

CARDIFF HENDRE LAKES

Transport Assessment



August 2020

Cardiff Parkway Developments Ltd
Cardiff Hendre Lakes
Transport Assessment

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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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Abbreviations

AADT	Average Annual Traffic Data	TEMPro	Trip End Model Presenation Porgram
ARCADY	Assessment of Roundabout Capacity and Delay	TfW	Transport for Wales
ATC	Automatic Traffic Count	ULEV	Ultra Low Emmission Vehicle
BUG	Bicycle User Group	VPH	Vehicles Per Hour
CC	Cardiff Council	XC	Cross Country
CEMP	Construction Environmental Management Plan		
CLDP	Cardiff Local Development Plan		
CTMP	Construction Traffic Mangement Plan		
DfT	Department for Transport		
DMRB	Design Manual for Roads and Bridges		
DoS	Degree of Saturation		
EIA	Environmental Impact Assessment		
FTP	Framework Travel Plan		
GRIP	Governance for Railway Investment Projects		
GWR	Great Western Railways		
HGV	Heavy Goods Vehicle		
IEP	Intercity Express Programme		
LDP	Local Development Plan		
LaGV	Large Goods Vehcile		
LiGV	Light Goods Vehicle		
MfS	Manual for Streets		
MMQ	Mean Maximum Queue		
NCC	Newport City Council		
NCN	National Cycle Network		
NDF	National Development Framework		
NLDP	Newport Local Development Plan		
NTP	National Transport Plan		
PCU	Per Car Units		
PICADY	Priority Intersection Capacity and Delay		
PPW	Planning Policy Wales		
PRC	Practical Reserve Capacity		
PROW	Public Right of Way		
RFC	Ratio of Flow to Capacity		
RTC	Road Traffic Collision		
SCOOT	Split Cycle and Offset Optimisation Technique		
SEWTM	South East Wales Transport Model		
TA	Transport Assessment		
TAN	Technical Advice Note		

Executive Summary

Introduction

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, a proposed business district and Transport Interchange. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

The development proposals for Cardiff Hendre Lakes include a business district (up to 90,000m²) and a new transport interchange, comprising a railway station and station park & ride car park of up to 650 parking spaces.

This Transport Assessment (TA) has been prepared in support of an outline planning application for the above proposals. In addition to this TA, Framework Travel Plans (FTP) have been prepared for the business district and Railway Station. The content of the TA was established through collaborative dialogue with CC, Newport City Council (NCC) and Welsh Government as the relevant highway authorities.

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). Part of the southern and western extent of the development boundary adjoins the authority boundary between Newport and Cardiff. The development site is in an accessible location, with a network of footways and cycleways. There are opportunities for others to make improvements to this network to realise the full connectivity benefits that could be provided by Cardiff Parkway railway station, including cycle infrastructure improvements being delivered by CC (Cycleway 2).

There are several bus services that operate in the local area that combined provide high frequency services towards Cardiff and Newport city centres. There are 8-9 train services an hour that pass the site between Cardiff Central and Newport railway stations. The development site is accessed via Cypress Drive and Cobol Road. To the northwest, Cypress Drive forms a roundabout with the A48 slips and the A48, providing links to Cardiff and Newport respectively.

Development Proposals

The development seeks to deliver new employment space that will become a catalyst for growth, contributing to the regeneration of East Cardiff and the wider Cardiff Capital Region by attracting high quality businesses and investment.

The proposed access strategy for the business district has been developed with reference to the sustainable transport hierarchy. This gives priority to pedestrians and cyclists over other road users within many areas of the site while recognising the need for convenient road access to the train station.

Several high-quality active travel routes are proposed within the site. It is also proposed to improve the existing PROW footpath within the site, between Heol Las and Cypress Drive. There are several opportunities for pedestrian and cycle infrastructure improvements to be delivered by others, including a shared footway/cycleway to the site via Hendre Lake Park.

The proposed station will have four platforms and is planned to be served by eight services an hour to Newport, Cardiff and beyond (16 services total). The proposed interchange includes cycle parking, bus stops with high quality waiting facilities and up to 650 long-stay, short-stay and accessible car parking spaces. Additional bus stops are proposed within the site.

The primary vehicle access into the site is proposed to be taken from Cypress Drive. Additional site accesses are proposed via the Cypress Drive/Sandbrook Road roundabout and Cobol Road. An access is also required from Heol Las to provide construction and maintenance access to the south of the railway line. The internal highway network has been designed to limit the proportion of traffic routing through the site.

The provision of car parking for the business district will be agreed with CC as part of the detailed approvals through the reserved matters. The non-central parking standard allows a maximum of 1,800 parking spaces to be introduced for 90,000m² of office space. 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.

Highway Capacity Assessment

The study area was agreed with CC as part of the scoping discussion and included 22 junctions and the A48 slips at the St Mellons Interchange.

A detailed capacity assessment of all offsite junctions has been undertaken and a requirement for mitigation has been established at several junctions with Cypress Drive including Fortran Road, Pascal Close, Willowdene Way and the A48. Whilst other junctions are forecast to exceed practical capacity in the future year scenarios, these are a result of existing capacity issues and other strategic developments such as North East Cardiff. Given the traffic impacts of the proposed development are not significant at these junctions, it is not considered appropriate for delivery of the proposed development to be linked to highway mitigation.

In addition to accommodating the additional traffic flow associated with the development proposals, mitigation is proposed as part of this application on Cypress Drive to reduce traffic speeds and improve pedestrian and cycle permeability encouraging active travel to the station and business district. Traffic signals have therefore been proposed along Cypress Drive to mitigate the traffic impacts and change the character of the road to reflect a more urban environment.

A significant highway improvement scheme is required at the A48/Cypress Drive/Newport Road roundabout and the mechanisms for these improvements will be agreed through the determination of the application. The roundabout currently experiences significant peak hour congestion and a significant increase in traffic is forecast due to these proposals. A staggered signalised junction has been identified as a potential improvement scheme which is forecast to operate acceptably with traffic associated with the proposed development.

It is considered that there are no traffic or transportation reasons why the site should not be developed, providing that the range of transport measures identified in this report are implemented.

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, a proposed business district and sustainable transport hub including Cardiff Parkway Railway Station. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

Outline planning permission, with all matters reserved, is being sought for: the construction of a business park (up to 90,000m² - Use Classes 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 2,500m² - Use Class 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.

The vision for Cardiff Hendre Lakes is of a vibrant, employment development that will be accessible by a variety of transport modes. The project aims to become a catalyst for growth, contributing to the regeneration of East Cardiff and the wider Cardiff Capital Region by attracting high quality businesses and investment.

This Transport Assessment (TA) has been prepared in support of an outline planning application for the above proposals. In addition to this TA, Framework Travel Plans (FTPs) have been prepared for the business district and Railway Station. These FTPs are summarised in Chapter 10 and can be found within Appendix A and Appendix B.

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 redline boundary for this planning application is presented in Figure 1. Part of the southern and western extent of the redline boundary follows the authority boundary between Newport and Cardiff.

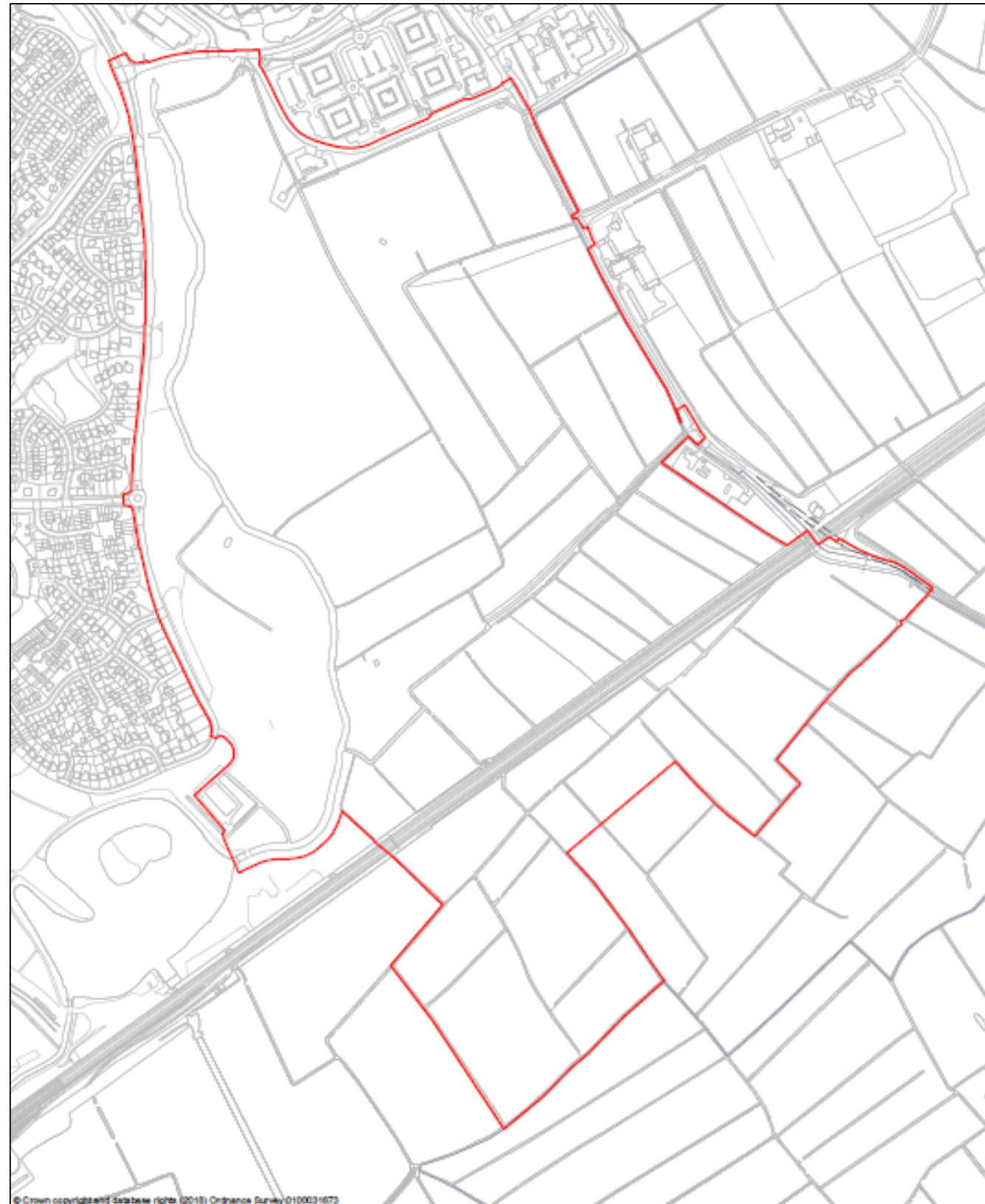


Figure 1: Development Boundary

1.2 Scoping and Methodology

The content of the TA was established through collaborative dialogue with CC, Newport City Council (NCC) and Welsh Government as the relevant highway authorities. This included the preparation of a Transport Assessment Scoping Note, attached as Appendix C, that outlines agreed key parameters for the technical work.

The Transport Assessment Scoping Note was submitted to CC for comment in the summer of 2018. There have been subsequent engagements with CC through both project meetings and by email to further refine the scope of the TA and discuss the evolving masterplan. A record of these discussions can be found in Appendix D.

It was agreed with CC during the TA scoping discussions that a series of technical notes would be submitted to seek agreement on several matters prior to the submission of the planning application. The following technical notes were submitted to CC for comment and have been incorporated within this TA:

- Technical Note 1: Committed Development and Background Traffic Growth (Appendix E);
- Technical Note 2: Base Junction Models (Appendix F); and
- Technical Note 3: Trip Generation and Distribution (superseded)

In addition, there has also been engagement with the following stakeholders to discuss the development proposals:

- Informal engagement with NCC; and
- Pre-application discussions with the Welsh Government as the strategic highway authority.

Discussions with the local bus operators, including Cardiff Bus, Newport Bus, New Adventure Travel (NAT) and Stagecoach, are planned to follow the submission of the formal pre-application consultation documents to CC.

1.3 Report Structure

The remainder of this report is structured as follows:

- Chapter 2 reviews existing policy relevant to these proposals;
- Chapter 3 describes the existing site conditions;
- Chapter 4 details the travel demand on the existing network;
- Chapter 5 sets out the development proposals including the outline access strategy;
- Chapter 6 outlines the future aspirations, emerging technologies and interventions;
- Chapter 7 sets out the future travel demand associated with Cardiff Hendre Lakes Business District and Cardiff Parkway Railway Station;
- Chapter 8 presents the findings of the highway capacity assessment;
- Chapter 9 details the recommended highway mitigation;
- Chapter 10 outlines the proposed methods to manage the impacts of construction traffic;
- Chapter 11 outlines the FTPs;
- Chapter 12 presents the Transport Implementation Strategy; and
- Chapter 13 presents a summary of the TA and sets out the overall conclusions.

2 Policy Context

2.1 National Policy

Planning Policy Wales: Edition 10

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). The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

Chapter 2 (People and Places: Achieving Well-being through Placemaking) indicates all development decisions should contribute towards the making of Sustainable Places and improved well-being. Five Key Principles are presented in PPW which should be embraced to ensure the planning system facilitates the right development in the right place. These are listed below alongside how Cardiff Parkway is considered to positively contribute to these goals:

1. Growing our economy in a sustainable manner – development should contribute to long-term economic well-being, making the best use of existing infrastructure and planning for new supporting infrastructure and services;
2. Making best use of resources – using resources efficiently, development should be resilient to climate change and contribute towards decarbonising society;
3. Facilitating accessible and healthy environments – development should support healthy lives, providing high-quality places that are barrier-free and inclusive to all members of society;
4. Creating and sustaining communities – places should have the right mix of good homes, jobs, services, infrastructure and facilities, creating urban and rural communities where people want to be and interact with others; and

5. Maximising environmental protection and limiting environmental impact – natural, historic and cultural assets should be protected and enhanced whilst negative environmental impacts should be avoided in the wider public interest.

1. The proposals include employment space which will be accessible by sustainable modes of travel, including walking, cycling, bus and rail. The proposed improvements to accessibility by sustainable modes of transport, particularly rail, will also benefit existing residents and employees in St Mellons and Trowbridge.
2. The proposed improvements to sustainable transport infrastructure, including the provision of a railway station, will encourage a modal shift away from single occupancy car trips. This should assist in reducing the level of carbon emissions produced and therefore Wales' impact on climate change.
3. The development will be accessible by active modes of travel including walking and cycling, with direct links to Route 88 of the National Cycle Network (NCN) and Route 2 of the proposed Cardiff Cycleway. Pedestrian and cycle crossings are proposed within the development site and on Cypress Drive to mitigate the potential severance caused by the anticipated increase in vehicular traffic.
4. The access strategy for Cardiff Hendre Lakes seeks to integrate the development site with the existing residential and employment sites in St Mellons. The provision of Cardiff Parkway railway station will improve the accessibility of St Mellons and Trowbridge by sustainable modes of transport.
5. The proposed railway station will provide existing residents and employees in St Mellons with alternatives modes of travel to the private car, potentially reducing the negative impacts that arise from single occupancy car trips.

Chapter 3 (Strategic and Spatial Choices) identifies five key aspects of good design, as summarised in Figure 2. It states good design is inclusive design, placing people at the heart of the design process.

It must reduce the inequality of access to essential services, education and employment with design measures improving accessibility by walking, cycling and public transport.



Figure 2: Five Aspects of Good Design (PPW 10)

It is also noted that good design should avoid the creation of car-based developments by maximising opportunities for people to make sustainable and healthy travel choices for their daily journeys. To maximise accessibility by sustainable non-car modes, infrastructure measures proposed within the site should be integrated with existing infrastructure such as the strategic cycling network.

The development addresses the five key aspects of good design in the following ways:

- **Access:** The proposed development will be highly accessible by all modes of transport including walking, cycling, bus, rail and road.
- **Character:** The Masterplan seeks to retain some of the natural characteristics of the site with the aim of enhancing the environment wherever possible, ultimately to help people enjoy the heritage and beauty of the landscape.
- **Community Safety:** The Masterplan will create safe and open spaces including two parks that will be overlooked, providing natural surveillance.
- **Environmental Sustainability:** It is proposed to incorporate the existing green network with attractive landscaping features, walkways and public seating, whilst respecting the ecological importance.
- **Movement:** Travel Plans are proposed for the business district and railway station to further reduce the proportion of trips made to the site by car. Furthermore, in comparison with the adopted parking standards it is proposed to seek a lower level of car parking for the business district.

Chapter 4 (Active and Social Places) discusses components of placemaking required to create well-connected and cohesive communities, covering the following:

- Transport;
- Housing;
- Retail & commercial development;
- Community facilities; and
- Recreational spaces.

With regards to transport, it states people should have access to jobs and services through more efficient and sustainable journeys, by walking, cycling and public transport.

It is also noted that land use and transport planning should be integrated, including:

- Within and between different types of transport;
- Between transport measures and land use planning;
- Between transport measures and policies to protect and improve the environment; and
- Between transport measures and policies for education, health, social inclusion and wealth creation.

The proposed business district will be highly accessible by sustainable modes of transport. This will provide multiple opportunities to travel to the existing business park and proposed business district by modes other than private motor vehicles.

The development proposals will also benefit residents, including those in St Mellons, Trowbridge and Marshfield, by enabling more journeys to be made by sustainable modes of travel, particularly rail.

A transport interchange is proposed near the station which will include cycle parking, high-quality bus stops, a taxi rank, vehicular drop-off and a park & ride car park for up to 650 vehicles. The interchange will be designed to integrate the various modes of travel associated with Cardiff Parkway railway station and the business district.

The sustainable transport hierarchy presented in Figure 3, which prioritises walking, cycling and public transport ahead of private motor vehicles, should be used to:

- Reduce the need to travel;
- Prevent car-dependent developments in unsustainable locations; and
- Support the delivery of schemes located, designed and supported by infrastructure which prioritises access and movement by active and sustainable transport.

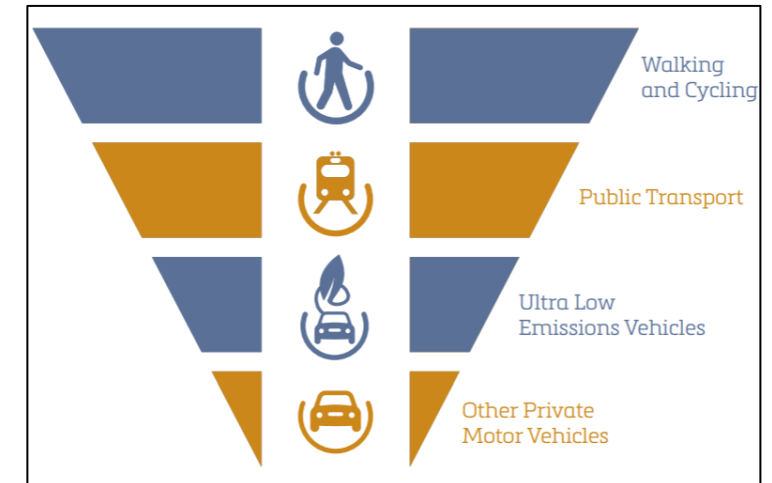


Figure 3: Sustainable Transport Hierarchy (source: PPW Edition 10)

The access strategy and masterplan for the proposed development site will prioritise pedestrians, cyclists and public transport users over private motor vehicle users across much of the site. This will be achieved through the provision of high-quality pedestrian and cycle infrastructure with appropriate crossing facilities. The Masterplan will also seek to principally locate parking to the periphery of the development to minimise traffic through the site.

To encourage the use of Ultra Low Emission Vehicles (ULEVs), PPW 10 states the planning system should support the provision of ULEV charging points as part of new developments. *Where car parking is provided for new non-residential development, planning authorities should seek a minimum of 10% of car parking spaces to have ULEV charging points.* PPW 10 also notes that it may be appropriate for some to be 'passive', with the necessary underlying infrastructure provided to enable installation and activation in the future.

A minimum of 10% of all car parking for Cardiff Hendre Lakes will have ULEV charging points. Passive provision is also being planned within infrastructure requirements for all future spaces to be ULEV equipped.

Chapter 5 (Productive and Enterprising Places) considers the economic theme of place-making. It states that the provision of sustainable transport infrastructure is essential to build prosperity, tackle climate change, reduce airborne pollution and to improve the social, economic, environmental and cultural well-being of Wales.

Development plans should support public transport routes, including improved facilities for bus users, park & ride schemes and new railway stations. They should also identify the need for new transport interchange sites.

The proposed railway station and transport interchange will provide numerous opportunities for existing and future employees in St Mellons to commute by sustainable modes of transport. The station park & ride car park is also anticipated to encourage additional people to travel by rail.

By increasing access to the rail network there will be opportunity for modal shift from private car to rail, across the following areas:

- North and East Cardiff;
- West Newport; and
- South Wales Valleys.

This should result in associated benefits on the local and strategic road network such as congestion and air quality.

Technical Advice Note 18: Transport (March 2007)

Although it precedes PPW, Technical Advice Note 18 elaborates on the relationship between land use planning and transport infrastructure. It outlines a range of key principles that should be adopted to ensure that economic development can create a basis for sustainable travel patterns. These include the following:

1. Ensuring new development is located where there is, or will be, good access by public transport, walking and cycling;
2. Managing parking provision;
3. 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;
4. Encouraging the location of development near other related uses to encourage multi-purpose trips;
5. Promoting cycling and walking; and
6. Supporting the provision of high quality, inclusive public transport.

1. The development will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail. Travel Plans are also proposed with the objective of reducing the number of single occupancy vehicle trips made to the site.
2. It is proposed to seek a lower level of car parking for the business district, in comparison with the adopted parking standards to reflect the sustainable credentials of the site.
3. The proposed development and access strategy have been developed with reference to the Sustainable Transport Hierarchy and seeks to maximise the potential for journeys to be made by sustainable modes of transport.
4. The proposed business district is located to the south of St Mellons business park and to the east of St Mellons.

5. High quality walking and cycling routes are proposed within the site, alongside cycle parking and Nextbike stations.
6. The development proposals include a railway station and interchange that will be served by eight services an hour between Newport and Cardiff.

With regards to traffic impact, the impacts of a development are considered to be material where a turning movement is anticipated to increase by 5%. If the junction is approaching capacity however, a smaller material increase would normally be considered material.

The traffic impact of the proposed development at each junction will be reviewed with CC and the Welsh Government, alongside the modelling results of the base junction models.

All junctions within the agreed study area have been assessed in detail using industry standard junction modelling software.

National Development Framework 2020-2040 Consultation Draft (August 2019)

The National Development Framework (NDF) will set the direction for development in Wales from 2020 to 2040. The consultation period for the draft extended from August to November 2019.

The NDF sets a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, decarbonisation, developing resilient ecosystems and improving the health and wellbeing of communities.

The NDF sets out 11 key outcomes which it will develop. These describe a Wales where people live...

1. ...and work in connected, inclusive and healthy places;
2. ...in vibrant rural places with access to homes, jobs and services;
3. ...in distinctive regions that tackle health and socio-economic inequality through sustainable growth;
4. ...in places with a thriving Welsh Language;
5. ...and work in towns and cities which are a focus and springboard for sustainable growth;
6. ...in places where prosperity, innovation and culture are promoted;
7. ...in places where travel is sustainable;
8. ...in places with world-class digital infrastructure;
9. ...in places that sustainably manage their natural resources and reduce pollution;
10. ...in places with biodiverse, resilient and connected ecosystems; and
11. ...in places which are decarbonised.

It is stated that the 11 Outcomes can be achieved over the next 20 years if the planning system – through the NDF and other development plans – is focussed on the long-term and provides quality development in the right places for the right reasons. These Outcomes are inter-related and inter-dependent and will improve places and well-being across Wales.

1. The proposed business district will be highly accessible by active modes of transport, enhancing the health of people travelling to the site. The Cardiff Parkway railway station, proposed as part of the development, will also enhance connectivity, particularly for St Mellons, Trowbridge and Marshfield;
2. The proposed Cardiff Parkway railway station will enhance access to the proposed business district and the wider local area;
3. The proposed railway station and transport interchange will provide numerous opportunities for existing and future employees in St Mellons to commute by sustainable modes of transport. This will contribute to sustainable growth in the region. It will also improve accessibility between the site and the wider city, improving access to good quality jobs;
4. The infrastructure proposals, including the proposed railway station, will improve accessibility for local people to Welsh language and cultural assets in South East Wales and beyond by sustainable modes;
5. The proposed station and park & ride will enhance accessibility to employment and encourage modal shift from private car use towards sustainable alternatives, encouraging sustainable growth in the area;
6. The infrastructure proposals, including the proposed railway station, will improve access to both employment and cultural assets in South East Wales and beyond;
7. The proposed improvements to sustainable transport infrastructure, including the provision of a railway station, will encourage a modal shift away from single occupancy car trips. The proposed development will also be highly accessible by active transport;
8. The proposed improvements will enhance access to the wider city and region, improving opportunities to access digital infrastructure for residents. It is envisaged that the proposed business district will attract investment in ICT;

9. The proposed railway station and transport interchange will provide numerous opportunities for existing and future employees in St Mellons to commute by sustainable modes of transport. The station park & ride car park is also anticipated to encourage additional people to travel by rail. This is likely to result in a reduction in congestion and reductions in pollution and improvements to air quality;
10. The proposed development includes provision of sustainable transport infrastructure, which will encourage mode shift from private car use, reducing the impact of the development on ecosystems in the area; and
11. The proposed improvements to sustainable transport infrastructure, including the provision of a railway station, will encourage mode shift away from single occupancy car trips. This should assist in reducing the level of carbon emissions produced.

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, and include the following:

1. 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;
2. A resilient Wales that maintains and enhances a biodiverse natural environment which has the capacity to adapt to change;
3. 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;
4. A more equal Wales where people are able to achieve their full potential regardless of their background or circumstances;
5. A Wales of cohesive communities which are attractive, viable, safe and well-connected;
6. A Wales of vibrant culture and Welsh language; and
7. 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.

The proposals will positively contribute towards the seven well-being goals in the following ways:

1. The business district will be highly accessible by sustainable modes of transport, reducing reliance on the private motor vehicles. The proposed station and park & ride will also enhance accessibility to employment and education and encourage modal shift from private car use.
2. The proposed railway station should encourage a mode shift away from single occupancy car journeys. The Masterplan also seeks to bring forward a sustainable development that offers long-term benefits for the community and the environment;
3. Active travel routes are proposed within the site to encourage people to walk and cycle to work;
4. The provision of a railway station will improve accessibility between the site and the wider city region, increasing access to good quality jobs. These proposed improvements to the transport network will improve access for residents, such as those in St Mellons, Trowbridge and Marshfield, to health and education facilities. Furthermore, they will facilitate inward movement and job prospects within the Cardiff City Region.
5. The proposed development will also benefit the local community through the enhancement to socially-inclusive public transport and high-quality active travel routes;
6. The infrastructure proposals, including the proposed railway station, will improve accessibility for local people to cultural assets in South East Wales and beyond by sustainable modes; and
7. The proposed improvements to sustainable transport infrastructure, including the provision of a railway station, will encourage a modal shift away from single occupancy car trips. This should assist in reducing the level carbon emissions produced by this area of South East Wales, therefore reducing the impact on climate change.

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 prepared their Existing Route Map which identified current walking and cycling routes in Cardiff. CC have subsequently prepared the Integrated Network Map which was approved by Welsh Government in February 2018. These plans are included within Appendix G. The Integrated Network Map for Marshfield and Castleton has been prepared by NCC and is also included in Appendix G.

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.

The access strategy for the site has been developed with reference to the Integrated Network Maps for Cardiff and Newport. The access proposals seek to integrate with, and where appropriate, enhance the existing walking and cycling network. The Masterplan will be cognisant of the design guidance published by the Welsh Government.

Wales Spatial Plan (2008)

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

1. Building sustainable communities;
2. Promoting a sustainable economy;
3. Valuing our environment;
4. Achieving sustainable accessibility; and
5. Respecting distinctiveness.

The Wales Spatial Plan 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.

The Plan does not however advocate road building stating that road building in general is not a sustainable solution to the pattern of traffic growth.

1. The proposed development will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail, reducing reliance on the private car.
2. The development will provide high-quality employment space that is accessible by sustainable modes of transport.
3. The Masterplan seeks to bring forward a sustainable development that offers long-term benefits for the community and the environment.
4. The development proposals include a railway station and interchange that will be served by eight services an hour between Newport and Cardiff. In addition, Travel Plans are proposed for the business district and railway station to further reduce the proportion of trips made to the site by car.

5. The Masterplan seeks to retain some of the natural characteristics of the site with the aim of enhancing the environment wherever possible, ultimately to help people enjoy the heritage and beauty of the landscape.

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:

1. Achieving a more effective and efficient transport system;
2. Achieving greater use of the more sustainable and healthy forms of travel;
3. Minimising demands on the transport system; and
4. 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.

1. The proposed railway station will enable existing residents and existing and future employees to make journeys to/from St Mellons by rail;
2. The site will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail.
3. The proposed Travel Plan for the business district will include measures that will aim to reduce the number of journeys made to the site.
4. The development proposals seek to maximise the opportunity to travel to the site by sustainable modes of travel. Charging points will also be provided for ULEV in line with PPW guidance.

2.2 Cardiff Council Local Policy

Cardiff Local Development Plan (2016)

CC adopted a Local Development Plan (CLDP) in 2016 for the period 2006-2026.

The Cardiff Hendre Lakes development site is allocated in the plan as strategic employment site H under policy KP2 and illustrated in the CLDP as shown in Figure 4. The CLDP uses the name 'South of St Mellons Business Park' to describe the site.

The CLDP vision fully recognises economic, social, environmental, as well as sustainability issues. The aim of the CLDP 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 CLDP 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 CLDP 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 CLDP objectives are set out under four 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 CLDP 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:

1. *44 hectares (ha) of business land capable of accommodating up to 90,000m² development;*
2. *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;*
3. *Provision of park and ride facility;*
4. *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;*
5. *High quality on and off-site walking and cycling links and facilities to maximise walking and cycling access to the site from neighbouring communities;*
6. *Retention of land to the east of Cypress Drive and Faendre Reen as green space linked with Hendre Lake Park; and*
7. *Integrating the site with local facilities in the surrounding area and effectively responding to landscape and biodiversity assets.*



Figure 4: CLDP Policy KP2 Site H

The development proposals, as detailed in the Planning Statement and outlined in Chapter 5 of this TA, reflect the Local Plan allocation as follows:

1. Development proposals seek to deliver 90,000m² of employment space.
2. The proposed railway station will have four platforms and will be served by eight trains per hour between Cardiff and Newport. At least one of these services per hour is expected to continue to London Paddington.
3. A station park & ride facility is proposed with up to 650 long-stay, short-stay, drop-off and accessible car parking spaces.
4. CC have been consulted to provide guidance on the planned bus service and infrastructure improvements that are being delivered as part of the residential-led strategic sites.
High-quality waiting facilities for local bus services will be provided within the site.
5. The proposals will integrate with Route 2 of the Cardiff Cycleway, providing a segregated cycle route through the site and to the station.
6. The Masterplan reserves a significant proportion of the site for green space, including parks and natural features.
7. To fully realise the connectivity benefits provided by the proposed railway station and fully integrate the site with the existing employment sites and communities of St Mellons, there are opportunities for others to deliver further improvements to the existing network of footways and cycleways.

Policy KP8: Sustainable Transport notes that if the proposed level of growth in Cardiff is to be supported, existing and future residents need to become less reliant on the private car. The location and form of developments are major determinants of the distance people travel and how they travel, and to combat this it will be necessary to integrate land use with transport provision to avoid car dependent developments. The policy states:

Development in Cardiff will be integrated with transport infrastructure and services in order to:

1. *Achieve the target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport;*
2. *Reduce travel demand and dependence on the car;*
3. *Enable and maximise use of sustainable and active modes of transport;*
4. *Integrate travel modes;*
5. *Provide for people with particular access and mobility requirements;*
6. *Improve safety for all travellers;*
7. *Maintain and improve the efficiency and reliability of the transport network;*
8. *Support the movement of freight by rail or water; and*
9. *Manage freight movements by road and minimise their impacts.*

The CLDP notes that to mitigate transport impacts and achieve the 50:50 modal split target, the development of strategic sites will be integrated with provision of transport and highways infrastructure referred to in Policy KP6.

The development proposals will seek to positively contribute towards the objectives set out in Policy KP8 in the following ways:

1. The development will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail. The proposed railway station is also anticipated to result in some existing journeys made by car to transfer to rail.
2. Travel Plans for the business district and railway station are also proposed with the objective of reducing the number of single occupancy vehicle trips made to and from the site.
3. There are opportunities for offsite improvements to the existing network of footways and cycleways to fully realise the connectivity benefits provided by the proposed railway station and interchange.
4. The proposed interchange for the railway station will be designed to enable a seamless transition between travel modes including walking, cycling, bus, rail, taxi and car.
5. As part of the development of the station design, the Built Environment Accessibility Panel has been consulted, an independent panel of experts that seek to ensure station designs are as inclusive as possible. The evolving Masterplan will reflect appropriate design guidance to deliver a site that can accommodate mobility and access requirements.
6. Traffic signals are proposed at several junctions along Cypress Drive to mitigate the traffic impacts associated with the proposals. Traffic signals are also anticipated to change the character of the road to a more urban environment, providing formal pedestrian and cycle crossings, reducing road speeds and are likely to result in safety benefits.
7. The proposed improvements to sustainable transport infrastructure, including the proposed railway station, is anticipated to reduce the number of existing journeys on the local and strategic highway network.
8. It is anticipated that a proportion of the construction materials for the Rail works

transport by rail, reducing the amount of material that will be transport by road; and

9. It is anticipated that Delivery Management Plans will be prepared for the individual employment spaces within the business district to manage the timing of servicing and delivery movements in and out of the site.

Detailed Policies: Transport

There are nine detailed transport policies set out in the CLDP, as summarised in Table 1 below.

Table 1: Summary of the CLDP Detailed Transport Policies

Transport Policy	Summary
T1: Walking and Cycling	<p>Developments should incorporate high quality, sustainable design with permeable and legible networks of safe and convenient walking and cycling routes. Developments should also seek to make connections with, and extensions to, the Cardiff Strategic Cycle Network and the Cardiff Walkable Neighbourhoods Plans. Furthermore, vehicle speed should be minimised, and priority given to pedestrians and cyclists.</p> <p>Safe, convenient and attractive walking and cycling connections should be made to existing developments, neighbourhoods, jobs and services, and infrastructure should be designed in accordance with standards of good practice including the CC Cycling Design Guide.</p>
T2: Strategic Rapid Transit and Bus Corridors	<p>Policy T2 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.</p>
T3: Transport Interchanges	<p>Policy T3 states that new railway stations will be supported if they are easily accessed by walking, cycling and local bus services, and where appropriate facilitate rail park and ride, meeting the access needs of all users. Strategically located Park & Ride facilities should be supported by attractive, frequent and reliable bus or rapid transit services.</p>
T4: Regional Transport Hubs	<p>Policy T4 relates to the development of infrastructure and facilities in and around Cardiff Central Railway Station and therefore does not relate to these proposals.</p>
T5: Managing Transport Impacts	<p>The LDP states that the purpose of this Policy is to ensure all new developments for which planning permission is required:</p> <ul style="list-style-type: none">• Properly addresses the demand for travel and its impacts;• Contributes to reducing reliance on the private car;• Make satisfactory provision for access, parking and circulation; and• Avoids unacceptable harm to safe and efficient use and operation of the road, public transport and other movement networks and routes.
T6: Impact on Transport Networks and Services	<p>This policy states <i>that development will not be permitted which would cause unacceptable harm to the safe and efficient operation of the highway, public transport and other movement networks including pedestrian and cycle routes, public rights of way and bridle routes.</i></p>
T7: Strategic Transportation Infrastructure	<p>Policy T7 notes support will be given to the development of the St Mellons rail interchange including Park & Ride.</p>
T8: Strategic Recreational Routes	<p>This policy outlines the core strategic network of recreation routes that will be maintained and developed to links Cardiff’s coast, river corridors, open spaces, countryside, and the regional network of routes, facilitating access to them by local communities, and forming an integral part of the wider cycling and walking network in Cardiff.</p>
T9: Cardiff City Region ‘Metro’ Network	<p>Policy T9 indicates CC will seek to facilitate the development of a future regional ‘Metro’ network of integrated public transport routes and services within Cardiff. Where the alignment of a future route which is likely to form part of a ‘Metro’ network falls within any part of a development site, CC will, through the development management process, seek either to secure provision of the necessary infrastructure as part of the development, or otherwise, safeguard the land and space required to accommodate the route and potential mode options in the future.</p>

- T1. The development proposals will introduce high quality walking and cycling routes within the development site. Furthermore, there is an opportunity for the site to link with Route 2 of the Cardiff Cycleway which forms part of the Cardiff Strategic Cycle Network.
- T2. The opportunity to extend existing and future bus services into the site and this will be explored with CC and the local operators.
- T3. Cardiff Parkway railway station is proposed to be accessible by walking, cycling and local bus services. Proposals also include a station park & ride for up to 650 long-stay, short-stay, drop-off and accessible car parking spaces. The proposed station is anticipated to be served by eight trains an hour to Cardiff and Newport, and direct trains to Bristol and London.
- T5. A robust traffic impact assessment has been prepared to estimate the traffic impacts associated with the development proposals. The introduction of a railway station is estimated to result in some existing journeys to switch from car to rail.
- T6. Where the development is demonstrated to have a severe impact on the operation of the highway, mitigation has been proposed, as set out in Chapters 7 and 8 of this Transport Assessment.
- T7. The parking strategy has been developed in discussions with CC. Bespoke parking standards are proposed which reflect the sustainable credentials of the site and the trip making assumptions.
- T8. There is an existing PROW that routes through the site that is inaccessible due to hedgerows and a lack of reen crossings. It is proposed to enhance this PROW as part of these proposals.
- T9. The station identified as St Mellons Station on the SW Metro map is Cardiff Parkway. The proposals are therefore facilitating the wider SW Metro aspirations.

Managing Transportation Impacts Supplementary Planning Guidance (July 2018)

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 the CLDP 2006-2026.

The SPG provides guidance on:

1. Managing the impacts of development on the highway network and how developments can contribute to the CC goal of a 50/50 modal split;
2. Information which is required within Transport Assessments, Transport Statements and Travel Plans and how this is quantified and assessed;
3. Planning Conditions, Planning Obligations and Technical Standards;
4. Parking guidance and Technical Standards and;
5. Public Rights of Way (PROW).

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

1. The development proposals include a railway station and enhancements to active travel routes within the site. This should encourage existing and future journeys to be made by sustainable modes of transport, reducing the overall traffic impacts of the development.
2. The scope of the Transport Assessment has been discussed and agreed with CC.
3. Planning conditions and obligations will be discussed with CC as the application progresses.
4. It is proposed to seek a reduction in the maximum parking standards for offices to encourage trips to be made by sustainable modes of transport.
5. It is proposed to divert and enhance the currently inaccessible PROW that routes through the site. Appropriate permissions will be secured.

Cardiff’s Transport White Paper: Transport Visions to 2030 (2020)

The CC White Paper, Transport Visions to 2030: Changing how we Move around a Growing City, sets out a ten-year plan to tackle the climate emergency, reduce congestion and improve air quality.

The White Paper identifies a range of sustainable transport projects and measures which seek to increase the proportion of journeys made by modes other than the private car. These include the following:

1. Expanding current Metro plans to deliver more new tram/train routes and stations in Cardiff and the region;
2. Introducing new Bus Rapid Transit services and Park & Ride sites;
3. Lowering the cost of bus travel significantly;
4. Delivering safer walking and cycling routes; and
5. Offering real travel options designed to get people out of their cars and onto public transport.

1. Cardiff Parkway railway station is identified on the SW Metro plan. These proposals are therefore delivering part of the overall proposals for the SW Metro.
2. A station park & ride facility is proposed with up to 650 long-stay, short-stay, drop-off and accessible car parking spaces.
3. The potential to redirect existing and proposed bus services in to the site will be explored, alongside the provision of high-quality waiting facilities. Should the cost of bus travel be reduced by CC, there is potential for a higher proportion of journeys to the site to be made by bus.
4. The development proposals will introduce high quality walking and cycling routes to, from and within the development site, providing links to existing developments and neighbourhoods.
5. The proposed railway station will enable existing residents and employees in St Mellons to make journeys by rail, reducing reliance on the private car.

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:

1. The future of the Metro and Buses;
2. Active Healthy city;
3. Clean air city;
4. Business, work and culture;
5. The future cars; and
6. The smart city.

Each of the themes is accompanied by 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 recognises the east of the city as one of the most deprived and disconnected within Cardiff.

1. Cardiff Parkway railway station is identified on the SW Metro plan and therefore these proposals are actively contributing to its delivery.
2. The development proposals will introduce high quality walking and cycling routes and integrate with offsite proposals including Route 2 of the Cardiff Cycleway.
3. The proposed railway station is anticipated to result in some existing journeys made by car to transfer to rail
4. The proposed development provides a major opportunity for improving the transport infrastructure including provision of a new railway station for St Mellons and Trowbridge, increasing accessibility to residents and businesses in this part of the city.
5. The proposals will actively support the use of ULEV with Travel Plan measures and the provision of electric vehicle charging points.
6. The evolving masterplan will be cognisant of emerging technologies and interventions.

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

Figure 5 presents the Cardiff Cycle Network. This plan shows *a comprehensive network of cycle routes linking existing communities and strategic development sites with key destinations across the city.*

It is proposed to extend Route 2 of the Cardiff Cycleway within the site to Cardiff Parkway railway station. The introduction of traffic signals on Cypress Drive enables controlled crossings to be introduced in to the existing business parks.

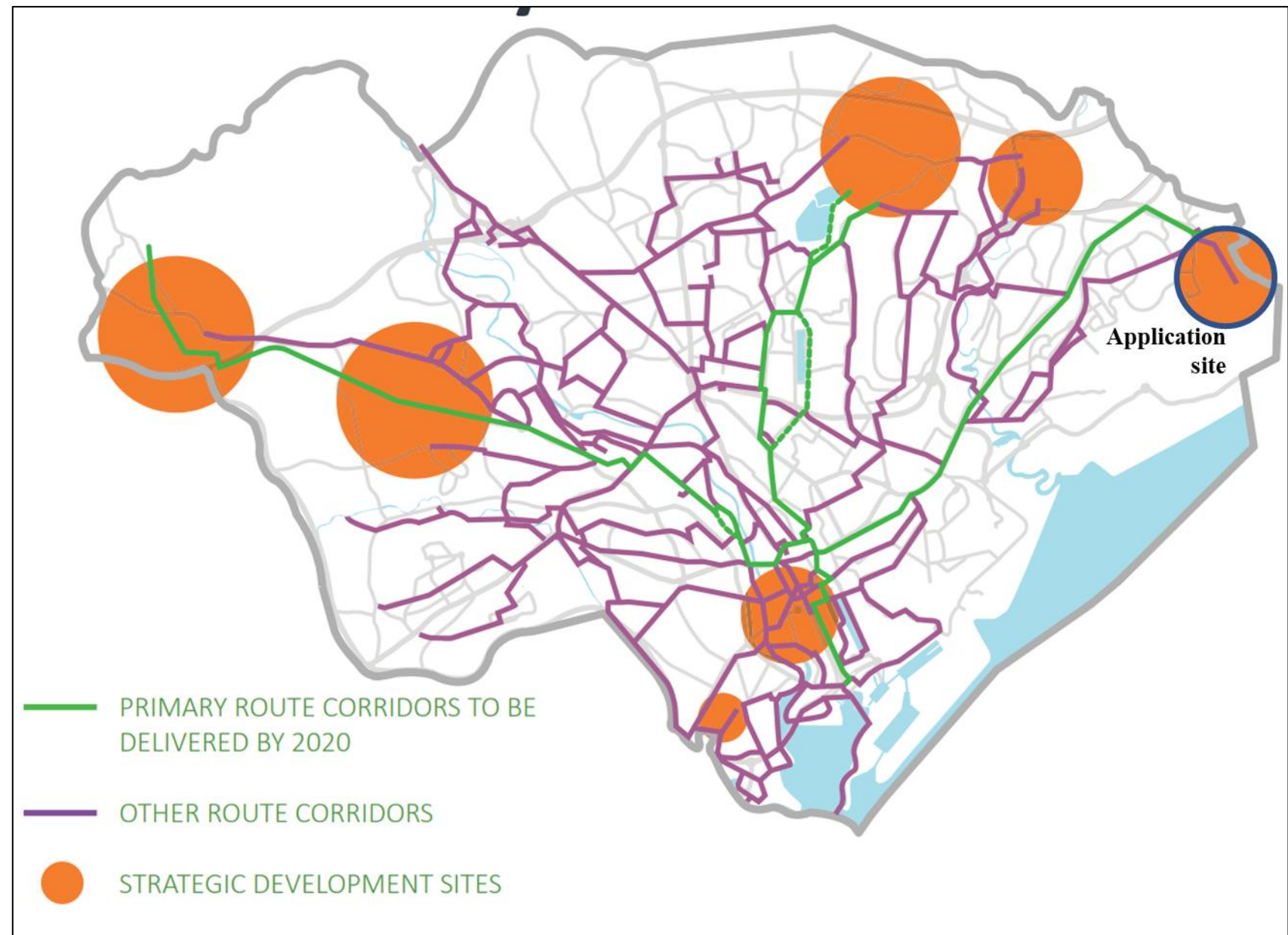


Figure 5: The Cardiff Cycle Network

2.3 Newport City Council Local Policy

Newport Local Development Plan (2015)

NCC adopted the Local Development Plan (NLDP) in 2016 for the period 2011-2026. The vision of the plan seeks Newport to be a centre of regeneration which *celebrates its culture and heritage, while being a focus for varied economic growth that will strengthen its contribution to the region.*

Strategic Policy 1 (SP1) of the NLDP relates to sustainability and indicates proposals will be required to make a positive contribution to sustainable development and will be assessed as to their potential contribution to:

1. *Reuse previously developed land and empty properties in preference to greenfield sites;*
2. *Provide for traffic-free walking and cycling facilities and expansion of the network;*
3. *Encourage the use of public transport and other modes which reduce energy consumption and pollution;*
4. *Improve road safety;*
5. *Improve the quality of life of residents;*
6. *Assist the local economy;*
7. *Assist urban regeneration;*
8. *Provide access to new development areas which incorporate sustainable transport modes;*
9. *Relieve traffic congestion in the long term; and*
10. *Result in other environmental improvements, including air quality, noise reduction, sustainable drainage and enhanced biodiversity.*

1. The greenfield site is located within CC and identified in the Local Plan as a strategic employment site.
2. The development proposals will introduce high quality walking and cycling routes and integrate with the existing network including Route 88 of the National Cycle Network (NCN). With specific relevance to Newport, improvement of the PROW crossing on Green Lane Reen is proposed. Improvements to the route to also accommodate cyclists is identified as an opportunity (subject to agreements). There is also the opportunity to provide a new active travel link into the site north of the Gas Pressure Reduction Station on Heol Las, with this subject to planning approval.
3. Cardiff Parkway railway station will enable residents of Marshfield to make journeys by rail.
4. There is an opportunity for NCC to introduce road safety improvements on St Mellons Road, including the reduction of the posted speed limit.
5. The proposed railway station will provide additional travel options to residents of Marshfield, unlocking access to education, health, and leisure facilities.
6. The proposals include high-quality employment space which will be accessible by sustainable modes of travel, including walking, cycling, bus and rail.
7. The development proposals will deliver new jobs in the South East Wales that are accessible by sustainable modes of travel including rail and bus.
8. The development will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail.
9. The development proposals include a railway station and high-quality active travel routes within the site. This should encourage existing and future journeys to be made by sustainable modes of transport which could relieve traffic congestion in the long-term.
10. This reduction in traffic could contribute towards air quality and traffic noise benefits.

Chapter 7 of the NLDP sets out the overall transport strategy and includes several transport-specific policies.

Policy T1 states NCC will support proposals for the railway system, including supporting and progressing scheme for Park & Ride.

Policy T3 sets out the road hierarchy that should be established to facilitate the effective and safe use of the highway network. Access roads are described to *provide access to residential areas, industrial areas, the city centre and small rural communities. If necessary, and for reasons of safety and amenity, traffic movements and speed will be restricted... These roads will often give greater priority to pedestrians and cyclists.*

Policy T5 states that a network of walking and cycling routes will continue to be developed. Whilst some are routes are identified on the Proposals Map, the NLDP states that these are not prescriptive, and it is anticipated that further routes will be developed and improved during the Plan Period.

Policy T6 supports proposals to improve and extend the PROW network, with an emphasis on sustainability and access for all. Where a PROW will be affected by a development, Policy T7 states the development proposals will require retention of the suitable alternative. Furthermore, additional footpaths, bridleway and cycleways will be sought in new developments, with linkages to the existing network.

T1. The proposed Cardiff Parkway railway station will be supported by a park & ride for up to 650 parking spaces.

T3. 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.

T5. A cycleway is proposed through the site between St Mellons Road (NCN Route 88) and the planned Cardiff Cycleway on Cypress Drive, improving connectivity between Newport and Cardiff by cycle.

T6. The development proposals seek to divert and enhance the existing inaccessible PROW that routes through the site. This includes improving the crossing of Green Lane Reen subject to agreement with land owners.

Newport Local Transport Plan (2015)

The proposals should further the aspirations and objectives as set out in the Local Transport Plan. The Transport Plan considers goals for improvement to 2020 in addition to aspirations up to 2030. Some of the broad objectives of the plan are as follows:

1. *Safety and security - Reduce the number and severity of road traffic casualties;*
2. *Connectivity and accessibility - Improve access for all to employment opportunities, services, healthcare, education, tourism and leisure facilities;*
3. *Quality and efficiency - Reduce traffic growth, traffic congestion and to make better use of the existing road system;*
4. *Environment – Reduce significantly the emission of greenhouse gases from transport; and*
5. *Land use and regeneration - To ensure developments in South East Wales are accessible by sustainable transport.*

1. There are opportunities for works to take place on St Mellons Road to reduce traffic speeds and potentially vehicular volumes to improve conditions for pedestrians and cyclists.
2. The proposed railway station and bus service improvements will provide new travel options to residents of Marshfield, unlocking access to employment and service opportunities.
3. The proposed railway station will enable existing residents and employees in St Mellons to make journeys by rail, reducing reliance on the private car.
4. The proposals will actively support the use of ULEV with Travel Plan measures and the provision of electric vehicle charging points.
5. The development will be highly accessible by sustainable modes of transport including walking, cycling, bus and rail. The proposed railway station is also anticipated to result in some existing journeys made by car to transfer to rail.

3 Existing Conditions

3.1 Introduction

The development 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 illustrated in Figure 6. The site covers an area of approximately 44 hectares.

The site is bounded to the north by the Links and St Mellons Business Parks, Fortran Road and Heol Las to the east, open countryside (referred to as the Wentloog Levels) to the south and to the west by Cypress Drive and residential development beyond.

Faendre Reen, which runs in a north/south alignment close to the western boundary of the site, demarks the edge of the proposed development. Land between the reen and Cypress Drive is proposed to be used to gain access only.

The southern section of the site is 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, Bristol and the Midlands.

This chapter of the Transport Assessment presents an audit of existing connectivity by all modes of transport including walking, cycling, public transport and private vehicles.

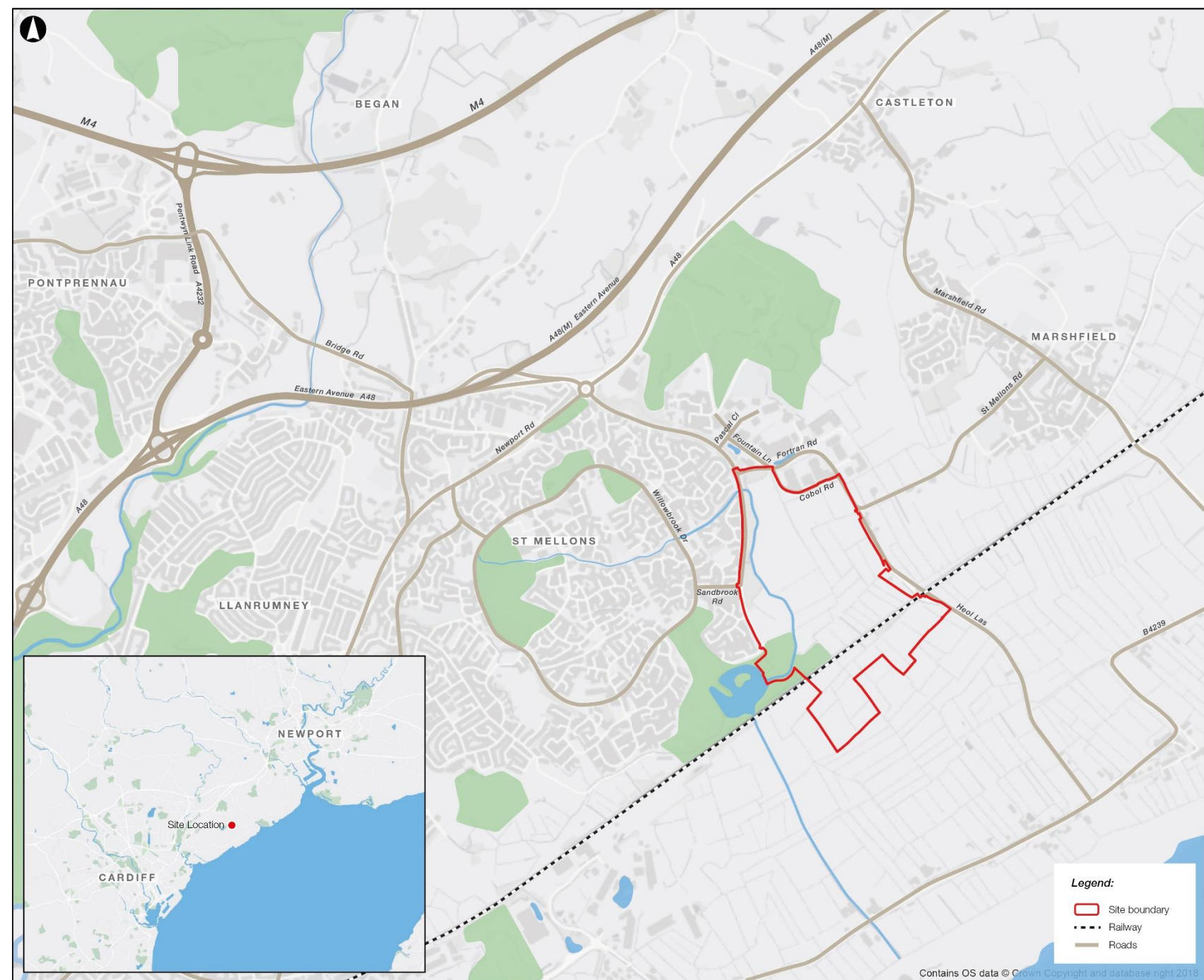


Figure 6: Site Location

3.2 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 development site was prepared following a site visit on Wednesday 21st August 2019. The report detailing the findings of the audit can be found in Appendix H and are summarised in this section.

Figure 7 presents the pedestrian infrastructure near the proposed development, local facilities and travel time isochrones. The walking isochrones have been developed to assess the services and facilities which are within a 5, 10, 20 and 30-minute walk of the centre of the site. The isochrone shows that the majority of St Mellons, which has a population of approximately 13,000, is within a 30-minute walk from the site. Marshfield, to the east is within a 20-30 minute walk.

Cypress Drive

Cypress Drive runs along the western boundary of the site. There is a footway on the west side of Cypress Drive from Water Aens Close in the south to a signalised pedestrian crossing near the Fortran Road junction.



Photograph 1: Signalised Crossing on Cypress Drive

The western footway terminates at this pedestrian crossing and pedestrians can take a footpath heading west from Cypress Drive towards the residential developments of St Mellons or north west to an underpass under Cypress Drive to the existing Business Parks.

To the north, a footway resumes on the western carriageway 530m north of Fortran Road at the Willowdene Way/Cypress Drive junction. This footway continues north to the A48/Cypress Drive roundabout.

