or degree of saturation below 80% have been deemed to operate within practical capacity*[2].
	Over Practical Capacity, Approaching Theoretical Capacity – *junctions with an RFC of between 0.80-0.99 or degree of saturation between 80% and 99%.*
	Over Theoretical Capacity - *junctions with an RFC over 1.00 or degree of saturation above 100% have been deemed to operate over theoretical capacity.*

The interaction between junctions has been considered by comparing predicted queues with the available stacking space. Given some junctions are located close to one another, excessive queues could affect the operation of adjacent junction. To understand if 'blocking back' would occur, the mean maximum queue forecast to occur on each arm of the junction has been checked against available queuing capacity.

The geometric parameters used for the junction models have been measured from OS mapping data. Queue lengths predicted by the model have been compared with observed queue lengths which were measured at each of the junctions on Wednesday 5th July 2017, the same day traffic flows were surveyed.

For roundabouts, differences between modelled and surveyed queue lengths were overcome by directly adjusting the intercept. The adjustment applied considers site specific conditions once all geometric features have been calculated for a junction arm. Conditions which are not considered and that may require a correction could include driver behaviour, changes in signage, re-marking of the junction or complete resurfacing.

[1] Cardiff Council (2018) Managing Transport Impacts SPG

[2] Cardiff Council (2018) Managing Transport Impacts SPG

3 Junction Assessment Results

Junction 1: Cypress Drive/Sandbrook Road Roundabout

The Cypress Drive/Sandbrook Road three-arm roundabout has been assessed using the ARCADY module of Junctions 9. The capacity assessment results for the base year are summarised in Table 2 below.

Table 2: Sandy Roundabout ARCADY Base Year Results

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Cypress Drive (N)	0	0	3.3	0.07	0	0	3.05	0.04
2	Sandbrook Road	0	0	3.77	0.22	0	0	3.43	0.15
3	Cypress Drive (S)	0	0	2.81	0.09	0	0	3.13	0.18

The junction is estimated to be operating within capacity in both peak hours. A comparison of the surveyed and modelled queue indicates no calibration is required.

Junction 2: Cypress Drive/Fortran Road Priority Junction

PICADY has been used to assess the Cypress Drive/Fortran Road priority junction. The assessment results are summarised below alongside the surveyed queue lengths.

Table 3: Cypress Drive/Fortran Road PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Fortran Road	B-C	0	0	7.17	0.05	0	0	14.38	0.23
Fortran Road	B-A	0	0	8.38	0.20	0	3	28.03	0.78
Cypress Drive	C-AB	0	0	7.15	0.19	0	0	5.72	0.09

The junction assessment results indicate the junction is operating within capacity in both peak hours. The model does appear to be over-estimating the predicted queue on Fortran Road in the PM peak hour, although no calibration is necessary.

Junction 3: Cypress Drive/Pascal Close Priority Junction

The Cypress Drive/Pascal Close priority junction has been assessed with the PICADY node of Junctions 9. The capacity assessment results for the base year are summarised in Table 4 below alongside the surveyed queue lengths.

Table 4: Cypress Drive/Pascal Close PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Pascal Close	B-C	0	0	7.85	0.01	0	0	7.86	0.04
Pascal Close	B-A	0	0.1	8.53	0.09	0	1	10.94	0.37
Cypress Drive	C-AB	0	0	6.73	0.03	0	0	5.54	0.04

The junction is estimated to be operating within capacity in both peak hours. A comparison of the surveyed and modelled queues indicates no calibration is required.

Junction 4: Cypress Drive/Willowdene Way Priority Junction

The capacity of the Cypress Drive/Willowdene Way priority junction has been modelled using Junctions 9. The assessment results are summarised below alongside surveyed queue lengths.

Table 5: Cypress Drive/Willowdene Way PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Willowdene Way	B-AC	0+0	1	11.72	0.49	0+0	0	9.69	0.31
Cypress Drive	C-AB	0	0	6.49	0.19	2	1	12.15	0.51

The junction is estimated to be operating within capacity and no calibration is deemed to be required.

Junction 5: A48/Cypress Drive/Newport Road Roundabout

The A48/Cypress Drive/B4487 Newport Road four-arm roundabout has been assessed using the ARCADY module of Junctions 9. The results of the capacity assessment are summarised in Table 6 below.

Table 6: A48/Cypress Drive Roundabout ARCADY Base Year Results (without calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	A48	5+3	2	6.19	0.65	2+1	2	6.63	0.71
2	Cypress Drive	1+1	1	3.16	0.32	22+20	1	6.12	0.58
3	Newport Road	1+1	1	5.61	0.57	13+4	5	18.75	0.83
4	A48 Slips	4+1+1	6	10.17	0.86	1+0+1	1	3.04	0.54

A comparison of the modelled and surveyed queue lengths indicates the model is underestimating the queues at three of the entries to the roundabout. The intercept has been directly amended within the junction model for the modelled queues to better reflect site observations.

Table 7: A48/Cypress Drive Roundabout ARCADY Model Capacity Adjustments

Arm		Calculated Intercept	Revised Intercept
1	A48	2588	2550
2	Cypress Drive	2523	1940
3	Newport Road	1932	1780
4	A48 Slips	-	-

With the calibration described above, Table 8 presents the revised assessment results.

Table 8: A48/Cypress Drive Roundabout ARCADY Base Year Results (with calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	A48	5+3	2	6.62	0.66	2+1	3	7.11	0.72
2	Cypress Drive	1+1	1	6.66	0.5	22+20	24	103.38	1.02
3	Newport Road	1+1	2	7.34	0.63	13+4	11	47.11	0.95
4	A48 Slips	4+1+1	6	10.3	0.86	1+0+1	1	3.03	0.54

The junction is estimated to operate within theoretical capacity in the AM peak hour. In the PM peak hour, the Cypress Drive entry is estimated to exceed theoretical capacity based on the surveyed queue length calibrated assessment.

Junction 6: A48/Marshfield Road Priority Junction

The A48/Marshfield Road priority junction is a non-standard arrangement with traffic turning right from the A48 on to Marshfield Road giving way to traffic turning right from Marshfield Road on to Newport Road. This is the reverse in priority in comparison to a typical junction upon which PICADY has been based.

TRL was contacted to understand if PICADY would be suitable to model this non-standard arrangement and the response is presented below.

> This is a non-standard junction arrangement and cannot be modelled as a single junction, in this instance you may have to model this scenario separately. For the major road turn to the minor road you can add the minor road turners to the opposing major road flow so it becomes a controlling flow element. Obviously, if the minor road right-turners wait and block straight ahead traffic then this will also cause issues that cannot be modelled. It may be possible to set up some of these elements and link together in Lane Simulation mode but you will need to determine which movements to model separately.

As noted in the response from TRL above, multiple junction models are required to assess the give-way movements at this junction. The first junction model is proposed to assess the right-turn movement on to the A48 (eastbound), as summarised in Figure 2 below.

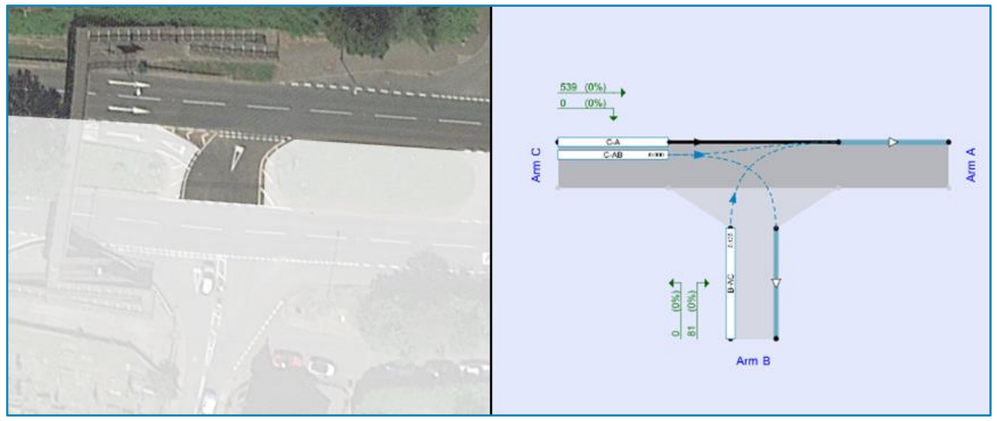


Figure 2: A48/Marshfield Road Junction Model 1

The capacity assessment results for the right-turn movement from the central reserve on to the A48 eastbound carriageway is summarised in Table 9 below.

Table 9: A48/Marshfield Road PICADY Base Year Results (1 of 3)

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Central Reserve	B-A	1	1	13.92	0.33	0	0	9.83	0.19

The junction model estimates that there is minimal queuing in the central reserve for traffic turning right from Marshfield Road on to the A48. The queue lengths surveys summarised in Table 9 above indicate minimal queueing was also observed.

The second junction model provides an assessment of the Marshfield Road junction with the A48 westbound carriageway as summarised in Figure 3 below. The traffic flow for the movement C-A has been inputted as zero as traffic turning right from Marshfield Road to the central reserve do not give-way to eastbound traffic on the A48.

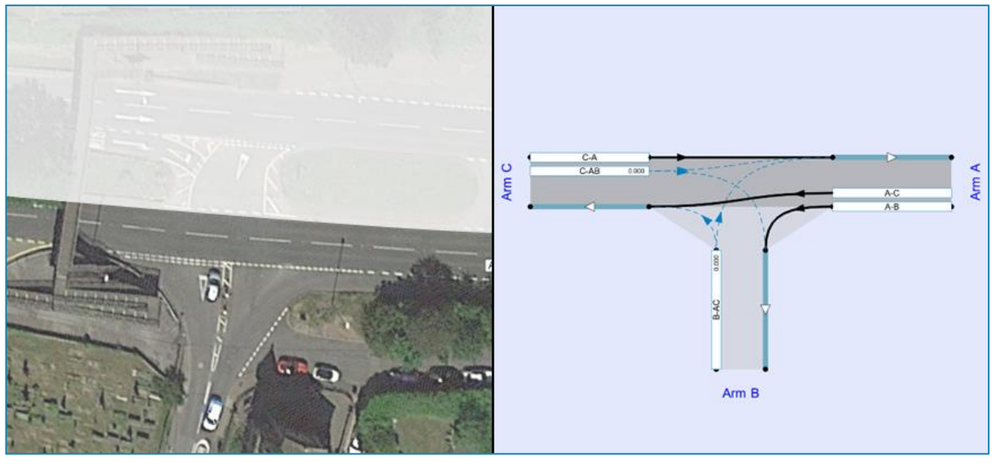


Figure 3: A48/Marshfield Road Junction Model 2

The capacity assessment results for the Marshfield Road entry to the junction are summarised in Table 10 below

Table 10: A48/Marshfield Road PICADY Base Year Results (2 of 3)

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Marshfield Rd	B-C	2	1	17.89	0.5	1	1	23.14	0.57
Marshfield R	B-A	2	1	20.12	0.42	1	1	25.45	0.38

The Marshfield Road entry to the junction is estimated to be operating within practical capacity in the base year. A comparison of the modelled and surveyed queue lengths indicates the junction model is accurately reflecting site observations.

The third junction model assesses the give way right-turn movement from the A48 on to Marshfield Road. Traffic turning left from the A48 on to Marshfield Road has also been included. As suggested by TRL, traffic turning right from Marshfield Road has been added to the major arm flow as these movements have priority over the right-turn from the A48 to Marshfield Road.

The results of junction model 1 and the queue length surveys indicate there is minimal queuing in the central reserve. It has therefore been assumed that the traffic turning right from the A48 on to Marshfield Road will not be impeded by vehicles queuing in the central reserve.

The third junction model is presented in Figure 4 below. A crossroads arrangement has been selected within PICADY to assess this element of the junction with the following assumptions made:

- A48 westbound carriageway is a one-way road (A-C);
- The central reserve is a one-way road (entry only);
- Marshfield Road is an exit only
- Traffic turning right from Marshfield Road added to the main flow; and
- Traffic turning left out of Marshfield Road has been excluded from the model as it does not have an impact on the link D-B.

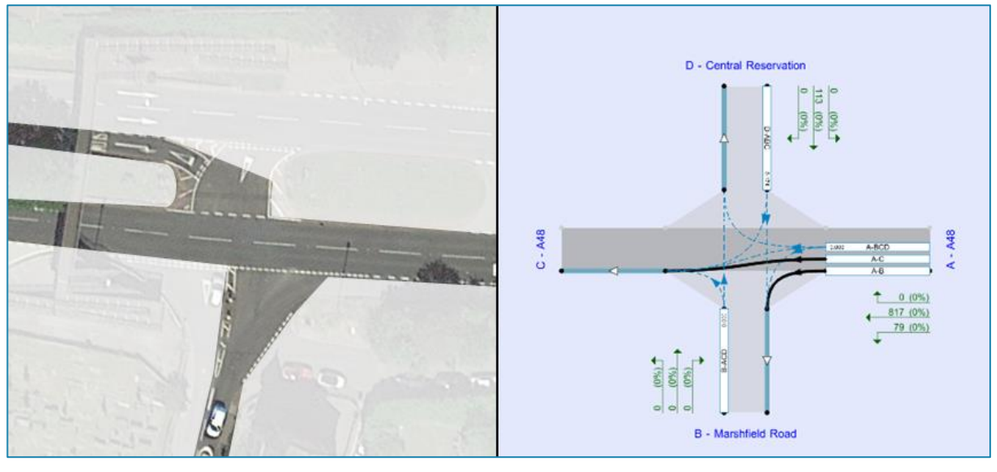


Figure 4: A48/Marshfield Road Junction Model 3

The assessment results for this junction model are summarised in Table 11 below.

Table 11: A48/Marshfield Road PICADY Base Year Results (3 of 3)

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
A48 Right-Turn	D-B	1	1	11.48	0.32	1	1	14.19	0.41

The junction is estimated to be operating within capacity and the queue lengths indicate the junction model reflects site observations.

