Persimmon Homes

Land to the North of Dinas Powys

SLR Project No.: 226510

2 February 2024

Revision: N02 / V0B

RESPONSE TO HIGHWAYS: ACCESS AND TRANSPORT NOTE

1.0 Introduction

1.1 SLR has been appointed by Persimmon Homes to assist with the promotion of the proposed residential development on land to the north of Dinas Powys accessed via Cardiff Road.

1.2 The Vale of Glamorgan (VoG) are in the process of preparing a new Local Development Plan (LDP) with a range of documents prepared to support the site's allocation within the emerging draft Replacement LDP. To date, two Transport Strategy documents have been submitted to VoG for consideration with this Technical Note providing an updated approach, in particular to access arrangements, following comments from VoG.

Background

1.3 As outlined above, two Transport Strategy documents have been submitted to VoG with a range of comments provided on each. These are considered in turn below.

Transport Strategy

1.4 In September 2022 an initial Transport Strategy was submitted to VoG, this is attached at **Appendix A** for completeness. This Strategy accounted for a development of circa 650-800 dwellings on currently undeveloped land to the north of Cardiff Road and east of Pen-Y-Turnpike Road.

1.5 The overarching aim of the Transport Strategy for the site sought to build on the existing links and encourage future residents and visitors to travel via sustainable modes of transport. In addition, the Strategy outlined the options that could be incorporated into the masterplan to provide new connections and access to alternative transport modes such as electric bicycles.

1.6 The Strategy outlined how the site could be delivered in two phases, with the first phase taking access via a signalised junction with Cardiff Road and the latter phase benefitting from an additional priority junction access from Pen-Y-Turnpike. Junction modelling was undertaken which demonstrated that the access arrangements would be suitable to serve the proposals.

1.7 The comments received from VoG in response to the proposed Transport Strategy can be summarised as follows:

- The proposed priority junction at Pen-Y-Turnpike Road may need revising to suit capacity depending on the quantum of development served via this route.
- Junction improvements may be required at Pen-Y-Turnpike Road / Leckwith Road to the north as well as the Merrie Harrier junction and Cardiff Road / Murch Road / Millbrook junction.
- Active travel links would need to be provided to connect the site to existing routes with particular concerns relating to links along Pen-Y-Turnpike Road.
- The site is located between two proposed walking and cycling routes and consideration will be required as to how a connection will be provided.
- Access to public transport should be considered, in particular relating to links to Eastbrook station.

1.8 Following receipt of these comments, a Refined Transport Strategy was prepared and submitted to VoG in August 2023.

Refined Transport Strategy

1.9 Incorporating the VoG comments, the Refined Transport Strategy provided a focused approach as to how a development of 300 dwellings could be delivered, this is attached at **Appendix B**.

1.10 The Refined Strategy provided a comprehensive review of pedestrian routes to key amenities including public transport, education, retail, medical and leisure facilities. In addition, a review of local cycle routes was undertaken. It was demonstrated that the site is suitable located for future residents to be able to travel via active travel and public transport and therefore was considered to alleviate VoG concerns relating to accessibility.

1.11 An updated access strategy was prepared comprising a signalised junction with right turn facility connecting to Cardiff Road. Capacity testing of this arrangement demonstrated that it would be suitable to serve the proposed 300 dwellings with no requirement for an additional access via Pen-Y-Turnpike Road to serve this quantum. As such, it was considered that the VoG concerns relating to vehicle access were addressed.

1.12 Following submission of the Refined Strategy, comments have been received from VoG relating to access, active travel and modelling. These are considered in turn below.

2.0 Access

2.1 Concerns were raised relating to the proposed access arrangement and, in particular, the short right-turn lane, potentially insufficient space for infrastructure within the highway and the suggested highway realignment. With this in mind, two options have been prepared for consideration.

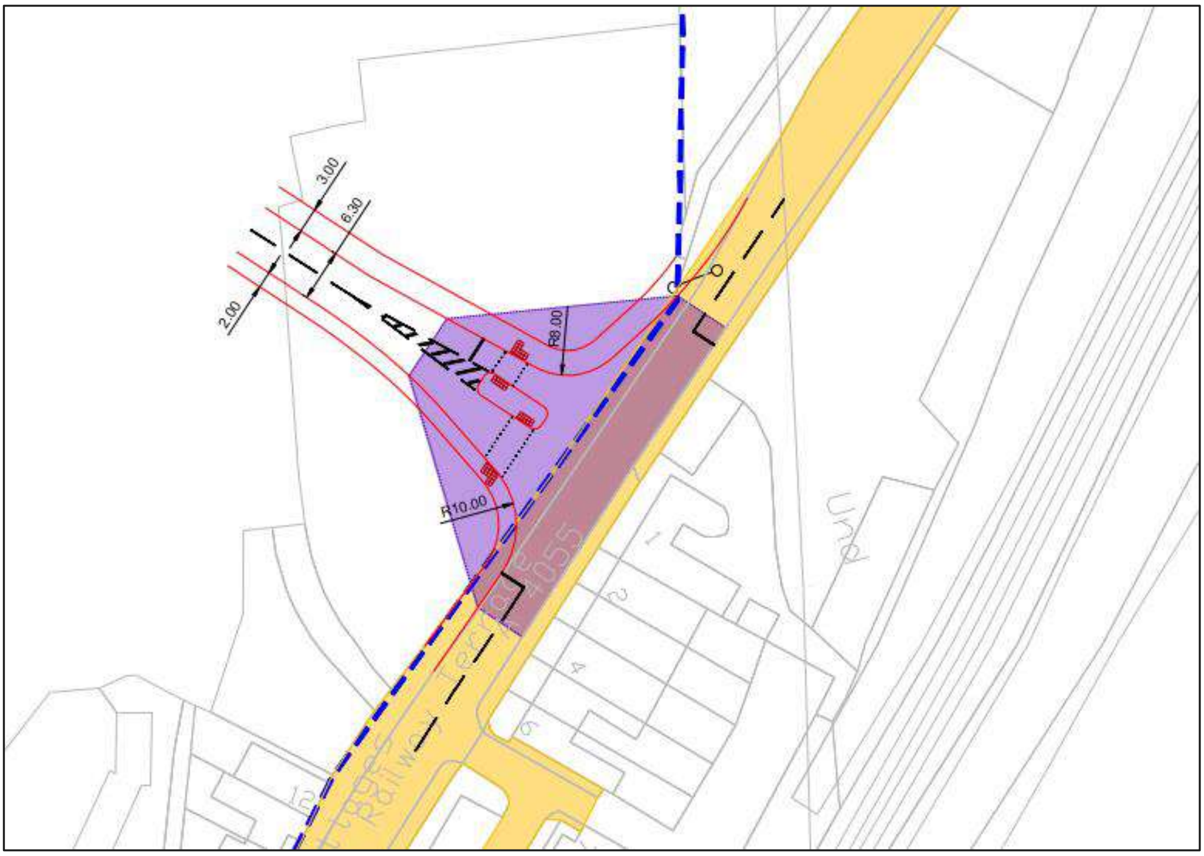
Option 1

2.2 Option 1 comprises a signalised junction located at the northern boundary of the land within ownership of the applicant. This junction has been located such that all required infrastructure can be accommodated within the highway boundary including signal heads and power supplies.

2.3 A staggered pedestrian crossing of the access arm has been included providing a north/south link to local bus stops and other amenities. No crossing of Cardiff Road has been provided as it is considered that footways on the northern / western side of the highway are suitable for pedestrian movements.

2.4 The proposed arrangement is shown at **Figure A** below and further included at **Appendix C** along with the corresponding swept path analysis.

Figure A – Option 1 Access Arrangement



2.5 Junction modelling of the potential arrangement has been undertaken assuming that 300 dwellings are served by the junction. **Table A** summarises the results in the morning and evening peak hours while the full modelling outputs are included at **Appendix D**.

Table A – Option 1 Access Strategy Modelling Results

2032 With Development (AM Peak)	DoS (%)	MMQ (PCU)	Delay (s/PCU)
Cardiff Road (east)	46.1	8	13
Cardiff Road (west)	61.3	12	13
Site Access	43.9	3	57
Overall PRC	**46.7%**		
2032 With Development (PM Peak)	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Cardiff Road (east)	79.7	18	22
Cardiff Road (west)	55.1	10	11
Site Access	21.1	1	51
Overall PRC	**13.0%**		

2.6 **Table A** demonstrates that this arrangement would be expected to operate with sufficient spare capacity such that queuing and delays are minimal on all arms with queuing traffic expected to clear the junction within a single cycle.

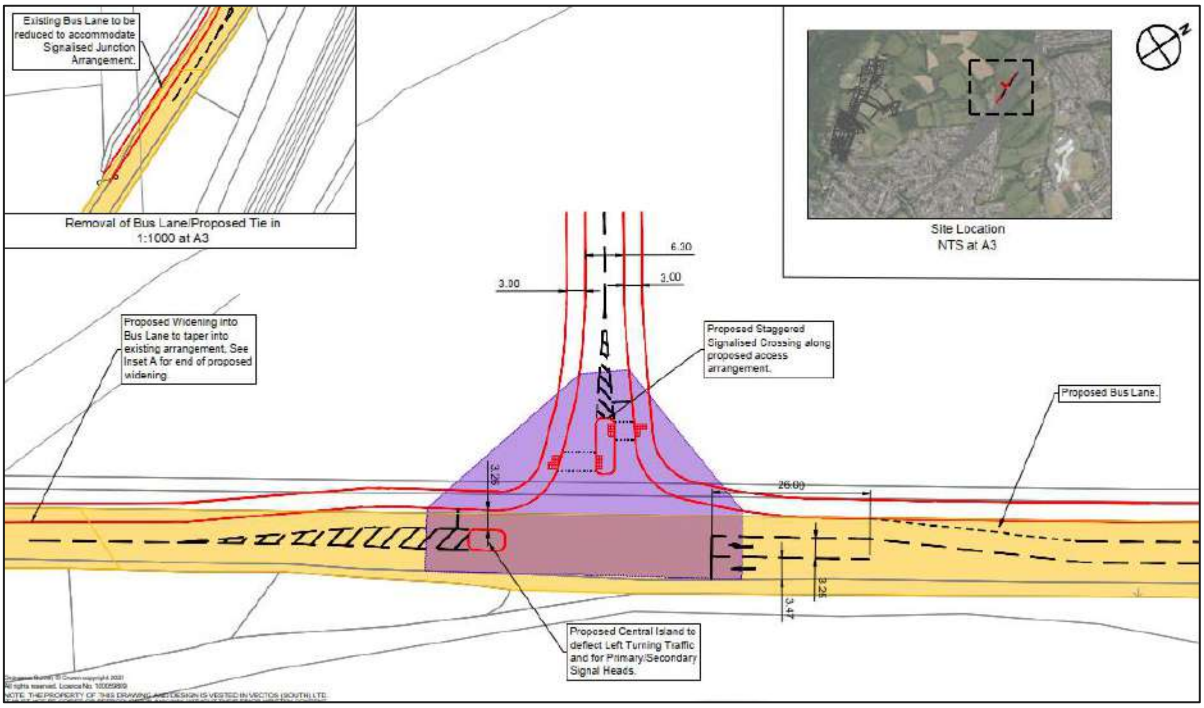
Option 2

2.7 Option 2 comprises a signalised junction with a 26-metre dedicated right turn lane, utilising the existing bus lane on the western side of Cardiff Road. The arrangement requires the highway to be widened into the southern section of this existing bus lane, with the bus lane then reinstated to the north of the proposed junction. As such, the arrangement requires a reduced level of highway realignment when compared with the previous option presented to VoG whilst also providing a longer right turn lane.

2.8 As with option 1, this junction has been located such that all required infrastructure can be accommodated within the highway boundary including signal heads and power supplies. In addition, a staggered pedestrian crossing of the access arm has been included while no crossing of Cardiff Road has been provided.

2.9 The proposed arrangement is shown at **Figure B** below and further included at **Appendix C** along with the corresponding swept path analysis.

Figure B – Option 2 Access Arrangement



2.10 Junction modelling of the potential arrangement has been undertaken assuming that 300 dwellings are served by the junction. **Table B** summarises the results in the morning and evening peak hours while the full modelling outputs are included at **Appendix D**.

Table B – Option 2 Access Strategy Modelling Results

2032 With Development (AM Peak)	DoS (%)	MMQ (PCU)	Delay (s/PCU)
Cardiff Road (east)	30.1	4	5
Cardiff Road (west)	60.2	12	12
Site Access	49.4	3	63
Overall PRC	**49.6%**		
2032 With Development (PM Peak)	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Cardiff Road (east)	52.1	8	7
Cardiff Road (west)	54.0	10	11
Site Access	23.7	1	54
Overall PRC	**66.7%**		

2.11 **Table B** demonstrates that this arrangement would be expected to operate with sufficient spare capacity such that queuing and delays are minimal on all arms with queuing traffic expected to clear the junction within a single cycle.

2.12 When compared with option 1, it is shown that there is a slight increase in spare capacity in the morning peak hour whilst in the evening peak hour the increase in capacity is more substantial.

Summary

2.13 It is illustrated that either arrangement would be suitable to serve a development of 300 dwellings in terms of junction capacity. It is therefore evident that the site can be accessed safely without requiring infrastructure outside the adopted highway.

3.0 Active Travel

3.1 The responses received included comments relating to the accessibility of the site, particularly referencing the active travel network.

3.2 An extensive review of the network, including an audit of crossings, was undertaken as part of the Refined Transport Strategy. It was demonstrated that the site was well located for a range of connections towards Eastbrook Station, Dinas Powys and a collection of amenities such that walking and cycling would be a suitable and attractive transport mode for future residents.

3.3 As part of the active travel strategy for the development, two southern pedestrian links connecting to Highfield Close and George’s Row. The links form part of a continuous pedestrian network to key amenities whilst additional providing a quieter alternative to using the footways on Cardiff Road, accessible via the vehicular access. Furthermore, given the Framework Plan for the site these routes would be shorter than travelling via Cardiff Road for access to Eastbrook Station, Dinas Powys and the wider area to the south of the site.

3.4 In addition, it has been outlined in Figures A and B that the site access will include provision for pedestrians on the southern side of the carriageway with a shared foot/cycleway on the north side connecting to the existing infrastructure on Cardiff Road. Routeing north from the site the existing shared surface is of a reasonable width to be comfortable for active travel users. This is further enhanced by high quality, signalised pedestrian crossing facilities at the Merrie Harrier junction providing links to the wider area including several local schools.

3.5 On the basis of the above and the previously submitted evidence, it is considered that the site is suitably located such that future residents would have ready access to the wider active travel network.

Links to Eastbrook Station and Dinas Powys

3.6 The comments included the suggestion that the current pedestrian routes along Cardiff Road are not adequate and subsequently the links to Eastbrook Station and Dinas Powys to the south of the site are not suitable.

3.7 It is accepted that the existing pedestrian routes along Cardiff Road to the south are of limited width. However, given the proximity of existing dwellings to the carriageway there are limited, if any, opportunities to widen these routes. With this in mind, links within the site will be provided connecting to Highfield Close and George’s Row with pedestrians joining Cardiff Road at points where the existing footway provision is of a more suitable width. Given the layout of the site it is expected that these routes would be more widely used due to their proximity to the majority of dwellings when compared with the Cardiff Road access. It is therefore considered that the site is suitably connected to both Eastbrook Station and Dinas Powys.

Cogan Transport Interchange Study

3.8 The response highlighted work being done in the area to improve the local transport network, in particular with reference to the Cogan Transport Interchange study and bus priority measures at Barons Court, noting that the development should consider links to these elements.

3.9 It is understood that the Cogan Transport Interchange has not been taken forward beyond the submitted WelTAG Stage 2 appraisal due to not receiving funding from the Welsh Government. It is considered that links to the bus priority measures as a standalone feature would not be required as part of the proposals.

Links to Cogan

3.10 The response included reference to a potential active travel route along Penarth Road, albeit this did not include the section between the Merrie Harrier junction and Barons Court. As such, it is suggested that the development would need to consider improvements to this alongside links to the nearest supermarket in the vicinity of Cogan.

3.11 This is noted, however, there are alternative quieter routes that could be used by active travel users such as Andrew Road which provides a link from the Merrier Harrier junction to Cogan Station and the adjacent Tesco superstore. It can also be used to access the Cardiff Bay Trail to the north east of the station. It is anticipated that for many active travel users, this quieter connection would likely be preferable to the more highly trafficked A4055.

Routes to Schools

3.12 It was raised that safe routes to schools should be considered. In particular connections to St Cyres as the closest secondary school, Ysgol Pen-y-Garth as the nearest Welsh School and St Josephs as the nearest Roman Catholic School were outlined.

3.13 St Cyres can be accessed via the existing active travel network comprising shared foot/cycleways along the western side of Cardiff Road, footways along Redlands Road and St Cyres Close. Alternatively, a traffic-free link operates between Murch Road in Dinas Powys and St Cyres Road which can be accessed via the pedestrian connections to Highfield Close and George's Row and footways on Cardiff Road. These existing connections include suitable crossings such as the signalised crossings at the Merrie Harrier junction and the Murch Road / Cardiff Road junction. Given that the site will provide a connection to this existing network, it is considered that links to St Cyres are of a suitable quality to support future residents.

3.14 Ysgol Pen-y-Garth can be accessed via the existing active travel network comprising shared foot/cycleways along the western side of Cardiff Road, footways along Redlands Road and Norris Close. These existing connections include suitable crossings such as the signalised crossing at the Merrie Harrier junction and are of a reasonable width. Given that the site will provide a connection to this existing network, it is considered that links to Ysgol Pen-y-Garth are of a suitable quality to support future residents.

3.15 St Josephs can be accessed via the existing active travel network comprising footways on Highfield Close, George's Row, Cardiff Road and Murch Road. From Murch Road a traffic-free link operates to the east and creates a connection to Sully Road. A signalised pedestrian crossing is provided where the traffic-free link joins Sully Road creating a safe and convenient link to wide footways on the eastern side of the carriageway which continue to the school entrance. Given that the site will provide a connection to this existing network, it is considered that links to Ysgol Pen-y-Garth are of a suitable quality to support future residents.

Summary

3.16 The above review, alongside the previously submitted information, demonstrates that the site is well located to take advantage of access to the existing active travel network. It is illustrated that the existing and proposed links provide connections to Dinas Powys, Eastbrook Station, supermarkets at Cogan and local schools.

4.0 Modelling

4.1 Whilst it has been demonstrated that the site is suitably located to encourage future residents to travel via more sustainable transport means, at the request of VoG, detailed junction modelling has been undertaken at the Merrie Harrier junction to the north of the site and the Cardiff Road / Murch Road junction to the south of the site. In the absence of available signal timing data, a site visit was undertaken in December 2023 to ascertain the timing profiles of each junction.

4.2 As with the site access junctions, a future year assessment of 2032 has been undertaken informed by traffic surveys and TEMPRO growth factors. A comparison can then be made between without development and with development scenarios, for reference the 2022 baseline scenario has also been modelled. It is noted that the Cardiff Road corridor currently operates effectively as one long dynamic queue during peak periods and therefore, in reality, this level of traffic growth will unlikely materialise, especially on a congested network as there will be limited capacity to accommodate this growth.

4.3 It is important to recognise that the assessment undertaken provides a worst-case scenario in which no adjustments made for elements such as the sustainable transport strategy at the site or public transport improvements. As such, the modelling presented below provide a robust scenario.

Merrie Harrier Junction

4.4 A summary of the modelling results at the Merrie Harrier junction is provided in **Table C** whilst full modelling outputs are included at **Appendix D**.

Table C – Merrie Harrier Junction Modelling Results

2022 Baseline	**AM Peak**			**PM Peak**		
	DoS (%)	**MMQ (PCU)**	**Delay (s/PCU)**	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Penlan Road	85.6	13	77	89.9	17	85
A4055 (east)	66.3	14	55	66.3	21	39
Redlands Road	86.4	16	61	87.3	16	65
A4055 (west)	86.0	24	55	89.8	31	61
PRC	**4.2%**			**0.1%**		
2032 Without Development	**AM Peak**			**PM Peak**		
	DoS (%)	**MMQ (PCU)**	**Delay (s/PCU)**	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Penlan Road	91.9	15	92	96.4	21	109
A4055 (east)	80.0	17	80	69.1	23	57
Redlands Road	94.0	21	77	95.4	22	87
A4055 (west)	92.2	28	67	96.3	37	85
PRC	**-4.4%**			**-7.1%**		
2032 With Development	**AM Peak**			**PM Peak**		
	DoS (%)	**MMQ (PCU)**	**Delay (s/PCU)**	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Penlan Road	95.9	18	112	98.3	22	120
A4055 (east)	86.7	17	101	78.7	28	58
Redlands Road	97.1	24	92	97.0	23	96
A4055 (west)	98.0	37	92	98.9	43	110
PRC	**-8.9%**			**-9.9%**		

4.5 The results presented in **Table C** demonstrate that the junction will be expected to exceed its theoretical capacity prior to the inclusion of unfettered development traffic (i.e. no adjustments for sustainable travel) and traffic growth which will unlikely materialise. It is accepted that delay and queues increase following the inclusion of development traffic, however, the vehicles would be able to clear the junction on an average cycle over the peak hours.

4.6 The comments received from VoG highlighted concerns relating to the free flow of traffic and highway safety. Given that the majority of vehicles would be expected to clear the junction within a single cycle, it is not expected that the development would have a material impact on the free flow of traffic through the junction.

4.7 With regard to highway safety, consideration has been made to the extent of queueing that would likely be experienced. It is demonstrated that at the development would result in a maximum increase in queueing of 9 vehicles experienced at the A4055 (west) in the morning peak hour. However, in reality, individuals will act to minimise their inconvenience by either travelling outside the peaks, change modes or not taking the journey in the first place.

4.8 Notwithstanding the above, consideration has been made as to whether queueing vehicles would extend from the Merrie Harrier junction to the site access given that should this occur, it would impact both the free flow of vehicles and highway safety. Given that one PCU is accepted as the equivalent of 5.75 metres, at the busiest point in the evening peak hour and following the inclusion of development traffic, queuing could reach 247 metres along Cardiff Road towards the site access. With the site access being located in excess of 350 metres to the south west of this junction, it is evident that queueing would not extend back to this point.

4.9 On the basis of the above, it is expected that the Cardiff Road corridor would continue to operate as per the existing situation of an extended by dynamic queue during the peak hours. It is expected that the development proposals could be accommodated without detriment to highway safety or the free flow of traffic at the Merrie Harrier junction when compared with the existing situation and accounting for future traffic growth.

A4055 Cardiff Road / Murch Road Junction

4.10 A summary of the modelling results at the Cardiff Road / Murch Road junction is provided in **Table D** whilst full modelling outputs are included at **Appendix D**.

Table D – Cardiff Road / Murch Road Junction Modelling Results

2022 Baseline	AM Peak			PM Peak		
	DoS (%)	MMQ (PCU)	Delay (s/PCU)	DoS (%)	MMQ (PCU)	Delay (s/PCU)
A4055 (north)	82.1	23	55	89.4	32	57
Murch Road	80.9	14	77	89.7	17	108
A4055 (south)	71.3	19	47	72.9	22	44
Millbrook Road	78.8	5	112	88.1	12	110
PRC	**9.6%**			**0.3%**		

2032 Without Development	AM Peak			PM Peak		
	DoS (%)	MMQ (PCU)	Delay (s/PCU)	DoS (%)	MMQ (PCU)	Delay (s/PCU)
A4055 (north)	88.0	27	62	95.9	41	76
Murch Road	86.9	16	87	96.2	20	137
A4055 (south)	76.4	21	50	78.3	26	47
Millbrook Road	84.4	6	125	94.8	15	138
PRC	**2.3%**			**-6.9%**		
2032 With Development	**AM Peak**			**PM Peak**		
	DoS (%)	**MMQ (PCU)**	**Delay (s/PCU)**	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
A4055 (north)	88.6	28	62	96.8	43	81
Murch Road	89.9	17	96	96.2	20	137
A4055 (south)	75.6	21	49	80.5	27	48
Millbrook Road	84.4	6	125	94.8	15	138
PRC	**0.2%**			**-7.6%**		

4.11 The results presented in **Table D** demonstrate that the junction will be expected to operate within its theoretical capacity during the morning peak hour following the inclusion of unfettered development traffic. During the evening peak hour it is expected that the junction will exceed its theoretical capacity prior to the inclusion of development traffic.

4.12 With regard to queueing, it is demonstrated that during the morning peak hour the development would result in 1 additional vehicle at the A4055 (north) arm and the Murch Road arm. During the evening peak it is anticipated that development traffic would result in 2 additional queueing vehicles at the A4055 (north) arm and 1 additional vehicle at the A4055 (south) arm. In reality, this level of change is not likely to be noticeable given the daily fluctuations experienced on the highway network. On this basis, it is considered that the development could be accommodated without detriment to highway safety or the free flow of traffic at the Cardiff Road / Murch Road junction.

Evidence Base

4.13 As noted previously, the modelling presented above is considered to provide a worst-case assessment in relation to both background traffic growth and indeed development traffic. The evidence base for how these factors may be overestimating traffic is therefore explored below.