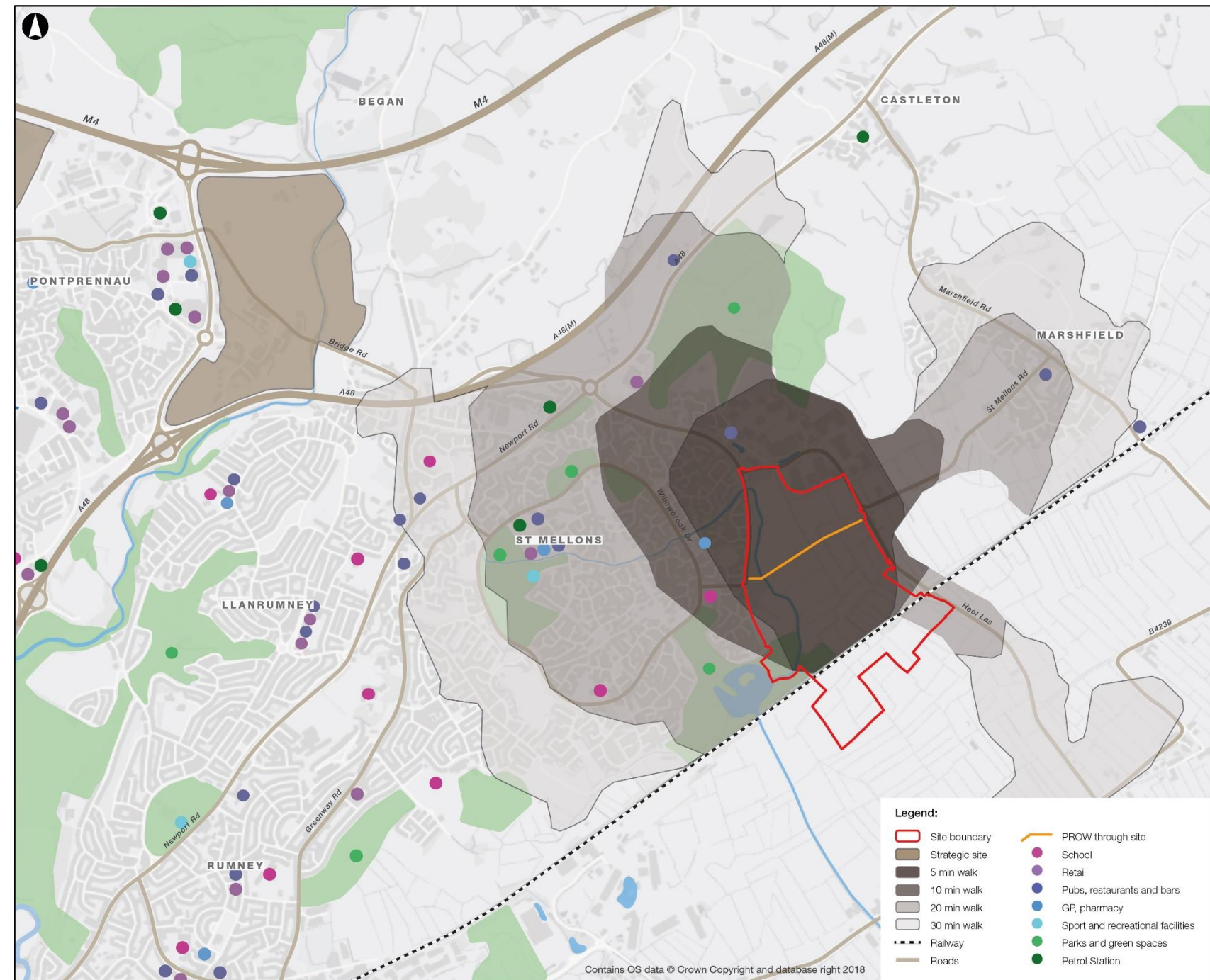


Figure 7: Walking Isochrones

There are two underpasses below Cypress Drive, all of which are unlit and may not be desirable to use by both pedestrians and cyclists. The underpass that links St Mellons with the existing business parks is shown below in Photograph 2



Photograph 2: Cypress Drive Underpass

Fountain Lane

Fountain Lane is an access road within the existing business parks, linking Fortran Road and Pascal Close.

The width of the footway along Fountain Lane is approximately 1.2m -1.5m, below the minimum recommendation of 2m (MfS). This existing width would not allow two wheelchair users to pass.

It is likely that any pedestrians travelling between the northern units of the existing business park and the proposed Cardiff Parkway railway station would walk on Fountain Lane.

It is therefore recommended that the footway is widened to a minimum of 2m. The verge beyond the edge of footway is however outside the extent of adopted highway.

There is an existing bus stop/shelter on Fountain Lane which is sited on this narrow footway, as shown in Photograph 3 below. This results in limited space for passengers to wait for a bus under the shelter. Furthermore, the shelter and any passengers waiting for a bus would obstruct other pedestrians walking on Fountain Lane.

It is therefore also recommended that further local widening is explored near the bus stop. As noted above, this would require land outside of the extent of adopted highway.



Photograph 3: Fountain Lane Bus Stop

Fortran Road

There is no footway adjacent to the highway at the Fountain Lane/Fortran Road priority junction, severing the route from the bus stop on Fountain Lane with the business units accessed from Fortran Road. The junction is shown in Photograph 4 below.



Photograph 4: Fortran Road/Fountain Lane Junction

Cobol Road

Cobol Road forms the southern boundary of the existing business parks and the northern boundary of the proposed development.

There is currently no footway provision on Cobol Road, however there is an opportunity for CC to introduce footway to improve connectivity between the site and St Mellons Business Park. Owing to the limited extent of adopted highway, any footway on Cobol Road may need to be delivered within the carriageway, reducing the effective width of the highway. This would impact the provision of informal on-street car parking which is heavily used at present.

There are two potential routes from Cobol Road into the existing business park. There is an existing footway adjacent to the south-western unit (shown in Photograph 5 below) and another footway adjacent to Fortran Road.



Photograph 5: Footway Link between Cobol Road and the Existing Business Parks

A48

A shared footway/cycleway adjoins the southern carriageway of the A48, east of the A48/Cypress Drive roundabout, as shown in Photograph 6 below.



Photograph 6: Shared Footway/Cycleway on the A48

Uncontrolled raised table pedestrian crossings are provided on Cypress Drive at the roundabout with the A48.

There is a signalised pedestrian crossing on the A48 to the east of the garden centre providing access to a bus stop north of the A48 which is within a 20-minute walk of the site. From this 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 Newport Road. The footway adjacent to the northern carriageway is heavily overgrown and footway width is reduced to below 1.5 meters at several locations, reducing accessibility along this route.

The Integrated Route Map for Cardiff indicates Route 2 of the Cardiff Cycleway network is proposed along the B4487 Newport Road and Cypress Drive.

Willowbrook Drive

Willowbrook Drive is a circular spine road which gives access to residential developments, services and facilities in St Mellons. The south east of Willowbrook Drive is accessible within 10 minutes' walk of the site giving access to a doctor's surgery and pharmacy. The road has a 30mph speed limit and is lit.

Most of the facilities in St Mellons are located on Crickhowell Road which is accessed via Willowbrook Drive. Services include a Tesco Superstore, Post Office, St Mellons Community Education Centre and The Willows Pub. All these services are accessible within a 20-minute walk of the site.

There is a traffic free route for pedestrians and cyclists that runs in a west/east alignment through St Mellons, as shown in Photograph 7. To the east, the route originates from the Toucan crossing on Cypress Drive, south of the junction with Fortran Road.



Photograph 7: Traffic Free Route through St Mellons

Heol Las and St Mellons Road

The Heol Las/St Mellons Road priority junction is located directly east of the site and shown in Photograph 8 below.



Photograph 8: Heol Las/St Mellons Road Priority Junction

No footways are provided on Heol Las or St Mellons Road to the west of the site. These are lightly trafficked roads which could be considered conducive for walking and cycling.

National speed limit restrictions do however apply on these unlit roads and therefore a reduced speed limit may be appropriate to improve conditions for pedestrians and cyclists.

To the south of the Heol Las/St Mellons Road priority junction, Heol Las routes over the railway. There is limited footway/verge for pedestrians on this bridge, as shown in Photograph 9.



Photograph 9: Heol Las Railway Bridge

Hendre Lake Park

There is a good quality hard-surfaced footway that loops around Hendre Lake which is observed to typically be used for leisure purposes. This unlit footway is over 3m in width as shown in Photograph 10 below.



Photograph 10: Footway Directly North of Hendre Lake

To the east of Cypress Drive there is a network of footpaths, either unsurfaced or surfaced with unbound gravel.

Any recreational routes proposed as part of the development should be integrated with these routes. There is an opportunity to provide pedestrian and cycle link between Hendre Lake Park and the proposed station which is hard surfaced, overlooked and lit. This is discussed further in Chapter 5.

Public Rights of Way

There is an unsigned Public Right of Way (PROW) that crosses the site in an east/west alignment between the Fortran Road/St Mellons Road/Heol Las junction and Cypress Drive.

It is currently not possible to walk the full length of the PROW through the site as the route is blocked by a network of reens and hedgerow. Figure 8 presents the alignment of the PROW (dashed green line) and the obstructions (red line). There is no access in to the site from the west via Cypress Drive.

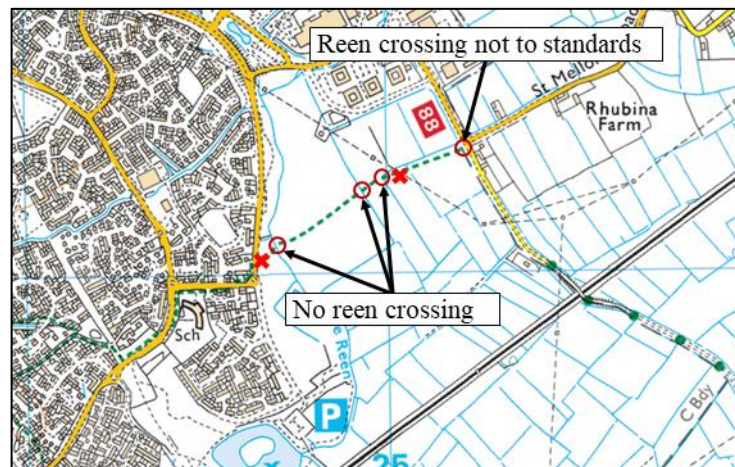


Figure 8: PROW Alignment

As shown in Photograph 11 below, there is a footbridge near the Fortran Road/St Mellons Road/Heol Las junction which provides access in to the site. This bridge is in poor condition and does not meet modern design standards. The gate shown in the photograph below was observed to be stuck closed.



Photograph 11: PROW Footbridge from Heol Las

Approximately 230m west of Heol Las, there is a hedgerow with no crossing point, as shown in Photograph 12 below. From the west, there is no access in to the site from Cypress Drive along or near the alignment of the PROW.

It is proposed to improve the existing PROW as part of these proposals as detailed in Chapter 5.



Photograph 12: Hedgerow Severing the PROW within the Site

Summary

There is an existing network of footpaths and traffic free routes beyond the boundary of the site of varying quality, providing opportunities for people to travel to the development by foot. As noted in this section, there are opportunities for others to introduce improvements beyond the site boundary, these could include:

- Off-road segregated footway and cycleway on Cypress Drive, being introduced by CC as part of the Cardiff Cycleway scheme (Cycleway 2);
- Opportunities for CC and relevant land owners to enhance footway provision within the existing business park to provide a link between the site and Pascal Close;
- There are opportunities for interventions to be explored by NCC on St Mellons Road to improve conditions for pedestrians and cyclists; and
- Opportunity for CC to introduce a lit route between southern St Mellons and the proposed railway station via Hendre Lake Park.

These opportunities are detailed further in Chapter 5 of this report. If these opportunities were implemented there would be additional benefits for walkers, aligning with Policy TP1 of the CLDP.

3.3 Cycling

The existing and proposed cycling facilities near the development together with cycling journey time isochrones are illustrated in Figure 9. The figure presents the locations and facilities which can be reached in a 10, 20 and 30-minute cycle from the centre of Hendre Lakes.

The cycling isochrones show that most of St Mellons and Marshfield are accessible within a 10-minute cycle of the development. Local facilities including a Tesco Superstore, Post Office, St Mellons Library and a community education centre (Hyb) are all within this catchment. The 20-minute catchment includes communities in Llanrumney and Castleton.

The figure also shows that parts of the strategic housing site at St Edeyrns are anticipated to be within 30 minutes cycle of the site. It is considered that these cycle times may improve once the site is built out due to the dedicated cycle infrastructure proposed at St Edeyrns providing a link into the planned Cardiff Cycleway network.

Existing Routes and Infrastructure

National Cycling Network

Route 88 of the National Cycle Network (NCN) adjoins the site's eastern boundary along Fortran Road between the St Mellons Road and Cobol Road junctions as shown in Figure 10 overleaf. From Fortran Road, the route follows St Mellons Road to the east as an on-road cycle route for 3.5km through the settlement of Marshfield and 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 to either head east across Newport or north towards Rhiwderin which are each accessible within approximately 5km, or a 20-minute cycle.

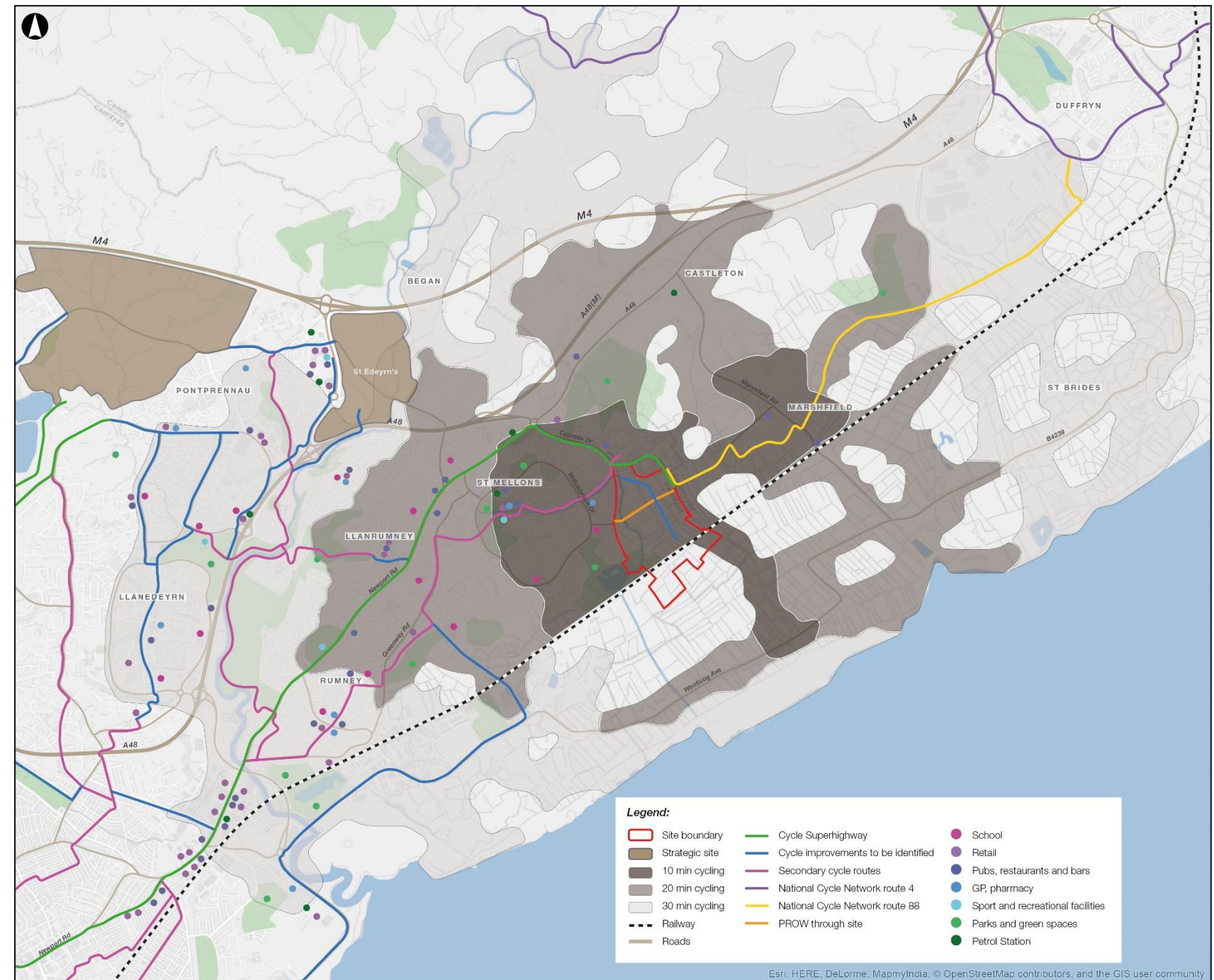


Figure 9: Cycling Routes and Travel Time Isochrones

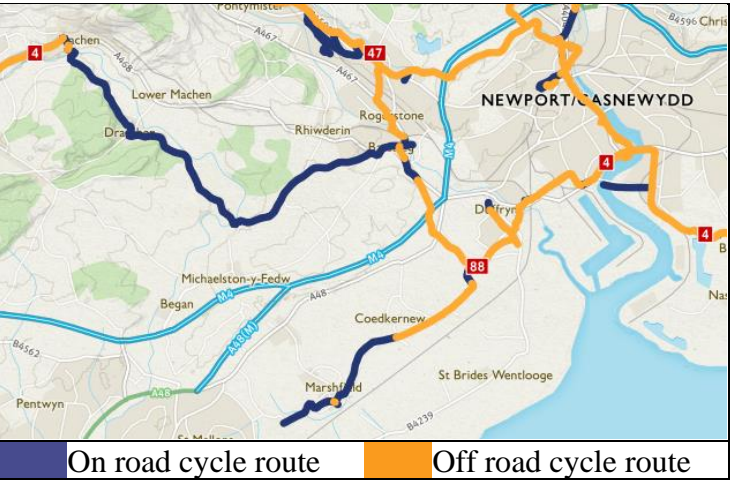


Figure 10: National Cycle Network

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 (posted speed limit of 40-50mph) may deter less experienced and confident cyclists.

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

B4487 Newport Road

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

Travelling eastbound towards the A48/Cypress Drive roundabout, the cycle lane terminates, and cyclists are directed across Cypress Drive on to the shared footway/cycleway. The shared footway/cycleway then continues along the westbound carriageway of the A48.

Forttran 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

CC have committed to improving cycle infrastructure as part of the Cardiff Cycling Strategy (2017 Draft) by developing five new primary route corridors. These routes are also presented on the Integrated Route Map and will provide segregated routes along key corridors, connecting to strategic development sites as shown in Figure 11. One of the proposed routes will provide a link along the B4487/Newport Road from Cardiff city centre to the Links and St Mellons Business Parks, near the Cardiff Hendre Lakes site.

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 development site to the adjacent residential communities of St Mellons and Trowbridge.

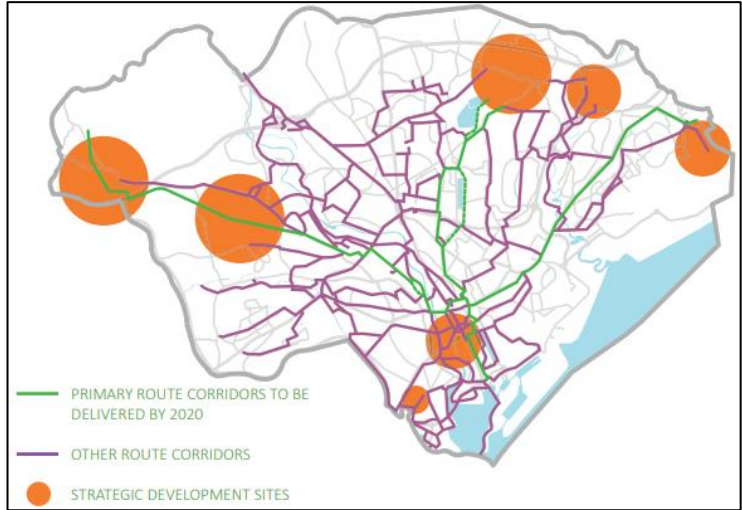


Figure 11: Cardiff Council Proposed Cycle Network¹

Nextbike

The bike share scheme 'Nextbike' was launched in Cardiff in May 2018 with 50 stations. Since this point Nextbike has been expanding the network of stations and number of bikes to link with strategic housing, employment and transport interchange sites.

Based on the existing network the closest Nextbike station to the site is currently on the B4487 Newport Road, St Mellons which is approximately 2km from the site, as shown in Figure 12.

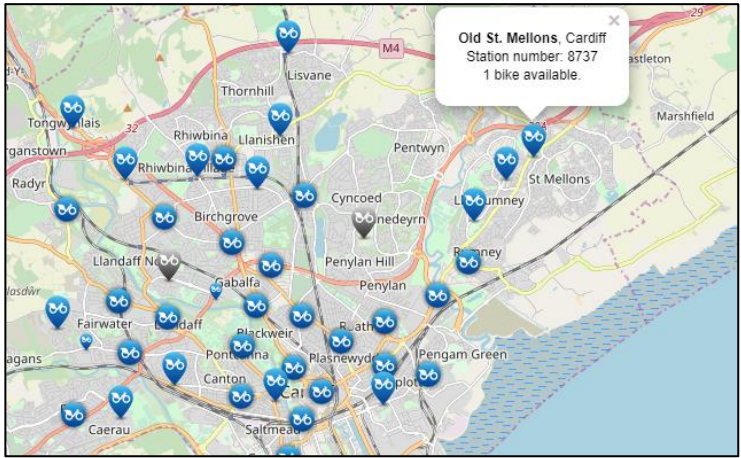


Figure 12: Location of Nextbike Stations

Nextbike stations have been provided at or near several railway stations in Cardiff including the following:

- Cardiff Central;
- Cardiff Bay;
- Ninian Park;
- Cathays;
- Heath (high and low levels); and
- Radyr.

Summary

With the proposed improvements associated with the Cardiff Cycleway Network, the site is accessible by cycle, complying with Policy KP8 and Policy TP1 of the CLDP. The access strategy for cycles set out in Chapter 5 therefore focuses on how the development can best integrate with this network.

¹ Source: Cardiff Council Cycling Strategy (2017 Draft)

3.4 Public Transport

Bus

Bus services operating near the development are summarised in Table 2 and displayed in Figure 14 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, these stops are located 1.1km, 1km and 2km from the centre of the site respectively. This is beyond the recommended walking distance to a bus stop of 400m². It is recommended that some of these services are diverted into site and the potential for new services and enhanced frequencies should be explored.

As shown in Table 2, 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. The bus stop on Fountain Lane is in good condition with a bus shelter, however the footway is narrow as discussed in Section 3.2.

A journey time isochrone has been produced to display the accessibility of the site by bus at 17:30 and this is included in Figure 15. 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 the local bus services were extended into 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.

² Department for Transport (2005) Inclusive Design

Table 2: Local Bus Services³

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	Kwik Save (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	Kwik Save (800 m)	3
65	Capital Links/ Cardiff Bus	Llanrumney and St Mellons - Pentrebane – Cardiff	Kwik Save (800 m)	Bihourly
30	Newport Bus/ Cardiff Bus	Newport – Cardiff	A48 (2 km)	3
		Cardiff – Newport	A48 (2 km)	3

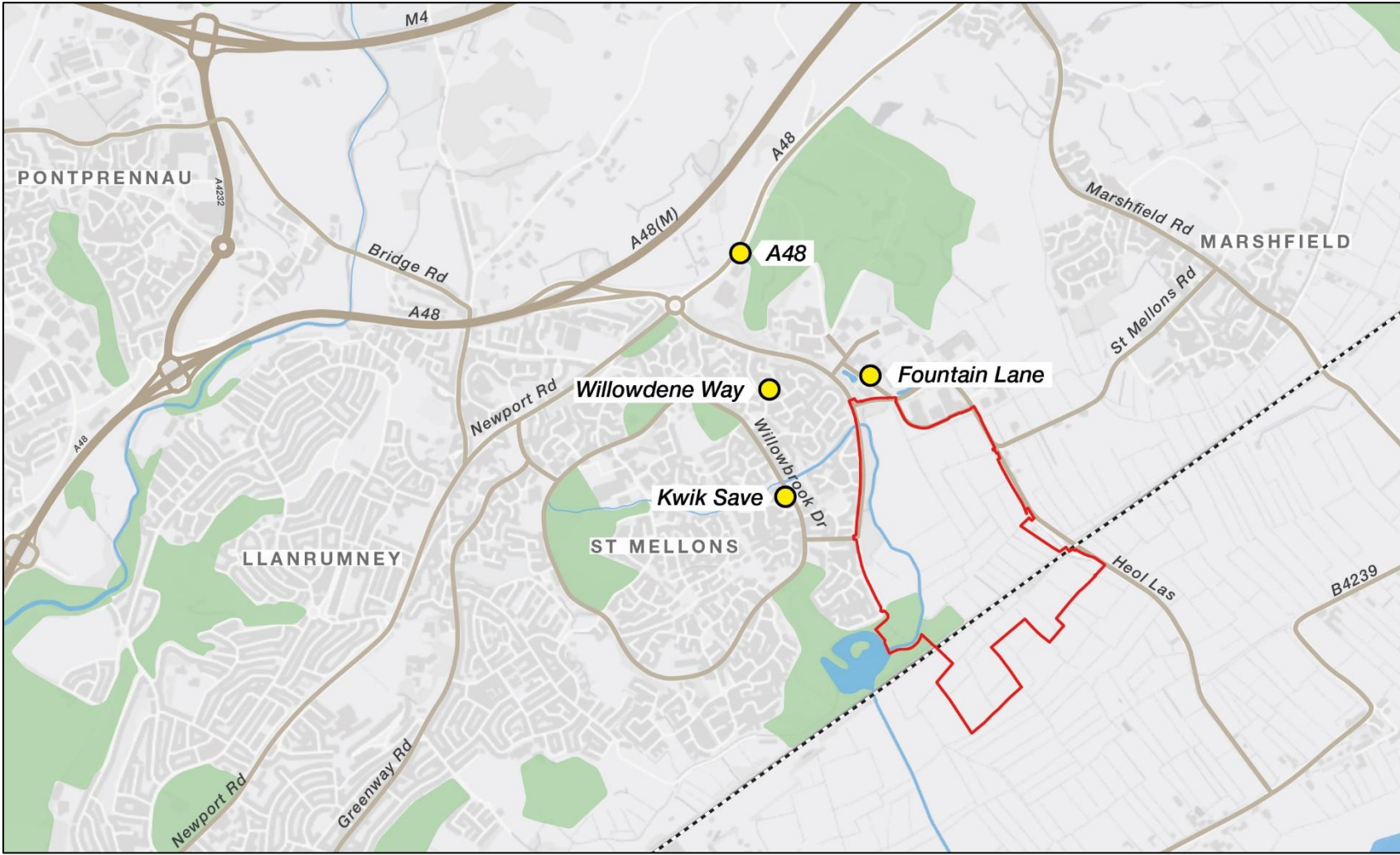


Figure 13: Bus Stop Locations

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

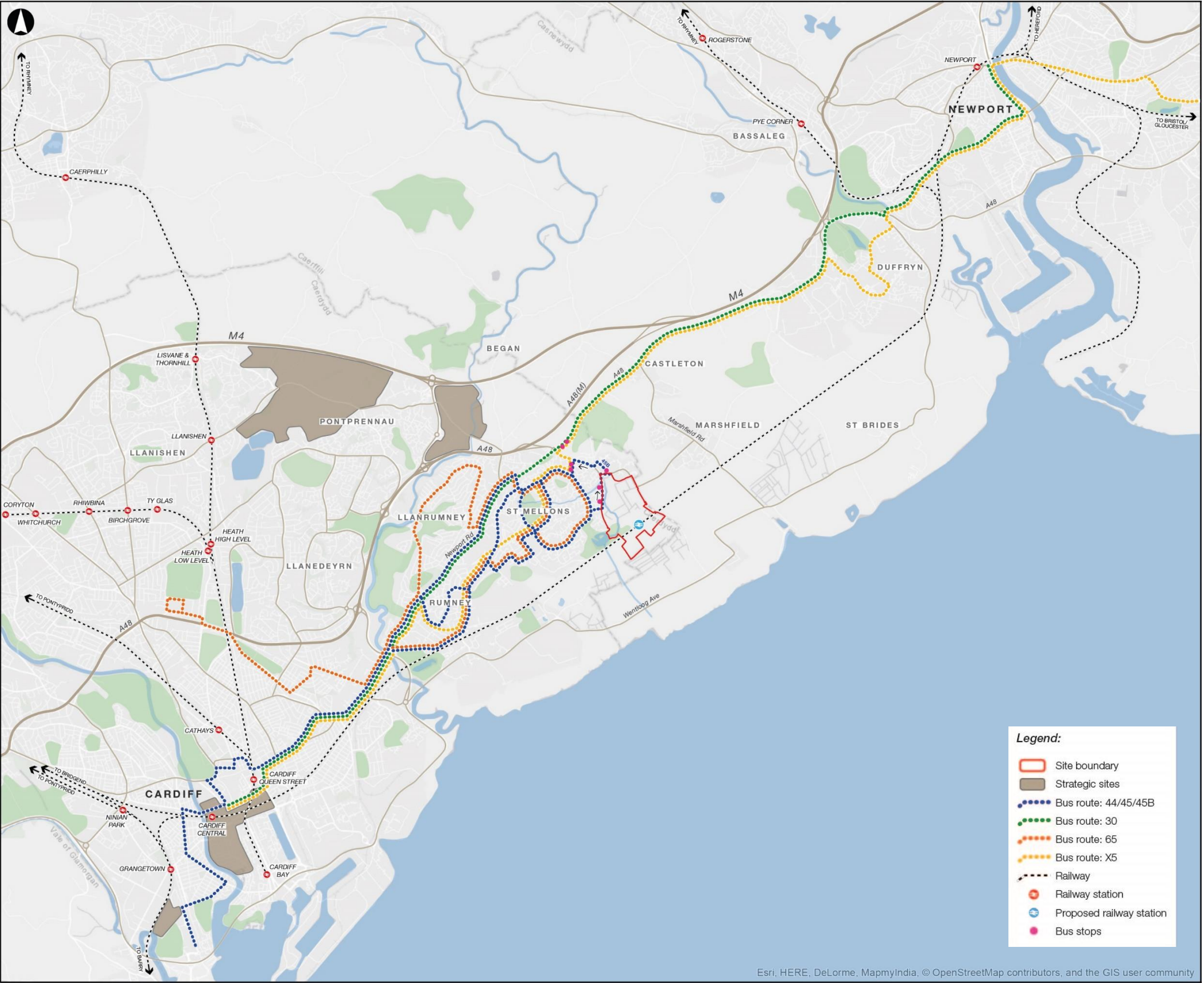


Figure 14: Public Transport Services

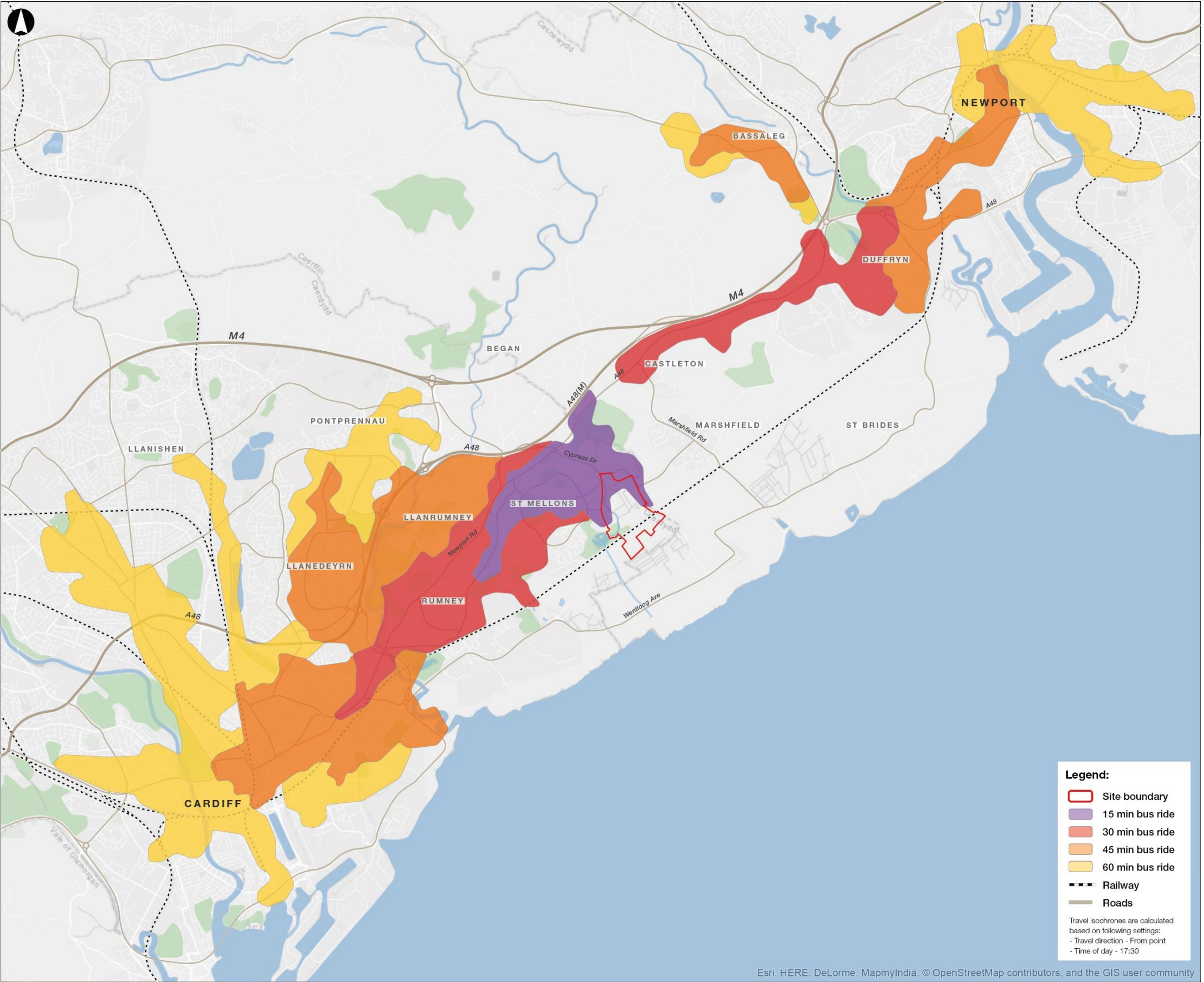


Figure 15: Bus Isochrones

Rail

The site is not currently directly accessible by rail. The closest existing train station to the site is Cardiff Central, which is approximately 8.4km west of the site. Cardiff Queen Street is located a similar distance from the Cardiff Hendre Lakes site. To the east, Newport Railway Station is located approximately 10km from the proposed development. From St Mellons, all stations require a long bus journey or a car journey through the congested city centres.

Cardiff Central is the busiest railway station in Wales, served by long distance services operating from London, Swansea and the South West, as shown in Figure 16. Cardiff Central also operates several local services linking with Cardiff’s northern suburbs the and Valley lines.

Currently, 8-9 trains per hour pass the station site. Services are currently provided by three operators: Transport for Wales (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 – 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 Bristol and the Midlands from various routes. There are up to two rail services per hour from Cardiff Central to Cardiff International Airport. Cardiff Parkway is identified as St Mellons Station on the South Wales Metro plan. These proposals therefore assist in facilitating the wider Metro aspirations.

The electrification of the GWR mainline has resulted in journey time improvements with journeys from Cardiff to Bristol Parkway and London Paddington taking 35 minutes and 110 minutes respectively.

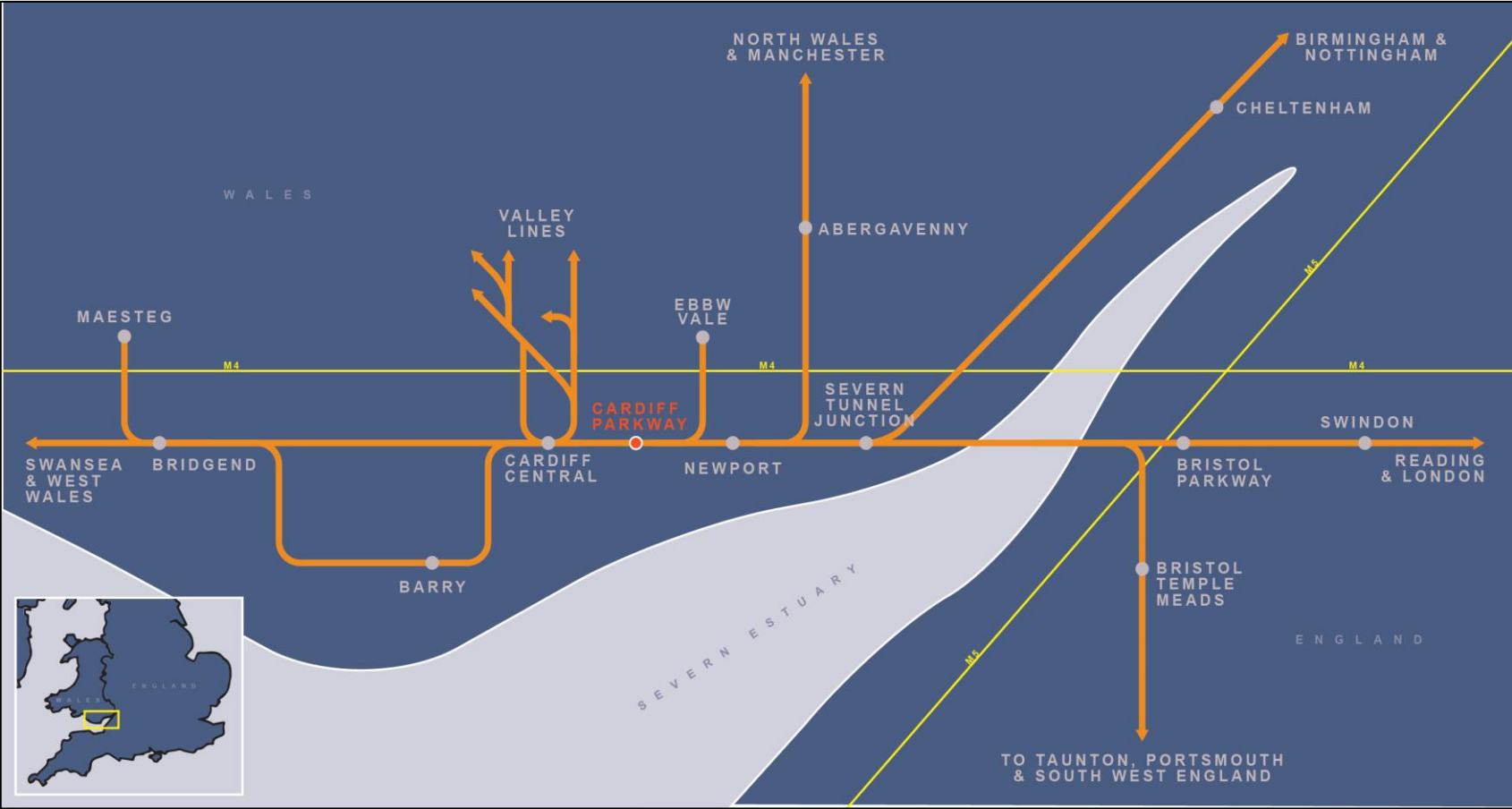


Figure 16: South Wales Railway Services

3.5 Local Highway Network

The local highway network is illustrated in Figure 17 and described below.

Cypress Drive

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 (Photograph 13), 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.



Photograph 13: Cypress Drive/Sandbrook Road Roundabout

Directly northwest of the development site, Fortran Road forms a priority junction with Cypress Drive. Cypress Drive is a single carriageway road adjacent to the site which widens to a dual carriageway directly north of the junction with Fortran Road. A right-turn lane is provided at this junction for traffic turning from Cypress Drive onto Fortran Road.

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

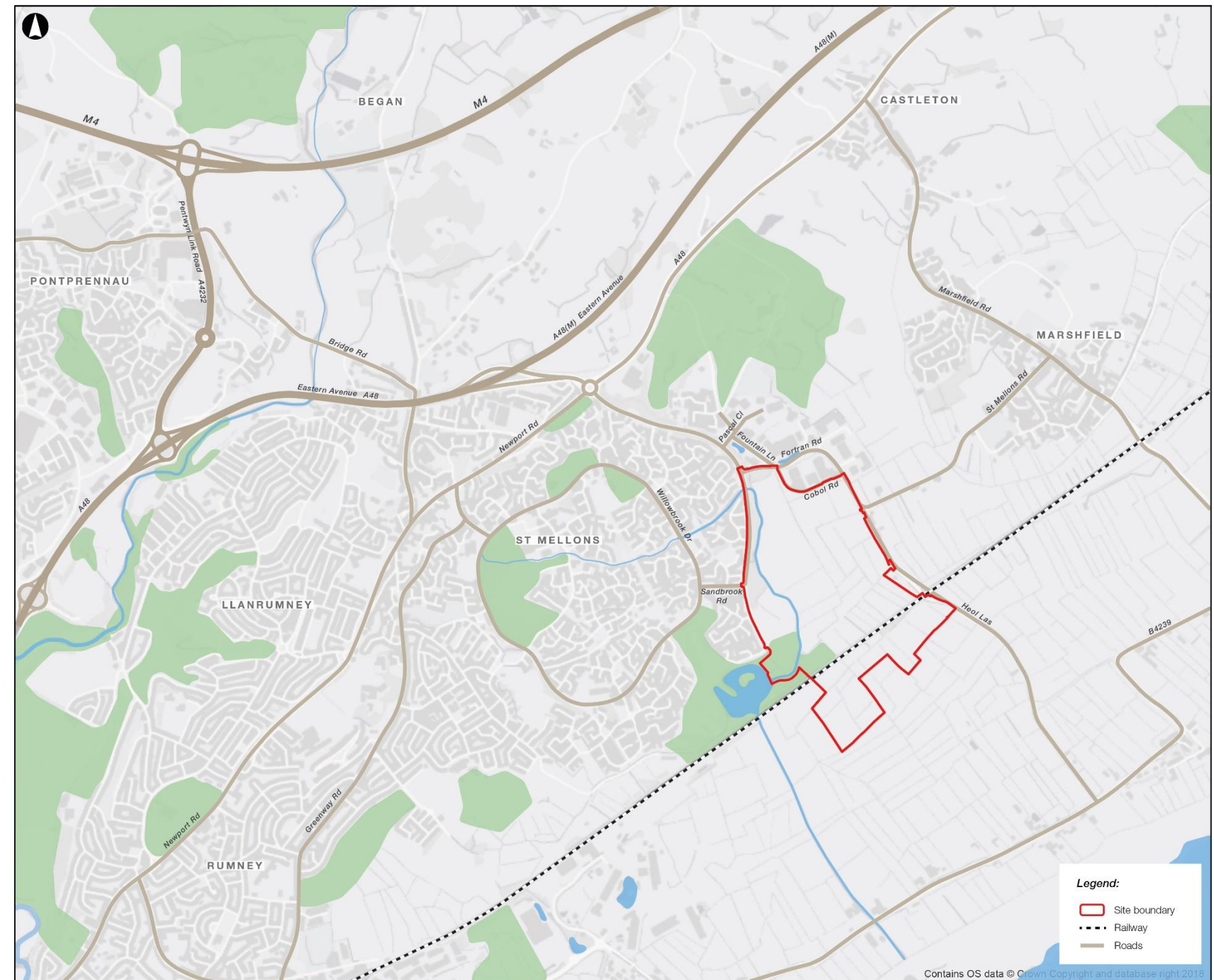


Figure 17: Local Highway Network

Fortran Road/Heol Las

Fortran Road provides access through St Mellons Business Park via a priority junction with Cypress Drive, as shown in Photograph 14 below. East of the business park, Fortran Road curves to the south and forms a junction with Cobol Road.



Photograph 14: Cypress Drive/Fortran Road Priority Junction

South of the junction with Cobol Road, Fortran Road narrows and has no central markings, and continues south to a junction with St Mellons Road and Heol Las. This priority junction is sited 200m south of the business park. The national speed limit applies on Heol Las and St Mellons Road, the latter provides access towards Marshfield and does not have a designated footway or cycleway.

A48

The A48 to the east of the roundabout with Cypress Drive is a dual carriageway with two lanes in each direction. Approximately 100m east of the junction the A48 forms a priority T-junction with a minor access road to a private property from the eastbound carriageway. A further 115m east of the junction there is a priority T-junction adjoining the westbound carriageway to Cardiff Garden Centre in the south. A right-turn lane is provided at this junction for traffic turning from the A48 eastbound in to the Garden Centre.

The speed limit is 30mph for 600m east of the A48/Cypress Drive roundabout, before increasing to 50mph which continues towards Newport. From the 50mph limit, the A48 continues as a high-speed route with high traffic volumes and varies between one and two lanes in both directions with a combination of roundabout and signalised junctions.

Newport Road

The B4487 Newport Road continues to the west from the A48/Cypress Drive roundabout. This single carriageway road does widen to two lanes to allow for turning movements at junctions and roundabouts. Priority T-junctions frequently join Newport Road towards residential developments in Old St Mellons and Llanrumney along the route into Cardiff.

A48 Eastern Avenue

The A48 Eastern Avenue connects into the A48/Cypress Drive roundabout via slip roads for journeys to/from the west. This road is a dual carriageway with two lanes in each direction and a 50mph speed limit. Approximately 1.5km west of the slips to Cypress Drive a four-arm grade separated roundabout connects with Capel Edeyrn and the A4232 Pentwyn Link Road in the north. Continuing along the A48, there are two further grade separated roundabouts 2.5km and 4.3km west, connecting to communities in Pentwyn and Llanedryn. Beyond, the A48 continues west through Cardiff to the Gabalfa Interchange.

The Cardiff East Park & Ride is accessed directly from the A48 Eastern Avenue via the Pentwyn Interchange grade separated roundabout. The park & ride has approximately 950 parking spaces and is served by the X59 service, proving a route to the city centre every 15 minutes, and the H59 service providing a link to Heath Hospital every 10 minutes.

A4232 (Pentwyn Link Road)

The A4232 Pentwyn Link Road runs between the A48 Eastern Avenue/Capel Edeyrn roundabout in the south to Junction 30 of the M4 in the north. The speed limit of this dual carriageway is 40mph. Approximately 530m north of the A48, a four-arm roundabout connects to Heol Pontprennau in the west and Church Road to the east. On the approach from the A48, there is a partially signalised pedestrian crossing just before the roundabout across the A4232.

Approximately 830m north of this roundabout, a signalised grade separated roundabout above the M4 provides access to Cardiff Gate Business Park, M4 west towards Swansea, M4 east towards Newport and Bristol and north to Maes-Y-Bryn.

3.6 Car Parking

At the existing St Mellons Business Park, each plot has its own associated parking which is either free or managed by the respective occupant. In addition, significant uncontrolled/informal on-street parking is also present on Fortran Road, Cobol Road, Fountain Lane, Pascal Close and other adjoining Unnamed Roads.



Photograph 15: On-street Car Parking on Cobol Road

Parking within the residential area of St Mellons to the east of the development site is mostly uncontrolled and there is no resident permit system.

There is a small surface car park that serves Hendre Lake Park that has approximately 45 spaces. This uncontrolled car park has no maximum parking restriction and is free of charge.

3.7 Road Traffic Collision Analysis

Road Traffic Collision (RTC) data is recorded by police when they attend the scene of a collision and medical assistance is required by one or more parties, therefore damage only accidents are omitted.

Collisions are categorised according to their severity:

- Slight – medical attention was required but no hospital stay way necessary;
- Serious – medical attention involving a hospital stay was required; and
- Fatal.

RTC Recorded in Cardiff

RTC data for the most recent available five-year period (2013 –2017) has been obtained from CC for the surrounding highway network and was agreed as part of the TA scoping exercise. The output plans and associated records presenting the location and severity of the collisions are included within Appendix I. An extract of the plan is presented in Figure 18.

The total collisions recorded in the study area from 2013-2017 are summarised below in Table 4, based on the severity of the collision and the modes of transport involved.

Table 4: RTC Summary

Collision involving	Severity			
	Slight	Serious	Fatal	Total
Motor vehicle only (excluding 2-wheels)	50	1	3	54
2 wheeled motor vehicles	8	2	0	10
Pedal cycle	18	4	0	22
Pedestrian	5	2	0	7
Total	81	9	3	93

As shown in Table 4, a total of 93 collisions were recorded, of these three were fatal, nine were categorised as serious and 81 were slight.

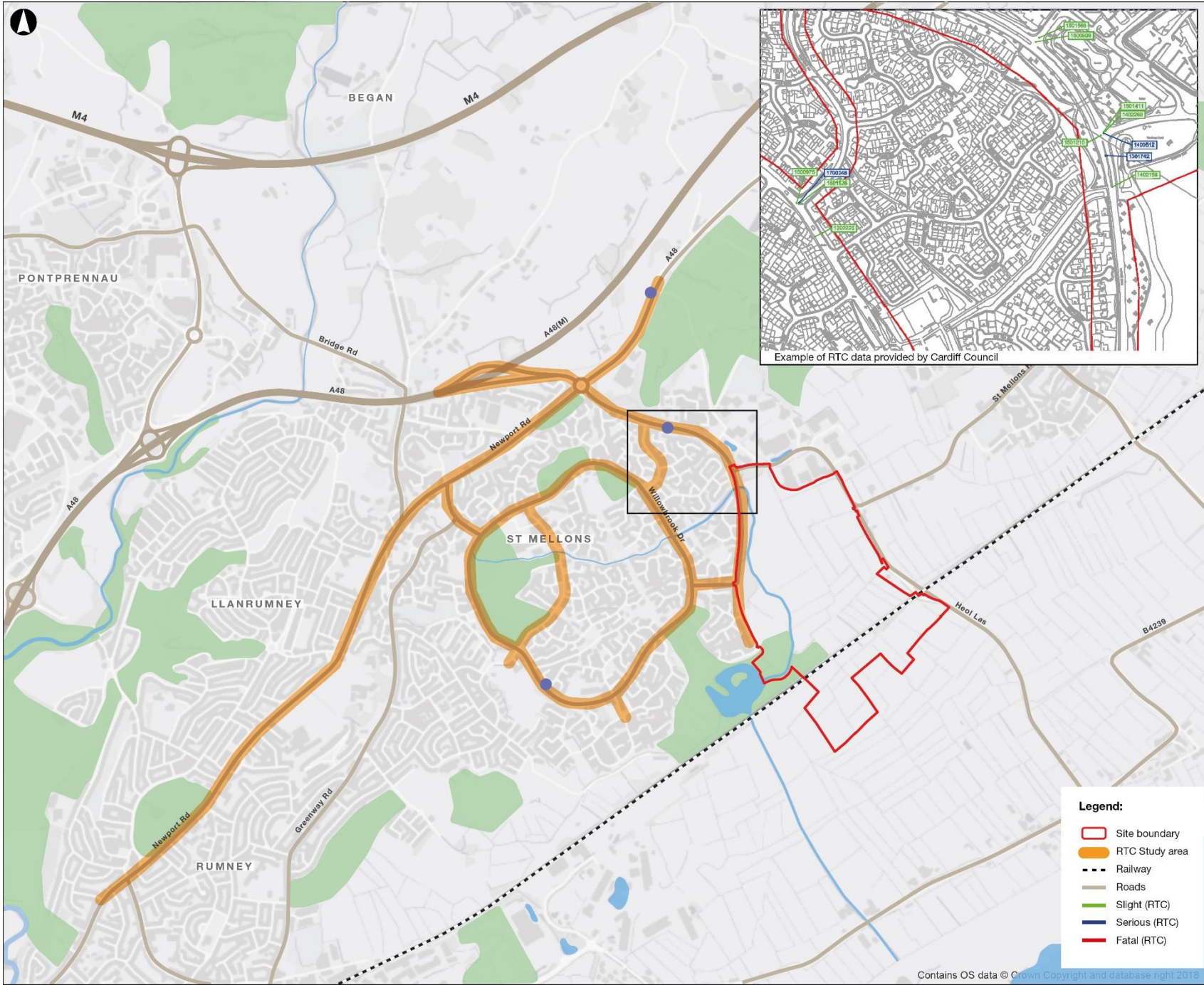


Figure 18: Road Traffic Collision Study Area

Collisions recorded at the main highway links within the study area are summarised in Table 5.

Table 5: Link collision summary by severity

Link (excluding junctions)	Number of incidents (2013-2017)			
	Slight	Serious	Fatal	Total
A48 Slips	3	0	0	3
A48 east of Cypress Drive	2	0	1	3
Cypress Drive	1	1	1	3
Willowbrook Drive, Crickhowell Road	6	0	1	7
Newport Road, Cypress Drive to Mount Pleasant Ave	3	0	0	3
Newport Road Mount Pleasant Ave to Wentloog Road	4	0	0	4

Three fatal collisions were recorded on links within the study area. One fatal collision was recorded on the A48, east of the junction with Cypress Drive and involved two vehicles travelling in opposite directions. One of the vehicles lost control and slid into the opposite carriageway, colliding with an oncoming vehicle. This is the only incident recorded at this location and the description attributes this to driver error. It is therefore not considered the road layout played a contributory factor in this collision.

The second fatal collision was recorded on the southern side of the Willowbrook Drive loop road around St Mellons. The incident involved one vehicle travelling in a westbound direction under icy conditions, losing control of the vehicle and colliding with a building.

Six slight incidents were also recorded on Willowbrook Drive; however, none were within proximity to this fatal incident and the cited contributory factors relate to driver and or pedestrian/cyclist error. Based on the collision data provided, there does not appear to be a pattern to the location of the incidents in St Mellons.

The final fatal collision was recorded on the Cypress Drive link, the collision occurred when a vehicle travelling southbound on Cypress drive lost control and crossed the grassed central reservation colliding with a bus travelling in the opposing direction. The recorded contributory factor was ‘aggressive driving’.

In addition to the fatal collision a serious collision was also recorded on Cypress Drive, this incident involved a motorcycle colliding with a lamppost at 04:44 on a Saturday morning. The recorded cause of the incident is the driver being ‘careless/reckless/in a hurry’. These collisions have been attributed to driver error. Traffic signals have been proposed at the Pascal Close and Fortran Road junctions, which should reduce traffic speeds and risk of collision on this link.

There is a cluster of four slight incidents on Newport Road west of Mount Pleasant Avenue, adjacent to Eastern High School. Two of these incidents were caused by weather conditions which resulted in a slippery surface. One involved three pedestrians walking into the road and the final incident involved a vehicle overshooting the junction. There is no pattern to the cause of incidents at this location therefore no alternations are proposed.

A further seven slight incidents were recorded on the residential road network within St Mellons with four of these occurring along Coleford Drive. Of these five were slight and one was serious. As these are small residential streets with low traffic flows that aren’t anticipated to be greatly affected by the proposed development no mitigation is proposed on these links.

In addition to the link analysis the collision records of the key junctions and incident clusters within the study area have been summarised in Table 6.

Five slight incidents were recorded at the entrance to the A48 from the slip road adjoining Cypress Drive roundabout. The recorded contributory factors for the incidents related to driver error and included following too close, failing to judge path/speed, or failing to look properly. Based on the heavy flow of traffic on this link of between 2,500 – 3,000 vehicles on the main line and merge lanes travelling west bound in the AM and PM peak hours these incidents are not considered to be significant, therefore no changes are considered necessary at this location.

Table 6: Key Junction Collision Summary by Severity

Junction	Severity			
	Slight	Serious	Fatal	Total
A48 Slips	5	0	0	5
Cypress Drive/A48 roundabout	24	2	0	26
Cypress Drive/Willowdene Way	1	0	0	1
Cypress Drive/Pascal Close	2	0	0	2
Cypress Drive/Fortran Road	3	1	0	4
Willowbrook Drive/Willowdene Way	2	1	0	3
Texaco forecourt entrance/Newport Road	1	1	0	2
Llanrumney Avenue/B4487 Newport Road	5	0	0	5
Wentloog Road/B4487 Newport Road	4	0	0	4

Over the surveyed period 26 collisions were recorded at the A48/Cypress Drive roundabout. The majority of these were slight (23) and three were serious. Of the collisions recorded, 12 slight incidents involved a motorcycle or cyclist and all three serious incidents involved a cyclist.