Junction 7: B4487 Newport Road/Llaneirwg Way Roundabout

The Newport Road/Llaneirwg Way three-arm roundabout has been assessed using ARCADY and the assessment results can be found in Table 12 below.

Table 12: Newport Road/Llaneirwg Way Roundabout ARCADY Base Year Results

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Newport Road	0+0+0	1	3.65	0.48	0+0+0	1	4.21	0.54
2	Llaneirwg Way	1+0	2	9.33	0.66	1+0	2	9.17	0.66
3	B4487	0+0	1	3.72	0.44	0+1	1	3.68	0.45
4	William Nichols Drive	0	0	5.79	0.28	0	0	5.95	0.21

The junction is estimated to be operating within capacity and no calibration is deemed to be required.

Junction 8: B4487 Newport Road/Mount Pleasant Avenue Traffic Signals

The Newport Road/Mount Pleasant Avenue signalised junction has been assessed using LINSIG. The junction model has been informed by the signal specifications that were provided by CC. The assessment results alongside surveyed queue lengths are presented in Table 13 below.

Table 13: Newport Road/Mount Pleasant Avenue Traffic Signals LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
3/1	Mount Pleasant (Left)	7	11	18.2	56.1%	6	7.	11.1	36.8%
3/2	Mount Pleasant (Right)	6	9	35.9	56.3%	3	11	35.2	63.4%
1/2	Newport Road NE (Right)	7	8	34.2	56.1%	14	11	29.4	63.8%
2/1+ 2/2	Newport Road SW (Left, Ahead)	1+3	7	27.8	55.2%	1+5	4	40.4	54.7%
Junction PRC		59.8% @ 90 seconds				41.2% @ 90 seconds			

As summarised in the table above, the junction is estimated to be operating within capacity and a comparison of surveyed and predicted queue lengths suggests no calibration is required.

Junction 9: B4487/Llanrumney Avenue Traffic Signals

LINSIG has been used to assess the capacity of the Newport Road/Llanrumney Avenue signalised junction. The junction model has been informed by the signal specifications that were provided by CC. The assessment results alongside surveyed queue lengths are presented in Table 14 below.

Table 14: Newport Road/Llanrumney Avenue traffic signals LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
3/1	Llanrumney Ave (Left, Right)	6	3	23.0	43.6%	4	3	25.4	45.2%
3/2	Llanrumney Ave (Right)	4	4	23.0	44.4%	6	4	25.4	46.4%
1/3	Newport Road NE (Right)	1	0	11.9	7.5%	2	1	13.3	18.2%
2/1	Newport Road SW (Ahead)	0	2	9.9	17.4%	0	2	9.2	23.5%
Junction PRC		97.1% @ 60 seconds				15.9% @ 60 seconds			

The junction is estimated to be operating with spare capacity in both peak hours. A comparison of the estimated and survey queue lengths indicates no calibration is required.

Junction 10: A48/A4232/Capel Edeyrn Roundabout

The A48/A4232/Capel Edeyrn roundabout has been assessed using ARCADY and the results are summarised below alongside the observed queue lengths.

Table 15: A48/A4232 ARCADY Base Year Results

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	A48 (North)	0+4	1	4.52	0.44	1+8	2	7.38	0.7
2	A48 (South)	2+0+0	0	2.05	0.31	9+3+0	1	2.8	0.42
3	Capel Edeyrn	2+0	1	8.79	0.55	4+0	1	13.25	0.57
4	A4232	0+1+0	4	8.57	0.78	0+0+0	1	4.02	0.55

A comparison of the surveyed and estimated queue lengths indicates the junction model is not fully replicating existing conditions, primary on the A48 entries. Adjustments have been made to the junction model in order for the modelled queues to better reflect site observations.

There appears to be an imbalance in flows using the two entry lanes on the A48 North. This is to be expected as all traffic is taking the 2nd or 3rd exit at the roundabout. An adjustment has therefore been made to the intercept.

On the A48 South entry, there appears to be no vehicles using the offside lane and therefore this has been removed from the model. There is also an imbalance in flows between the nearside and middle lane and therefore a direct adjustment has been made to the intercept, a s summarised in Table 16 below.

Table 16: A48/A4232 Roundabout ARCADY Model Capacity Adjustments

Arm		Calculated Intercept	Revised Intercept
1	A48 (North)	2181	1900
2	A48 (South)	2040	1700
3	Capel Edeyrn	-	-
4	A4232	-	-

With the capacity adjustments described above, Table 17 presents the revised ARCADY results for the A48/Capel Edeyrn/A4232 roundabout.

Table 17: A48/A4232 Roundabout ARCADY Base Year Results (with calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	A48 (North)	0+4	1	6.99	0.55	1+8	5	17.23	0.85
2	A48 (South)	2+0+0	2	6.71	0.59	9+3+0	6	24.75	0.87
3	Capel Edeyrn	2+0	1	8.79	0.55	4+0	1	13.18	0.56
4	A4232	0+1+0	4	8.57	0.78	0+0+0	1	4.02	0.55

With the proposed capacity adjustments, the junction model is considered to better reflect site observations. The junction is estimated to be operating within theoretical capacity however the estimated RFC on the A48 South is 0.87 in the PM peak hour.

Junction 11: A4232/Church Road/Heol Pontprennau Roundabout

ARCADY has been used to assess the A4232/Church Road/Heol Pontprennau roundabout. The assessment results are summarised in Table 18 below.

Table 18: A4232/Heol Pontprennau/Church Road ARCADY Base Year Results (without calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Pentwyn Link Road	5+5+1	5	7.61	0.83	0+0+0	1	3.04	0.59
2	Church Road	0+1+0	1	9.68	0.32	0+0+0	0	4.66	0.19
3	A4232	0+2+1	1	2.99	0.47	0+0+0	2	4.78	0.64
4	Heol Pontprennau	2+2+4	1	4.45	0.58	1+1+4	1	4.52	0.54

A comparison of the modelled and surveyed queue lengths indicates the model is underestimating the queues at three of the entries to the roundabout. The intercept for the Heol Pontprennau entry has been directly amended within the junction model so the modelled queues better reflect site observations.

Table 19: A4232/Heol Pontprennau/Church Road ARCADY Model Capacity Adjustments

Arm		Calculated Intercept	Revised Intercept
1	Pentwyn Link Road	-	-
2	Church Road	-	-
3	A4232	-	-
4	Heol Pontprennau	2687	2175

The ARCADY results for the calibrated junction model are summarised in Table 20 below.

Table 20: A4232/Heol Pontprennau/Church Road ARCADY Base Year Results (with calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Pentwyn Link Road	5+5+1	5	7.6	0.83	0+0+0	1	3.04	0.59
2	Church Road	0+1+0	1	9.68	0.32	0+0+0	0	4.66	0.19
3	A4232	0+2+1	1	2.99	0.47	0+0+0	2	4.78	0.64
4	Heol Pontprennau	2+2+4	4	12.2	0.79	1+1+4	3	12.76	0.77

With the direct capacity adjustments to the Heol Pontprennau entry, the junction model is reflective of the on-site observations. The junction is forecast to be operating within theoretical capacity in the AM peak hour and practical in the PM peak hour.

Junction 12: M4/A4232 Partially Signalised Roundabout

The capacity of Junction 30 of the M4 partially signalised junction has been assessed using LINSIG. Signal specifications and SCOOT outputs have been provided by Cardiff Council to inform the junction model. Saturations flows have been calculated using the RR67 method in LinSig.

For the priority entries to the junction (M4 Eastbound off slip and Maes Y Bryn Road), an ARCADY model has been prepared to inform the intercept and slope.

SCOOT outputs have been used to inform the cycle time. Whilst stage times have also been extracted from the SCOOT outputs, these have not been added to the model as observed and modelled queues became dissimilar. Given the SCOOT outputs are not from the same day as the traffic counts, this approach is considered to be acceptable.

The assessment results are summarised in Table 21 below.

Table 21: M4 J30 Partially Signalised Roundabout LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
1/1	M4 W/B Off-slip (A&L)	15	11	42.2	79.2%	10	10	48.5	62.3%
2/2	Pentwyn Link Road (A)	11	12	17.0	63.9%	13	16	11.1	62.2%
3/2	Malthouse Avenue A	1	3	29.5	30.6%	15	20	41.4	78.0%
4/2	M4 E/B Off-slip (A)	8	1	4.4	70.2%	4	1	3.9	53.9%
5/1+ 5/2	Maes-Y-Bryn Road (A)	1+1	0	5.9	36.3%	0+0	0	7.0	11.4%
7/1+ 7/2	Pentwyn Link Rd Gyratory (A)	-	11	17.3	78.8%	-	3	39.2	36.3%
Junction PRC		10.4% @ 80 seconds				41.8% @ 120 seconds			

A comparison of the surveyed and modelled queues indicates the junction model is reflecting site observations. Should traffic increase on the M4 westbound off slip, additional green time should be given to the corresponding stage to avoid potential impacts on the M4.

Junction 13: A48/Southern Way Partially Signalised Roundabout

The 48/Southern Way Partially signalised roundabout has been assessed using LinSig. The model has been prepared to reflect the signal specifications and SCOOT outputs provided by Cardiff Council.

An ARCADY model was prepared to calculate the slope and intercept of the priority entries to the junction, including the A48 southbound off slip and the A4161 Southern Way.

Table 22: A48/Southern Way Partially Signalised Roundabout LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
1/2	A48 S/B Off Slip (A)	2	3	4.7	36.9%	4	3	6.9	57.0%
2/2+ 2/1	Southern Way (A)	4+2	10	11.4	88.1: 94.2%	-	3	6.0	85.7 : 81.8%
3/2	A48 N/B Off Slip (A)	7	10	33.0	80.4%	9	17	86.2	97.8%
4/2	Circle Way (A)	11	9	42.1	83.4%	7	10	54.2	89.4%
7/3	A48 N/B Off Slip Gyratory (R)	-	12	19.5	76.8%	-	10	14.0	69.1%
8/2	Circle Way Gyratory (R&A)	-	7	12.3	80.0%	-	7	12.3	80.0%
Junction PRC		-8.6% @ 60 seconds				-8.6% @ 60 seconds			

In the AM peak hour, a comparison of surveyed and modelled queue lengths indicates the model is reflecting site observations. The junction is estimated to exceed practical capacity with a PRC of -8.6%. The Southern Way entry is estimated to have a degree of saturation of 94%, indicating it is close to theoretical capacity.

In the PM peak hour, the modelled and surveyed queue lengths are less comparable. The Southern Way entry to the junction typically has extensive queuing which can result in blocking back to the A4232/Newport Road roundabout. This congestion is not however considered to be the result of the Southern Way entry to the junction.

The model does appear to be under estimating the capacity of the A48 northbound off slip with a surveyed queue of 9 and a modelled queue of 17. The queue surveys do however indicate that the maximum queue over the peak hour varied from 4-16 PCUs. Given the signal timings taken from the SCOOT output are not from the same day as the surveys were undertaken, it is considered that the model is replicating the capacity of this entry.

The junction is forecast to exceed practical capacity and approach theoretical capacity in the PM peak hour with a PRC of -8.6%.

Junction 14: B4487/A4161 Newport Road/A4232 Signalised Roundabout

LinSig has been used to model the B4487/A4161 Newport Road/A4232 partially signalised three-arm roundabout. Signal specifications and SCOOT outputs have been provided by Cardiff Council to inform the junction model. Saturation flows have been calculated using the RR67 method in LinSig. The A4161 Newport Road entry to the junction is not signalised and therefore ARCADY has been used to calculate the slope and intercept.

Given the presence of a bus gate on the A4232 off slip, 'Bus Zones' have been used to add the traffic flow from this entry to the junction. Only buses travelling through the bus gate have been added to the model separately from the other traffic flow.

There is a merge on the B4487 Newport Road exit directly after the junction. A higher proportion of drivers are therefore expected to exit the roundabout in the nearside lane. To account for this within the model, a saturation flow has been added to the offside lane. The model is therefore assigning approximately 60% of traffic to the nearside lane an 40% to the offside lane.

Similarly, there is a merge on the A4232 on slip which results in a much higher proportion of vehicles in the nearside lane on the link between Newport Road and the on slip. A similar approach has therefore been applied resulting in approximately 80% of traffic being assigned to the nearside lane.

Table 23: B4487/A4161 Partially Signalised Roundabout LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
1/2	B4487 Newport Road (A)	23	13	16.6	75.8%	4	8	13.3	56.4%
2/1	A4161 Newport Road (A)	0	0	2.9	32.6%	2	1	4.1	57.4%
3/1	A4232 Southern Way Off Slip (L&A)	13	5	12.4	65.1%	10	15	48.0	88.5%
4/3	B4487 Newport Rd Gyratory (R)	-	7	22.5	72.5%	-	4	11.4	68.9%
7/1	A4232 Off Slip Gyratory (A)	-	5	23.2	49.9%	-	9	18.1	65.1%
10/1	A4232 Southern Way On Slip (A)	-	14	29.7	88.2%	3	1	4.4	38.4%
Junction PRC		2.0% @ 64 seconds				-0.0% @ 64 seconds			

In the AM peak hour, the junction appears to be over estimating the capacity of the junction surveyed queue lengths on the B4487 and A4232 off slip nearly doubling modelled queues. This is attributed to the signal timings that have been taken from the SCOOT output which were recorded on a different day to the survey. It is therefore considered that the model can replicate the existing conditions, providing the SCOOT output is not used to inform the signal timings. It is therefore recommended that the future year assessment scenarios are not based on the recorded signal timings and instead the green splits should be optimised.

Junction 15: Heol Las/St Mellons Road Priority Junction

The Heol Las/St Mellons Road Priority Junction has been assessed with the PICADY software program. The capacity assessment results are summarised in Table 24 below.

Table 24: Heol Las/St Mellons PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Heol Las	B-AC	0+0	0	8.06	0.19	0+0	0	8.06	0.17
St Mellons	C-AB	0	0	5.18	0	0	0	5.41	0

The junction is estimated to be operating with plenty of spare capacity which is to be expected given the low traffic flow surveyed at this location.