Policy Aspirations

4.14 Within Welsh Government guidance and policy there is an overarching aim to reduce reliance on the private vehicle. This is echoed throughout Planning Policy Wales Edition 11 (PPW11) which highlights that development proposals must seek to maximise accessibility by walking, cycling and public transport, by prioritising the provision of appropriate on-site infrastructure and, where necessary, mitigating transport impacts through the provision of off-site measures, such as the development of active travel routes, bus priority infrastructure and financial support for public transport services. It has been demonstrated within the Technical Note along with the previously submitted information, that the site is accessible by a range of transport modes including pedestrian links to key infrastructure such as Eastbrook Station and local schools.

4.15 The new Transport Strategy for Wales (Llwybr Newydd) outlines a range of priorities to improve well-being both now and in the future several of which support this strategy's promotion of sustainable travel. In particular, this cites support for remote working in line with the Welsh Government target of 30% of the workforce to work remotely on a regular basis. Whilst this has been accounted for within the analysis to date, it is noteworthy that data released by the Office of National Statistics in February 2023 demonstrated that some 42% of the workforce in Wales were working either fully remotely or in a hybrid capacity, of the remaining 58%, 50% were not able to work from home.

4.16 Within the Active Travel Act Guidance, it is noted that two out of every three journeys are less than five miles in length – an achievable distance to cycle for most people, with many shorter journeys also suitable for walking. For school children the opportunities are even greater: three quarters of children live within a 15-minute cycle ride of a secondary school, while more than 90% live within a 15-minute walk of a primary school. The guidance further states that developments that do not adequately make provision for walking and cycling should not be approved. This may include adequate off-site improvements for pedestrians and cyclists using existing highways that are affected by the development. The site has the potential provide excellent pedestrian links allowing for residents of the site to connect with the local area, as well as providing active travel benefits for the existing community.

Public Transport Improvements

4.17 Both Dinas Powys and Eastbrook stations are located on future South Wales Metro lines which will provide a higher frequency service to destinations including Bridgend to the west and both Cardiff Central and Cardiff Queen Street stations to the east. Given the convenient links from the site to local stations, it is considered that these higher frequency services would be a suitable alternative to the private car for future residents.

Sustainable Transport Strategy

4.18 Accounting for the above policy elements, the site will be supported by a sustainable transport strategy with the aim to educate future residents on the transport options available from the outset. A key element of this strategy is a mobility hub which will provide access to sustainable transport options for residents and would likely include cycle hire services and access to a car club vehicle. It is further anticipated that the mobility hub will incorporate community facilities such as a community concierge service, retail facilities and third-place working facilities in the form of a café or hireable desk space.

4.19 In addition to the above, the site will be designed to a pedestrian scale allowing for the maximum opportunity to provide social inclusion. Pedestrian and cycle routes are designed to ensure full permeability through the site including connections through cul-de-sacs, and all internal routes will benefit from ample natural surveillance ensuring they are not only convenient links, but secure and attractive also. Active travel infrastructure will be provided at all points of access to the site with additional active travel corridors provided to the south connecting to Highfield Close.

Summary

4.20 The above review has demonstrated that the development proposals are unlikely to have a severe impact on the operation of key junctions in terms of highway safety and the free flow of vehicle movements.

4.21 It is acknowledged that queuing and delays are regularly experienced along the Cardiff Road corridor, however, it is considered that this is not a reason to deny or dismiss a candidate site for residential development give that is located in close proximity to a rail station with regular services to Cardiff, Barry and the wider network. In addition there regular bus services which can be accessed from Cardiff Road whilst the site access ties in with an existing shared cycleway footway providing a safe and suitable link for pedestrians and cyclists.

4.22 With the above in mind and given elements such as public transport improvements and the sustainable transport strategy, the modelling results show a worst-case scenario when assessing traffic impact.

5.0 Summary

5.1 SLR has prepared this Technical Note on behalf of Persimmon Homes to provide further details in relation to access and transport in relation to a residential development on land to the north of Dinas Powys.

5.2 This Note has responded to comments provided by VoG following submission of a Transport Strategy for the site. It has demonstrated the following:

- Two access options for the site have been prepared and illustrate that either arrangement would be suitable to serve a development of 300 dwellings in terms of junction capacity. It is therefore evident that the site can be accessed safely without requiring infrastructure outside the adopted highway.
- A review of the local area demonstrates that the site is well located to take advantage of access to the existing active travel network. It is illustrated that the existing and proposed links provide connections to Dinas Powys, Eastbrook Station, supermarkets at Cogan and local schools.
- Junction modelling of two key junctions has demonstrated that the development proposals are unlikely to have a severe impact on the operation of key junctions in terms of highway safety and the free flow of vehicle movements. It is anticipated that, given elements such as public transport improvements and the sustainable transport strategy, the modelling results show a worst-case scenario when assessing traffic impact.

5.3 It is therefore concluded that the site is suitably located for a residential development which could be delivered without detriment to highway safety and would additionally be able to take advantage of existing and proposed active travel connections to key locations such that future residents would not be required to rely on the private car.

Appendix A Transport Strategy

Land to the North of Dinas Powys

Persimmon Homes

SLR Project No.: 226510

02/02/2024

TRANSPORT STRATEGY

Persimmon Homes

Land to the North of Dinas Powys

September 2022

Transport Strategy

vectos.co.uk

Contents

Figures

Appendices

1 Introduction

1.1 Vectos has been appointed by Persimmon Homes to assist with the promotion of the proposed residential development on land to the north of Dinas Powys.

Site Overview

1.2 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station and a number of local bus stops.

1.3 The proposals comprise a development of circa 650-800 dwellings. It is expected that the site would be delivered in two phases with phase 1 comprising circa 400 dwellings at the Cardiff Road frontage and future phases providing the remaining dwellings and primary school to the north.

Policy Context

1.4 The Vale of Glamorgan (VoG) are in the process of preparing a new Local Development Plan (LDP). This Transport Strategy has subsequently been prepared to support the site's allocation within the emerging draft Replacement LDP.

1.5 It is noted that as part of the process VoG have prepared a Review Report (May 2022) which reviews, amongst other things, the delivery of new dwellings during the current Local Development Plan period of 2011-2026.The review report highlights that housing provision to date is below the target within the Local Plan and, in order to reach the target within the Local Plan period, 840 dwellings would have to be constructed annually.

1.6 It is expected based on the above that the replacement LDP will require similar housing targets. It is therefore considered that the proposed development provides an excellent opportunity to provide new housing and integration between the site and Dinas Powys to the south.

Report Structure

1.7 This Transport Strategy will evaluate the existing and future accessibility of the site in relation to local amenities and a range of transport modes. The remainder of this report is structured as follows:

- Section 2 summarises the existing accessibility of the site;
- Section 3 provides a review of planning policy within the context of the proposals;
- Section 4 describes the development proposals, including an access strategy for all modes;
- Section 5 summarises the trends of mobility;
- Section 6 provides a transport strategy for the site;
- Section 7 provides a high-level trip generation review; and,
- Section 8 summarises and concludes the report.

2 Baseline Conditions

Site Location

2.1 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station.

2.2 Pen-Y-Turnpike Road forms the western boundary of the wider site whilst existing residential areas are located to the south and undeveloped land forms the northern boundary. To the east the site fronts Cardiff Road (A4055), a primary movement corridor between the Vale of Glamorgan and Cardiff.

2.3 The site location in relation to the surrounding area is shown in **Figure 2.1**, below.

Figure 2.1 – Site Location Plan

Local Highway Network

2.4 The local highway network centres around the A4055 Cardiff Road and Pen-Y-Turnpike Road. These roads in the context of the site are illustrated in **Figure 2.2**.

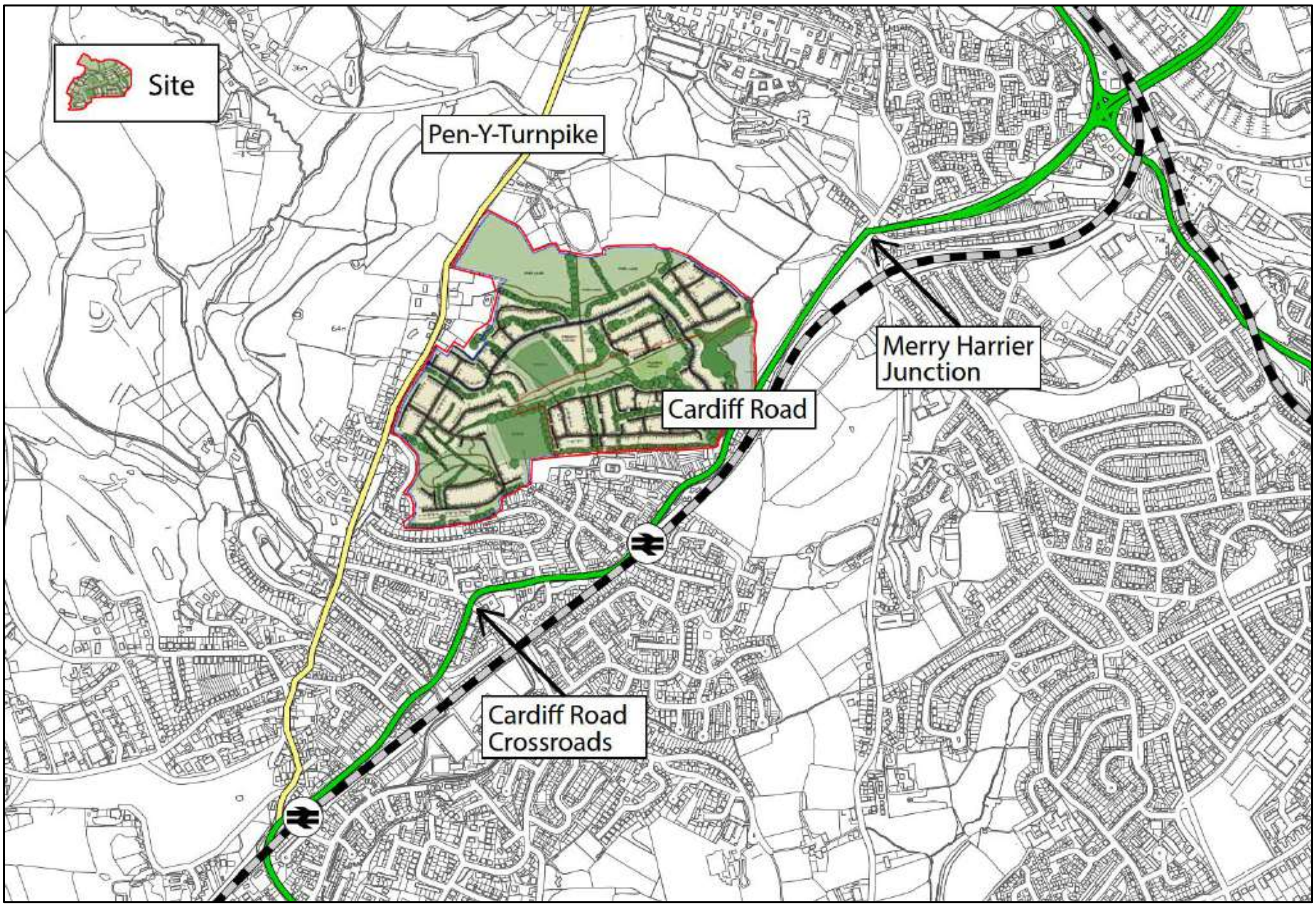


Figure 2.2 – Local Highway Network

Cardiff Road (A4055

2.5 Cardiff Road forms part of the Vale of Glamorgan highway network and provides the main link from Barry to Cardiff. It is the primary road in/out of Dinas Powys and accommodates a number of through-traffic movements associated with commuters, schools and general journeys between Cardiff and the south-eastern areas of the VoG.

2.6 Within the vicinity of the site Cardiff Road is subject to a 30mph speed limit and is a two-way single lane carriageway with the addition of a dedicated bus lane on the north-western side of the road, allowing a short traffic-free route for buses from the edge of Dinas Powys to the 'Merry Harrier' junction.

2.7 Access to the site could be taken via the latter phase of development from Cardiff Road at the south west of the site.

Pen-Y-Turnpike

2.8 Pen-Y-Turnpike is a two-way single carriageway subject to a 30mph speed limit. This increases to 40mph slightly further to the north, adjacent to the northwest edge of the proposed site. The road provides access to a smaller number of residential properties/ farms and links Dinas Powys to Leckwith Road through a semi-rural landscape. It is intended that access to phase 1 of the development would be taken from Pen-Y-Turnpike Road.

Baseline Traffic Flows

2.9 In order to ascertain the existing conditions in the vicinity of the site, automatic traffic counts (ATCs) were undertaken between the 23rd and 29th of June 2022. A summary of the recorded 5-day average traffic flows recorded at the two sites is provided in **Table 2.1** whilst a summary of the 5-day mean average and 85th percentile speeds at each location is provided in **Table 2.2**.

Cardiff Road	Northbound	Southbound	Two-Way
AM Peak (0800-0900)	520	463	983
PM Peak (1700-1800)	610	641	1251
Daily (0700-1900)	7065	6618	13683
Pen-Y-Turnpike Road	**Northbound**	**Southbound**	**Two-Way**
AM Peak (0800-0900)	468	128	596
PM Peak (1700-1800)	136	467	603
Daily (0700-1900)	2424	2601	5025

Table 2.1 – Recorded Traffic Flows

	Mean Average	85th Percentile
Cardiff Road (northbound)	27.3 mph	33.4 mph
Cardiff Road (southbound)	28.1 mph	33.3 mph
Pen-Y-Turnpike Road (northbound)	31.3 mph	37.4 mph
Pen-Y-Turnpike Road (southbound)	29.7 mph	33.3 mph

Table 2.2 – Recorded Speeds

Highway Network Summary

2.10 In the broader context of the wider highway network and settlements south and east of Dinas Powys, these two named roads provide half of the four key route options available to existing vehicle movements linking the western fringes of VoG with Cardiff. The other two routes are the B4267 linking Barry with Penarth and Cardiff and Windsor Road (A4160) /Cogan Spur to the south of Dinas Powys and Port Road (A4050) to the north and west of Dinas Powys routing via Culverhouse Cross.

Personal Injury Collision (PIC) Data

2.11 In order to determine the likely safety of the local highway, CrashMap has been used to ascertain the level of Personal Injury Collisions (PICs) that have occurred in the vicinity of the site over the most recent 5-year period. **Figure 2.3** provides an extract summary of the registered collisions within the study area.

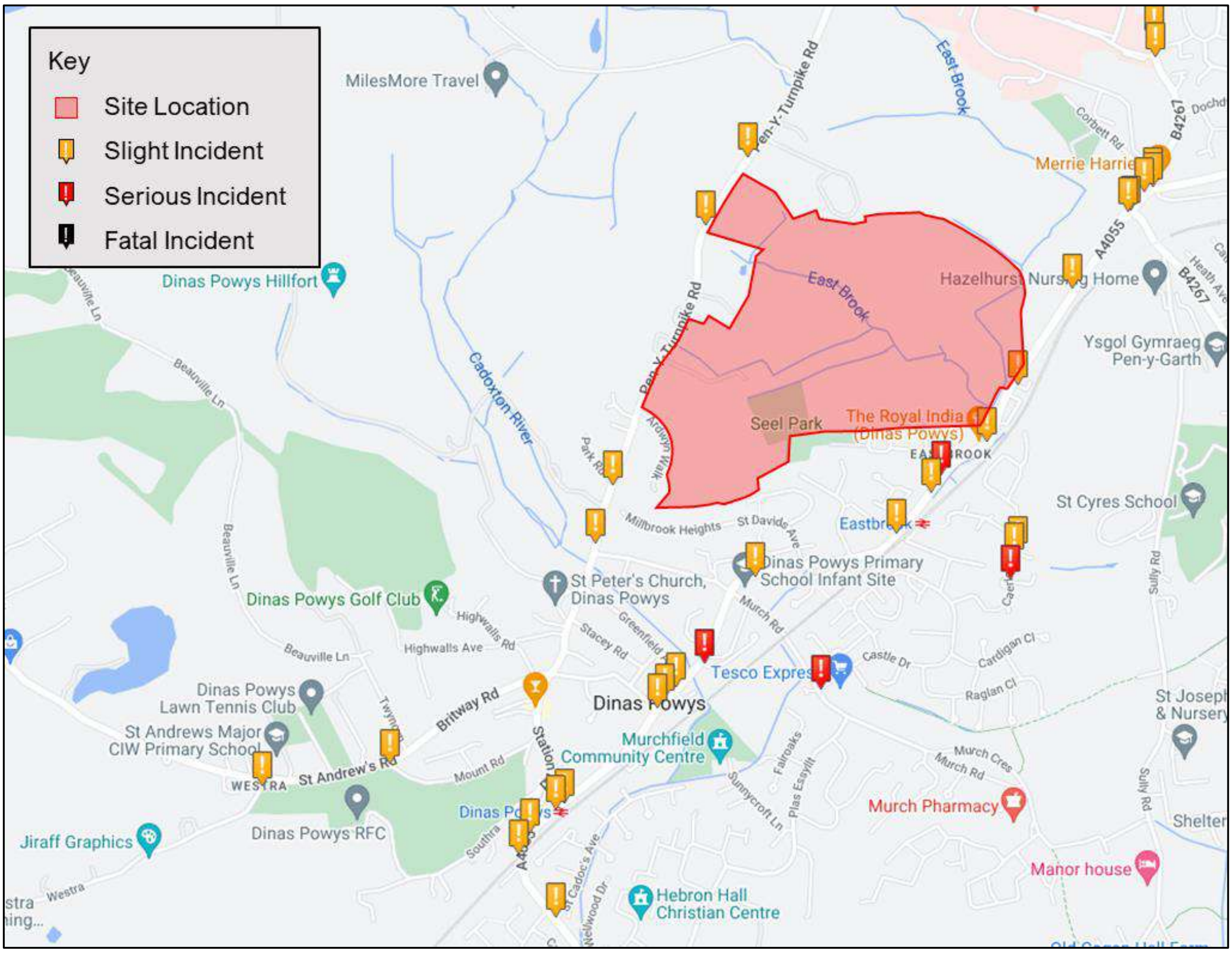


Figure 2.3 – CrashMap Collision Data

2.12 As highlighted in **Figure 2.3**, during the most recent period a total of 32 collisions were recorded comprising 4 serious and 28 slight incidents, no fatalities were recorded. The majority of incidents occurred in the vicinity of local junctions, likely to be attributed to vehicles manoeuvring and changing speed.

2.13 On the basis of the above, that there are no inherent safety issues associated with the existing highway network and junction arrangements in the vicinity of the site.

Active Travel Network

2.14 It is generally accepted that walking and cycling provide important alternatives to the private car and should also be encouraged to form part of longer journeys via public transport. For example, research undertaken by the Chartered Institution of Highways and Transportation (CIHT) outlines that most people would walk to a destination within one mile or cycle for a journey within five miles.

2.15 Moreover, Manual for Streets (MfS) identifies 'walkable neighbourhoods' as being:

"characterised by having a range of facilities within 10 minutes (up to about 800m) walking distance of residential areas which residents may access comfortably on foot."

2.16 However, it is important to recognise that MfS does not consider 800 metres to be a maximum walking distance. Indeed, MfS contends that walking can be used to access a variety of destinations within a range of up to 2 kilometres.

2.17 More recently, there has been an emergence of 20-minute neighbourhoods, based on a design ethos of creating complete, compact and connected neighbourhood, where people can meet their everyday needs within a short walk or cycle. This concept builds upon the notion of walkable neighbourhoods and places designed at pedestrian scale and is supported by a 20-minute neighbourhood guide published by the Town and Country Planning Association in March 2021.

2.18 The concept of walkable neighbourhoods is further captured within Placemaking Wales' Placemaking Guide (2020). Within the guide it is noted that walkable neighbourhoods provide opportunities for reducing car travel to tackle climate change whilst simultaneously improving mental wellbeing and boosting local economies.

Pedestrian Network

2.19 Footways are provided on both sides of Cardiff Road in the vicinity of the site serving the amenities of Dinas Powys, as well as Eastbrook station, to the south. At Cardiff Road leads northeast towards Llandough and the hospital the footway remains along the western side, and is a shared cycleway / footway approximately three metres in width.

2.20 Footways are additionally provided on the southern section of Pen-Y-Turnpike Road. These are provided continuously from approximately 100 metres to the north of the Millbrook Road / Pen-Y-Turnpike Road to the centre of Dinas Powys to the south.

2.21 There are two signalised crossing facilities on Cardiff Road that assist pedestrians in gaining access to bus stops and Eastbrook Station. To the east, a puffin crossing forming part of the bus lane control at the Cardiff Road / Redlands Road junction provides a safe crossing between bus stops and the wider footway network. To the west, an on demand puffin crossing allows pedestrians to cross from the northern side of Cardiff Road providing access to Eastbrook station to the south and the wider footway network.

2.22 In addition to the above, a range of public rights of way operate in the vicinity of the site. An east-west connection between Dinas Powys and Dingle Road can be accessed from Castle Drive to the south of the site. This route further provides a link to connections towards Cosmeston Lakes and Penarth to the south and east respectively.

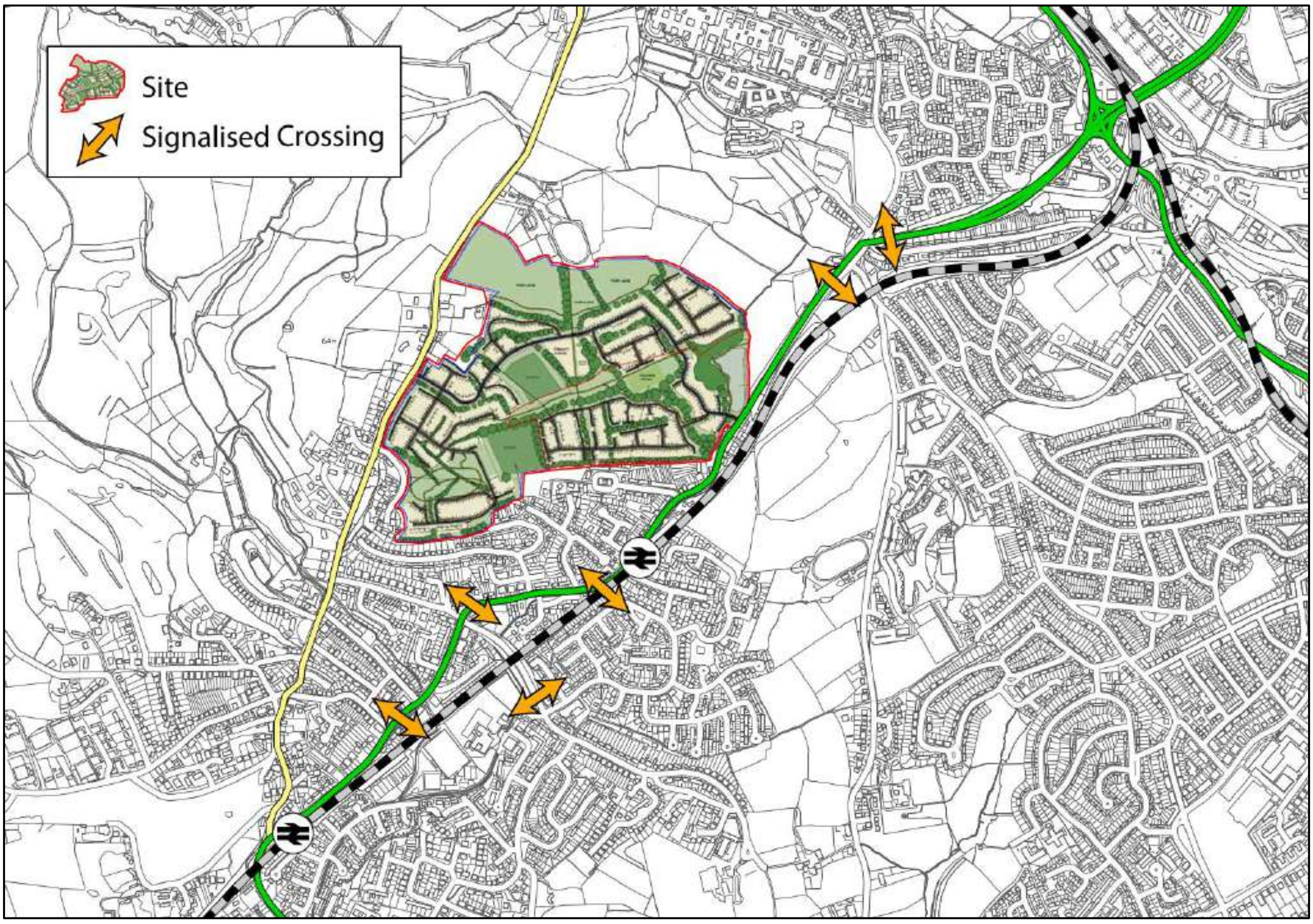


Figure 2.4 – Signalised Crossings

Cycle Network

2.23 As noted, the section of Cardiff Road joining the proposed site to the Merry Harrier junction benefits from a shared footway / cycleway, providing a connection to Llandough and it's associated facilities including the hospital.

2.24 The public rights of way, as described above, operate as shared surface allowing for cyclists and creating traffic-free links towards Dingle Road, Cosmeston Lakes and Penarth.

2.25 Route 88 of the National Cycle Network (NCN) can be accessed at Cosmeston which presently connects Penarth Marina to Cosmeston. From Penarth Marina, a connection to Cardiff Bay and Cardiff city centre, via NCN route 8, can be accessed.

2.26 To the south west, a signed cycle route operates from Cosmeston Lakes towards Barry via Sully largely comprising shared foot/cycleway along the B4267. This link can be used to access the western section of NCN route 88 operating from Barry to Bridgend.