For the nine slight and three serious collisions involving cyclists, the recorded contributory factor was either ‘failed to look properly’ or ‘failed to judge path or speed’. These are both deemed to be driver/rider error and not anticipated to be caused by the junction arrangement. The Cycleway proposed by CC will provide a segregated route from Newport Road to Cypress Drive which should reduce the number of cyclists negotiating this junction. In addition, an alternative junction arrangement is being considered at this junction as part of these proposals.

One slight collision was recorded at the Willowdene Way/Cypress Drive junction. The incident involved a vehicle pulling out from Willowdene Way and colliding with a cyclist travelling west bound on Cypress Drive. The collision record states the driver’s failure to look as a contributory factor. Due to the proximity to the Hendre

Lakes site and anticipated trip generation along Cypress Drive, mitigation is proposed at this junction.

Two slight incidents were recorded at the Pascal Close/Cypress Drive junction, both incidents involved two vehicles and were attributed to driver error including failure to signal and not undertaking appropriate checks. It is proposed to signalise this junction as part of the wider proposals for Hendre Lakes.

A total of four incidents were recorded at the Fortran Road junction with Cypress Drive, three were of a slight severity and one serious. The serious collision involved a vehicle pulling out from Fortran Drive and colliding with a motorcycle travelling north bound on Cypress Drive. The slight incidents all involved two vehicles colliding, of which two were attributed to driver failing to look properly and one to heavy rain and poor lighting reducing visibility. Junction improvements are proposed at this location, including the introduction of traffic signals.

RTC Recorded in Newport

The CrashMap online mapping service for collision data has been used to identify RTCs that have occurred within NCC for the most recent five-year period (2014-2018). The study area includes the A48, Marshfield Road, St Mellons Road, Heol Las and the B4239 Wentloog Avenue.

No RTCs were recorded on St Mellons Road and its junction with Heol Las, the proposed active travel route between Marshfield and the development site.

Two slight RTCs were recorded on links within the study area, one on Marshfield Road and a second on the B4239 Wentloog Avenue.



Figure 19: RTC in Newport (source: www.crashmap.co.uk)

In addition, several RTCs occurred at key junctions, as summarised in Table 7 below.

Table 7: Key Junction Collision Summary by Severity

Junction	Severity			
	Slight	Serious	Fatal	Total
A48/Marshfield Rd	2	0	0	2
A48/Coal Pit Ln	2	0	0	2
A48/Craig-Y-Haul Dr	0	1	0	1
A48/Channel View	0	1	0	1
B4239/Broadway	1	0	0	1

Three slight and two serious collisions were recorded on the A48 near the junctions with Channel View, Craig-Y-Haul Drive, Coal Pit Lane and Marshfield Road. All four priority junctions on the A48 are located within 350m. The A48 is a dual carriageway with a posted speed limit of 50mph near these junctions.

Five collisions over a five years period is not considered to be statistically significant given the relatively high traffic flow on the A48.

4 Existing Travel Demand

4.1 Introduction

This chapter presents a summary of the existing travel demand on the surrounding transport network. This has been used as a basis for quantifying the potential future changes associated with the proposed development.

4.2 Study Area

The study area was agreed with CC as part of the scoping exercise and 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. Manual Classified Counts (MCC) including surveys of pedestrians and cyclists were undertaken at 23 junctions within the study area as shown in Figure 20 and listed below. All data collected at these junctions has been made available to CC.

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) west-facing slip roads
23. A48 Pentwyn Interchange priority roundabout

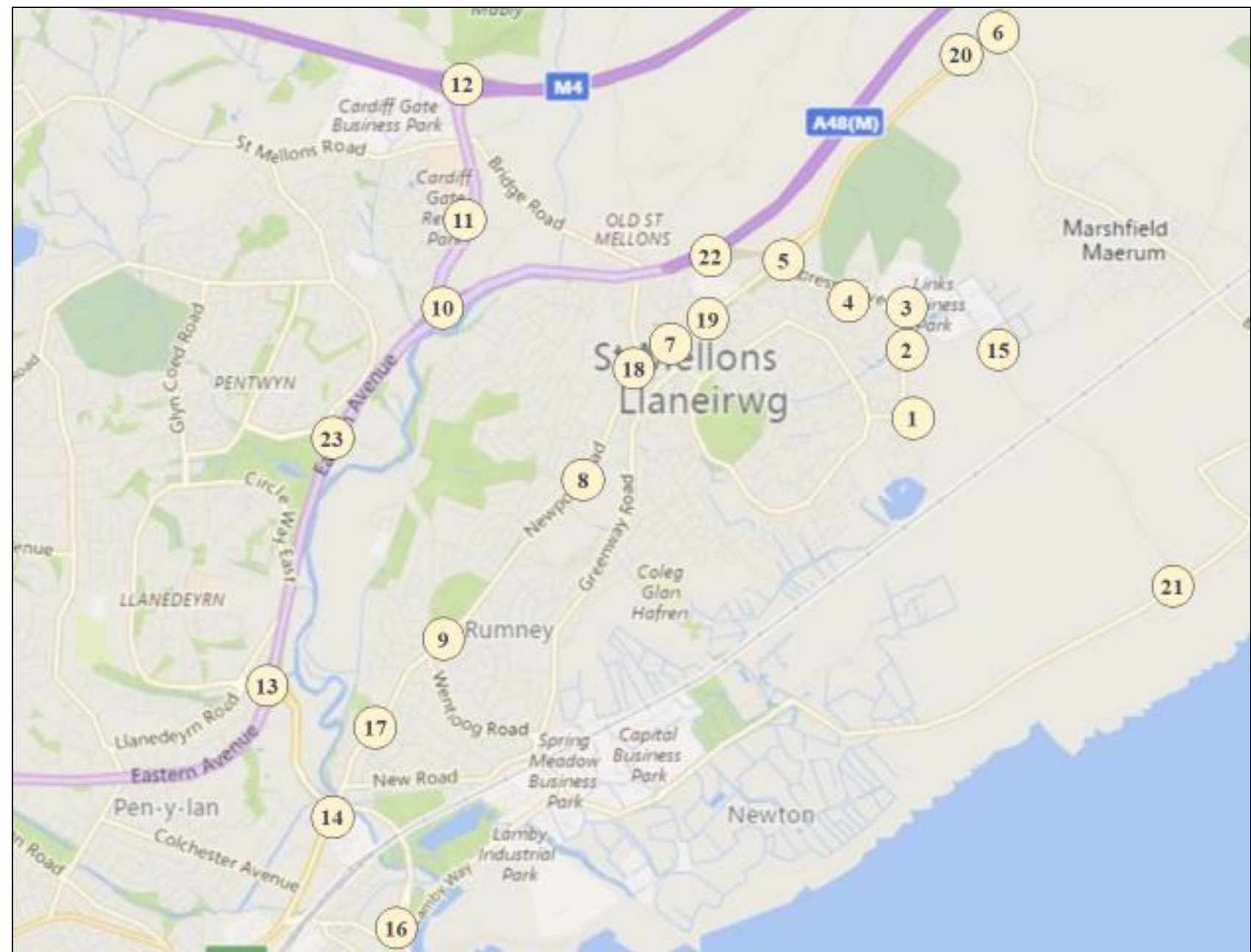


Figure 20: Study Area

4.3 Walking

Pedestrian crossing counts were undertaken at all junctions within the study area. In addition, two pedestrian crossing counts were undertaken at the following locations on Cypress Drive:

- The signalised pedestrian crossing across Cypress Drive south of the junction with Fortran Road; and
- The pedestrian underpass below Cypress Drive into Fountain Lane.

All surveys were undertaken on 7th June 2018, which was outside of school holidays, for the period from 07:00 – 10:00 and 15:00 – 19:00. The pedestrian movements recorded near the site during the peak hours of 07:45 – 08:45 and 16:30 – 17:30 are shown in Figure 21.

The greatest number of pedestrian movements were recorded at the Cypress Drive underpass towards the existing business parks with six movements in the AM peak hour and the same number in the reverse direction in the PM peak hour. The controlled pedestrian crossing on Cypress Drive had four pedestrian movements towards the business parks in the AM peak and three in the opposing direction in the PM peak. This indicates there is a low level of existing pedestrians currently walking to the Links and St Mellons Business Park from St Mellons.

A similar number of pedestrians were recorded crossing Cypress Drive at the Pascal Close junction with five pedestrians travelling to and from the business park in each peak hour.

Pedestrian movements along the A48 to the north of Cypress Drive were also limited with just four movements recorded in the AM peak hour and nine in the PM peak hour.

In summary, the pedestrian surveys show that only a small number of pedestrians currently walk to the existing business park in either peak hour.

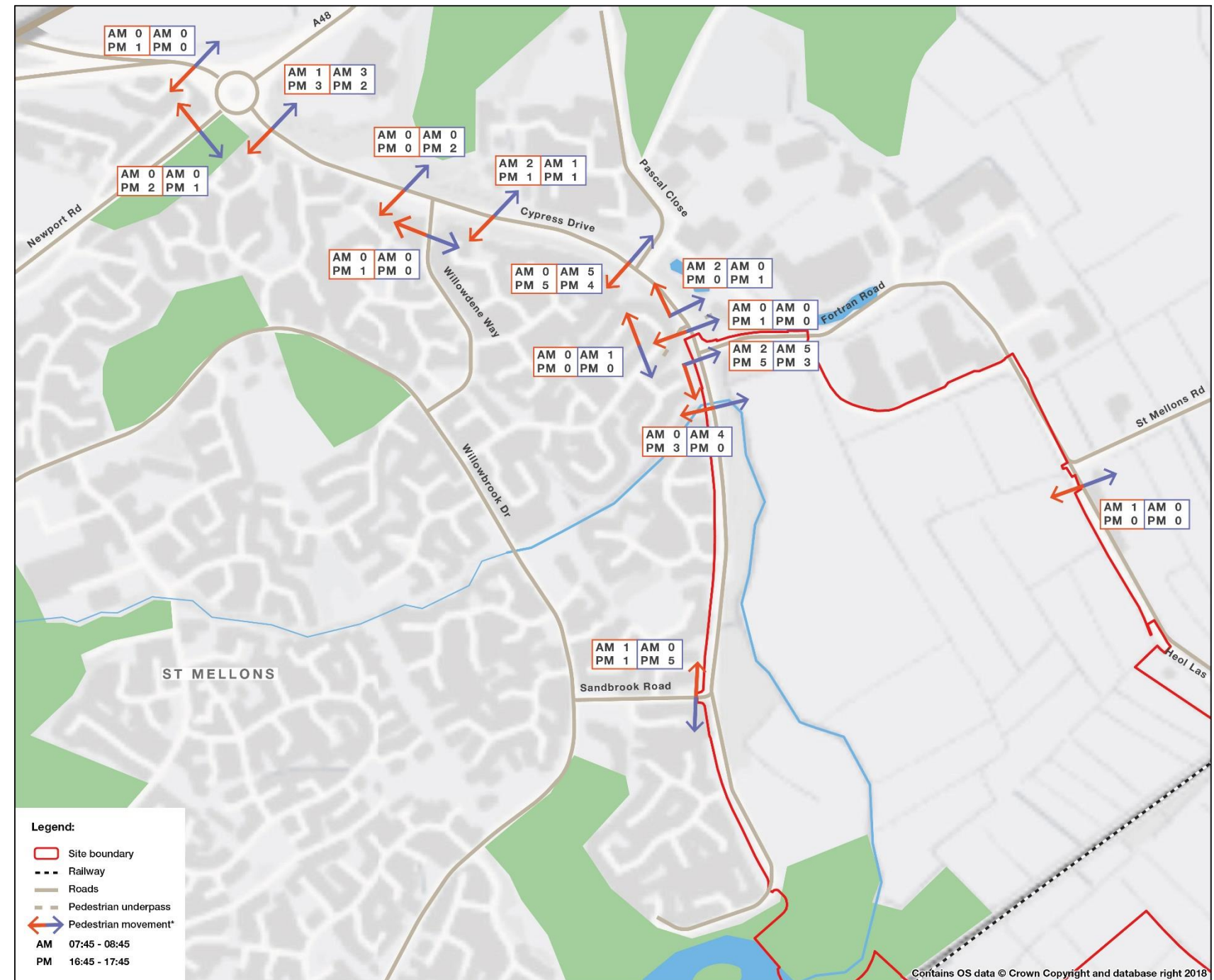


Figure 21: Pedestrian Peak Period Analysis

4.4 Cycling

Cycling counts were also undertaken as part of the traffic surveys at all junctions within the study area. For simplicity, the number of cyclists recorded at several key links have been included in Figure 22. These include:

- Cypress Drive/Sandbrook Road Roundabout
- Cypress Drive/Fortran Road Priority Junction
- A48/Cypress Drive/Newport Road Roundabout,
- Heol Las/St Mellons Road Priority Junction
- B4487/Mount Pleasant Ave Traffic Signals
- A48 Newport Road/Coal Pit Lane priority junction

The survey shows that seven cyclists accessed the existing business park in the AM peak hour, four from the south and three from the north. This ties in with the surveys at A48/Cypress Drive which show two cyclists turning onto Cypress Drive from the A48 (east) and one from the west. No cyclists were recorded entering/departing Pascal Close in the peak hours.

In the PM peak hour nine cyclists were observed to depart the business park via the Fortran Road entry, eight from the north and one from the south. This again correlates with the movements at the Cypress Drive/A48 junction which recorded eight cyclists travelling from Cypress Drive to Newport Road in the PM peak hour.

Cyclists were also observed at the Heol Las/St Mellons Road priority junction with eight cycling towards the business parks in the AM peak hour, seven of which were from St Mellons Road via Route 88 of the NCN which continues to Newport. In the PM peak hour, 10 cyclists were recorded to depart from the business park with the same number heading east towards Newport.

The recorded quantum of cycle movements is very low considering the scale of the existing business park and residential dwellings. However, the surveys do show that when cycling from the east, Heol Las may be a preferable route to the site than the A48, indicating a preference for using the NCN which connects into an off-road cycle route into Newport.

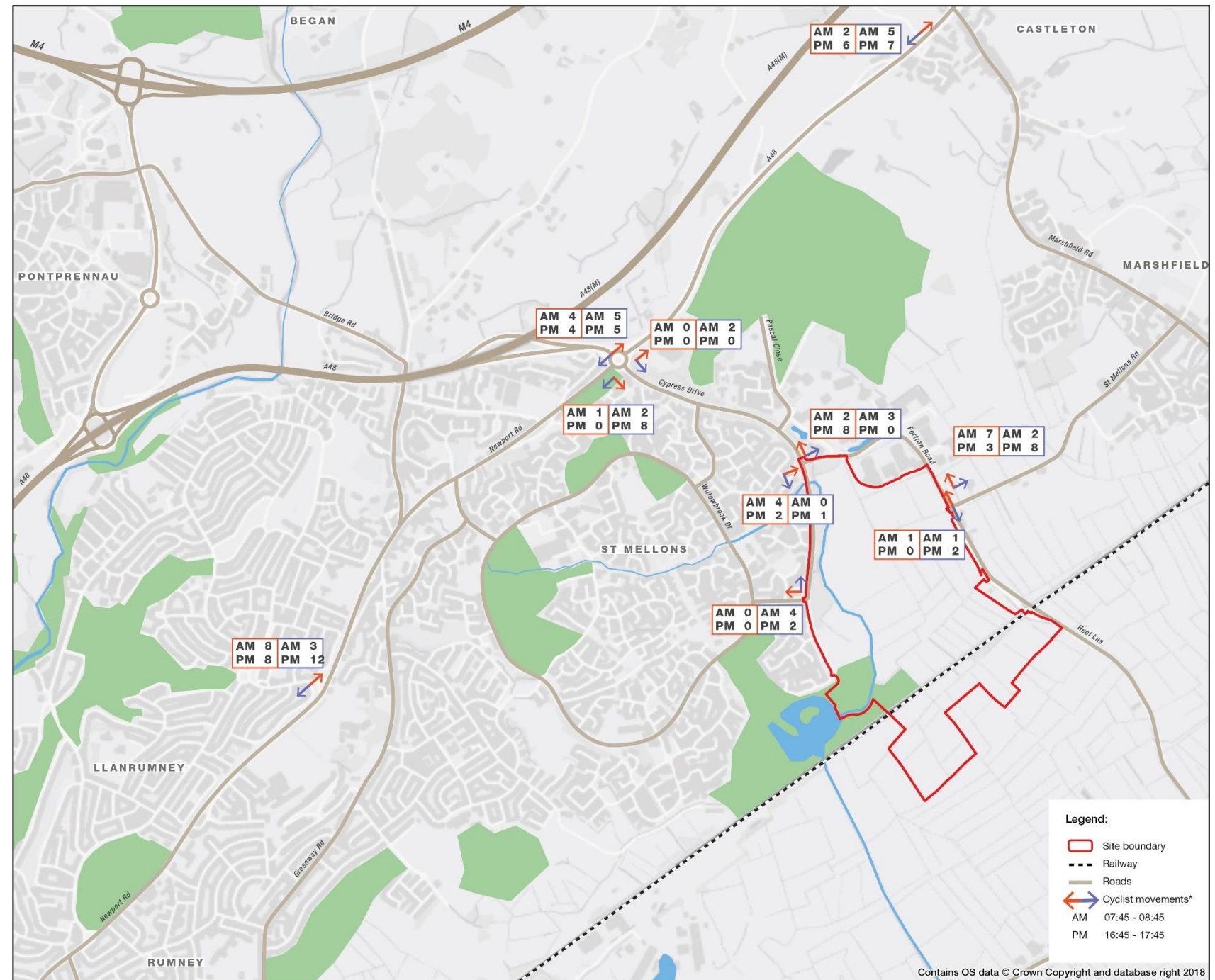


Figure 22: Cycling Peak Period Analysis

4.5 Public Transport

As the nearest existing train station to the site is over 8.4km to the west, this section focuses on existing bus usage towards the site.

To identify the existing commuting patterns by bus, 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. The method of travel to work was set as ‘Bus, minibus and coach’.

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 and Newport were identified. Cardiff has been grouped into three areas as displayed in Figure 23, and Newport has been treated as one area. The three areas identified have been defined with considerations to land uses, size and characteristics/development density.

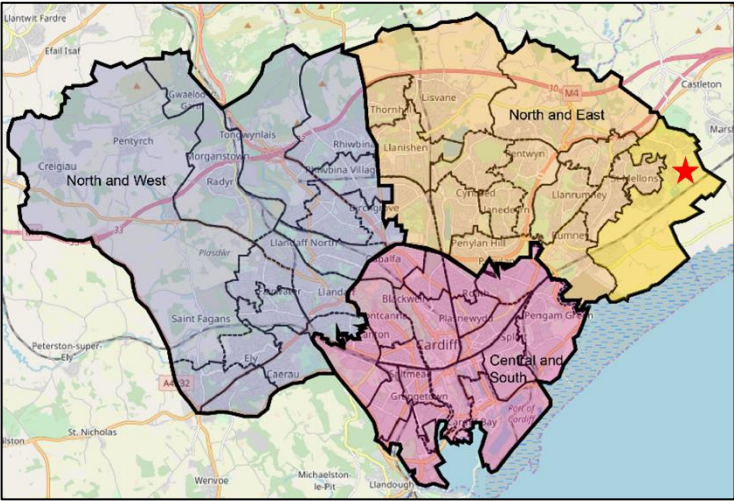


Figure 23: Cardiff Grouped MSOAs for Bus Distribution

The total travel demand from each of the four identified areas to the site’s MSOA is shown in Table 10 alongside the distribution and proportion of these trips that are made by bus, minibus and coach. Census data indicated minimal bus journeys were made to St Mellons from other local authority areas and therefore these have been excluded from the assessment.

Table 8: Bus, Minibus and Coach Existing Travel Demand

Area	Total commuters by all modes	Bus/coach (% of total trips)	Distribution by area
Cardiff North and West	571	31 (5%)	12%
Cardiff North and East	1411	86 (6%)	33%
Cardiff Central and South	704	122 (17%)	47%
Newport	526	19 (4%)	7%
Total	3212	258 (8%)	100%

Table 10 shows that the greatest proportion of bus, minibus and coach trips to the site are from the Cardiff Central and South area (47%), accounting for 17% of the commuters coming from this area. This reflects the existing bus routes which are provided from the city centre along the A48.

Cardiff North and East has the second greatest proportion of bus commuters to the site with 33% of the overall total share. There are however also a significant number of commuters that travel to/from this area which is likely to be a contributory factor to overall proportion of bus journeys.

4.6 Existing Vehicle Traffic Flows

Traffic Count Validation

Classified turning count surveys were undertaken at 22 junctions and the A48 slips, as presented in Figure 24 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. This approach was agreed with CC as part of the TA scoping exercise.

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 consistency within the traffic model, the July data was factored to a June base.

Peak Hour Analysis

Table 9 overleaf provides details of the total flows at each of the study area junctions. The AM and PM peak hours have been identified as 07:45-08:45 and 16:30-17:30 respectively. It was agreed through the TA scoping with CC that these peak periods are appropriate for assessment as part of the traffic impact assessment.

Table 9: Peak Period Analysis (Total Vehicles)

Junction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	23	Total
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%	
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%	

4.7 Recorded Vehicle Speeds

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 24 below and summarised in Table 10, alongside the recorded seven-day 85th percentile speeds. The survey results indicate vehicles typically exceed the speed limit at all locations.



Figure 24: ATC Survey Locations

The ATC data indicates that a significant amount of speeding occurs in excess of 30mph. Traffic signals are proposed at several junctions along Cypress Drive with the aim of reducing traffic speeds, and this is discussed further in Chapter 8.

Table 10: ATC Location and Recorded 85th Percentile Speeds

Site	Location	Speed Limit (mph)	Direction	Recorded 85 th Percentile Speeds (mph)		
				Weekday	AM Peak Hour	PM Peak Hour
A	Cypress Drive (north of the roundabout with Sandbrook Road)	30 mph	Northbound	40.3	40.1	40.4
			Southbound	42.3	42.0	41.0
B	Cypress Drive (south of the junction with Fortran Road)	30 mph	Northbound	44.0	43.2	44.5
			Southbound	42.7	41.6	36.6
C	Cypress Drive (south of the roundabout with the A48)	30 mph	Westbound	41.5	42.4	39.7
			Eastbound	39.2	38.0	39.0
D	The A48 (east of the roundabout with Cypress Drive and the B4487)	30 mph	Westbound	34.7	32.9	33.0
			Eastbound	35.8	34.9	33.6
E	The B4487 Newport Road (west of the roundabout with the A48)	30 mph	Westbound	37.9	36.4	37.0
			Eastbound	39.6	36.6	40.7

4.8 Bristol Parkway

It was agreed with CC that a survey of Bristol Parkway railway station would be commissioned to inform the trip making assumptions for the proposed Cardiff Parkway Railway Station.

Bristol Parkway Railway Station is in Stoke Gifford, eight kilometres north of Bristol city centre. The four platformed railway station on the South Wales Main Line is served by numerous services to Bristol Temple Meads, Cardiff, London Paddington, Birmingham and Manchester. In the year 2017/2018, the station served 2.5 million passengers (entering and exiting).

Bristol Parkway is served by the following transport infrastructure and parking facilities:

- A ‘park & ride’ (long-stay) car park with a total capacity of 1,095 spaces;
- Additional long-stay car parking (220 spaces) located 600m from the station entrance;
- A short stay car park with a total capacity of 45 spaces;
- As part of the short-stay parking available, there is a dedicated ‘drop-off and pick-up only’ car park for 17 vehicles, of which two are accessible spaces reserved for blue badge holders;
- A taxi rank with capacity for 38 vehicles to wait at one time;
- Cycle parking for 156 bicycles; and
- Bus layby with capacity for two buses.

To establish information on the number of vehicles using the long-stay car parks, drop-off and taxi rank, a vehicle entry/exit count survey was conducted through video observation.

The one-day survey was undertaken over the period 05:30 – 22:00 on Tuesday 16th July 2019; during both the Bristol and South Gloucestershire term times. The weather conditions on the day of the survey were cloudy throughout with some clearer spells.

A Technical Note was prepared that detailed the findings from the study and can be found in Appendix J. In summary, the key findings from the analysis of the survey data are as follows:

- The ratio of taxi pick-ups and drop-offs in the peak hours suggest most taxis pick-up a passenger after dropping someone else off;
- Drop-off (excluding taxi) accounted for 23% of all car journeys arriving to the station in the AM peak hour;
- In the PM peak hour, drop-off (excluding taxi) accounted for 35% of all car movements departing from the station.

It should be noted that the findings presented in the technical note and summarised above are based on a one-day survey. The results therefore present a snapshot of parking demand on a single day and therefore does not capture variations in day-to-day travel patterns.

5 Development Proposals

5.1 Introduction

This chapter provides an overview of the development proposals that will form the basis of the travel demand assessment in the subsequent chapters of this report.

The development proposals for Cardiff Hendre Lakes include a business district (up to 90,000m²) and a Transport Interchange, comprising railway station with four platforms, a surface car park (up to 650 parking spaces). In addition, there will be ancillary uses and infrastructure associated with biodiversity, landscape, drainage, walking, cycling and other transport modes.

The development seeks to deliver high quality employment space that will become a catalyst for growth, contributing to the regeneration of East Cardiff and the wider Cardiff Capital Region by attracting high quality businesses and investment.

The Illustrative Masterplan is presented in Figure 25. The proposals aim to deliver a sensitive and sustainable development that offers long-term benefits for the community and the environment.

The remainder of the chapter sets out the following:

- Summary of planning applications in Newport
- The outline access strategy for the site by all modes of transport;
- The hierarchy of streets, including indicative cross-sections;
- The brief for the transport interchange, including the station park & ride car park;
- The Parking Management Plan proposed to monitor on-street car parking on Cypress Drive and within St Mellons that may be associated with the development proposals; and
- Parking proposals for the business district.

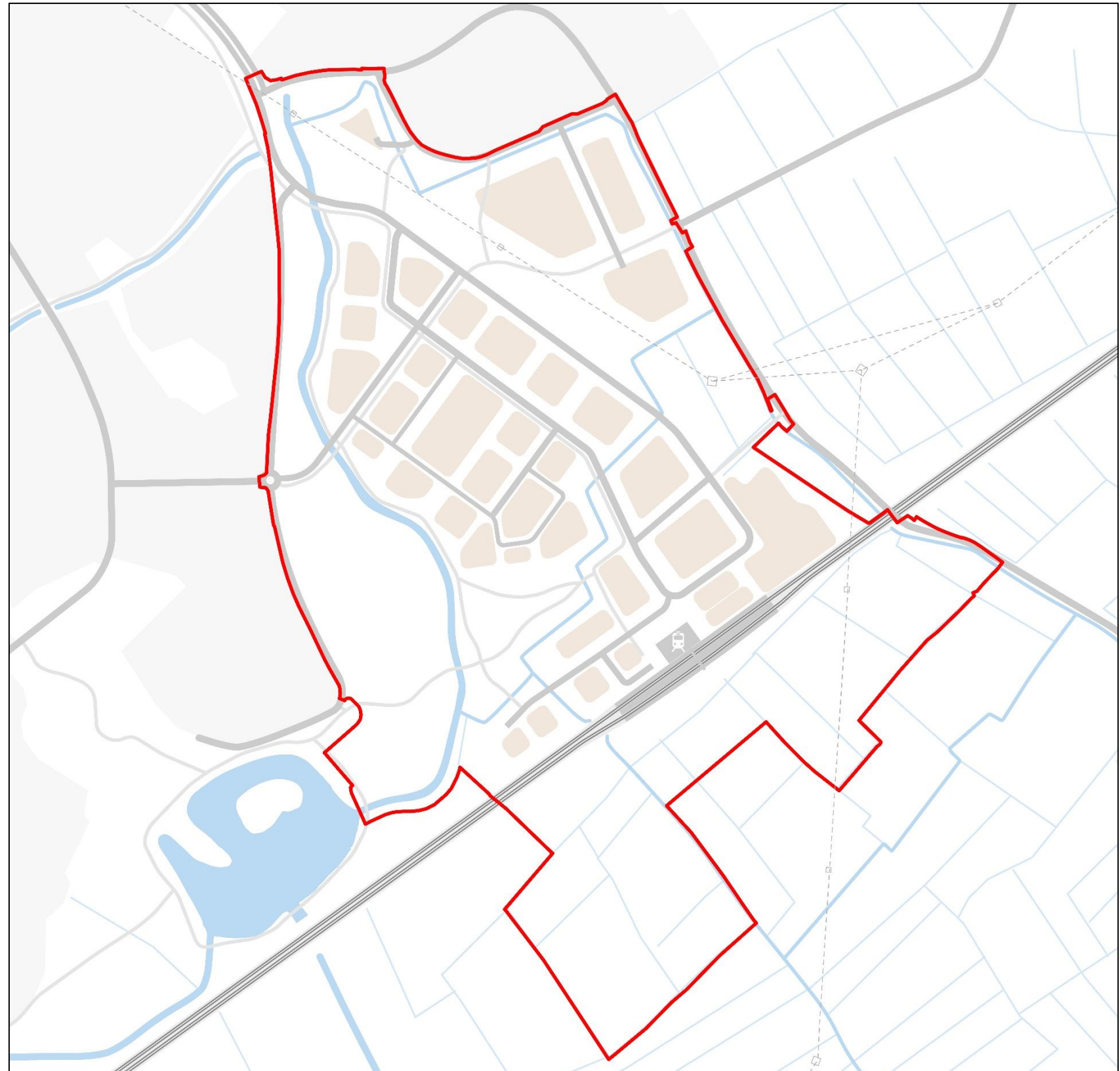


Figure 25: Cardiff Hendre Lakes Illustrative Masterplan

5.2 Access Works on Land in Newport

As detailed further within this Chapter, the proposed development is accessed from the west via Cypress Drive, the north via Fortran Road and Cobol Road and the east via Heol Las.

Access into the site from the east involves works on land in the NCC administrative area and proposed at the following locations:

- Alignment of the existing PROW, directly south of the Heol Las/St Mellons priority-controlled junction;
- Alignment of the existing access into the site, located directly north of the gas pressure reduction station; and
- Proposed vehicular access south of the railway

This outline planning application establishes the principles (scenarios a, b, c, d and e summarised below) of the locations of the three access points, with the detail being the subject of full planning applications to NCC accordingly to consent the works.

Full Application 1: Public Right of Way (PROW)

Full application 1 is to enable the upgrade of the existing Green Lane Reen crossing structure to enable the PROW to be useable once more and use as an active travel route. This align with Policy T6 of the NLDP.

This outline application includes an option (scenario ‘a’) for the PROW (which is currently unpassable in the site due to a missing reen crossing) to be useable once more as part of localised reen widening works.

The outline application also includes an option (scenario ‘b’) for the existing bridge to be ‘upgraded’ to provide an active travel access point for Newport ‘users’ into/out of the proposed development. These optimal works would therefore enable access for pedestrians and cyclists at this location.

Full application 1 will seek planning permission for scenario ‘b’ but in the context that the applicant may elect to only undertake the ‘maintain’ works set out in scenario ‘a’.

Full Application 2: North of Gas Pressure Reduction Station

Full application 2 is to provide a permanent active travel route and a temporary construction access to the north of the gas pressure reduction station.

This outline application includes an option (scenario ‘c’) that the existing bridge is merely ‘maintained’. It also includes an option (scenario ‘d’) for the existing bridge to be ‘upgraded’ to provide an active travel access point for Newport ‘users’ into/out of the proposed development. The optimal works associated with scenario ‘d’ would therefore improve the permeability of the site for active travel modes, aligning with Policy T5 of the NLDP.

This outline application also includes an option (scenario ‘e’) for the existing bridge to be removed and for a temporary structure to be installed and for this to be used for access into the proposed development for construction purposes. Thereafter a new permanent structure is to be installed to provide an active travel access point for Newport ‘users’ into/out of the ‘completed’ scheme. Further details on this temporary construction access are set out in Chapter 9.

Works associated with option ‘d’ and ‘e’ have not been defined as part of the outline, but are assumed to include the installation of a structure to facilitate a crossing or spanning of the existing Green Lane Reen and for the structure to be used by pedestrians and cyclists. The construction and use of the structure is entirely dependent upon NCC granting planning permission for the works and the use of it as an active travel access point.

The implementation of any full planning permission will rely upon this outline providing planning permission for the upgrade works within Cardiff. Implementation by the applicant will also depend upon securing rights to undertake these works both within Newport and Cardiff.

Full Application 3: South of Railway Line

Full application 3 is to provide a temporary construction access and permanent access for railway infrastructure related maintenance as well as access to private land (South-eastern Access Point).

This outline application includes the construction of the new access point south of the railway line and two new sluices – one of which is partially within Newport.

The implementation of the Scheme is dependent upon planning permission being obtained for the new access point and reen crossing on the south side of the rail line.

Full application 3 covers only those works which are required to construct the permanent access and sluice. Works to improve the adopted highway to enable vehicular access would require an agreement with NCC under S.278 of the 1980 Highways Act.

Summary

The access works on land with the NCC administrative area require separate planning applications. The development is not reliant on the two accesses north of the railway line for construction or operation of the development, but that they are an enhancement from an active travel perspective. This includes works associated with scenarios ‘a’ and ‘c’ and optimal works associated with scenarios ‘b’ and ‘d’.

The access south of the railway line is required for construction and maintenance as well as access to private land.

5.3 Outline Access Strategy

Access has been reserved as part of this outline planning application and therefore the detailed access strategy will be developed as part of the reserved matters. This section presents the outline access strategy

The outline access strategy has been developed with reference to the sustainable transport hierarchy, as presented in Figure 26 below. This gives priority to pedestrians and cyclists over other road users within much of the site.

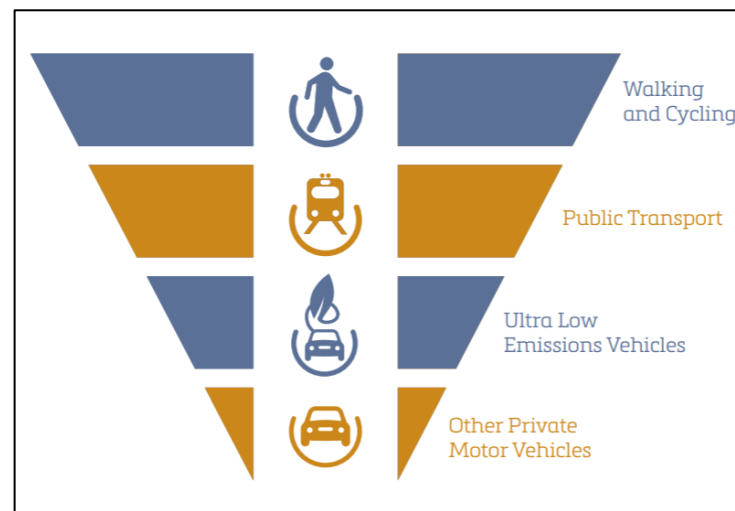


Figure 26: Sustainable Transport Hierarchy⁴

In alignment with the Well-being of Future Generations Act and the UN Sustainable Development Goals, the access strategy seeks to maximise the proportion of trips made to the development site by sustainable modes of transport.

The development proposals also seek to enable existing residents and employees of St Mellons, Marshfield and other neighbouring communities and employment sites to travel by more sustainable modes of transport through infrastructure and service improvements, most notably the provision of a railway station.

The access strategy for each mode of transport is set out overleaf. In summary, it is recommended that the following infrastructure is delivered/upgraded:

- Active travel routes within the site, accessible from Hendre Lakes Park, Cypress Drive, the existing business park and St Mellons Road;

- Enhance the existing PROW within the site which is currently not walkable due to hedgerows and missing reën crossings;
- Pedestrian access from Heol Las to be secured via a separate planning application with NCC, as set out in Section 5.2. Optimal works include two active travel links from Heol Las, north of the railway line. These would be subject to agreement with NCC and acquisition of relevant land interests.
- Provide a segregated cycleway within the site from Cardiff Parkway Railway Station to the planned Cardiff Cycleway on Cypress Drive;
- Provide cycle parking throughout the site, which as a minimum, complies with CC adopted parking standards⁵;
- Explore the potential for introducing Nextbike stations at the railway station, within the business district and the existing business parks
- Provide a railway station that is served by frequent trains services between Cardiff and Newport;
- Deliver a Transport Interchange, including cycle parking, up to 650 spaces of long-stay, short-stay, drop-off and accessible car parking, a taxi rank and bus stops;
- A minimum of 10% of the parking provision for both the station park & ride and the business district will provide charging facilities for ULEV with passive provision for future supply;
- Bus stops with high quality waiting facilities are sited throughout the site so all development is within approximately 400m walking distance of a stop;
- Provide a primary vehicle access into the site from Cypress Drive, south of the existing junction with Fortran Road;
- Introduce a secondary vehicle access in to the site with the existing Cypress Drive/Sandbrook Road roundabout. Subject to discussions with the local bus operators, there is potential this access could be a bus only access;
- Provide vehicular site access junctions for the north-eastern and north-western land parcel on to Cobol Road. These major-minor priority junction

arrangements will result in the loss of informal on-street parking on Cobol Road;

- Introduce traffic signals at the Fortran Road, Pascal Close and Willowdene Way junctions with Cypress Drive, changing the characteristics of the road to be more fitting of the urban environment and provide signalised pedestrian crossings to the existing business park; and
- Deliver a significant mitigation scheme at the A48/Cypress Drive/Newport Road roundabout, proposed to be secured via a planning condition.

The proposals identified above and detailed in this chapter will encourage journeys to the site to be made by sustainable modes, complying with Policy KP8, TP1 and TP5 of the CLDP.

In addition, this section outlines opportunities for offsite works to be delivered by others to realise the full connectivity benefits of Cardiff Parkway railway station, these include:

- 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;
- 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; and
- Opportunities for CC to extend existing and future bus services in to the site.

⁴ Planning Policy Wales -Edition 10 (2018)

⁵ Cardiff Council (2018) Managing Transportation Impacts

Walking

It is proposed to develop a permeable site which encourages active travel over other modes of transport, particularly the private car. This is proposed to be achieved with a network of good quality and direct footways throughout the site. In addition, it is proposed to enhance the PROW and deliver a network of permissive paths that run adjacent to the reens and parks.

As shown in Figure 27, access is proposed into the site from the west, via Cypress Drive along the alignment of the two proposed vehicles accesses, and Hendre Lake Park to the south west. All routes within the site will have appropriate lighting, the strategy for which can be found in the Design and Access Statement (DAS). There are opportunities for CC to enhance the routes to the site via Cypress Drive and Hendre Lake Park.

To the north, there is an opportunity for CC to provide lit pedestrian routes between the site and to the existing business parks via Cobol Road. In addition, there are opportunities for CC and the relevant land owners to improve pedestrian infrastructure within the existing business park to improve pedestrian links to the proposed railway station, including the following:

- Introducing a footway on Cobol Road, as shown in Figure 27;
- Linking the existing footways on Fortran Road and Fountain Lane; and
- Widening the footway on Fountain Lane, particularly where the bus stop is located.

To provide a pedestrian access from the east, it is proposed to enhance the existing PROW within the site. This will include improvement of the existing crossing of Faendre Reen and Green Lane Reen. As set out in Section 5.2, the delivery of the Green Lane Reen crossing is subject to agreement with NCC and acquisition of relevant land interests. As part of this enhancement, a section of the PROW west of the Wildlife Corridor will be diverted, a measure which has been discussed with CC PROW officers.

An additional active travel route has been identified, north of the Gas Pressure Reduction Station. The delivery of these optimal works is subject to agreement with NCC and acquisition of relevant land interests.

To improve conditions for pedestrians walking to the site from Marshfield, there is an opportunity for NCC to introduce measures on St Mellons Road such as reducing the speed limit and banning the right turn movement from St Mellons Road to Heol Las.

Traffic signals are proposed as part of this application at the Fortran Road, Pascal Close and Willowdene Way junctions with Cypress Drive. These junction improvements schemes include signalised pedestrian crossings, improving permeability along Cypress Drive.

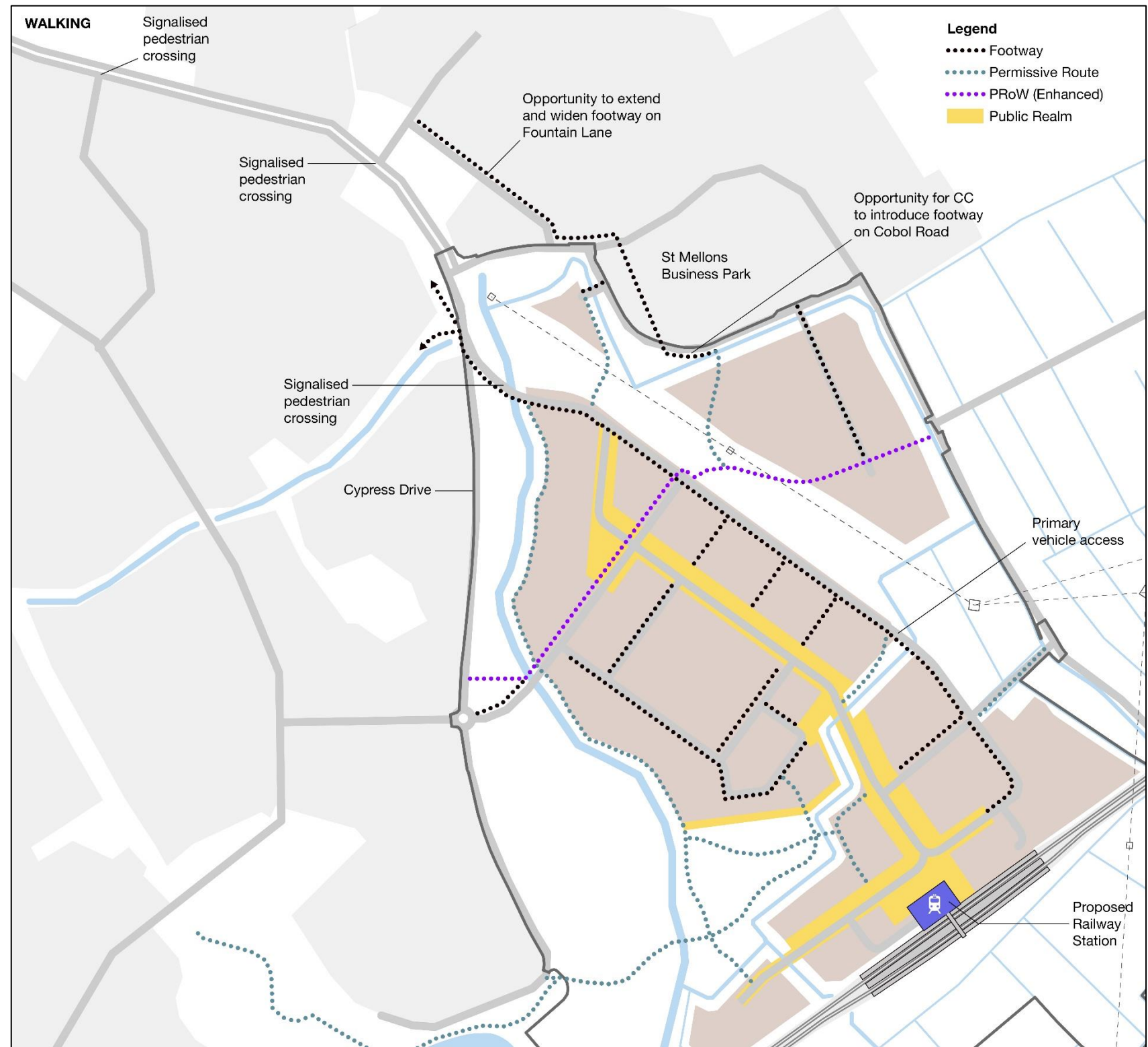


Figure 27: Pedestrian Illustrative Access Strategy

Cycling

The access strategy for cyclists is presented in Figure 28. The principle cycle access is proposed via Cypress Drive to the north east of the site, along the primary vehicular access. There is an opportunity for CC to extend Route 2 of the Cardiff Cycleway to the site boundary. The detail of the cycle route within the site will be considered as part of the reserved matters applications.

Access will be provided from the west via the Sandbrook Road Roundabout. In addition, there is an opportunity for CC to introduce a route to the site via Hendre Lake Park. It is envisaged that these accesses will both be shared footway/cycleways, however the detail will be explored as part of the reserved matters applications and in consultation with CC. Both the shared footway/cycleway and the segregated cycleways (two-way) will be a minimum of 3m wide. Cross-sections can be found in Section 5.4 and further detail is provided in the DAS.

To the east, optimal works include an access for cyclists adjacent to the enhanced PROW, near the St Mellons Road/Heol Las junction. As set out in Section 5.2, delivery is subject to agreement from NCC and acquisition of relevant land interests. This route would be segregated from the PROW and incorporated into the highway boundary. This route will link Route 88 of the NCN on St Mellons Road with the planned Cardiff Cycleway on Cypress Drive.

Optimal works include an additional active travel route from the east (north of the Gas Pressure Reduction Station – labelled emergency vehicle access opposite), with delivery subject to agreement with NCC and acquisition of relevant land interests.

To improve conditions for cyclists on St Mellons Road, there is an opportunity for NCC to introduce potential measures along the link such as reducing the speed limit.

A cycle route is proposed between the station and Cobol Road, providing a link towards the existing business park. The potential for Nextbike stations being installed at both locations will be explored at a later date, to provide existing employees with the opportunity to cycle between the station and their place of work.

As set out in the following sections, appropriate cycle parking provision will be provided within the transport interchange and business district.

Cycle parking as a minimum, will comply with CC adopted parking standards. Appropriate links will be introduced between the principle cycle paths and the

cycle parking areas, and this will be considered in detail as part of the reserved matters.

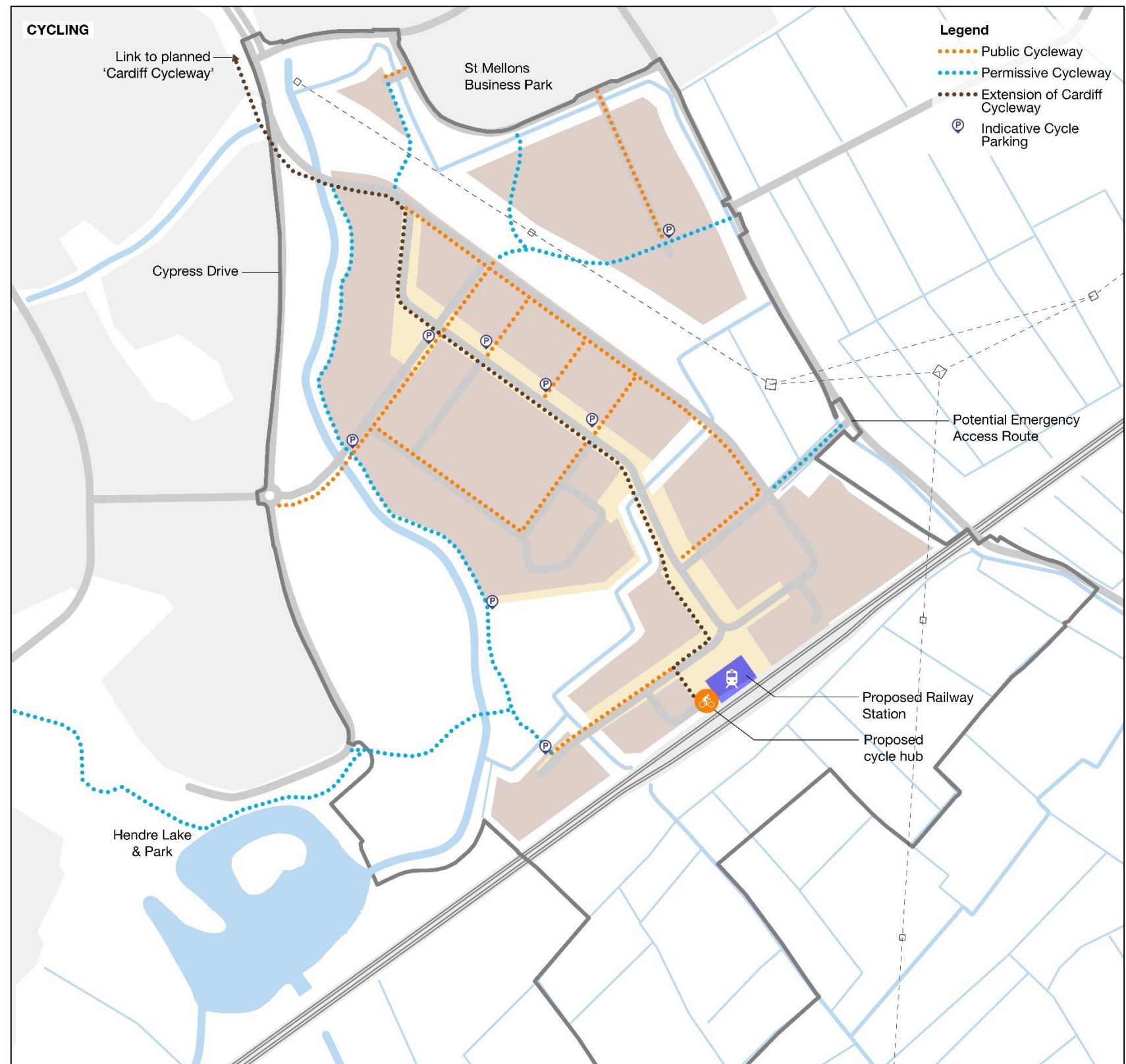


Figure 28: Cycling Illustrative Access Strategy

Public Transport

A Transport Interchange is proposed to the south of the business district, including Cardiff Parkway railway station and park & ride, taxi rank, bus stops and cycle parking. The station will provide a step change in rail network access, allowing residents and employees in the area to switch from car travel to public transport.

The proposed station will have four platforms and is anticipated to be served by eight services an hour to Newport and Cardiff Central. The station park & ride will have up to 650 long-stay, short-stay and accessible parking spaces. The requirements for the Transport Interchange are detailed further in Section 5.5.

As presented indicatively in Figure 29, bus stops are proposed within the site, including near Cardiff Parkway railway station. It is recommended that bus stops will be located so that all areas of the development are within 400m of a stop and locations will be agreed with operators as part of the reserved matters application.

To accommodate the vehicular site access proposals, it is proposed to relocate the existing bus stop on Cypress Drive, sited 100m south of the junction with Fortran Road. Subject to discussions with CC and the local bus operators, it is proposed to relocate this stop within the site, at the junction of the primary and secondary access.

The pedestrian and cycle access strategies seek to maximise connectivity to bus stops and Cardiff Parkway station to improve the attractiveness of these modes.

High-quality waiting facilities will be provided and equipped with the following as appropriate:

- Real-time passenger information;
- Electronic passenger information kiosks and information points; and
- Clear signage for passengers and staff.

Design of bus stops will include lay-bys, raised kerbs for boarding and a minimum spacing of 1.3m between the kerb and shelter (Inclusive Mobility). There is the opportunity for existing bus services operating near the site to be redirected into the proposed development. This could include the X4, X45, 30, 44/45/45B and 65 bus services to provide frequent bus services (every 10-15 minutes) to key destinations in the peak periods.

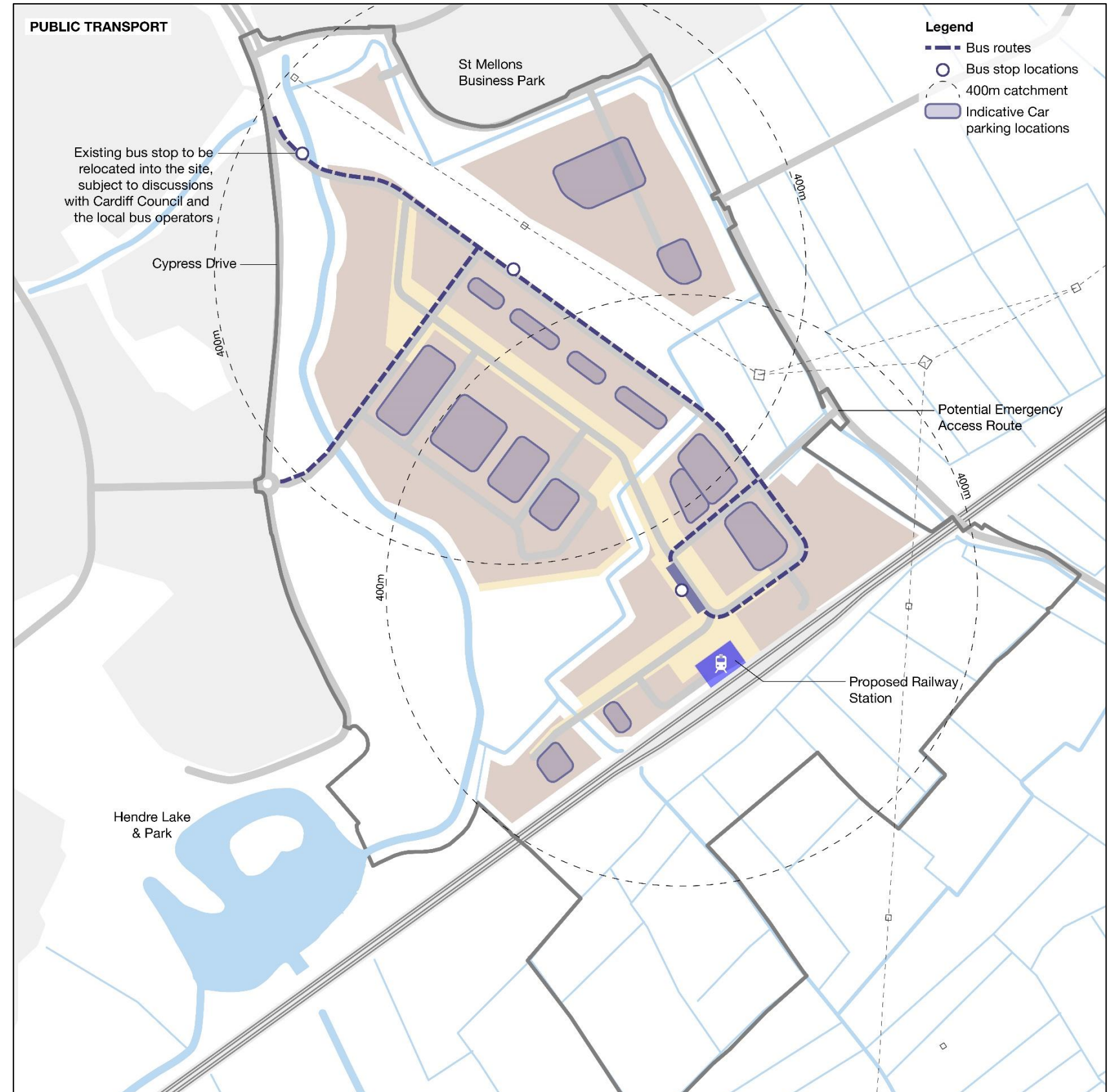


Figure 29: Public Transport Illustrative Access Strategy

Vehicle Access and Circulation

The indicative highway arrangement and street hierarchy within the development is presented in Figure 30. The detailed arrangement will be developed as part of the reserved matters process and will be cognisant of both vehicle requirements (servicing and public transport) and delivering a low traffic speed environment. Further narrative on the street hierarchy is set out in the following section.

The primary vehicle access in to the site is proposed to be taken from Cypress Drive, to the northwest of the site. It is proposed to change the priority at the junction, with Cypress Drive (south) becoming the minor arm. This junction will be signalised and include a toucan crossing on Cypress Drive (south) for the extension to Route 2 of the Cardiff Cycleway. This junction is presented in Drawing 2.