Junction 16: Rover Way/Lamby Way/A4232 priority roundabout

Table 25 below presents the ARCADY assessment of the Rover Way/Lamby Way/A4232 priority roundabout alongside the surveyed queue lengths recorded at this junction.

Table 25: A4232/Rover Way/Lamby Way/A4232 ARCADY Base Year Results (without calibration)

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Lamby Way	5+5	6	26.55	0.86	2+5	4	17.02	0.81
2	Rover Way (South)	6+0	7	20.44	0.87	5+2	4	12.58	0.79
3	Rover Way (East)	1+0	1	6.79	0.54	1+2	1	5.91	0.51
4	A4232	25+1	54	103.98	1.05	12+1	5	13.56	0.83

As summarised in Table 25 above, the junction is forecast to exceed capacity in the AM peak hour and operate within theoretical capacity in the PM peak hour. A comparison of modelled and surveyed queue lengths indicates the model is underestimating the capacity of the A4232 entry to the roundabout in the AM peak hour, however the estimated RFC is over 1 and therefore the results should be treated with caution. Given the modelled and surveyed queues are similar in the PM peak hour, no calibration is proposed.

Junction 17: B4487 Newport Road/Ty-Mawr Road signalised junction

The capacity of the B4487 Newport Road/Ty-Mawr Road signalised junction has been assessed using LINSIG. Signal specifications have been provided by Cardiff Council to inform the junction model. Based on site observations it has been estimated that the pedestrian crossing will be called once every three cycles.

The assessment results are summarised in Table 26 below. It should be noted that Ty-Mawr Road is an 'exit only' link and therefore no capacity results are presented for the road.

Table 26: B4487 Newport Road/Ty-Mawr Road Traffic Signals LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
1/2	Newport Road NE (Ahead)	3	8	9.6	50.4%	1	7	17.4	49.2%
2/2	Newport Road SW (Ahead)	-	4	4.3	23.0%	-	7	4.9	33.8%
2/3	Newport Road SW (Right)	1	3	35.6	50.7%	1	5	20.3	49.1%
Junction PRC		72.3% @ 190 seconds				82.9% @ 190 seconds			

A comparison of the modelled and surveyed queue lengths indicates the model is underestimating the spare capacity of this junction. This could be because the pedestrian phase is called fewer times. Whilst no further alterations are proposed to the model, any future assessments should be considered as a worst case.

Junction 18: B4487 Newport Road/Tyr Winch Road priority junction

The PICADY assessment results for the B4487 Newport Road/Tyr Winch Road priority junction are presented in Table 27 below.

Table 27: B4487/Newport Road PICADY Base Year Results (without calibration)

Link		AM				PM			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Tyr Winch Road	B-C	0	0	8.08	0.17	0	0	8.68	0.09
Tyr Winch Road	B-A	1	0	17.93	0.25	1	1	25.26	0.32
Newport Road	C-AB	0+0	0	6.7	0.1	0+1	0	7.8	0.17

The junction is estimated to be operating within practical capacity in both peak hours.

Junction 19: B4487 Newport Road/Wern Fawr Lane signalised junction

LINSIG has been used to assess the capacity of the B4487 Newport Road/Wern Fawr Lane signalised junction. Signal specifications have been requested from Cardiff Council and used to inform the junction model. The assessment results are summarised in Table 28 below.

Table 28: B4487 Newport Road/Wern Fawr Lane Traffic Signals LINSIG Base Year Results

Lane		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	Deg Sat	Survey Queue	Queue (PCU)	Delay (s)	Deg Sat
1/1 + 1/2	Newport Road NE (A & R)	4+1	9	7.9	61.5%	5+0	10	7.9	62.8%
2/1	Newport Road SW (A & L)	2	12	12.3	56.5%	1	11	13.9	58.4%
3/1 + 3/2	Wern Fawr Lane (L & R)	2+1	3	51.8	57.5%	2+1	4	50.2	62.8%
Junction PRC		46.3% @ 180 seconds				43.2% @ 180 seconds			

The B4487 Newport Road/Wern Fawr Lane signalised junction is estimated to be operating within capacity in both peak hours. A comparison of the surveyed and modelled queue lengths indicates the junction is underestimating the capacity of the junction and therefore results should be considered as a worst case.

Junction 20: A48 Newport Road/Coal Pit Lane priority junction

The Newport Road/Coal Pit Lane priority junction has been assessed using the PICADY module of Junctions 9. The junction has a diverge lane measuring approximately 100m which PICADY does not have the capabilities to assess without calibration. The TRL website has an article that outlines the methodology for calibrating a junction model with a diverge lane and is summarised below:

- Determine the sensitivity of the minor entry (B) by removing the left-turn flow (A-B) from the model; and
- Reintroduce the left-turning traffic and manually increase the capacity of Arm B.

Removing the left-turn traffic has a minimal impact on the capacity of Arm B. No calibration is therefore proposed at this junction to increase the capacity of Arm B. The results should however be considered as a worst case.

Table 29: A48 Newport Road/Coal Pit Lane PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Coal Pit Lane	B-AC	1+3	2	24.93	0.67	0+0	0	8.01	0.10
A48 Newport Road	C-AB	0	0	6.45	0.12	0	0	6.26	0.20

A comparison of the modelled and surveyed queue lengths indicates the model is reflecting site observations. The Newport Road/Coal Pit Lane priority junction is estimated to operate within practical capacity in both peak hours.

Junction 21: B4239 Wentloog Avenue/Heol Las priority junction

The Wentloog Avenue/Heol Las priority junction has been modelled using the PICADY module of Junctions 9.

Table 30: B4239 Wentloog Avenue/Heol Las PICADY Base Year Results

Link		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
Heol Las	B-AC	0	0	8.78	0.07	0	0	9.3	0.07
B4239 Wentloog Ave.	C-AB	0	0	5.61	0.01	0	0	6.04	0.01

The junction is estimated to be operating with spare capacity in both peak hours.

Junction 23: A48 Pentwyn Interchange Roundabout

The A48 Pentwyn Interchange Roundabout has been assessed using the ARCADY module of Junctions 9. The junction modelling results alongside the surveyed queue lengths are presented in Table 31 below.

Table 31: A48 Pentwyn Interchange ARCADY Base Year Results

Arm		Weekday AM Peak Hour				Weekday PM Peak Hour			
		Survey Queue	Queue (PCU)	Delay (s)	RFC	Survey Queue	Queue (PCU)	Delay (s)	RFC
1	Eastern Ave (NE)	4	1	5.06	0.46	5	1	4.55	0.47
2	Cardiff East Park & Ride	1+0	0	2.18	0.02	1+2	0	2.41	0.13
3	Eastern Ave (SW)	1+0	0	2.19	0.24	2+1	0	2.61	0.29
4	Bryn Celyn Road	0+0	1	3.51	0.44	1+0	1	3.2	0.34
5	Pentwyn Road	0+0	1	3.68	0.45	0+0	1	3.1	0.37

The junction is forecast to be operating within capacity in both peak hour. A comparison of surveyed and modelled queue lengths indicates that no calibration is required.

4 A48 West Facing Slip Roads, St Mellons

The A48 west-facing slips in St Mellons provide access to the A48 from the A48/Cypress Drive/Newport Road roundabout (Junction 5). Whilst the capacity of a slip road is not typically assessed using junction modelling software, DMRB guidance (TD 22/06) sets out the appropriate design based on the Mainline Flow and the Merge Flow in Vehicles Per Hour (VPH).

The turning and link counts presented in the traffic flow diagrams (Appendix A) are in PCUs whereas the DMRB guidance uses VPH. Movements expressed in VPH for the slips and mainline flow are summarised in Table 32 below. Chapter 3 of the DMRB guidance was considered and where appropriate, traffic flows were amended to account for the proportion of Large Goods Vehicles (LGV) and uphill gradients.

Table 32: A48 West-Facing Slips Traffic Flows (VPH)

	Westbound		Eastbound	
	Mainline	Merge	Mainline	Diverge
AM Peak Hour Flow (VPH)	1,824	904	2,222*	1,928
PM Peak Hour Flow (VPH)	1,190	1,681	2,947*	1,238

* Adjusted by 15% to account for the assumed uphill gradient (>2%) and the proportion of LGVs (7.2%)

Merge Lane

Figure 5 presents the merge lane arrangement that should be provided based on the peak hour flows (VPH) presented in Table 32. The DMRB guidance recommends the peak hour flow should be used to calculate the appropriate slip design. Given the variance in traffic flows on the slip and mainline in the AM and PM peak hours, both have been shown in the figure. Based in the AM peak hour, DMRB indicates that the existing arrangement 'D-2' is appropriate for the surveyed traffic flow in the AM Peak Hour.

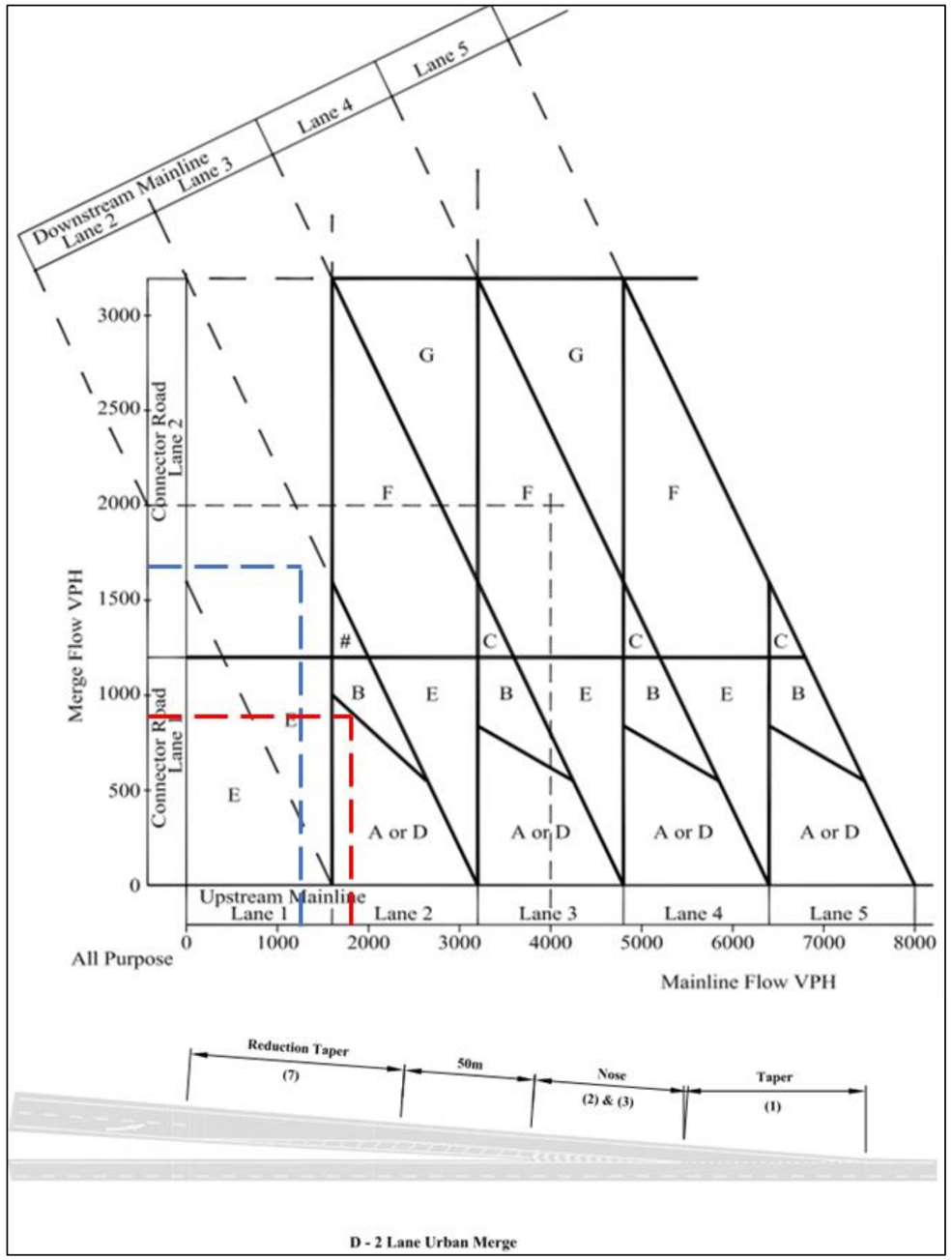


Figure 5: Merge Lane Arrangement

Diverge Lane

Based on the peak hour traffic flow figures presented in Table 32, Figure 6 below presents the diverge arrangement recommended in the DMRB guidance. DMRB indicates the A48 should have the following:

- Three lanes upstream of the diverge lane;
- Two lanes downstream of the diverge lane; and
- Diverge arrangement 'D' with a lane drop (PM peak hour)

The existing diverge arrangement "A" provided at this location is recommended by DMRB for mainline upstream traffic flow of 2,000-3,000 VPH and diverge flow of 500-1,000 VPH. The guidance therefore suggests that based on the surveyed traffic volumes, the A48 eastbound should be three lanes west of the off-slip.