2.27 NCN 88 is currently undergoing consultation within VoG with a proposal to extend the route to Eastbrook railway station, just 400m from the proposed Cardiff Road site access. This is a part of the LDP policy MG 16 (01) - SP 7 (06).

2.28 Numerous assessments have been undertaken of the cycling routes within VoG and specifically within Dinas Powys. These include the Sustrans walking and cycling audits undertaken in 2017 and various consultations of active travel routes. As a result of these, the Barry to Dinas Powys Active Travel Route was expected to live for public consultation in May 2022, although it is yet be made public.

Other Active Travel Network Improvements

2.29 In 2021 the Vale of Glamorgan began consultation on walking and cycling improvements across the council area. As a result, a range of future active travel routes are being considered within the local area, including shared foot/cycle links along Pen-Y-Turnpike Road and Cardiff Road, cycle links towards Cogan and pedestrian connections towards Westra and Lower Penarth.

2.30 In addition to the above, Nextbike launched an electric bike share scheme in VoG in November 2020 with pilot stations provided in Penarth, Cosmeston, Llandough and Sully. Following a successful launch it is proposed to install further stations, including at Dinas Powys, it is noted that no schedule or further details relating to location are available.

2.31 It is proposed to improve the NCN route 88 connection in other areas, linking the existing sections to provide a coastal route connecting Newport, Cardiff, Bridgend and Margam Country Park. To date, the following sections are operational:

— Caerleon to Newport

— Newport to Marshfield

— Cardiff City Centre to Penarth / Cosmeston

— Barry to Ewenny

2.32 As such, further works to connect Marshfield with Cardiff City Centre and Cosmeston to Barry will be considered.

Local Amenities

2.33 There are a plethora of local amenities available within Dinas Powys and the surrounding area including shops, schools, employment areas, leisure facilities, Llandough Hospital as well as excellent access to public transport opportunities such a buses and trains.

2.34 The village, although having a population of close to 10,000, benefits from a community feel spread across different areas which the proposed site can benefit from, as well as providing additional facilities which can further support the local area and community feel.

2.35 Existing residents of Dinas Powys often walk or cycle to local destinations, with the village square providing a typical village feel with pubs, hairdressers, takeaways, shops and other professional services. Other retail areas include The Parade (Tesco, post office, bank, takeaways, other retail), Camms Corner (florist, retail, professional services), the Cardiff Road retail units (garage, petrol station, vet, NISA local, takeaways, professional services.

2.36 From the south of the site, there are good connections in the form of footways primarily along Cardiff Road leading to most facilities. The facilities within the vicinity of the site are detailed in **Table 2.3**. All distances and times are calculated using google maps, which accounts for gradients and road crossings, and are taken from the proposed access at Cardiff Road.

Public Transport	Distance (m)	Walk Time(mins)	Cycle Time(mins)
Eastbrook Bus Stop (NB)	240	3	1
Eastbrook Bus Stop (SB)	300	4	1
Eastbrook Railway Station	400	5	1
Education	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Dinas Powys Primary School	850	10	2
Pen Y Garth Primary School	900	12	3
Murch Primary School	1400	16	4
St Josephs Primary School	1900	24	7
St Andrews Major Primary School	2200	29	10
St Cyres Secondary School	1200	16	4
Stanwell Secondary School	2300	30	12
Retail, Food & Drink, Other	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
The Parade (Murch)	1100	13	4
Cardiff Road Retail Units	1200	14	3
Camms Corner	1400	17	4
Dinas Powys Village Square	1500	19	6
Healthcare	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Llandough Hospital	1100	16	6
Murch Pharmacy & Medical Centre	1700	18	6
Sport & Leisure	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Dinas Powys Football Club	1700	21	6
Dinas Powys Golf Club	1800	23	8
Dinas Powys Athletic Club	2200	27	9

Table 2.3 – Local Amenities

2.37 The location of these facilities in the context of the site is set out in **Figure 2.5**.

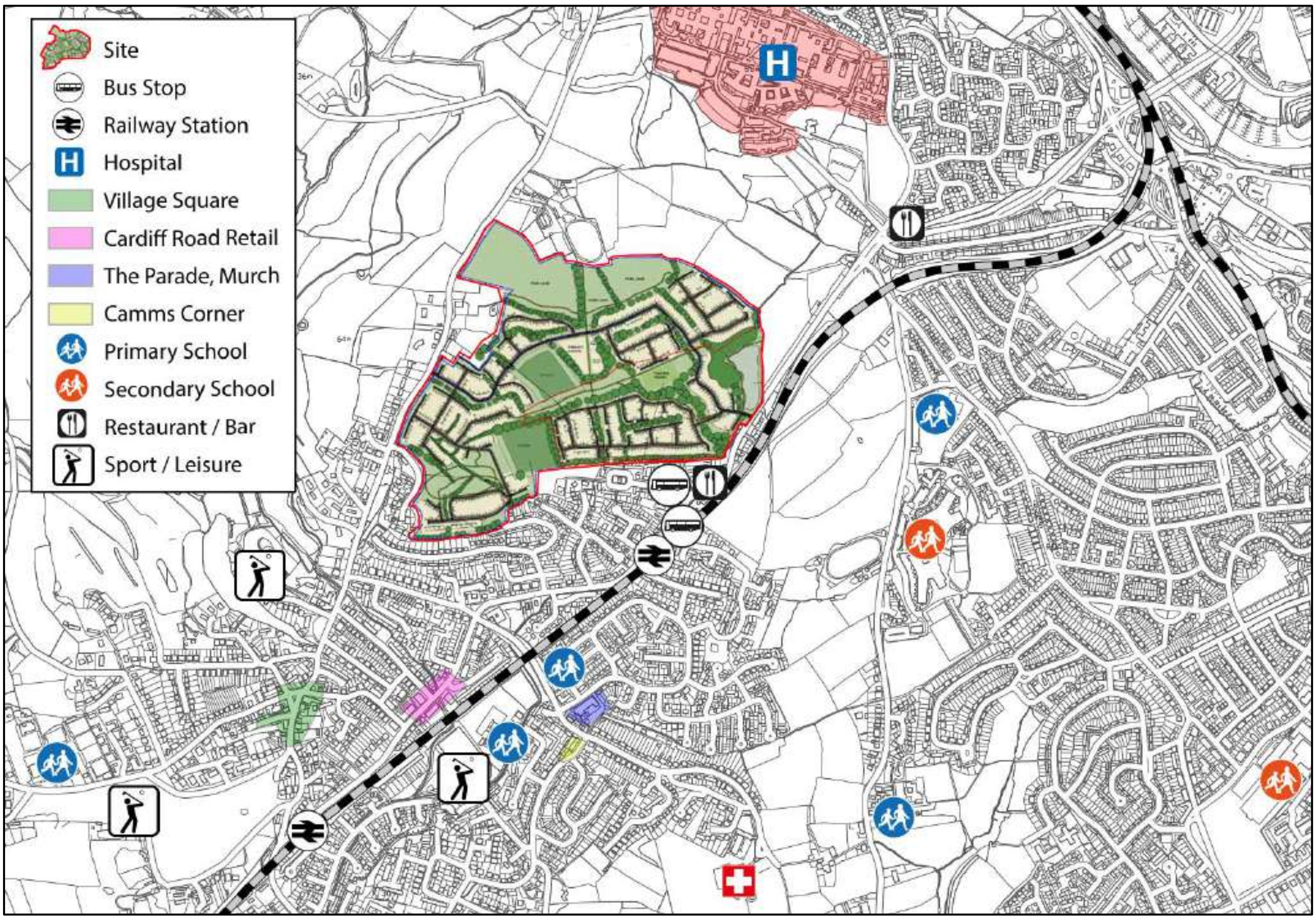


Figure 2.5 – Local Amenities

2.38 As well as being well located in order to make use of existing facilities in a community which is typically centred around being able to walk to these amenities, the site will also provide its own facilities which will enhance the surrounding area and also somewhat minimise trips off-site.

Public Transport Network

2.39 The site is well placed to make good use of the local existing public transport infrastructure, including bus and rail.

Bus

2.40 The nearest bus stops to the site are the 'Eastbrook' stops on Cardiff Road, with the northbound stop being approximately 260m from the proposed site access and the southbound stop being approximately 300m from the proposed site access.

2.41 The northbound bus stop benefits from a shelter and bench, as well as a flagpole and timetabling information. The southbound stop has a flagpole and timetabling information, and on-road bus stop marking.

2.42 Both of these stops are served by the 89A, 93, 95 and 304 services of which details are included in **Table 2.4**.

Number	Route	Frequency			Operator
		Mon-Fri	Saturday	Sunday	
89A	Cardiff – Dinas Powys	120	120	N/A	Adventure Travel
	Dinas Powys - Cardiff	120	120	N/A	
93	Cardiff - Morrisons	60	N/A	N/A	Cardiff Bus
	Morrisons - Cardiff	60	N/A	N/A	
95	Heath Hospital - Barry Island	30	30	60	Cardiff Bus
	Barry Island – Heath Hospital	30	30	60	
304	Llantwit Major – Cardiff	60	60	120	Adventure Travel
	Cardiff – Llantwit Major	60	60	120	

Table 2.4 – Local Bus Services

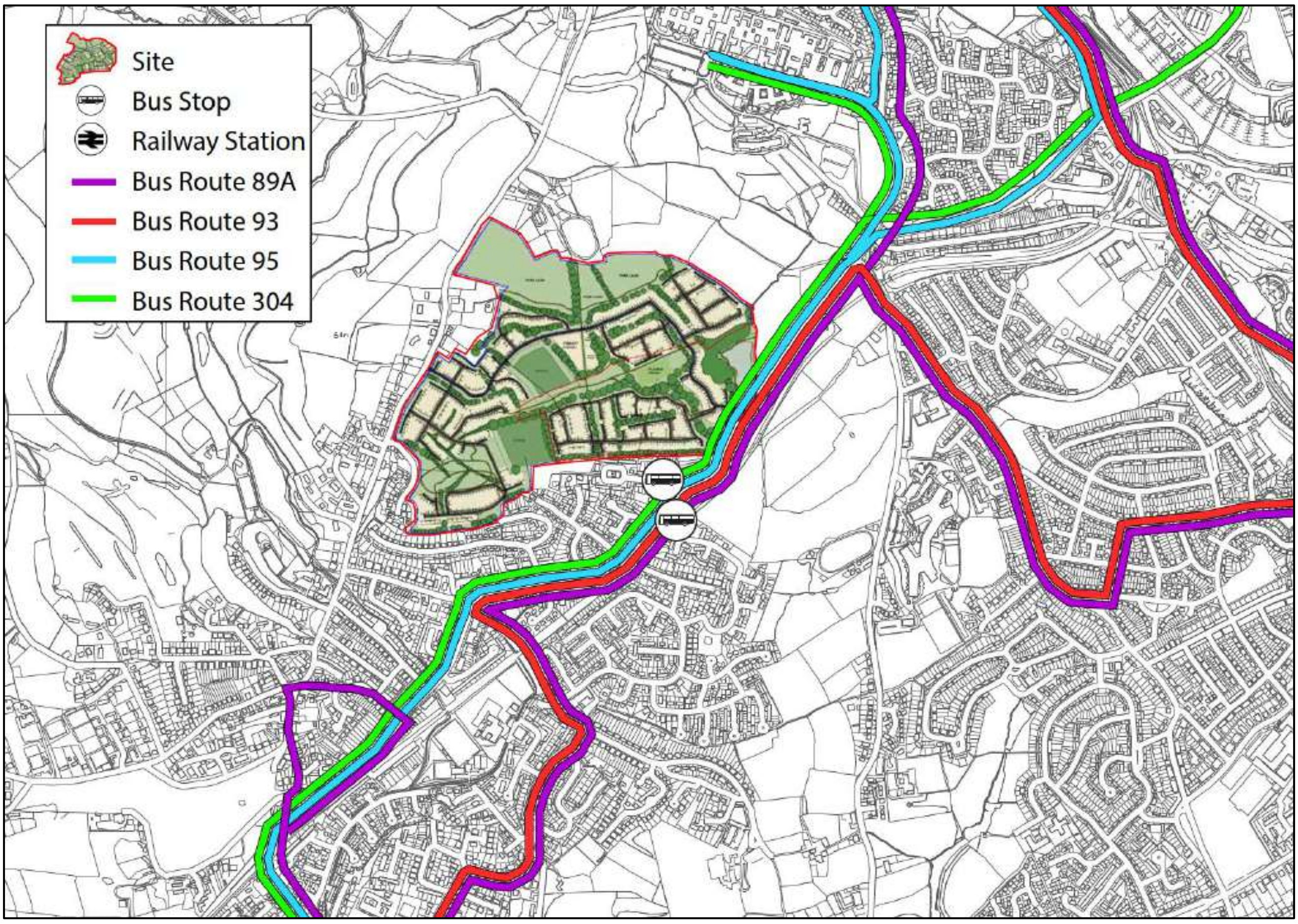


Figure 2.5 – Bus Routes

Rail

2.43 Dinas Powys benefits from two railway stations, the nearest of which is Eastbrook. Eastbrook railway station is approximately 400m from the proposed site access along Cardiff Road. It can be currently accessed by pedestrians via the footways along Cardiff Road, with the most convenient location to cross Cardiff Road being the signalised crossing just to the south of the station which also provides access to the pedestrian footbridge.

2.44 Station facilities at Eastbrook include self-service ticket machines (found on the Barry-bound platform 2), waiting shelters, a station car park, and customer information points with a train running information. Access to both platforms is via ramp; platform interchange without steps requires exiting the station and re-entering

2.45 Passenger services are operated by Transport for Wales as part of the Valley Lines network. Typical Monday-Saturday off-peak service sees trains from Eastbrook depart twice per hour for Merthyr Tydfil via the main Cardiff stations, twice per hour for Aberdare via Cardiff, three times per hour for Barry Island via Dinas Powys and Barry Docks, and once per hour for Bridgend via Dinas Powys, Barry Docks, Cardiff Airport, and Llantwit Major. Evening services see these trains operate every 30 minutes each direction; on Sundays, trains run twice an hour to Barry Island, two hourly to Bridgend, and twice or thrice an hour to Cardiff.

2.46 The railway stations and routes are illustrated in **Figure 2.6**

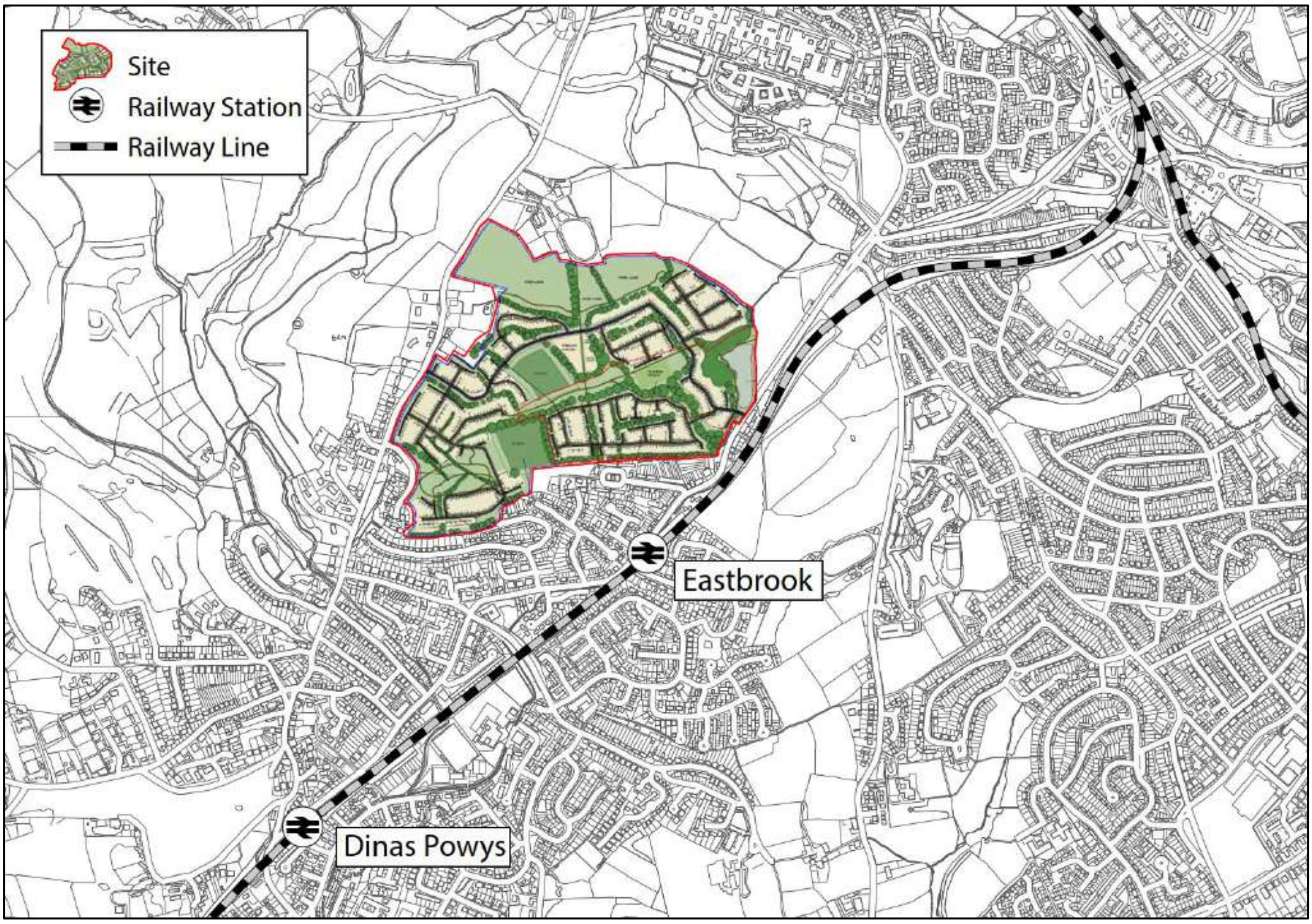


Figure 2.6 – Railway Stations

Summary

2.47 The site excellently located to take advantage of local facilities, and benefits from a good surrounding active travel network. There are a good range of public transport options, including Eastbrook station which provides a direct connection into Cardiff and towards Barry. The site is sustainably located and forms a natural extension to the existing settlement of Dinas Powys.

3 Policy Context

3.1 This section of the report outlines relevant policies for development and transport in Wales, which are cognisant of one another and follow a common theme; moving towards carbon reduction in the promotion of communities, virtual and active mobility, followed by public transport with private vehicle trips at the bottom of the hierarchy. This hierarchy is demonstrated in **Figure 3.1**.

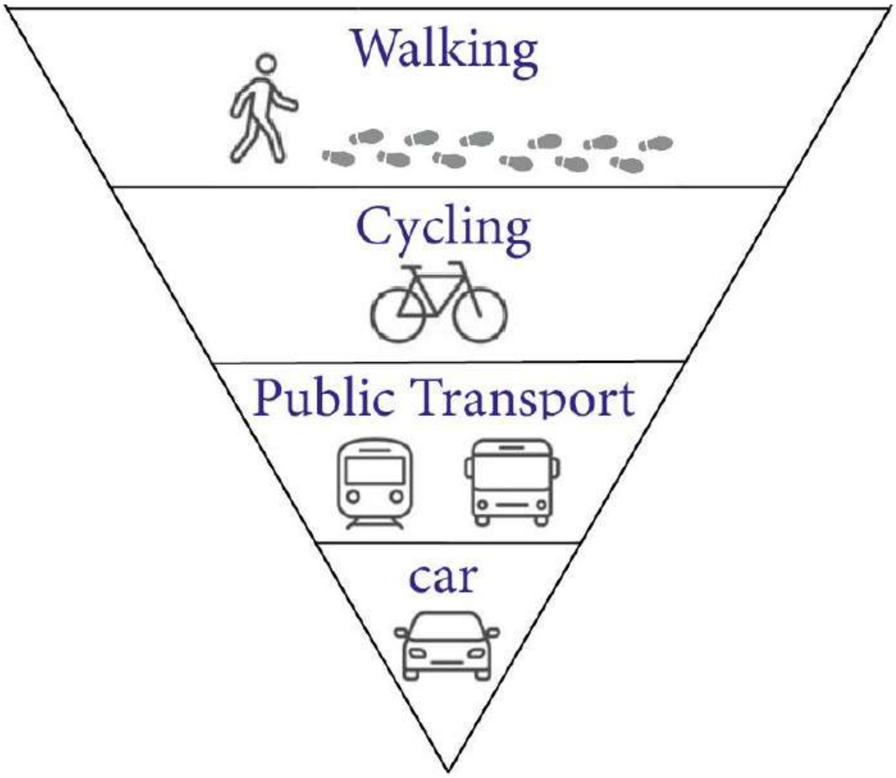


Figure 3.1 – Transport Hierarchy (Active Travel Act Guidance 2021)

Planning Policy Wales (Edition 11) (February 2021)

3.2 Planning Policy Wales Edition 11 (PPW11) sets out the land use planning policies of the Welsh Government. The primary objective of PPW11 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."

3.3 Section 4 of PPW11 concerns Active and Social places. It asserts that Active and Social Places are those which provide well-connected cohesive communities and further state that a 'Resilient Wales' is supported by protecting existing communities and natural environments whilst well-connected infrastructure and facilities closer to where people live.

3.4 Furthermore, with regards to sustainable transport, PPW11 advises that, in the context of active and social places, developments should encourage modal shift and be easily accessible by walking, cycling and public transport, by virtue of their location, design and provision of on and off-site sustainable transport infrastructure.

3.5 A key theme throughout PPW is the aim of reducing reliance on travel by private car, and the adverse impacts of motorised transport on the environment and people's health, by prioritising and increasing active travel and public transport. Additionally, it states that development proposals must seek to maximise accessibility by walking, cycling and public transport, by prioritising the provision of appropriate on-site infrastructure and, where necessary, mitigating transport impacts through the provision of off-site measures, such as the development of active travel routes, bus priority infrastructure and financial support for public transport services.

3.6 It is Welsh Government policy to require the use of a sustainable transport hierarchy in relation to new development, which is; walking, cycling, ultra-low emission vehicles and public transport. To this extent, paragraph 4.19 relates specifically to sustainable transport and states:

"The Welsh Government is committed to reducing reliance on the private car and supporting a modal shift to walking, cycling and public transport. Delivering this objective will make an important contribution to decarbonisation, improving air quality, increasing physical activity, improving the health of the nation and realising the goals of the Well-being of Future Generations Act."

Llwybr Newydd – The Wales Transport Strategy (May 2021)

3.7 The new Transport Strategy for Wales sets out the 'new path' that will shape the transport system over the next 20 years. It is a "new way of thinking that places people and climate change at the front and centre of our transport system". This document crucially defines the climate emergency as one of the biggest defining issues of our time, and the need to achieve net zero by 2050.

3.8 This seeks to improve the social, economic, environmental and cultural well-being of Wales. It contains seven well-being goals which local authorities as well as other public bodies must seek to achieve in order to improve well-being both now and in the future several of which support this strategy's promotion of sustainable travel.

3.9 The strategy sets out three urgent priorities which are illustrated in **Figure 3.2**.

Priority 1	Priority 2	Priority 3
Bring services to people in order to reduce the need to travel.	Allow people and goods to move easily from door to door by accessible, sustainable transport.	Encourage people to make the change to more sustainable transport.

Figure 3.2 – Wales Transport Strategy Priorities

3.10 Priority 1 seeks to reduce the need for people to use their cars on a daily basis by:

- Supporting remote working in line with Welsh Government target of 30% remote working;
- Locate new public services close to where people live and to existing public transport routes;
- Design new developments to be walk and cycle friendly from the outset;

- Maximise the use of land close to transport hubs;
- Improve access to fast and reliable broadband; and
- Set aside land for multi-modal hubs to transfer freight to smaller vans or e-cargo bikes for last mile deliveries.

3.11 The mobility strategy for the site will continue to be developed to meet these criteria including provision of a mobility hub as well as consideration for a community concierge facility to handle last mile deliveries, in accordance with the aspirations of Priority 1.

3.12 Priority 2 aims to achieve a shift away from private car use to more sustainable transport modes, enabling more people to walk, cycle, and use public transport, as well as low-emissions vehicles. It is expected that the inclusion of a mobility hub will allow future residents and visitors to switch between transport types and therefore be confident about leaving the car behind.

3.13 Infrastructure will be future-proofed where possible to adapt to climate change and facilitate more sustainable transport choices. In addition, new infrastructure will give priority to interventions that support walking and cycling, public transport and ultra-low emissions vehicles over other private motor vehicles.

3.14 Priority 3 seeks to encourage people to change their travel behaviour to use low carbon, sustainable transport. This will be done through (but not limited to):

- Developing a range of behaviour-change projects;
- Move from individual vehicle ownership to shared solutions;
- Reduce the cost of sustainable travel; and
- Support digital innovation.

3.15 Through the development design, on site mobility hub and promotion of active travel, the development will meet these priorities with the overall aim being to encourage an accessible, sustainable and efficient transport system.

Future Wales – The National Plan 2040 (February 2021)

3.16 'Future Wales – the National Plan 2040' (Future Wales) is the national development framework, setting the direction for development in Wales to 2040. Future Wales strongly considers the Well-Being of Future Generations (Wales) Act 2015, which gives a legally-binding common purpose – the seven well-being goals – for national government, local government, local health boards and other specified public bodies. It details the ways in which these bodies must work, and work together, to improve the well-being of Wales.