Access to the south of the railway line is required for construction and maintenance as well as access to private land. A new priority T-junction with Heol Las is proposed for this lightly trafficked access. The junction arrangement is presented in Drawing 4 for information. The junction arrangement is the subject of an application for full planning permission to Newport Council. Details of those elements of the road within Cardiff will be the subject of a reserved matters application. A speed survey will be required to determine the visibility requirements for this junction, as per guidance in TAN 18. Should the recorded 85th percentile road speeds be below 60kmph, the appropriateness of applying MfS standards will be explored.

Following consultation with CC, a secondary access is proposed via a new arm on the Cypress Drive/Sandbrook Road roundabout. This access is not required from a traffic capacity perspective, but provides resilience as a secondary means of access and could therefore be designated as a bus only access. This can be agreed as part of the reserved matters, in consultation with CC and the local bus operators. The proposed arrangement is presented in Drawing 3.

Two priority T-junctions are proposed with Cobol Road to provide a vehicle access in to the north-eastern development areas. Up to 20 informal on-street car parking will need to be removed on Cobol Road to accommodate this vehicle access. These junction arrangements will be agreed as part of the reserved matters application.

A potential emergency access route has been identified from Heol Las, north of the Gas Pressure Reduction Station. This access would require a suitable crossing over Green Lane Reen with delivery subject to agreement with NCC and acquisition of relevant land interests.

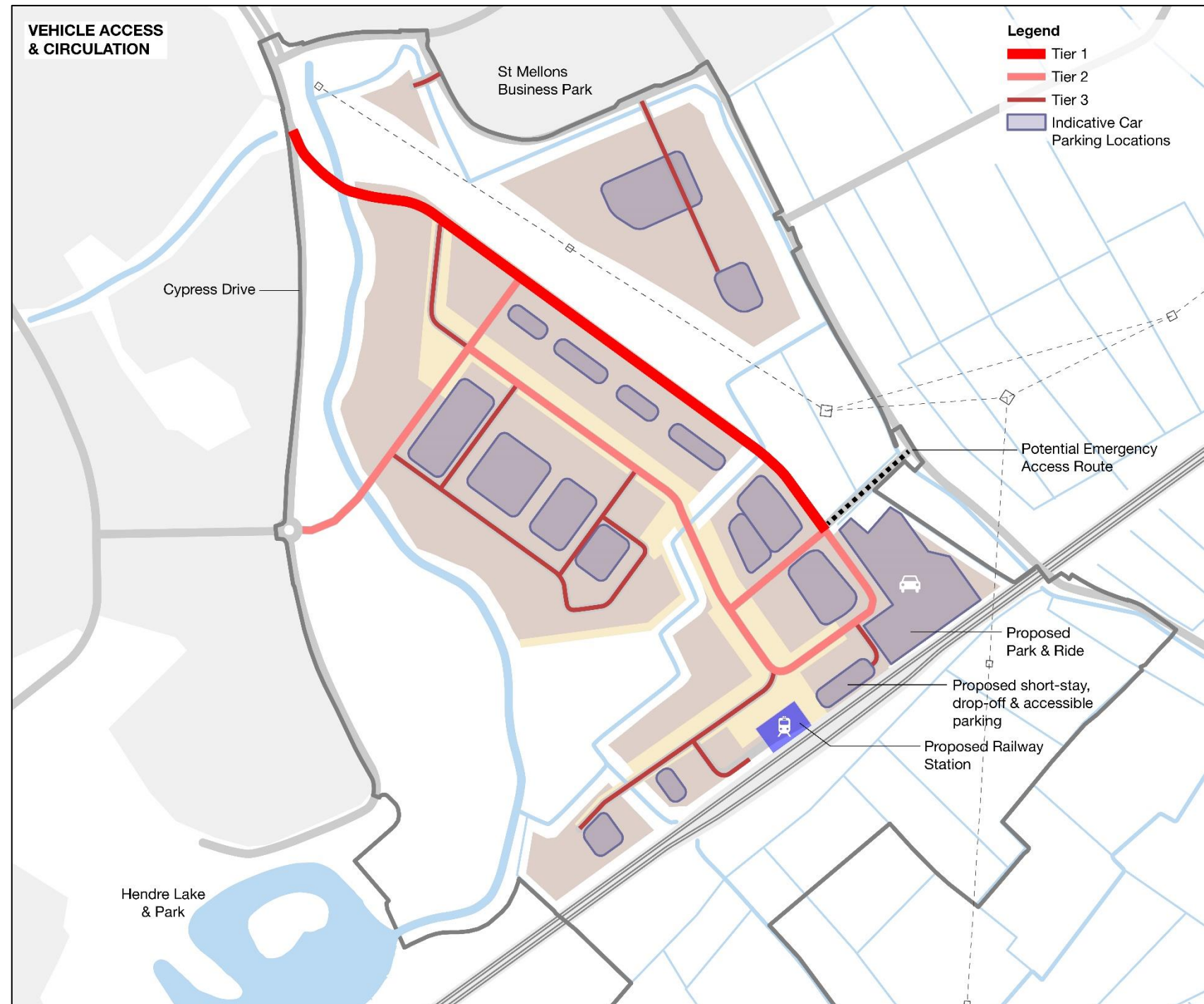


Figure 30: Vehicle Access Strategy

A spine road is proposed along the eastern edge of the development. This provides access to car parking for the proposed business district and direct access to the railway station. It is envisaged that other roads within the site will be relatively lightly trafficked and thus more conducive for pedestrians and cyclists, who have dedicated facilities and routes along the highway boundary. It is recommended all roads within the development site have a posted speed limit of 20mph.

Beyond the redline, traffic signals are proposed as part of the application on Cypress Drive at the junctions with Fortran Road, Pascal Close, Willowdene Way and the A48. These proposed highway mitigations will be delivered via Section 278 Agreements (Highways Act 1980). This will change the character of Cypress Drive to be more fitting of an urban environment, reducing speeds and providing signalised pedestrian and cycle crossings and routes. Cypress Drive will therefore become more permeable and better facilitate active travel. These proposals are discussed in Chapter 8.

Summary

The proposed access strategy, incorporating all principle modes of transport, is presented in Figure 31. This includes opportunities for others to deliver.

As previously noted, the detailed access strategy will be developed as part of the reserved matters. This outline strategy presents the general themes, aspirations and proposals indicatively.

The indicative arrangement prioritises pedestrian and cyclists over the private car with multiple accesses and more direct routes to the railway station and interchange. The network of formal and permissive active travel routes, alongside the enhanced PROW provides a permeable site.

The primary vehicular traffic route is along the eastern edge of the main development, resulting in the Tier 2 and Tier 3 highways being more lightly trafficked and thus more conducive to pedestrians and cyclists.

The outline access strategy has been designed to maximise the opportunity for existing and future journeys to Cardiff Hendre Lakes business district and Cardiff Parkway railway station to be made by sustainable modes of transport, complying with Policy KP8, TP1 and TP5 of the CLDP.

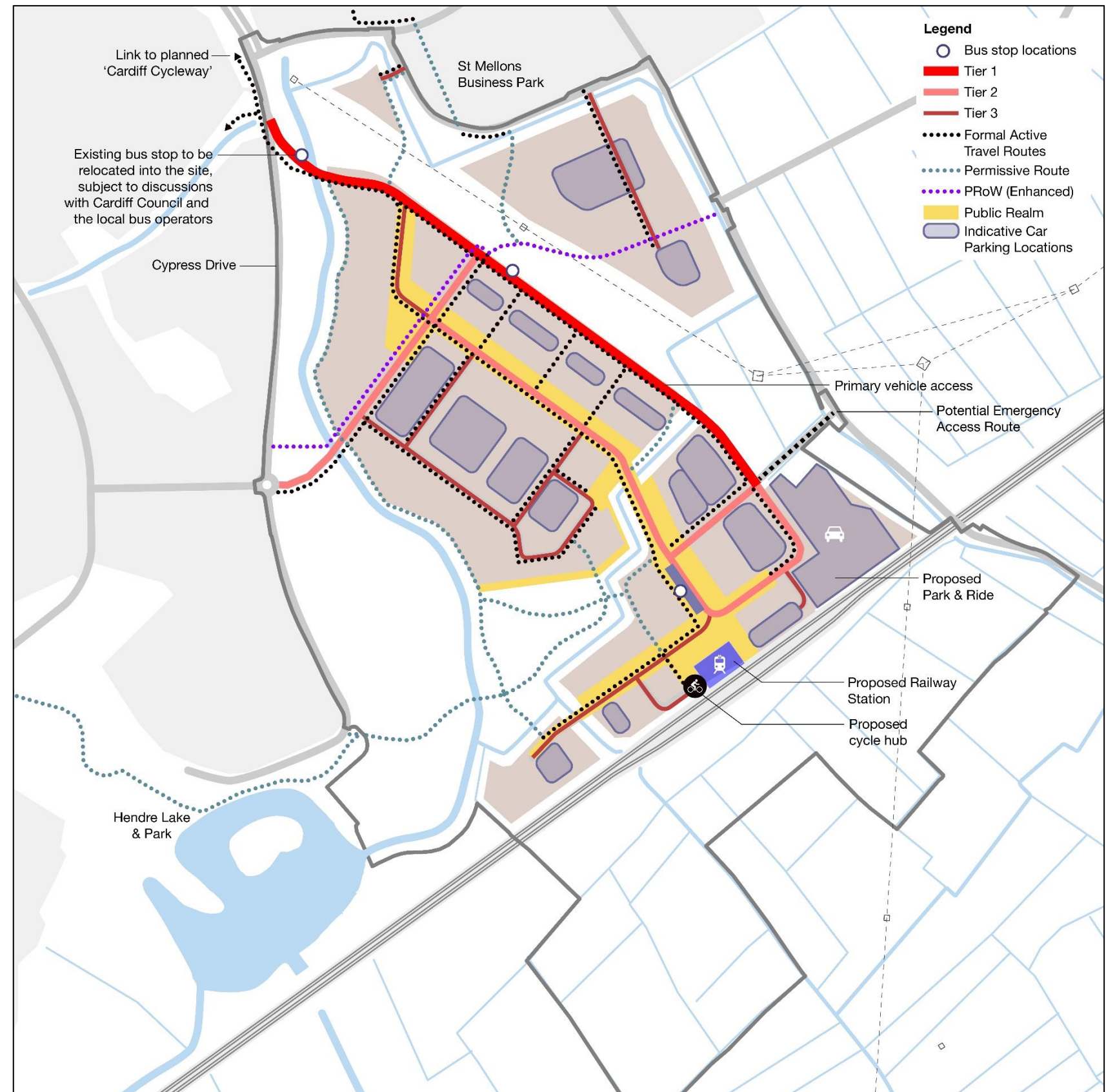


Figure 31: Overall Illustrative Access Strategy

5.4 Hierarchy of Streets

A sustainable transport hierarchy will be integrated in to the design, prioritising pedestrians, cyclists and public transport users over the private car. This is intended to result in a well-connected development that is integrated with the local community and existing facilities.

Figure 30 presents the outline vehicle access strategy and identifies the following three street types:

- Tier 1: primary streets;
- Tier 2: secondary streets; and
- Tier 3: tertiary streets.

The indicative character and role of each of these streets is set out within this section. The detail however will be developed as part of the reserved matters applications.

Tier 1: Primary Streets

The primary access road is planned to accommodate most of the vehicular traffic accessing and travelling within the site. Subject to the masterplan, development mix and junction locations, there is potential that the primary access road may have two-lanes in one or both directions and an appropriate highway width has been provided in the masterplan to provide four 3.5m wide lanes and a verge/central island. An illustrative cross-section of the Primary Street is presented in Figure 32 below.

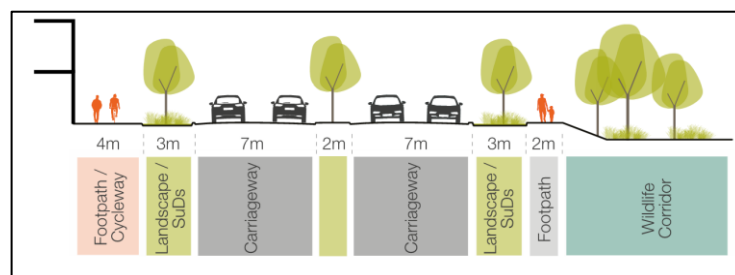


Figure 32: Primary Street Illustrative Cross Section

Traffic calming measures may be considered along the primary highway, including speed tables, horizontal alignment and planting treatment. Signalised junctions will also be explored to compliment these features, encourage a low speed environment and to create pedestrian crossing phases.

Given the width and anticipated traffic volumes, standalone pedestrian and cycle crossings will likely need to be signalised. These will be required where the PROW crosses the highway and where there are bus stops and other facilities that require access.

Tier 2: Secondary Streets

These single carriageway roads are envisaged to be much lighter trafficked than the tier 1 roads, however they are anticipated to be used by public service vehicles with corresponding highway geometries.

There is potential that some streets may have drop-off and collection points alongside service bays. These will be integrated in to the public realm and considered as part of the reserved matters. No on-street parking is envisaged to be allowed beyond these formal bays.

Footways will likely be 2-3m wide and footway/cycleways and segregated cycleways (two-way) will be 3-4m, as shown in the illustrative cross-section in Figure 33 below.

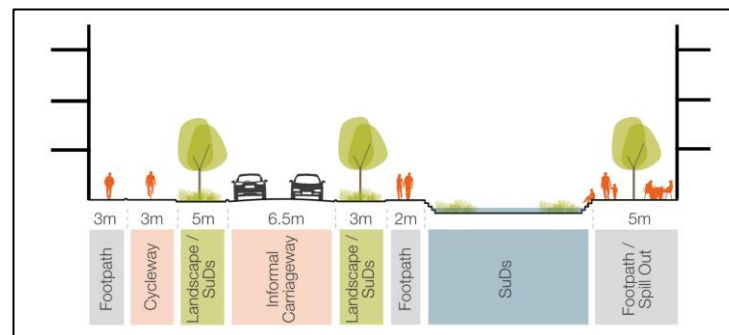


Figure 33: Secondary Street Illustrative Cross Section

Tier 3: Tertiary Streets

These roads are anticipated to be very lightly trafficked, primarily providing vehicular access to individual plots. These roads will be designed to encourage low traffic speeds and therefore be conducive for pedestrians and cycling. An illustrative cross-section for the tertiary streets is presented in Figure 34.

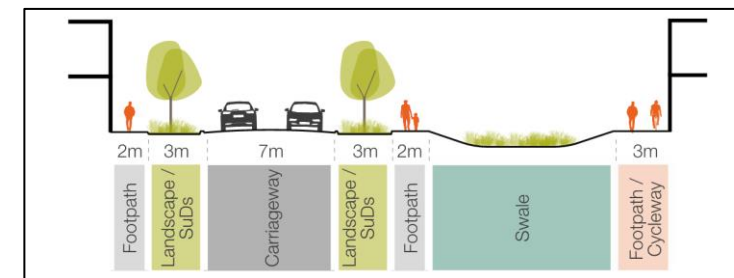


Figure 34: Tertiary Street Illustrative Cross Section

The highway design may seek to reflect ‘Informal Streets’ which are described in the CIHT guidance as the following:

- Creating a street where the higher volume of traffic does not dominate non-vehicular users;
- A defined carriageway for vehicles, however an absence or reduction of formal traffic control measures at junctions;
- Regular crossings of the carriageway where drivers stop or slow to allow pedestrians to cross with confidence, either through formal crossings (signalised or zebra crossings) or by design (courtesy crossings).

Where appropriate, ‘Pedestrian-Prioritised Streets’ may also be introduced and are described as the following:

- Create conditions whereby drivers and riders feel they should give priority to pedestrians, and where pedestrians feel comfortable in accepting that priority;
- Low traffic volumes suggested to be 100 vehicles per hour or less;
- Do not appear to contain a well-defined carriageway so that road users (particularly drivers) do not assume that pedestrians need a defined crossing or a driver’s permission to cross the street; and
- Seating and other useful street furniture has often been placed in the street to emphasise its primary function as a place to be enjoyed.

Pedestrian-Prioritised Streets can result in wayfinding issues for some user groups including young children, older people, non-locals and visually impaired people in this type of street. These potential impacts will need to be fully explored as part of the detailed proposals for the reserved matters applications.

5.5 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. Through the incorporation of best practice design, transport interchange facilities can assist in meeting the social, economic and environmental needs of South East Wales.

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 35 below. The railway station has also progressed through the Governance for Railway Investment Projects (GRIP) Stage 3.

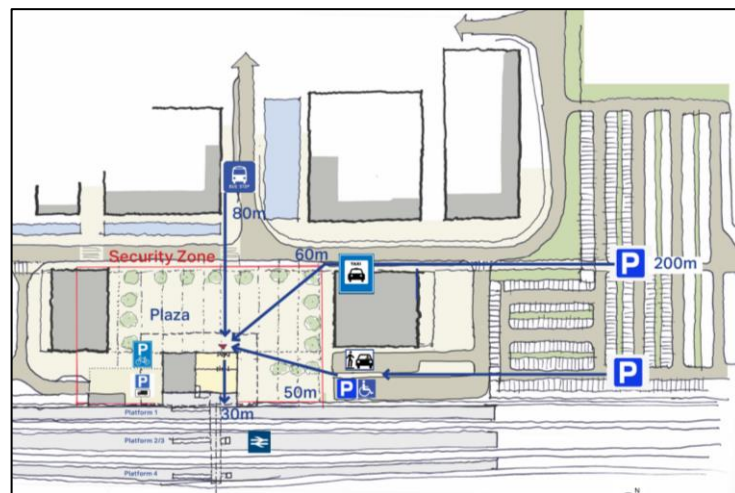


Figure 35: Draft Illustrative Interchange Arrangement (Wilkinson Eyre)

This section outlines the design brief for the transport interchange, the detail of which will follow in subsequent planning stages.

Pedestrians

The transport interchange facility will provide a safe, secure and coherent pedestrian environment with clearly defined routes, appropriate crossings and supporting infrastructure. The interchange zone will be permeable, providing people with the maximum amount of choice for how to move around.

Whilst MfS recommends footway widths of 2m to allow two wheelchair users to pass, additional width will be

provided to accommodate the anticipated footfall and provide a high-quality pedestrian environment. In addition, appropriate crossings will be provided giving pedestrians priority over other modes such as the car.

Cycle

Standards require cycle parking for 5% of adjoining passengers, equating to approximately 35 cycle stands. To bolster the sustainable credentials of the station and support the Travel Plan measures, secure and sheltered cycle parking provision for 100 cycles, including provision for electric and adapted bikes. This cycle parking provision is similar to that at Bristol Parkway.

The cycle stands will ideally be sited a maximum of 50m from the railway station and in a location that is accessible by bike. The stands should therefore both be sited close to the railway station, and directly accessible from a cycle lane or shared footway/cycleway. These cycle paths will be accessible from cycle routes connecting to the wider area, with access paths designed to limit conflict with pedestrians and vehicles.

Nextbike have also introduced a bike share scheme in Cardiff which allows riders to rent a bike and cycle between five bike stations located across the city including at County Hall and Cardiff Central Railway Station. It is proposed that an area of 45m² is safeguarded for a Nextbike station. It is envisaged that this station would need to accommodate up to 30 cycles, with monitoring of demand proposed.

Bus

As presented in the previous section, bus stops are proposed near the station to facilitate easy transition between modes. Depending on the mix of services extended into the site, two or three bus stops will be required, however this will be confirmed following discussions with the local bus operators.

For rail replacement services, vehicles could utilise the bus stops (dependent on demand from scheduled local services) or could be accommodated in the immediate local road system around the station. Rail replacement tends to be required at weekends, when demand for the other uses nearby is likely to be lower.

Taxis

Taxi facilities at Cardiff Parkway station have been sized based on data taken from Bristol Parkway. Based on this information, the facility at Cardiff Parkway should provide a minimum of two set down spaces (in layby form), and a primary rank and pick-up area of 10-15 spaces.

Taxi ranks that underprovide on capacity can result in taxis parking in inappropriate locations, potentially impacting the operation of the overall interchange facility. The design of the taxi rank should therefore consider the potential for future expansion and methods to deter parking in unallocated areas.

Car Parking

Drop off and private hire vehicles

For passengers and staff being dropped off at the railway station, ten spaces will be provided near to the railway station within a 100m walking distance. Based on the survey of Bristol Parkway, ten spaces should be enough to meet demand.

Accessible Car Parking

Parking for Blue Badge Holders should be located as close as possible to the facility it serves, preferably within 50m. The surface of designated parking spaces should be even and stable, with any variation of surface profile not exceeding $\pm 5\text{mm}$.

At railway stations, the 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 a deviation of these standards. Based on a car park of 600 long-stay parking spaces, 30 accessible parking spaces should be provided.

Station Park and Ride

Up to 650 parking spaces are proposed for the station park & ride car park (including accessible parking) and the short-stay and drop-off. It is therefore expected that there will be a minimum of 600 long-stay parking spaces serving the station.

This surface car park, which will also include electric charging provision, will have all spaces within 400m walking distance of the railway station entrance⁶.

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.⁷

Electric vehicle charging will be provided for 10% of long-stay parking spaces to reflect PPW 10. Passive provision is proposed so that the other 90% of spaces can be easily converted in response to market or regulatory demand.

The car park will also include provision for motorcycles. These spaces should be located closest to the station.

Inclusive Design

Designing for accessibility is about making places easier to use for all passengers. This includes people with a range of disabilities and is not limited to visually and mobility-impaired passengers. Older people, families with young children, people with heavy or bulky baggage, and those with bicycles should also be considered when designing for accessibility.

To design an interchange that is accessible for all users, consideration will be given to the following:

- Those with mobility, hearing and visual impairments;
- Appropriate provision of lifts, escalators and ramps;
- Clearly signposted step-free routes;
- Points to stop, wait and rest;
- Tactile paving and clearly defined and simple routes;
- Potential for an enclosed footbridge connecting the concourse of the interchange with the rail station;
- Accessible and sheltered walkways between the railway station, car park, bus stops and drop-off facilities; and
- Provision for adapted cycles.

⁶ CIHT (2000) Guidelines for Providing for Journeys on Foot

5.6 Parking Management Plan

There will be a parking charge associated with the long-stay car park for Cardiff Parkway. This could result in some station users parking on peripheral highways or the residential street in St Mellons including Cypress Drive. Subject to pricing and demand, there is also potential that some future employees of Cardiff Hendre Lakes business district may also park on these residential streets. At the initial public consultation events some concerns were expressed by residents that additional on-street car parking would occur because of these proposals.

A Parking Management Plan is therefore proposed to monitor on-street car parking near the site over a five-year period from the time when the station is operational. 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. Any management proposals, such as issuing resident permits or introducing double yellow lines, would need to be discussed and agreed with CC.

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



Figure 36: Potential Extent of the Parking Management Plan

⁷ DfT (2015) Design Standards for Accessible Railway Stations

5.7 Business District Parking

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. For 90,000m² of Office, 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 should be secured, sheltered and should be step-free.

Cycle parking provisions should be provided individually for each plot and reflect the aspirations of the corresponding Travel Plans.

In addition, visitor cycle parking will be provided throughout the site and will be integrated in to the public realm strategy. The design and location of this cycle parking will be agreed as part of the reserved matters.

There is potential that these public bike storage areas could incorporate a green roof, similar to the design implemented at IKEA, Greenwich, as presented in Figure 37 below.



Figure 37: Green Roof Bike Shelters, IKEA Greenwich (source: Livingroofs.org)

Car Parking Strategy

Car parking provision for the proposed business district will be agreed with CC as part of the reserved matters.

As agreed with CC at scoping, a bespoke parking standard will be explored that sits between the central and non-central parking standards, and reflects the sustainable credentials of the development site.

The robust vehicle trip estimates presented in the Section 6.4 and summarised in Table 12, up to 2,090 parking spaces may be required. This will need to be recalculated once the development land-use mix and quantum has been fixed.

Table 11 sets out the CC adopted parking standards for office development⁸.

Table 11: Parking Standards for B1(a) Office

Standard	Parking Requirements	
	Standard	90,000m ²
Central	1 per 250m ²	360
Non-Central	1 per 50m ²	1,800

The central parking standard is not considered appropriate for the development site as the centre of Cardiff is more accessible and there is considerable existing public car parking.

The non-central parking standard allows up to 1,800 parking spaces to be introduced for 90,000m² of office. Subject to the land-use mix being refined in subsequent design stages, 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 PPW 10, 10% of parking spaces will be designed for EV charging. Passive provision is proposed for the remaining 90% of car parking so they can be easily converted in response to market or regulatory demand.

Table 12: Business District Car Parking Accumulation Calculation (Office – 90,000m²)

Time Range	In	Out	Cumulative
07:00-07:30	88	11	77
07:30-08:00	395	18	454
08:00-08:30	432	40	845
08:30-09:00	637	59	1,424
09:00-09:30	461	70	1,815
09:30-10:00	249	73	1,991
10:00-10:30	154	92	2,053
10:30-11:00	135	99	2,090
11:00-11:30	95	99	2,086
11:30-12:00	106	106	2,086
12:00-12:30	172	296	1,962
12:30-13:00	231	381	1,812
13:00-13:30	296	311	1,797
13:30-14:00	329	190	1,936
14:00-14:30	212	146	2,002
14:30-15:00	121	143	1,980
15:00-15:30	102	128	1,954
15:30-16:00	95	157	1,892
16:00-16:30	73	253	1,713
16:30-17:00	70	315	1,468
17:00-17:30	66	630	904
17:30-18:00	33	392	545
18:00-18:30	22	348	220
18:30-19:00	7	88	139

⁸ Managing Transportation Impacts (2018) Cardiff Council

6 Future Travel Demand

6.1 Introduction

This chapter presents the future travel demand forecasts that are expected to be generated by the proposed development. These form the basis for understanding how demand will be spread across the traffic and transport networks. The development vehicle trip forecasts will also enable the impact of the proposed development at junctions to be quantified.

As part of the pre-application consultation with CC, the following technical notes have been submitted for comment:

- Technical Note 1: Committed Development and Background Traffic Growth (Appendix E); and
- Technical Note 3: Trip Generation and Distribution (superseded).

Following some alterations to the trip making assumptions, Technical Note 3 has been superseded and revised forecasts are presented in this Transport Assessment.

6.2 Committed Development

Technical Note 1: Committed Development and Background Traffic Growth sets out the approach adopted to estimate traffic impacts from committed development. This section of the TA presents a summary of the technical note which can be found in Appendix E.

As agreed with CC, several committed developments have been included within this assessment. These sites are outlined in Table 13 and illustrated in Figure 38.

There is potential for some trips between the committed and proposed development to be double counted. These trips have been isolated and removed from the assessment, as detailed in Technical Note 1.

Planning permission has been granted for many of these developments and therefore the associated Transport Assessments have been approved by CC. Where this is the case, consented trip rates have been taken from the corresponding Transport Assessments.

Table 13: Committed Developments near Cardiff Hendre Lakes

No	Development Site	Proposals
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

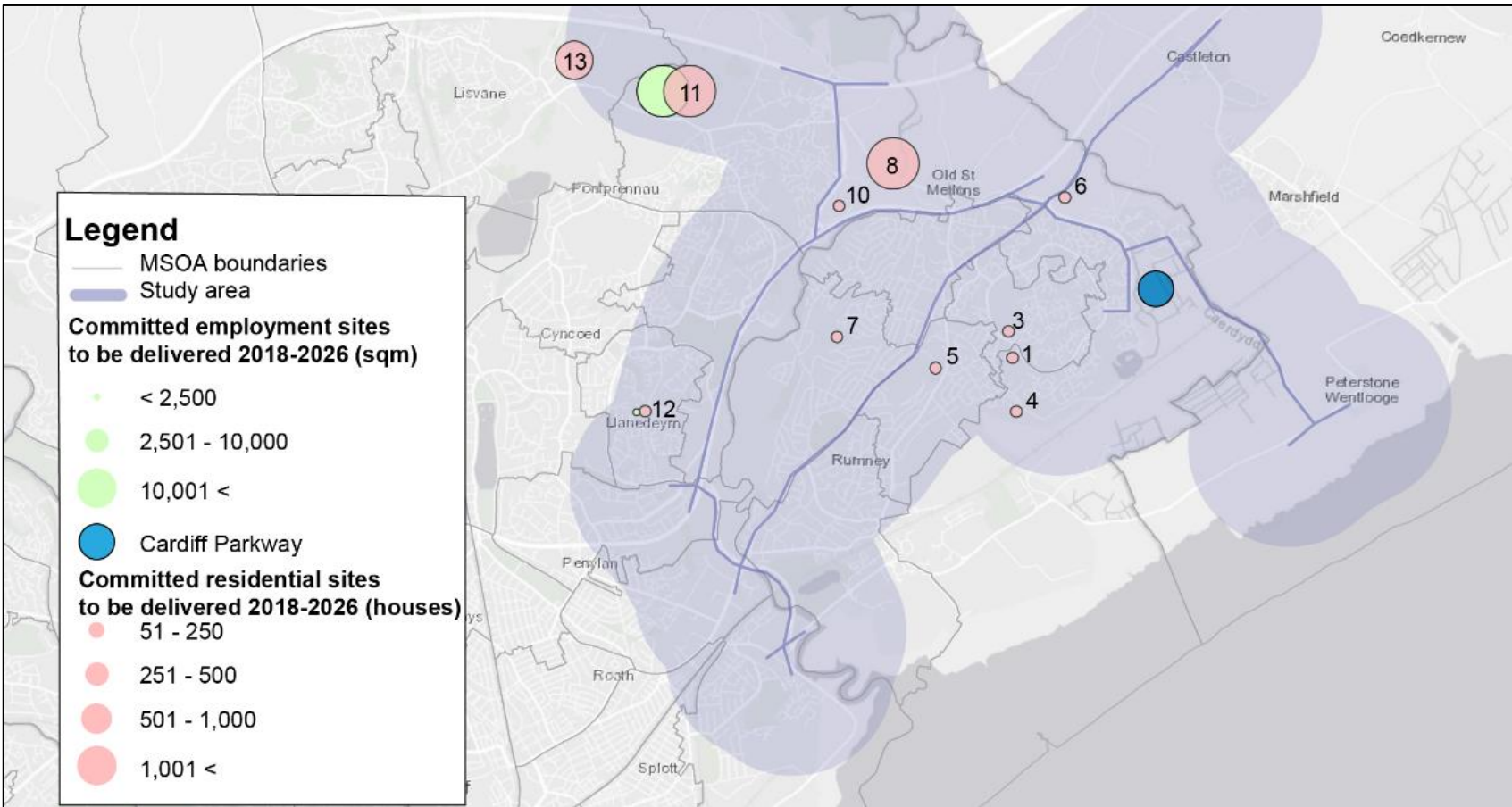


Figure 38: Committed Developments

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 included a proportion of flats.

The residential development is estimated 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 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 approximately 150 dwellings. However, in 2006 an outline application for the development of around 350 dwellings was approved under application reference 06/00524/E. This followed a previous successful application for development of a portion of the site.

Although this may now have lapsed, the previous planning permission shows that 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 the CLDP (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 residential development 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 for up to 83 dwellings.

The development is 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 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 1,020 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 the CLDP as part of strategic site G which was identified as having potential to deliver 1,300 homes.

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 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 2019 to accompany Pre-Application Consultation submission 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.

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.

A subsequent TA has been submitted as part of the Outline Planning Application which includes potential trip making forecasts if the CLDP objective for a 50/50 modal split is achieved. Given CC have not provided comment on these assumptions, the more robust trip making assumptions have been used to inform this assessment.

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 site is estimated to 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 CLDP as strategic site F.

The residential trip rates set out in the TA 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 set out in Table 14. The total number of trips produced by committed developments for the Hendre Lakes TIA is 3,534 two-way trips in the AM peak hour and 3,510 trips in the PM peak hour.

The methodology for distributing these committed development trips across the highway network is detailed in Technical Note 1. In summary, the distribution of the development traffic has 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 multiple feasible routes could be used, the development trips have been split accordingly.

The cumulative traffic impact of all the committed development traffic is presented diagrammatically within Technical Note 1, included in Appendix E.

The technical note also outlines how trips between the proposed and committed developments have been isolated to reduce potential double-counting.

Table 14: Summary of Committed Development Vehicle 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	3,534	1,927	1,584	3,510

6.3 Background Traffic Growth

The future year assessment scenarios that have been assessed within the TA have been defined through consultation with CC. It has been agreed that two future years will be assessed and include the following:

- 2023, the year in which the station and Phase 1 of the development is expected to be operational; and
- 2028, representing the year when the site is expected to be fully built-out and operational.

As set out in Chapter 9 of this TA, the final construction programme for the development will be subject to market conditions and the station programme will be subject to agreements with Network Rail and the securing of possessions and other agreements. Changes in the delivery programme are therefore possible but are unlikely to have a significant impact on this assessment.

It has been agreed through the TA Scoping Note and discussion with CC 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 Hendre Lake 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 the risk of allowing for the site twice.

To provide the most robust assessment this TA assumes that all 90,000m² of development is offices as this has the highest employment density and as a result, total trips. To maintain consistency with that assumption the ratio of jobs to NIA was established through reference to the Employment Densities Guide⁹ which states there is an average of 1 full time employee for every 12m² of Net Internal Area (NIA) for office land uses.

⁹ Homes and Communities Agency (2015) Employment Density Guide 3rd Edition

The forecast number of jobs created by the business district in the years 2023 and 2028 is based on an assumed build out rate of 22,500m² GFA in 2023 and the full build out of 90,000m² in 2028. This equates to 18,000 NIA in 2023 and 72,000 NIA in 2028 The total number of jobs assumed to be created for both assessment years is shown in Table 15.

Table 15: Assumed jobs created by Cardiff Hendre Lakes Business District

Year	Quantum (NIA)	Measurement	Jobs
2023	18,000m ²	NIA	1,500
2028	72,000m ²	NIA	6,000

The likely final employment mix will include other, less dense, employment types and, therefore, this figure (6,000) is higher than that used in consultation materials (5,000).

The alternative assumptions included in TEMPro are detailed in Table 16 below. Adjustments have been altered accordingly to avoid a negative growth in either households or jobs between the base and future year.

Table 16: Alternative assumptions applied in TEMPro

Year	Base	Unadjusted Future	Adjusted Future
Households			
2023	3,078	3,269	3,078
2028	3,078	3,469	3,078
Employment			
2023	6,638	6,749	6,638
2028	6,638	6,843	6,843

To derive growth factors from 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 17, with the full output and results presented in Technical 1 (Appendix E).

Table 17: TEMPro Growth Factors (2018-2028)

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, 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 results of this sensitivity test are included in Table 18 alongside the TEMPro growth factors achieved without any alternative assumptions applied for 2028.

Table 18: Traffic Growth Sensitivity Analysis (2018-2028)

Method	Growth Factors	
	AM Peak	PM Peak
With alternative assumptions and Committed Development	1.2885	1.2908
TEMPro without alternative assumptions	1.1243	1.1245

As shown in Table 18, the proposed methodology achieves a much higher traffic 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.

These traffic growth factors were included in Technical Note 1 and submitted to CC for comment.

A traffic growth factor has not been applied to all turning movements associated with Cypress Drive given the committed and proposed development will likely capture all traffic growth in the area. Given that the development is expected to reduce the proportion of existing journeys made by car owing to the sustainable transport improvements including the proposed railway station, this approach is appropriate and agreed by CC.

6.4 Station Trip Generation

Travel demand forecasts presented in this section form the basis for understanding how vehicular traffic will be distributed across the transport network.

South East Wales Transport Model

The South East Wales Transport Model (SEWTM) is a multi-modal disaggregate demand model of the region. It comprises of a highway and public transport assignment model linked to a demand model.

It has been developed to provide the Welsh Government with a tool to assess multi-modal transport interventions in the Cardiff Capital Region.

The use of SEWTM is suitable for understanding the current travel patterns, predicting future travel patterns, assessing transport and development interventions and providing inputs for transport appraisals.

The model can assess new stations, rail-based P&R schemes, highway infrastructure, timetable improvements and new residential or commercial developments.

The following assessment scenarios were assessed in SEWTM:

- Base Year (2015);
- 2026 Do Minimum (without development); and
- 2026 Do Something (with development).

Whilst the above future year scenarios do not correspond with the assessment scenarios proposed for this TA, the same development proposals were assessed in SEWTM (90,000m² of employment and a railway station). The net impacts of the development proposals are therefore considered to be broadly the same, regardless of the future year that has been assessed. The model outputs are therefore appropriate, even though the future year of 2026 was assessed rather than 2028. This has been agreed with CC.

Journey Purpose

Table 19 below presents the journey purposes associated with the proposed station. The park & ride trips include all trips to the station by car.

Table 19: Railway Station Journey Purpose (Weekdays – excludes major events)

Journey Purpose	Weekday (%)
Park & ride (westbound services)	7%
Park & ride (eastbound services)	28%
Existing residents and employees	34%
Business district	31%

Of weekday trips to and from the station, 35% are estimated to be vehicle trips switching to rail (P&R). The remaining trips are estimated to be existing residents and existing and proposed employment in St Mellons, including Hendre Lakes. Trips to the existing business park and the proposed business district will not generate any vehicle trips as passengers will travel to the station by rail and depart principally by foot. Similarly trips from residents excludes vehicle trips as these would be associated with the park & ride. These trips would therefore be made by a mix of walking, cycling and bus.

Peak Hour Movements

Table 20 presents the factors that have been used to calculate the proportion of weekday journeys that will occur in the peak hours, and these have been derived from SEWTM.

Table 20: Weekday to Peak Hour Factors excluding events (All Trips – 2028)

Period	Factor	Total Trips
Weekday	-	2,780
AM Peak Hour	3.56	781
PM Peak Hour	4.36	637

In the weekday AM peak hour, 781 passengers are forecast to travel either to or from the station. In the weekday PM peak hour, 637 passengers are forecast to use the station in 2028.

It should be noted that the above forecast does not include any potential impact associated with the Llanwern Railway Station proposals. Given the catchment for Cardiff Parkway is not anticipated to extend beyond west Newport, as presented in Figure 40 overleaf, the potential impacts of the Llanwern railway station proposals on Cardiff Parkway patronage are anticipated to be minimal.

Vehicle trips originating from the east of Newport are mostly allocated to Severn Tunnel Junction or Newport. The introduction of a park & ride as part of any proposed station at Llanwern is therefore more likely to impact Severn Tunnel Junction and Newport railway stations.

Bench Marking

CC have requested that a benchmarking exercise is undertaken to compare how the forecast number of trips that will be generated by Cardiff Parkway compares with existing railway stations.

Table 21 below presents a comparison of the daily entry/exits recorded at existing stations in Wales with the Cardiff Parkway forecast. It also presents the frequency of services and the quantum of car parking available.

With regards to daily entries and exits, Cardiff Parkway is expected to attract a similar number of trips as Pontypridd and Neath. This is appropriate as Pontypridd station is served by a similar number of services and has significant car parking provision either within or near the station. Whilst Neath has fewer services per hour, it is served by a London service and has a larger park & ride market.

In comparison with other ‘mainline’ stations, Cardiff Parkway is estimated to attract fewer passengers than city centre stations such as Cardiff, Newport and Swansea.

Like the proposed Cardiff Parkway, Bridgend is served by one service an hour to London and several services to Cardiff and Swansea. Bridgend railway station does however serve a town of around 40,000 people with significant levels of inward/outward commuting and relatively few local alternatives. It is therefore a reasonable assumption Cardiff Parkway might attract fewer passengers than Bridgend.

In summary, the benchmarking presented above indicates that the demand forecast for Cardiff Parkway sits within a sensible range.

Table 21: Cardiff Parkway Railway Station Benchmarking (2018)

Station	Weekday Entries/Exits	Departures per Hour ¹⁰		Parking Spaces
		08:00-09:00	17:00-18:00	
Cardiff Central	41,861	32	35	372
Cardiff Queen Street	9,413	30	29	-
Newport	8,716	12	18	260
Swansea	6,978	3	5	41
Bridgend	4,934	12	11	105
Cardiff Bay	4,210	5	5	-
Cathays	3,058	13	12	-
Pontypridd	2,793	12	14	6 (+410)
Cardiff Parkway (2028)	2,780	9	9	600
Neath	2,640	5	5	69 (+450)
Caerphilly	2,495	8	8	228
Barry Island	2,435	3	3	-
Treforest	2,432	12	12	118
Bangor	2,140	2	2	89
Penarth	2,026	4	4	15
Aberdare	1,848	2	2	43
Radyr	1,741	15	14	119 (+177)

¹⁰ National Rail Enquiries (02/07/2019)

Park & Ride Vehicle Trips

The Demand Forecasting Report for the proposed railway station indicates the park & ride is forecast to generate 983 additional vehicle trips on the local network on a typical weekday, reflecting 491 vehicle trips to and from the station. As detailed in the following section, a proportion of these vehicle trips will be pick-ups/drop-offs, “kiss & ride.”

The factors presented in Table 20 relate to all movements associated with the station. It is envisaged that many park & ride users will arrive before the AM peak hour as they will be commuting to Bristol and beyond. Similarly, it is envisaged that many users of the park and ride will arrive back at the station after the PM peak hour (16:30-17:30). These factors are therefore not considered to be reflective of vehicle trips associated park & ride.

The Department for Transport (DfT) dataset RAI0202¹¹ presents the number of arrivals and departures from Cardiff city centre¹² by rail on a typical autumn weekday. This dataset has been used to calculate a daily profile of arrivals and departures for the AM and PM peak periods, as presented in Table 22 below.

Table 22: Arrivals and Departures from Cardiff City Centre

Period	Arrivals		Departures	
	Trips	Profile (%)	Trips	Profile (%)
AM Peak Period				
07:00 - 07:59	4,262	31%	2,128	31%
08:00 - 08:59	6,757	50%	2,927	43%
09:00 - 09:59	2,572	19%	1,832	27%
PM Peak Period				
16:00 - 16:59	2,434	33%	4,797	34%
17:00 - 17:59	2,868	39%	5,824	41%
18:00 - 18:59	2,098	28%	3,435	24%
16:30-17:30	2651	36%	5310.5	38%

To align with the peak hours assessed within this report, it is proposed to use 08:00-09:00 for the AM peak hour. To estimate the arrival and departure profile for the PM

¹¹ DfT (2017) RAI0202: City centre arrivals and departures by rail on a typical autumn weekday, by city and time band

peak hour (16:30-17:30), an average of the arrivals and departures in the period 16:00-18:00.

The park & ride eastbound services are anticipated to have a similar profile to departures from Cardiff city centre. The destination of westbound services from the park & ride is likely to be Cardiff Central and therefore the profile should reflect arrivals to Cardiff city centre.

Table 23 below presents the estimated number of vehicle trips generated by the railway station. The peak hour movements have been derived with the assumption all vehicle trips associated with the park & ride will arrive and depart in the AM and PM peak periods.

Table 23: Weekday to Peak Hour Factors (Park & Ride - 2028)

Period	Westbound Services		Eastbound Services		Total Vehicle Trips
	Factor	Vehicle Trips	Factor	Vehicle Trips	
Weekday		191		792	983
Weekday Departures	2	95	2	396	491
AM Peak Hour	2.01	47	2.35	168	216
Weekday Arrivals	2	95	2	396	491
PM Peak Hour	2.65	36	2.79	142	178

As set out in the table above, 216 vehicles are anticipated to arrive in the AM peak hour. In the PM peak hour, 178 vehicles are expected to depart from the park & ride.

In agreement with CC, two additional sensitivity tests have been explored:

- Sensitivity Test 1: Park & Ride car park with approximately 600 long-stay parking spaces being fully occupied at the end of the morning peak period i.e. 10:00; and
- Sensitivity Test 2: Park & Ride car park with approximately 600 long-stay parking spaces fully occupied at the end of the morning peak hour i.e. 8.45am.

¹² Cardiff city centre includes Cardiff Central and Cardiff Queen Street railway stations

Table 24 presents the vehicle trips that would be generated if the park & ride car park of approximately 600 spaces was fully occupied at the end of the morning peak period.

Table 24: Annual to Peak Hour Factors for all Rail (Car Park Fully Occupied)

Period	Westbound Services		Eastbound Services		Total Vehicle Trips
	Factor	Vehicle Trips	Factor	Vehicle Trips	
Weekday		233		967	1,200
Weekday Departures	2	117	2	483	600
AM Peak Hour	2.01	58	2.35	205	263
Weekday Arrivals	2	117	2	483	600
PM Peak Hour	2.65	44	2.79	173	217

In a scenario where the car park would be fully occupied, the station is forecast to generate 263 vehicles in the AM peak hour and 217 vehicles in the PM peak hour. Given the development proposals are for a park & ride with approximately 600 long-stay parking spaces, the vehicle trips presented in Table 24 above will be used to inform the traffic impact assessment to ensure a worst case is assessed.

Sensitivity Test 2 reflects a scenario where demand for the eastbound services was higher than anticipated. This would likely result in the park & ride becoming fully occupied by the end of the AM peak hour (08:45), rather than the peak period (10:00). This sensitivity test has been developed based on the following assumptions:

- 90% P&R passengers travelling eastbound, as opposed to the SEWTM forecast of 80%;
- Car park will be fully occupied at the end of the peak hour; and
- Arrival and departure profiles will reflect Cardiff Central station car park.

Traffic flows associated with the alternative sensitivity test are presented in Table 25 below.

Table 25: Annual to Peak Hour Factors for all Rail (Car Park Fully Occupied)

Period	Westbound Services		Eastbound Services		Total Vehicle Trips
	Factor	Vehicle Trips	Factor	Vehicle Trips	
Weekday	-	120	-	1,080	1,200
Weekday Departures	2	60	2	540	600
AM Peak Hour	1.63	37	1.73	313	349
Weekday Arrivals	2	60	2	540	600
PM Peak Hour	2.65	23	2.79	194	217

In this alternative sensitivity test where the car park would be fully occupied at the end of the peak hour, the station is forecast to generate 349 vehicles in the AM peak hour and 217 vehicles in the PM peak hour. This is an overly robust scenario and it is therefore proposed not to include this within the future year assessments.

Should demand for the Park & Ride increase to the extent that the car park is fully occupied by the end of the peak hour, it is envisaged that the car park would be expanded. This would require a separate planning application in which the traffic impact would likely be assessed and potentially mitigated.

Kiss & Ride Vehicle Trips

SEWTM is not able to distinguish between park & ride and kiss & ride trips generated by the proposed station. The forecast vehicle trips estimated to be generated by the station in 2028, as set out in Table 23, includes both the Park & Ride (long-stay car parking) and Kiss & Ride (drop-off, pick-up and taxi).

As set out in Section 4.8, a survey of Bristol Parkway railway station was undertaken. In summary, key findings include the following:

- The ratio of taxi pick-ups and drop-offs suggests most taxis pick-up a passenger after dropping someone else off;
- Drop-off (including taxi) accounted for 33% of all car journeys arriving to the station in the AM peak hour;
- In the PM peak hour, drop-off (including taxi) accounted for 47% of all car movements departing from the station.

This survey data has been used to calculate the proportion of the vehicle trips presented be kiss & ride, including drop-off, pick-up and taxi, as presented in Table 26 below.

Table 26: Kiss & Ride Vehicle Trips (2028)

	AM Peak Hour	PM Peak Hour
Total Vehicle Trips	216	178
Kiss & Ride (%)	33%	47%
Park & Ride	146	94
Kiss & Ride	70	84

The Kiss & Ride, including pick-up, drop-off and taxi, is estimated to generate 70 vehicle trips in the AM peak hour and 84 trips in the PM peak hour.

Vehicle Trips Summary

The vehicle trips estimated to be generated by Cardiff Parkway railway station for each scenario is presented in Table 27 below.

Table 27: Railway Station Vehicle Trips

	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
2028 (Demand Forecasting Report)				
Park & Ride	146	0	0	94
Kiss & Ride	70	70	84	84
Total	216	70	84	178
Sensitivity Test 1				
Park & Ride	263	0	0	217
Kiss & Ride	70	70	84	84
Total	333	70	84	301
Sensitivity Test 2				
Park & Ride	349	0	0	217
Kiss & Ride	70	70	84	84
Total	419	70	84	301

In 2028, the railway station is forecast to generate 286 vehicle trips in the AM peak hour and 262 vehicle trips in the PM peak hour. In Sensitivity Test 1, based on the long-stay car park becoming fully occupied at the end of the morning peak period, the station is forecast to generate 403 vehicle trips in the AM peak hour and 385 trips in the PM peak hour.

For the purposes of this assessment, vehicle trips associated with Sensitivity Test 1 will be used in the future year assessment scenarios. Whilst this does reflect a significant increase in traffic movements in comparison with the forecasting demand report, it does align with the approximate quantum of long-stay car parking proposed.

Sensitivity Test 2 is deemed to be an overly robust scenario and should demand for the Park & Ride increase to the extent that the car park is fully occupied by the end of the peak hour, it is envisaged that the car park would be expanded. This would be subject to a separate planning application.

6.5 Business District Trip Generation

Introduction

This section sets out the potential land uses associated with the business district and the methodology proposed to calculate the future travel demand. Trip generation rates have been obtained through the identification of comparable sites within the TRICS (v7.6.4) database. Owing to the outline nature of the proposals, the exact mix of development is not certain, and the future occupiers are not confirmed. It is however anticipated that the business district will be mostly B1(a) office and B1(b) research and development.

It has been assumed for the purposes of this assessment that the entire business district will be office. Given office developments typically generates more traffic than research and development sites, this assumption provides for a suitable robust assessment.

As set out in the ES, the business district is estimated to deliver approximately 6,000 jobs. Subject to the end users and land uses, both of which are uncertain, there may however be some variations in the number of jobs created. As set out above, given the assessment is based on 90,000m² of office, it is suitably robust.

In addition to the above, ancillary development is proposed alongside the business district and includes the following land-uses:

- A1: Convenience store; and
- A1 & A3: Café/restaurant.

These land uses will be in addition to the 6,000 jobs created by the business district. However, given that they are ancillary, they are deemed to be incidental to the business district and station and not generate any material peak hour movements. Given it is proposed to assess the most robust land use for the business district, B1(a) office, it is deemed to be appropriate not to include the ancillary development within the site trip generation.

Methodology

The proposed development will be highly accessible by sustainable modes of transport. The proposals for the site include a railway station, bus waiting facilities and an extension to Route 2 of the Cardiff Cycleway within the site. The masterplan will also prioritise sustainable modes of transport including walking, cycling and bus over the car.

A site-wide Travel Plan and Parking Strategy is also proposed to encourage trips to be made to the site by sustainable modes of transport. To account for these infrastructure and service improvements, the following methodology is proposed to forecast future travel demand:

- Extract total person trip rates from TRICS for the land-use B1(a) office, with both floor area and jobs as the potential input parameters;
- Cross test the trip rates to calculate the variation in the mean and median trip rates for both input parameters (floor area and jobs) to understand the robustness of each dataset;
- Forecast the total person trips generated by 90,000m² (6,000 jobs) of office using the trip rates deemed to be the most robust for this assessment;
- Estimate the modal split of journeys made to and from the business district using census data and SEWTM outputs; and
- Calculate the number of trips estimated to be generated by the business district for each mode of transport.

Total Person Trips

The category Employment-Office has been selected within TRICS to estimate the total person trip rates for the land use B1(a) office. The following filters have been applied within TRICS:

- Sites within London, Northern Ireland and Scotland were removed;
- Only sites with at least 100 jobs or 2,500m² were included to reflect the scale of the proposals, removing any small office developments that many have alternative travel demand profiles;
- Public sector offices such as council offices have been removed as these are considered to have different characteristics to private sector offices; and
- Other sites were removed that were deemed to not be reflective of the proposals. This included data centres, a DIY Headquarters (which included a conference centre) and a construction company.

Given total person trips are being obtained, as opposed to vehicle trips, no further filters were deemed to be necessary. The cross test indicated that the ‘jobs’ parameter provided more robust trip rates than that of the ‘floor area’ parameter, with a variation between the mean and median of 0.6%, as opposed to the floor area parameter which has a variation of 16.7%.

Details of the selected TRICS sites presented in this section are included in Appendix K. Table 28 below presents the trip rates and the resulting total person trips that would be generated by the business district.

Table 28: Office Total Person Trip Rates (90,000m²)

Factor	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Trip Rates	0.292	0.027	0.037	0.258
Trips	1752	162	222	1548

The business district is forecast to generate 1,914 two-way person trips in the AM peak hour and 1,770 trips in the PM peak hour. Potential other land uses such as research & development have not been included in this assessment. Given these land uses have lower trip rates than office, the above total person trips are considered to present a suitable robust scenario.

Modal Split

Existing travel characteristics of employees in the local area can be obtained from census data. The census data is not considered to reflect future travel characteristics 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 a new mode;
- It is proposed to improve bus service frequency and provision;
- Cycleway 2 is proposed by CC to run from the city centre to the site; and
- A Travel Plan and Parking Strategy will be prepared to encourage travel by sustainable modes and reduce the number of trips made to the site by car.

As detailed in Table 30, the estimated modal split of journeys to Cardiff Hendre Lakes business district has been informed by SEWTM outputs and census data. The resultant modal split has then been finessed to reflect the measures that will be set out in the Travel Plan and the Parking Strategy. These modes shares have been agreed in principle with CC at TA scoping.

Table 29: Business District (Employment) Modal Split

Mode	Modal Split
On foot	6.0%
Bicycle	4.0%
Motorcycle, scooter or moped	0.7%
Train	13.4%
Bus	8.6%
Car (All Trips)	67.3%
Car (Driver) (91% of Car)	61.0%
Car (Passenger) (9% of Car)	6.3%

It is estimated that approximately 67% of trips to the business district will be made by car, of which 61% will be drivers and 6% will be as passengers.

Table 30: Summary of Modal Split Assumptions

Mode	Modal Split Assumptions
Walking and Cycling	Census data indicates that 5.1% of people currently walk to work and 1.3% cycle. As noted above, the census data includes the employment site located on Wentloog Avenue which is not accessible by foot or cycle. With a proposed Masterplan that prioritises suitable modes of transport over vehicle movements, it is estimated that 6% of people will walk to the business district. With the introduction of Cycleway 2 and the Travel Plan interventions, it is estimated that approximately 4% of employees would commute by cycle.
Motorcycle, Scooter & Moped	Census data for St Mellons indicates that 0.7% of trips are made to the site by motorcycle, scooter or moped. It has been assumed that the same proportion of commuters to the proposed business district will arrive by this mode of transport.
Train	As noted in Table 19, 31% of weekday trips to and from Cardiff Parkway are associated with the proposed business district. This equates to both 431 arrivals and 431 departures a day. These are principally associated with commuting and will therefore occur in the morning and evening peak periods. With an arrival and departure profile obtained from TRICS, it is estimated that 239 of journeys to work are made by rail in the AM peak hour and 208 journeys are made in the PM peak hour. This equates approximately 13.4% of journeys being made by rail in the peak hours.
Bus	SEWTM indicated that 8.6% of journeys to the business district would be made by bus based on indicative assumptions inputted in to the model. These assumptions included the 44/45, X5 and 64/65 bus services being extended in to the site, equating to nine services an hour in peak periods. Whilst it is envisaged that further journeys may be made by bus given the potential service improvements to the strategic residential sites including St Edeyrn’s and North East Cardiff, 8.6% mode share is a suitably robust assumption.
Car Share	Census data for the area indicates that 92% of the commuters travelling by car are drivers and 8% are passengers. With the introduction of an additional 90,000m ² of office development, there will be more employees in the St Mellons area which will increase the opportunity to car share. With the introduction of a site-wide Travel Plan that will include specific measures to encourage car sharing, it is estimated that 9% of commuters travelling by car would car share
Car Driver	The remaining journeys made to the site are therefore estimated to be car drivers, as set out in Table 29.