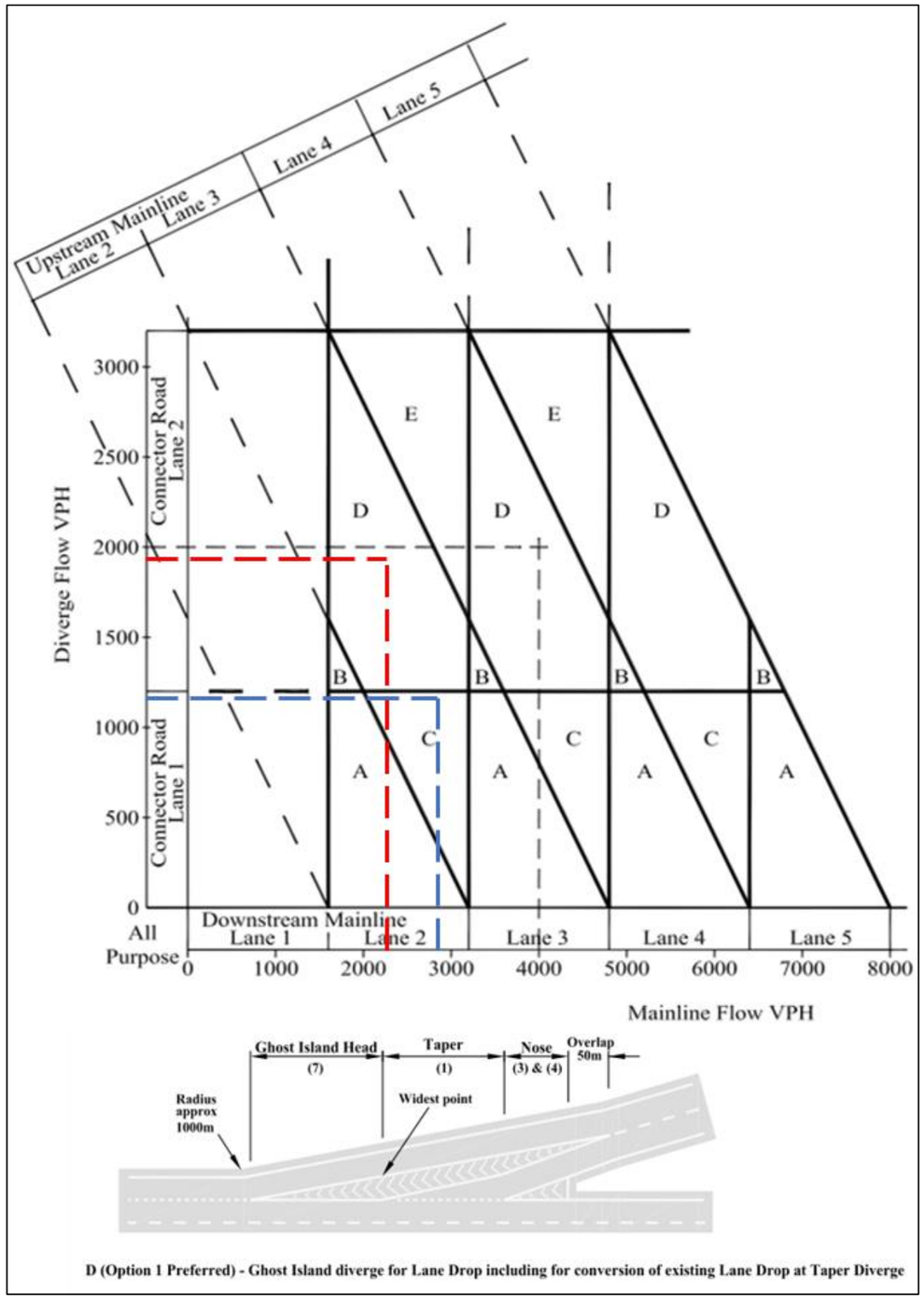


Figure 6: Diverge Lane Arrangement

5 Summary and Conclusions

Ove Arup & Partners Ltd (Arup) has been instructed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support of the Cardiff Parkway development proposals.

It has been agreed with CC as part of the Transport Assessment scoping exercise that a series of technical notes will be prepared prior to the submission of the outline planning application. This Technical Note details the methodology and results of the junction assessments undertaken for the base year 2018. Junction assessments have been undertaken for 22 junctions over 24 models using LinSig for signalised junctions, ARCADY for roundabouts, and PICADY software for priority junctions.

In agreement with CC, traffic data was collected on 7th June 2018, a neutral weekday outside of the school holidays. Due to an oversight by the surveyor and stolen equipment, some surveys were rescheduled.

In accordance with CC Supplementary Planning Guidance[3], the threshold for practical capacity was set as 0.80 RFC for priority junctions and 80% degree of saturation for signalised junctions.

The majority of the junctions within the study area are estimated to be operating within practical capacity in the base year. Four junctions are estimated to be exceeding practical capacity and approaching theoretical capacity and two junctions are exceeding theoretical capacity. The results of the capacity assessments are summarised diagrammatically on Figure 7.

The existing designs of the St Mellons A48 on-slip and off-slip have been assessed using DMRB guidance (TD 22/06). Whilst the guidance indicates the existing on-slip deign is appropriate, it recommends the A48 (eastbound) should be widened to three lanes upstream of the off-slip.

Next steps

The following next steps are proposed to progress the highway capacity assessments:

- Seek agreement on the base junction models following a workshop with Cardiff Council;
- Calculate background traffic flows following agreement of the future year assessment scenarios;
- Estimate the traffic impact of the development proposals and assign the trips to the local network;
- Forecast the impact of development trips on the capacity of the junctions located within the study area; and
- Identify the need for potential mitigation and further sustainable transport interventions.

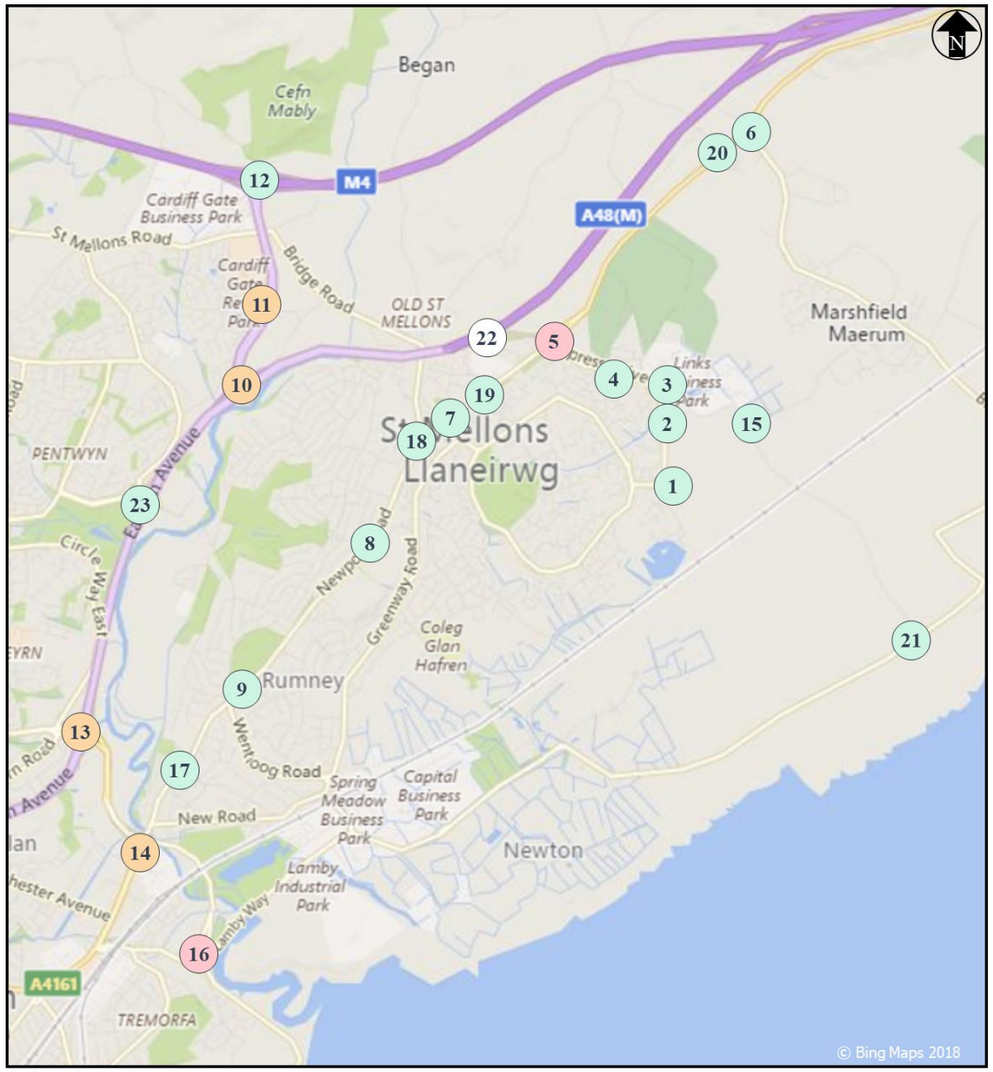
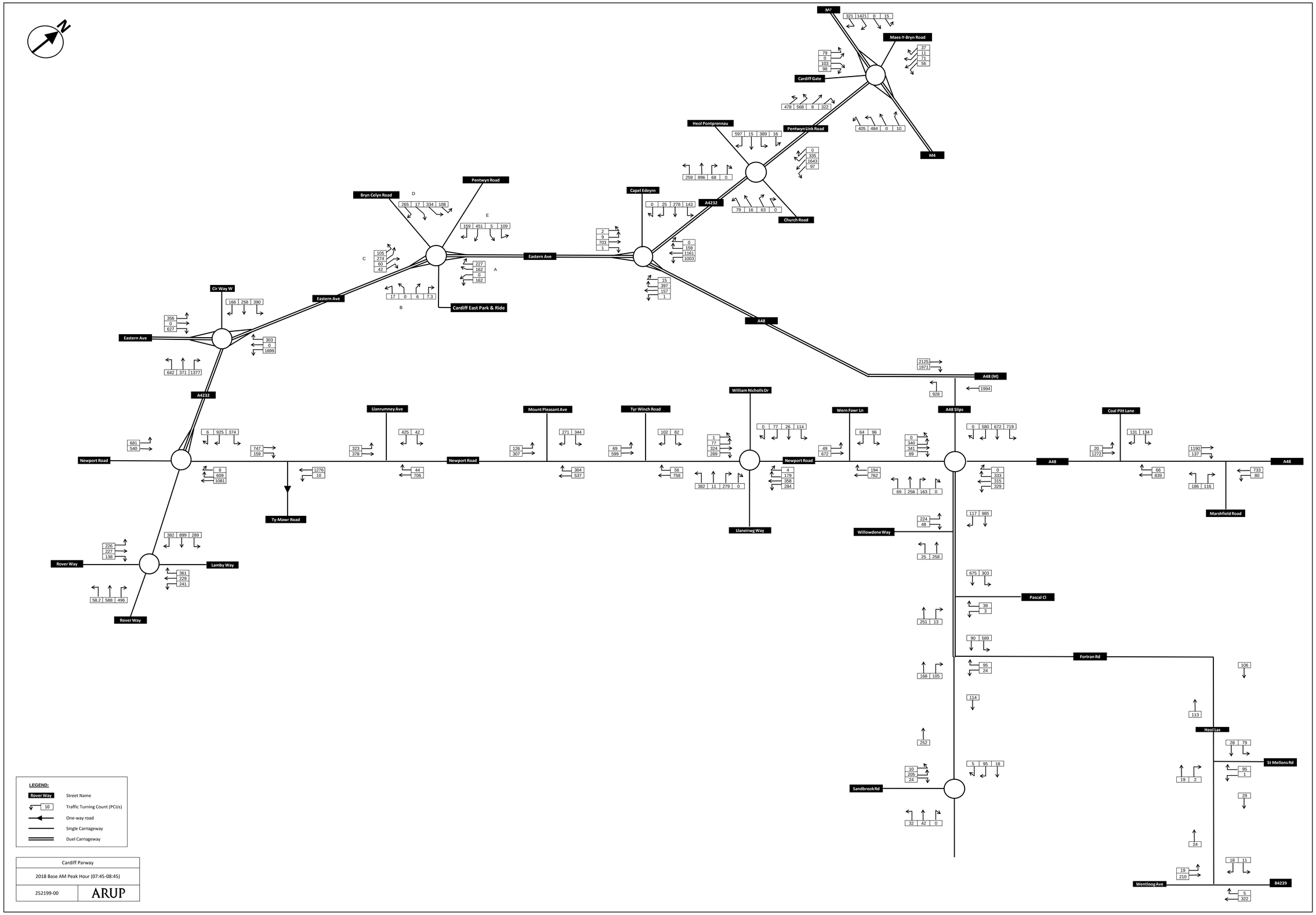