3.17 Future Wales recognises that Placemaking is at the heart of the planning system in Wales, and that this policy establishes a strategic placemaking approach and principles to support planning authorities to shape urban growth and regeneration.

3.18 Policy Two of Future Wales is titled Shaping Urban Growth and Regeneration – Strategic Placemaking. It states that Urban growth and regeneration should be based on the following strategic placemaking principles:

— creating a rich mix of uses;

— providing a variety of housing types and tenures;

— building places at a walkable scale, with homes, local facilities and public transport within walking distance of each other;

— increasing population density, with development built at urban densities that can support public transport and local facilities;

— establishing a permeable network of streets, with a hierarchy that informs the nature of development;

— promoting a plot-based approach to development, which provides opportunities for the development of small plots, including for custom and self-builders; and

— integrating green infrastructure, informed by the planning authority's Green Infrastructure Assessment.

3.19 Within its Strategic Placemaking Principles, Future Wales considers mix of uses, variety of housing, walkable scale, density, street network, plot-based development and green infrastructure.

3.20 Of vital importance to new developments such as the proposed site is the concept of the 'walkable scale'. This strategic placemaking principle states that to enable active and healthy lives, people should be able to easily walk to local facilities and public transport.

Active Travel (Wales) Act 2013 (October 2013)

3.21 The Active Travel (Wales) Act aims to make it easier for people to walk and cycle in Wales and makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve their infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport.

3.22 By connecting key sites such as workplaces, hospitals, schools and shopping areas with active travel routes, the Act will encourage people to rely less on their cars when making short journeys and make implementing successful Travel Plans easier.

Active Travel Act Guidance (July 2021)

3.23 The Active Travel Act Guidance was first published in July 2021 and is issued using the powers of the Welsh Ministers to give guidance under sections 2(6), 2(9), 3(4), 4(5), 5(2) and 7(2) of the Active Travel Act.

3.24 The act requires local authorities in Wales to produce maps of walking and cycling networks, and to deliver year on year active travel improvements along the mapped routes and their related facilities. These routes should be coherent, direct, safe, comfortable and attractive. The maps shall now be known as Active Travel Network Maps (ATNM) – showing existing routes and future routes which shall combine the Existing Routes Map and the Integrated Network Map required by the act.

3.25 As well as creating the infrastructure, the act includes provision for making people aware of the existing and future routes through the publication of the maps and for the promotion of active travel as a means of transport.

3.26 The active travel network is designed to serve everyday journeys. These are also known as utility journeys – trips with a purpose rather than purely for leisure. Examples of destinations which can be considered to form an everyday or utility journey include; school or other educational establishments, local shops, employment sites, healthcare facilities, and other destinations people travel to for a purpose.

3.27 **Figure 3.3** is an extract of Table 4.1 within the guidance which provides a guide for network development in relation to reasonable distances that would be travelled by each respective mode for everyday journeys.

	Less than 1km	Up to 3km	Up to 5km	Up to 8km	Up to 12km	Up to 24km
	Many users	Many users	Some users	Few users	Few users	Few users
	Many users	Many users	Many users	Many users	Some users	Few users
	Many users	Many users	Many users	Many users	Some users	Some users

Figure 3.3 – Active Travel Guidance Table 4.1

3.28 Two out of every three journeys are less than five miles in length – an achievable distance to cycle for most people, with many shorter journeys also suitable for walking. For school children the opportunities are even greater: three quarters of children live within a 15-minute cycle ride of a secondary school, while more than 90% live within a 15-minute walk of a primary school.

3.29 The guidance further states that developments that do not adequately make provision for walking and cycling should not be approved. This may include adequate off-site improvements for pedestrians and cyclists using existing highways that are affected by the development. The site has the potential provide excellent pedestrian links allowing for residents of the site to connect with the local area, as well as providing active travel benefits for the existing community.

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

3.30 Wales faces a number of challenges now and in the future, such as climate change, poverty, health inequalities and jobs and growth.

3.31 The Well-being of Future Generations Act puts in place seven well-being goals that will help to tackle these challenges. The Act makes it clear the listed public bodies must work to achieve all of the goals, not just one or two.

3.32 In terms of the impact of the goals on develop and travel, the first goal of 'A Prosperous Wales' recognises the need for an innovative, productive and low carbon society and is somewhat all-encompassing of the other goals and the need for sustainable travel options and low carbon communities.

South East Wales Strategic Development Plan

3.33 The Welsh Government published Future Wales: The National Plan 2040 in February making it the first ever national development plan in the United Kingdom. All Strategic Development Plans (SDPs) and Local Development Plans (LDPs) prepared in Wales now have to be in general conformity with Future Wales.

3.34 Following its release, the South East Wales SDP is due to be the first SDP to formally commence preparation in February 2022. This will introduce a tier of regional planning to address matters transcending Local Authority boundaries.

3.35 Most local authorities are currently in the process of reviewing their LDPs and are at different stages in the process of preparation; with tighter phosphate target levels in Special Areas of Conservation set by Natural Resources Wales causing delays to several reviews.

3.36 It is proposed that SDP's will allow "larger than local issues such as housing numbers, strategic housing allocations, strategic employment sites, strategic green infrastructure routes, supporting transport infrastructure which cuts across a number of LPA areas to be considered and planned for in an integrated and comprehensive way."

Vale of Glamorgan Local Development Plan 2011-2026

3.37 The presently adopted Local Development Plan (LDP) provides an overview of the local planning policies against which future development is assessed. Whilst a Replacement LDP is in the process of being prepared, it is considered that the existing document provides a suitable base against which to consider the proposals.

3.38 The LDP includes a number of key strategic objectives to steer development within VoG, of particular relevance are the following:

- Develop sustainable communities with opportunities for living, working, learning and leisure for all.
- Ensure development makes a positive contribution towards lowering the impacts of climate change.
- Reduce the need for residents to travel and provide greater access to more sustainable modes of transport.

3.39 The site is well located to form a natural extension to Dinas Powys, enhancing the existing community with facilities such as a new primary school. In addition, the proposed development would be supported by a comprehensive mobility strategy to encourage future users to travel via sustainable transport modes.

3.40 Policy SP3 considers the need for housing and identifies a need for the provision of 9460 new dwellings within the LDP period up to 2026. A recent review report has highlighted that housing provision to date is below the target within the Local Plan and, in order to reach the target within the Local Plan period, 840 dwellings would have to be constructed annually. It is therefore considered that the site is well placed to assist in reaching housing targets.

Summary

3.41 The principles of the development proposals comply with the transport related planning policies discussed within this chapter. Situated to the north of Dinas Powys, the site will seek to reduce the need to travel in the first instance with more sustainable modes of transport promoted for journeys beyond the site. This will be aided through design and continued promotion of the transport hierarchy placing pedestrian and cycle movements at the forefront of all development.

4 Proposed Development

Overview

4.1 The proposals comprise a development of 650-800 dwellings to act as a natural extension to the existing settlement of Dinas Powys. It is anticipated that the site would be delivered in two phases with phase 1 comprising circa 400 dwellings at the Cardiff Road frontage and future phases comprising the remaining dwellings, primary school and further ancillary uses to the north.

4.2 An initial masterplan is illustrated in **Figure 4.1** highlighting phase 1 of the proposals as well as the future development area to the north.

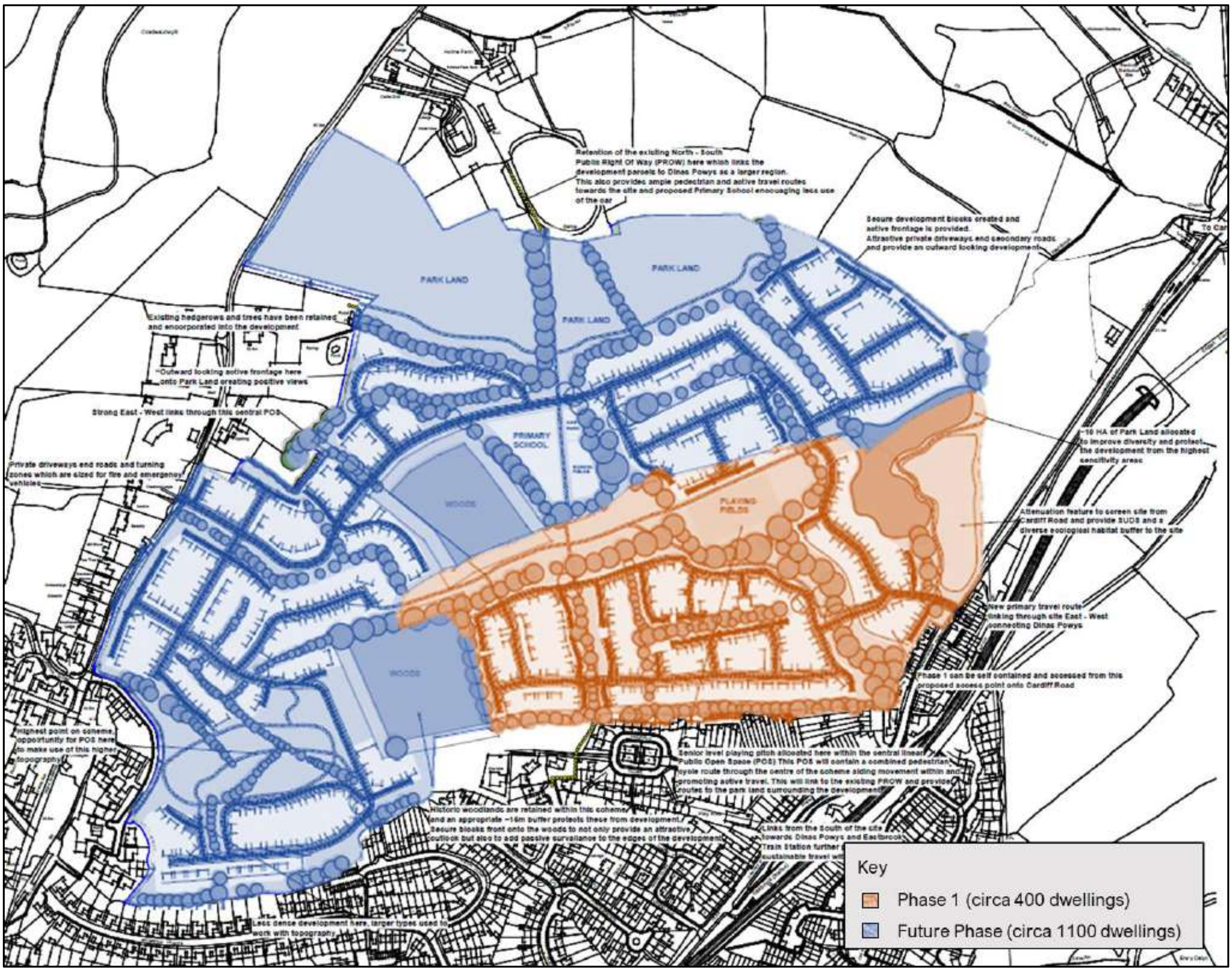


Figure 4.1 – Initial Masterplan

Masterplan

4.3 The development will be designed from the outset with movement by two feet and two wheels as a first choice. There are four key stages to creating a socially inclusive community that encourages community interaction in such a way to promote non-motorised travel modes, prioritising active travel followed by the use of the bus and rail. These stages are;

— Design;

— Choice;

— Behaviour; and

— Network Management.

4.4 Design is in terms of creating communities, where public interaction, outdoor and indoor, is the norm. Where friends and day-to-day activities are nearby and easy to get to, and where it is not an automatic reaction when leaving home to get into a car. The site is both well placed to take advantage of the proximity of a range of day-to-day facilities, and will be designed to enhance this.

4.5 The site design will be of a pedestrian scale where walking, cycling, and accessing public transport will be easy, and vehicle intimidation will be at its minimum. This approach is consistent with the movement hierarchy outlined in planning policy as highlighted in Section 2 of this report.

4.6 Choice is in terms of providing the infrastructure and facilities to minimise reliance on any single option. This widens social inclusion, and for instance, makes contributing to commuter car congestion on average more of a choice and less of a necessity. Through increased real choices a change in behaviour can be affected. The proposals will introduce and maintain any sustainable transport options and seek to encourage a net travel behavioural change in line with policy aims.

4.7 Behaviour is in terms of educating people in the options and consequences. It brings together awareness, health, environment, and personal convenience. One of the 'by design' aims is to create an environment where fewer people automatically choose to use their cars when leaving their homes, therefore decreasing the impact on the road network and on carbon emissions.

4.8 Network Management is in terms of managing the road network in accord with the user hierarchy set out by the Welsh Government in Planning Policy Wales (Edition 11) and Llwybr Newydd, prioritising walking and cycling above all else.

4.9 Development at the site will be visioned based on these themes and design principles.

Access Strategy

4.10 The access strategy for the development considers how safe and suitable access can be achieved by all users across a range of transport modes.

Pedestrian and Cycle Access

4.11 Permeability of the site with surrounding neighbourhoods will be a crucial feature of the design process. The site will be designed to feature a network of active travel links running throughout, allowing for permeability with the surrounding existing network including the pedestrian infrastructure on Cardiff Road.

4.12 Active travel infrastructure will be provided at all points of access to the site. In addition, two key active travel links will be provided comprising a north-south connection utilising an existing PRoW Holmes

Farm in the north and Highfield Close in the south. A similar east-west link will be provided connecting to the southern end of Pen-Y-Turnpike Road and on to Dinas Powys.

Vehicle Access

4.13 Phase 1 will be accessed from Cardiff Road. Whilst the access design is not fixed at this stage, it is anticipated that it will comprise a signalised junction with dedicated right turn lane on Cardiff Road. This strategy will further allow for a convenient crossing for pedestrians between the site and the southern side of Cardiff Road. An indicative access arrangement is included at **Appendix A**.

4.14 It is expected that the future phases would be served by a spine road utilising the Cardiff Road connection, as outlined above, and connecting to Pen-Y-Turnpike Road to the west.

Parking Strategy

4.15 Parking will be provided in accordance with Vale of Glamorgan standards as set out in the 'Revised Parking Standards SPG.'

4.16 The standards provide a zonal approach to parking policy with the site abridging Zone C, associated with suburban or near urban areas, and Zone E, associated with deep rural areas. As the proposed development will act as an extension to the existing settlement of Dinas Powys, it is considered that the standards associated with Zone C are most applicable. The resulting residential parking standards are summarised in **Table 4.1**.

<table>
<tr><th></th><th>Resident Car Parking</th><th>Visitor Car Parking</th><th>Electric Vehicle</th><th>Cycle</th></tr>
<tr><td>Houses</td><td rowspan="2">1 space per bedroom (maximum 3 spaces)</td><td rowspan="2">1 space per 5 dwellings</td><td rowspan="2">10% of resident and visitor space to provide active EV charging facilities</td><td>Assumed provision within curtilage of dwelling</td></tr>
<tr><td>Flats</td><td>1 stand per 5 bedrooms</td></tr>
</table>

Table 4.1 – Residential Parking Standards

4.17 The proposed development will comply with the above parking standards, ensuring that there is no parking stress on the adjacent highway network, whilst seeking to not overprovide as to encourage unnecessary car ownership.

5 Changing Mobility

Overview

5.1 Mobility is a function of placemaking and is about accessing day to day facilities such as schools, shops, family and friends, healthcare, and the workplace. Strategic sites such as Land to the East of Dinas Powys, allow for a planned and coordinated approach to development, ensuring provision of effective mobility infrastructure. The aim of this approach is first and foremost to reduce the need to travel and offering a range of choice in how to travel.

5.2 Transport policy, which promotes active travel and places single occupancy car use at the bottom of the movement hierarchy, is intrinsically linked to health policy. Rising obesity is caused by sedentary lifestyles, and there is now a cross over between transport and health in prioritising investment in, and use of, active (walking and cycling) travel corridors to deliver transport objectives and health objectives.

5.3 The common threads through local and national policy are:

- Mobility, access to day to day and other facilities, is fundamental to liveability;
- Mobility must be provided through a plethora of realistic choices; and,
- The highest priority travel choices are ‘those which are most space efficient, most energy efficient, are likely to result in good community integration, and those which combat a sedentary lifestyle.

5.4 In the context of the site, it is therefore crucial to consider the strategy of the development in tandem with the wider Dinas Powys area.

Changing Trends in Mobility

5.5 The way that people understand mobility has changed, is changing and will continue to change in the future. Mobility is about accessing day-to-day facilities, such as schools, shops, friends, healthcare, and the workplace.

5.6 Per capita travel in terms of distance has decreased significantly over the past decade, and is now 10% lower than in the mid 2000’s. Each person makes significantly fewer trips now than they used to, and the car driving mileage per adult has dropped significantly. The historic correlation between income, costs and travel are weakening, with car driving per adult declining despite motoring costs remaining stagnant. The link between economic growth and travel has weakened.

5.7 Car use is falling most dramatically amongst younger people (younger than 35). Since 1996/98 the miles travelled by car by men aged 17-34 has reduced by 47%, and by women by 15%. Younger people are increasingly relying on public transport for their travel when compared to previous generations and are much less wedded to the car. The changing lifestyles are resulting in a car-oriented existence becoming less common amongst younger people.

5.8 Research shows a change in attitudes towards travel, such as:

— Cars are increasingly viewed as 'appliances not aspirations'

— There is a growing body of understanding of travel options

— Use of technology for communication and work whilst travelling is easier and safer by non-car modes

— For business travel there is some travel substitution by home working and video conferencing

— There is a growing disconnection between car ownership and car use leading to a wider use of alternatives including vehicle and journey sharing

5.9 These changes in attitude are set to accelerate, with the catalysts of the Central Government initiatives to promote healthier living, and the recently announced ban on all new diesel and petrol cars and vans by 2030.

5.10 There is an expectation borne out of emerging evidence that travel habits will continue to evolve so that a greater proportion of people will be travelling less, and using more socially inclusive mobility methods, such as walking, cycling, car sharing and public transport.

5.11 There is also increasing acknowledgement by local and national governments and individuals on the impact unsustainable travel can have on the environment. That is evident by the increasing number of local authorities, including Vale of Glamorgan Council, who have declared a climate emergency. Through reducing the need to travel unsustainably, the impact of transport on the environment can be reduced. This in part is the reasoning given by Welsh Government for aiming for 30% of the Welsh workforce to work from home in the longer term.

Local Living

5.12 Local living or 'liveability' is at the forefront of people's minds right now and 15-minute neighbourhoods are based upon a design ethos of creating complete, compact, and connected neighbourhoods where people can meet their everyday needs within a short walk or cycle.

5.13 This is not a new concept and historically many towns and cities have evolved around a model similar to a 15-minute neighbourhood. The emergence of these walkable places to live has grown around the world, and the need for them has only been quickened by the Covid-19 pandemic which has put a spotlight on the importance of the liveability of where we live.

5.14 This idea presents multiple benefits including boosting local economies, improving people's health and wellbeing, increasing social connections in communities, and tackling the climate change emergency.

5.15 The features of a 15-minute neighbourhood include a range of facilities provided within towns and cities, and it may be that some of these facilities are situated within the surrounding area and are not required on site. The masterplan of the wider development features a primary school and it is expected that other non-residential uses will serve the site. Furthermore, the facilities of Dinas Powys are within a 15 to 20 minute walk for future residents and therefore accessed easily from the site.

Vision and Validate

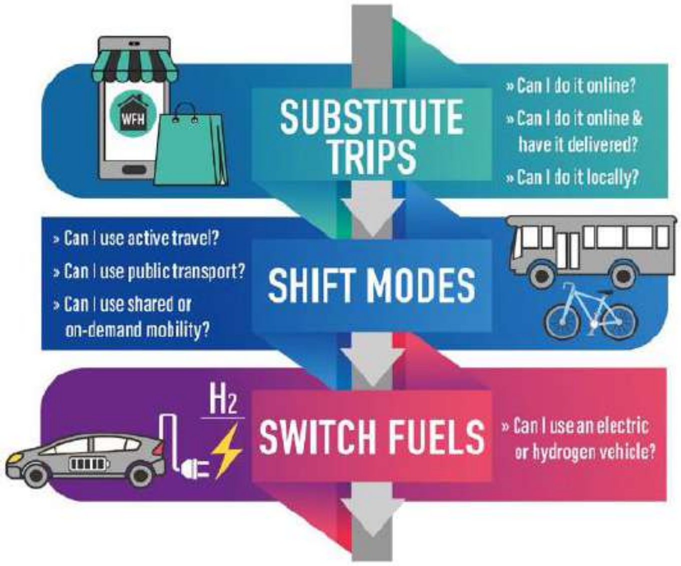
5.16 Building on the 15-minute neighbourhood principles, the mobility strategy for the site will embrace a vision and validate approach to minimise the need for travel.

5.17 The mobility strategy supports the vision by following the SAM (sustainable accessibility and mobility) Framework (RTPI, Net Zero Transport: the role of spatial planning and place-based solutions. January 2021).

5.18 This basic hierarchy is summarised in the 'Sustainable Accessibility and Mobility (SAM) Framework', a tool created by Vectos to help planners and designers prioritise interventions in the following order:

— **Substitute Trips** and replace the need to travel beyond your community. This can include working from home more, centralised delivery provision such as Amazon lockers, and provision of on-site education facilities.

— **Shift Modes** to use active, public and shared forms of transport when foot and cycle are not suitable. This can be improved through provision of mobility hubs featuring public transport stops, car sharing and bike hire facilities.



— **Switch Fuels** for any trips that must be made by car, ensuring the vehicle is zero emission. This will be aided by provision of electric vehicle charging infrastructure throughout the site.

Mobility as a Service (Maas)

5.19 Mobility-as-a-Service (MaaS) is at the forefront of change, and is a concept of combining services from public and private transport providers in one place which allows users to create and manage trips, which they can then pay for from a single account, typically a single app.

5.20 MaaS can be delivered by a range of innovative new mobility services complementing more established transport modes, and can include:

— Demand Responsive Transport;

- Active Travel Corridors;
- Bike sharing /electric bike schemes;
- Car clubs/carpooling;
- Virtual mobility;
- Personalised Travel Planning;
- Mobility Hub; and
- Workhubs (the ‘third-place).

5.21 One single initiative will not deliver mobility, but the combination of these services and the collection of access to each service in a single location (or app) will provide people with the Mobility and choice they desire.

6 Transport Strategy

6.1 The transport strategy for the site draws upon the various trends in mobility, change in attitudes towards travel and opportunities to reduce the need to travel beyond the local area. The phase 1 transport strategy forms the first part of the wider strategy for the full development of circa 1500 dwellings.

Community Infrastructure

6.2 It is expected that a mobility hub will be provided as part of the phase 1 development and this will be where the MaaS services would be available, offering numerous sustainable modes of travel for residents to choose from in one place. It is expected that services could include bike hire, electric vehicle charging facilities and access to a car club vehicle, the final level of service to be provided will develop alongside the final masterplan for the site.

6.3 It is considered that the mobility hub could be combined with a community concierge service and community hub to provide a cohesive and connected approach to living. As such, additional services that could be offered may include:

- Centralised delivery services such as Amazon lockers.
- Retail facilities such as a local food store.
- Working facilities such as a café or hireable desk space.

6.4 The above also feeds into the concept of a third place, with facilities available at these hubs to enable third place working and retain trips within the site.

Mobility Hub Concept

Active Travel

6.5 Designing the site to a pedestrian scale allows for the maximum opportunity to provide social inclusion. Pedestrian and cycle routes are designed to ensure full permeability through the site including connections through cul-de-sacs, and all internal routes will benefit from ample natural surveillance ensuring they are not only convenient links, but secure and attractive also.

6.6 Active travel infrastructure will be provided at all points of access to the site. In addition, two key active travel corridors will be provided comprising a north-south connection utilising an existing PRoW Holmes Farm in the north and Highfield Close in the south. A similar east-west corridor will be provided connecting to the southern end of Pen-Y-Turnpike Road and on to Dinas Powys.

Bike Sharing

6.7 Bike sharing schemes can make cycling as a travel mode more accessible and salient. Nextbike (now known as OVOBikes) is the bike shared provider within Vale of Glamorgan and Cardiff. This scheme has fixed docking points, various levels of fees and monthly memberships. The scheme is set to be expanded to include Dinas Powys in the near future and it is considered that this could be developed in tandem with the provision of new active travel links throughout the site and to existing provision in order to promote and encourage cycling, either as the main mode of transport for or as part of a multi-modal journey.

Scooters

6.8 The UK Government is currently taking part in 'Future Transport Zone' trials for e-scooter hire, with a view of making them legal to use on a road. Similarly in Wales, the Welsh Government are exploring their use across Wales.

6.9 GOiA are leading the charge on the electric micro-mobility future with the launch of e-scooter rental opportunities. They are currently in talks with Local Authorities across Wales and the rest of the UK to offer e-scooters in towns and cities (subject to government agreement).

Public Transport

6.10 Pedestrian links to existing public transport interchanges will be retained and enhanced as part of the development proposals. For example, the north-south active travel corridor connecting to Highfield Close will provide a convenient link to existing bus stops on Cardiff Road for future residents. Furthermore, the proposed signalised site access junction will create a safe crossing of Cardiff Road connecting residents to Eastbrook station.

Community Transport

6.11 Community transport can be key in unlocking development to people of all ages, providing support to those who are unable to drive with a level of flexibility around pick-up and drop-off locations to minimise walking distance.

6.12 The site is located within an area already served by a range of community transport services, these comprise the Greenlinks Community Transport service and the Dinas Powys Voluntary Concern (DPVC) minibus service.