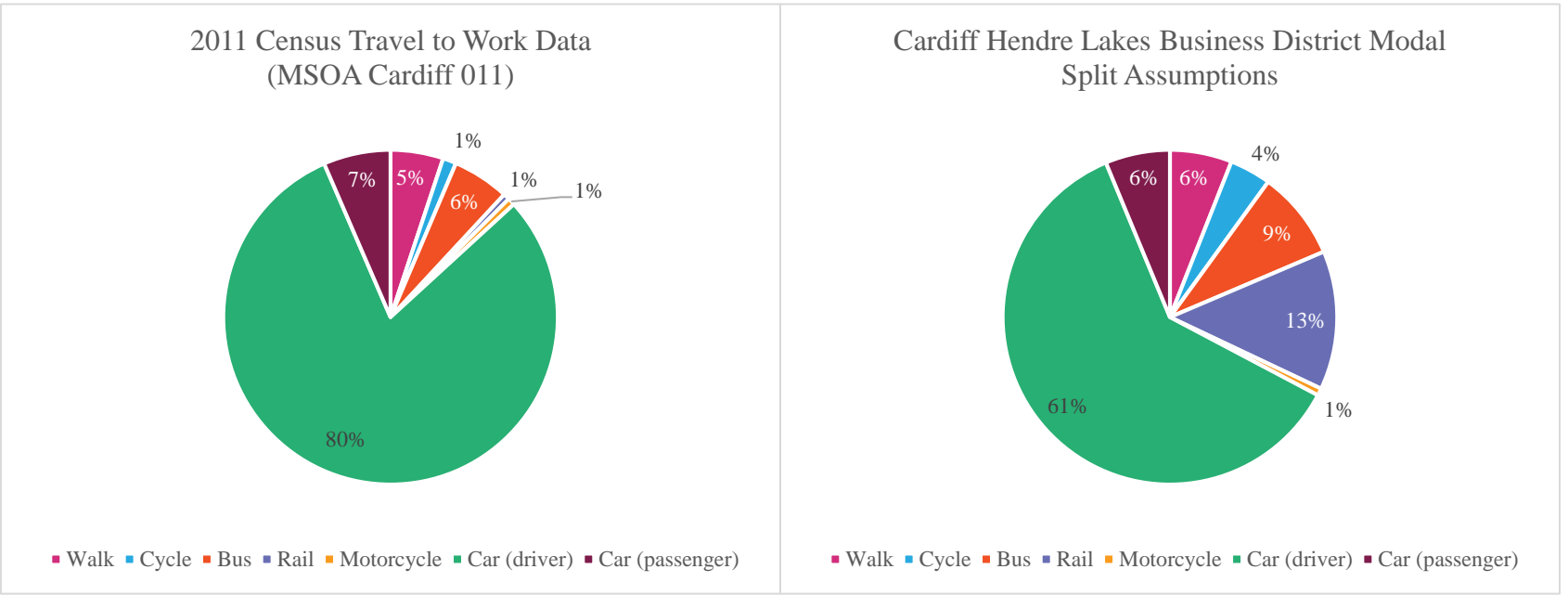


Figure 39: Cardiff Hendre Lakes Business District Modal Split Assumptions

Benchmarking

Table 31 presents a comparison of the proposed modal split for the business district with census data for the MSOA of St Mellons and additional similar MSOAs within Cardiff. The benchmarking exercise indicates;

- Lower proportion of journeys are made by car to the city centre. This is partially linked to increased opportunities to walk and cycle;
- A similar proportion of car share trips is estimated to the business district as the other MSOAs in Cardiff;
- A similar proportion of journeys are estimated to be made by rail and bus to the business district and employment on Dumballs Road which is located near Cardiff Central and mostly office; and
- It is estimated that a lower proportion of trips would be made to the business district by foot and cycle which reflects the site location near the edge of city.

Based on this benchmarking exercise, the estimated modal split for the proposed business district is shown to be reflective of other locations in Cardiff with a similar level of accessibility and is therefore deemed to be reasonable.

Multi-Modal Trips

Table 32 outlines the multi-modal trips for the proposed business district. The development proposals are estimated to generate 971 vehicle trips in the AM peak hour and 812 trips in the PM peak hour.

Table 31: Business District Modal Split - Benchmarking

Method of Travel to Work	Business District (Proposed)	Cardiff 11 (St Mellons)	Cardiff 032 (City Centre)	Cardiff 033 (City Road)	Cardiff 049 (Dumballs Road)
Car (Driver) (includes taxi)	61.0%	80.3%	36.6%	51.8%	52.2%
Car (Passenger)	6.3%	6.5%	5.0%	4.7%	5.3%
Train	13.4%	0.6%	17.3%	10.3%	18.6%
Bus	8.6%	5.5%	16.0%	9.9%	9.4%
Bicycle	4.0%	1.3%	4.3%	4.3%	3.1%
On foot	6.0%	5.1%	20.3%	18.7%	10.9%
Motorcycle	0.7%	0.7%	0.5%	0.3%	0.5%

Table 32: Business District Multi-Modal Trips (90,000m² of B1(a) Office)

Mode	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Two-Way	In	Out	Two-Way
Car (Driver)	1,069	99	1,168	135	945	1,080
Car (Passenger)	110	10	120	14	97	111
Train	235	22	257	30	208	238
Bus	151	14	165	19	133	152
Bicycle	70	6	77	9	62	71
On foot	105	10	115	13	93	106
Motorcycle	12	1	13	2	11	12
Total	1,752	162	1,914	222	1,548	1,770

6.6 Business District Car Parking

As set out in the Parking Strategy in Section 5.7, it is proposed to develop a bespoke parking standard that reflects the sustainable credentials of the site, including the proposed railway station. The bespoke parking standards are proposed to be based on the trip making assumptions set out in this chapter of the TA. This approach was agreed in principal with CC as part of the TA scoping exercise.

Table 34 presents the accumulation of car trips for three of the potential land uses that could be proposed as part of the business district. This is based on a test scenario where 90,000m² of each land use where to come forward.

Based on the cumulative number of car trips based in Table 34, Table 33 sets out the proposed parking standards based on the parking demand at the end of the AM peak period (10:00) and over a typical weekday.

Table 33: Business District Bespoke Parking Standards

Parking Demand	Parking Requirements		
	90,000m ²	100m ²	Space
AM Peak Period	1,991	2.21	45m ²
Daily	2,090	2.32	43m ²

The non-central parking standard allows up to 1,800 parking spaces to be introduced for 90,000m² of office. Subject to the land-use mix being refined in subsequent design stages, 1,800 parking spaces will be introduced for the business district.

Table 34: Business District Car Parking Accumulation Calculation (Office – 90,000m²)

Time Range	In	Out	Cumulative
07:00-07:30	88	11	77
07:30-08:00	395	18	454
08:00-08:30	432	40	845
08:30-09:00	637	59	1,424
09:00-09:30	461	70	1,815
09:30-10:00	249	73	1,991
10:00-10:30	154	92	2,053
10:30-11:00	135	99	2,090
11:00-11:30	95	99	2,086
11:30-12:00	106	106	2,086
12:00-12:30	172	296	1,962
12:30-13:00	231	381	1,812
13:00-13:30	296	311	1,797
13:30-14:00	329	190	1,936
14:00-14:30	212	146	2,002
14:30-15:00	121	143	1,980
15:00-15:30	102	128	1,954
15:30-16:00	95	157	1,892
16:00-16:30	73	253	1,713
16:30-17:00	70	315	1,468
17:00-17:30	66	630	904
17:30-18:00	33	392	545
18:00-18:30	22	348	220
18:30-19:00	7	88	139

6.7 Station Park & Ride Trip Distribution

This section presents the methodology for assigning the vehicle trips generated by the station park & ride on to the local highway network

Station Park & Ride Catchment

SEWTM includes a station choice sub-model that allocates park & ride trips to a station. This calculates the generalised cost of a tour via different stations. The costs of travelling via different stations are compared and the three best (i.e. lowest generalised cost) options are identified.

SEWTM selects the top three stations before including an adjustment for car park size, resulting in many residents of northern Cardiff being assigned to local Valley Line stations with limited or no secure car parking. The attractiveness of a large secure car park which offers near certainty of having available parking spaces has therefore not been captured in the model.

The calculation used to identify the top three preferred stations has therefore been amended to include a station choice overlay earlier in the process. Whilst this revised methodology broadly reflects SEWTM's station choice model, it selects the top three stations after including the car park adjustment and incorporates judgement based on knowledge of the local area to check that the results are reasonable. It should be noted that this overlay only applies to car access (park & ride) rail trips with an ultimate origin zone in South East Wales and a destination in England.

Based on the above calculations, the park & ride catchment for the proposed Cardiff Parkway railway station is presented in Figure 40.

The assignment of vehicle trips generated by the park & ride has been determined by examination of the highway network. This exercise has been undertaken by attributing each set of vehicle trips to the most likely route. Where multiple feasible routes could be used, the development trips have been split accordingly. The distribution of station vehicle trips can be found presented diagrammatically in Appendix L.

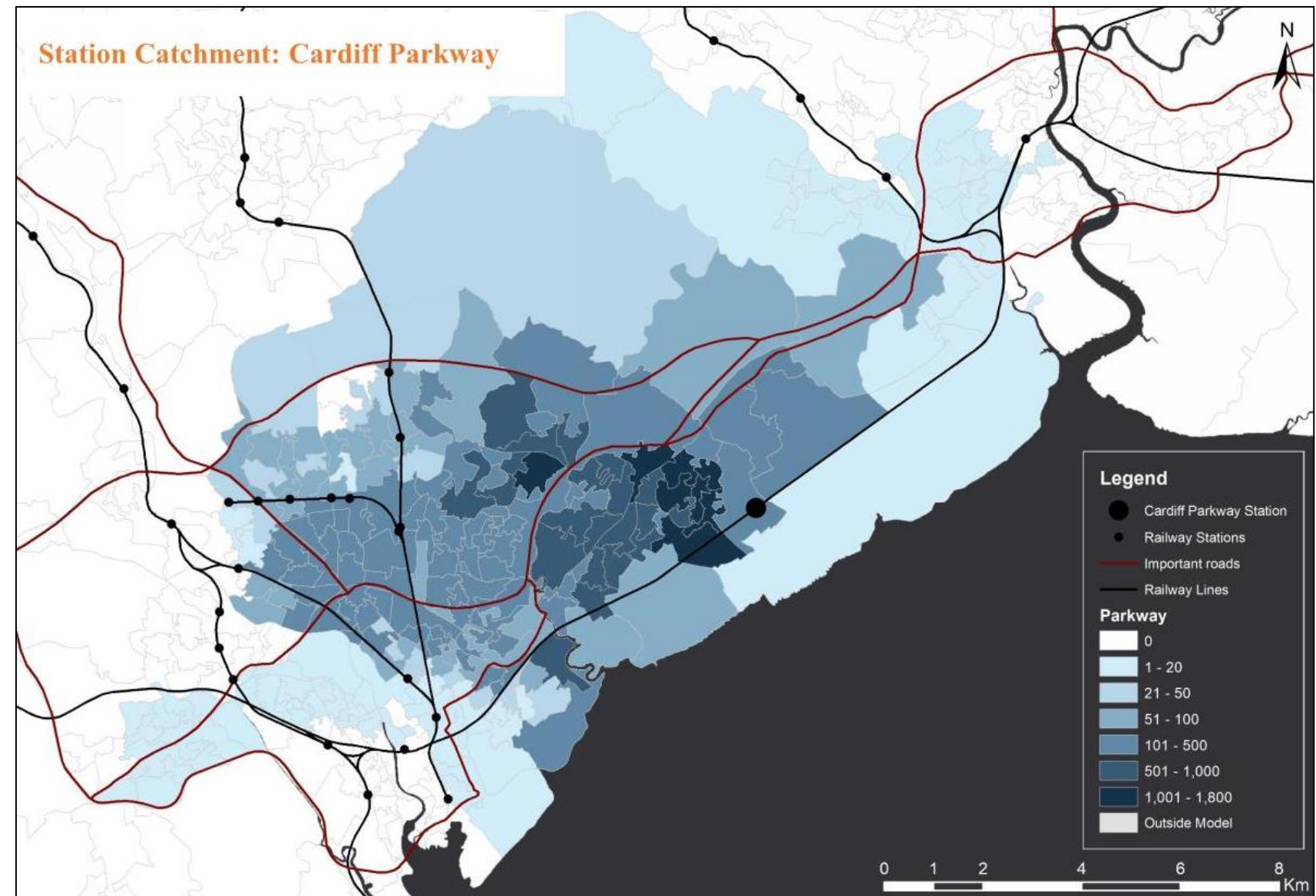


Figure 40: Cardiff Parkway Railway Station Catchment (Car Trips)

6.8 Business District Trip Distribution

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 represent the movement patterns from the site.

This section presents the methodology used to obtain the likely distribution of development trips associated with the Cardiff Parkway proposals.

Vehicle Distribution (SEWTM)

The SEWTM output ‘Flow Bundle (Vehicles): Cardiff Parkway Development’ presents the distribution of vehicles trips associated with the business district. The output can be found in Appendix M, alongside a similar output for the railway station.

As noted previously, SEWTM does not account for new trips on the network that originate from outside of the fully modelled area. Trips from Swansea and South West England therefore need to be accounted for separately.

The vehicle trips illustrated on the SEWTM output have been presented on traffic flow diagrams as percentages. These can be found in the Appendix N.

The SEWTM distribution suggests that vehicles traveling between Newport Road and the site will route via Willowbrook Drive rather than the A48/Cypress Drive roundabout. It is understood that this is because the strategic model does not distinguish between the characteristics and speed restrictions of the two roads. It is therefore proposed to route vehicle trips via the A48/Cypress Drive roundabout as this is a more appropriate route.

SEWTM also appears to assume all traffic originating from the east will route via Tredegar Roundabout and the A48. As noted in the Transport Assessment Scoping Note, there are two other potential routes to the site from the east, one via Junction 30 of the M4 and the other via the A48(M).

As discussed in the following section, trips originating outside of the Fully Modelled Area to the east have been directed via Junction 30 of the M4. This results in some trips from the east distributing via alternative routes to the A48 via Tredegar Roundabout.

Vehicle Distribution (Census Data)

As noted above, SEWTM does not model new trips originating from outside the Fully Modelled Area. Therefore, new trips on the network associated with the proposed business district originating from Swansea and South West England are not included in the SEWTM distribution calculation outlined in the previous section.

The distribution calculation for trips originating from outside the Fully Modelled Area has 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.

To interrogate the data to determine distribution of trips to work, place of work was set to Cardiff 011 MSOA. Trips to usual residences in Local Authorities situated outside of the SEWTM fully modelled area were identified such as Swansea and Bristol.

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.

The calculation indicated 6% of car trips to the business district would originate from outside of the Fully Modelled Area. Of these, 26% are anticipated to arrive from the west and 74% are estimated to arrive from the east.

As discussed in the previous section, vehicle trips originating from the west have been distributed via Junction 30 of the M4. Trip originating from the east have also been distributed via this junction.

Summary

Two distribution calculations have been prepared for vehicles originating from within and outside of the Fully Modelled Area of SEWTM. The combined distribution calculation is presented diagrammatically in Appendix N.

6.9 Changes to Existing Traffic

Introduction

The proposed railway station is expected to have an impact on the travel characteristics of people living and working in St Mellons and the surrounding area. As noted in Section 6.4, 33% of the journeys to and from the proposed railway station are forecast to be made by residents and employees within St Mellons. These trips to and from the station are all forecast to be made by sustainable modes of transport.

Whilst some of these existing trips could be made by another mode of sustainable transport (e.g. bus), many of them are likely to be car trips. The proposed railway station will therefore result in the reduction of some existing vehicle trips on the highway network.

SEWTM

The SEWTM output ‘Flow Difference (Vehicles)’ presents the forecast net traffic impact of the proposed business district and railway station on the local highway network. This includes traffic generated by the business district and park & ride, and the reduction of existing vehicle trips anticipated to occur because of the proposed railway station.

SEWTM does not however model new trips on the network originating from outside of the Fully Modelled Area. The below calculations therefore do not capture a transfer from car to rail of journeys originating from South West England and are therefore considered to be robust.

The SEWTM outputs presenting the net traffic impact of the proposals in the AM and PM peak hour are included in Appendix M. To isolate the reduction in existing traffic because of the proposed railway station, the following needs to be removed:

- Traffic impact of the proposed business district presented in ‘Flow Bundle (Vehicles): Cardiff Parkway Development’ (included in Appendix M); and
- Traffic impact of the park & ride presented in the SEWTM output ‘Flow Bundle (Vehicles): Cardiff Parkway Station’ (included in Appendix M).

The link count data presented in the SEWTM Outputs identified above have been inputted in to traffic flow diagrams which can be found in Appendix O. As noted above, the impact of the railway station on background traffic has been isolated by subtracting the traffic associated with business district and park & ride from the overall net traffic impact.

Whilst the net traffic impact presented gives an indication of the likely reduction on the network, the flows have been finessed to account for the following considerations:

- The existing St Mellons Business Park does not have separate zone within SEWTM. The reduction in vehicle trips for St Mellons (residential and employment) has therefore been calculated by combining Sandbrook Road, Willowdene Way and Llaneirwg Way (see Table 35 below).
- There is a redistribution in existing traffic movements via Willowdene Way which does not appear to be because of the proposals (84 vehicles in the AM peak hour and 67 vehicles in the PM peak hour). This is likely attributed to the capacity of existing junctions on the network which will be assessed as part of the Cardiff Parkway TA. It is therefore proposed to exclude this redistribution.
- SEWTM assumes vehicles will route from Newport Road to the site via Willowbrook Drive as oppose to the A48/Cypress Drive Roundabout. It is understood that this is because the strategic model does not distinguish between the characteristics and speed restrictions of the two roads.
- There is redistribution of traffic from Greenway Road to Newport Road (57 vehicles eastbound in the AM peak hour and 21 vehicles westbound in the PM peak hour).

Cypress Drive and Llaneirwg Way

SEWTM does not have a separate zone for the existing business park in St Mellons, accessed from Pascal Close and Fortran Road. The strategic model therefore hasn’t assigned the estimated reduction in traffic associated with the business park to these two roads.

Table 35 presents reduction in traffic on Cypress Drive and Llaneirwg Way. As noted previously, the redistribution of traffic via Willowdene Way has been excluded.

Table 35: Reduction in Background Traffic on Cypress Drive and Llaneirwg Way (SEWTM)

Link	Weekday AM Peak Hour		Weekday PM Peak Hour	
	In	Out	In	Out
Willowdene Way	93	-2	66	-3
Pascal Close	0	0	0	0
Fortran Road (excluding St Mellons Road)	0	0	0	0
Sandbrook Road	-3	-4	-3	-19
Llaneirwg Way	-113	-68	-114	-52
Total	-116	-74	-117	-71
* The redistribution of existing traffic via Willowdene Way has been excluded from the calculation				

As summarised above, the SEWTM output indicates traffic flow on Cypress Drive and Llaneirwg Way is forecast to reduce by 190 vehicles in the AM peak hour and 188 in the PM peak hour. This reduction in traffic has principally been assigned to Llaneirwg Way by SEWTM.

It can be assumed that the reduction in traffic travelling in to the study area in the AM peak hour (-116) and out of the study area in the PM peak hour (-71) is associated with commuter trips to and from the existing business park. It is therefore proposed to assign this reduction in traffic to Pascal Closed and Fortran Road.

Similarly, the reduction in traffic leaving the study area in the AM peak hour and arriving in the PM peak hour can be attributed to existing residents of St Mellons. It is therefore proposed to assign this traffic to Sandbrook Road, Willowdene Way and Llaneirwg Way.

Table 36 presents the revised distribution of traffic on Cypress Drive and Llaneirwg Way. The distribution factors have been calculated using professional judgement and base traffic flows.

Table 36: Reduction in Background Traffic on Cypress Drive and Llaneirwg Way (Revised)

Link	Weekday AM Peak Hour		Weekday PM Peak Hour	
	In	Out	In	Out
Redistribution Factor				
Willowdene Way	0%	10%	10%	0%
Pascal Close	30%	5%	5%	30%
Fortran Road (excluding St Mellons Road)	60%	5%	5%	60%
Sandbrook Road	5%	20%	20%	5%
Llaneirwg Way	5%	60%	60%	5%
Total	100%	100%	100%	100%
Revised Distribution				
Willowdene Way	0	-7	-12	0
Pascal Close	-35	-4	-6	-22
Fortran Road (excluding St Mellons Road)	-69	-4	-6	-44
Sandbrook Road	-6	-15	-23	-4
Llaneirwg Way	-6	-44	-70	-4
Total	-116	-74	-117	-74

The revised link flows presented above are more reflective of the likely reduction in traffic on Cypress Drive and Llaneirwg Way.

Reduction in Existing Traffic

The link flows summarised in Table 36 and presented diagrammatically in Appendix O have been used to estimate the likely reduction in traffic at each junction in the study area. The assignment of the link count data to individual turning counts has been undertaken using professional judgement and considering the following:

- Other link counts near the junctions;
- Likely justification for the reduction in flow, e.g. a commuter trip to St Mellons Business Park now being made by train;
- Local context and base traffic flows; and
- Redistributions of existing traffic that have been excluded from the calculation.

Link flows indicating an increase in traffic have not been included as this likely represents a redistribution in existing traffic. This redistribution is likely a result of a junction operating over capacity or assumptions within SEWTM, as opposed to a change in travel behaviour due to the introduction of the station.

Not all turning count movements presented on the traffic flow diagrams perfectly equate across the network. This can be attributed to the strategic nature of the model outputs and the omittance of some junctions within the extent of the study area.

The traffic flow diagrams presenting the reduction in traffic at each junction within the study area are included in Appendix O.

6.10 Major Events

Major events in Cardiff, such as sporting or music events at the Principality Stadium, can generate a significant number of additional vehicle trips. Cardiff Parkway could play a role as a park & ride site on event days, attracting passengers who would otherwise have driven to the city centre or used alternative event day park & ride facilities.

Whilst it is recognised that the use of Cardiff Parkway as a park & ride for special events could result in some traffic impact on the highway network, there is not sufficient traffic data to undertake an assessment. Furthermore, the traffic impacts associated with the park & ride on event days are not anticipated to exceed weekday peak hour vehicle movements associated with the proposed business district and park & ride.

Given these events are relatively infrequent (typically one a month), it is unlikely that the potential traffic impacts would warrant physical mitigation.

It is therefore not proposed to undertake capacity assessments of traffic impacts associated with the use of Cardiff Parkway as a park & ride for special events.

6.11 Assessment Scenarios

Following discussions with CC, the following future year assessment scenarios have been developed:

- 2023 with Committed Development;
- 2023 with Committed Development, Cardiff Parkway Railway Station and Phase 1 of Hendre Lakes Business District (22,500m²);
- 2028 with Committed Development; and
- 2028 with Committed Development, Cardiff Parkway Railway Station and Hendre Lakes Business District (90,000m²).

The traffic flows for each of the assessment scenarios are presented diagrammatically and included within Appendix P.

As with any major development, there is potential that some variations in the overall programme will occur, resulting in the delivery of the railway station and business district taking longer than initially estimated. The assessment scenarios presented above are suitably robust should there be a variation to the programme given the following:

- All assessment scenarios include traffic associated with every committed development fully built-out, some of which have an estimated construction programme of over ten years; and
- The CLDP is targeting to reduce the overall proportion of journeys in Cardiff made by car to below 50%. There is therefore potential that background traffic growth may reduce rather than increase, particularly in the context of committed development trips being considered separately.

6.12 Summary

This chapter presents the future travel demand forecasts that are expected to be generated by the proposed development. In summary:

- In agreement with CC, the traffic impacts of 13 committed development location have been included in the traffic impact assessment;
- Trips between the proposed and committed developments have been isolated to avoid double-counting;
- Background traffic growth factors have been derived using TEMPro and adjusted to account for the committed and proposed development;
- The railway station is forecast to generate 403 vehicle trips in the AM peak hour and 385 vehicle trips in the PM peak hour, should the long-stay car park of approximately 600 spaces reach full occupancy at the end of the AM peak period;
- The business district is forecast to generate 1,168 vehicle trips in the AM peak hour and 1,080 trips in the PM peak hour;
- Development trips have been distributed across the network using outputs from SEWTM and census data; and
- The reduction in existing traffic movements as a result of the sustainable transport interventions such as the proposed railway station has been captured through reference to the SEWTM outputs.

7 Highway Capacity Assessment

7.1 Introduction

This chapter presents the results of the capacity assessments undertaken at each of the junctions within the assessed network. They provide a basis for determining whether the additional traffic generated by the committed and proposed developments can be accommodated on the network, and where appropriate, identifying the locations where highway improvements are likely to be necessary.

The following assessment scenarios will be assessed:

- 2018 Base;
- 2023 with Committed Development;
- 2023 with Committed Development, Cardiff Parkway Railway Station and Phase 1 of Hendre Lakes Business District (22,500m²);
- 2028 with Committed Development; and
- 2028 with Committed Development, Cardiff Parkway Railway Station and Hendre Lakes Business District (90,000m²).

7.2 Percentage Impact Assessment

Following scoping discussions with CC, it was agreed that the percentage impact of traffic associated with the development proposals would be assessed at each junction in the study area.

Table 37 sets out the percentage impact of the development proposals for both 2023 and 2028 future year development scenarios. The impact in the table is presented for the turning movement (link) that is estimated to experience the largest increase in traffic, and the junction overall.

In agreement with CC, the capacity of a junction will be assessed where either the traffic impacts of a development exceed 5% (as specified in TAN 18), or where a junction is already operating close to practical capacity. Practical capacity is set as 80% saturation or RFC 0.8. This analysis of the base junction modelling results and the traffic impact assessment is set out in Section 7.5, Table 44.

Table 37: Traffic Impact Assessment

Ref	Junction	Link/ Junction	2028 with Committed Development		Development Impact (Trips)		Development Impact (%)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
1	Cypress Drive/ Sandbrook Road	Link	247	277	133	134	54%	48%
		Junction	492	571	148	155	30%	27%
2	Cypress Drive/ Fortran Road	Link	104	111	1217	1060	1166%	958%
		Junction	1192	1099	1214	1101	102%	100%
3	Cypress Drive/ Pascal Close	Link	727	530	1177	981	162%	185%
		Junction	1389	1233	1239	1082	89%	88%
4	Cypress Drive/ Willowdene Way	Link	1037	610	1133	951	109%	156%
		Junction	1763	1562	1230	1062	70%	68%
5	A48/Cypress Drive/Newport Road	Link	715	537	706	607	99%	113%
		Junction	4713	4488	1011	894	21%	20%
6	A48/Marshfield Road	Link	786	593	233	117	30%	20%
		Junction	2623	2197	177	37	7%	2%
7	B4487/Llaneirwg Way	Link	383	529	70	70	18%	13%
		Junction	2757	2783	60	31	2%	1%
8	B4487/Mount Pleasant Ave	Link	329	418	32	35	10%	8%
		Junction	2042	1976	55	57	3%	3%
9	B4487/Llanrumney Avenue	Link	44	483	10	23	22%	5%
		Junction	2076	2204	22	26	1%	1%
10	A48/A4232/Capel Edeyrn	Link	1140	950	141	190	12%	20%
		Junction	4895	4511	64	172	1%	4%
11	A4232/Church Road	Link	1749	1216	149	128	9%	11%
		Junction	6156	6080	63	114	1%	2%
12	M4/A4232	Link	1587	735	149	90	9%	12%
		Junction	3548	5059	161	93	5%	2%
13	A48/ Southern Way	Link	421	504	63	46	15%	9%
		Junction	7864	6923	123	53	2%	1%
14	B4487/A4161 Newport Road/A4232	Link	783	889	22	13	3%	2%
		Junction	4699	4738	-19	-15	0%	0%
15	Heol Las/St Mellons Road	Link	99	83	12	-2	13%	-3%
		Junction	233	361	13	-1	6%	0%
16	Rover Way/Lamby Way	Link	685	324	12	12	2%	4%
		Junction	4579	4170	-2	9	0%	0%
17	B4487 Newport Road/Ty-Mawr Road	Link	805	847	0	4	0%	1%
		Junction	2387	2441	0	7	0%	0%
18	B4487 Newport Road/Tyr Winch Road	Link	658	842	61	68	9%	8%
		Junction	1810	1905	40	55	2%	3%
19	B4487 Newport Road/Wern Fawr Lane	Link	839	985	88	47	10%	5%
		Junction	2159	2167	67	83	3%	4%
20	A48 Newport Road/Coal Pit Lane	Link	898	734	216	109	24%	15%
		Junction	2644	2164	177	62	7%	3%
21	B4239 Wentloog Avenue/Heol Las	Link	5	8	-6	0	-114%	0%
		Junction	614	586	-6	0	-1%	0%
23	A48 Pentwyn Interchange	Link	356	378	57	74	16%	19%
		Junction	3223	3201	43	55	1%	2%

M4 Junction 28 Tredegar Roundabout

A significant highway improvement scheme has recently been completed by the Welsh Government at the Tredegar Park Roundabout, including traffic signals, enlarging the roundabout and introducing a route through the middle.

Following pre-application consultation with the Welsh Government as the Strategic Highway Authority, it was agreed that a traffic impact assessment should be undertaken to understand the potential impacts of the Cardiff Parkway development proposals on Junction 28 of the M4. It was agreed that the traffic impact assessment would be used to determine whether there is a need for a more detailed capacity assessment at this location.

To inform this assessment, the Welsh Government provided traffic data collected as part of the ongoing analysis associated with Junction 28. The junction was surveyed in March 2019 and the matrixes are presented in Table 38 and Table 39 below.

Table 38: Junction 28 - 2019 Traffic Counts AM Peak Hour (07:15-08:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East	8	122	880	6	114	1,129
A48 East	37	0	255	589	142	1,023
A48 West	409	286	3	131	276	1,104
M4 West	1	755	163	4	424	1,346
A467	172	494	325	326	0	1,317
Total	628	1,657	1,626	1,055	955	5,921

Table 39: Junction 28 - 2019 Traffic Counts PM Peak Hour (16:15-17:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East	7	81	340	8	151	587
A48 East	133	0	183	844	526	1,686
A48 West	685	328	6	198	552	1,771
M4 West	1	461	46	3	812	1,323
A467	237	315	210	416	0	1,178
Total	1,064	1,185	786	1,469	2,041	6,545

Using traffic growth factors derived through TEMPro, Table 40 and Table 41 set out the traffic movements for the year 2028. This reflects the year in which the development is expecting to be fully-built-out.

The forecast traffic flows for 2028 have been used to inform the traffic impact assessment for Cardiff Parkway. It should be noted that traffic associated with individual committed developments have not been included within the traffic flows presented in the above tables.

Table 40: Junction 28 - 2028 Traffic Counts AM Peak Hour (07:15-08:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East	9	133	964	6	124	1,237
A48 East	40	0	279	646	156	1,121
A48 West	448	313	3	143	302	1,210
M4 West	2	827	178	4	464	1,475
A467	188	542	356	357	0	1,443
Total	688	1,815	1,781	1,156	1,047	6,486

Table 41: Junction 28 - 2028 Traffic Counts PM Peak Hour (16:15-17:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East	7	89	372	9	165	643
A48 East	146	0	200	924	575	1,846
A48 West	750	359	7	217	605	1,938
M4 West	2	504	50	3	889	1,448
A467	260	345	230	455	0	1,290
Total	1,165	1,297	860	1,608	2,235	7,165

A Traffic Impact Assessment has been undertaken to identify the percentage increase in traffic movements on each link of the junction. Development trips from Cardiff Hendre Lakes have been distributed using outputs from SEWTM and reference to ‘travel to work’ census data.

Table 42 and Table 43 below present the Cardiff Parkway development trips at Junction 28 and the percentage impact on 2028 traffic flows. The proposed railway station is anticipated to result in some existing journeys to transfer from car to train. This has resulted in a minor reduction in vehicle movements in the on some links.

Table 42: Proposed Development Trips and Percentage Impact on 2028 Traffic Flows AM Peak Hour (07:15-08:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East			12.2% (117)			9.5% (117)
A48 East			11.4% (32)			2.8% (32)
A48 West	-2.7% (-12)	-1.1% (-3)			-2.0% (-6)	-1.8% (-22)
M4 West						
A467			16.5% (59)			4.0% (59)
Total	-1.8% (-12)	-0.2% (-3)	11.7% (208)		-0.6% (-6)	2.9% (186)

Table 43: Proposed Development Trips and Percentage Impact on 2028 Traffic Flows PM Peak Hour (16:15-17:15) (total vehicles)

	M4 East	A48 East	A48 West	M4 West	A467	Total
M4 East			-3.2% (-12)			-1.9% (-12)
A48 East			-1.6% (-3)			-0.2% (-3)
A48 West	7.9% (59)	4.5% (16)			4.9% (30)	5.4% (105)
M4 West						
A467			-2.6% (-6)			-0.5% (-6)
Total	5.1% (59)	1.2% (16)	-2.5% (-21)		1.3% (30)	1.2% (84)

The overall impact of the development is estimated to be a 2.1% increase in total traffic in the AM peak hour and 0.5% in the PM peak hour. In the AM peak hour, the M4 East entry to the roundabout is forecast to have the largest increase (7.3%) in total vehicle movements. In the PM peak hour, the largest traffic increase is 3.3% on the A48 West entry to the junction.

The forecast traffic impact of Hendre Lakes on Junction 28 of the M4 is negligible with changes in traffic within normal day to day variation. Further assessment of Junction 28 is therefore not deemed necessary, particularly as significant capacity improvement works have recently been completed at this location.

7.3 Assessment Methodology

Junction assessments have been undertaken for 22 junctions, using approved software packages – LinSig for signalised junctions, ARCADY for roundabouts and PICADY for priority junctions.

Junction capacity in these 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 an RFC of 0.85 for roundabouts and priority junctions. However, the CC SPG¹³ 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.

For signalised junctions, CC recommend the threshold for practical capacity is 80% Degree of Saturation (DoS). It should be noted that the Traffic Modelling Guidelines¹⁴ recommend a DoS of 90% should be adopted to represent practical capacity for signalised junctions. This is because random delay begins to increase exponentially once degree of saturation exceeds 90%.

These parameters have been used to summarise the operational effectiveness of individual junctions in accordance with the following 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 ¹⁵ .
	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 (MMQ¹⁶) 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.

For signalised junctions, traffic signal data was obtained from CC and used to inform the LinSig models.

Results for all junctions are presented in terms of RFC/PRC, average maximum queue (Junctions 9), MMQ for LinSig models (expressed in PCUs¹⁷), and average delay per PCU.

¹³ Cardiff Council (2018) Managing Transport Impacts SPG
¹⁴ Transport for London (2010) Traffic Modelling Guidelines: TfL Traffic Manager and Network Performance Best Practice, V 3.0
¹⁵ Cardiff Council (2018) Managing Transport Impacts SPG

¹⁶ MMQ represents the maximum queue within a typical cycle averaged over all the cycles within the modelled period and can be expressed as the average maximum queue that a driver would experience at the junction during the modelled period.

¹⁷ A Passenger Car Unit (PCU) is a unit of measurement where vehicles are defined by size in relation to a car with a car being one PCU and a bus, for example, generally being defined as two PCUs.

7.4 Base Junction Models

Technical Note 2: Base Junction Models, included in Appendix F, has been reviewed by CC. The note sets out the methodology and results of the junction assessments undertaken for the base year 2018.

Most 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 41.

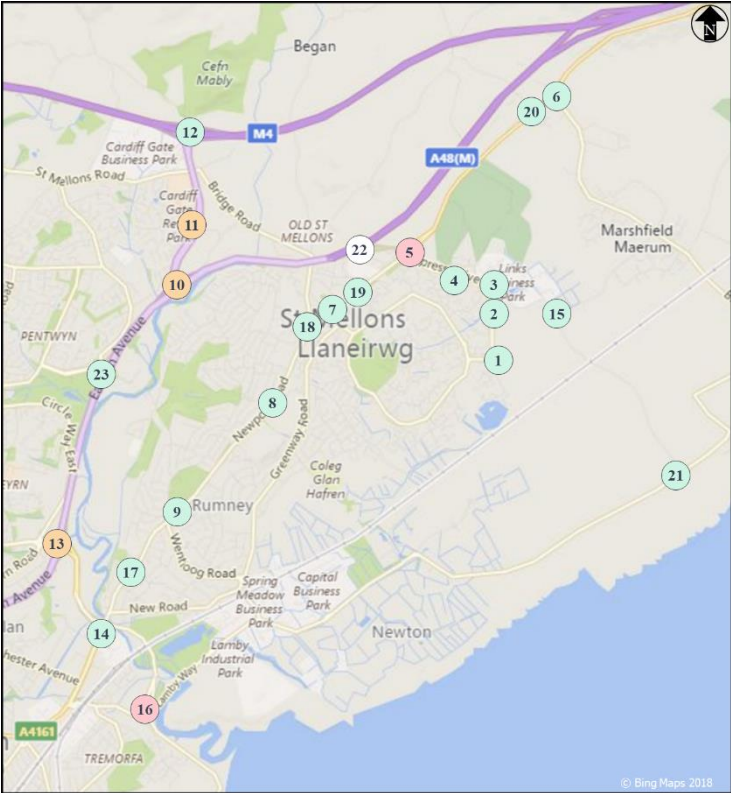


Figure 41: Summary of Base Year Junction Capacity Assessment Results

The results of the base junction models indicate that some junctions are either operating close to, or exceeding capacity. These are existing traffic congestion problems which CC should be resolving regardless of whether this development comes forward.

7.5 Test for Detailed Capacity Assessment

Table 44: Summary of Junctions that Require a Detailed Capacity Assessment

Junction	2018 Base Capacity Results		Development Traffic Impact (Link)		Future Year Assessment Required
	AM Peak	PM Peak	AM Peak	PM Peak	
1. Cypress Drive/ Sandbrook Road	0.22	0.18	54%	48%	Yes
2. Cypress Drive/ Fortran Road	0.20	0.78	1166%	958%	Yes
3. Cypress Drive/ Pascal Close	0.09	0.37	162%	185%	Yes
4. Cypress Drive/ Willowdene Way	0.49	0.51	109%	156%	Yes
5. A48/Cypress Drive/Newport Road	0.86	1.02	99%	113%	Yes
6. A48/Marshfield Road	0.50	0.57	30%	20%	Yes
7. B4487/Llaneirwg Way	0.66	0.66	18%	13%	Yes
8. B4487/Mount Pleasant Ave	59.8%	41.2%	10%	8%	Yes
9. B4487/Llanrumney Avenue	97.1%	15.9%	22%	5%	Yes
10. A48/A4232	0.78	0.87	12%	20%	Yes
11. A4232/Church Road	0.83	0.77	9%	11%	Yes
12. M4/A4232	10.4%	41.8%	9%	12%	Yes
13. A48/Southern Way	-4.6%	6.2%	15%	9%	Yes
14. B4487/A4161 Newport Road/A4232	2.8%	19.2%	3%	2%	No
15. Heol Las/St Mellons Road	0.19	0.17	13%	-3%	AM only
16. Rover Way/Lamby Way	1.05	0.83	2%	4%	Yes
17. B4487 Newport Road/Ty-Mawr Road	72.3%	82.9%	0%	1%	No
18. B4487 Newport Road/Tyr Winch Road	0.25	0.32	9%	8%	Yes
19. B4487 Newport Road/Wern Fawr Lane	46.3%	43.2%	10%	5%	AM only
20. A48 Newport Road/Coal Pit Lane	0.67	0.20	24%	15%	Yes
21. B4239 Wentloog Avenue/Heol Las	0.07	0.07	0%	0%	No
23. A48 Pentwyn Interchange	0.46	0.47	16%	19%	Yes

7.6 Future Year Assessments

Each junction has been assessed with the following scenarios:

- 2023 with Committed Development;
- 2023 with Committed Development, Cardiff Parkway Railway Station and Phase 1 of Hendre Lakes Business District (22,500m²)
- 2028 with Committed Development; and
- 2028 with Committed Development, Cardiff Parkway Railway Station and Hendre Lakes Business District (90,000m²).

Whilst the junctions have been assessed with multiple ‘with development’ scenarios, these assessments do not indicate when mitigation may be required. This will be calculated as part of the phasing strategy which is anticipated to be conditioned to this application.

This section presents the results of the future year capacity assessments. As set out in the previous section, future year capacity assessments are not required for the following junctions given they are estimated to be operating within practical capacity in the base year and the development impact is below 5% of traffic in the corresponding without development scenario:

- Junction 14: B4487/A4161 Newport Road/A4232;
- Junction 16: Rover Way/Lamby Way; and
- Junction 21: B4239 Wentloog Avenue/Heol Las.

Junction modelling results have however been provided in this section for completeness, however no mitigation will be considered at these junctions.

The full junction modelling output files for the ARCADY, PICADY and LinSig are included in Appendix Q, Appendix R and Appendix S respectively. Table 45 overleaf presents a summary of the capacity assessment results, detailing the PRC for signal-controlled junctions and the highest RFC for priority-controlled junctions.

The remainder of this section details the junction capacity assessment results for each junction.

Table 45: Summary of the Junction Capacity Assessment Results (without Mitigation)

Junction	Model	2018 Base		2023 with Committed Development		2023 with Committed and Phase 1 of Proposed Development		2028 with Committed Development		2028 with Committed and Proposed Development	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1. Cypress Drive/ Sandbrook Road	ARCADY	0.22	0.18	0.25	0.23	0.34	0.31	0.69	0.53	0.25	0.24
2. Cypress Drive/ Fortran Road	PICADY	0.2	0.78	0.25	0.87	0.32	1.01	0.25	0.87	0.38	1.02
3. Cypress Drive/ Pascal Close	PICADY	0.09	0.37	0.09	0.39	0.13	0.46	0.09	0.39	0.20	0.49
4. Cypress Drive/ Willowdene Way	PICADY	0.49	0.51	0.5	0.52	0.50	0.62	0.5	0.52	0.63	0.76
5. A48/Cypress Drive/Newport Road	ARCADY	0.86	1.02	0.95	1.27	1.13	1.95	0.97	1.31	1.28	2.69
6. A48/Marshfield Road	PICADY	0.5	0.57	0.54	0.63	0.59	0.63	0.57	0.66	0.68	0.52
7. B4487/Llaneirwg Way	ARCADY	0.66	0.66	0.82	0.75	0.86	0.78	0.84	0.76	0.83	0.80
8. B4487/Mount Pleasant Ave	LinSig	59.8%	41.2%	51.5%	33.4%	47.3%	27.8%	48.3%	31.1%	45.9%	27.0%
9. B4487/Llanrumney Avenue	LinSig	97.1%	15.9%	83.3%	9.5%	83.2%	9.3%	79.6%	7.7%	79.5%	7.5%
10. A48/A4232	ARCADY	0.78	0.87	1	1.23	1.01	1.24	1.01	1.25	1.03	1.24
11. A4232/Church Road	ARCADY	0.83	0.77	1.92	1.54	2.03	1.61	1.98	1.58	2.10	1.61
12. M4/A4232	LinSig	10.4%	41.8%	-12.9%	18.3%	-8.3%	20.0%	-14.8%	16.2%	-14.4%	18.7%
13. A48/Southern Way	LinSig	-4.6%	6.2%	-25.4%	-5.5%	-25.7%	-5.9%	-28.0%	-7.0%	-28.0%	-6.6%
14. B4487/A4161 Newport Road/A4232	LinSig	2.8%	19.2%	-5.7%	9.8%	-5.8%	10.4%	-7.7%	8.5%	-8.1%	8.7%
15. Heol Las/St Mellons Road	PICADY	0.19	0.17	0.19	0.17	0.21	0.18	0.19	0.17	0.23	0.18
16. Rover Way/Lamby Way	ARCADY	1.05	0.83	1.17	0.93	1.20	0.96	1.20	0.95	1.22	0.98
17. B4487 Newport Road/Ty-Mawr Road	LinSig	72.3%	82.9%	61.1%	70.4%	60.0%	70.4%	58.7%	67.6%	57.2%	67.0%
18. B4487 Newport Road/Tyr Winch Road	PICADY	0.25	0.32	0.29	0.37	0.31	0.40	0.3	0.39	0.31	0.41
19. B4487 Newport Road/Wern Fawr Lane	LinSig	46.3%	43.2%	25.3%	25.8%	19.5%	18.0%	22.3%	24.1%	17.4%	16.5%
20. A48 Newport Road/Coal Pit Lane	PICADY	0.67	0.2	0.71	0.21	0.72	0.21	0.74	0.21	0.75	0.22
21. B4239 Wentloog Avenue/Heol Las	PICADY	0.07	0.07	0.07	0.07	0.08	0.07	0.08	0.07	0.08	0.07
23. A48 Pentwyn Interchange	ARCADY	0.46	0.47	0.65	0.54	0.67	0.59	0.67	0.55	0.68	0.61

Junction 1: Cypress Drive/Sandbrook Road Roundabout

The Cypress Drive/Sandbrook Road three-arm roundabout is presented in Figure 42 and has been assessed using the ARCADY module of Junctions 9. As noted in Technical Note 2, the base junction model has been validated and no calibration was required.



Figure 42: Cypress Drive/Sandbrook Road Existing Arrangement

The capacity assessment results are presented in Table 46. The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 30% in the AM peak hour and 27% in the PM peak hour. The ARCADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are proposed at this location.

A secondary vehicle access is proposed in to the development site from this junction. The capacity assessment for the proposed four-arm arrangement is presented in section 7.8.

Table 46: Cypress Drive/Sandbrook Road Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	Cypress Drive (S)	0	3.30	0.07	0	3.05	0.04
2	Sandbrook Road	0	3.77	0.22	0	3.43	0.15
3	Cypress Drive (N)	0	2.81	0.09	0	3.13	0.18
2023 with Committed Development							
1	Cypress Drive (S)	0	3.34	0.07	0	3.27	0.05
2	Sandbrook Road	0	3.97	0.25	0	3.43	0.15
3	Cypress Drive (N)	0	2.86	0.11	0	3.5	0.23
2023 with Committed and Proposed Development (Phase 1)							
1	Cypress Drive (S)	0	3.37	0.07	0	3.31	0.05
2	Sandbrook Road	1	4.46	0.34	0	3.51	0.17
3	Cypress Drive (N)	0	2.90	0.12	0	3.92	0.31
2028 with Committed Development							
1	Cypress Drive (S)	0	3.34	0.07	0	3.31	0.05
2	Sandbrook Road	0	3.97	0.25	0	3.52	0.17
3	Cypress Drive (N)	0	2.86	0.11	0	3.56	0.24

Junction 2: Cypress Drive/Fortran Road
Priority Junction

PICADY has been used to assess the Cypress Drive/Fortran Road priority junction. The capacity assessment results are presented in Table 47.

The percentage impact of the proposed development at this junction is 102% in the AM peak hour and 100% in the PM peak hour. The PICADY assessment of this junction indicates the junction is forecast to approach theoretical capacity in the PM peak hour in all future year scenarios.

In the 2023 with Committed and Proposed Development (Phase 1), the Fortran Road entry is forecast to have a RFC of 1.01. In the scenario 2028 with Committed and Proposed Development, the operation of the junction is forecast to improve. This can be attributed to the estimated reduction in existing traffic as a result of the proposed sustainable transport interventions.

The proposed development would add a significant number of vehicular trips to Cypress Drive. ATC data recorded on this link indicates a significant amount of speeding in excess of the posted 30mph speed limit occurs. Additionally, the route will need to become more permeable to pedestrians and cyclists in future to facilitate active travel access to Cardiff Parkway Station and Hendre Lakes and improve the station catchment.

Mitigation has therefore been considered at this junction, and this is explored further in Chapter 8. This will result in a change in character on Cypress Drive to a more urban environment, with controlled crossings and lower traffic speeds. Traffic signals are therefore proposed in this location to mitigate against the significant increase in vehicle trips on Cypress Drive associated with the proposed development, and to formalise pedestrian and cycle permeability with controlled crossings.

Traffic signals would also improve the safety of turning manoeuvres at the junction, especially the right turn manoeuvres, which would otherwise give way to two southbound lanes of traffic on Cypress Drive. These turning manoeuvres are not considered appropriate given the increase in traffic that would be generated by the development. Based on the forecast traffic flow, DMRB TD 42/95 (Fig 2/2) recommends an alternative junction arrangement to the T-junction should be identified.

Table 47: Cypress Drive/Fortran Road PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Fortran Road (Nearside)	B-C	0	7.17	0.05	0	14.38	0.23
Fortran Road (Offside)	B-A	0	8.38	0.20	3	28.03	0.78
Cypress Drive	C-AB	0	7.15	0.19	0	5.72	0.09
2023 with Committed Development							
Fortran Road (Nearside)	B-C	0	7.45	0.06	1	25.22	0.38
Fortran Road (Offside)	B-A	0	9.17	0.25	6	43.99	0.87
Cypress Drive	C-AB	0	7.5	0.21	0	5.9	0.10
2023 with Committed and Proposed Development (Phase 1)							
Fortran Road (Nearside)	B-C	0	9.22	0.10	5	215.36	1.01
Fortran Road (Offside)	B-A	1	12.96	0.32	16	118.75	1.00
Cypress Drive	C-AB	0	9.69	0.26	0	6.11	0.10
2028 with Committed Development							
Fortran Road (Nearside)	B-C	1	7.45	0.06	1	25.22	0.38
Fortran Road (Offside)	B-A	0	9.17	0.25	6	43.99	0.87
Cypress Drive	C-AB	0	7.5	0.21	0	5.9	0.10
2028 with Committed and Proposed Development							
Fortran Road (Nearside)	B-C	0	12.90	0.14	5	228.03	1.02
Fortran Road (Offside)	B-A	1	21.66	0.38	15	134.28	1.01
Cypress Drive	C-AB	1	14.22	0.32	0	6.13	0.10

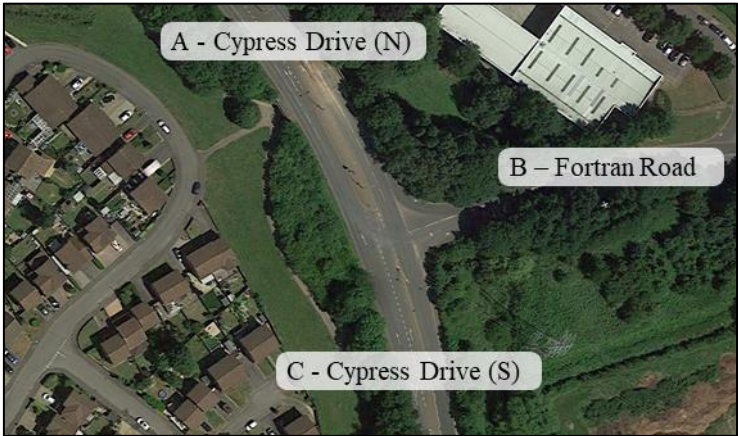


Figure 43: Cypress Drive/Fortran Road Existing Arrangement

Junction 3: Cypress Drive/Pascal Close

The Cypress Drive/Pascal Close priority junction is presented in Figure 44 and has been assessed with the PICADY node of Junctions 9. The capacity assessment results are presented in Table 48.

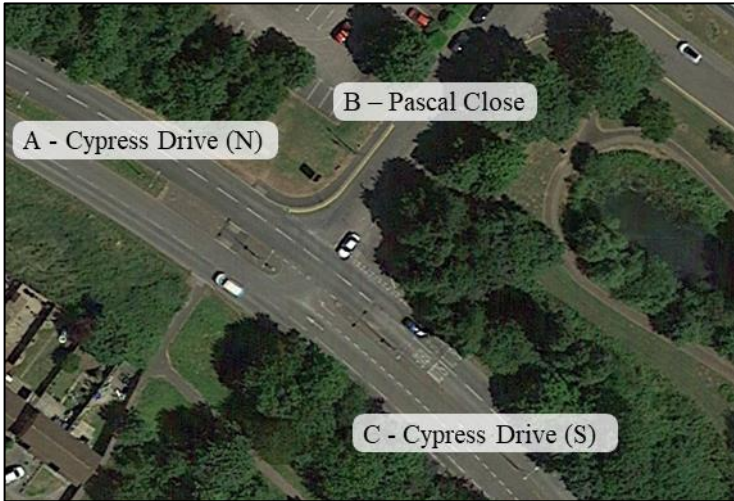


Figure 44: Cypress Drive/Pascal Close Existing Arrangement

The PICADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. However, given that a change in character is proposed on Cypress Drive to improve walking and cycling permeability and reduce traffic speeds, traffic signals are identified as appropriate works at this location.

Traffic signals would also improve the safety of turning manoeuvres at the junction, especially the right turn from Cypress Drive (South) and Pascal Close, which would otherwise have to give way to two southbound lanes of traffic on Cypress Drive. These turning manoeuvres are not considered appropriate, given the increase in traffic associated with the proposed development. Based on the forecast AADT flow of over 8,000 vehicles, DMRB TD 42/95 (Fig 2/2) recommends an alternative junction arrangement to T-junction should be identified.

Table 48: Cypress Drive/Pascal Close PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Pascal Close	B-C	0	7.85	0.01	0	7.86	0.04
Pascal Close	B-A	0	8.53	0.09	1	10.94	0.37
Cypress Drive	C-AB	0	6.73	0.03	0	5.54	0.04
2023 with Committed Development							
Pascal Close	B-C	0	8.01	0.01	0	8.14	0.04
Pascal Close	B-A	0	8.91	0.09	1	11.7	0.39
Cypress Drive	C-AB	0	6.87	0.03	0	5.68	0.04
2023 with Committed and Proposed Development (Phase 1)							
Pascal Close	B-C	0	10.02	0.01	0	8.98	0.04
Pascal Close	B-A	0	12.46	0.13	1	15.69	0.46
Cypress Drive	C-AB	0	8.71	0.03	0	5.87	0.04
2028 with Committed Development							
Pascal Close	B-C	0	8.01	0.01	0	8.14	0.04
Pascal Close	B-A	0	8.91	0.09	1	11.7	0.39
Cypress Drive	C-AB	0	6.87	0.03	0	5.68	0.04
2028 with Committed and Proposed Development							
Pascal Close	B-C	0	15.12	0.01	0	9.44	0.04
Pascal Close	B-A	0	24.24	0.20	1	20.60	0.49
Cypress Drive	C-AB	0	13.34	0.05	0	5.94	0.04

Junction 4: Cypress Drive/Willowdene Way
Priority Junction

The capacity of the Cypress Drive/Willowdene Way priority junction has been modelled using the PICADY module in Junctions 9. The assessment results are summarised in Table 49.

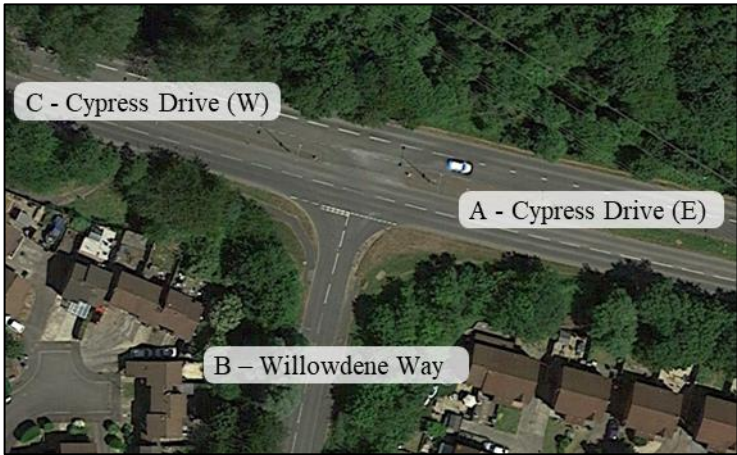


Figure 45: Cypress Drive/Willowdene Way Existing Arrangement

The PICADY assessment indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. However, given that a change in character is proposed on Cypress Drive to improve walking and cycling permeability and reduce traffic speeds, traffic signals are identified as appropriate works at this location.

Traffic signals would also improve the safety of turning manoeuvres at the junction, especially the right turn from Cypress Drive (North) and Willowdene Way, which would otherwise have to give way to two northbound lanes of traffic on Cypress Drive. These turning manoeuvres are not considered appropriate, given the increase in traffic associated with the proposed development. As noted previously, this aligns with DMRB guidance (TD 42/95)

These mitigation proposals are discussed further in Chapter 8.