Figure 7: Summary of Base Year Junction Capacity Assessment Results

[3] Cardiff Council (2018) Managing Transport Impacts SPG

Appendix A

2018 Base Traffic Flow Diagrams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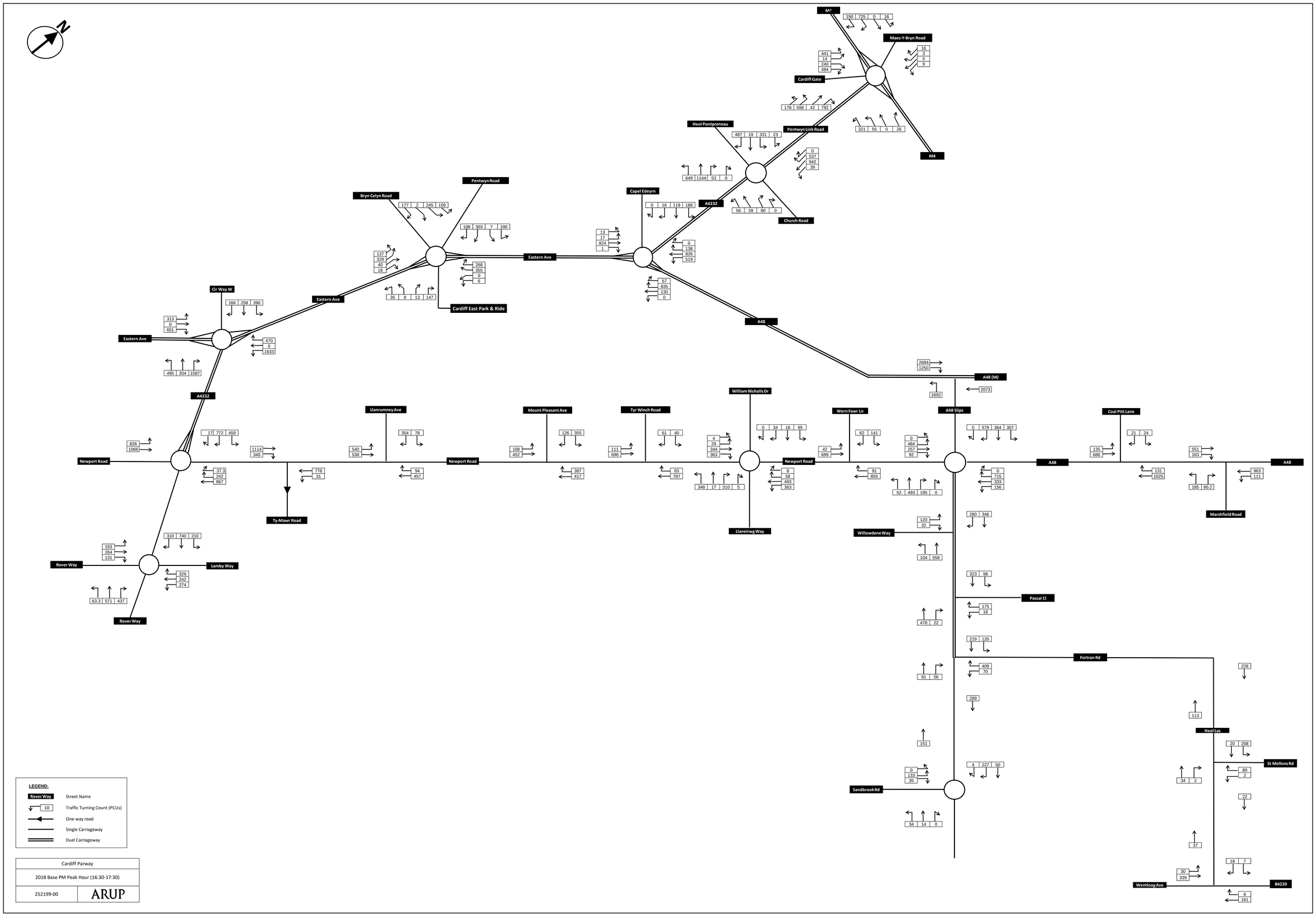
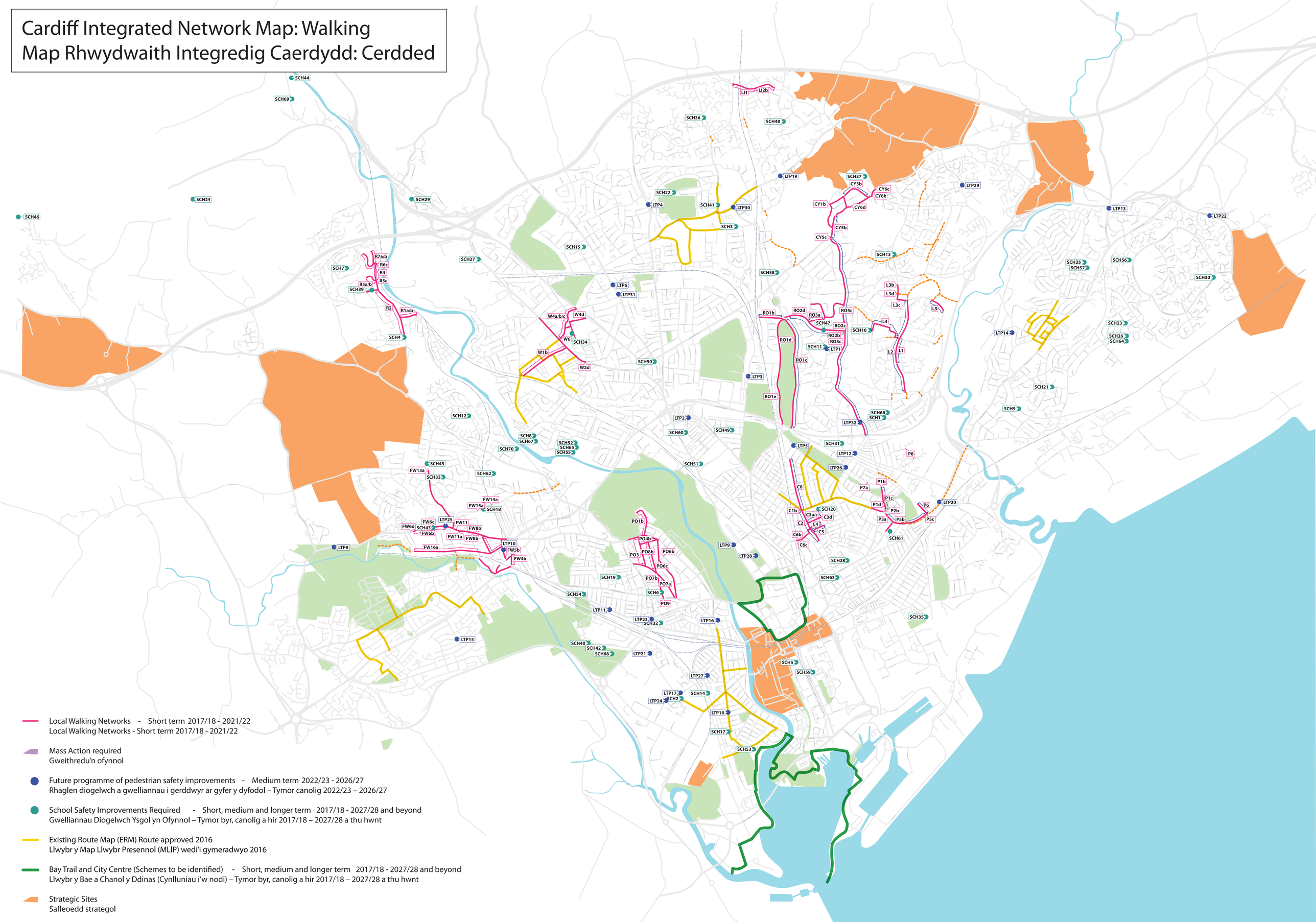
M4
321 1421 0 15
Maes-Y-Bryn Road
37
11
71
56
79
0
103
98
Cardiff Gate
478 568 8 322
405 484 0 10
Heol Pontprennau
597 15 389 16
Pentwyn Link Road
0
335
1543
97
259 896 68 0
Church Road
79 16 63 0
Capel Edeyrn
0 25 278 143
A4232
Pentwyn Road
Bryn Celyn Road
D
285 17 334 108
E
159 451 5 109
2
9
703
1
0
159
1161
1003
C
105
274
60
42
227
162
0
162
A
Eastern Ave
15
397
157
1
17 0 6 7.3
B
Cardiff East Park & Ride
Cir Way W
166 258 390
Eastern Ave
356
0
627
303
0
1899
642 371 1377
A48
2125
1971
A48 (M)
928
1994
A4232
William Nicholls Dr
Llanrumney Ave
Mount Pleasant Ave
Tyr Winch Road
Wern Fawr Ln
A48 Slips
Coal Pitt Lane
681
540
6 925 374
747
159
323
378
425 42
126
307
271 344
69
599
102 82
1
77
324
289
0 77 26 114
49
672
64 96
0
340
341
89
0 580 672 719
20
1272
131 134
1190
137
Newport Road
Newport Road
Newport Road
A48
A48
8
609
1081
1276
10
44
706
304
537
56
758
382 11 279 0
4
179
358
284
194
762
69 256 163 0
0
333
315
329
66
839
186 116
733
80
Ty-Mawr Road
Llaneirwg Way
Marshfield Road
224
48
Willowdene Way
117 985
25 258
382 899 289
226
227
138
Rover Way
Lamby Way
361
229
241
58.2 588 496
Rover Way
675 303
Pascal Cl
38
3
251 13
90 589
Fortran Rd
95
24
168 105
106
114
113
Heol Las
252
28 79
St Mellons Rd
95
1
10
205
24
5 95 18
19 2
Sandbrook Rd
29
32 42 0
24
18 11
19
210
Wentloog Ave
B4239
5
322
LEGEND:
Rover Way Street Name
10 Traffic Turning Count (PCUs)
One-way road
Single Carriageway
Duel Carriageway
Cardiff Parway
2018 Base AM Peak Hour (07:45-08:45)
252199-00
ARUP


N
M4
150 725 0 16
Maes-Y-Bryn Road
16 3 5 9
441 14 240 494
Cardiff Gate
178 598 42 792
321 55 0 26
Heol Pontprennau
487 19 331 23
Pentwyn Link Road
0 537 942 39
649 1144 53 0
Capel Edeyrn
0 16 119 186
A4232
56 28 80 0
Church Road
Pentwyn Road
Bryn Celyn Road
177 2 245 109
108 303 7 190
13 17 824 1
0 138 826 519
137 329 40 18
268 355 0 6
Eastern Ave
35 8 13 147
Cardiff East Park & Ride
67 835 130 0
Cir Way W
166 258 390
313 0 651
Eastern Ave
470 0 1633
495 204 1587
A48
2684 1250
A48 (M)
1692
2073
A4232
William Nicholls Dr
Llanrumney Ave
Mount Pleasant Ave
Tyr Winch Road
Wern Fawr Ln
A48 Slips
Coal Pitt Lane
826 1066
17 772 459
1114 340
37.3 242 867
Newport Road
540 538
354 78
778 31
94 457
Newport Road
108 452
126 355
387 417
111 696
61 40
83 787
4 29 344 363
348 17 310 5
0 34 16 95
8 58 493 363
Newport Road
42 699
62 141
91 855
0 484 257 92
52 493 195 0
0 579 364 307
0 715 333 156
A48
135 686
21 24
131 1025
551 163
185 80.2
963 111
A48
Ty-Mawr Road
Llaneirwg Way
Marshfield Road
Willowdene Way
120 32
280 346
104 558
323 98
Pascal Cl
175 16
478 22
219 120
Fortran Rd
409 70
91 56
289
228
113
Heol Las
151
20 208
St Mellons Rd
80 2
34 2
22
0 133 35
Sandbrook Rd
4 227 50
34 14 0
37
18 7
30 339
Wentloog Ave
B4239
6 161
310 740 210
193 264 131
Rover Way
Lamby Way
329 242 274
63.3 571 437
Rover Way
LEGEND:
Rover Way Street Name
10 Traffic Turning Count (PCUs)
One-way road
Single Carriageway
Duel Carriageway
Cardiff Parway
2018 Base PM Peak Hour (16:30-17:30)
252199-00
ARUP

Appendix G

Cardiff Council's and Newport City Council's Integrated Network Maps

Cardiff Integrated Network Map: Walking
Map Rhwydwaith Integredig Caerdydd: Cerdded



Local Walking Networks - Short term 2017/18 - 2021/22
Local Walking Networks - Short term 2017/18 - 2021/22

Mass Action required
Gweithredu'n ofynnol

Future programme of pedestrian safety improvements - Medium term 2022/23 - 2026/27
Rhaglen diogelwch a gwelliannau i gerddwyr ar gyfer y dyfodol – Tymor canolig 2022/23 – 2026/27

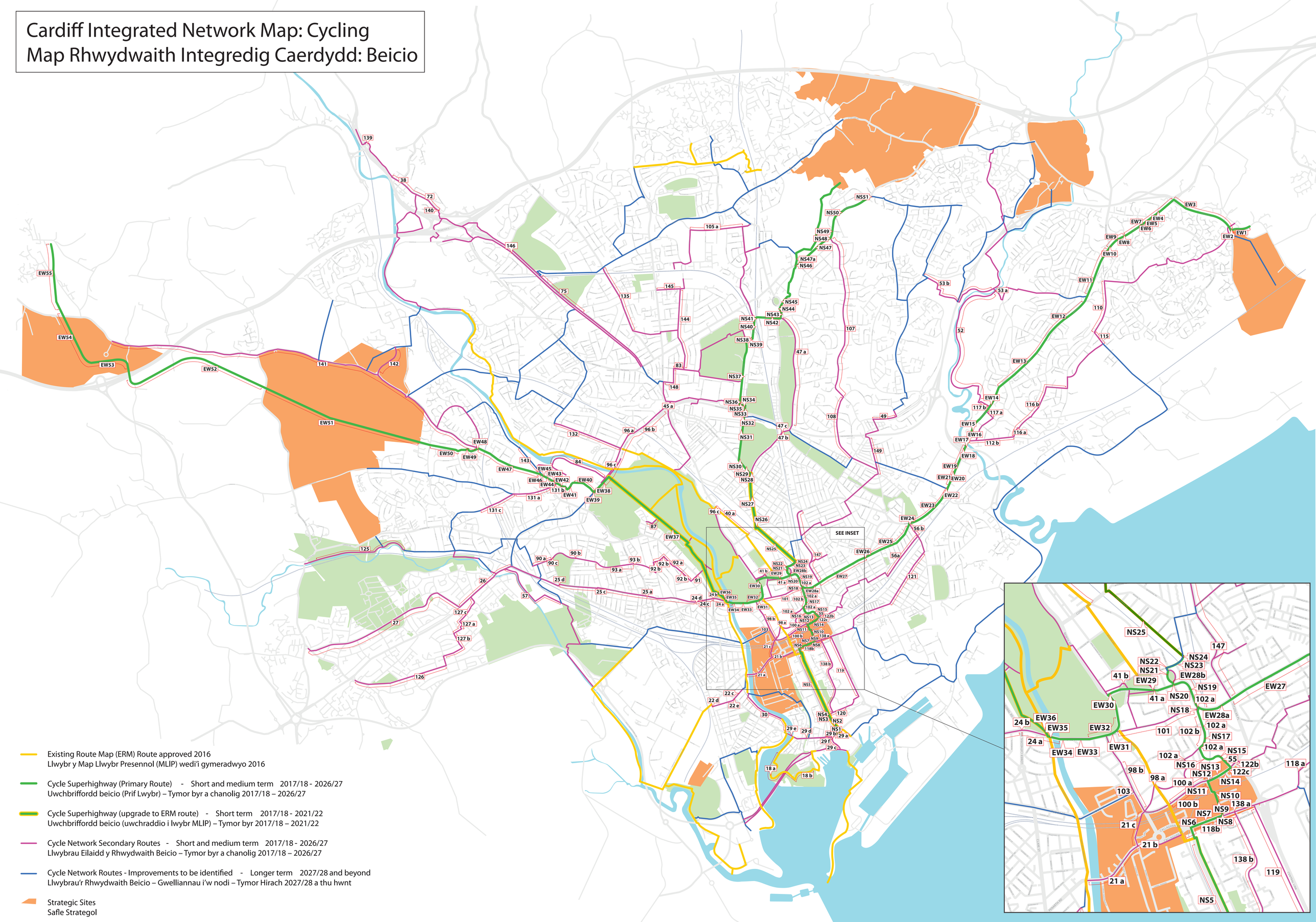
School Safety Improvements Required - Short, medium and longer term 2017/18 - 2027/28 and beyond
Gwelliannau Diogelwch Ysgol yn Ofynnol – Tymor byr, canolig a hir 2017/18 – 2027/28 a thu hwnt