6.13 The Greenlinks Community Transport service provides minimis hire opportunities alongside weekly 'on-demand' bus services and a rural vale to Cardiff service. Users are required to call a freephone number by midday one working day before travel to secure a space on their chosen service.

6.14 The DPVC community transport service operates an accessible minibus with fortnightly shopping visits to a local supermarket provided as well as transport to regular social activities within the local community such as coffee mornings. DPVC further offer a service for medical / health appointments which makes daily trips to the Dinas Powys medical centre as well as offering travel to Llandough Hospital.

Personalised Bus Services

6.15 Zeelo is a great example of a 'mobility platform that manages transportation requests from multiple passengers headed in different directions with a free-floating fleet of vans and minibuses'.

6.16 Journeys are performed based on both pre-booking and on-demand booking. Passengers can book and manage their rides through client branded mobile apps and designated websites, and are able to track current, future and past rides. Zeelo's solution flexes according to public needs, responding to changing demand and various trip type requirements.

Travel Planning

6.17 Personalised Travel Planning (PTP) can have a significant impact on travel behaviour and travel patterns, helping to achieve more sustainable travel practices and healthier lifestyles, which in turn contribute to a more socially inclusive community and help protect the environment. PTP can be effective both amongst existing residents and communities and in new developments.

6.18 PTP provides tailored information directly to the individual on sustainable mobility options through a one to one discussion with a PTP Adviser. The personal approach and specifically tailored information can lead to a greater propensity for behavioural change than a one-size-fits-all approach.

6.19 PTP will be considered as part of future development at the site to enable residents to make the most of the wide range of travel choices that will be available, and to contribute to instilling sustainable travel behaviour from the outset.

Vehicles

6.20 Whilst the overarching aim of the mobility strategy is to reduce trips undertaken by car, it is acknowledged that on occasion there is not a suitable alternative. Therefore opportunities to reduce the potential impact of vehicle trips must also form part of any mobility strategy at the site.

Car Clubs

6.21 A car club allows multiple people to access and drive one vehicle, for example, several people in the same community would drive the car on different days of the week. As such, car clubs offer the convenience of owning a private vehicle without the costs associated with fuel, servicing and repairs.

6.22 Access without ownership is becoming more common in modern-day living. Across the UK in 2007 there were approximately 32,000 members of a car club, a decade later this figure has soared to around 250,000 members.

6.23 Studies have demonstrated that each shared car replaces between eight and eleven private cars. Car clubs are becoming more prominent in towns and cities across the UK, and car club spaces can be located strategically at key destinations, major employment sites, transport hubs, and town and city centres. The membership of car clubs is increasing, reflecting people's changing attitudes towards mobility.

6.24 The provision of car clubs will encourage people to adopt more sustainable travel habits with the knowledge that should an emergency arise, the need to travel home quickly, or the need to run an errand, collect a parcel, or vary their journey in another way, there is a flexible option which can be used as required on-demand.

Electric Vehicle Charging

6.25 The recently announced ban on all new diesel and petrol cars and vans by 2030 highlights that EVs will be the primary form of private vehicles in the near future. As such, the development will commit to providing passive EV charging infrastructure in every dwelling, as well as ensuring the site-wide electricity infrastructure can accommodate this, so that future residents can choose EVs in the future knowing that there is both the reliable infrastructure and capacity to charge their EVs at home.

6.26 In addition, charging facilities for visitors to the site will be provided in accordance with VoG standards. It is expected that some level of EV charging facility would also be provided at any mobility or community hub provided at the site.

Summary

6.27 Ultimately, the aim of the Transport Strategy is to seek to minimise the quantum of trips that occur external to the site, and to ensure that these trips are made by sustainable modes. This can be achieved by a significant number of residents at Phase 1 working from home with reliable broadband and local facilities which mitigate the need for travelling further afield. Phase 1 can also remove existing trips from the highway network by providing a community, education and retail facilities.

7 Trip Assessment

7.1 It is considered that a vision and validate approach to future trip generation should be used in context of the transport strategy and planning policy.

Trip Internalisation

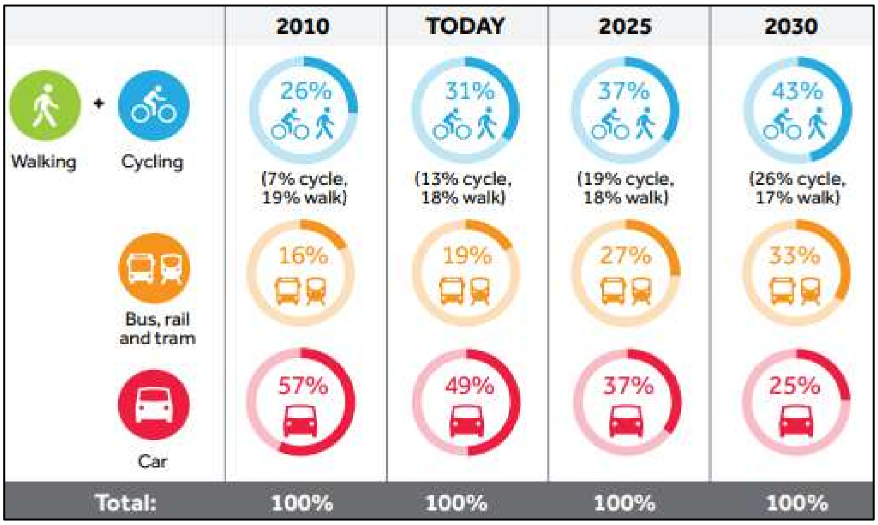
7.2 The site has the potential to provide a mobility hub and community facilities whilst it is anticipated that the future wider development would also provide education facilities in the form of a primary school.

7.3 Based on industry standard data, the majority of travel is for reasons of education and leisure (including incidental shopping). Commuting and business form other reasons for travel, with a marked increase in working from home or from a Third Place in the community since the onset of the pandemic. A trend which is expected to last. By design, the opportunity for internalisation of day-to-day trips within the local community will be maximised by the site.

The 50/50 Split

7.4 Given the context of the location the site to Dinas Powys and the western border of Cardiff, Cardiff's LDP notes the intention of the council to achieve a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport.

7.5 The figure to the right, shown within the Cardiff Transport White Paper, published in 2020, shows the great progress Cardiff has already achieved in meeting this policy. It also indicates the ambition of the council to go further in reducing car usage through a mixture of public transport and active travel.



Working From Home

7.6 A Briefing Paper was published by the independent Wales Fiscal Analysis (WFA), a research body within Cardiff University's Wales Governance Centre in July 2020, two months before the Welsh Government announced its target of 30% working from home in September 2020.

7.7 The paper outlines how 39.9% of Welsh jobs could be done from home and 65.5% of employees have reported that they were able to produce more work per hour working from home during COVID-19, and therefore they would like to continue working mainly from home in the future. This indicates that there is both potential and desire for a proportion of the population to continue working from home after COVID-19, whether that be full time or shared between home working and a traditional work environment. As such, the Welsh Government aspiration of 30% working from home is both realistic and appears achievable.

7.8 A step-change in home working is already happening, with many large companies publicly reducing office or desk space for employees on the basis than many or all will continue to work flexibly in the UK (for example KPMG, HSBC, Lloyds Banking Group, Unilever).

Trip Generation

7.9 A high-level trip generation assessment has been undertaken to determine the likely impact of phase 1 on the surrounding transport network. The assessment has been undertaken as follows:

- Person trip rates have been obtained from the TRICS database associated with similar sized developments in similar locations.
- Trip purpose has been determined with consideration for data within the National Travel Survey (NTS) which divides trips into commuting, education, leisure, retail and other purposes.
- An adjustment to commuting trips has been made to account for the Welsh Government aim of 30% of people working from home in the future.
- An additional internalisation of primary school trips has been undertaken to account for the proposed primary school to be provided within the future phases of development.
- Mode share data has been obtained from the 2011 Census for commuting trips whilst NTS data has been used to inform mode split for other trip purposes.

7.10 A summary of the expected trip generation by mode for all purposes is provided in **Table 7.1** whilst a full summary is attached at **Appendix B**.

Mode	AM Peak (0800-0900)			PM Peak (1700-1800)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Train	1	6	7	6	3	9
Bus, minibus or coach	9	38	47	12	5	16
Taxi	0	1	1	2	1	4
Motorcycle or scooter	0	0	0	1	0	1
Car driver	24	100	123	115	8	164
Car passenger	5	23	28	45	19	67
Bicycle	2	8	10	4	2	6
Foot	25	104	127	39	16	52
Other	1	5	6	2	1	3
Work from Home	5	21	26	27	11	38
Total	**73**	**305**	**377**	**253**	**105**	**360**

Table 7.1 – Trip Generation by Mode

7.11 **Table 7.1** demonstrates that, during the morning peak hour, the proposed development could generate in the order of 54 public transport trips, 137 active travel trips and 123 vehicle trips. In the evening peak hour, it could be expected to result in 25 public transport trips, 58 active travel trips and 113 vehicle trips.

7.12 It is considered that through the implementation of the transport strategy as outlined in Section 6 and internalisation opportunities that the level of vehicle trips could be substantially reduced. As such, the above assessment is considered to be a worst-case scenario.

Trip Distribution

7.13 The 2011 Census data has been investigated in order to determine the distribution of vehicle trips from the site, based on the 'WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)' records. This exercise has been undertaken in order to determine routes that vehicle trips generated by the site will take, and thus allowing for an assessment of the proposed development's impact on the junctions surrounding the site.

7.14 The MSOA used as the point of origin for this distribution exercise is 'The Vale of Glamorgan 006', the Mid-Layer Super Output Area (MSOA) in which the site resides. The destination MSOAs include every MSOA within England and Wales.

7.15 The trip distribution has been initially categorised into vehicles travelling north and south from the site access along Cardiff Road. Following this, the traffic adjudged to be travelling north has been distributed through each arm of the 'Merry Harrier' junction.

7.16 All vehicle trips have been distributed using the online Google Maps 'Directions' tool, and professional judgement has been applied to routing closer to the site, on occasions when two or more routes could be taken to a destination. In these situations, the common solution has been to split the trips equally between the routes.

7.17 The distribution is demonstrated in **Table 7.2**, clearly setting out the split between Cardiff Road (North) and Cardiff Road (South).

Route		Census Trips	Percentage
Cardiff Road (North)	Penlan Road	430	20%
	Barry Road	1118	52%
	Redlands Road	133	6%
Cardiff Road (South)		467	22%
Total		**2,148**	**100%**

Table 7.2 – Vehicle Trip Distribution

7.18 As demonstrated, 22% of traffic has been distributed south form the site access along Cardiff Road, with the remaining 78% distributed to the north. Of the 78% of traffic distributed north to the Merry Harrier junction, 20% is distributed along Penlan Road (towards Leckwith), 52% along Barry Road (towards the Baron's Court junction) and 6% along Redlands Road (towards Penarth).

Junction Impact Assessment

7.19 Following the distribution exercise, a junction impact assessment has been undertaken in order to assess the impact of the development on local junctions.

7.20 The 2022 base flows have therefore been compared with the proposed number of trips forecast to be associated with the development in the AM and PM peaks, and the results subsequently analysed.

7.21 The two junctions assessed are the signalised Merry Harrier junction to the north, and the signalised Cardiff Road crossroads to the south. **Table 7.3** sets out the forecast junction impacts based on the 2022 traffic surveys and the trip generation / distribution exercise.

Junction	Time Period	Total Junction Flows		
		2022 Base	Development	% Impact
Merry Harrier Junction	AM Peak 0800-0900	2461	97	3.9%
	PM Peak 1700-1800	2686	127	4.7%
Cardiff Road Crossroads	AM Peak 0800-0900	1466	27	1.8%
	PM Peak 1700-1800	1843	35	1.9%

Table 7.3 – Junction Impact Assessment

7.22 As is demonstrated within **Table 7.3**, the highest impact on total flows at any junction is at the Merry Harrier Junction in the PM peak, with a maximum impact of 4.7%.

7.23 Whilst there is not a uniformly accepted threshold at which junction modelling should be undertaken, it is pertinent to note that Environmental Assessments typically refer to transport impacts warranting further investigation when traffic flows increase by more than 10% in sensitive locations and 30% in those areas that are not considered sensitive. The lower threshold is consistent with what are generally accepted to reflect typical daily fluctuations in exiting traffic flows.

7.24 When viewed in this context the information presented at **Table 7.3** would suggest that the increases in development related traffic would not warrant further detailed investigation. Indeed, historic guidance prepared by the CIHT suggested that detailed modelling would only normally be required once traffic flows increased by 5%.

7.25 It is therefore considered that the impact of the proposed development will not have a perceptible effect on the current operational capacity of the Merry Harrier junction nor the Cardiff Road crossroads junction.

8 Junction Modelling

8.1 As noted in Section 4 the proposed development would be accessed via a signalised junction with Cardiff Road. The proposed arrangement has been modelled within the industry standard LinSig software to ascertain the likely operation during peak hours.

Assessment Scenarios

8.2 A baseline scenario has been informed by traffic surveys undertaken in June 2022. A TEMPRO growth factor, accounting for expected growth in the local area, has been applied to provide a 2032 'without development' scenario. The following growth factors have been used:

— AM Peak 1.0724

— PM Peak 1.0741

8.3 The development traffic as outlined in Section 7 has been added to the 2032 'without development' scenario to provide a 2032 'with development' scenario.

Modelling Results

8.4 LinSig considers the relationship between the traffic flow and the capacity of a road, referred to as Degree of Saturation (DoS). In addition, LinSig shows the Practical Reserve Capacity (PRC) of the junction as a percentage, which indicates the amount of residual capacity of a junction.

8.5 A summary of the modelling results is provided in **Table 8.1** whilst the full modelling outputs are attached at **Appendix C**.

	Maximum DoS	Maximum Queue	PRC
2032 With Development AM	46.2%	6.3	94.9%
2032 With Development PM	55.9%	11.7	60.9%

Table 8.1 – Modelling Results Summary

8.6 As outlined in **Table 8.1,** the proposed site access arrangement is expected to operate well within the theoretical capacity of the junction following the inclusion of development traffic and therefore is suitable to serve the development proposals.

9 Summary and Conclusion

9.1 This report has been prepared by Vectos on behalf of Persimmon Homes to outline the Transport Strategy for the wider development and initial access arrangements for phase 1 of a residential-led development on land east of Dinas Powys.

9.2 It is proposed to provide circa 400 dwellings in the first phase of a larger 650-800 dwelling development along with provision for a primary school. Phase 1 will be accessed from Cardiff Road (A4055) via a signalised junction with dedicated right turn lane. It is expected that the future phases would be served by a spine road utilising the Cardiff Road connection, as outlined above, and connecting to Pen-Y-Turnpike Road to the west.

9.3 The site benefits from connections to Dinas Powys, as well as nearby public transport interchanges, which will be enhanced as part of the development proposals. The Transport Strategy for the site seeks to build on the existing links and encourage future residents and visitors to travel via sustainable modes of transport.

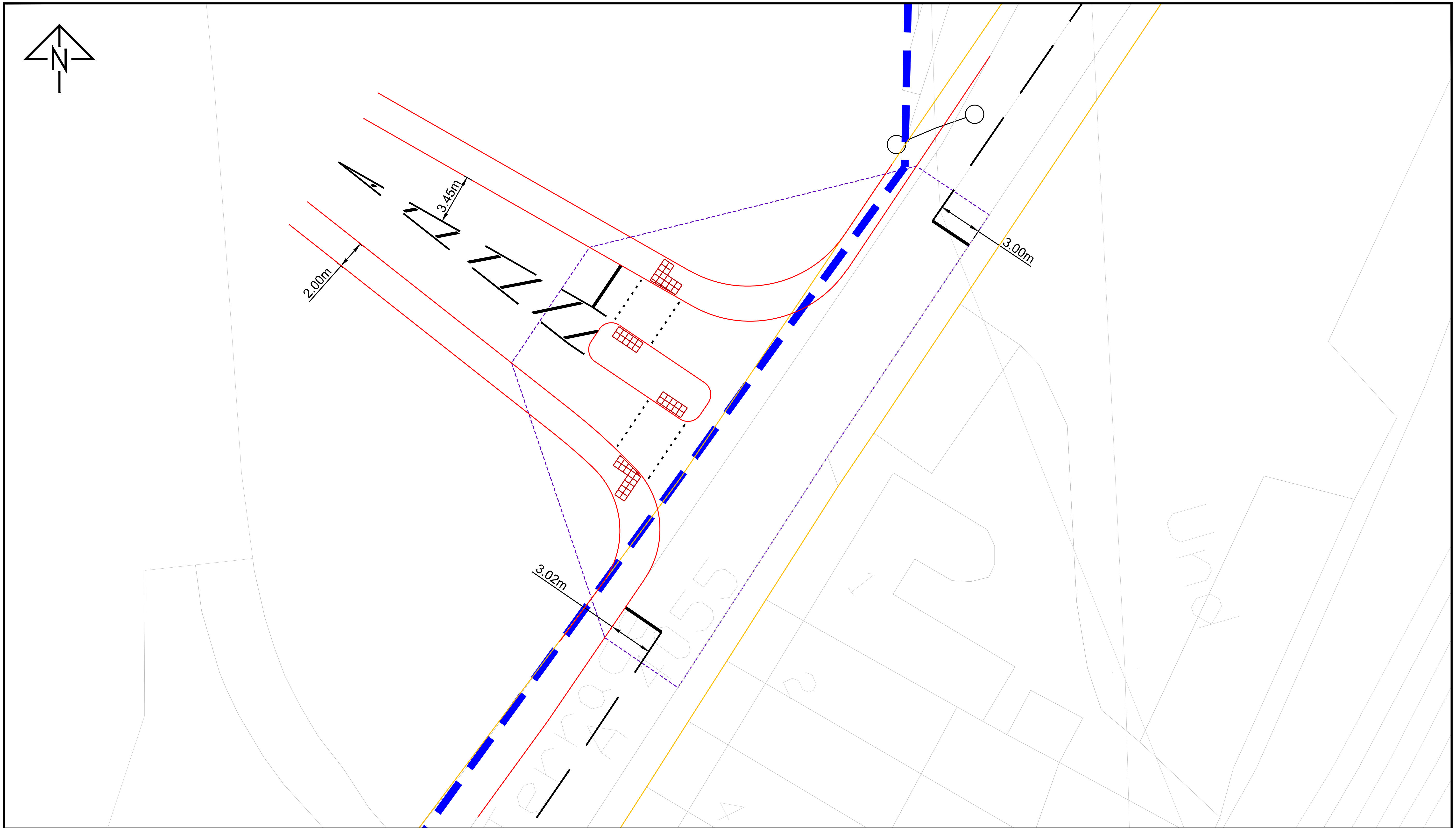
9.4 It is anticipated that this can be enhanced by a significant number of residents at Phase 1 working from home with reliable broadband and local facilities which mitigate the need for travelling further afield and align with Welsh Government working from home aspirations.

9.5 Junction modelling has been undertaken of the proposed site access to ascertain its suitability to serve the development. It has been demonstrated that the proposed site access arrangement is expected to operate well within the theoretical capacity of the junction following the inclusion of development traffic and therefore is suitable to serve the proposals.

9.6 This report demonstrates that the site is suitably located for a residential development observing the principles of national policies, and ultimately can deliver the necessary growth in VoG whilst contributing towards a Carbon Neutral goal as per the declared Climate Emergency in Wales.

Appendix A

Indicative Site Access Arrangement



REV.	DETAILS	DRAWN	CHECKED	DATE
A	Staggered Crossing added.	KR	KD	06.09.22

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

- Land Ownership Boundary (shown indicatively)
- Adopted Highway Boundary
- Junction Intervisibility

Cardiff Road, Dinas Powys

Proposed Access General Arrangement Signalised Junction

Persimmon Homes

vectos. PART OF SLR

Ground Floor, Helmont House, Churchill Way, Cardiff CF10 2HE
t: 02920 720 860 e: vectos@vectos.co.uk

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
KR	KD	22.06.22	1:250 at A3	194849_PD01	A

Appendix B

Trip Generation Calculations

Land to the East of Dinas Powys: Trip Generation

Proposed Residential Development

TOTAL UNITS	400

Vehicle Trip Rates

House Type	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Private Houses	0.180	0.764	0.944	0.635	0.263	0.898
TOTAL	**72**	**306**	**378**	**254**	**105**	**359**

Trip Purpose

National Travel Survey Table NTS0502: Trip start time by trip purpose (Monday to Friday only): England, 2015/19

Purpose	08:00-08:59	17:00-17:59
Commuting	20%	32%
Business	3%	3%
Education	29%	3%
Escort education	23%	2%
Shopping	4%	12%
Other work, other escort and personal business	14%	20%
Visiting friends / entertainment / sport	3%	20%
Holiday / Day trip / Other	4%	8%
All purposes	**100%**	**100%**

Person Trips by Purpose

Purpose	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Work based trips [1]	17	70	87	89	37	126
Primary Education trips [2*]	13	54	66	4	2	6
Secondary Education trips [2*]	25	105	130	8	3	12
Leisure/recreation trips [3]	5	21	26	71	29	101
Retail trips [4]	3	12	15	30	13	43
Other [5]	10	43	53	51	21	72
TOTAL	**72**	**306**	**378**	**254**	**105**	**359**

1. Commuting and business
2. Education and Escort education
3. Visiting friends, holidays, etc...
4. Shopping
5. Other work, other escort and personal business
**Total education trips have been split based on 34% Primary and 66% Secondary according to the Nomis 2011 Census Age Structure and Population (Vale of Glamorgan 008 Output*

Education Split	Primary	Secondary
Census 2011 Age Structure (Vale of Glamorgan 008)	34%	66%

Actual Mode Share

Mode	Purpose					
	Work [1]	Primary [3]	Secondary [3]	Leisure [2]	Retail [2]	Other [2]
Train	5%	0%	2%	3%	1%	1%
Bus, Minibus or Coach	4%	0%	31%	4%	6%	4%
Taxi	0%	0%	0%	2%	1%	1%
Motorcycle, Scooter or Moped	1%	0%	0%	0%	0%	0%
Driving a Car or Van	76%	0%	27%	38%	46%	48%
Passenger in a Car or Van	5%	0%	0%	33%	19%	26%
Bicycle	2%	6%	3%	2%	1%	1%
On Foot	5%	94%	34%	16%	25%	19%
Other	1%	0%	4%	1%	1%	1%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

1. 2011 Census Journey to Work Data - Vale of Glamorgan 008
2. Average number of trips (trip rates) by purpose and main mode (NTS0409a): England, 2019
3. Usual mode of travel to school by age group: England 2019 (NTS0615) Primary (5-10 years) Secondary (11-16 years)

Work based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	1	2	3	3	1	4
Bus, Minibus or Coach	0	2	3	3	1	4
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	1
Driving a Car or Van	9	37	46	48	20	67
Passenger in a Car or Van	1	3	3	3	1	5
Bicycle	0	1	1	1	1	2
On Foot	1	3	3	3	1	5
Other Method of Travel to Work	0	0	1	1	0	1
Work from Home	5	21	26	27	11	38
TOTAL	**17**	**70**	**87**	**89**	**37**	**126**
Wales work from home proportion	*30%*					

Primary Education based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	0	0	0	0
Bus, Minibus or Coach	0	0	0	0	0	0
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	0	0	0	0	0	0
Passenger in a Car or Van	0	0	0	0	0	0
Bicycle	1	3	4	0	0	0
On Foot	12	51	62	4	2	6
Other Method of Travel to Work	0	0	0	0	0	0
TOTAL	**13**	**54**	**66**	**4**	**2**	**6**

Secondary Education based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	2	2	0	0	0
Bus, Minibus or Coach	8	33	40	2	1	4
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	7	28	35	2	1	3
Passenger in a Car or Van	0	0	0	0	0	0
Bicycle	1	3	4	0	0	0
On Foot	8	36	44	3	1	4
Other Method of Travel to Work	1	4	5	0	0	0
TOTAL	**25**	**105**	**130**	**8**	**3**	**12**

Leisure/recreation trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	1	1	2	1	3
Bus, Minibus or Coach	0	1	1	3	1	4
Taxi	0	0	1	2	1	2
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	2	8	10	27	11	38
Passenger in a Car or Van	2	7	9	23	10	33
Bicycle	0	0	1	2	1	2
On Foot	1	3	4	12	5	16
Other Method of Travel to Work	0	0	0	1	0	1
TOTAL	**5**	**21**	**26**	**71**	**29**	**101**

Retail trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	0	0	0	0
Bus, Minibus or Coach	0	1	1	2	1	2
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	1	6	7	14	6	21
Passenger in a Car or Van	1	2	3	6	2	11
Bicycle	0	0	0	0	0	0
On Foot	1	3	4	8	3	8
Other Method of Travel to Work	0	0	0	0	0	0
TOTAL	**3**	**12**	**15**	**30**	**13**	**43**

Other trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	1	0	0	1
Bus, Minibus or Coach	0	2	2	2	1	3
Taxi	0	0	0	0	0	1
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	5	21	26	25	10	35
Passenger in a Car or Van	3	11	14	13	5	18
Bicycle	0	0	0	0	0	1
On Foot	2	8	10	10	4	14
Other Method of Travel to Work	0	0	0	0	0	1
TOTAL	**10**	**43**	**53**	**51**	**21**	**72**