Table 49: Cypress Drive/Willowdene Way Priority Junction PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Willowdene Way	B-AC	1	11.72	0.49	0	9.69	0.31
Cypress Drive	C-AB	0	6.49	0.19	1	12.15	0.51
2023 with Committed Development							
Willowdene Way	B-AC	1	12.26	0.50	1	10.08	0.32
Cypress Drive	C-AB	0	6.62	0.19	1	12.6	0.52
2023 with Committed and Proposed Development (Phase 1)							
Willowdene Way	B-AC	1.3	15.63	0.50	1	10.08	0.32
Cypress Drive	C-AB	0	6.82	0.20	2	18.31	0.62
2028 with Committed Development							
Willowdene Way	B-AC	1	12.26	0.50	1	10.08	0.32
Cypress Drive	C-AB	0	6.62	0.19	1	12.6	0.52
2028 with Committed and Proposed Development							
Willowdene Way	B-AC	2	20.13	0.63	1	26.55	0.56
Cypress Drive	C-AB	0	6.88	0.20	3	32.39	0.76

Junction 5: A48/Cypress Drive/Newport Road Roundabout

The A48/Cypress Drive/B4487 Newport Road four-arm roundabout is presented below in Figure 46. The junction has been assessed using the ARCADY module of Junctions 9 and the capacity assessment results are presented in Table 50.



Figure 46: A48/Cypress Drive/Newport Road Roundabout Existing Arrangement

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 21% in the AM and 20% in the PM peak hour.

The ARCADY assessment of this junction indicates the junction is forecast to operate over theoretical capacity in the AM and PM peak hours of all future year scenarios, and a significant re-modelling of the junction layout is required.

A significant change to the junction layout is identified as mitigation as discussed in Chapter 8.

Table 50: A48/Cypress Drive Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	A48	2	6.62	0.66	3	7.11	0.72
2	Cypress Drive	1	6.66	0.50	24	103.38	1.02
3	Newport Road	1.7	7.34	0.63	11	47.11	0.95
4	A48 Slips	6	10.3	0.86	1	3.03	0.54
2023 with Committed Development							
1	A48	3	9.68	0.76	4	11.02	0.81
2	Cypress Drive	22	9.71	0.62	95	361.47	1.27
3	Newport Road	4	13.87	0.80	33	110.98	1.04
4	A48 Slips	16	25.87	0.95	2	3.61	0.61
2023 with Committed and Proposed Development (Phase 1)							
1	A48	8	24.52	0.90	5	13.80	0.85
2	Cypress Drive	2	10.45	0.66	424	1550.08	1.95
3	Newport Road	8	26.99	0.90	37	120.46	1.04
4	A48 Slips	167	194.93	1.13	2	3.86	0.64
2028 with Committed Development							
1	A48	3	10.22	0.77	5	12.04	0.83
2	Cypress Drive	2	10.15	0.63	105	405.3	1.31
3	Newport Road	4	14.91	0.81	38	123.32	1.05
4	A48 Slips	20	31.17	0.97	2	3.67	0.62
2028 with Committed and Proposed Development							
1	A48	99	266.10	1.14	5	12.62	0.83
2	Cypress Drive	2	7.64	0.60	1023	3274.81	2.69
3	Newport Road	8	27.10	0.90	37	120.69	1.04
4	A48 Slips	354	512.47	1.28	2	3.65	0.62

Junction 6: A48/Marshfield Road Priority Junction

As shown in Figure 47 below, the A48/Marshfield Road priority junction is a non-standard arrangement with traffic turning right from the A48 to Marshfield Road giving way to traffic turning right from Marshfield Road to Newport Road. This is the reverse in priority in comparison to a typical junction.



Figure 47: A48/Marshfield Road Existing Arrangement

As set out in Technical Note 2, three junction models have been used to assess the capacity of this junction and the key results are summarised in Table 51.

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 7% in the AM peak hour and 2% in the PM peak hour. This indicates the traffic is estimated to reduce at this junction in the PM peak hour, principally as a result of the proposed railway station.

The PICADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 51: A48/Marshfield Road PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Central Reserve (A48)	Right-turn	1	13.92	0.33	0	9.83	0.19
Marshfield Road	Left-turn	1	17.89	0.50	1	23.14	0.57
Marshfield Road	Right-turn	1	20.12	0.42	1	25.45	0.38
A48	Right-turn	1	11.48	0.32	1	14.19	0.41
2023 with Committed Development							
Central Reserve (A48)	Right-turn	1	14.6	0.35	0	9.83	0.19
Marshfield Road	Left-turn	1	20.36	0.54	2	28.59	0.63
Marshfield Road	Right-turn	1	22.78	0.45	1	31.42	0.44
A48	Right-turn	1	11.83	0.34	1	14.9	0.43
2023 with Committed and Proposed Development (Phase 1)							
Central Reserve (A48)	Right-turn	1	14.64	0.35	0	10.16	0.20
Marshfield Road	Left-turn	1	24.22	0.59	2	29.40	0.63
Marshfield Road	Right-turn	1	27.19	0.50	1	32.38	0.45
A48	Right-turn	1	12.18	0.34	1	14.97	0.43
2028 with Committed Development							
Central Reserve (A48)	Right-turn	1	14.9	0.36	0	10.06	0.21
Marshfield Road	Left-turn	1	21.94	0.57	2	31.78	0.66
Marshfield Road	Right-turn	1	24.44	0.48	1	34.92	0.47
A48	Right-turn	1	12.03	0.35	1	15.26	0.44
2028 with Committed and Proposed Development							
Central Reserve (A48)	Right-turn	1	14.75	0.35	0	9.80	0.16
Marshfield Road	Left-turn	2	38.87	0.68	1	21.06	0.52
Marshfield Road	Right-turn	2	46.09	0.64	0	23.37	0.31
A48	Right-turn	1	12.51	0.33	1	14.23	0.41

Junction 7: B4487 Newport Road/Llaneirwg Way Roundabout

The existing arrangement of the Newport Road/Llaneirwg Way three-arm roundabout is presented in Figure 48 and has been assessed using ARCADY. The assessment results can be found in Table 52.

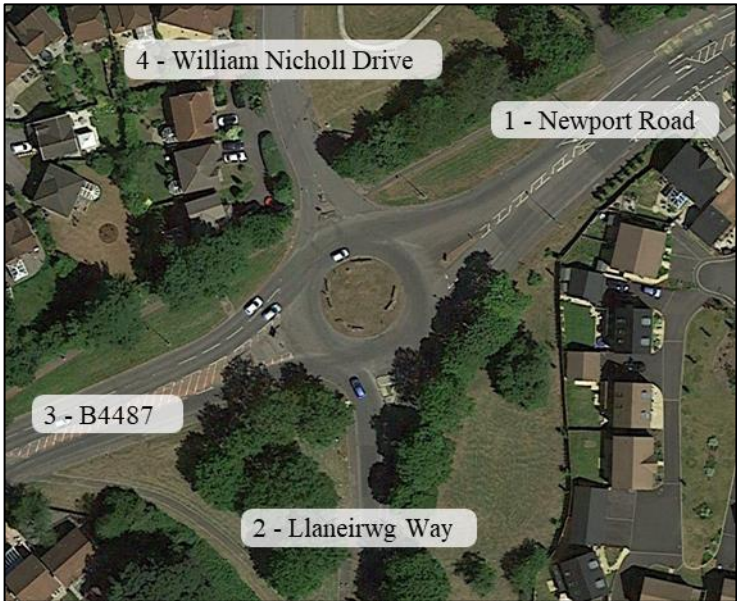


Figure 48: Newport Road/Llaneirwg Way/William Nicholl Drive Existing Arrangement

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 2% in the AM peak hour and 1% in the PM peak hour. The ARCADY assessment of this junction indicates that the Llaneirwg Way arm is forecast to operate over practical capacity in the AM Peak Hour of the 2023 and 2028 scenarios, due to a heavy opposing flow from the Newport Road (East) arm. All arms are forecast to operate within capacity in the PM Peak Hour.

The proposed development is forecast to cause a slight improvement in the performance of the junction in 2028, due to reduction in traffic associated with mode shift to rail from introduction of Cardiff Parkway Railway Station. As a result, no junction mitigation measures are required at this location.

Table 52: B4487 Newport Road/Llaneirwg Way Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	Newport Road	1	3.65	0.48	1	4.21	0.54
2	Llaneirwg Way	2	9.33	0.66	2	9.17	0.66
3	B4487	1	3.72	0.44	1	3.68	0.45
4	William Nichols Drive	0	5.79	0.28	0	5.95	0.21
2023 with Committed Development							
1	Newport Road	1	4.18	0.54	2	5.08	0.62
2	Llaneirwg Way	4	17.86	0.82	3	12.66	0.75
3	B4487	1	4.49	0.5	1	4.15	0.50
4	William Nichols Drive	1	7.28	0.34	0	6.94	0.25
2023 with Committed and Proposed Development (Phase 1)							
1	Newport Road	1	4.27	0.55	2	5.77	0.66
2	Llaneirwg Way	6	22.28	0.86	3	14.72	0.78
3	B4487	1	5.02	0.55	1	4.25	0.51
4	William Nichols Drive	1	7.54	0.35	0	7.16	0.26
2028 with Committed Development							
1	Newport Road	1	4.31	0.55	2	5.27	0.63
2	Llaneirwg Way	5	20.02	0.84	3	13.64	0.76
3	B4487	1	4.63	0.52	1	4.26	0.51
4	William Nichols Drive	1	7.54	0.35	0	7.16	0.26
2028 with Committed and Proposed Development							
1	Newport Road	1	4.15	0.54	2	5.69	0.66
2	Llaneirwg Way	5	19.26	0.83	4	17.13	0.80
3	B4487	1	5.21	0.57	1	4.21	0.50
4	William Nichols Drive	1	8.70	0.39	0	6.97	0.24

Junction 8: B4487 Newport Road/Mount Pleasant Avenue Traffic Signals

The Newport Road/Mount Pleasant Avenue signalised junction is presented in Figure 49 and has been assessed using LinSig.

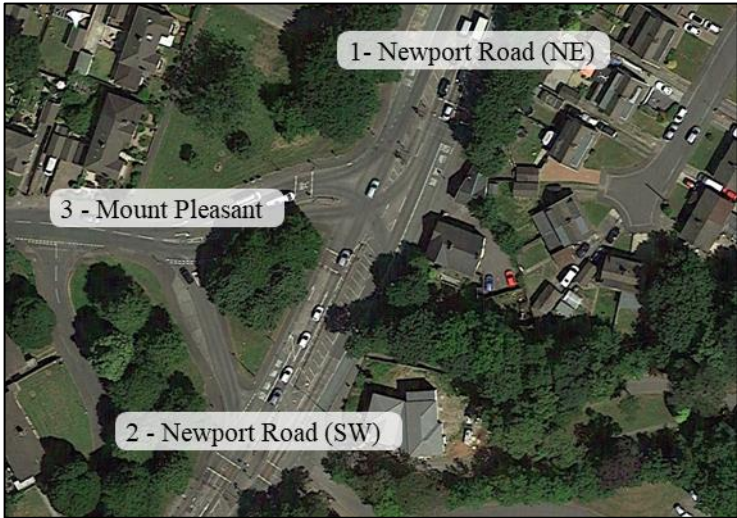


Figure 49: B4487 Newport Road/Mount Pleasant Avenue Existing Arrangement

The junction model has been informed by the signal specifications that were provided by CC. The assessment results are presented in Table 53.

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 3% in both the AM and PM peak hours. The LinSig assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 53: B4487 Newport Road/Mount Pleasant Avenue Traffic Signals LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	Deg. Sat	Queue (PCU)	Delay (s)	Deg. Sat
2018 Base							
3/1	Mount Pleasant (Left)	11	18.2	56.1%	7	11.1	36.8%
3/2	Mount Pleasant (Right)	9	35.9	56.3%	11	35.2	63.4%
1/2	Newport Road NE (Right)	8	34.2	56.1%	117	29.4	63.8%
2/1+2/2	Newport Rd SW (L & A)	7	27.8	55.2%	4	40.4	54.7%
Junction PRC		59.8% @ 180 seconds			41.2% @ 180 seconds		
2023 with Committed Development							
3/1	Mount Pleasant (Left)	12	17.7	58.2%	8	11.6	38.6%
3/2	Mount Pleasant (Right)	10	36.1	58.8%	12	36.4	67.5%
1/2	Newport Road NE (Right)	8	35.1	58.9%	11	30.5	67.0%
2/1+2/2	Newport Rd SW (L & A)	8	29.8	59.4%	4	40.7	56.1%
Junction PRC		51.5% @ 180 seconds			33.4% @ 180 seconds		
2023 with Committed and Proposed Development (Phase 1)							
3/1	Mount Pleasant (Left)	12	18.1	58.5%	8	12.2	40.2%
3/2	Mount Pleasant (Right)	10	36.0	60.0%	13	36.3	70.4%
1/2	Newport Road NE (Right)	9	34.9	60.3%	12	32.1	69.4%
2/1+2/2	Newport Rd SW (L & A)	8	30.4	61.1%	4	41.6	56.1%
Junction PRC		47.3% @ 180 seconds			27.8% @ 180 seconds		
2028 with Committed Development							
3/1	Mount Pleasant (Left)	13	18.8	59.9%	8	12.1	39.6%
3/2	Mount Pleasant (Right)	9	35.8	59.8%	12	36.7	68.6%
1/2	Newport Road NE (Right)	8	35.2	60.0%	12	30.8	68.1%
2/1+2/2	Newport Rd SW (L & A)	8	30.4	60.7%	4	41.5	57.4%
Junction PRC		48.3% @ 180 seconds			31.1% @ 180 seconds		
2028 with Committed and Proposed Development							
3/1	Mount Pleasant (Left)	131	19.4	60.9%	9	12.5	42.4%
3/2	Mount Pleasant (Right)	9	37.8	61.6%	13	36.0	70.8%
1/2	Newport Road NE (Right)	9	34.3	61.7%	12	33.2	70.9%
2/1+2/2	Newport Rd SW (L & A)	8	29.1	60.7%	4	42.6	57.4%
Junction PRC		45.9% @ 180 seconds			27.0% @ 180 seconds		

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 are presented in Table 54.

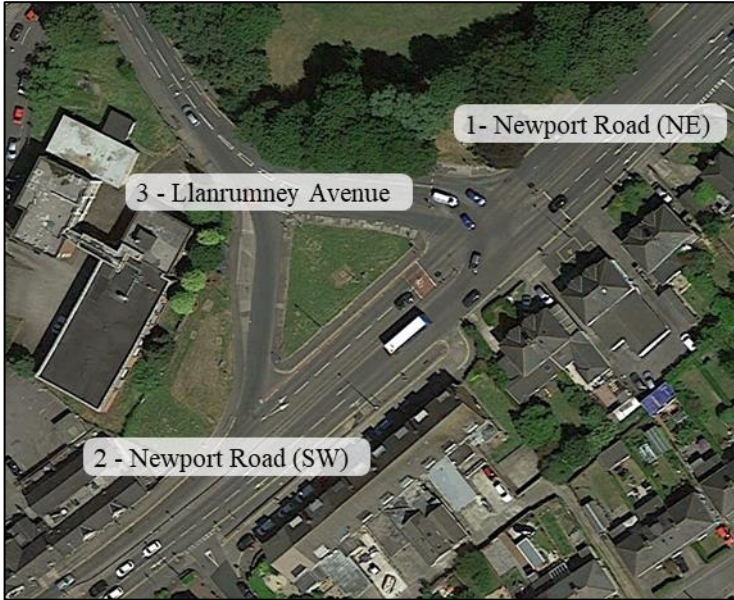


Figure 50: Newport Road/Llanrumney Avenue Existing Arrangement

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 1% in both the AM and PM peak hours. The LinSig assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 54: B4487/Llanrumney Avenue Traffic Signals LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
3/1	Llanrumney Ave (Left, Right)	3	23.0	43.6%	3	25.4	45.2%
3/2	Llanrumney Ave (Right)	4	23.0	44.4%	4	25.4	46.4%
1/3	Newport Road NE (Right)	0	11.9	7.5%	1	13.3	18.2%
2/1	Newport Road SW (Ahead)	2	9.9	17.4%	2	9.2	23.5%
Junction PRC		97.1% @ 60 seconds			15.9% @ 60 seconds		
2023 with Committed Development							
3/1	Llanrumney Ave (Left, Right)	4	23.6	47.1%	4	26.1	48.5%
3/2	Llanrumney Ave (Right)	4	23.6	48.1%	4	26.1	49.5%
1/3	Newport Road NE (Right)	0	12.3	8.2%	1	13.5	19.2%
2/1	Newport Road SW (Ahead)	2	10.0	18.4%	2	9.3	24.7%
Junction PRC		83.3% @ 60 seconds			9.5% @ 60 seconds		
2023 with Committed and Proposed Development (Phase 1)							
3/1	Llanrumney Ave (Left, Right)	4	23.7	47.7%	4	26.1	48.5%
3/2	Llanrumney Ave (Right)	4	23.7	48.7%	4	26.1	49.7%
1/3	Newport Road NE (Right)	0	12.5	8.5%	1	13.6	20.2%
2/1	Newport Road SW (Ahead)	2	10.0	18.6%	2	9.3	24.8%
Junction PRC		83.2% @ 60 seconds			9.3% @ 60 seconds		
2028 with Committed Development							
3/1	Llanrumney Ave (Left, Right)	4	23.8	48.0%	4	26.2	49.1%
3/2	Llanrumney Ave (Right)	4	23.8	48.9%	4	26.2	50.4%
1/3	Newport Road NE (Right)	0	12.5	8.5%	1	13.6	19.8%
2/1	Newport Road SW (Ahead)	2	10.0	18.7%	2	9.3	25.1%
Junction PRC		79.6% @ 60 seconds			7.7% @ 60 seconds		
2028 with Committed and Proposed Development							
3/1	Llanrumney Ave (Left, Right)	4.0	24.0	49.0%	4	26.1	48.7%
3/2	Llanrumney Ave (Right)	4.1	24.0	49.8%	4	26.1	49.7%
1/3	Newport Road NE (Right)	0.4	12.5	8.7%	1	13.8	21.0%
2/1	Newport Road SW (Ahead)	1.8	10.0	19.0%	2	9.3	25.2%
Junction PRC		79.5% @ 60 seconds			7.5% @ 60 seconds		

Junction 10: A48/A4232/Capel Edeyrn Roundabout

The A48/A4232/Capel Edeyrn roundabout has been assessed using ARCADY and the results are summarised in Table 55. As set out in Technical Note 2, the model has been calibrated to reflect surveyed queue lengths.



Figure 51: A48/A4232/Capel Edeyrn Roundabout Existing Arrangement

The percentage impact of the proposed development at this junction overall in comparison to the scenario 2028 with Committed Development is 1% in the AM peak hour and 4% in the PM peak hour. This indicates traffic overall is expected to be less than typical day-to-day variations.

The ARCADY assessment of this junction indicates the junction is forecast to operate over theoretical capacity in the AM and PM peak hours of all future year scenarios. Vehicle trips from nearby committed developments including North East Cardiff, Land at Church Street/St Edeyrn’s and Churchlands place considerable demand on operation of the junction, whilst the impact of the proposed development is negligible and within typical day to day variation.

The impacts of these developments have been considered within separate planning applications for each site, and as a result, no junction mitigation measures are proposed at this location as part of these proposals.

Should CC deem there to be a need for physical mitigation at this junction, it is considered appropriate that any committed developments will be responsible for delivering the necessary highway improvements.

Table 55: A48/A4232/Capel Edeyrn Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	A48 (North)	1	6.99	0.55	5	17.23	0.85
2	A48 (South)	2	6.71	0.59	6	24.75	0.87
3	Capel Edeyrn	1	8.79	0.55	1	13.18	0.56
4	A4232	4	8.57	0.78	1	4.02	0.55
2023 with Committed Development							
1	A48 (North)	3	16.48	0.78	35	94.56	1.03
2	A48 (South)	3	11.91	0.76	126	401.58	1.23
3	Capel Edeyrn	2	13.39	0.66	2	20.13	0.68
4	A4232	28	53.85	1.00	2	5.45	0.67
2023 with Committed and Proposed Development (Phase 1)							
1	A48 (North)	4	17.26	0.79	80	187.97	1.12
2	A48 (South)	3	12.18	0.77	146	492.26	1.24
3	Capel Edeyrn	2	15.20	0.70	2	20.90	0.69
4	A4232	33	61.44	1.01	2	5.46	0.67
2028 with Committed Development							
1	A48 (North)	4	17.92	0.79	47	120.41	1.06
2	A48 (South)	3	12.84	0.78	140	462.62	1.25
3	Capel Edeyrn	2	14.41	0.68	2	20.76	0.69
4	A4232	37	67.23	1.01	2	5.64	0.68
2028 with Committed and Proposed Development							
1	A48 (North)	4	18.04	0.80	158	388.31	1.24
2	A48 (South)	2	9.37	0.69	149	532.72	1.24
3	Capel Edeyrn	2	12.94	0.66	2	18.97	0.66
4	A4232	49	84.31	1.03	2	5.41	0.66

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 56. As set out in Technical Note 2, the model has been calibrated to reflect surveyed queue lengths.



Figure 52: A4232/Church Road/Heol Pontprennau Roundabout Existing Arrangement

The percentage impact of the proposed development at this junction is 1% in the AM peak hour and 2% in the PM peak hour.

The ARCADY assessment of this junction indicates the junction is forecast to operate over theoretical capacity in the AM and PM peak hours of all future year scenarios. Vehicle trips from nearby committed developments including North East Cardiff, Land at Church Street/St Edeyrn’s and Churchlands have a significant negative impact on operation of the junction, whilst the impact of the proposed development is relatively marginal.

The impacts of these developments have been considered within separate planning applications for each site, and as a result, no junction mitigation measures are proposed at this location as part of these proposals.

Table 56: A4232/Church Road/Heol Pontprennau Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	Pentwyn Link Road	5	7.6	0.83	1	3.04	0.59
2	Church Road	1	9.68	0.32	0	4.66	0.19
3	A4232	1	2.99	0.47	2	4.78	0.64
4	Heol Pontprennau	4	12.2	0.79	3	12.76	0.77
2023 with Committed Development							
1	Pentwyn Link Road	32.8	44.52	0.99	4	7.27	0.82
2	Church Road	215.9	1173.3	1.92	2	11.86	0.63
3	A4232	1.6	4.61	0.62	14	31.4	0.95
4	Heol Pontprennau	186.1	468.87	1.28	273	805.58	1.54
2023 with Committed and Proposed Development (Phase 1)							
1	Pentwyn Link Road	57.3	69.66	1.03	4	7.23	0.82
2	Church Road	261.0	1500.49	2.03	2	11.90	0.63
3	A4232	1.6	4.57	0.62	23	47.16	0.98
4	Heol Pontprennau	196.6	490.82	1.30	319	1014.98	1.61
2028 with Committed Development							
1	Pentwyn Link Road	44.5	56.81	1.01	5	7.65	0.83
2	Church Road	239.3	1396.16	1.98	2	12.63	0.65
3	A4232	1.7	4.73	0.63	18	39.03	0.97
4	Heol Pontprennau	205.9	527.72	1.31	301	952.98	1.58
2028 with Committed and Proposed Development							
1	Pentwyn Link Road	121.5	132.92	1.08	4	7.08	0.81
2	Church Road	306.5	1996.21	2.10	2	11.83	0.63
3	A4232	1.4	4.17	0.59	54	94.00	1.04
4	Heol Pontprennau	182.9	426.95	1.27	344	1150.17	1.61

Junction 12: M4/A4232 Partially Signalised Roundabout

Junction 30 of the M4 is part of the strategic highway network for which the Welsh Government are responsible. Specifications and SCOOT outputs that have been provided by CC to inform the junction model and saturations flows have been calculated using the RR67 method in LinSig. The assessment results are presented in Table 57.



Figure 53: M4 Junction 30 Existing Arrangement

CC have noted that Google Maps traffic data indicates this junction may be operating at or close to capacity in the base year. Given the estimated queue lengths were shown to mostly match queue lengths surveyed on the day the traffic data was collected, no further alterations have been made to the junction model.

The percentage impact of the proposed development at this junction is 5% in the AM peak hour and 2% in the PM peak hour. The ARCADY assessment of this junction indicates the junction is forecast to operate over theoretical capacity in the AM peak hour of all future year scenarios, and within theoretical capacity in the PM peak hour. The eastbound and westbound M4 off-slips are around 550m and 400m long respectively and can therefore comfortably accommodate the associated queue lengths without blocking the M4 mainline.

Vehicle trips from nearby committed developments including North East Cardiff, Land at Church Street/St Edeyrn’s and Churchlands generate significant demand on the junction, whilst the impact of the proposed development is negligible and within typical day to day variation. The impacts of these developments have been considered within the separate planning applications for each site, and as a result, no junction mitigation measures are required at this location in association with Hendre Lakes.

Table 57: M4 J30 Partially Signalised Roundabout LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1/1	M4 W/B Off-slip (A&L)	11	42.2	79.2%	10	48.5	62.3%
2/2	Pentwyn Link Road (A)	12	17.0	63.9%	16	11.1	62.2%
3/2	Malthouse Avenue A	3	29.5	30.6%	20	41.4	78.0%
4/2	M4 E/B Off-slip (A)	1	4.4	70.2%	1	3.9	53.9%
Junction PRC		10.4% @ 80 seconds			41.8% @ 120 seconds		
2023 with Committed Development							
1/1	M4 W/B Off-slip (A&L)	29	94.4	100.0%	18	43.5	76.0%
2/2	Pentwyn Link Road (A)	16	17.7	75.5%	18	9.9	69.3%
3/2	Malthouse Avenue A	4	30.2	35.2%	20	36.9	75.5%
4/2	M4 E/B Off-slip (A)	4	7.5	81.1%	5	5.8	63.2%
Junction PRC		-12.9% @ 80 seconds			18.3% @ 120 seconds		
2023 with Committed and Proposed Development (Phase 1)							
1/1	M4 W/B Off-slip (A&L)	19	65.4	94.5%	18	42.0	74.8%
2/2	Pentwyn Link Road (A)	20	23.2	83.7%	20	9.9	73.1%
3/2	Malthouse Avenue A	3	28.8	32.4%	20	35.6	74.3%
4/2	M4 E/B Off-slip (A)	4	7.9	82.3%	5	5.8	63.8%
Junction PRC		-8.3% @ 80 seconds			20.0% @ 120 seconds		
2028 with Committed Development							
1/1	M4 W/B Off-slip (A&L)	36	126.0	102.8%	18	43.9	76.7%
2/2	Pentwyn Link Road (A)	17	18.1	76.5%	19	10.1	70.3%
3/2	Malthouse Avenue A	4	30.3	35.6%	21	37.9	77.2%
4/2	M4 E/B Off-slip (A)	4	7.9	82.1%	15	5.9	64.5%
Junction PRC		-14.8% @ 80 seconds			16.2% @ 120 seconds		
2028 with Committed and Proposed Development							
1/1	M4 W/B Off-slip (A&L)	30	117.1	101.6%	18	42.5	75.8%
2/2	Pentwyn Link Road (A)	18	20.4	80.2%	21	9.6	75.3%
3/2	Malthouse Avenue A	3	22.7	24.7%	20	36.1	75.2%
4/2	M4 E/B Off-slip (A)	5	9.7	85.6%	5	6.1	64.5%
Junction PRC		-14.4% @ 80 seconds			18.7% @ 120 seconds		

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 CC. The assessment results are presented in Table 58.



Figure 54: A48/Southern Way Partially Signalised Roundabout Existing Arrangement

In the base year, the junction is forecast to exceed practical capacity in both the AM and PM peak hour.

In all future year scenarios, the junction is forecast to exceed theoretical capacity in the AM peak hour with significant queuing forecast on the A4232 Southern Way entry to the roundabout. A comparison of the scenarios 2028 with Committed and Proposed Development and 2028 with Committed Development indicates the development would have a negligible impact on the operation of the junction.

In the PM peak hour, the junction is forecast to exceed practical capacity and approach theoretical capacity in all future year scenarios. The impact of the development proposals is however shown to have a slight beneficial impact on the capacity of the junction.

Given the development proposals are shown to have negligible or beneficial impact on the junction, no mitigation is required. With the wider sustainable transport proposals being introduced to meet the 50:50 target set out in Policy KP8 of the CLDP, the results can reflect a worst case with the potential for background traffic to be lower than estimated.

Table 58: A48/Southern Way Partially Signalised Roundabout LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1/2	A48 S/B Off Slip (A)	2	4.8	37.3%	3	7.4	57.9%
2/2+ 2/1	Southern Way (A)	11	11.8	89.0 : 94.2%	3	5.9	85.3 : 81.6%
3/2	A48 N/B Off Slip (A)	9	29.9	77.6%	10	37.7	84.0%
4/2	Circle Way (A)	7	28.9	70.9%	8	36.1	79.0%
Junction PRC		-4.6% @ 60 seconds			5.5% @ 60 seconds		
2023 with Committed Development							
1/2	A48 S/B Off Slip (A)	2	5.4	40.3%	4	8.6	62.9%
2/2+ 2/1	Southern Way (A)	151	228.4	112.9 : 112.9%	8	16.3	94.9 : 94.9%
3/2	A48 N/B Off Slip (A)	14	56.7	92.9%	12	42.9	87.9%
4/2	Circle Way (A)	31	227.2	109.3%	9	39.5	82.8%
Junction PRC		-25.4% @ 60 seconds			-5.5% @ 60 seconds		
2023 with Committed and Proposed Development (Phase 1)							
1/2	A48 S/B Off Slip (A)	2.2	5.7	42.4%	5	9.7	68.2%
2/2+ 2/1	Southern Way (A)	154	231.4	113.1 : 113.1%	9	17.2	95.3 : 95.3%
3/2	A48 N/B Off Slip (A)	14	59.8	93.8%	13	52.9	91.6%
4/2	Circle Way (A)	22	143.2	103.0%	9	39.7	83.0%
Junction PRC		-25.7% @ 60 seconds			-5.9% @ 60 seconds		
2028 with Committed Development							
1/2	A48 S/B Off Slip (A)	2	5.6	41.4%	4	9.2	64.9%
2/2+ 2/1	Southern Way (A)	165	254.3	114.8 : 114.8%	11	20.1	96.3 : 96.3%
3/2	A48 N/B Off Slip (A)	16	68.4	95.7%	12	46.3	89.7%
4/2	Circle Way (A)	35	254.1	111.4%	9	41.0	84.1%
Junction PRC		-27.5% @ 60 seconds			-7.0% @ 60 seconds		
2028 with Committed and Proposed Development							
1/2	A48 S/B Off Slip (A)	2.1	5.8	44.5%	5	10.3	70.3%
2/2+ 2/1	Southern Way (A)	171	260.0	115.2 : 115.2%	11	19.0	95.9 : 95.9%
3/2	A48 N/B Off Slip (A)	18	79.8	97.7%	14	57.3	93.0%
4/2	Circle Way (A)	12	55.5	90.9%	10	41.5	84.5%
Junction PRC		-28.0% @ 60 seconds			-6.6% @ 60 seconds		

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. The junction model has been updated following comments from CC noting that a direct lane has been introduced from the B4487 to the A4161 Newport Road (westbound). The existing junction arrangement is presented in Figure 55 and the assessment results are presented in Table 59.

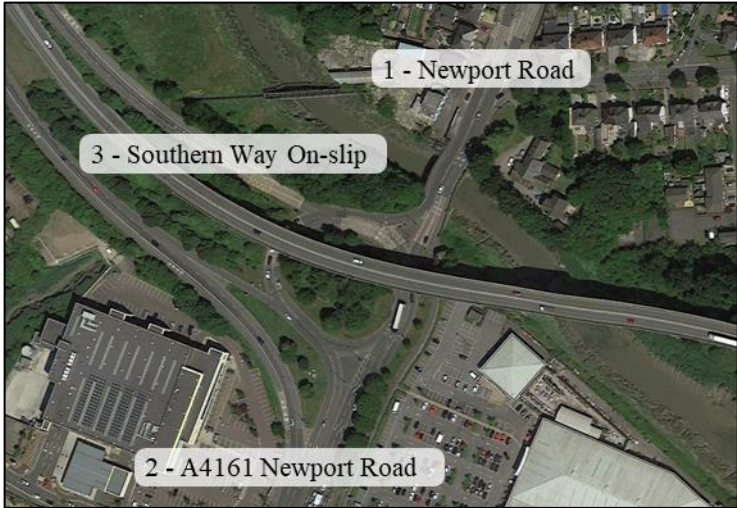


Figure 55: B4487/A4161 Newport Road/A4232 Existing Arrangement

The percentage impact of the proposed development at this junction is 0% in both the AM and PM peak hour.

The LinSig assessment of this junction indicates the junction is forecast to operate above practical capacity in the AM and PM peak hours of all future year scenarios. The impact of the proposed development is negligible or beneficial at this location and as a result, no junction mitigation measures are required.

Table 59: B4487/A4161 Newport Road/A4232 Signalised Roundabout LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
10/1	A4232 Southern Way On Slip (A)	14	33.0	87.5%	4	6.1	36.0%
3/1	A4232 Southern Way Off Slip (L&A)	5	11.8	69.4%	6	18.8	74.3%
4/2	B4487 Newport Rd Gyratory (R)	5	12.0	70.9%	3	6.1	65.8%
7/1	A4232 Off Slip Gyratory (A)	5	25.6	52.6%	10	25.9	75.5%
Junction PRC		2.8% @ 64 seconds			19.2% @ 64 seconds		
2023 with Committed Development							
10/1	A4232 Southern Way On Slip (A)	18	53.3	95.1%	5	7.9	43.8%
3/1	A4232 Southern Way Off Slip (L&A)	6	12.8	76.5%	7	20.4	80.0%
4/2	B4487 Newport Rd Gyratory (R)	7	17.3	81.3%	1	7.0	72.4%
7/1	A4232 Off Slip Gyratory (A)	5	28.1	58.7%	12	30.8	82.0%
Junction PRC		-5.7% @ 64 seconds			9.8% @ 64 seconds		
2023 with Committed and Proposed Development (Phase 1)							
10/1	A4232 Southern Way On Slip (A)	18	53.9	95.3%	5	8.1	43.6%
3/1	A4232 Southern Way Off Slip (L&A)	6	12.8	76.7%	7	20.4	80.0%
4/2	B4487 Newport Rd Gyratory (R)	7	17.2	81.1%	1	6.7	71.0%
7/1	A4232 Off Slip Gyratory (A)	5	28.0	58.2%	12	30.5	81.6%
Junction PRC		-5.8% @ 64 seconds			10.4% @ 64 seconds		
2028 with Committed Development							
10/1	A4232 Southern Way On Slip (A)	20	62.7	97.0%	5	8.4	44.6%
3/1	A4232 Southern Way Off Slip (L&A)	54	10.4	74.5%	7	20.8	80.9%
4/2	B4487 Newport Rd Gyratory (R)	6	19.0	81.5%	1	6.3	69.8%
7/1	A4232 Off Slip Gyratory (A)	6	32.8	65.9%	12	31.6	82.9%
Junction PRC		-7.7% @ 64 seconds			8.7% @ 64 seconds		
2028 with Committed and Proposed Development							
10/1	A4232 Southern Way On Slip (A)	21	64.9	97.3%	5	8.4	44.2%
3/1	A4232 Southern Way Off Slip (L&A)	5	10.6	74.4%	7	21.2	81.6%
4/2	B4487 Newport Rd Gyratory (R)	12	18.6	81.9%	1	6.4	70.4%
7/1	A4232 Off Slip Gyratory (A)	6	32.8	65.9%	12	31.5	82.8%
Junction PRC		-8.1% @ 64 seconds			8.7% @ 64 seconds		

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 60.



Figure 56: Heol Las/St Mellons Road Priority Junction
Existing Arrangement

The percentage impact of the proposed development at this junction is 6% in the AM peak hour and 0% in the PM peak hour. The PICADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 60: Heol Las/St Mellons Road PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Heol Las	B-A	0	8.06	0.19	0	8.06	0.17
St Mellons	C-AB	0	5.18	0.00	0	5.41	0.00
2023 with Committed Development							
Heol Las	B-A	0	8.13	0.20	0	8.12	0.17
St Mellons	C-AB	0	5.19	0	0	5.42	0.00
2023 with Committed and Proposed Development (Phase 1)							
Heol Las	B-A	0	8.29	0.21	0	8.17	0.18
St Mellons	C-AB	0	5.19	0	0	5.43	0
2028 with Committed Development							
Heol Las	B-A	0	8.17	0.20	0	8.17	0.18
St Mellons	C-AB	0	5.19	0.00	0	5.42	0.00
2028 with Committed and Proposed Development							
Heol Las	B-A	0	8.44	0.23	0	8.17	0.18
St Mellons	C-AB	0	5.19	0	0	5.42	0

Junction 16: Rover Way/Lamby Way/A4232
priority roundabout

Table 61 presents the ARCADY assessment of the Rover Way/Lamby Way/A4232 priority roundabout.



Figure 57: Rover Way/Lamby Way/A4232 Roundabout Existing Arrangement

The overall percentage impact of the proposed development at this junction is 0% in both the AM and PM peak hours.

The ARCADY assessment of this junction indicates the junction is forecast to exceed practical capacity in the AM and PM peak hours in all future year scenarios, with the A4232 arm operating above theoretical capacity in the AM peak. Given the impact of the proposed development overall at this location is 0% in both peak hours, no junction mitigation measures are proposed.

Table 61: Rover Way/Lamby Way/A4232 Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	Lamby Way	8	33.40	0.90	5	19.09	0.83
2	Rover Way (South)	9	26.92	0.90	5	13.98	0.81
3	Rover Way (East)	1	7.28	0.56	1	6.15	0.52
4	A4232	71	129.83	1.07	6	15.31	0.85
2023 with Committed Development							
1	Lamby Way	15	56.45	0.96	10	37.60	0.92
2	Rover Way (South)	23	60.25	0.99	11	31.87	0.93
3	Rover Way (East)	2	8.67	0.61	1	7.54	0.58
4	A4232	172	338.98	1.20	15	36.64	0.95
2023 with Committed and Proposed Development (Phase 1)							
1	Lamby Way	15	53.76	0.96	10	39.65	0.93
2	Rover Way (South)	26	66.02	1.00	12	32.77	0.93
3	Rover Way (East)	2	8.91	0.62	1	7.57	0.58
4	A4232	173	341.93	1.20	17	41.04	0.96
2028 with Committed Development							
1	Lamby Way	18	65.66	0.97	12	45.95	0.95
2	Rover Way (South)	30	74.59	1.01	14	38.47	0.95
3	Rover Way (East)	2	9.12	0.63	2	7.92	0.60
4	A4232	194	397.75	1.22	19	45.86	0.97
2028 with Committed and Proposed Development							
1	Lamby Way	15	55.05	0.96	14	50.19	0.95
2	Rover Way (South)	33	80.48	1.01	16	40.31	0.95
3	Rover Way (East)	2	9.21	0.63	1	7.82	0.59
4	A4232	194	398.52	1.22	22	50.64	0.98

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 CC to inform the junction model. Based on site observations it has been estimated that the pedestrian crossing will be called once every three cycles.

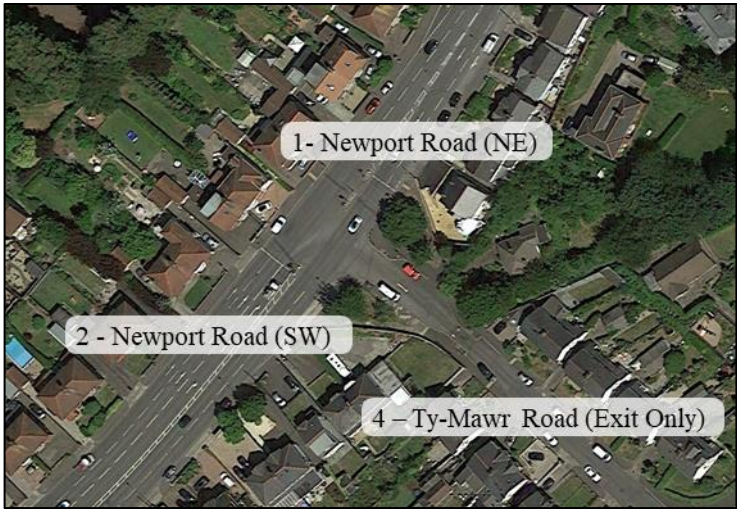


Figure 58: Newport Road/Ty-Mawr Road Existing Arrangement

The assessment results are summarised in Table 62 below. It should be noted that Ty-Mawr Road is an ‘exit only’ link and therefore no capacity results are presented for the road.

The percentage impact of the proposed development at this junction is 0% in both the AM peak hour and PM peak hour. The LinSig assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 62: B4487 Newport Road/Ty-Mawr Road Traffic Signals LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1/2	Newport Road NE (Ahead)	8	9.6	50.4%	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)	3	35.6	50.7%	5	20.3	49.1%
Junction PRC		72.3% @ 190 seconds			82.9% @ 190 seconds		
2023 with Committed Development							
1/2	Newport Road NE (Ahead)	10	10.2	55.7%	7	18.3	52.8%
2/2	Newport Road SW (Ahead)	5	4.3	24.3%	8	5.0	35.3%
2/3	Newport Road SW (Right)	4	36.3	55.1%	6	20.6	52.1%
Junction PRC		61.1% @ 190 seconds			70.4% @ 190 seconds		
2023 with Committed and Proposed Development (Phase 1)							
1/2	Newport Road NE (Ahead)	10	10.3	56.3%	7	18.0	52.7%
2/2	Newport Road SW (Ahead)	5	4.3	24.3%	8	5.0	35.3%
2/3	Newport Road SW (Right)	4	36.3	55.1%	6	21.0	52.8%
Junction PRC		60.0% @ 190 seconds			70.4% @ 190 seconds		
2028 with Committed Development							
1/2	Newport Road NE (Ahead)	10	10.3	56.7%	7	18.1	53.1%
2/2	Newport Road SW (Ahead)	5	4.4	24.7%	8	5.0	36.0%
2/3	Newport Road SW (Right)	4	36.6	56.0%	6	21.2	53.7%
Junction PRC		58.7% @ 190 seconds			67.6% @ 190 seconds		
2028 with Committed and Proposed Development							
1/2	Newport Road NE (Ahead)	10	10.4	57.3%	7	18.2	53.9%
2/2	Newport Road SW (Ahead)	5	4.4	24.7%	8	5.0	36.0%
2/3	Newport Road SW (Right)	4	36.6	56.0%	6	21.2	53.7%
Junction PRC		57.2% @ 190 seconds			67.0% @ 190 seconds		

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 63.

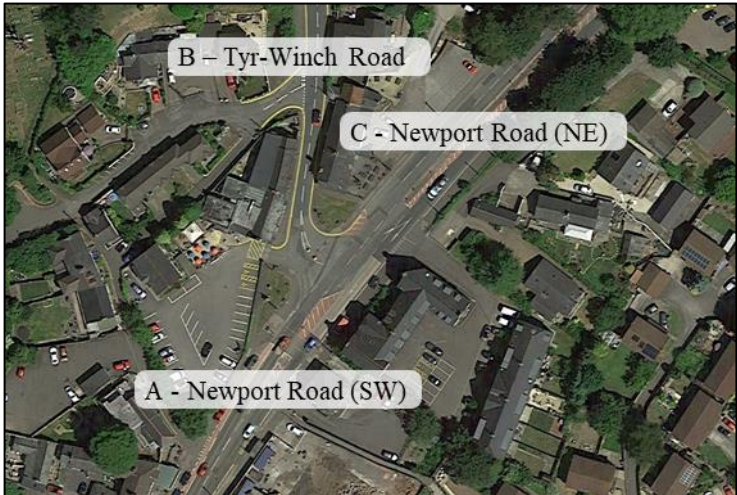


Figure 59: B4487 Newport Road/Tyr Winch Road Existing Arrangement

The percentage impact of the proposed development at this junction is 2% in the AM peak hour and 3% in the PM peak hour. The PICADY assessment indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 63: B4487 Newport Road/Tyr Winch Road PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Tyr Winch Road	B-C	0	8.08	0.17	0	8.68	0.09
Tyr Winch Road	B-A	0	17.93	0.25	1	25.26	0.32
B4487 Newport Road	C-AB	0	6.7	0.10	0	7.8	0.17
2023 with Committed Development							
Tyr Winch Road	B-C	0	8.57	0.18	0	9.31	0.10
Tyr Winch Road	B-A	0	20.78	0.29	1	30.44	0.37
B4487 Newport Road	C-AB	0	6.93	0.11	0	8.13	0.18
2023 with Committed and Proposed Development (Phase 1)							
Tyr Winch Road	B-C	0	9.03	0.19	0	9.59	0.11
Tyr Winch Road	B-A	0	23.10	0.31	1	33.94	0.40
B4487 Newport Road	C-AB	0	7.16	0.11	0	8.22	0.18
2028 with Committed Development							
Tyr Winch Road	B-C	0	8.76	0.19	0	9.59	0.11
Tyr Winch Road	B-A	0	21.87	0.30	1	32.81	0.39
B4487 Newport Road	C-AB	0	7.01	0.11	0	8.26	0.18
2028 with Committed and Proposed Development							
Tyr Winch Road	B-C	0	1050	0.23	0	9.70	0.09
Tyr Winch Road	B-A	0	23.23	0.31	1	36.13	0.41
B4487 Newport Road	C-AB	0	6.90	0.07	0	8.26	0.19

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 CC and used to inform the junction model. The assessment results are summarised in Table 64.



Figure 60: Newport Road/Wern Fawr Lane Existing Arrangement

The percentage impact of the proposed development at this junction is 3% in both the AM peak hour and 4% in the PM peak hour.

The LinSig assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 64: B4487 Newport Road/Wern Fawr Lane LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1/1 + 1/2	Newport Road NE (A & R)	9	7.9	61.5%	10	7.9	62.8%
2/1	Newport Road SW (A & L)	12	12.3	56.5%	11	13.9	58.4%
3/1 + 3/2	Wern Fawr Lane (L & R)	3	51.8	57.5%	4	50.2	62.8%
Junction PRC		46.3% @ 180 seconds			43.2% @ 180 seconds		
2023 with Committed Development							
1/1 + 1/2	Newport Road NE (A & R)	11	11.3	68.8%	13	9.5	70.2%
2/1	Newport Road SW (A & L)	27	25.6	71.8%	26	25.3	71.1%
3/1 + 3/2	Wern Fawr Lane (L & R)	6	72.4	61.5%	9	82.7	71.5%
Junction PRC		25.3% @ 180 seconds			25.8% @ 180 seconds		
2023 with Committed and Proposed Development (Phase 1)							
1/1 + 1/2	Newport Road NE (A & R)	12	11.8	69.9%	16	10.6	75.3%
2/1	Newport Road SW (A & L)	20	16.8	75.3%	19	17.6	75.9%
3/1 + 3/2	Wern Fawr Lane (L & R)	4	53.9	63.4%	6	62.5	76.3%
Junction PRC		19.5% @ 180 seconds			18.0% @ 180 seconds		
2028 with Committed Development							
1/1 + 1/2	Newport Road NE (A & R)	12	12.0	70.1%	14	10.0	71.3%
2/1	Newport Road SW (A & L)	28	26.2	73.0%	27	25.8	72.1%
3/1 + 3/2	Wern Fawr Lane (L & R)	6	73.3	62.5%	9	83.6	72.5%
Junction PRC		22.3% @ 180 seconds			24.1% @ 180 seconds		
2028 with Committed and Proposed Development							
1/1 + 1/2	Newport Road NE (A & R)	110	11.9	68.2%	15	10.5	74.4%
2/1	Newport Road SW (A & L)	20	17.3	76.6%	20	18.1	77.2%
3/1 + 3/2	Wern Fawr Lane (L & R)	4	54.4	64.4%	6	63.6	77.3%
Junction PRC		17.4% @ 180 seconds			16.5% @ 180 seconds		

Junction 20: A48 Newport Road/Coal Pit Lane
Lane Priority Junction

The Newport Road/Coal Pit Lane priority junction has been assessed using the PICADY module of Junctions 9 and the assessment results are presented in Table 65.

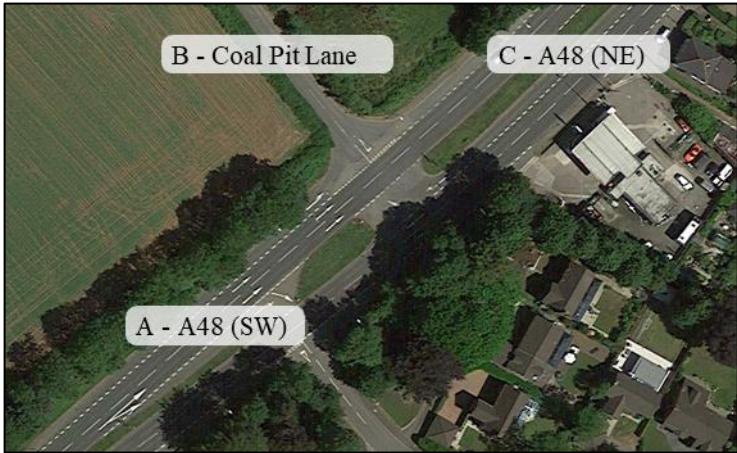


Figure 61: A48 Newport Road/Coal Pit Lane Existing Arrangement

The overall percentage impact of the proposed development at this junction is 7% in the AM peak hour and 3% in the PM peak hour. The PICADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 65: A48 Newport Road/Coal Pit Lane PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Coal Pit Lane	B-A	2	24.93	0.67	0	8.01	0.10
A48 Newport Road	C-AB	0	6.45	0.12	0	6.26	0.20
2023 with Committed Development							
Coal Pit Lane	B-A	2	29.51	0.71	0	8.21	0.10
A48 Newport Road	C-AB	0	6.66	0.12	0	6.39	0.21
2023 with Committed and Proposed Development (Phase 1)							
Coal Pit Lane	B-A	3	30.78	0.72	0	8.39	0.11
A48 Newport Road	C-AB	0	6.67	0.12	0	6.51	0.21
2028 with Committed Development							
Coal Pit Lane	B-A	3	32.2	0.74	0	8.29	0.11
A48 Newport Road	C-AB	0	6.73	0.13	0	6.45	0.21
2028 with Committed and Proposed Development							
Coal Pit Lane	B-A	3	34.27	0.75	0	8.55	0.11
A48 Newport Road	C-AB	0	6.65	0.12	0	6.69	0.22

Junction 21: B4239 Wentloog Avenue/Heol Las
Las Priority Junction

The B4239 Wentloog Avenue/Heol Las priority junction is presented in Figure 62 and has been assessed using the PICADY module of Junctions 9. The assessment results are presented in Table 66.



Figure 62: Wentloog Avenue/Heol Las Existing Arrangement

The percentage impact of the proposed development at this junction is -1% in the AM peak hour and 0% in the PM peak hour.

The PICADY assessment of this junction indicates the junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 66: B4239 Wentloog Avenue/Heol Las PICADY Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
Heol Las	B-A	0	8.78	0.07	0	9.30	0.07
B4239 Wentloog Avenue	C-AB	0	5.61	0.01	0	6.04	0.01
2023 with Committed Development							
Heol Las	B-A	0	8.87	0.08	0	9.40	0.07
B4239 Wentloog Avenue	C-AB	0	5.63	0.01	0	6.08	0.01
2023 with Committed and Proposed Development (Phase 1)							
Heol Las	B-A	0	8.87	0.08	0	9.42	0.07
B4239 Wentloog Avenue	C-AB	0	5.64	0.01	0	6.08	0.01
2028 with Committed Development							
Heol Las	B-A	0	8.93	0.08	0	9.46	0.07
B4239 Wentloog Avenue	C-AB	0	5.65	0.01	0	6.10	0.01
2028 with Committed and Proposed Development							
Heol Las	B-A	0	8.92	0.08	0	9.49	0.07
B4239 Wentloog Avenue	C-AB	0	5.65	0.01	0	6.10	0.01

Junction 23: A48 Pentwyn Interchange Roundabout

The A48 Pentwyn Interchange Roundabout is presented in Figure 63 and has been assessed using the ARCADY module of Junctions 9. The capacity assessment results are presented in Table 67.



Figure 63: A48 Pentwyn Interchange Existing Arrangement

The percentage impact of the proposed development at this junction is 1% in the AM peak hour and 2% in the PM peak hour.

The ARCADY assessment indicates this junction is forecast to operate satisfactorily in the AM and PM peak hours of all scenarios, with acceptable levels of queueing and delay. As a result, no junction mitigation measures are required at this location.

Table 67: A48 Pentwyn Interchange Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2018 Base							
1	Eastern Ave (NE)	1	5.06	0.46	1	4.55	0.47
2	Cardiff East Park & Ride	0	2.18	0.02	0	2.41	0.13
3	Eastern Ave (SW)	0	2.19	0.24	0	2.61	0.29
4	Bryn Celyn Road	1	3.51	0.44	1	3.20	0.34
5	Pentwyn Road	1	3.68	0.45	1	3.10	0.37
2023 with Committed Development							
1	Eastern Ave (NE)	1	7.28	0.56	1	5.89	0.54
2	Cardiff East Park & Ride	0	2.53	0.02	0	2.78	0.15
3	Eastern Ave (SW)	1	2.67	0.38	1	3.50	0.47
4	Bryn Celyn Road	1	4.47	0.52	1	3.93	0.41
5	Pentwyn Road	2	6.00	0.65	1	4.37	0.54
2023 with Committed and Proposed Development (Phase 1)							
1	Eastern Ave (NE)	1	7.48	0.57	1	6.56	0.59
2	Cardiff East Park & Ride	0	2.54	0.02	2	2.85	0.15
3	Eastern Ave (SW)	1	2.69	0.38	1	3.63	0.48
4	Bryn Celyn Road	1	4.88	0.56	1	4.00	0.42
5	Pentwyn Road	2	6.38	0.67	1	4.41	0.54
2028 with Committed Development							
1	Eastern Ave (NE)	1	7.61	0.58	1	6.08	0.55
2	Cardiff East Park & Ride	0	2.56	0.02	0	2.82	0.15
3	Eastern Ave (SW)	1	2.71	0.38	1	3.57	0.48
4	Bryn Celyn Road	1	4.6	0.53	1	4.01	0.42
5	Pentwyn Road	2	6.25	0.67	1	4.47	0.55
2028 with Committed and Proposed Development							
1	Eastern Ave (NE)	1	7.37	0.56	2	7.04	0.61
2	Cardiff East Park & Ride	0	2.54	0.02	0	2.92	0.16
3	Eastern Ave (SW)	1	2.69	0.38	1	3.71	0.48
4	Bryn Celyn Road	1	5.00	0.57	1	3.97	0.41
5	Pentwyn Road	2	6.61	0.68	1	4.44	0.55

7.7 A48 West Facing Slip Roads

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, the Design Manual for Roads and Bridge (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 P) are in PCUs whereas the DMRB guidance uses VPH. Movements expressed in VPH for the slips and mainline flow are summarised in Table 68 below. Chapter 3 of TD 22/06 has been considered and where appropriate, traffic flows were amended to account for the proportion of Large Goods Vehicles (LaGV) and uphill gradients.

Table 68: A48 West-Facing Slips Traffic Flows (VPH)

	Westbound		Eastbound	
	Mainline	Merge	Mainline	Diverge
2018 Base				
AM Peak Hour	1,824	903	1,932*	1,926
PM Peak Hour	1,990	1,680	2,563*	1,236
2023 with Committed Development				
AM Peak Hour	1,878	1,106	1,989*	2,115
PM Peak Hour	2,043	1,848	2,631*	1,429
2023 with Committed and Proposed Development (Phase 1)				
AM Peak Hour	1,878	1,156	1,989*	2,402
PM Peak Hour	2,043	2,169	2,631*	1,491
2028 with Committed Development				
AM Peak Hour	1,914	1,123	2,027*	2,153
PM Peak Hour	2,079	1,878	2,678*	1,452
2028 with Committed and Proposed Development				
AM Peak Hour	1,914	1,153	2,027*	2,731
PM Peak Hour	2,079	2,430	2,678*	1,459

**Assumed uphill gradient (<2%) and therefore no adjustment made for the proportion of LaGV (7.2%).*

The existing merge and diverge arrangements of the St Mellons A48 slip roads are presented in Figure 64 and Figure 65 respectively.