Existing Route Map (ERM) Route approved 2016
Llwybr y Map Llwybr Presennol (MLIP) wedi'i gymeradwyo 2016

Bay Trail and City Centre (Schemes to be identified) - Short, medium and longer term 2017/18 - 2027/28 and beyond
Llwybr y Bae a Chanol y Ddinas (Cynlluniau i'w nodi) – Tymor byr, canolig a hir 2017/18 – 2027/28 a thu hwnt

Strategic Sites
Safleoedd strategol

Cardiff Integrated Network Map: Cycling
Map Rhwydwaith Integredig Caerdydd: Beicio



Existing Route Map (ERM) Route approved 2016
Llwybr y Map Llwybr Presennol (MLIP) wedi'i gymeradwyo 2016

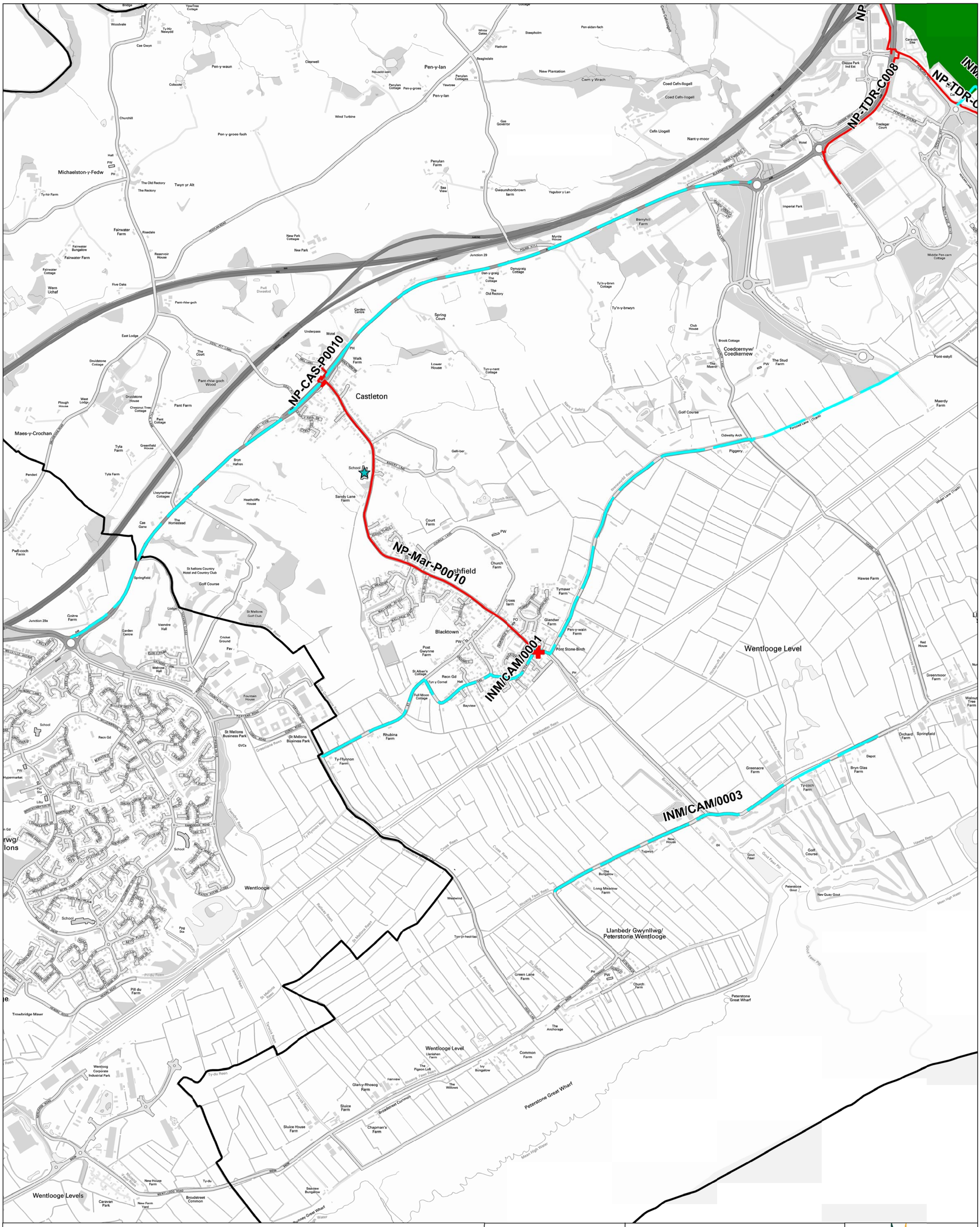
Cycle Superhighway (Primary Route) - Short and medium term 2017/18 - 2026/27
Uwchbriffordd beicio (Prif Lwybr) – Tymor byr a chanolig 2017/18 – 2026/27

Cycle Superhighway (upgrade to ERM route) - Short term 2017/18 - 2021/22
Uwchbriffordd beicio (uwchraddio i lwybr MLIP) – Tymor byr 2017/18 – 2021/22

Cycle Network Secondary Routes - Short and medium term 2017/18 - 2026/27
Llwybrau Eilaidd y Rhwydwaith Beicio – Tymor byr a chanolig 2017/18 – 2026/27

Cycle Network Routes - Improvements to be identified - Longer term 2027/28 and beyond
Llwybrau'r Rhwydwaith Beicio – Gwelliannau i'w nodi – Tymor Hirach 2027/28 a thu hwnt

Strategic Sites
Safle Strategol



Key

- Existing Active Travel Routes
- Proposed Integrated Route Network
- Health (GP surgeries)
- Leisure
- Libraries
- Parks
- Railway/Bus Station
- Primary Schools
- Secondary Schools
- Special Schools
- Welsh Medium Schools

Scale NTS

N

Newport City Council
Civic Centre, Godfrey Road,
Newport, NP20 4UR

Newport City Council
Cyngor Dinas Casnewydd

Active Travel: Integrated Network Map Castleton/Marshfield

3

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Key

- Existing Active Travel Routes
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Scale
NTS

N

Newport City Council
Civic Centre, Godfrey Road,
Newport, NP20 4UR

Newport City Council
Cyngor Dinas Casnewydd

Active Travel: Integrated Network Map
Newport South West

7

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Appendix H

Audit of Existing Pedestrian and Cycle Routes

Cardiff Parkway Developments LTD

Cardiff Parkway

Audit of Existing Pedestrian and Cycle Routes

Job Number: 252598

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

ARUP

Introduction

Background

Ove Arup and Partners (Arup) have been appointed by Cardiff Parkway Developments Limited (CPDL) to provide traffic and transportation advice in support the Cardiff Parkway development proposals that will comprise a railway station, park & ride, transport interchange and Business District. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

The vision for Cardiff Parkway is of a vibrant, employment-led development. The development site will be accessible by a variety of transport modes and will be an amenity for those currently residing within the Cardiff city region.

The site is located in the St Mellons area of Cardiff, approximately 8km to the east of the city centre and to the south of the M4 and A48(M). The site is bounded to the north by St Mellons Business Park, Heol Las to the east, open countryside to the south and to the west by Cypress Drive and residential development beyond.

St Mellons is an urban settlement and therefore there is some existing infrastructure for pedestrians and cyclists. In addition, there is a Public Right of Way (PROW) that crosses the site in an east/west alignment between Cypress Drive and the St Mellons Road/Heol Las junction.

Route 88 of the National Cycle Network routes towards the site from Marshfield via St Mellons Road. This on-road cycle path terminates adjacent to the site at the junction with Fortran Road and Heol Las.

There are also committed improvements to the walking and cycling infrastructure as part of the Cardiff Cycleway scheme. A segregated cycle rout is proposed from the centre of Cardiff to St Mellons via Newport Road and Cypress Drive.

Report Purpose

This report presents an audit of the walking and cycling routes to and around the proposed development site, including footways, footpaths, PROWs an other informal leisure routs. The audit also considers the accessibility and environment of existing public transport

The audit has been undertaken to identify any routes that may need to be enhanced in order to maximise the sustainable accessibility of the site. This could include new or improved footways, crossings or bus stop facilities.

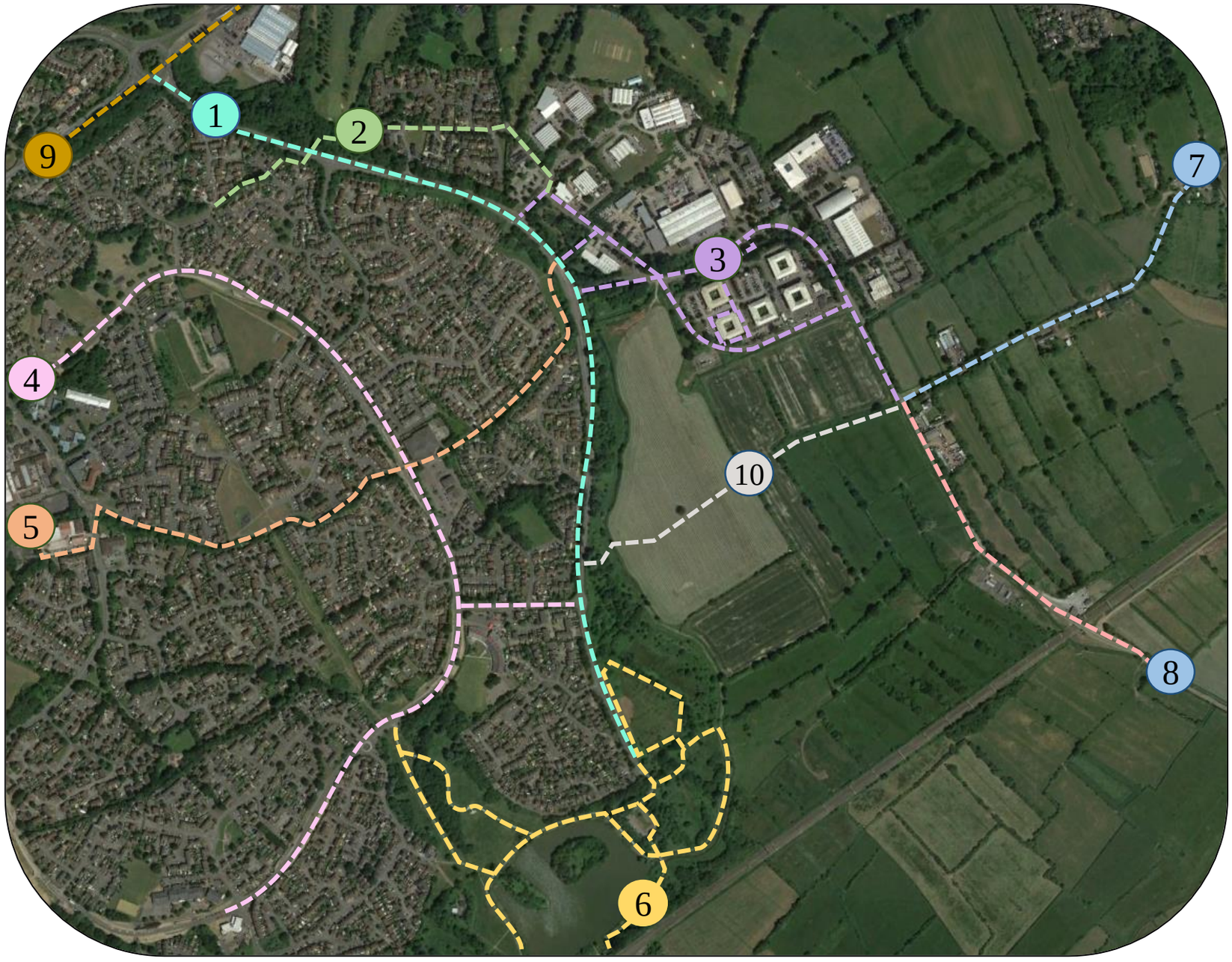
Assessment Methodology

A bespoke assessment has been undertaken which audits pedestrian and cycle routes, crossing provision and bus stop facilities. Given the purpose of the audit, the full methodology set out in the Walking, Cycling & Hose-riding Assessment and Review (TD 42/17) has not ben adopted. The scope of this audit audit does however capture the key assessment tools and criteria considered relevant to this project.

The audit was undertaken on Wednesday 21st August 2019. The results of this audit reflect the observations made a the time of the survey and the judgement of the auditors.