Total person residential trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	1	6	7	6	3	9
Bus, Minibus or Coach	9	38	47	12	5	16
Taxi	0	1	1	2	1	4
Motorcycle, Scooter or Moped	0	0	0	1	0	1
Driving a Car or Van	24	100	123	115	48	164
Passenger in a Car or Van	5	23	28	45	19	67
Bicycle	2	8	10	4	2	6
On Foot	25	104	127	39	16	52
Other Method of Travel to Work	1	5	6	2	1	3
TOTAL	**73**	**305**	**377**	**253**	**105**	**360**

Appendix C

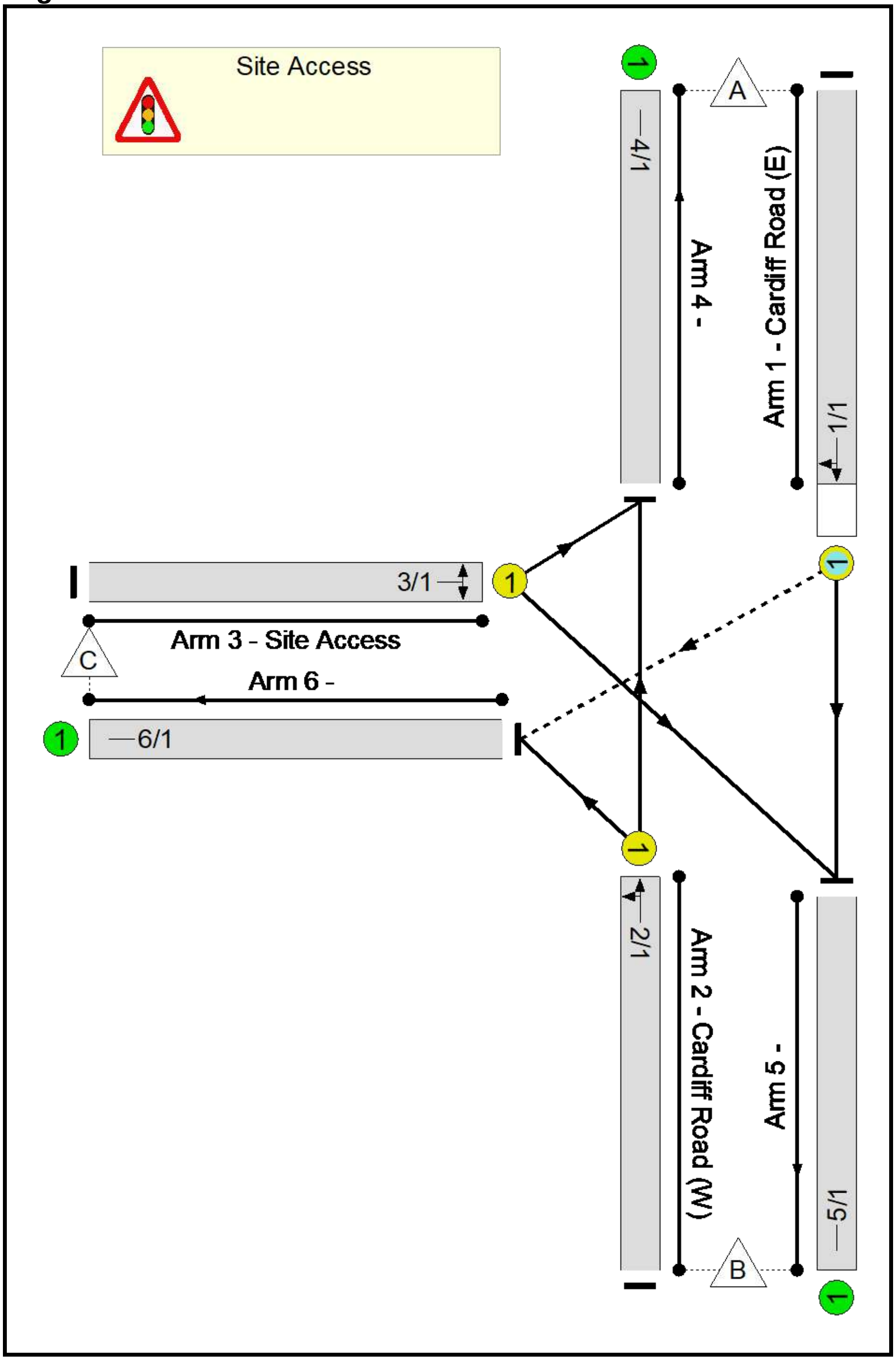
Junction Modelling Output Files

Full Input Data And Results

User and Project Details

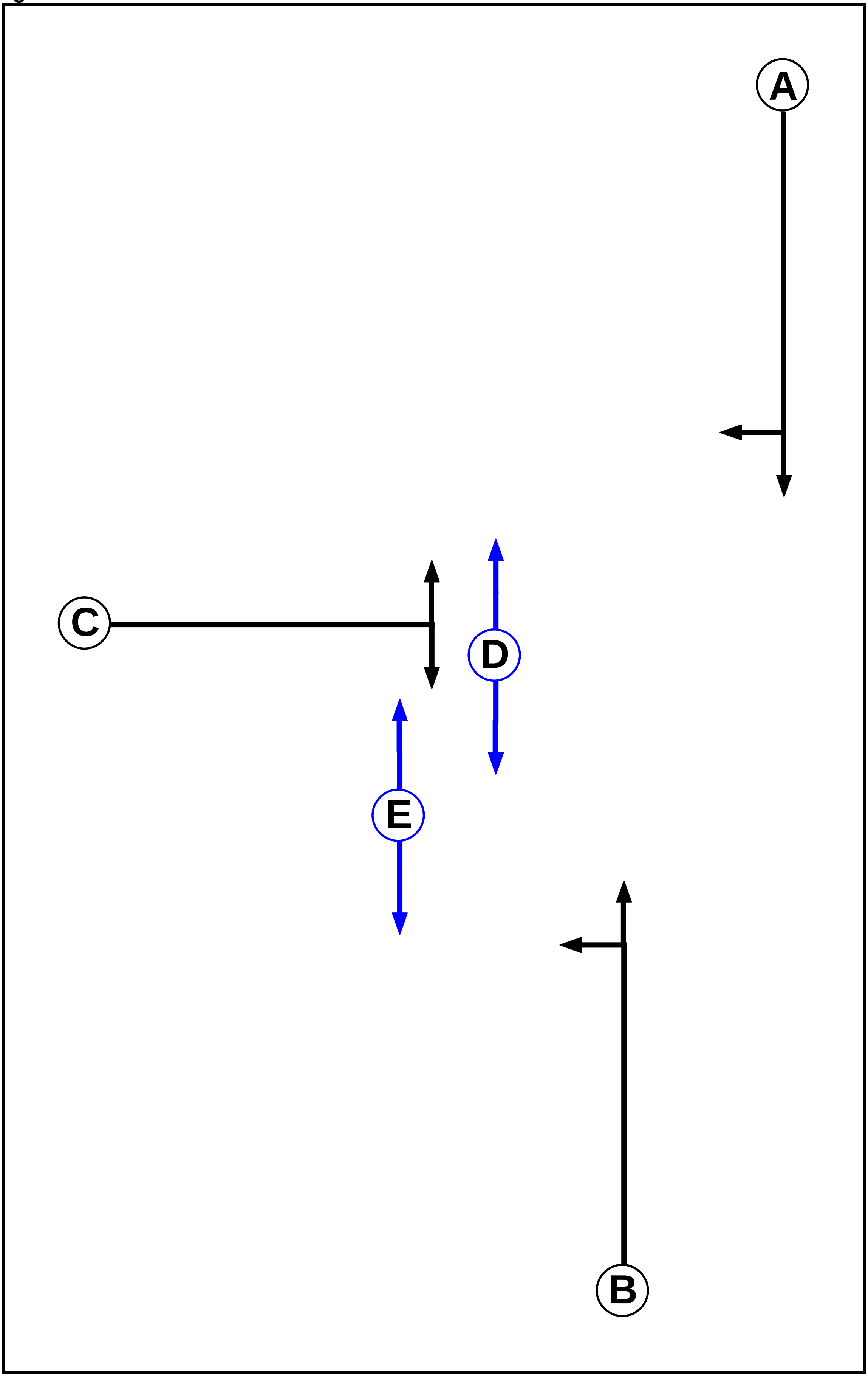
Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 - Site Access (PD01) - V3.lsg3x
Author:	Ben Stone
Company:	Vectos, part of SLR
Address:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Pedestrian		5	5
E	Pedestrian		5	5

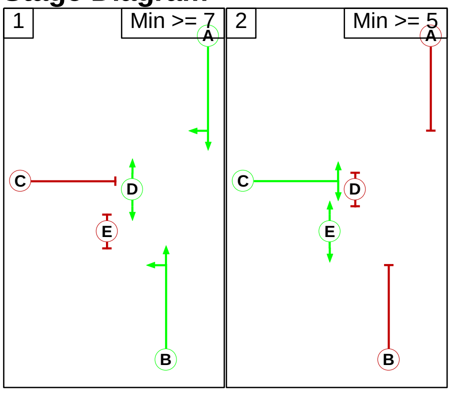
Phase Intergreens Matrix

	Starting Phase					
Terminating Phase		A	B	C	D	E
	A		-	5	-	8
	B	-		5	-	7
	C	5	5		5	-
	D	-	-	5		-
	E	5	5	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	C E

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

	To Stage		
From Stage		1	2
	1		8
	2	5	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Site Access											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
1/1 (Cardiff Road (E))	6/1 (Right)	1439	0	2/1	1.09	All	2.00	-	0.50	2	2.00

Full Input Data And Results

Lane Input Data

Junction: Site Access													
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Cardiff Road (E))	O	A	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	12.50
2/1 (Cardiff Road (W))	U	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Ahead	Inf
											Arm 6 Left	10.00
3/1 (Site Access)	U	C	2	3	60.0	Geom	-	3.15	0.00	Y	Arm 4 Left	10.00
											Arm 5 Right	12.50
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 + Dev AM'	08:00	09:00	01:00	
2: '2022 + Dev PM'	17:00	18:00	01:00	
3: '2032 + Dev AM'	08:00	09:00	01:00	
4: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	416	78	494
	B	734	0	22	756
	C	19	5	0	24
	Tot.	753	421	100	1274

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 1: 2022 + Dev AM
Junction: Site Access	
1/1	494
2/1	756
3/1	24
4/1	753
5/1	421
6/1	100

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	84.2 %	1879	1879
				Arm 6 Right	12.50	15.8 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	97.1 %	1907	1907
				Arm 6 Left	10.00	2.9 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	79.2 %	1687	1687
				Arm 5 Right	12.50	20.8 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	676	37	713
	B	642	0	10	652
	C	90	25	0	115
	Tot.	732	701	47	1480

Traffic Lane Flows

Lane	Scenario 2: 2022 + Dev PM
Junction: Site Access	
1/1	713
2/1	652
3/1	115
4/1	732
5/1	701
6/1	47

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	94.8 %	1903	1903
				Arm 6 Right	12.50	5.2 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	98.5 %	1911	1911
				Arm 6 Left	10.00	1.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	78.3 %	1688	1688
				Arm 5 Right	12.50	21.7 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	447	78	525
	B	787	0	22	809
	C	19	5	0	24
	Tot.	806	452	100	1358

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 3: 2032 + Dev AM
Junction: Site Access	
1/1	525
2/1	809
3/1	24
4/1	806
5/1	452
6/1	100

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	85.1 %	1881	1881
				Arm 6 Right	12.50	14.9 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	97.3 %	1907	1907
				Arm 6 Left	10.00	2.7 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	79.2 %	1687	1687
				Arm 5 Right	12.50	20.8 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	726	37	763
	B	689	0	10	699
	C	90	25	0	115
	Tot.	779	751	47	1577

Full Input Data And Results

Traffic Lane Flows

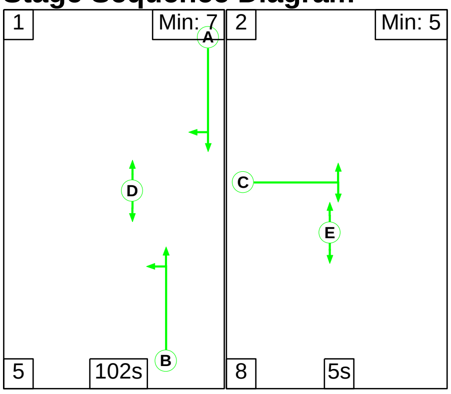
Lane	Scenario 4: 2032 + Dev PM
Junction: Site Access	
1/1	763
2/1	699
3/1	115
4/1	779
5/1	751
6/1	47

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Site Access								
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.2 %	1904	1904
				Arm 6 Right	12.50	4.8 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	98.6 %	1911	1911
				Arm 6 Left	10.00	1.4 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	78.3 %	1688	1688
				Arm 5 Right	12.50	21.7 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram

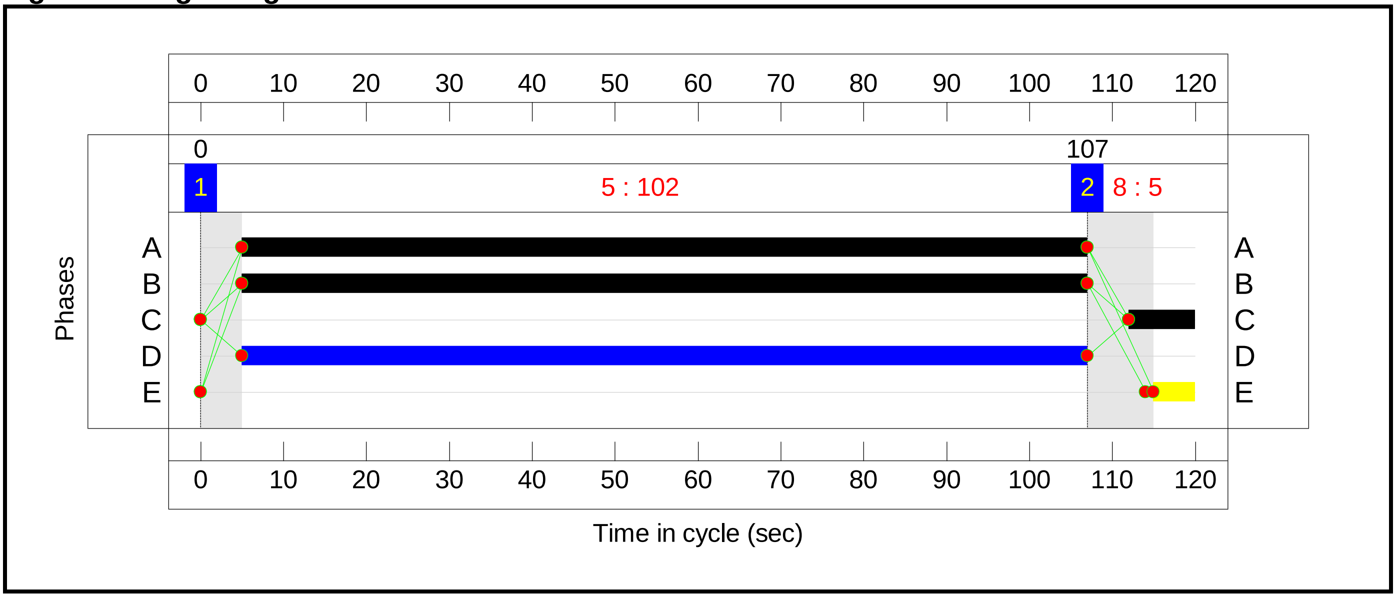


Full Input Data And Results

Stage Timings

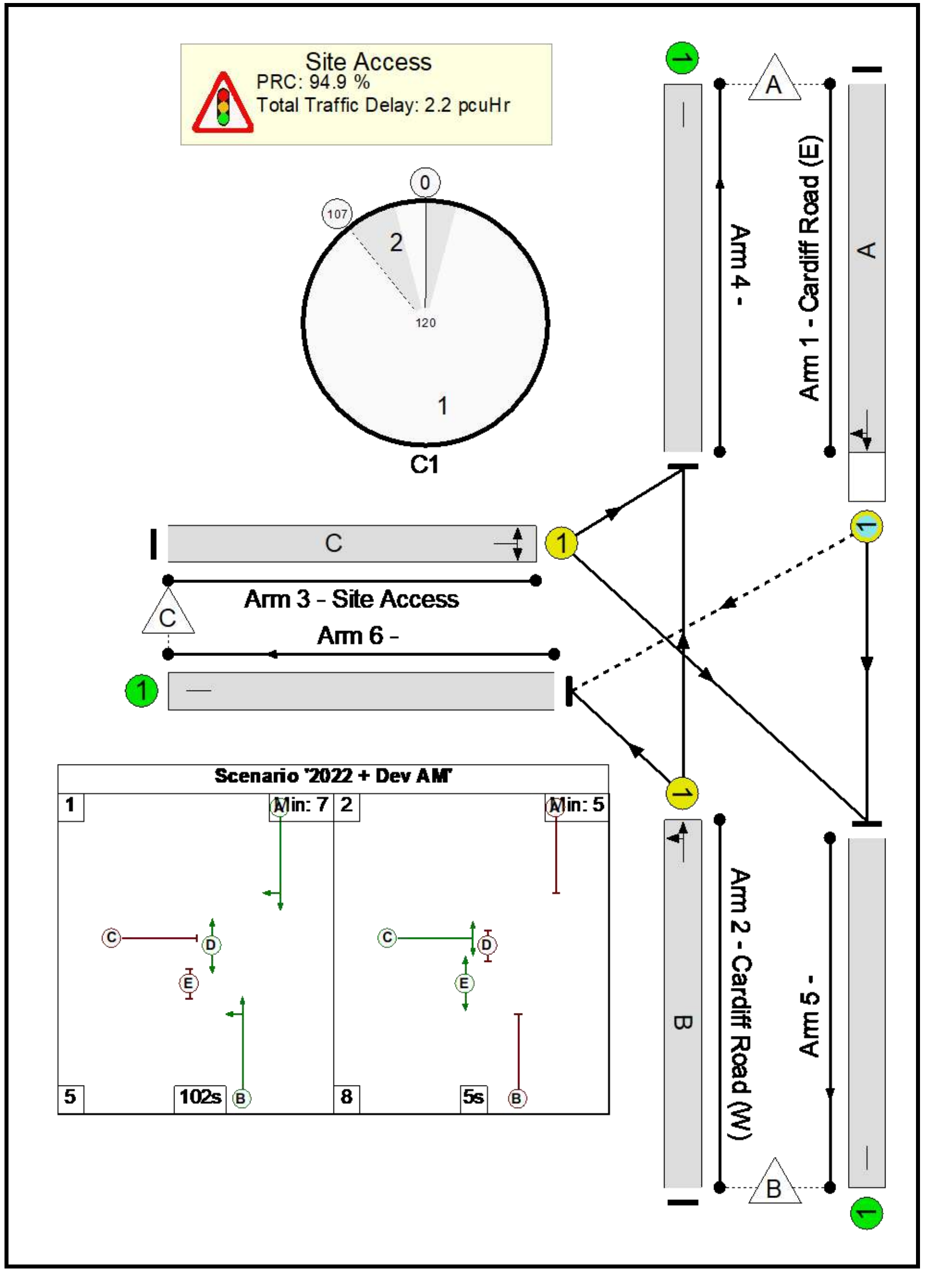
Stage	1	2
Duration	102	5
Change Point	0	107

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.2%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.2%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	102	-	494	1879	1122	44.0%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	102	-	756	1907	1637	46.2%
3/1	Site Access Left Right	U	N/A	N/A	C		1	8	-	24	1687	127	19.0%
4/1		U	N/A	N/A	-		-	-	-	753	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	421	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	100	Inf	Inf	0.0%

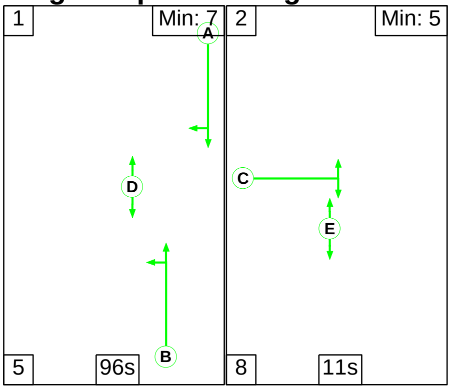
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**77**	**0**	**1**	**1.2**	**0.9**	**0.0**	**2.2**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**77**	**0**	**1**	**1.2**	**0.9**	**0.0**	**2.2**	**-**	**-**	**-**	**-**
1/1	494	494	77	0	1	0.4	0.4	0.0	0.9	6.3	5.2	0.4	5.6
2/1	756	756	-	-	-	0.4	0.4	-	0.8	4.0	5.9	0.4	6.3
3/1	24	24	-	-	-	0.3	0.1	-	0.5	69.7	0.7	0.1	0.9
4/1	753	753	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	421	421	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	100	100	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 94.9 Total Delay for Signalled Lanes (pcuHr): 2.18 Cycle Time (s): 120
PRC Over All Lanes (%): 94.9 Total Delay Over All Lanes(pcuHr): 2.18

Full Input Data And Results

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

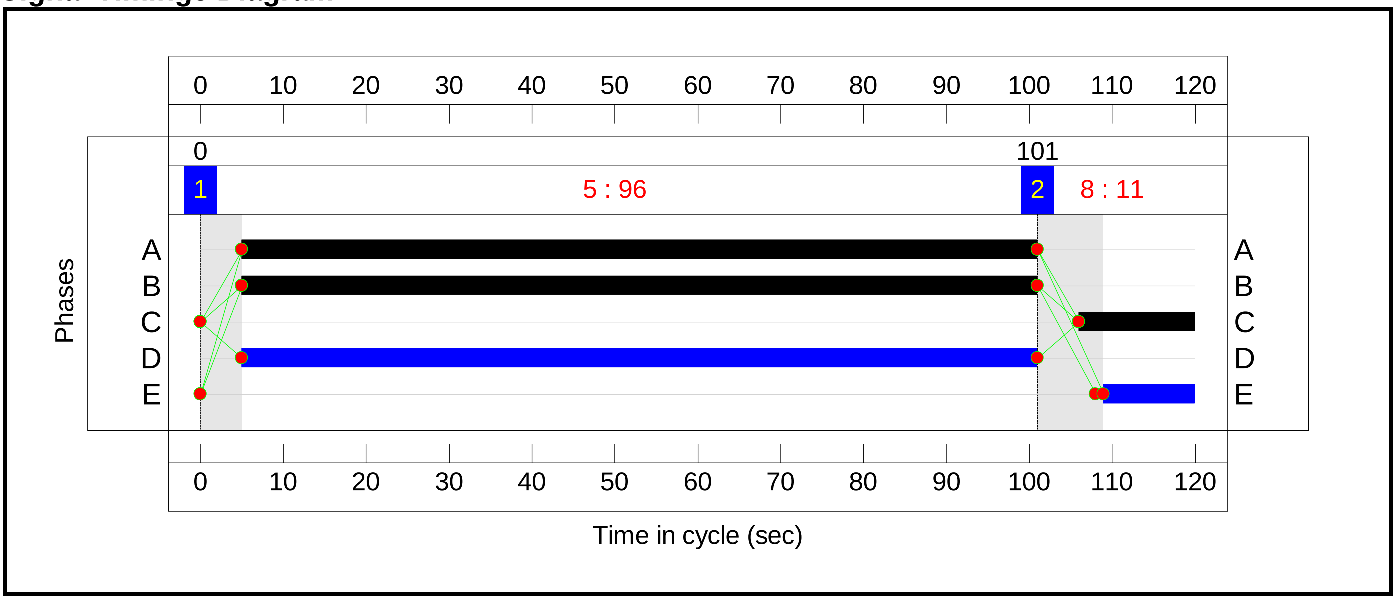
Stage Sequence Diagram



Stage Timings

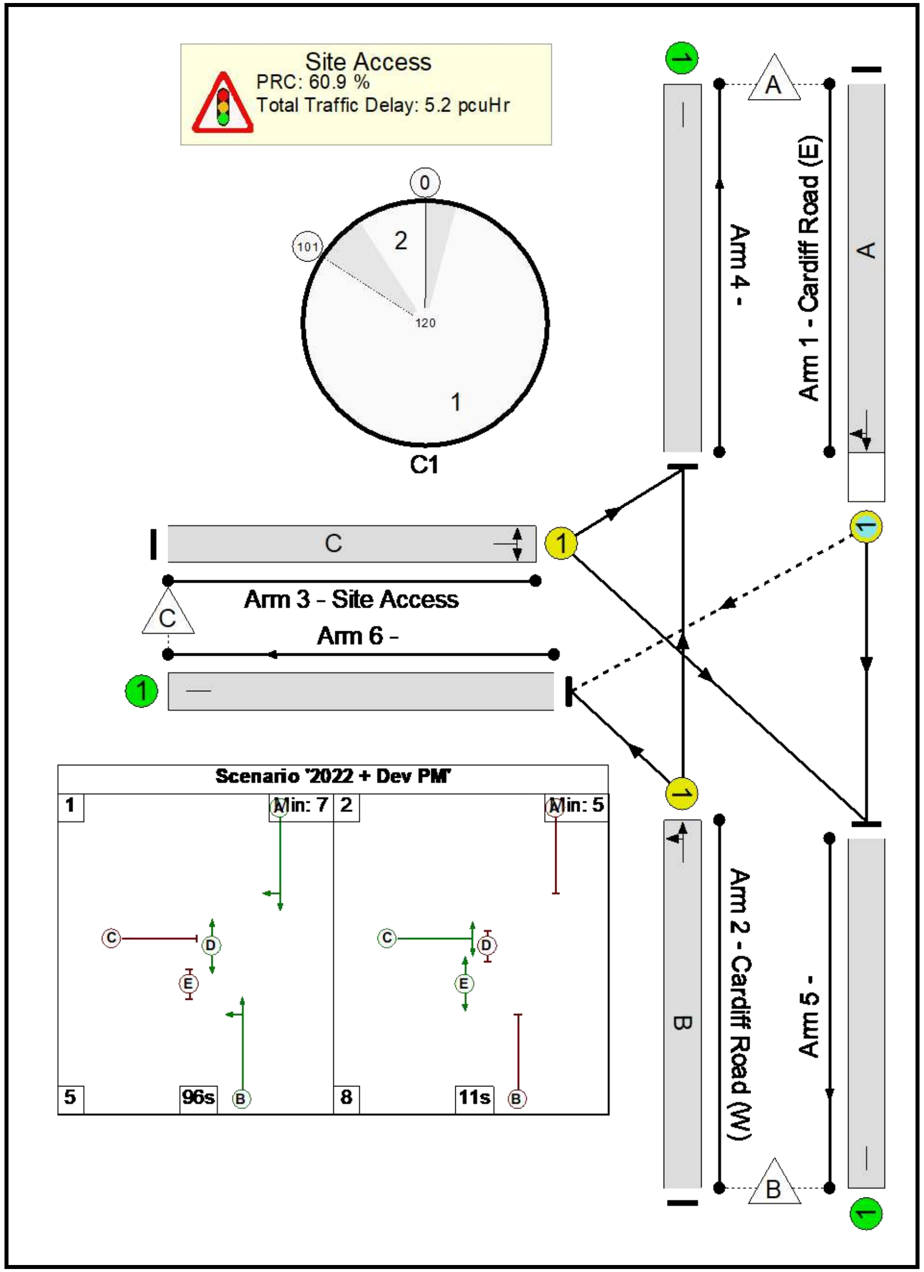
Stage	1	2
Duration	96	11
Change Point	0	101