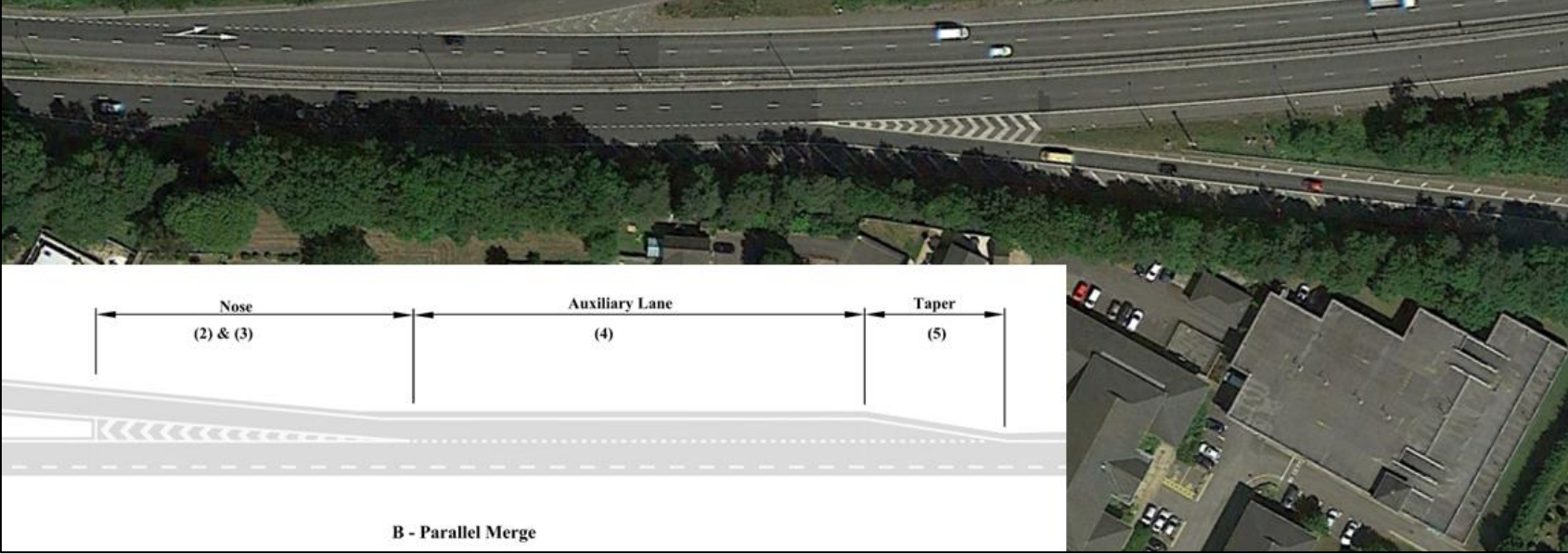


Figure 64: A48 Slips Existing Merge Arrangement

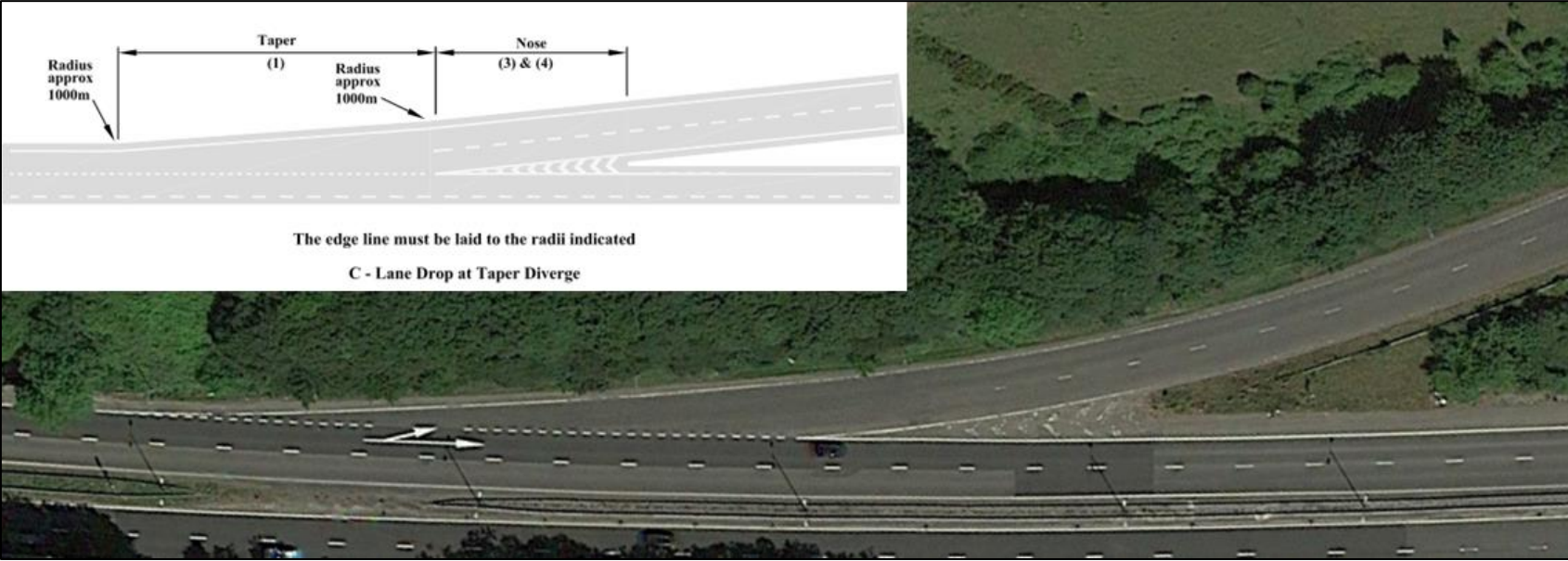


Figure 65: A48 Slips Existing Diverge Arrangement

Merge Lane

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, traffic flows associated with each peak hour have been reviewed, as presented in Figure 66 and Figure 67.

In the AM peak hour of the base and future year assessment scenarios, DMRB indicates that the arrangement ‘B-Parallel Merge’ is appropriate for the surveyed traffic flow in the AM Peak Hour. In the PM peak hour, it is recommended that arrangement ‘F-Lane Gain with Ghost Island Merge’ is provided. This includes a lane gain downstream of the junction, resulting in the A48 being three lanes wide.

The DMRB guidance recommends a lane gain should be provided on the A48, downstream of the merge lane as the link flow exceeds 3,200 vehicles. It should be noted that in 2018 the surveyed flow in the PM peak hour is 3,670 VPH, which also exceeds the link flow set out in this guidance. The existing arrangement is therefore well below that recommended in guidance.

Policy KP8 of the CLDP seeks to achieve a target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport. Furthermore, the Well-being of Future Generation Act is targeting a move towards a low-carbon society that is globally responsible. The introduction of a third lane on the A48 is considered to conflict with these policy and legislative objectives and is therefore not considered to be appropriate.

The existing slip road arrangement of a parallel merge is therefore deemed to be the most appropriate arrangement for the on-slip in the future year scenario 2028 with Committed and Proposed Development.

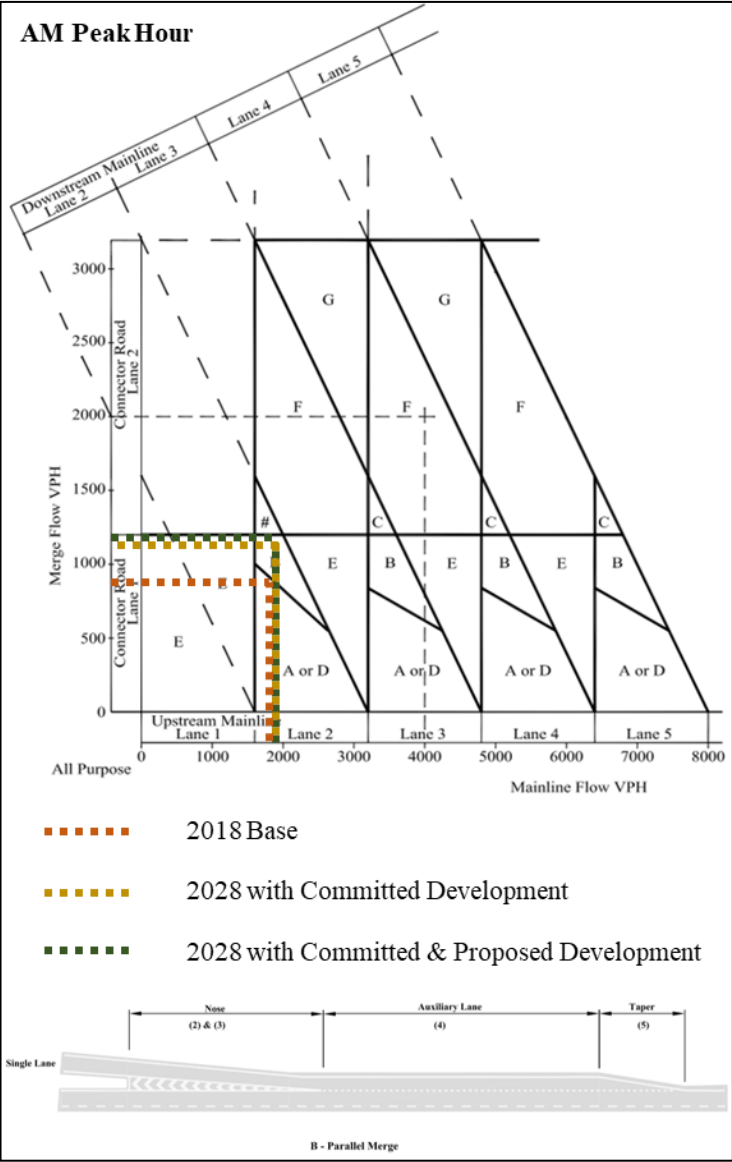


Figure 66: Merge Lane Arrangement (AM Peak Hour)

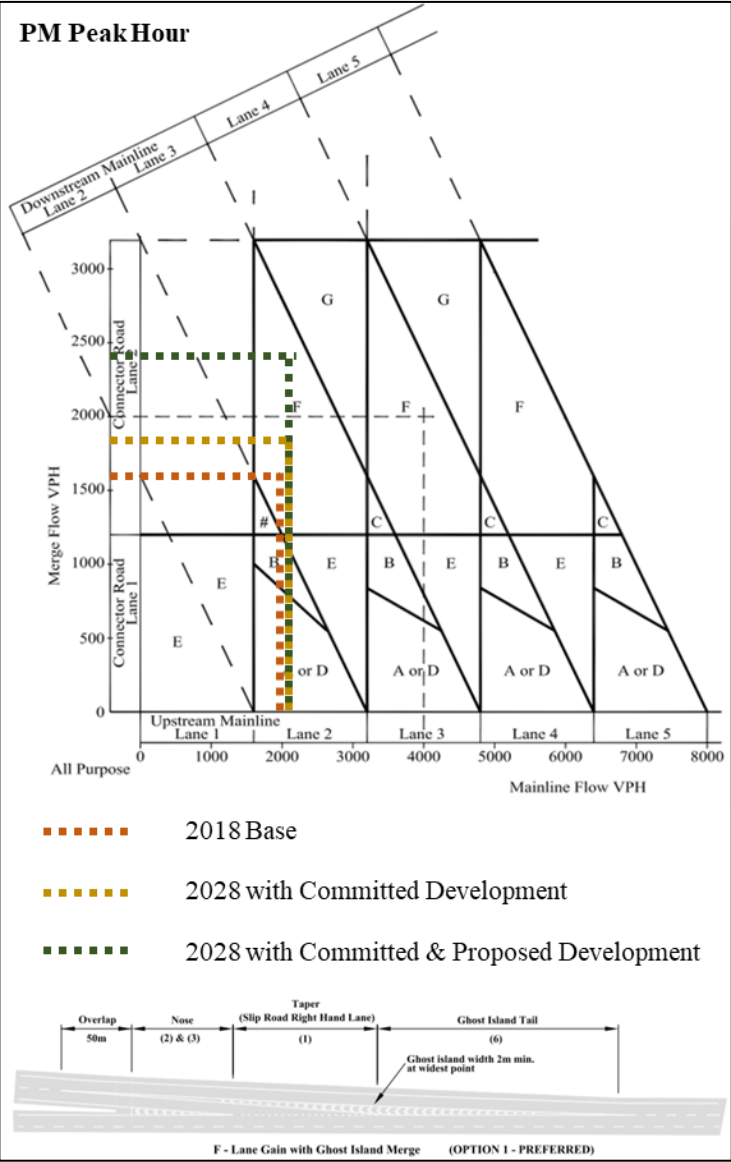


Figure 67: Merge Lane Arrangement (PM Peak Hour)

Diverge Lane

Figure 68 and Figure 69 below presents the diverge arrangements recommended by the DMRB guidance the AM and PM peak hours at the St Mellons Interchange.

In the AM peak hour of the base and future year assessment scenarios, DMRB indicates the preferred arrangement is either ‘D – Ghost Island Diverge for Two Lane Drop’ or ‘E- Two Lane Drop’ is provided. In the PM peak hour, it is also recommended a lane drop arrangement is introduced.

To deliver the junction arrangement recommended in the DMRB guidance, the A48 would need to be widened to three lanes upstream of the junction. As set out in the previous section, this would conflict with local policy and national legislative objectives and is therefore not considered to be appropriate.

Given it is not considered appropriate to widen the A48 to three lanes west of the junction, the existing arrangement is deemed to be appropriate.

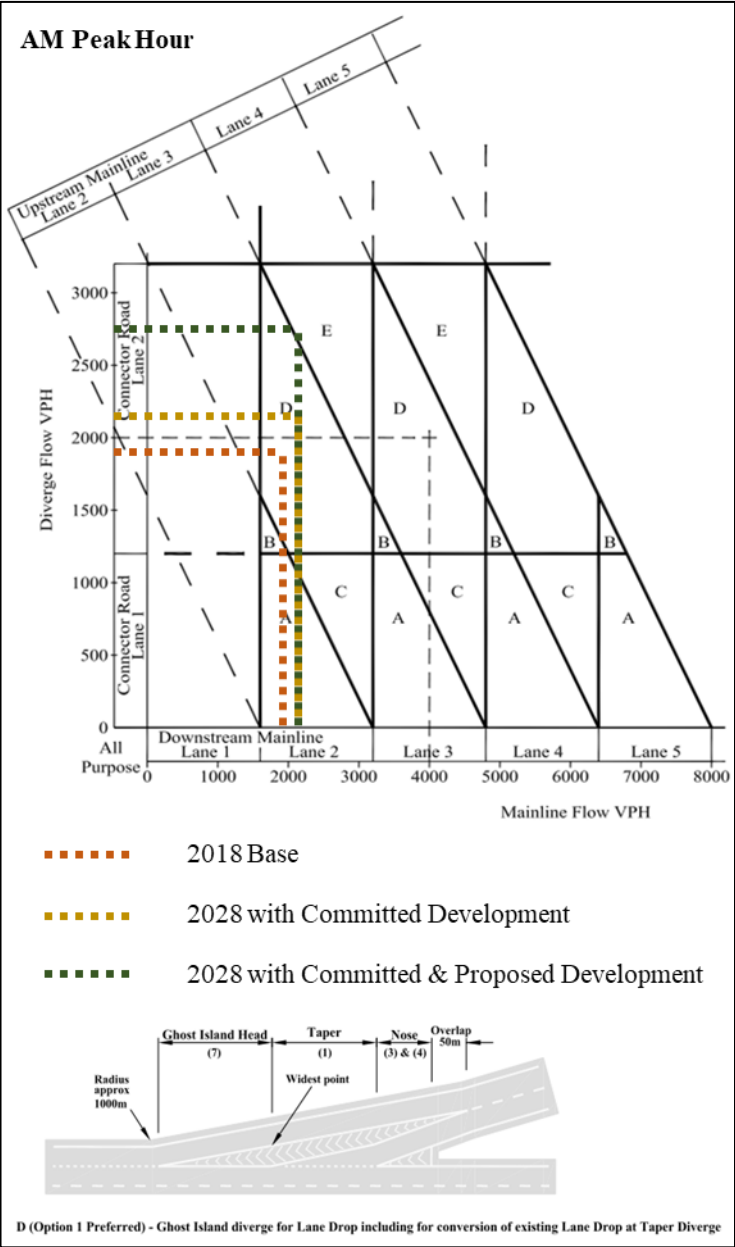


Figure 68: Diverge Lane Arrangement (AM Peak Hour)

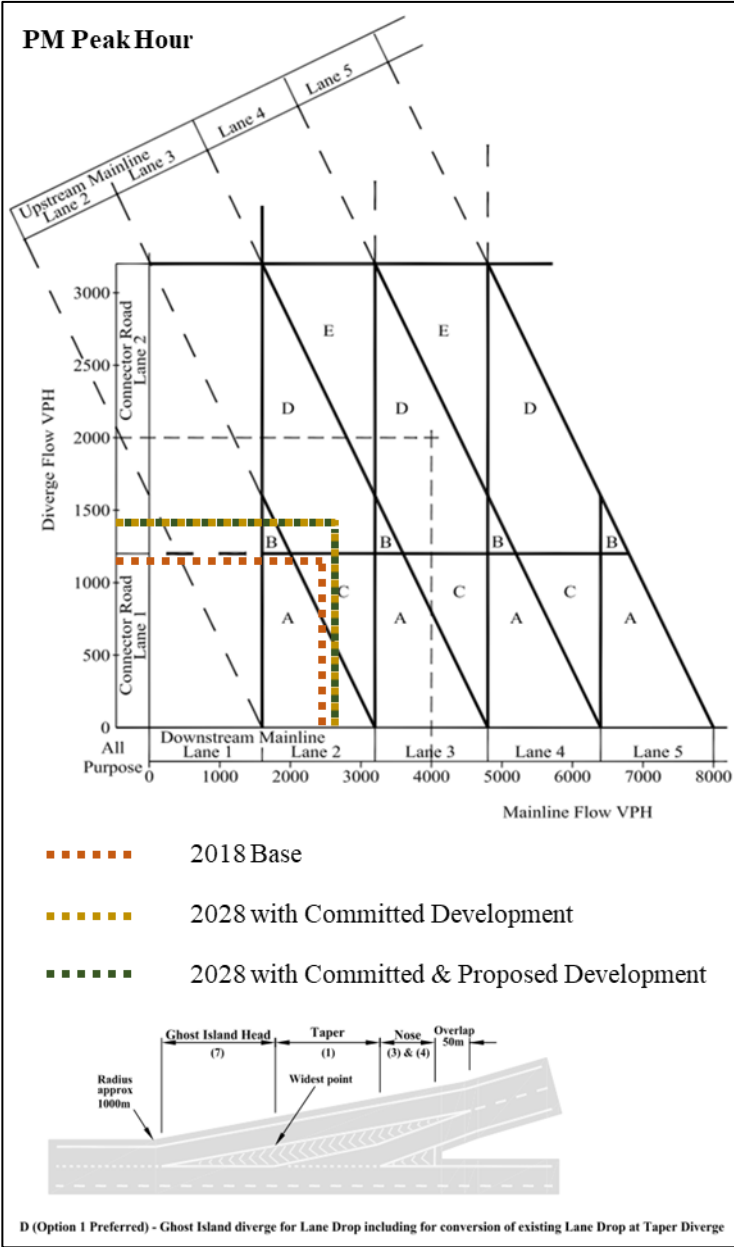


Figure 69: Diverge Lane Arrangement (PM Peak Hour)

7.8 Site Accesses

This Outline Planning Application has been submitted with all matters reserved including access. The final design of the site access junctions will therefore be agreed as part of the reserved matters.

Primary Site Access with Cypress Drive

The primary vehicular site access is proposed to be taken from Cypress Drive, south of the junction with Fortran Road. It is proposed to change the alignment of Cypress Drive and introduce traffic signals, as presented in Drawing 2.

The capacity of the junction has been assessed using LinSig. Given it is proposed to introduce traffic signals at the Fortran Road, Pascal Close and Willowdene Way junctions with Cypress Drive, a single LinSig model has been prepared to assess all four junctions.

The capacity assessment results for the primary site access junction with Cypress Drive are presented in Table 69. The junction is forecast to operate within practical capacity in all future year scenarios with limited queuing and delay.

Table 69: Cypress Drive/Primary Site Access LinSig Results

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)	DoS
2023 with Committed and Proposed Development (Phase 1)							
Site Access (L & A)	1/1	0	22.0	4.6%	3	15.7	28.9%
Cypress Drive South (L & R)	2/1	7	28.7	62.1%	5	46.1	66.1%
Cypress Drive North (Ahead)	3/1	5	18.0	39.6%	1	8.6	8.7%
Cypress Drive North (Right)	3/2	5	18.2	39.4%	5	23.2	57.1%
Junction PRC		44.8% @ 70 seconds			36.2% @ 70 seconds		
2028 with Committed and Proposed Development							
Site Access (L & A)	1/1	1	18.2	8.1%	12	25.0	66.8%
Cypress Drive South (L & R)	2/1	12	48.6	80.9%	6	59.1	70.8%
Cypress Drive North (Ahead)	3/1	13	20.9	66.5%	2	8.0	15.1%
Cypress Drive North (Right)	3/2	13	21.0	66.5%	9	52.8	76.1%
Junction PRC		11.2% @ 90 seconds			18.2% @ 90 seconds		

Cypress Drive/Sandbrook Road/Secondary Site Access Roundabout

The secondary vehicular access in to the development site is proposed to be taken from the Cypress Drive/Sandbrook Road roundabout, as shown in Drawing 3.

There is potential that this access will only be used for sustainable modes including bus. For the purposes of the traffic impact assessment, it has been assumed that all vehicular traffic will access the site via the primary site access junction.

To assess the capacity of the junction, all traffic that is estimated to access the site via Sandbrook Road has been redistributed via the secondary site access. This equates to approximately 10% of all development traffic.

The junction has been assessed using ARCADY and the assessment results are presented in Table 70. The junction is estimated to operate within practical capacity in all future year scenarios. Should the secondary site access be restricted to sustainable modes of transport, the junction is likely to operate with additional spare capacity.

Should additional development traffic use this junction beyond the 10% routing via Sandbrook Road, the roundabout is shown to have significant spare capacity. The junction arrangement for the secondary access will be assessed in detail as part of the reserved matters application.

Table 70: Cypress Drive/Sandbrook Road/Secondary Site Access Roundabout ARCADY Results

Arm		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2023 with Committed and Proposed Development (Phase 1)							
1	Cypress Drive (S)	0	3.40	0.07	0	3.44	0.05
2	Sandbrook Road	1	4.95	0.40	0	3.58	0.18
3	Cypress Drive (N)	0	3.02	0.12	1	3.98	0.31
4	Secondary Site Access	0	4.14	0.02	0	5.84	0.12
2028 with Committed and Proposed Development							
1	Cypress Drive (S)	0	3.4	0.07	0	3.61	0.05
2	Sandbrook Road	1	5.73	0.48	0	3.68	0.21
3	Cypress Drive (N)	0	3.10	0.13	1	4.31	0.36
4	Secondary Site Access	0	4.16	0.02	0	7.04	0.22

7.9 Summary

A detailed capacity assessment of all offsite junctions has been undertaken and it is recommended that mitigation is provided at the following locations:

- Cypress Drive/Fortran Road priority junction;
- Cypress Drive/Pascal Close priority junction;
- Cypress Drive/Willowdene Way priority junction; and
- Cypress Drive/A48/Newport Road roundabout.

These mitigation schemes are discussed further in the following chapter. In addition to mitigating the traffic impacts associated with the development proposals, the mitigation strategy for Cypress Drive seeks to change the character of the highway to reflect an urban environment with lower traffic speeds.

Other offsite junctions are forecast to exceed practical capacity in the future year scenarios, however the traffic impact of the development proposals is limited and therefore mitigation is not deemed to be required or appropriate.

Junctions along the A4232 Pentwyn Link Road are estimated to operate over capacity. Vehicle trips from nearby committed developments including North East Cardiff, Land at Church Street/St Edeyrn's and Churchlands have a significant negative impact on operation of these junctions, whilst the impact of the proposed development is relatively marginal. The impacts of these committed developments have been considered within separate planning applications for each site, and as a result, no junction mitigation measures are proposed along the A4232 Pentwyn Link Road as part of these proposals.

This is principally a result of traffic impacts arising from committed developments such as North East Cardiff. It is therefore considered that these committed developments should deliver any mitigation CC and Welsh Government consider appropriate.

The A48 Slips (St Mellons Interchange) merge and diverge arrangements have been reviewed with reference to DMRB guidance (TD 22/06). The guidance indicates that the A48 should be widened to three lanes in both directions, south-west of the St Mellons Interchange.

The introduction of a third lane on the A48 in both directions is considered to conflict with local and national policy and legislative objectives and is therefore not considered to be appropriate.

The primary and secondary site access junctions are estimated to operate with spare capacity in the future year scenarios with development. Given this Outline Planning Application has been submitted with all matters reserved including access, the precise design of these site access junctions will be agreed as part of the reserved matters process.

8 Highway Mitigation

8.1 Introduction

This chapter of the TA presents the highway works recommended to mitigate the traffic impacts associated with the development proposals. As set out in Chapter 7, mitigation is proposed at the following junctions:

- Cypress Drive/Fortran Road priority junction;
- Cypress Drive/Pascal Close priority junction;
- Cypress Drive/Willowdene Way junction; and
- Cypress Drive/A48/Newport Road roundabout.

As previously noted, works are proposed to mitigate the following existing and forecast issues:

- The proposed development would add a significant number of vehicular trips to existing traffic on Cypress Drive;
- ATC data recorded on this link indicates a significant amount of speeding over the posted 30mph speed limit occurs; and
- The route will need to become more permeable to pedestrians and cyclists to facilitate active travel access to Cardiff Parkway Railway Station to improve the station catchment.

Traffic signals are proposed at these junctions to mitigate against the increase in vehicle trips on Cypress Drive associated with the proposed development, and to formalise pedestrian and cycle permeability with controlled crossings. These highway mitigation proposals have been identified to change the character of Cypress Drive to reflect a more urban environment, with controlled crossings and lower traffic speeds.

Traffic signals would also improve the safety of the uncontrolled turning movements, which would otherwise have to give way to at least two lanes of oncoming traffic on Cypress Drive in both directions. It is also recommended to install SCOOT (Split Cycle and Offset Optimisation Technique) at these junctions to further improve junction performance and maintain coordination along Cypress Drive. SCOOT can realise delay reductions of around 15% through maximised network efficiency.

8.2 Junction Capacity Assessments

Table 71: Summary of the Junction Capacity Assessment Results (with Mitigation)

Junction	Model	2028 with Committed Development (without Mitigation)		2028 with Committed and Proposed Development (with Mitigation)	
		AM	PM	AM	PM
2. Cypress Drive/ Fortran Road	PICADY/LinSig	0.38	1.02	23.2%	14.8%
3. Cypress Drive/ Pascal Close	PICADY/LinSig	0.20	0.49	10.6%	16.7%
4. Cypress Drive/ Willowdene Way	PICADY/LinSig	0.63	0.76	7.9%	0.6%
5. A48/Cypress Drive/Newport Road	ARCADY/LinSig	1.28	2.69	0.7%	13.6%

Cypress Drive/Fortran Road Signalised Junction

It is proposed to introduce traffic signals at several junctions on Cypress Drive to create a more urban environment, improving permeability for active travel modes, reducing traffic speed and seeking to improve highway safety.

Several junctions have therefore been assessed in a single LinSig junction model and include the following:

- Cypress Drive/Primary Site Access;
- Cypress Drive/Fortran Road;
- Cypress Drive/Pascal Close; and
- Cypress Drive/Willowdene Way.

Combining these junctions into one LinSig model enables coordination between the junctions. A 90-second cycle time has been used across the four junctions to allow for coordinated green times along Cypress Drive.

The proposed junction arrangement for the Fortran Road/Cypress Drive signal-controlled junction is illustrated in Drawing 2.

Table 72 shows the capacity results of the Cypress Drive/Fortran Road signalised junction. The junction operates with significant spare capacity in all scenarios. There are delays of around 50 seconds on Fortran Road in the AM peak as movements on Cypress Drive are prioritised due to the relatively low flow out of Fortran Road in the AM. In the PM peak hour, the delays on Fortran Road are reduced to around 25 seconds as it is given equal priority to the northbound movement on Cypress Drive. This junction arrangement is therefore deemed to be acceptable.

In comparison with the assessment scenario without development or the recommended mitigation scheme, there are limited benefits in terms of capacity or delay. The proposed scheme does however mitigate the traffic impacts associated with the development and is anticipated to improve road safety, reduce traffic speeds and improve permeability for active travel.

Table 72: Cypress Drive/Fortran Road LinSig Results (with Mitigation)

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC/DoS	Queue (PCU)	Delay (s)	RFC/DoS
2023 with Committed Development (without Mitigation)							
Fortran Road (Nearside)	B-C	0	9.22	0.1	5	215.36	1.01
Fortran Road (Offside)	B-A	1	12.96	0.32	16	118.75	1
Cypress Drive	C-AB	0	9.69	0.26	0	6.11	0.1
2023 with Committed and Proposed Development (Phase 1)							
Fortran Road	1/1	4	51.1	66.3%	10	27.6	73.0%
Cypress Drive North (Ahead)	2/1	1	4.1	14.5%	4	13.5	29.5%
Cypress Drive North (Right)	2/2+2/3	1	23.2	43.1%	3	14.0	33.3%
Cypress Drive South (L & A)	3/1	7	10.3	56.5%	3	18.3	32.5%
Junction PRC		35.8% @ 70 seconds			23.4% @ 70 seconds		
2028 with Committed Development (without Mitigation)							
Fortran Road (Nearside)	B-C	0	12.9	0.14	5	228.03	1.02
Fortran Road (Offside)	B-A	1	21.66	0.38	15	134.28	1.01
Cypress Drive	C-AB	1	14.22	0.32	0	6.13	0.1
2028 with Committed and Proposed Development							
Fortran Road	1/1	5	74.0	73.1%	12	43.4	78.4%
Cypress Drive North (Ahead)	2/1	2	3.6	20.9%	9	13.5	51.1%
Cypress Drive North (A & R)	2/2+2/3	2	72.4	67.2%	9	13.6	53.5%
Cypress Drive South (L & A)	3/1	13	11.1	67.6%	4	13.9	26.1%
Junction PRC		23.2% @ 80 seconds			14.8% @ 80 seconds		

Cypress Drive/Fortran Road Signalised
Junction Sensitivity Test

For this traffic impact assessment, it has been assumed that the proposed development is accessed from Cypress Drive via the primary site access. The proposals also include a secondary site access with the Cypress Drive/Sandbrook Road roundabout and minor accesses on to Cobol Road for the North Eastern and North Western plots.

A sensitivity test has been prepared that assumes 20% of the employment will be accessed from the northeast via Cobol Road. The results are presented in Table 73.

This changes the balance of flows such that the cycle time is increased to 90 seconds in 2028. This enables the Willowdene Way junction to operate within practical capacity, with the other junctions set to 90 seconds to allow for coordination. SCOOT is proposed at the junctions along Cypress Drive, resulting in optimised signal timings that reflect the characteristics of the traffic flows in real time.

There is opportunity to assess this junction as part of the reserved matters application once the development mix has been fixed, however this sensitivity test demonstrates the junction can operate within capacity.

Table 73: Cypress Drive/Fortran Road LinSig Results Sensitivity Test (with Mitigation)

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC/DoS	Queue (PCU)	Delay (s)	RFC/DoS
2028 with Committed and Proposed Development							
Fortran Road	1/1	5	74.0	73.1%	12	43.4	78.4%
Cypress Drive North (Ahead)	2/1	2	3.6	20.9%	9	13.5	51.1%
Cypress Drive North (A & R)	2/2+2/3	2	72.4	67.2%	9	13.6	53.5%
Cypress Drive South (L & A)	3/1	13	11.1	67.6%	4	13.9	26.1%
Junction PRC		23.2% @ 80 seconds			14.8% @ 80 seconds		
2028 with Committed and Proposed Development (Sensitivity Test)							
Fortran Road	1/1	5	72.7	75.4%	16	36.0	81.7%
Cypress Drive North (Ahead)	2/1	2	3.9	19.9%	9	19.8	52.3%
Cypress Drive North (A & R)	2/2+2/3	2	70.7	69.3%	9	20.1	55.7%
Cypress Drive South (L & A)	3/1	13	12.7	69.4%	4	21.0	32.5%
Junction PRC		19.4% @ 90 seconds			14.8% @ 90 seconds		

Cypress Drive/Pascal Close Signalised Junction

The proposed signalisation of the Cypress Drive/Pascal Close junction is presented in Drawing 5 and has been assessed with LinSig. This junction has been assessed in the same junction model as the proposed traffic signals at the adjoining junctions.

The assessment results are presented in Table 74. The junction operates with significant spare capacity in all scenarios except the AM peak hour of the 2028 with Committed and Proposed Development scenario where Cypress Drive South is forecast with a DoS of 81%. The average delay per PCU on this lane is 16 seconds and therefore this it is acceptable.

As with the Cypress Drive/Fortran Road junction, the Pascal Close entry experiences delays of around 50-70 seconds in the peak hours. This delay is a result the signalised junction prioritising the heavy traffic flow on Cypress Drive. Given the limited queuing on this entry, the overall operation of this proposed junction is acceptable.

Table 74: Cypress Drive/Pascal Close LinSig Results (with Mitigation)

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC/DoS	Queue (PCU)	Delay (s)	RFC/DoS
2023 with Committed Development (without Mitigation)							
Pascal Close	B-C	0	10.02	0.01	0	8.98	0.04
Pascal Close	B-A	0	12.46	0.13	1	15.69	0.46
Cypress Drive	C-AB	0	8.71	0.03	0	5.87	0.04
2023 with Committed and Proposed Development (Phase 1) (with Mitigation)							
Pascal Close	1/1	1	39.1	20.0%	5	47.2	67.8%
Cypress Drive North (Ahead)	2/1	2	10.2	18.0%	7	15.3	49.7%
Cypress Drive North (A & R)	2/2+2/3	2	11.3	18.8%	7	15.2	50.8%
Cypress Drive South (L & A)	3/1	10	13.2	65.2%	3	9.9	26.4%
Junction PRC		35.9% @ 70 seconds			32.8% @ 70 seconds		
2028 with Committed Development (without Mitigation)							
Pascal Close	B-C	0	15.12	0.01	0	9.44	0.04
Pascal Close	B-A	0	24.24	0.2	1	20.6	0.49
Cypress Drive	C-AB	0	13.34	0.05	0	5.94	0.04
2028 with Committed and Proposed Development (with Mitigation)							
Pascal Close	1/1	1	53.0	23.8%	6	72.1	77.1%
Cypress Drive North (Ahead)	2/1	2	8.1	16.2%	13	15.3	63.6%
Cypress Drive North (A & R)	2/2+2/3	2	9.8	16.9%	13	15.2	64.3%
Cypress Drive South (L & A)	3/1	21	16.4	80.9%	3	7.8	23.6%
Junction PRC		10.6% @ 70 seconds			16.7% @ 70 seconds		

Cypress Drive/Willowdene Way Signalised Junction

As set out in the previous chapter, this junction is forecast to operate within capacity without mitigation. An alternative junction arrangement is however being explored to improve the safety for the right-turn movements. As set out in DMRB TD 42/95 (Fig 2/2), given the AADT flow on Cypress Dive is more than 8,000 vehicles, an alternative junction arrangement to T-junction should be identified.

The proposed junction arrangement for the Cypress Drive/Willowdene Way mitigation scheme is presented in Drawing 6. The improvement scheme includes the introduction of traffic signals and a signalised pedestrian crossing on Willowdene Way. There is an opportunity for CC to enhance the pedestrian crossing to a toucan crossing as part of Route 2

The proposed signalised junction arrangement has been assessed with LinSig and the results are presented in Table 75. The junction operates with some spare capacity in all scenarios except for the PM peak hour of the 2028 within the Committed and Proposed Development scenario. In this scenario the junction is forecast to exceed practical capacity however the average delay is estimated to remain below the cycle time and therefore the junction is operating acceptably.

Whilst a left-in/left-out junction arrangement was considered, this would sever an existing bus route and divert right turning vehicles to the Cypress Drive/Sandbrook Road roundabout. This arrangement was therefore not deemed to be acceptable. However, a review of the bus routes serving the St Mellons, and potential changes resulting from the development, could include the removal/alteration of the bus route turning right from Willowdene Way. Should this be the case, serious consideration should be given to banning the right turn out of Willowdene Way. This would improve junction performance for through traffic on Cypress Drive and reduce the potential for rat running.

Table 75: Cypress Drive/Willowdene Way LinSig Results (with Mitigation)

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC/DoS	Queue (PCU)	Delay (s)	RFC/DoS
2023 with Committed Development (without Mitigation)							
Willowdene Way	B-AC	1	15.63	0.5	1	10.08	0.32
Cypress Drive	C-AB	0	6.82	0.2	2	18.31	0.62
2023 with Committed and Proposed Development (Phase 1) (with Mitigation)							
Willowdene Way	1/1	6	37.2	67.7%	5	70.1	78.7%
Cypress Drive South (A & R)	3/2+3/3	10	15.0	67.1%	7	47.0	77.8%
Cypress Drive North	2/1	3	22.8	33.9%	12	31.4	79.2%
Junction PRC		33.0% @ 70 seconds			12.8% @ 70 seconds		
2028 with Committed Development (without Mitigation)							
Willowdene Way	B-AC	2	20.13	0.63	1	26.55	0.56
Cypress Drive	C-AB	0	6.88	0.2	3	32.39	0.76
2028 with Committed and Proposed Development (with Mitigation)							
Willowdene Way	1/1	8	59.0	79.8%	6	84.0	81.0%
Cypress Drive South (A & R)	3/2+3/3	22	19.9	83.4%	10	83.0	89.2%
Cypress Drive North	2/1	3	17.7	24.1%	22	38.0	89.2%
Junction PRC		7.9% @ 70 seconds			0.6% @ 80 seconds		

A48/Cypress Drive/Newport Road Staggered
Signalised Junction

The A48/Cypress Drive/Newport Road roundabout has been shown to be exceeding theoretical capacity in the base year 2018. This also matches observations which show significant peak hour queuing at the junction. With the additional traffic associated with the committed and proposed developments, significant queuing and delay is forecast at this junction.

A junction improvement scheme is therefore required at the A48/Cypress Drive/Newport Road roundabout to mitigate the traffic impacts associated with the proposed development. The nature extent and mechanisms for the improvements to the junction will be agreed through the determination of the application.

A staggered signalised junction has been identified as a potential improvement scheme that could be delivered at this junction. This potential arrangement is presented in Drawing 7 and has been assessed using LinSig. A high-quality pedestrian and cycle bridge is proposed between the A48 and Newport Road, providing a safer crossing in comparison to the existing uncontrolled crossings.

The potential junction arrangement has been assessed in LinSig and the results are presented in Table 76. In the 2023 future year scenarios, the junction is forecast to operate within practical capacity in the AM peak hour and within theoretical capacity in the PM peak hour. In both peaks the delay experienced on any arm does not exceed 60 seconds.

In the AM peak hour of the scenario 2028 with Committed and Proposed Development, the junction is forecast to operate within theoretical capacity. The degree of saturation is forecast to exceed 80% on some entries to the northern junction, however remain below the 90% threshold which is when random delay can increase exponentially.

There are some instances where the model indicates that the maximum queue would extend beyond the available stacking space in the links between the two junctions. The Queue Graphs within LinSig demonstrate that these queues are estimated to clear within each cycle duration and therefore the junction is estimated to operate satisfactorily. The LinSig model will be provided to CC for review.

Table 76: A48/Cypress Drive/Newport Road Staggered Junction Arrangement LinSig Results (with Mitigation)

Link		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Queue (PCU)	Delay (s)	RFC/DoS	Queue (PCU)	Delay (s)	RFC/DoS
2023 with Committed Development (without Mitigation)							
1	A48	3	9.68	0.76	4	11.02	0.81
2	Cypress Drive	22	9.71	0.62	95	361.47	1.27
3	Newport Road	4	13.87	0.80	33	110.98	1.04
4	A48 Slips	16	25.87	0.95	2	3.61	0.61
2023 with Committed and Proposed Development (Phase 1) (with Mitigation)							
A48 Slip (Left & Ahead)	1/1+1/2	12	16.9	78.5%	12	24.3	75.2%
A48 (Right)	2/3+2/4	6	50.9	73.7%	10	33.7	68.9%
Northbound Internal (Right)	3/3+3/4	14	39.8	78.5%	13	32.2	71.4%
Southbound Internal (A & R)	4/2+4/3	19	5.6	57.1%	17	26.4	61.3%
Cypress Drive (Ahead)	5/3+5/4	6	46.7	65.2%	12	31.3	70.0%
Newport Road (Left)	6/2+6/1	4	5.2	48.7%	10	15.4	67.7%
Junction PRC		14.6% @ 90 seconds			19.7% @ 90 seconds		
2028 with Committed Development (without Mitigation)							
1	A48	3	10.22	0.77	5	12.04	0.83
2	Cypress Drive	2	10.15	0.63	105	405.3	1.31
3	Newport Road	4	14.91	0.81	38	123.32	1.05
4	A48 Slips	20	31.17	0.97	2	3.67	0.62
2028 with Committed and Proposed Development (with Mitigation)							
A48 Slip (Left & Ahead)	1/1+1/2	17	22.3	89.3%	12	27.9	77.8%
A48 (Right)	2/3+2/4	7	58.9	81.6%	11	40.2	79.1%
Northbound Internal (Right)	3/3+3/4	14	44.7	84.1%	14	39.2	77.5%
Southbound Internal (A & R)	4/2+4/3	22	6.7	68.2%	17	29.9	78.3%
Cypress Drive (Ahead)	5/3+5/4	5	37.1	51.8%	15	26.7	78.6%
Newport Road (Left)	6/2+6/1	5	7.0	49.1%	14	25.3	79.1%
Junction PRC		0.7% @ 90 seconds			13.6% @ 90 seconds		

A48/Cypress Drive /Newport Road U-turns

Whilst a staggered signalised junction arrangement could be delivered at this junction, there are other alternative designs that could be considered.

Should this potential junction arrangement be considered as part of the reserved matters, further consideration will be needed with regards to potential U-turn manoeuvres from/to the A48 Newport Road. This could impact developments that take their access from the A48 Newport Road, including Blooms Garden Centre and existing housing to the north and the new housing development to the northeast.

The garden centre is accessed by a priority junction with the right-turn out movement prohibited. This prevents those egressing the site to travel directly towards Newport on the A48. The proposed housing development has a similar access arrangement with the right-turn prohibited. The existing housing to the north of the junction currently allows for all movements.

Most of the traffic from both sites is expected to be from/to Cardiff and this is confirmed by the 2018 traffic counts recording limited U-turns on the A48 Newport Road entry to the roundabout. The housing development was however under construction at the time of the survey and furthermore, it is likely that there are more U-turns at weekends related to the garden centre. The Transport Statement for the housing development estimated the site would generate six U-turn movements in the AM peak hour and two in the PM peak.

Right turn movements towards Castleton and Imperial Park would rely on the ability to U-turn at the A48/Cypress Drive junction. For Newport bound vehicles travelling beyond Junction 28 of the M4, there is limited difference in journey time¹⁸ between travelling via Newport Road or the A48/M4. Therefore, only journeys to the east of J28 would be notably impacted by potential mitigation scheme at the A48/Cypress Drive roundabout.

The accesses on to the south side of Newport Road would need to be signalised to accommodate the right turn out manoeuvre. The design of the garden centre

junction would necessitate the relocation of the northeast bound bus stop and pedestrian crossing on A48 Newport Road.

Given the proximity to the A48/Cypress Drive junction, it is unlikely that an all-movement signalised junction could be introduced for the properties to the north of Newport Road. There does appear to be potential to allow for all movements aside from the right-out. An alternative turning place would therefore need to be identified in Newport Road, should this scheme be progressed.

8.3 Summary

Mitigation has been identified at several junctions on Cypress Drive and is proposed to be delivered as part of this application. This includes the following junctions:

- Cypress Drive/Fortran Road priority junction;
- Cypress Drive/Pascal Close priority junction;
- Cypress Drive/Willowdene Way priority junction; and
- Cypress Drive/A48/Newport Road roundabout.

Whilst some of these junctions are forecast to operate within capacity, it is considered appropriate to introduce traffic signals to improve safety, reduce traffic speeds and change the character of the road to reflect a more urban environment.

With the highway mitigation proposals set out in this chapter, the junctions on Cypress Drive are shown to operate within capacity in all future year scenarios. Furthermore, it is recommended that SCOOT is installed at all signalised junctions along Cypress Drive to further improve capacity by maintaining coordination between the junctions

¹⁸ Average journey times are taken from Google Maps using the Blooms Garden Centre as the origin.

9 Management of Construction Traffic

9.1 Introduction

A Construction Environmental Management Plan (CEMP) will be prepared that sets out how the impacts arising from the construction of the development proposals will be mitigated. An Outline CEMP has been prepared in support of this outline planning application and appended to the EIA. It is envisaged that the full CEMP would be secured via a planning condition

This section of the TA outlines the general principles that will be incorporated within the CEMP and the outline strategy for construction traffic, including for the following:

- The construction programme;
- Vehicle trip attraction;
- Vehicle routing;
- The general principles of the construction phase; and
- Construction worker method of travel.

At this stage, a principal contractor has not been appointed for these development proposals. Following their appointment, it will be the responsibility of the contractor to comply with all statutory regulations and guidelines in relation to construction and movement activities.

The period in which construction activities can occur is proposed to be agreed with CC in a subsequent design stage and secured via a planning condition.

It is anticipated that construction activities will be undertaken in accordance with the requirements of the Considerate Constructors Scheme (CCS). The Code of Considerate Practice outlines the Scheme's expectations and resolves around five key themes:

- **Care about appearance:** *constructors should ensure sites appear professional and well managed;*
- **Respect the Community:** *Constructors should give utmost consideration to their impact on neighbours and the public;*
- **Protect the Environment:** *Constructors should protect and enhance the environment;*

- **Secure everyone's Safety:** *Constructors should attain the highest levels of safety performance; and*
- **Value their Workforce:** *Constructors should provide a supportive and caring working environment.*

There is also potential for construction activities to take place on a Saturday morning. Construction associated with the railway station may also require Sunday and Bank Holiday activity, and occasional overnight working, as these are quieter times for the rail network and, thus, any necessary rail closures will have a reduced impact. Any works that are scheduled to be undertaken in these times will be discussed and agreed with CC.

The construction of the development can be categorised in to three broad packages and include the following:

- Rail, including construction of the station building and platforms;
- Civils, including earthworks, infrastructure and highways; and
- Buildings, including the construction of the offices.

9.2 Construction Programme

The construction programme for Cardiff Hendre Lakes is at an informative stage and will be revised following the appointment of a contractor(s). Furthermore, it is subject to securing various permissions and permits. For the purposes of this planning application, the programme set out below is being assumed as this provides a robust case for the assessment of construction vehicular movements.

The rail works, including the construction of station are programmed for the period May 2021 to March 2023, with the station planned to open in the Spring of 2023.

The civil works, including the earthworks, are programmed to commence in February 2021, subject to receiving appropriate permissions and permits. The civil works are programmed to take four years, finishing in the summer of 2025.

It is estimated that the business district will be built-out over an eight-year period, commencing in May 2021 alongside the construction of the station.

The final construction programme for the development will be subject to market conditions and the station programme will be subject to agreements with Network Rail and the securing of possessions and other agreements. Changes in the delivery programme are therefore possible but are unlikely to have a substantial impact on this assessment.

9.3 Construction Vehicle Movements

Several studies have been undertaken to estimate the number of vehicle movements that will be generated in the construction stage. These estimates are considered to provide a robust basis on which to inform the EIA, however it is recommended they are reviewed following the appointment of the relevant contractors.

The number of vehicle movements that will be generated by the rail works have been calculated using the quantum of material that is anticipated to be imported by road. A technical note outlining the assumptions made to calculate the number of construction vehicle movements is set out in Appendix T.

The number of construction vehicle movements associated with the earthworks has been estimated using the amount of material estimated to be required. A spreadsheet setting out the expected number of movements throughout the construction periods is set out in Appendix T. Contractor movements have been calculated using figures from similar schemes involving earthworks and offices.

The estimated number of construction vehicle movements associated with the construction of the proposed business district is set out in Appendix T (ref: REP/AEB/20200102). Calculations within this note are based on survey data obtained from a wide range of sites within central London, varying from smaller sites (12,999m²), medium sites (42,000m²), and larger sites (68,000m²) in terms of area.

Table 77 overleaf presents the average number of construction vehicle movements anticipated to be generated for each year of the construction period. It also presents the following:

- Peak 12-month period of construction;
- Average construction movements during the earthworks period; and
- Average construction movements across the full construction period.

Table 77: Average Weekday Construction Vehicle Movements (One-way)

Period	Ave. Weekday Movements	
	HGVs	LiGVs*
2021 – 2022	63	98
2022 – 2023	148	259
2023 – 2024	94	193
2024 – 2025	119	194
2025 – 2026	44	98
2026 – 2027	7	51
2027 – 2028	7	51
Peak 12-month Period (Feb 2022 – Jan 2023)	151	264
Earthworks Ave. (Feb 2021 – Jun 2025)	112	198
Construction Period Ave. (Feb 2021 – Dec 2028)	63	127

*LiGV (including cars)

Vehicle movements associated with the construction period are expected to peak in the period February 2022 to January 2023. This 12-month period has therefore been used as the basis for the traffic, air quality and noise calculations in the EIA.

In this period, there are anticipated to be 264 Light Goods Vehicles (LiGV) movements (including contractors) generated on an average weekday. Most of the movements are expected to occur in, or before, the AM (arriving) and during/after PM (departing) peak periods. In addition, 151 HGVs are estimated to journey to and from the site on an average weekday which equates to approximately 15 HGVs arriving to the site and 15 HGVs departing per hour.

9.4 Vehicle Routing

In the absence of a principal contractor being appointed, it is uncertain where the deliveries will arrive from. For the purposes of the EIA, it has been assumed that all HGVs accessing the north of the site (north of railway line) will arrive from the M4 via Junction 30 (Cardiff Gate) and route to the site via a combination of the A4232, the A48 and Cypress Drive. This is also the likely route for much of the traffic associated with construction south of the railway line. This route is shown in Figure 70 below.

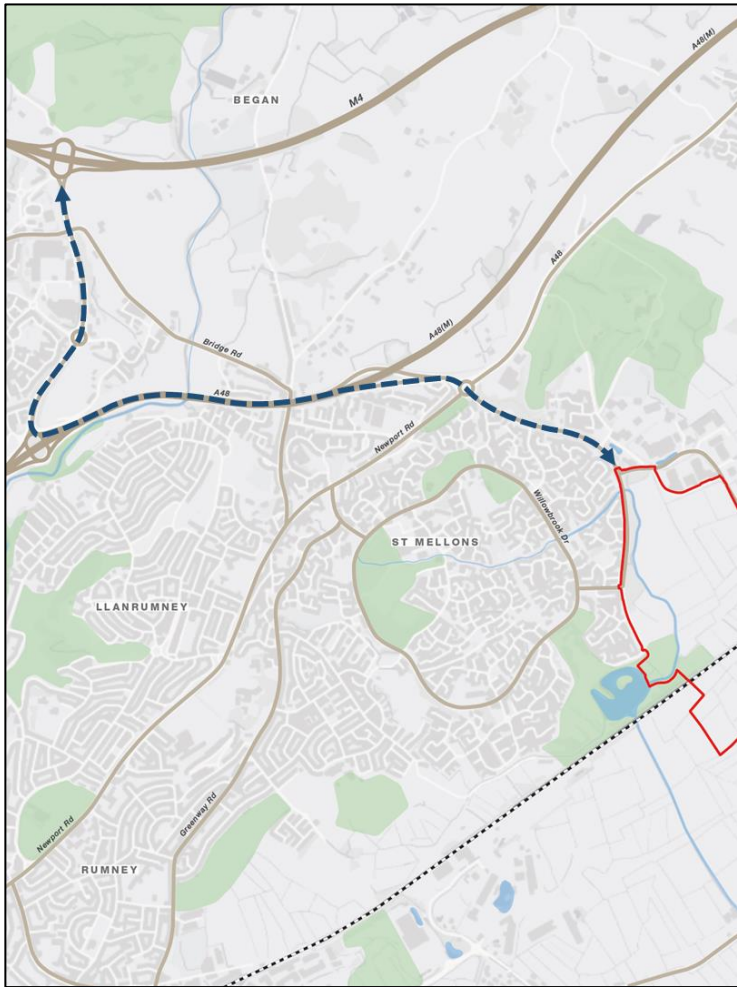


Figure 70: Anticipated HGV Construction Traffic Access Route

This is considered to be the most reasonable and logical route for HGV deliveries to the site. The exact routing can be agreed with CC as part of the Construction Traffic Management Plan (CTMP) and the CEMP following the appointment of the relevant contractors.

9.5 Vehicle Access

The primary site access proposed with Cypress Drive is not programmed to be constructed until Spring 2023 and therefore a temporary access will be required into the site. As presented in Figure 71, there are several options for this access, including from Cypress Drive and Heol Las, as summarised below:

- 1A) Potential access following the alignment of the primary vehicle access and will require a crossing on Faendre Reen;
- 1B) Access following the alignment of the secondary vehicle access and will require a crossing on Faendre Reen. Works are required to this roundabout to facilitate access for HGVs; and
- 1C) Access at the existing farm access, north of the railway line. This will require a new crossing of the Green Lane Reen and will be used by HGVs associated with construction. As set out in Section 5.2, this would require land in the NCC administrative area and therefore delivery is subject to agreement with NCC and acquisition of relevant land interests.

It is considered likely that a combination of these access points would be used during the construction programme. Therefore, construction vehicle movements will likely be spread across several access points reducing the impacts on any single link. Two scenarios have been assessed for planning, with all construction traffic accessing the site via either the Cypress Drive/Sandbrook Road roundabout (1B) or Heol Las (1C). Potential works to these junctions to facilitate access will be agreed as part of the reserved matters application.

It is anticipated that the secondary site access via Cypress Drive (1B) is most likely to be utilised for construction traffic. Subject to the phasing of the works to the Sandbrook Road/Cypress Drive roundabout, an alternative access may be used for the initial stages of construction. One potential access option is the existing farm access via Fortran Road (1D). Access for construction will be agreed as part of the reserved matters and assessed as part of the CTMP.

In addition to the potential construction accesses identified above, the following accesses will be required:

- 2 & 3) Construction access from Cobol Road for the NW and NE plots. This will also be the permanent access for this plot; and
- 4) Construction access from Heol Las for works to the south of the railway line, including the southern platform, and flood and ecological mitigation. The proposed access is presented in Drawing 4 and will be a maintenance/emergency access (vehicular) following the construction period.

As set out in Section 5.2, the access from Heol Las south of the railway line would require land in the NCC administrative area and therefore delivery is subject to agreement with NCC and acquisition of relevant land interests.

The site access arrangements for construction that are sited within the CC administrative area will be considered as part of the reserved matters application.