Study Area

Ref	Route
1	Cypress Drive
2	Heritage Park to Vaendre Lane
3	St Mellons Business Park
4	Willowbrook Drive
5	St Mellons traffic free footway/cycleway
6	Hendre Lake Park recreational paths
7	St Mellons Road
8	Heol Las
9	Newport Road to the A48
10	Public Right of Way



Route	1	Link	1

Cypress Drive: South of the roundabout with the A48

Footways			
Footway Width	1.5 – 2m	Obstructions	Some vegetation encroaching on to the footway
Gradient	Flat	Personal security	Limited overlooking however there is a heavy traffic flow
Lighting	Lit	Environment	Heavy traffic flow
Surface Quality	Average	Other observations	No pedestrians observed using the footway
Crossings			
Provision	Uncontrolled pedestrian crossing with raised table an refuge island at the roundabout	Kerbs/tactile	Drop kerbs and tactile paving provided
Deviation from Desire line	Good; limited deviation	Delay	Poor: uncontrolled crossing not suitable for traffic volumes in the peak hours
Capacity	Good: big refuge, wide footway	Obstructions	None
Bus Stops			
N/A			

Route	1	Link	12

Cypress Drive: Near the junction with Pascal Close

Footways			
Footway Width	2m at the crossing, no continual footway	Obstructions	Free of obstructions
Gradient	Flat	Personal security	Little to no overlooking, although there is constant traffic on the highway
Lighting	Lit	Environment	Heavy traffic flow
Surface Quality	Good, flat with no pot holes	Other observations	Crossing follows similar alignment as the underpass from the business park
Crossings			
Provision	Priority crossing with a refuge island	Kerbs/tactile	Dropped kerbs and tactile paving
Deviation from Desire line	Located close to the bell mouth of the junction	Delay	Potential for significant delay due to the heavy volume of traffic
Capacity	Large refuge island could accommodate several people	Obstructions	No obstructions identified
Bus Stops			
N/A			

Route	1	Link	3

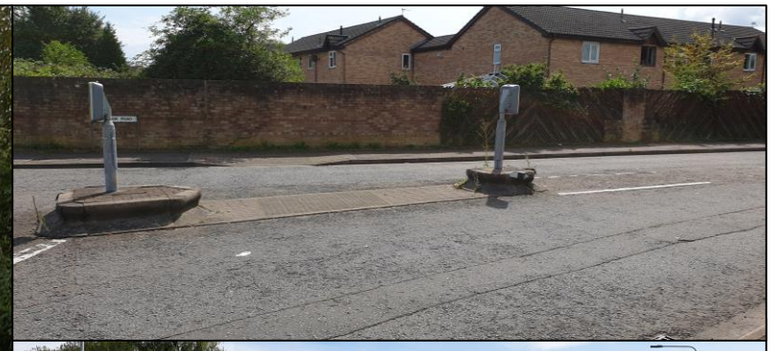
Cypress Drive: South of the junction with Fortran Road

Footways			
Footway Width	1.8m – 2m	Obstructions	Vegetation and signal poles for the crossing obstruct the footway in places
Gradient	Slope between Fortran road and signalised crossing	Personal security	Limited overlooking and moderately low traffic flow
Lighting	Lit	Environment	Lower traffic flow south of the junction with Fortran Road
Surface Quality	Good, flat with no pot holes	Other observations	Proposed pedestrian and cycle route should link with the exiting traffic free route to the west of Cypress Drive
Crossings			
Provision	Signalised TOUCAN crossing	Kerbs/tactile	Dropped kerbs and tactile paving
Deviation from Desire line	Located quite far from Fortran Road, but ties in with existing traffic free route	Delay	Good, demand responsive signals with an approximate delay of 10 seconds
Capacity	Average, no widening of footway in vicinity of crossing	Obstructions	Signal poles obstruct footway

Bus Stops							
Shelter	X	Raised Kerb	✓	Flag	✓	Timetable information	✓

Route	1	Link	4

Cypress Drive: West of the development site

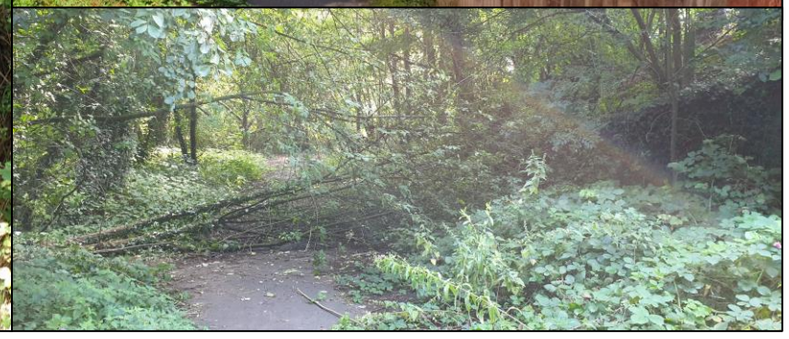


Footways			
Footway Width	2m, reduced to 1.5m in places due to vegetation. No footway on the east side of the road.	Obstructions	Vegetation needs cutting back in places
Gradient	Mostly flat	Personal security	Limited overlooking and moderately low traffic flow
Lighting	Lit	Environment	Lower traffic flow south of the junction with Fortran Road
Surface Quality	Average, some pot holes in places	Other observations	Properties front Cypress Drive, south of the Sandbrook Road roundabout
Crossings			
Provision	Signalised TOUCAN crossing	Kerbs/tactile	Dropped kerbs and tactile paving
Deviation from Desire line	Located quite far from Fortran Road, but ties in with existing traffic free route	Delay	Good, demand responsive with delay of 10 seconds
Capacity	Average, no widening of footway in vicinity of crossing	Obstructions	Signal poles obstruct footway

Bus Stops							
Shelter	X	Raised Kerb	X	Flag	✓	Timetable information	X

Route	2	Link	1

Footpath: Willowdene Way to Vaendre Lane



Footways			
Footway Width	1 – 2m	Obstructions	Some vegetation encroaching
Gradient	Flat	Personal security	No overlooking, unlit footpath
Lighting	None	Environment	Traffic free
Surface Quality	Poor – recreational route without hard surfacing in places	Other observations	Recreational route, unlikely to be used by commuters and not suitable for cyclists
Crossings			
Provision	Underpass	Kerbs/tactile	N/A
Deviation from Desire line	None	Delay	None
Capacity	Good: wide underpass	Obstructions	None
Bus Stops			
N/A			

Route	3	Link	1

St Mellons Business Park: Pascal Close

Footways			
Footway Width	1-1.5m, not sufficient for two wheel chair users to pass	Obstructions	None, although footways too narrow
Gradient	Flat	Personal security	Overlooked by neighbouring offices
Lighting	Lit	Environment	Moderate to low traffic with green spaces
Surface Quality	Good	Other observations	On-street parking car reduce pedestrian visibility and block crossings
Crossings			
Provision	Uncontrolled crossing at junction with Fountain Lane	Kerbs/tactile	Dropped kerbs not aligned, no tactile paving.
Deviation from Desire line	Located on the desire line	Delay	Limited traffic so delay is typically low
Capacity	Narrow footways provided limited space for waiting	Obstructions	No crossing at the junction with Vaendre Close
Bus Stops			
N/A			

Route	3	Link	2

St Mellons Business Park: Fountain Lane

Footways			
Footway Width	1.2m	Obstructions	Bus shelter
Gradient	Flat	Personal security	Overlooked by neighbouring offices
Lighting	Lit	Environment	Low traffic, particularly outside of peak hours
Surface Quality	Good	Other observations	Footway does not extend to Fortran Road and therefore the pedestrian route to
Crossings			
Provision	Drop kerbs	Kerbs/tactile	Drop kerbs, no tactile paving
Deviation from Desire line	None	Delay	Good
Capacity	poor	Obstructions	None

Bus Stops							
Shelter	✓	Raised Kerb	✓	Flag	✓	Timetable information	✓

Route	3	Link	3

St Mellons Business Park: Cypress Drive Underpass

Footways			
Footway Width	1-1.5m	Obstructions	Vegetation
Gradient	Mostly flat	Personal security	Poor: not overlooked, footway out of sight and the underpass is unlit.
Lighting	Some	Environment	Footway routes through pleasant scenery however the underpass is unlit.
Surface Quality	Average	Other observations	Potential for a footway link to Fortran Road. There are steps but no surfacing
Crossings			
Provision	Underpass	Kerbs/tactile	N/A
Deviation from Desire line	Minor	Delay	N/A
Capacity	Wide underpass	Obstructions	N/A
Bus Stops			
N/A			

Route	3	Link	4

St Mellons Business Park: Fortran Road/Fountain Lane

Footways			
Footway Width	Incomplete, 1.5m	Obstructions	Incomplete footway
Gradient	Flat	Personal security	Average: not lit and limited overlooking, although moderate traffic flow
Lighting	Not lit	Environment	Average: moderate traffic, particularly in peak hours
Surface Quality	No footway provision – unsuitable in wet conditions	Other observations	Missing footway could encourage pedestrians to walk on the carriageway which could potentially result in a road traffic collision.
Crossings			
Provision	Uncontrolled crossing	Kerbs/tactile	Dropped kerbs do not align, no tactile provided
Deviation from Desire line	Limited	Delay	Moderate to low traffic
Capacity	Narrow footway on Cobol Road	Obstructions	Incomplete footway, narrow footway, vehicle (farm) access
Bus Stops			
N/A			

Route	3	Link	5

St Mellons Business Park: Fortran Road

Footways			
Footway Width	2m on the north/east side of the road, 1m on south/west side, east of Cobol Road	Obstructions	None
Gradient	Flat	Personal security	Average: over looked by surrounding offices
Lighting	Lit	Environment	Moderate traffic flows with green spaces. Southern footway set back from the road.
Surface Quality	Good, except for the section between Cobol Road and the business park access on the south side of Fortran road is surfaced with chippings.	Other observations	No footway provision in the vicinity of Fountain Lane. The pedestrian route from the business park to the bus stop is therefore incomplete.
Crossings			
Provision	Dropped kerbs	Kerbs/tactile	Some dropped kerb crossing did not have
Deviation from Desire line	None	Delay	None
Capacity	Good	Obstructions	Some dropped kerb crossing were blocked by parked cars
Bus Stops			
N/A			

Route	3	Link	6

St Mellons Business Park: Business park north of Cobol Road

Footways			
Footway Width	2m footway to the west of offices, route from the car park to Fortran Road is narrower. No footway through car park between offices.	Obstructions	Vehicles parked on kerbs, tree on the route between the business park and Fortran Road
Gradient	Flat	Personal security	Overlooking from adjacent offices
Lighting	Lit	Environment	Car park with low traffic flow
Surface Quality	Good	Other observations	Notable level change between Cobol Road and Business Park
Crossings			
Provision	Uncontrolled crossings	Kerbs/tactile	No dropped kerbs or tactile paving
Deviation from Desire line	N/A	Delay	Limited traffic flow
Capacity	Good	Obstructions	Some on-street parking
Bus Stops			
N/A			

Route	3	Link	7

St Mellons Business Park: Cobol Road

Footways			
Footway Width	None	Obstructions	On-street parking
Gradient	Flat	Personal security	Overlooking from adjacent offices
Lighting	Lit	Environment	Greenfield to the south, although parked cars along the side of the highway
Surface Quality	Highway good, no footway	Other observations	There are quite significant level changes between the site, Cobol Road and the existing business park.
Crossings			
Provision	None	Kerbs/tactile	N/A
Deviation from Desire line	N/A	Delay	N/A
Capacity	N/A	Obstructions	N/A
Bus Stops			
N/A			

Route	4	Link	1

Willowbrook Drive: North

Footways			
Footway Width	1.5 – 2m	Obstructions	Bus shelter, some vegetation encroached on to pavements
Gradient	Flat	Personal security	Majority of link overlooked and close to local road
Lighting	Lit	Environment	Well maintained vegetation, low traffic speeds and footpath separated from road
Surface Quality	Good	Other observations	Option to walk at road level on pavements or follow a quieter footpath running parallel to the road along most of the link
Crossings			
Provision	Zebra crossing and uncontrolled crossings including dropped kerbs, refuge islands (some with a raised table) and an underpass.	Kerbs/tactile	Dropped kerbs some missing tactiles
Deviation from Desire line	Minimal deviation – some poor at roundabouts	Delay	Good
Capacity	Good	Obstructions	None

Bus Stop (northwest bound)							
Shelter	✓	Raised Kerb	✓	Flag	✓	Timetable information	✓

Route	4	Link	2

Willowbrook Drive: Sandbrook Road

Footways			
Footway Width	2m	Obstructions	Some signage posts in middle of footway on northern side of the road
Gradient	Flat	Personal security	Overlooked by adjacent houses
Lighting	Lit	Environment	Low traffic flow, although expected to be busier at beginning/end of a school day
Surface Quality	Good	Other observations	Primary school located directly south of Sandbrook Road
Crossings			
Provision	Dropped kerbs, refuge island and a zebra crossing with build-outs and a raised table	Kerbs/tactile	Dropped kerbs and tactile, although some tactile requires maintenance
Deviation from Desire line	Good	Delay	Good
Capacity	Good	Obstructions	None
Bus Stops			
N/A			

Route	4	Link	3

Willowbrook Drive: South

Footways			
Footway Width	2m	Obstructions	Bus stop. Some vegetation on footway.
Gradient	Flat	Personal security	Majority of link overlooked and close to busy road
Lighting	Lit	Environment	Well maintained vegetation and footpath separated from road
Surface Quality	Good	Other observations	Option to walk at road level on pavements or follow a footpath running parallel to the road along most of the link
Crossings			
Provision	Dropped kerbs, island, pelican crossing, and underpass	Kerbs/tactile	Dropped kerbs, some without tactile
Deviation from Desire line	Minimal deviation – some poor at roundabouts	Delay	Good, priority crossings and moderate traffic flow
Capacity	Good	Obstructions	No dropped kerb at Brython Drive (see image above)

Bus Stops							
Shelter	✓	Raised Kerb	✓	Flag	✓	Timetable information	✓

Route	5	Link	1

St Mellons Traffic Free Route: East

Footways			
Footway Width	2-3m	Obstructions	Small amounts of vegetation encroaching onto footway
Gradient	Flat	Personal security	Good: the majority of the link passes through a residential area so is well overlooked
Lighting	Lit	Environment	Traffic free route with plenty of open space/parks along link
Surface Quality	Mostly good although some weather damage appearing in places	Other observations	East of the underpass, the footway passes through a retail area. There also an additional link to Cypress Drive near the TOUCAN crossing
Crossings			
Provision	Underpass	Kerbs/tactile	N/A
Deviation from Desire line	None	Delay	None
Capacity	Good	Obstructions	None
Bus Stops			
N/A			