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

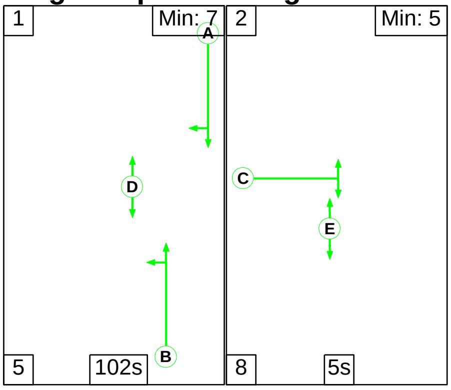
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**55.9%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**55.9%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	96	-	713	1903	1275	55.9%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	96	-	652	1911	1545	42.2%
3/1	Site Access Left Right	U	N/A	N/A	C		1	14	-	115	1688	211	54.5%
4/1		U	N/A	N/A	-		-	-	-	732	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	701	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	47	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**36**	**0**	**1**	**3.6**	**1.6**	**0.0**	**5.2**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**36**	**0**	**1**	**3.6**	**1.6**	**0.0**	**5.2**	**-**	**-**	**-**	**-**
1/1	713	713	36	0	1	1.4	0.6	0.0	2.1	10.5	11.1	0.6	11.7
2/1	652	652	-	-	-	0.6	0.4	-	1.0	5.4	6.2	0.4	6.5
3/1	115	115	-	-	-	1.6	0.6	-	2.2	67.8	3.6	0.6	4.2
4/1	732	732	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	701	701	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	47	47	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 60.9 Total Delay for Signalled Lanes (pcuHr): 5.22 Cycle Time (s): 120
PRC Over All Lanes (%): 60.9 Total Delay Over All Lanes(pcuHr): 5.22

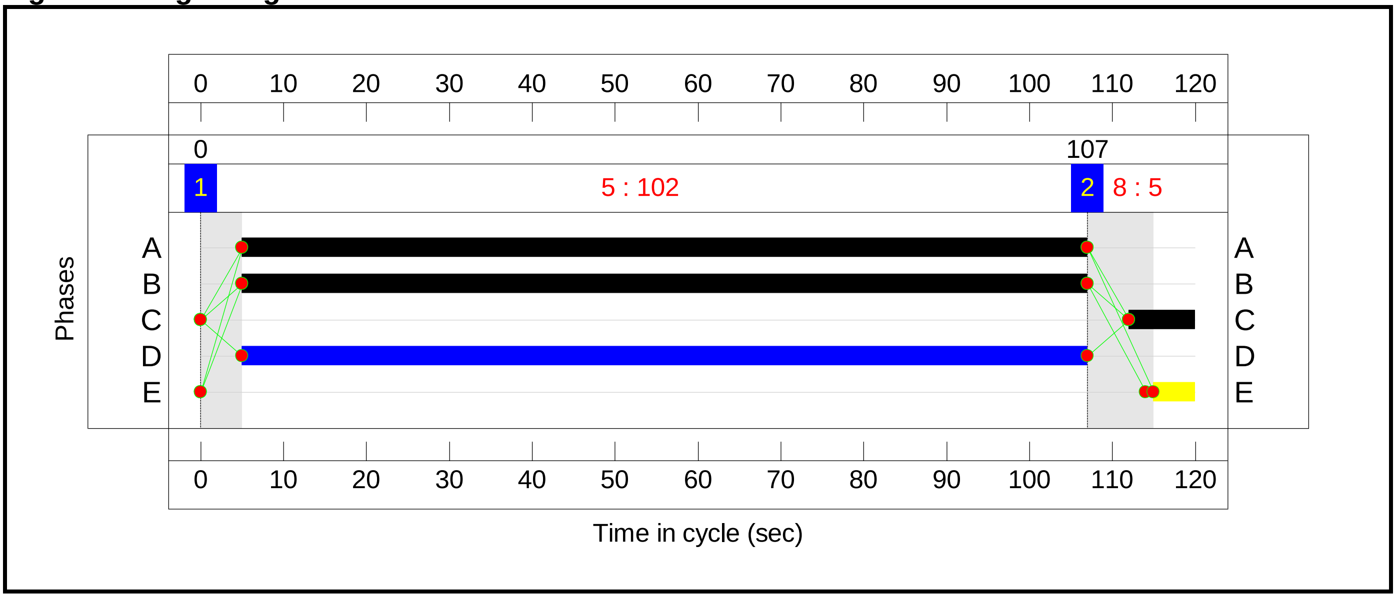
Full Input Data And Results
Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')
Stage Sequence Diagram



Stage Timings

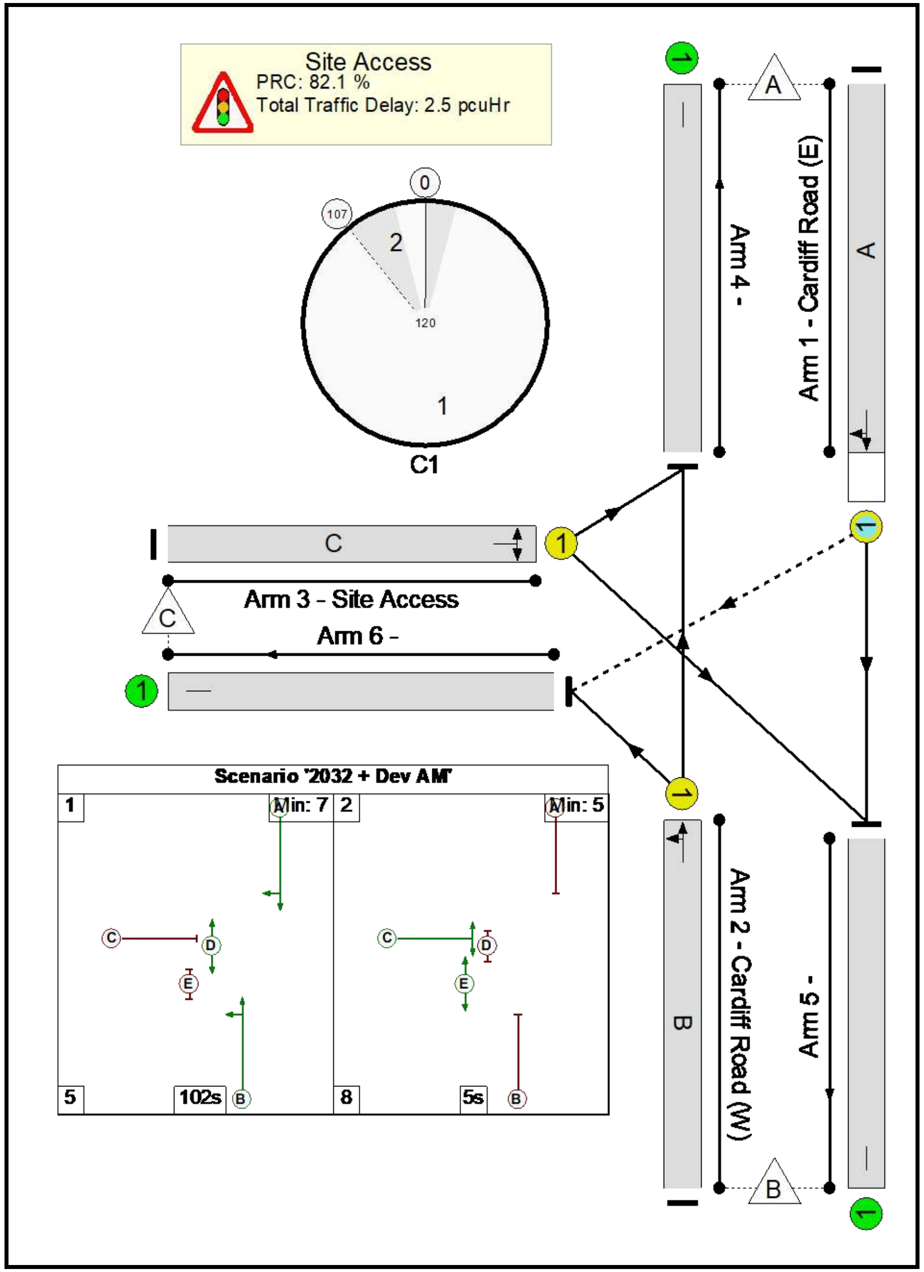
Stage	1	2
Duration	102	5
Change Point	0	107

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**49.4%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**49.4%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	102	-	525	1881	1079	48.6%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	102	-	809	1907	1637	49.4%
3/1	Site Access Left Right	U	N/A	N/A	C		1	8	-	24	1687	127	19.0%
4/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	452	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	100	Inf	Inf	0.0%

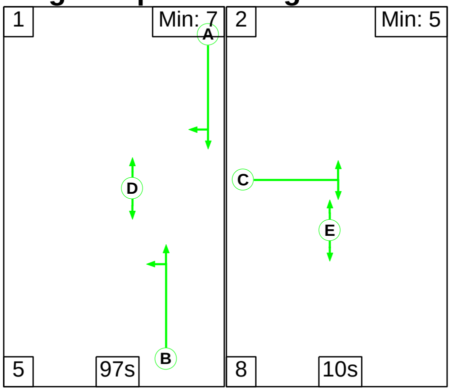
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**77**	**0**	**1**	**1.4**	**1.1**	**0.0**	**2.5**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**77**	**0**	**1**	**1.4**	**1.1**	**0.0**	**2.5**	**-**	**-**	**-**	**-**
1/1	525	525	77	0	1	0.6	0.5	0.0	1.1	7.4	6.3	0.5	6.7
2/1	809	809	-	-	-	0.5	0.5	-	1.0	4.3	6.5	0.5	7.0
3/1	24	24	-	-	-	0.3	0.1	-	0.5	69.7	0.7	0.1	0.9
4/1	806	806	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	452	452	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	100	100	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 82.1 Total Delay for Signalled Lanes (pcuHr): 2.50 Cycle Time (s): 120
PRC Over All Lanes (%): 82.1 Total Delay Over All Lanes(pcuHr): 2.50

Full Input Data And Results

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

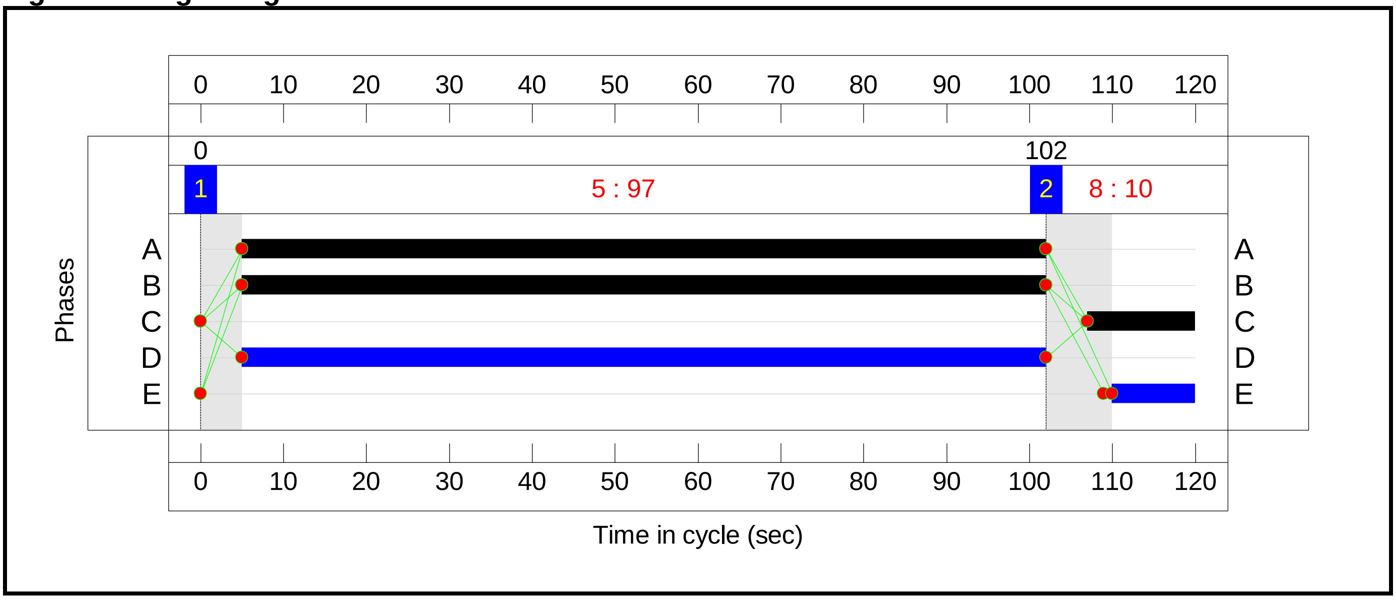
Stage Sequence Diagram



Stage Timings

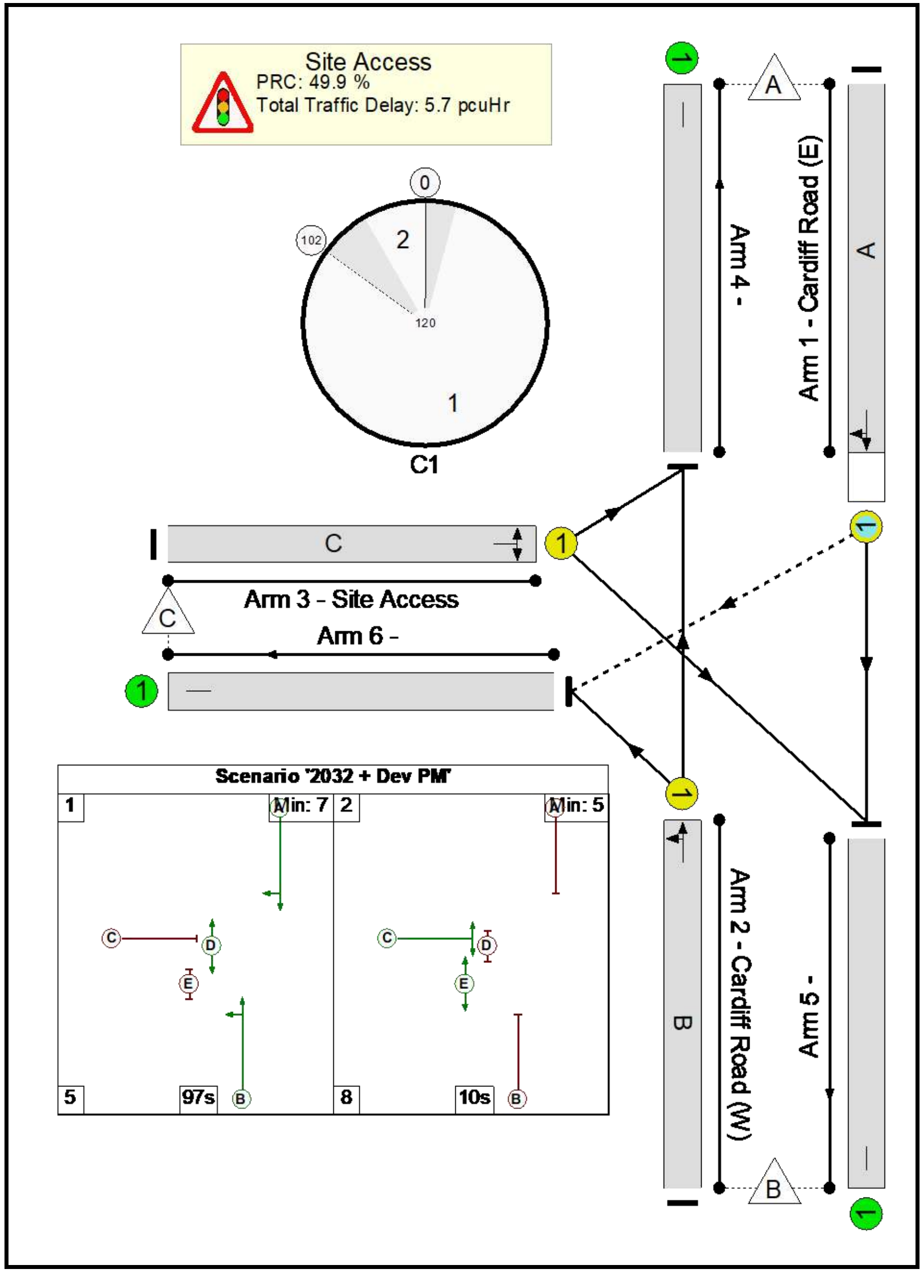
Stage	1	2
Duration	97	10
Change Point	0	102

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.1%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.1%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	97	-	763	1904	1271	60.1%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	97	-	699	1911	1561	44.8%
3/1	Site Access Left Right	U	N/A	N/A	C		1	13	-	115	1688	197	58.4%
4/1		U	N/A	N/A	-		-	-	-	779	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	751	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	47	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**36**	**0**	**1**	**3.8**	**1.8**	**0.0**	**5.7**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**36**	**0**	**1**	**3.8**	**1.8**	**0.0**	**5.7**	**-**	**-**	**-**	**-**
1/1	763	763	36	0	1	1.6	0.7	0.0	2.4	11.2	12.3	0.7	13.0
2/1	699	699	-	-	-	0.6	0.4	-	1.0	5.3	6.6	0.4	7.0
3/1	115	115	-	-	-	1.6	0.7	-	2.3	71.9	3.6	0.7	4.3
4/1	779	779	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	751	751	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	47	47	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 49.9 Total Delay for Signalled Lanes (pcuHr): 5.69 Cycle Time (s): 120
PRC Over All Lanes (%): 49.9 Total Delay Over All Lanes(pcuHr): 5.69

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Appendix B Refined Transport Strategy

Land to the North of Dinas Powys

Persimmon Homes

SLR Project No.: 226510

02/02/2024

vectos. | PART OF SLR

REFINED TRANSPORT STRATEGY

Persimmon Homes

Land to the North of Dinas Powys Accessed via Cardiff Road

August 2023

Refined Transport Strategy

vectos.co.uk

Contents

Figures

Appendices

1 Introduction

1.1 Vectos, part of SLR, has been appointed by Persimmon Homes to assist with the promotion of the proposed residential development on land to the north of Dinas Powys accessed via Cardiff Road.

Site Overview

1.2 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station and a number of local bus stops.

1.3 The proposals comprise a development of circa 300 dwellings with access taken directly from Cardiff Road to the south.

Policy Context

1.4 The Vale of Glamorgan (VoG) are in the process of preparing a new Local Development Plan (LDP). This Transport Strategy has subsequently been prepared to support the site's allocation within the emerging draft Replacement LDP.

1.5 VoG have prepared a Review Report (May 2022) which considered the delivery of new dwellings within the currently Local Development Plan period of 2011-2026. It was concluded that, in order to reach the target within the Local Plan period, 840 dwellings would have to be constructed annually.

1.6 It is expected based on the above that the replacement LDP will require similar housing targets. It is therefore considered that the proposed development provides an excellent opportunity to provide new housing and integration between the site and Dinas Powys to the south.

Report Structure

1.7 A previous Transport Strategy was provided to VoG in June 2022, included for reference at **Appendix A**.

1.8 This 'Refined Transport Strategy' provides additional details following comments received from VoG Highways Officers, in particular focussing on sustainable transport connections to existing amenities of Dinas Powys. The comments from VoG are included at **Appendix B** for completeness.

1.9 The remainder of this report is structured as follows:

- Section 2 sets out the policy context;
- Section 3 provides an overview of the existing accessibility of the site;
- Section 4 summarises the proposed access strategy; and,
- Section 5 summarises and concludes the report.

2 Policy Context

2.1 A full policy review was undertaken as part of the initial Transport Strategy and is included at **Appendix A.** A summary of the key elements, noting comments received from VoG is provided below.

Planning Policy Wales Edition 11 (PPW11) (February 2021)

2.2 PPW11 outlines a primary objective for the planning system to contribute towards sustainable development. The following are considered pertinent to the site:

— Paragraph 4.1.10 which outlines the need for development to be located to encourage modal shift through easy access to sustainable transport modes.

— Paragraph 4.1.11 highlights the sustainable transport hierarchy for planning where active travel modes and public transport should be prioritised ahead of vehicle movements.

— Paragraph 4.1.32 notes the need for housing, jobs, shopping, leisure and other services to be highly accessible by walking and cycling.

Llwybr Newydd – The Wales Transport Strategy (May 2021)

2.3 This seeks to improve the social, economic, environmental and cultural well-being of Wales. It contains seven well-being goals which local authorities as well as other public bodies must seek to achieve in order to improve well-being both now and in the future. Of particular relevance, the strategy sets out three urgent priorities:

— Priority 1 – bring services to people in order to reduce the need to travel.

— Priority 2 – allow people and goods to move easily from door to door by accessible, sustainable transport.

— Priority 3 – encourage people to make the change to more sustainable transport.

Future Wales – The National Plan 2040 (February 2021)

2.4 'Future Wales – the National Plan 2040' (Future Wales) is the national development framework, setting the direction for development in Wales to 2040. Future Wales strongly considers the Well-Being of Future Generations (Wales) Act 2015, which gives a legally-binding common purpose – the seven well-being goals – for national government, local government, local health boards and other specified public bodies. It details the ways in which these bodies must work, and work together, to improve the well-being of Wales.

2.5 Of particular relevance, the third Strategic Place Making Principle states:

"Walkable scale: to enable active and healthy lives, people should be able to easily walk to local facilities and public transport. Urban growth and regeneration should be focused within inner city areas and around town centres, as well as around mixed use local centres and public

transport. Co-working hubs offering an alternative to home-working are an important feature of the economy, and these should be located in town and local centres."

Active Travel (Wales) Act 2013 (October 2013)

2.6 The Active Travel (Wales) Act aims to make it easier for people to walk and cycle in Wales and makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve their infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport.

2.7 By connecting key sites such as workplaces, hospitals, schools and shopping areas with active travel routes, the Act will encourage people to rely less on their cars when making short journeys and make implementing successful Travel Plans easier.

Active Travel Act Guidance (July 2021)

2.8 The Active Travel Act Guidance was first published in July 2021 and is issued using the powers of the Welsh Ministers to give guidance under sections 2(6), 2(9), 3(4), 4(5), 5(2) and 7(2) of the Active Travel Act.

2.9 Of particular relevance to the site:

- Paragraph 4.2.2 highlights that the active travel is designed to serve everyday journeys including to destinations such as school, shops, employment and healthcare facilities.
- Table 4.1 demonstrates that most users would walk up to 3.2 kilometres (2 miles) or cycle up to 8 kilometres (5 miles).

Summary

2.10 The principles of the development proposals comply with the transport related planning policies discussed within this chapter. Situated to the north of Dinas Powys, the site will seek to reduce the need to travel in the first instance with more sustainable modes of transport promoted for journeys beyond the site, this is further expanded upon in Section 3.

3 Existing Situation

Site Location

3.1 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station.