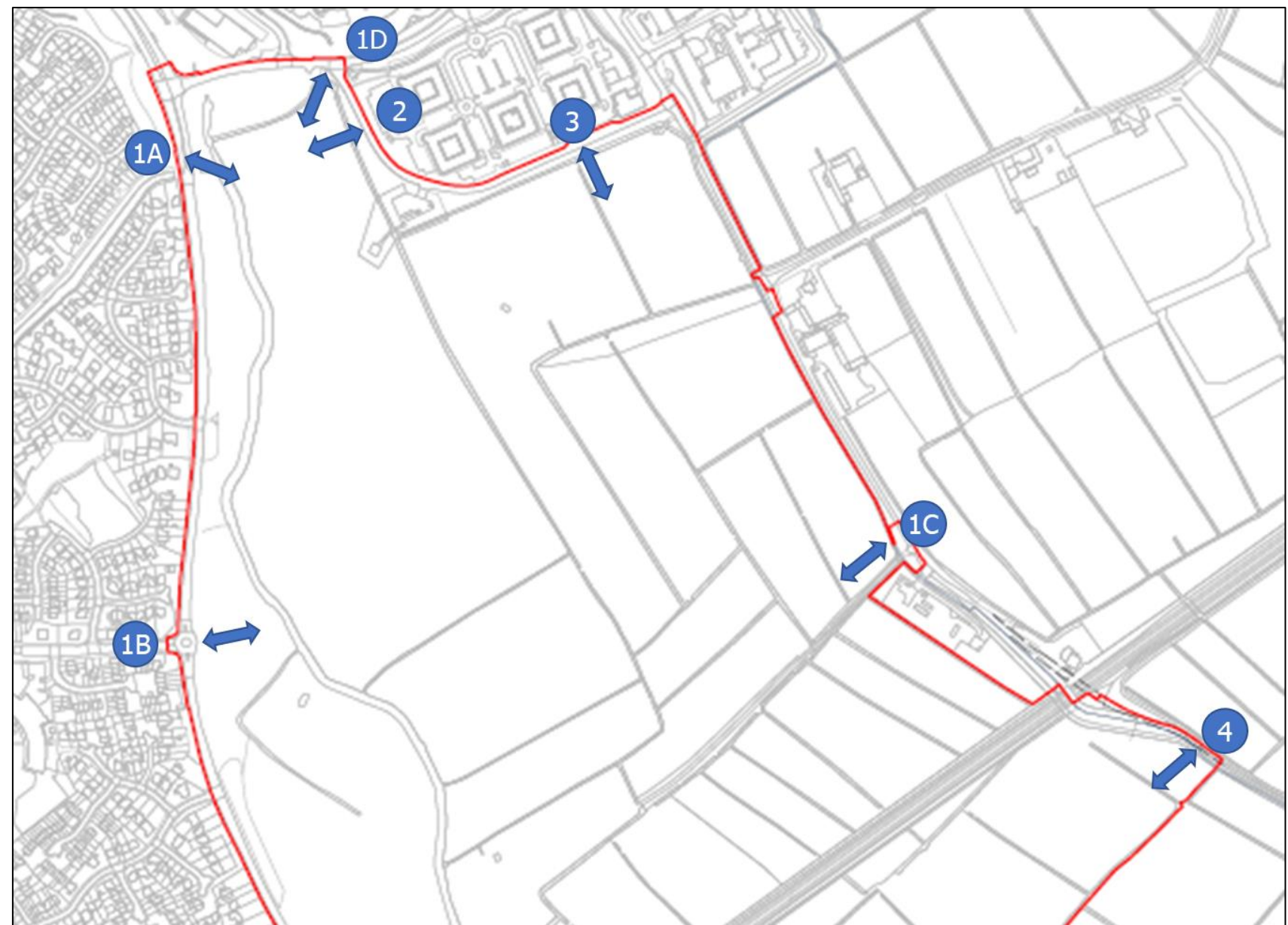


Figure 71: Potential Construction Access Locations

9.6 Construction Traffic Management Principles

An Outline CEMP has been prepared and included as an appendix to the EIA. A full CEMP typically includes the following:

- The requirements of the stakeholders;
- Demonstrates that the proposals are compliant with environmental legislation;
- Details the mitigation committed within the ES;
- Demonstrates how any adverse effects will be minimised during construction; and
- Sets out the site-specific method statements.

The principle objective of the transport element of the CEMP is to minimise the number of vehicular trips to the site, whilst also ensuring that the proposals for construction traffic are safe and will not have a material impact on the local highway network.

In addition to the CEMP, a CTMP will be prepared that outlines a range of measures to minimise potential traffic impacts arising from the construction of the Cardiff Hendre Lakes development proposals.

The CTMP will be reviewed and updated in line with the construction programme and is anticipated to include details of the following:

- Designated construction traffic routes to avoid disruption on local roads;
- Temporary traffic control measures, where required, such as temporary traffic signals and positioning of Banks person;
- HGV movements will be restricted as far as reasonably possible to avoid peak traffic flow periods 08:00-09:00 and 16:30-18:00)
- Temporary and permanent site access proposals, alongside an access management strategy to avoid a potential traffic congestion in the peak hours;
- Speed limits shall be put into place on site for all vehicular movements;
- Adequate parking and circulation will be provided within the site to avoid impacts on the neighbouring highways nuisance car parking;

- Where appropriate, all vehicles carrying loose material shall be covered;
- A wheel wash facility shall be used for vehicles egressing the site;
- Where necessary, use of road sweepers shall be incorporated to ensure highways remain clear of dust and mud;
- Road edges and pathways shall be swept by hand and damped down as necessary;
- Stockpiles to be damped down enclosed or covered as appropriate, be sealed or sprayed with chemical bonding agents as required, and located away from any sensitive receptors wherever possible; and
- Neighbouring communities and businesses will be consulted and kept informed of the traffic management proposals.

It is anticipated that the CTMP will be secured via a planning condition.

10 Travel Plans

10.1 Introduction

FTP's have been prepared for the business district and railway station and can be found in Appendix A and Appendix B respectively.

A Travel Plan provides a developer 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 attain within a defined timescale. The most successful Travel Plans are live documents that evolve with a development and in which several stakeholders have a role in developing and monitoring. For the business district Travel Plan, stakeholders will include the developer, management company, tenants and the local authority. For the Railway Station Travel Plan, additional key stakeholders include TfW, Network Rail and TfW Rail Services.

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 developments where several different uses and occupiers are proposed but these are not known at the time of the planning 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.

10.2 Benefits of a Travel Plan

UK Government has cited Travel Plans as an important tool in reducing the number of single occupancy car trips, made to and from a business, organisation, or facility, in favour of more sustainable modes of transport such as public transport, cycling or walking¹⁹.

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.

Travel Plans also aim to benefit employers, employees 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 a reduction in social exclusion through the provision of choice between modes of transport.

10.3 Objective and Goals

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

Site Wide Objectives

- Maximising transport choice through innovative measures;
- Encouraging sustainable travel choices among users of the site
- Maximising accessibility for walking, cycling and public transport as sustainable transport modes;
- Increasing awareness of the environmental and health implications of different travel choices;
- To manage site deliveries so that conflicts with pedestrians and other vehicles can be minimised; and
- Reducing travel by the private car, particularly single occupancy car journeys.

Employee Objectives

- To minimise the environmental impact of the travel demand generated by the development through raising travel awareness amongst employees, encouraging them to use sustainable modes of transport
- Encouraging multi-occupancy car usage; and
- To improve the choice of transport modes available to employees.

Visitor/Passenger Objectives:

- To minimise the environmental impact of the travel demand generated by the development by providing information to visitors, encouraging them to use sustainable modes of transport; and
- To improve the choice of transport modes available to visitors.

¹⁹ Ministry of Housing, Communities and Local Government (2014)
Travel Plans, Transport Assessments and Statements

10.4 Hendre Lakes Business District Framework Travel Plan

In addition to the physical improvements identified in this Transport Assessment, it will be necessary to implement several 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 combination of measures are most appropriate for each occupier of 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.

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.

In addition to targeting future employees, it is proposed for the Travel Plan to introduce measures that will benefit existing employees of the adjacent business parks and residents of St Mellons.

Site Wide Measures

A range of site-wide measures have been identified in the FTP. These could be implemented upfront as part of the wider scheme, providing benefits including economies of scale, or alternatively, these measures could be included in the individual site/building-specific Travel Plans.

Key site-wide measures include the following:

- 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;
- Ensure footways/cycleways are maintained, well-lit and kept clear. Suitable wayfinding and sign posting should also be installed to guide pedestrians/cyclists
- Provision of an onsite Cycle Hub within the proposed 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 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;
- Provision of Nextbike stands or provision of pooled cycles to encourage staff to consider cycling, including use for business trips;
- Displaying a map of key bus and rail routes, stops, journey durations and frequency of services;
- Offer Personalised Travel Planning to existing residents of St Mellons, employees of the existing business parks and future employees of the site;
- A target has been set for all areas of the masterplan to be within 400m walking distance of a bus stop;
- Provision of electric car charging stations positioned closer to buildings²⁰;
- The potential for car club spaces will be explored. These could be used for business trips and as a back-up for car sharers.

- Allocate car parking to those that reside in less accessible locations or have a need to travel by car (e.g. school run);
- A bespoke parking standard is proposed for the site that reflects the sustainable credentials of the site;
- 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; and
- 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 such as bike breakfasts, walking challenges.

²⁰ 10% of parking spaces will have electric vehicle charging points with passive provision for full conversion of the remaining spaces.

Workplace Measures

The FTP also sets out a broad range of measures that could be included in the tenant/building-specific Travel Plans.

Key measures identified in the FTP include the following:

- Introduce awareness campaigns such a cycle/walk to work week. Support and promote ‘Wellbeing Week’, ‘World Environment Day’ and other regular awareness events;
- Free Nextbike loans for up to 1 month for staff allowing them to try commuting to work by an alternative mode of transport;
- The provision of secure, sheltered and safe cycle parking with cloakroom facilities, showers and lockers at each building;
- Offer bus and/or rail taster tickets to encourage shift to more sustainable modes of transport;
- Offer interest-free season ticket loan scheme for staff to purchase an annual ticket for public transport;
- Provision of charging facilities for electric vehicles, bikes and scooters;
- Provision of a guaranteed lift home for car sharers in the event of an emergency;
- 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; and
- Encouraging flexible working to enable employees to adjust their working day to avoid peak travel times.

10.5 Cardiff Parkway Station Framework Travel Plan

Subject to detailed discussions with key stakeholders including Transport for Wales Rail Services, it is not possible at this stage to fully define which measures are most appropriate for the station.

The measures set out in the full STP will be tailored to the needs and aspirations of the Station operator and provide a toolbox of measures to inform management decisions. This FTP sets out a broad range of potential measures, the most appropriate of which will be selected and identified in the full STP.

There are expected to be key Travel Plan measures which will benefit passengers using the station and some which will benefit 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 as part of the business district FTP.

Passenger Measures

The Framework Station Travel Plan sets out a range of potential measures that could be adopted to encourage passengers to travel to and from the station by sustainable modes of transport. Key measures include the following:

- Improving outward journey information with a Parkway Travel Guide that can be made available at the station and online. Information could also be provided at the station with staff trained to provide advice journeys beyond the station including local bus travel;
- Wayfinding strategy within the station, wider interchange and on key walking and cycling routes beyond. This could include painted walkways within the interchange to key facilities such a cycle parking and bus stops;
- Introduce additional facilities beyond cycle stands for cyclists such as lockers and repair/maintenance equipment;
- Provide Nextbike stations to enable passengers to hire a bike and cycle form the station;
- Potential to introduce Plus Bus style ticket offers 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; and
- Introduce a taxi/ride sharing initiative that encourages passengers to share rides, this would be via manned ranks in peak hours (such as operated by TfL) or a phone app; and
- Provide incentives to travel using ultra-low emission vehicles such as reduced or free car parking.

10.6 Implementation and Management

To be successful, Travel Plans will need to be based on an understanding of the travel patterns relating to business through undertaking Travel Surveys. Furthermore, the Travel Plans will need to co-ordinate individual and overarching transport measures which contribute to increasing the proportion of journeys made by sustainable modes of travel.

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

Business District Travel Plan

A site-wide Travel Plan Coordinator will be appointed by the Hendre Lakes Development Management Company. Contact details of the appointed Travel Plan Co-ordinator will be provided to CC. The Travel Plan Co-ordinator 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 is detailed in the FTP and 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, CC etc;
- 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, and motorcycle parking facilities;
- 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 Travel Plan Co-ordinator; and
- Participate in a Travel Plan Group.

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 the business district, prior to occupation, based on the FTP, and under the supervision of the site-wide Travel Plan Coordinator. Site-wide quantitative, realistic and achievable targets are required with 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.

Railway Station Travel Plan

A Station Travel Plan Co-ordinator will be appointed by the station operator and their contact details will be provided to CC. The Travel Plan Coordinator role for the railway station 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 other 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.

10.7 Targets

To meet the overarching aim of reducing single occupancy car travel to and from Cardiff Hendre Lakes, a set of outline targets have been developed. These targets are derived from modal split data collected as part of the 2011 Census and have been integrated into the TA in line with policy.

Going forward, additional site-specific targets will be developed for each use within the site and for the railway station. 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 72 below.

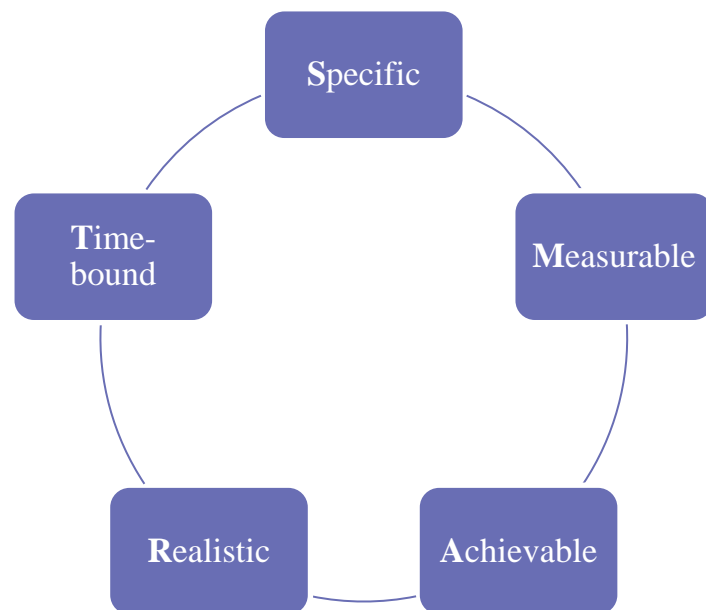


Figure 72: SMART Targets

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

10.8 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 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 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 in support of each plan with a commitment to review the targets at the end of each monitoring phase. This review will identify elements of the plan that are not working as well as others, and will 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).

10.9 Analysis and Reporting of Monitoring

The Travel Plan Coordinators 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.

11 Transport Implementation Strategy

11.1 Introduction

In accordance with TAN 18, this chapter is intended to draw together the elements of a Transport Implementation Strategy as part of demonstrating how the development will contribute positively to the overarching policy objectives.

11.2 Context

The policy context presented in Chapter 2 highlights the emphasis put on sustainability in national, regional and local policy guidance. This has provided a key guiding principle in the development of the Cardiff Hendre Lakes scheme, which looks to maximise the opportunities for both existing and future journeys to be made by sustainable modes of transport.

Policy KP8 targets an overall 50:50 modal split for journeys in Cardiff between trips by car and trips by walking, cycling and public transport. Fostering a step change away from journeys made by car can be achieved through the integration of sustainable travel modes and providing the opportunity for journeys to be made by alternative modes of travel to the car.

The establishment of pedestrian and cycle links to the neighbouring communities and employment area of St Mellons, and the provision of a sustainable transport hub including a railway station, forms a critical component of the vision for Cardiff Hendre Lakes. These infrastructure proposals, alongside a masterplan that adheres to a sustainable transport hierarchy, should deliver a sustainable development for which walking, cycling and public transport are often the most convenient and quickest forms of transport.

11.3 Objectives

The Transport Implementation Strategy is underpinned by the following over-arching objectives:

- Reduce the need to travel;
- Achieve accessibility and convenience by walking, cycling and public transport to reduce carbon emissions associated with the site;
- Increase the proportion of journeys made by existing residents and employees within St Mellons by sustainable modes of transport;
- Deliver a station park & ride facility that will reduce existing car journeys in the city centre and on the strategic road network;
- Regenerate the local area by increasing employment opportunities and improving transport links; and
- Where journeys to the site are made by car, seek to increase the occupancy of the cars to reduce the overall impact.

The development proposals outlined in Chapter 5 set out how this development seeks to address these overarching objectives.

11.4 Measures

The package of works and interventions that are proposed to be delivered as part of this application are summarised in Table 78 overleaf.

The recommended measures have been categorised into those considered necessary to be delivered prior to the railway station opening in 2023, and those that can be delivered alongside the remainder of the business district. The proposed timing of works is based on a target of achieving optimum modal shift and efficiency of delivery.

In addition to the physical infrastructure proposals set out overleaf, Travel Plans are also proposed for the business district and railway station. These Travel Plans will include a range of ‘soft-measures’ which seek to maximise the proportion of journeys made to the site by sustainable modes of transport. FTPs have been prepared in supported of this application, as summarised in Section 9.6 of this TA.

Temporary traffic management is also anticipated to be required to facilitate the safe construction of the proposed development and this is anticipated to be discussed and agreed with CC as part of the CTMP and CEMP, as summarised in Chapter 9.

In addition to the interventions and measures outlined above, there are opportunities for works to be delivered by others. These are detailed in Section 11.5.

Table 78: Summary of Works Proposed as part of this Application

Prior to Opening Year (2023 with Cardiff Parkway Railway Station and 22,500m ² of the business district)			Prior to Full Build-Out (2028)		
Active Travel	Public Transport	Vehicle Access and Highways	Active Travel	Public Transport	Vehicle Access and Highways
<ul style="list-style-type: none">• Pedestrian and cycle link from Hendre Lakes Park to Cardiff Parkway railway station;• Extension of the Cardiff Cycleway (Route 2) from the site boundary to Cardiff Parkway railway station;• Pedestrian and cycle link between Cardiff Parkway railway station and Cobol Road;• Pedestrian link from St Mellons Road to Cardiff Parkway railway station;• Optimal works, as detailed in Section 5.2, include two active travel links into the site from Heol Las;• Station forecourt and infrastructure associated with the transport interchange including cycle parking and Nextbike stations;• Appropriate pedestrian crossings within the development site to provide safe and convenient access to the railway station. These will be agreed with CC as part of the reserved matters; and• Improvements to the pedestrian crossing facilities at the A48/Cypress Drive junction to provide a controlled or traffic-free route between the A48 and Newport Road.	<ul style="list-style-type: none">• Construction of Cardiff Parkway Railway Station with four platforms served by trains to Newport and Cardiff;• Station park & ride with up to 650 spaces for long-stay, short-stay, drop-off and accessible car parking;• Installation of up to two bus stops with high-quality waiting facilities sited near the station; and• Relocation of the existing bus stop on Cypress Drive within the site, south of Fortran Road, to accommodate the primary vehicle access proposals.	<ul style="list-style-type: none">• Primary vehicle access into the site from Cypress Drive;• Internal highway network to provide access to Phase 1 of the business district, railway station and transport interchange;• Junction improvement scheme at the Cypress Drive/Fortran Road junction including the introduction of traffic signals;• Junction improvement scheme at the A48/Cypress Drive/Newport Road roundabout;• Supporting infrastructure for EV charging with 10% of parking spaces to be electric with passive provision for full conversion; and• Emergency access to be provided into Phase 1 and station.	<ul style="list-style-type: none">• Enhancement of the PROW route through the site, providing a pedestrian and cycle link between St Mellons Road and Cypress Drive;• Signalised pedestrian crossing at the Pascal Close and Willowdene Way junctions with Cypress Drive; and• Cycle route through the site between Route 88 of the NCN on St Mellons Road and Route 2 of the Cardiff cycleway on Cypress Drive.	<ul style="list-style-type: none">• Up to two additional bus stops within the Cardiff Hendre Lakes business district with high-quality waiting facilities.	<ul style="list-style-type: none">• Secondary vehicle access via the Cypress Drive/Sandbrook Road roundabout;• Vehicle accesses in to north eastern and north-western land parcels via Cobol Road;• Internal highways and access to all development plots; and• Junction improvement schemes at the Cypress Drive junctions with Pascal Close and Willowdene Way, both including traffic signals.

11.5 Offsite Opportunities

To fully realise the connectivity benefits provided by Cardiff Parkway railway station, there are opportunities for works and interventions to be delivered by others, as summarised in Table 79. These works are sited beyond land under the control of the applicant. Furthermore, not all works identified in Table 79 can be considered as necessary for the purposes of delivering planning conditions linked to opening or occupancy. As these opportunities will or could be delivered by others, the implementation has not been phased as part of the proposed development.

Table 79: Summary of Opportunities to be Delivered by Others

Active Travel	Public Transport	Vehicle Access and Highways
<ul style="list-style-type: none">• Opportunity for CC to deliver a pedestrian and cycle link from St Mellons to the site via Hendre Lake Park;• Opportunity for CC to extend the committed Cardiff Cycleway (Route 2) to the site boundary;• Opportunity for CC to introduce a pedestrian link between the site boundary and the existing business park via Cobol Road;• Opportunity for CC and other third-party landowners to deliver improvements to pedestrian infrastructure within the existing business park to provide a route between Pascal Close and the site boundary via Cobol Road; and• Opportunity for NCC to introduce traffic calming measures on St Mellons Road to improve the pedestrian and cycle route to Marshfield.	<ul style="list-style-type: none">• Bus service improvements including the extension of some services into the site to serve the railway station and business district.	<ul style="list-style-type: none">• Opportunity for NCC to introduce traffic calming measures on St Mellons Road to improve the pedestrian and cycle route to Marshfield.

12 Summary and Conclusions

This Transport Assessment (TA) has been prepared on behalf of Cardiff Parkway Developments Limited (CPDL) in support of Cardiff Hendre Lakes, a proposed business district and Transport Interchange including Cardiff Parkway railway station. This allocated site is identified in the Cardiff Council (CC) Local Development Plan (LDP) as Policy KP2 (H).

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 greenfield site covers approximately 44 hectares and is bisected by the South Wales branch of the Great Western Main Line which crosses the site east to west. Directly east of the site is the border between CC and Newport City Council (NCC).

There is an existing network of footpaths, cycleways and traffic free routes of variable quality and activity near the site. There are opportunities for this network to be improved by others to maximise the proportion of journeys that will be made to the site by foot and cycle. Combined existing bus services provide a high frequency service towards Cardiff City Centre, however many of these do not operate close to the site, and journey times are uncompetitive with the car or the proposed railway station.

The proposed access strategy for the development has been developed with reference to the sustainable transport hierarchy and prioritises pedestrians and cyclists over other transport modes, particularly the private car across much of the district. A network of pedestrian and cycle routes are proposed through the site, linking with existing and planned infrastructure including Cycleway 2 (CC) and Route 88 of the National Cycle Network (NCN).

A Transport Interchange is proposed, including Cardiff Parkway railway station, bus stops, a park & ride car park (up to 650 spaces), taxi rank and cycle parking and a Nextbike station. The intention is for the station to be served by up to eight trains an hour to Newport and Cardiff, including direct trains to Bristol, London and the midlands.

To maximise the success of the station, offsite improvements are recommended to provide pedestrian and cycle routes to the neighbouring communities and the existing business park. There is also an opportunity for some existing bus services to be rerouted into the site.

The proposed business district will comprise 90,000m² of employment space, as per Policy KP2 (H) of the CLDP. For the purposes of this traffic impact assessment, it has been assumed that the business district will comprise fully of B1(a) office development, representing the most robust potential development mix for the assessment of traffic movements.

The business district is forecast to generate 1,914 two-way person trips in the AM peak hour and 1,770 in the PM peak hour. It is estimated that approximately 67% of trips to the business district will be made by car, of which 61% will be drivers and 6% will be as passengers.

Cardiff Parkway railway station with a park & ride of up to 650 long-stay, short-stay, drop-off and accessible parking spaces is estimated to generate 403 vehicle trips in the AM peak hour and 385 vehicle trips in the PM peak hour. This includes drop-off and taxi movements and based on a scenario where the long-stay car park is fully occupied by the end of the AM peak period.

The proposed railway station is anticipated to result in a positive change in the travel behaviour of existing residents and employees, with some existing journeys made by car being transferred to rail. Outputs of the South East Wales Transport Model (SEWTM) have been used to estimate the reduction in existing traffic movements that are anticipated as a result of the proposed railway station and other sustainable transport interventions.

To mitigate the traffic impacts associated with the proposed development and change the character of Cypress Drive to reflect a more urban environment, traffic signals are proposed as part of this application at its junctions with Fortran Road, Pascal Close and Willowdene Way. The introduction of signals should reduce traffic speeds and result in the route becoming more permeable with the introduction of controlled crossings for pedestrians.

A junction improvement scheme is required at the A48/Cypress Drive roundabout. The nature, extent and mechanisms for these improvements will be agreed through the determination of the application. A staggered signalised junction has been identified as a potential improvement scheme which is forecast to mitigate the traffic impacts associated with the proposed development.

Framework Travel Plans have been prepared for the business district and the railway station. These seek to maximise the proportion of journeys made to the site by sustainable modes of transport through a range of measures including Personalised Travel Planning for all employees of the existing business park and the proposed business district.

It is anticipated that a Construction Traffic Management Plan and a Construction Environmental Management Plan will be prepared as part of the reserved matters process. These documents will include measures that will seek to minimise the impacts arising from construction traffic.

In summary, the development proposals will contribute positively towards the overarching policy objectives of the Local Development Plans for Cardiff and Newport and is compliant with relevant local and national policy regarding sustainable travel and transport. It is therefore considered that there are no traffic or transportation reasons why the site should not be developed, providing that the range of transport measures identified in this report are implemented.

Drawings



- Notes**
1. Do not scale from this drawing.
 2. All dimensions are in metres unless stated otherwise.
 3. The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.
 4. Refer to drawings:-
HDL-ARP-HW-SW-DRG-ECV-000091 to 000096 for proposed highway improvements and development access points.

IO	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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Client

Cardiff Parkway Developments Ltd

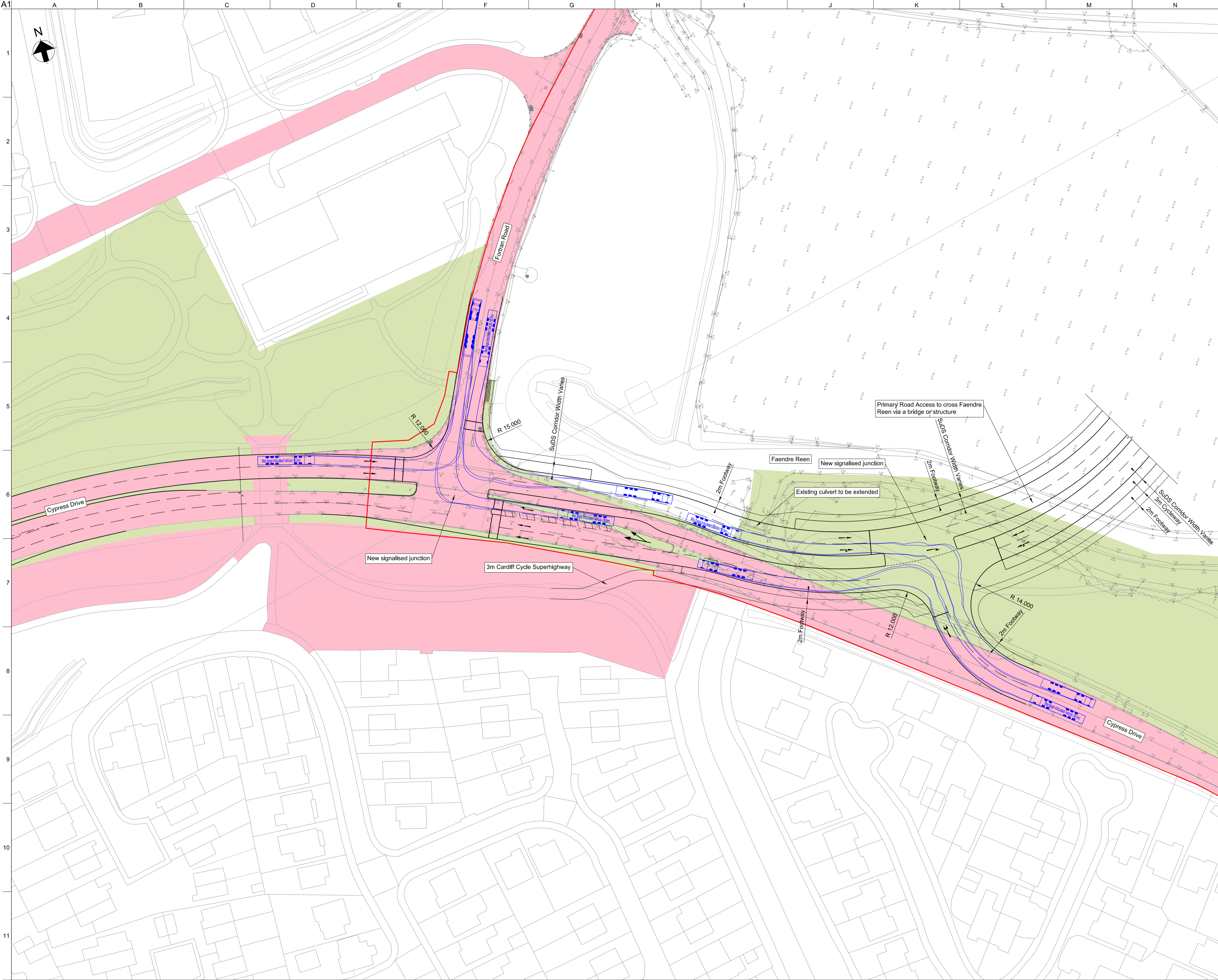
Project Title

Hendre Lakes

Drawing Title

Development Access and Highway Improvements Location Plan

Scale at A1	1:5000	Role	Infrastructure
Suitability	For Information		
Job No	252199-00		Rev
Drawing No	HDL-ARP-HW-SW-DRG-ECV-000090		IO



Legend

Extent of Adopted Highway

Extent of Cardiff Council Land

Vehicle Swept Path

Site Boundary

Notes

1. Do not scale from this drawing.

2. All dimensions are in metres unless stated otherwise.

3. The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.

4. Refer to drawings:- HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.

5. Details shown has allowed space for the Cardiff Cycle Superhighway proposals at this stage. This is to be considered with CCC in subsequent design stages.

6. All lane widths to be 3.5m.

7. All central reserves to be min. 2m wide.

Vehicle Legend

27.2

11.58

0.212

2.78

5.4

12.8

2.8

2.81

5.6

Max Legal Articulated Vehicle (16.5m)

Overall Length

Overall Width

Overall Body Height

Min Body Ground Clearance

Max Track Width

Lock to Lock Time

Curb to Curb Turning Radius

16,500m

2,500m

3,632m

0,396m

2,500m

6,00s

6,870m

I0	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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Client
Cardiff Parkway Developments Ltd

Project Title
Hendre Lakes

Drawing Title
Primary Development Access
Junctions
General Arrangement

Scale at A1
1:500

Role
Infrastructure

Suitability
For Information

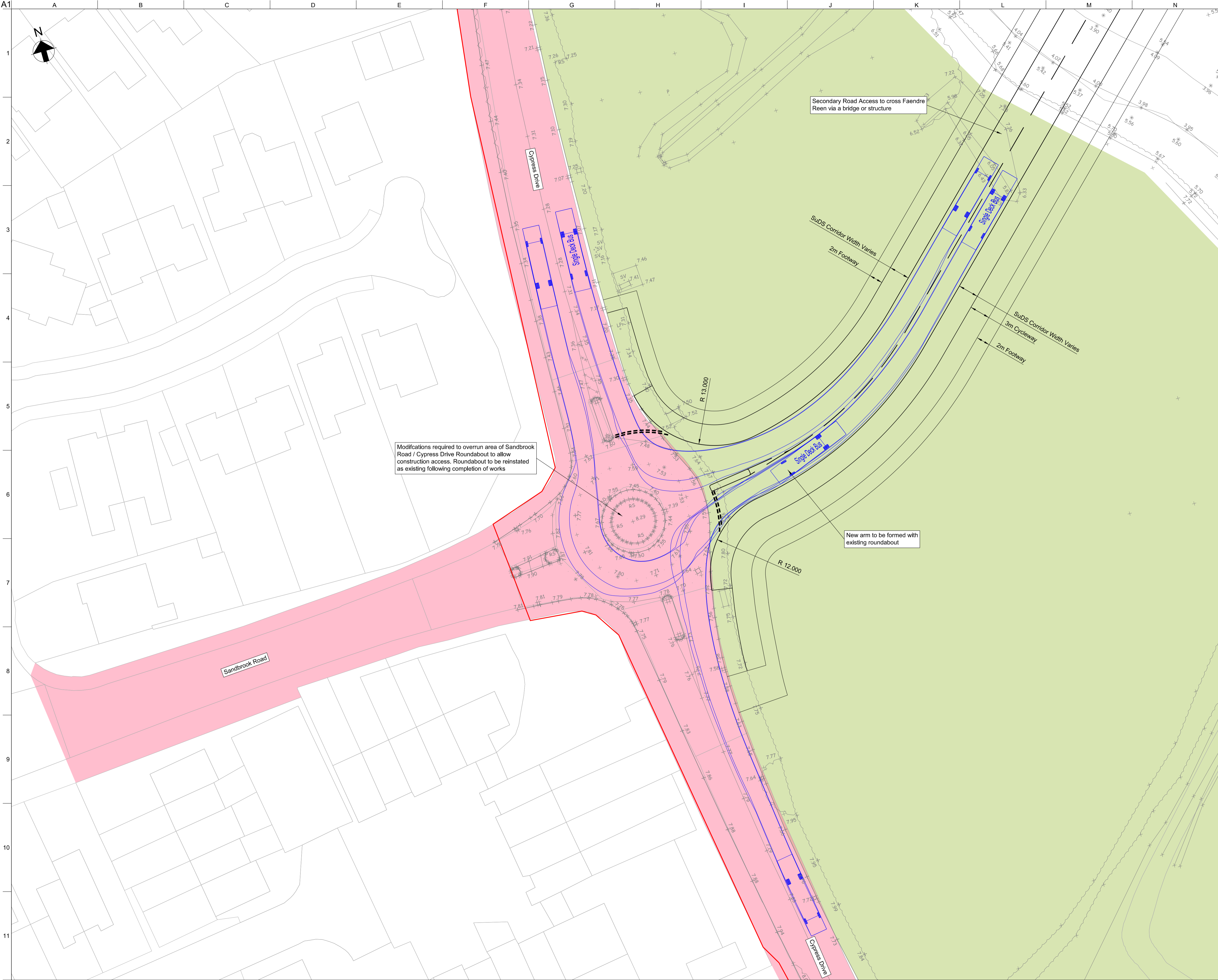
Job No
252199-00

Drawing No
HDL-ARP-HW-SW-DRG-ECV-000091

Rev
I0

Do not scale

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Legend

Extent of Adopted Highway

Extent of Cardiff Council Land

Vehicle Swept Path

Site Boundary

Notes

1. Do not scale from this drawing.

2. All dimensions are in metres unless stated otherwise.

3. The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.

4. Refer to drawings:-
HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.

5. Details shown has not allowed space for the Cardiff Cycle Superhighway proposals at this stage. This is to be considered with CCC in subsequent design stages.

6. All lane widths to be 3.5m.

Vehicle Legend

Single Deck Bus	11,980m
Overall Length	2,440m
Overall Width	3,070m
Min Body Ground Clearance	0,300m
Track Width	2,322m
Lock to Lock Time	6,00s
Kerb to Kerb Turning Radius	10,368m

I0	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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Client
Cardiff Parkway Developments Ltd

Project Title
Hendre Lakes

Drawing Title
Secondary Development Access Junction
General Arrangement

Scale at A1
1:250

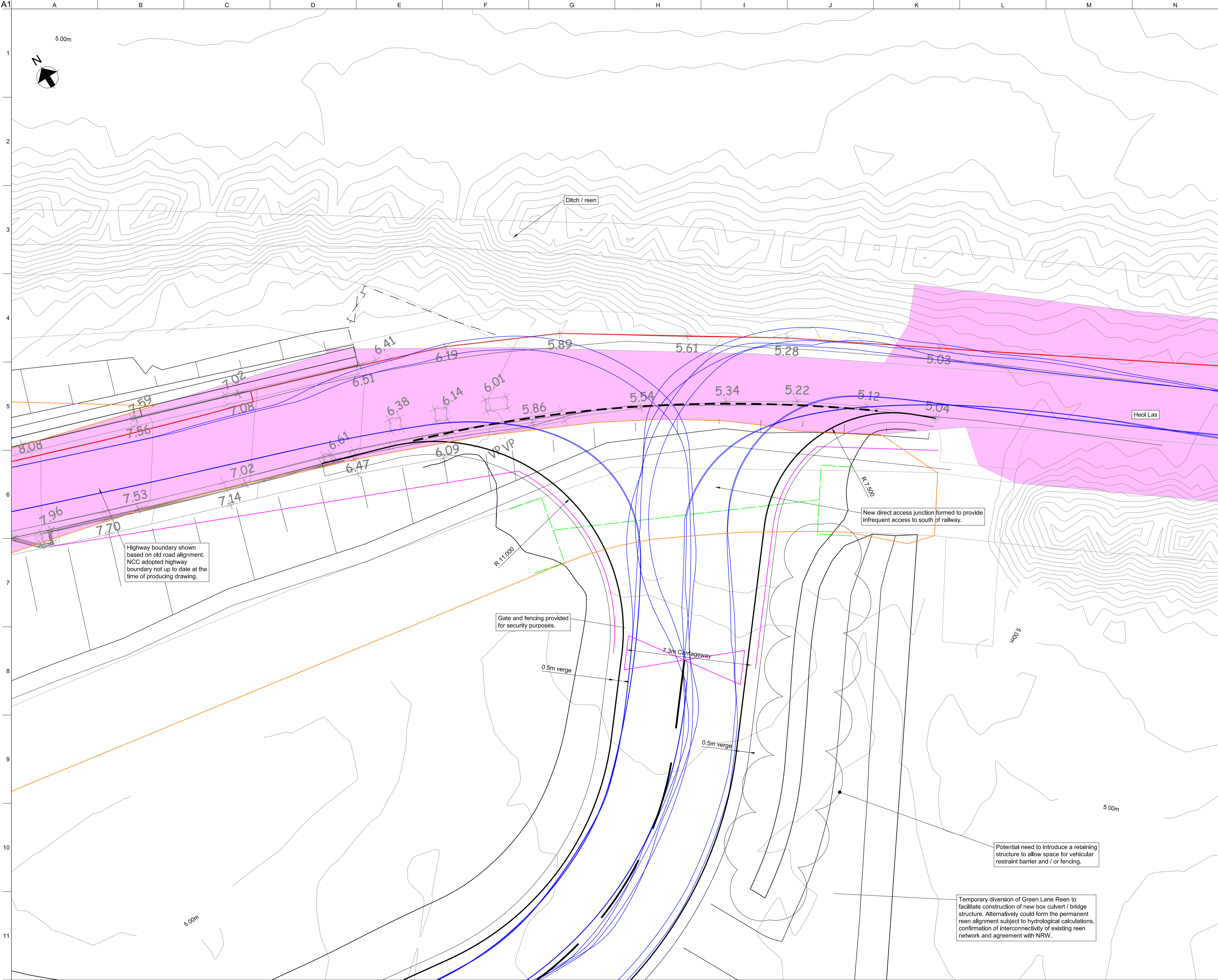
Role
Infrastructure

Suitability
For Information

Job No
252199-00

Rev
I0

Drawing No
HDL-ARP-HW-SW-DRG-ECV-000092



- Legend**
- Adopted Highway (Newport County Council)
 - Proposed Culvert / Bridge Structure
 - 12m Rigid Tracking
 - Proposed Fence
 - Proposed Gate
 - Network Rail land Boundary
 - Site Boundary

- Notes**
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 - The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.
 - Refer to drawings:- HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.
 - Proposed vehicle type used to be confirmed in subsequent design stages which may influence the junction geometry.
 - Visibility splays not shown as they are subject to the completion of ATC surveys to inform the extent. As such extent of works required to clear any visual obstructions are not known and may influence the proposals. To be confirmed in subsequent design stages.

Vehicle Legend

Rigid Truck
Overall Length 12.000m
Overall Width 2.500m
Overall Body Height 3.928m
Min Body Ground Clearance 0.412m
Track Width 2.471m
Lock to Lock Time 6.00s
Curb to Curb Turning Radius 11.900m

I1	28/07/20	SW	SW	SW
Drawing Updated				
I0	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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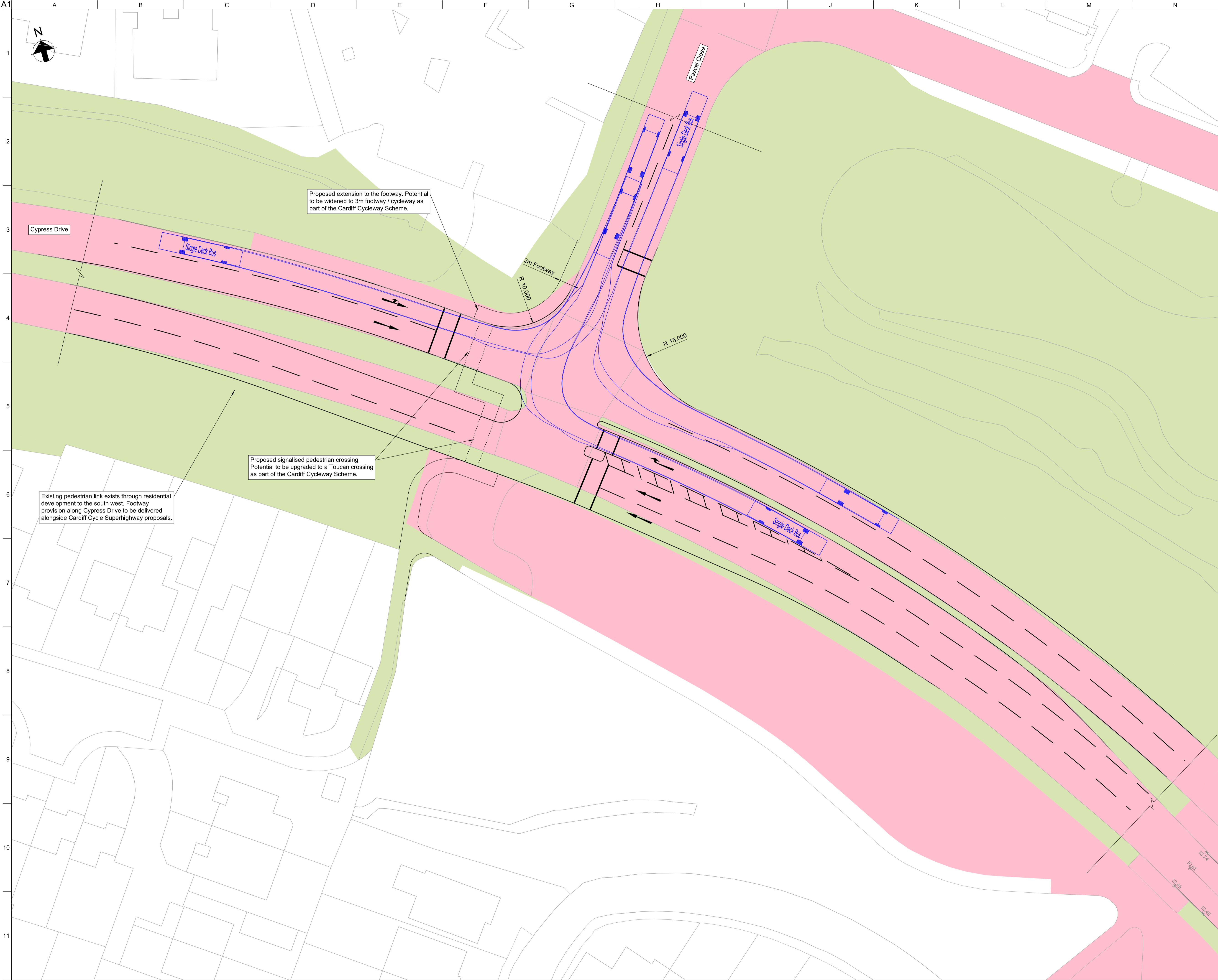
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Client
Cardiff Parkway Developments Ltd

Project Title
Hendre Lakes

Drawing Title
**Heol Las Highway Junction
General Arrangement**

Scale at A1	1:100	Role	Infrastructure
Suitability	For Information		
Job No	252199-00		Rev
Drawing No	HDL-ARP-HW-SW-DRG-ECV-000093		I1



- Legend**
- Extent of Adopted Highway
 - Extent of Cardiff Council Land
 - Vehicle Swept Path
- Notes**
- Do not scale from this drawing.
 - All dimensions are in metres unless stated otherwise.
 - The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.
 - Refer to drawings:- HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.
 - Details shown has not allowed space for the Cardiff Cycle Superhighway proposals at this stage. This is to be considered with CCC in subsequent design stages.
 - All lane widths to be 3.5m.

Vehicle Legend

Single Deck Bus
Overall Length 11,980m
Overall Width 2,440m
Overall Body Height 3,070m
Min Body Ground Clearance 0,300m
Track Width 2,322m
Lock to Lock Time 6,00s
Kerb to Kerb Turning Radius 10,368m

IO	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

ARUP

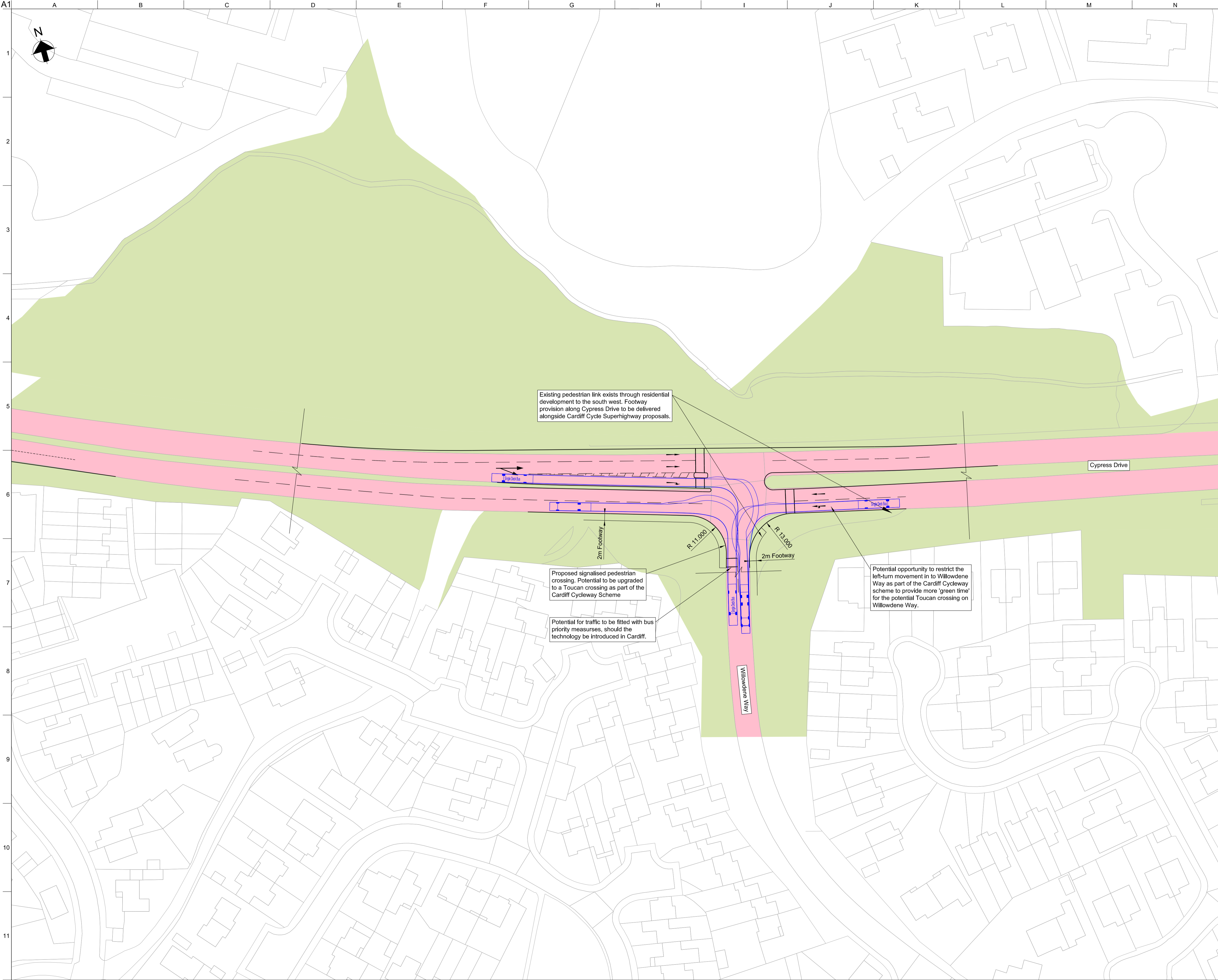
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Client
Cardiff Parkway Developments Ltd

Project Title
Hendre Lakes

Drawing Title
**Pascal Close / Cypress Drive Junction
General Arrangement**

Scale at A1	1:250	Role	Infrastructure
Suitability	For Information		
Job No	252199-00		Rev
Drawing No	HDL-ARP-HW-SW-DRG-ECV-000094		IO



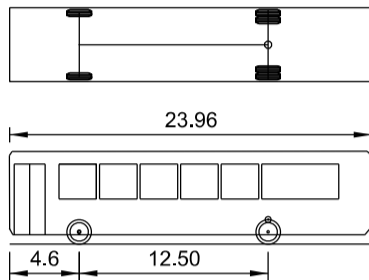
Legend

- Extent of Adopted Highway
- Extent of Cardiff Council Land
- Vehicle Swept Path

Notes

- Do not scale from this drawing.
- All dimensions are in metres unless stated otherwise.
- The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.
- Refer to drawings:- HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.
- Details shown has not allowed space for the Cardiff Cycle Superhighway proposals at this stage. This is to be considered with CCC in subsequent design stages.
- All lane widths to be 3.5m.

Vehicle Legend



Single Deck Bus	
Overall Length	11,980m
Overall Width	2,440m
Overall Body Height	3,070m
Min Body Ground Clearance	0,300m
Track Width	2,322m
Lock to Lock Time	6,00s
Kerb to Kerb Turning Radius	10,368m

IO	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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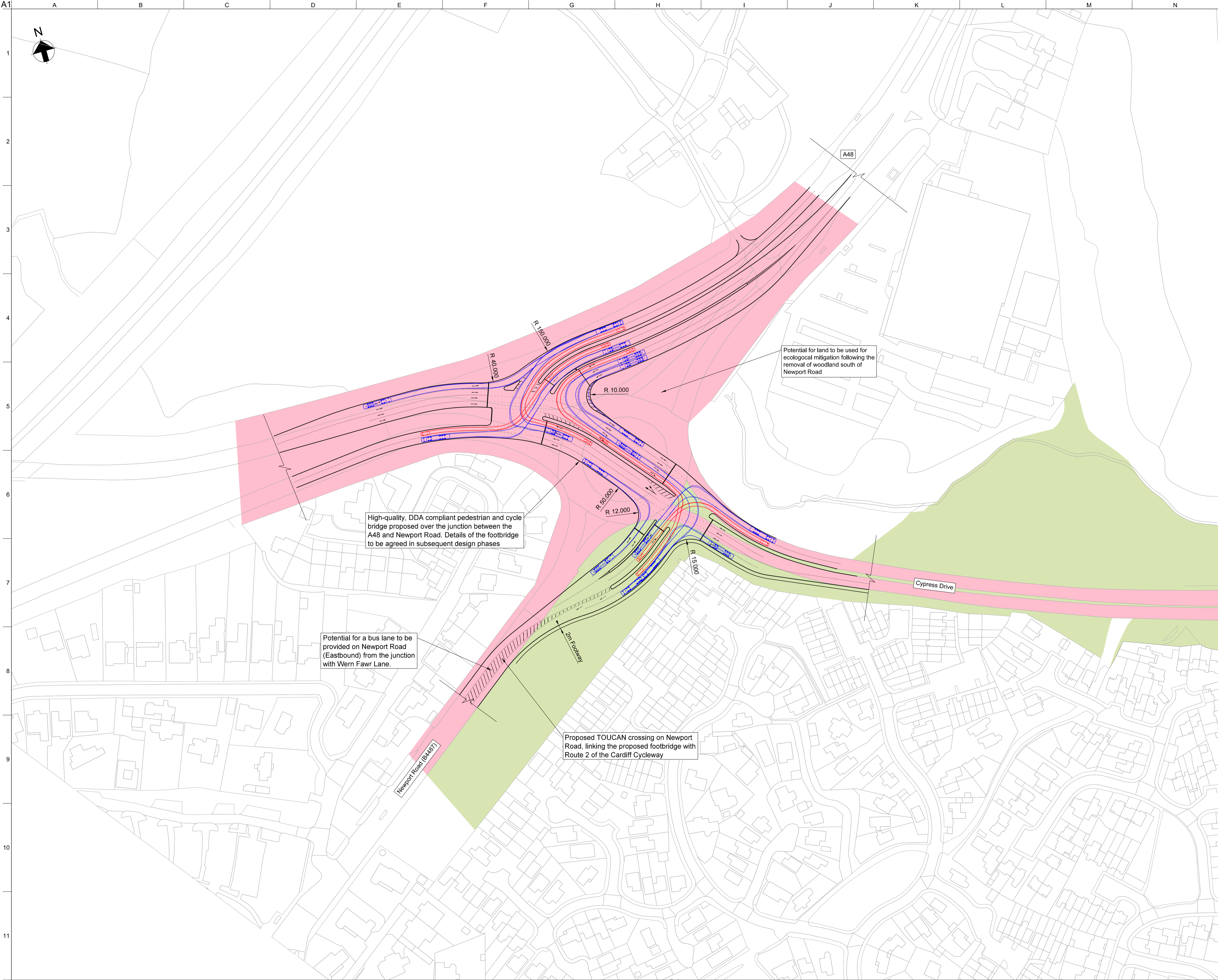
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Client
Cardiff Parkway Developments Ltd

Project Title
Hendre Lakes

Drawing Title
Willowdene Way / Cypress Drive
Junction
General Arrangement

Scale at A1	1:500	Role	Infrastructure
Suitability	For Information		
Job No	252199-00		
Drawing No	HDL-ARP-HW-SW-DRG-ECV-000095		
Rev	IO		



Do not scale

- Notes
1. Do not scale from this drawing.

2. All dimensions are in metres unless stated otherwise.

3. The details shown on this drawing are based on a schematic design produced for the outline planning application. The details will need to be reviewed and revised during subsequent design stages.

4. Refer to drawings:-
HDL-ARP-HW-SW-DRG-ECV-000090 to 000096 for other proposed highway improvements and development access points.

5. Details shown has not allowed space for the Cardiff Cycle Superhighway proposals at this stage. This is to be considered with CCC in subsequent design stages.

6. All lane widths to be 3.5m.

6. All lanes widths to be 3.5m.

7. All central reserves to be min. 2m wide.

8. Supplementary splitter islands provided where road layout increases risk of drivers inadvertently selecting the wrong lane resulting in late and dangerous manoeuvres (A48 approaches).

Legend

Extent of Adopted Highway

Extent of Cardiff Council Land

16.5m Max legal length Articulated Vehicle Swept Path

Large Car Vehicle Swept Path

Vehicle Legend

13.6

5.79

0.106

4.5

2.7

1.4

6.4

1.4

1.4

2.8

1.39

Max Legal Articulated Vehicle (16.5m)

Overall Length 16.500m

Overall Width 2.500m

Overall Body Height 3.632m

Min Body Ground Clearance 0.396m

Max Track Width 2.500m

Lock to Lock Time 5.00s

Curb to Curb Turning Radius 6.870m

4.988

0.89

2.87

Large Car

Overall Length 4.988m

Overall Width 1.793m

Overall Body Height 1.502m

Min Body Ground Clearance 0.287m

Track Width 1.700m

Lock to Lock Time 4.00s

Curb to Curb Turning Radius 6.200m

I1	15/05/20	SW	SW	SW
Drawing Updated				
I0	01/05/20	DS	SW	JS
Issued for Information				
Issue	Date	By	Chkd	Appd

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Client

Cardiff Parkway Developments Ltd

Project Title

Hendre Lakes

Drawing Title

A48 / Cypress Drive Junction
General Arrangement

Scale at A1 1:1000

Role Infrastructure

Suitability For Information

Job No 252199-00

Rev I1

Drawing No HDL-ARP-HW-SW-DRG-ECV-000096

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