Route	5	Link	2

St Mellons Traffic Free Route: West

Footways			
Footway Width	Over 2m	Obstructions	No major obstructions, vegetation encroaching, street lights/ electricity boxes on footway
Gradient	Flat	Personal security	Most of the link either overlooked or along frequently used road
Lighting	Lit	Environment	Well maintained, green areas, heavily used and traffic free
Surface Quality	Good	Other observations	Whilst lots of the footway is wider than 3m, a small distance of the most western segment is only 1.5-2m wide
Crossings			
Provision	Raised pelican crossing, dropped kerbs, footbridge	Kerbs/tactile	Dropped kerbs, some crossings missing tactile
Deviation from Desire line	Minor	Delay	Good
Capacity	Good	Obstructions	Some lack of dropped kerbs/proper crossing points (e.g. into carpark pictured)
Bus Stops			
N/A			

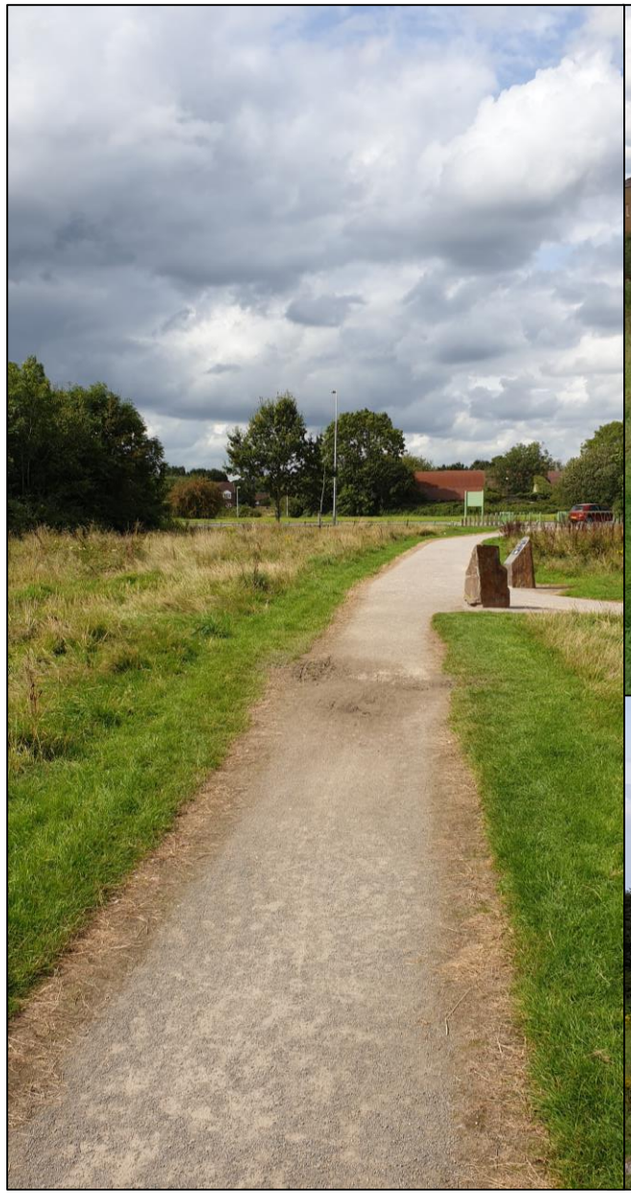
Route	5	Link	3

St Mellons Traffic Free Route: South

Footways			
Footway Width	1.5m	Obstructions	None, other than a small bit of vegetation encroaching on the footway
Gradient	Flat	Personal security	Good: overlooked by houses along the majority of the link
Lighting	No (only lit along the most southern section of the link)	Environment	Traffic free route
Surface Quality	Good	Other observations	Used by children as a scooter/bike park
Crossings			
Provision	Footbridge to access this section of the route	Kerbs/tactile	N/A
Deviation from Desire line	No	Delay	Possible build up if busy - as limited movement caused by pedestrian flow gates (pictured) at the extremities of the link
Capacity	Good	Obstructions	Pedestrian flow gates mean that this section of the route is inaccessible to wheelchair users
Bus Stops			
N/A			

Route	6	Link	1

Hendre Lake: North of Hendre Lake



Footways			
Footway Width	Links to Willowbrook Drive 1.5m Path around Hendre Lake over 3m	Obstructions	Limited obstructions, although recreational routes have some muddy patches
Gradient	Mostly flat or very gentle slope	Personal security	No overlooking from properties, although some paths are wide/open
Lighting	Not lit	Environment	Traffic free, quiet environment
Surface Quality	Path around lake is hard surfaced, other routes are unbound gravel paths	Other observations	Recreation routes used by dog walkers and young families. May not be appropriate for commuter cyclists to use this route

Route	6	Link	2

Hendre Lake: East of Hendre Lake

Footways			
Footway Width	Approximately 1.5m – 2m	Obstructions	Overgrown vegetation in places including brambles
Gradient	Mostly flat or very gentle slope	Personal security	No overlooking from properties and paths are narrow with bends
Lighting	Not lit	Environment	Traffic free, quiet environment
Surface Quality	Bound gravel path	Other observations	Recreation routes used by dog walkers and young families. Not suitable as an all weather route without significant widening, surface improvements and lighting.

Route	7	Link	1

St Mellons Road: East of Fortran Road

Footways			
Footway Width	No footway	Obstructions	Narrow highway, oncoming cars, overtaking cars. Vegetation and sign posts obstruct the verge.
Gradient	Flat	Personal security	Narrow lanes, unlit, not overlooked
Lighting	Not lit	Environment	Low traffic with rural surroundings
Surface Quality	Highway mostly good quality, no footway and verge not suitable for pedestrians	Other observations	Given the low traffic flow, the route could be conducive to pedestrians and cyclists in the daytime. At night, the unlit route would less suitable
Crossings			
Provision	N/A	Kerbs/tactile	N/A
Deviation from Desire line	N/A	Delay	N/A
Capacity	N/A	Obstructions	N/A
Bus Stops			
N/A			

Route	7	Link	2

St Mellons Road: Marshfield

Footways			
Footway Width	1.5m	Obstructions	Telephone pole in centre of walkway (pictured)
Gradient	Flat	Personal security	Residential area, overlooked by multiple homes
Lighting	Lit	Environment	Residential setting with low traffic flow
Surface Quality	Average	Other observations	The low traffic flow could be conducive for cycles
Crossings			
Provision	Some dropped kerbs	Kerbs/tactile	Only a few dropped kerbs, no tactile
Deviation from Desire line	Poor at some intersections	Delay	No
Capacity	Good	Obstructions	No
Bus Stops			
N/A			

Route	8	Link	1

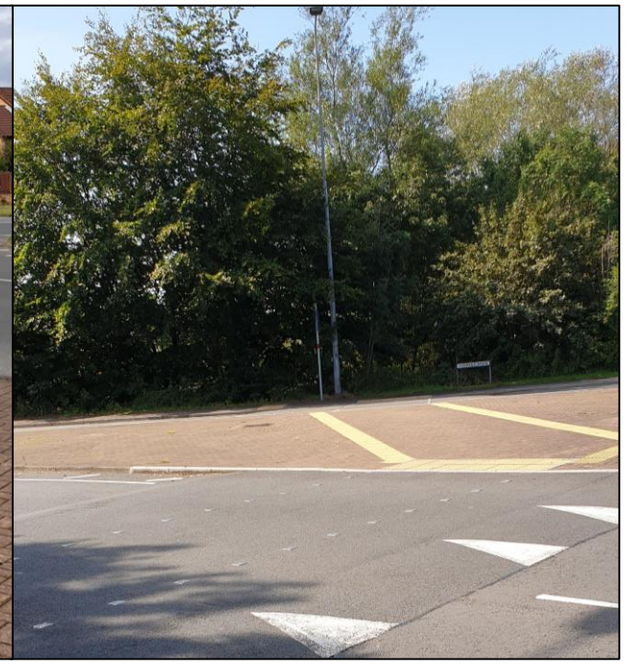
Heol Las

Footways			
Footway Width	No footway, narrow verge on bridge which pedestrians can walk along	Obstructions	Vegetation in verge and some on-street parking
Gradient	Flat	Personal security	Not overlooked, low traffic flow and no footway
Lighting	Not lit	Environment	Rural location surrounded by greenfield
Surface Quality	Highway is good quality, verge unkept grass and not suitable for pedestrians in wet conditions	Other observations	Popular route used by existing employees for a lunch time stroll
Crossings			
Provision	n/a	Kerbs/tactile	n/a
Deviation from Desire line	n/a	Delay	n/a
Capacity	n/a	Obstructions	n/a

Bus Stops							
Shelter	n/a	Raised Kerb	n/a	Flag	n/a	Timetable information	n/a

Route	9	Link	1

A48/Cypress Drive Roundabout: West



Footways			
Footway Width	3m	Obstructions	None
Gradient	Flat	Personal security	Good
Lighting	Lit	Environment	Average: heavy traffic
Surface Quality	Good	Other observations	
Crossings			
Provision	Raised table	Kerbs/tactile	Kerbs and tactile
Deviation from Desire line	None	Delay	Poor: heavy junction with no priority for pedestrians
Capacity	Good	Obstructions	None
Bus Stops			
N/A			

Route	9	Link	2

A48/Cypress Drive Roundabout: East

Footways			
Footway Width	3m wide shared footway/cycleway	Obstructions	None
Gradient	Flat	Personal security	Over looked and heavy trafficked road
Lighting	Lit	Environment	Heavy trafficked road
Surface Quality	Good, recently constructed	Other observations	Footway recently upgraded as part of the residential development
Crossings			
Provision	Signalised crossing with refuge island to eastbound bus stops	Kerbs/tactile	Dropped kerbs with correct tactile
Deviation from Desire line	None	Delay	Average
Capacity	Good, wide footways with limited demand	Obstructions	None, lamp posts and bus shelter set back from footway

Bus Stops							
Shelter	✓	Raised Kerb	✓	Flag	✓	Timetable information	✓

Route	10	Link	1

Public Right of Way

Footways			
Footway Width	No clear indication of the alignment of the footpath	Obstructions	Overgrown vegetation in places and only half of the route is walkable
Gradient	Mostly flat or very gentle slope	Personal security	No overlooking from properties, cattle can be in the fields
Lighting	Not lit	Environment	Traffic free, quiet environment
Surface Quality	No surfacing	Other observations	The network of hedgerows and reens prevents the remainder of the route to Cypress Drive from being accessible (see figure above)

Summary: Cypress Drive

Route 1: Cypress Drive
A48 Roundabout to Pascal Close
The Cardiff Cycleway is proposed on Cypress Drive from Newport Road to the existing business park. Therefore no footway or cycleway improvements need to be explored on Cypress Drive, north of the junction with Fortran Road.

Any junction improvement works that may be required on Cypress Drive will need to be cognisant of the proposed Cycleway, however concept designs for the proposed route have not been made public.

Pascal Close to Fortran Road
There is no footway on Cypress Drive between Pascal Close and Fortran Road, however there is a traffic free route beyond the verge on the west side of the highway. There is a level change between this footway and the highway which routes to the underpass below Cypress Drive. There does not appear to be any benefit in introducing footways on Cypress Drive between the junctions with Pascal Close and Fortran Road

South of Fortran Road
There is a continuous footway on the west side of Fortran Road, south of the junction with Fortran Road. Given no development is proposed to from Cypress Drive, there is no requirement to provide a footway on the east side of Cypress Drive. Suitable crossing will be required

Summary: St Mellons Business Park

Route 3: St Mellons Business Park
Pascal Close
A Cardiff Cycleway is proposed on Cypress Drive and Newport Road, providing an off-road cycle route between the existing business park and the city centre.

A crossing for both pedestrians and cyclists should therefore be considered at the Cypress Drive/Pascal Close junction. In addition, some on-road infrastructure for cyclist should be considered on Pascal Close, near the junction with Cypress Drive.

Fountain Lane
The footway width of approximately 1.2m -1.5m is below the minimum recommendation of 2m (MfS). There current width would not allow two wheel chair users to pass and widening should be explored.

The existing bus stop/shelter on Fountain Lane is sited on this narrow footway. This results in limited space for passengers to wait for a bus undercover. Furthermore, both the bus stop shelter and any passengers waiting or a bus would obstruct other pedestrian walking on Fountain Lane. Further widening is therefore required in the vicinity of the bus stop

Fortran Road/ Fountain Lane
There is a section of footway missing at this junction which severs the route form the southern business park to the bus stop on Fountain Lane. This should be addressed to improve the accessibility of the existing business park by bus. This footpath will also be required to walk from the proposed railway station to the northern units in the existing business park.

Cobol Road
There is currently no footway provision on Cobol Road. Owing to the limited extent of adopted highway, any footway proposed may need to be delivered by reducing the effective width of the highway.

There are two potential routes from Cobol Road in to the existing business park. There is an existing footway adjacent from Cobol Road, adjacent to the south-western unit. Alternatively, a footway could potentially be delivered more centrally, subject to 3rd party land considerations.

Summary: Leisure and Traffic Free Routes

Route 2: Heritage Park to Vaendre Lane

This unsurfaced route is unlit and not suitable for all weather conditions. Given the alignment and location of this route, it is unlikely it would be used by people travelling to the site, even if the surface quality was improved and lighting was installed. This is a pleasant leisure route and therefore attempts should be made to integrate this footpath within the wider network of footpaths and traffic free footways.

Route 5: St Mellons Traffic Free Footway

This traffic free route is identified to be improved for cycles on the Integrated Network Map (Cycling). Following an east/west alignment, it provides a route through St Mellons to the north-western corridor of the site. There is a considerable level change between the footway and Cypress Drive at the junction with Fortran Road.

Route 6: Hendre Lake

There is a good quality hard-surfaced footpath that runs around Hendre Lake which was observed to be mostly used by young families, dog walkers and joggers. To the east of Cypress Drive there are also a network of footpaths, either unsurfaced or surfaced with unbound gravel.

Whilst any recreational routes proposed as part of the development should be integrated with these routes, an alternative pedestrian and cycle link should be sought from Cypress Drive to the proposed station which is hard surfaced, is overlooked and lit.