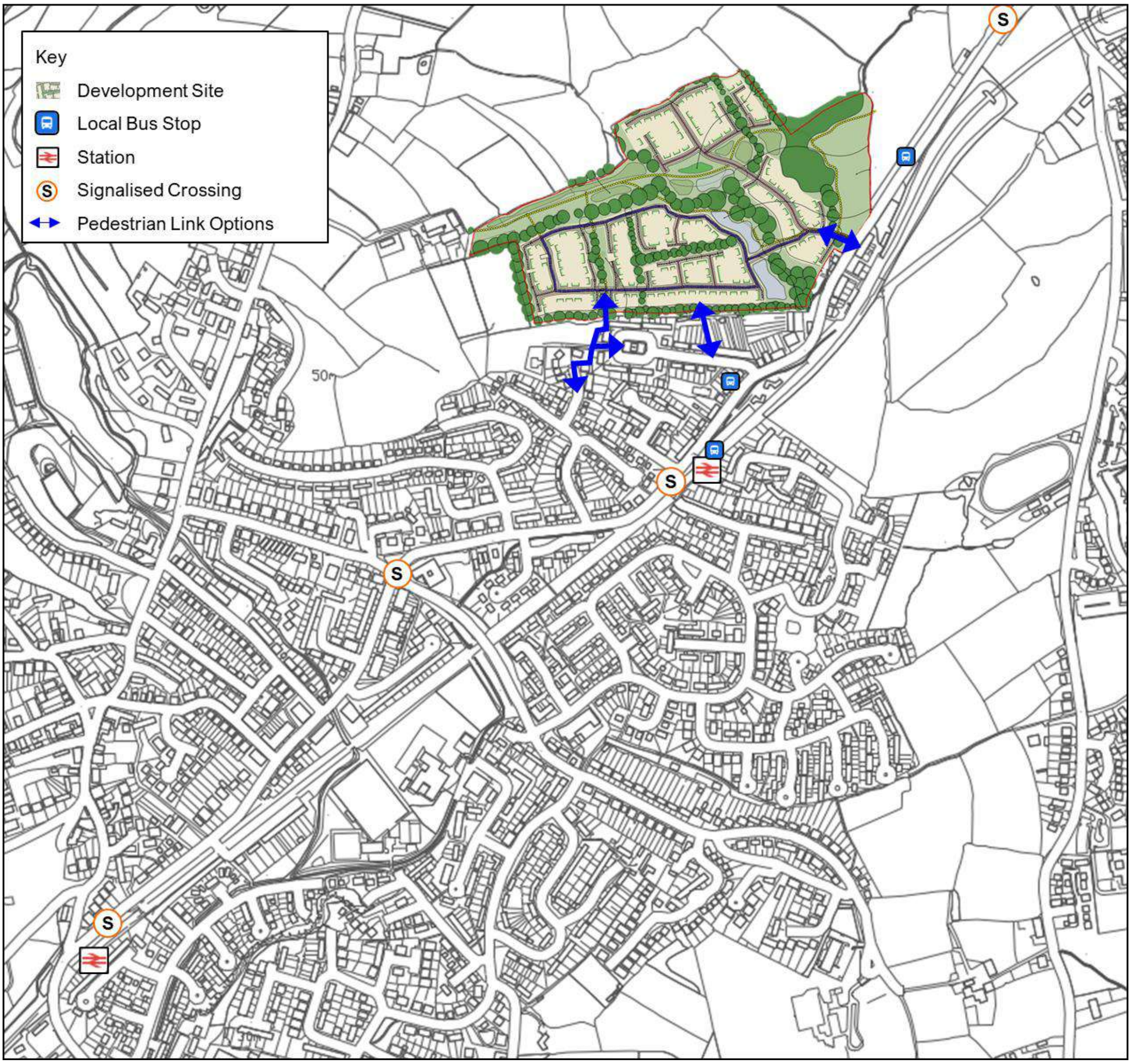


Figure 3.1 – Site Location Plan

Local Highway Network

3.2 Pen-Y-Turnpike Road forms the western boundary of the wider site whilst to the east the site fronts Cardiff Road (A4055), a primary movement corridor between the Vale of Glamorgan and Cardiff.

3.3 In the previous Transport Strategy prepared by Vectos SLR, a summary of baseline traffic flows on Pen-Y-Turnpike Road and Cardiff Road was included as Table 2.1 and 2.2. It was demonstrated that some 5,000 vehicles would be expected to use the former on the average weekday with circa 13,650 utilising Cardiff Road on an average weekday. Additionally, it was recorded that 85th percentile speeds on Pen-Y-Turnpike Road were 35.4mph whilst on Cardiff Road 85th percentile speeds were recorded as 33.4mph.

3.4 The Welsh Government are introducing a speed limit reduction to 20mph on routes in residential and built-up areas which will come into effect in September 2023. A review of the local network has been undertaken and it should be noted that whilst Pen-Y-Turnpike Road will be subject to the 20mph limit, Cardiff Road along the site frontage is subject to an exemption order and therefore the speed limit will remain at 30mph.

Active Travel

3.5 It was demonstrated in the previous Transport Strategy that there are existing pedestrian and cycle connections to local bus stops and Eastbrook station as well as the settlements of Dinas Powys to the south and Llandough to the north.

3.6 Notwithstanding the above, a more detailed assessment of the existing pedestrian and cycle links has been undertaken to alleviate concerns raised by VoG relating to connections to active travel routes.

Pedestrian and Cycle Network

3.7 To the south, footways are provided on both sides of Cardiff Road providing a continuous pedestrian connection towards Eastbrook station and Dinas Powys. To the north, a footway is provided on the western side of Cardiff Road creating a link to Llandough. Further footways are provided on Pen-Y-Turnpike Road from approximately 100 metres to the north of the Millbrook Road / Pen-Y-Turnpike Road to the centre of Dinas Powys to the south.

3.8 There are two signalised crossing facilities on Cardiff Road that assist pedestrians in gaining access to bus stops and Eastbrook Station, both comprising signalised pedestrian crossings. A range of uncontrolled crossing featuring dropped kerbs and tactile paving are provided at a collection of local junctions including:

- Georges Road / Cardiff Road
- Chapel Road / Cardiff Road
- Powys Place / Cardiff Road
- Mill Road / Elm Grove Road / Station Road / The Square

3.9 A shared foot/cycleway is provided on the western side of Cardiff Road operating from the proposed site access to Llandough at the north. In addition, a range of shared surface public right of way connections allow for cyclists to access the wider area including Cosmeston Lakes and Penarth from which there are ongoing links to the National Cycle Network Route 88.

3.10 It was demonstrated in the previously submitted Transport Strategy that the local network provides access to a range of amenities including public transport, education and retail facilities, these are shown in the context of the site in **Figure 3.2**.

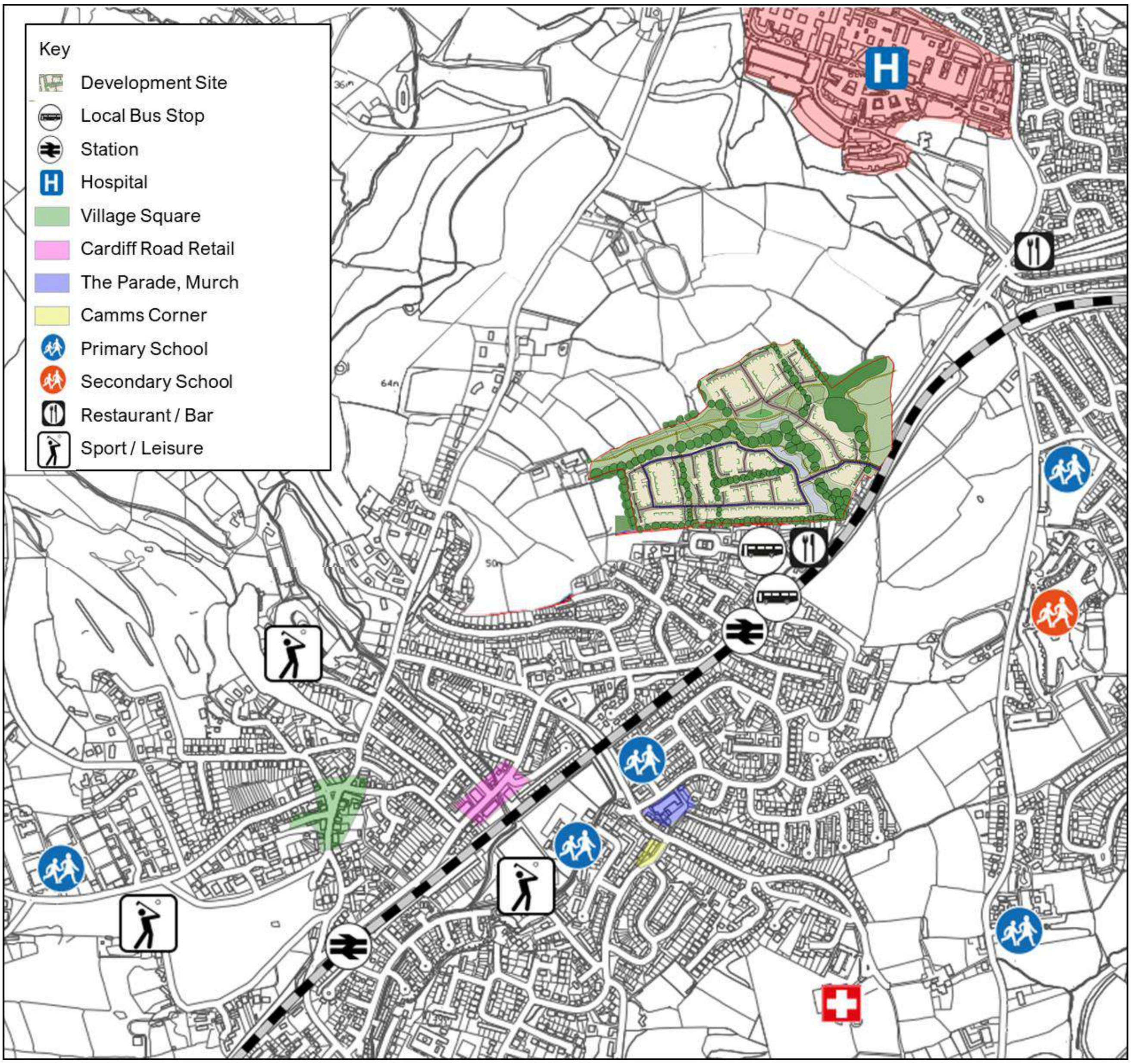


Figure 3.2 – Local Amenities

3.11 More detailed assessments of the routes that can be taken to the various amenities outlined above have been prepared and are provided below.

<u>Pedestrian Routes to Public Transport</u>

3.12 Local bus stops are provided on Cardiff Road with the nearest northbound bus stop located circa 40 metres to the north of the proposed access. A further northbound stop and the nearest southbound bus stop are provided in close proximity to Eastbrook station.

3.13 A range of routes can be used to access the bus stops and station. For the purposes of this assessment, a judgement has been made that pedestrians would avoid travelling along Cardiff Road where possible due to the higher trafficked nature of the route. It is noted, however, that footways are provided on both sides and therefore may be used.

3.14 It is expected that pedestrians would predominantly make use of a pedestrian connection to Highfield Close via Seel Park, or a pedestrian connection to Georges Row. Both form part of a longer route via footways to local public transport facilities as shown in **Figure 3.3**.

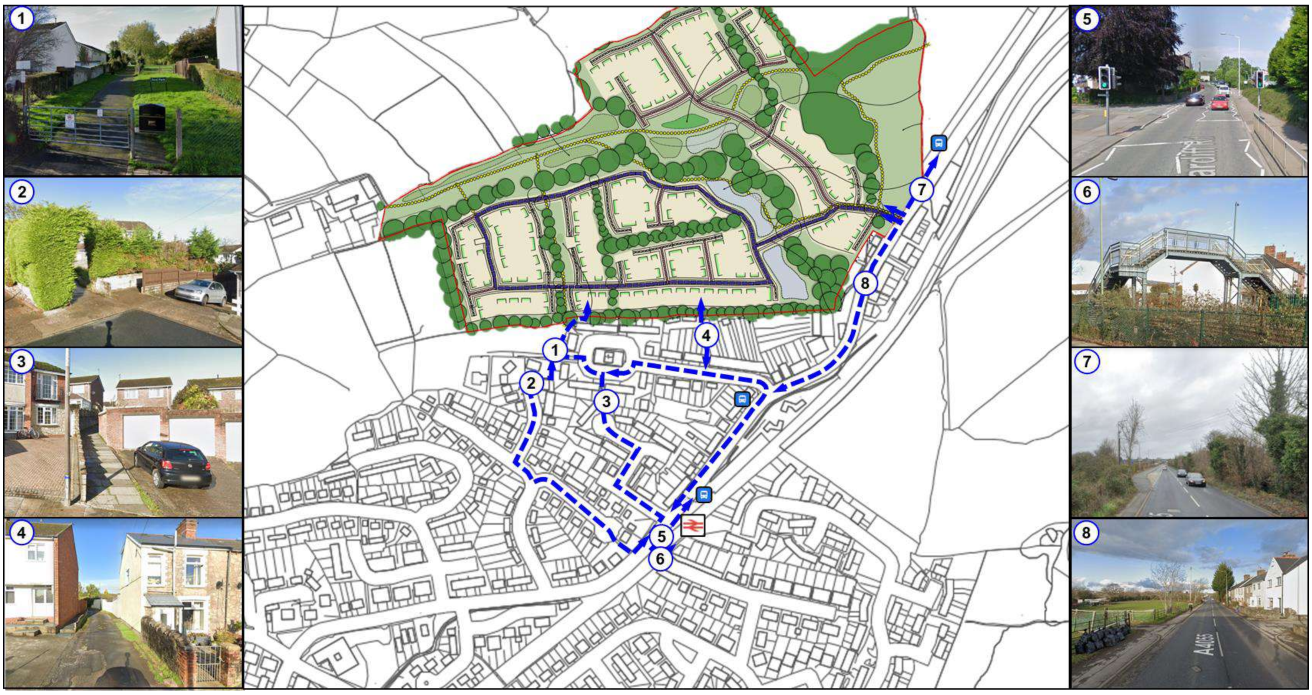


Figure 3.3 – Routes to Public Transport

3.15 It is evident from the above assessment that the site location accords with paragraph 4.1.10 of PPW11 with convenient and easy access to sustainable transport in the form of public transport opportunities.

Pedestrian Routes to Schools

3.16 A review of the expected routes to the nearest primary and secondary schools has been undertaken. To the south, the pedestrian facilities illustrated in **Figure 3.3** can be used to connect with footways on the southern side of Cardiff Road which serve Dinas Powys Infant School.

3.17 A signalised pedestrian crossing is provided at the Cardiff Road / Murch Road / Millbrook Road junction creating a safe link to footways on the southern side of Murch Road. This footway can be used to access Vale Court and a pedestrian link to Fairoaks and Dinas Powys Junior School. Alternatively, footways on the northern side of Murch Road can be used with a signalised crossing provided to the immediate north of its junction with Vale Court.

3.18 To the northeast of the site, footways along Cardiff Road, Redlands Road and Norris Close can be used to access Pen-Y-Garth Primary School. A signalised pedestrian crossing is provided as a safe link to across Cardiff Road to Redlands Road while an uncontrolled crossing creates a convenient link across Norris Close to the school. A further footway is provided to the south of the primary school connecting to St Cyres Secondary School albeit these are not continuous from Norris Close and do require approximately 130 metres of walking in the carriageway.

3.19 The routes to local schools are summarised in **Figure 3.4**

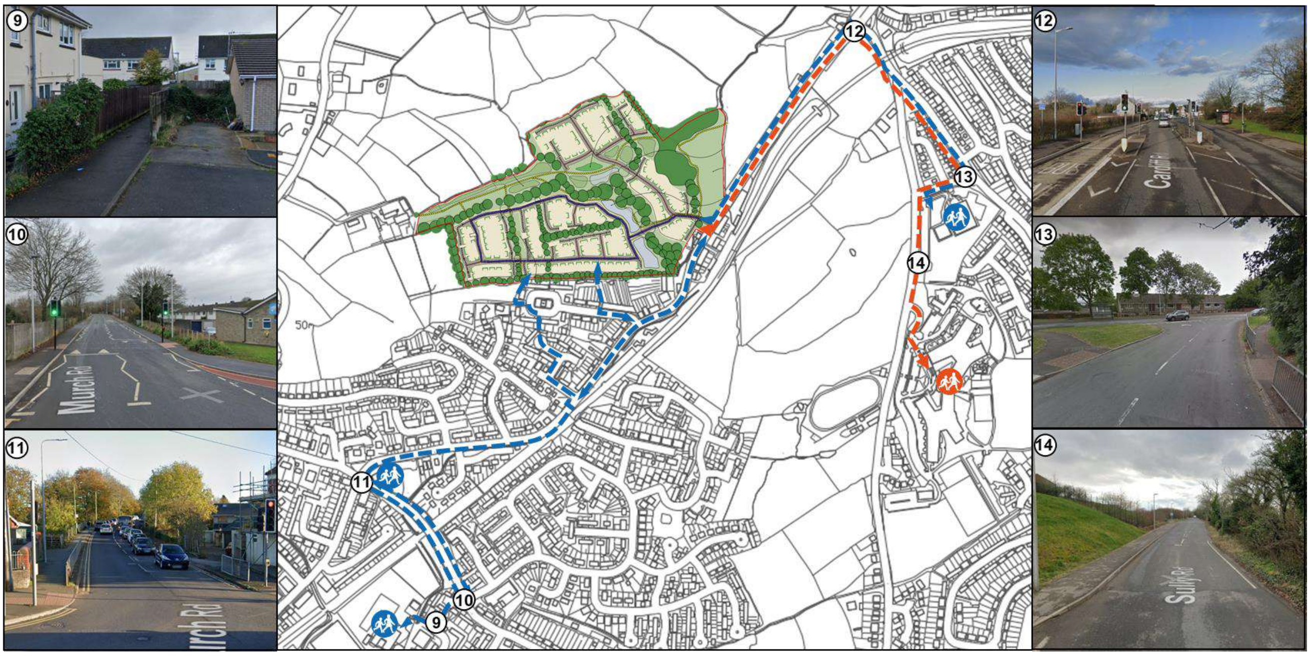


Figure 3.4 – Routes to Local Schools

3.20 It is clear that the site is located such that it accords with the third Strategic Place Making Principle of The National Plan 2040 relating to walkable neighbourhoods. It is further located in line with the guiding principles of the Active Travel Act Guidance, particularly Paragraph 4.2.2 which highlights that active travel should serve everyday journeys including to destinations such as schools.

<u>Pedestrian Routes to Retail Facilities</u>

3.21 A range of retail facilities can be accessed via the pedestrian networks outlined above. These include stores located on Cardiff Road in the vicinity of its junction with Greenfield Avenue, The Parade in Murch and the Village Square.

3.22 These areas can all be accessed via a continuous pedestrian network of footways and traffic-free links with a signalised pedestrian crossing provided at the Cardiff Road / Murch Road / Millbrook Road junction and in the vicinity of the shops on Cardiff Road. A series of uncontrolled pedestrian crossings are provided at the Village Square featuring dropped kerbs and tactile paving.

3.23 **Figure 3.5** illustrates the key routes to local retail.

Figure 3.5 – Routes to Local Retail Facilities

3.24 It is evident from the above that a range of retail facilities are located within a convenient walking distance such that the site would form a walkable neighbourhood in accordance with the principles of the Active Travel Act Guidance (paragraph 4.2.2).

Pedestrian Routes to Other Services

3.25 The local pedestrian network as detailed above further provides access to healthcare facilities, employment facilities and leisure facilities. For example:

- The route to the southern primary schools can additionally be used to access Dinas Powys medical centre on Murch Road.
- The routes to local retail facilities can be used to access leisure facilities such as Murchfield Community Centre and Dinas Powys Common.

Cycling Routes

3.26 The site will connect to cycle routes with direct access to the existing shared foot/cycleway provided at Cardiff Road. A review of the Active Travel Network Maps demonstrates that a wide range of routes are proposed in the local area which will link the site to nearby settlements, local stations and the schools as summarised previously. **Figure 3.6** provides an extract of the Active Travel Network Maps in the context of the site location.

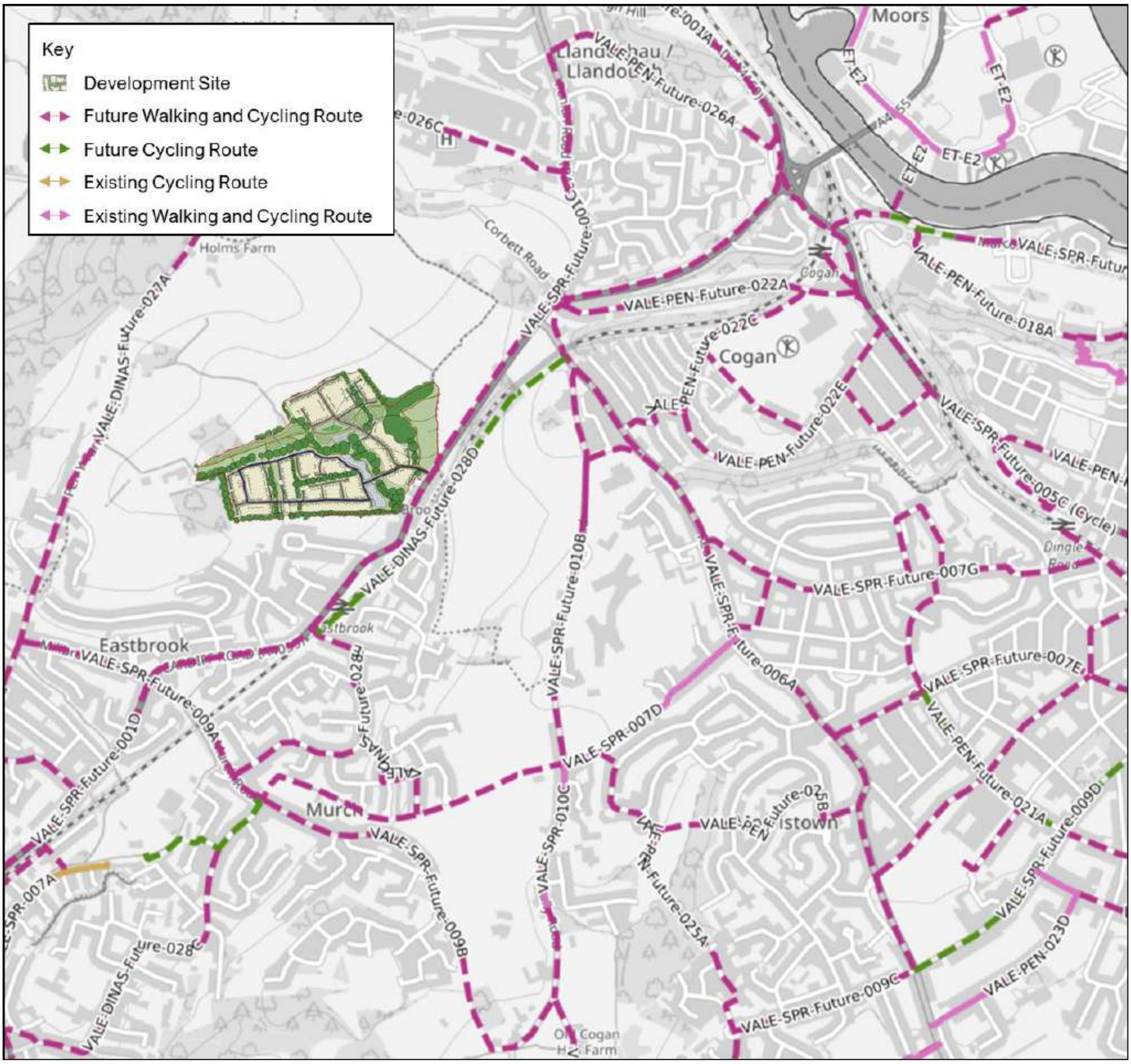


Figure 3.6 – Future Cycle Links

3.27 It is evident from the above review that the site is accessible by active travel modes which provide onward connections to the wider area.

Public Transport

3.28 As evidenced above and outlined in the previous Transport Strategy document, the site is well located with regard to public transport with bus stops and stations being accessible via the active travel network.

3.29 Local bus stops are within 150 metres of the site and are served by regular routes operating to Cardiff, Heath Hospital, Llantwit Major and Barry Island.

3.30 The nearest station to the site is Eastbrook, circa 450 metres from the site via the pedestrian connections outlined in **Figure 3.3**. Services operate half-hourly to Cardiff, Merthyr Tydfil and Aberdare with services operating every 20 minutes to Barry Island and hourly to Bridgend via Cardiff Airport.

Summary

3.31 The above review builds on that undertaken as part of the initial Transport Strategy for the site. It is demonstrated that the site is well located with regard to local amenities and public transport, all of which can be accessed via active travel means. It has been demonstrated that the site is located in accordance with key national planning policy, in particular:

- PPW11 paragraphs 4.1.10 and 4.1.32 which outline the need for development to be located to encourage travel via sustainable modes and a need for housing, shopping, leisure and other services to be accessible by walking and cycling.
- Priority 2 of The Wales Transport Strategy which requires people and goods to move easily from door to door by accessible, sustainable transport.
- The third Strategic Place Making Principle of The National Plan 2040 which states that development should be at a walkable scale to enable active and healthy lives with access to local centres and public transport.
- Paragraph 4.2.2 of the Active Travel Act Guidance which highlights that the active travel is designed to serve everyday journeys including to destinations such as school, shops, employment and healthcare facilities.

3.32 It is therefore clear that the site is suitably located such that future residents would have the opportunity to travel via active modes for a whole journey or as part of a longer journey via public transport.

4 Access Strategy

Vehicular Access

4.1 As per the previous strategy, vehicular access would be taken from Cardiff Road. The comments received from VoG Highways Officers relating to the location of this access and the current traffic levels on Cardiff Road are noted and have been incorporated into a revised access design. The updated design is shown in **Figure 4.1** and further included at **Appendix C.**

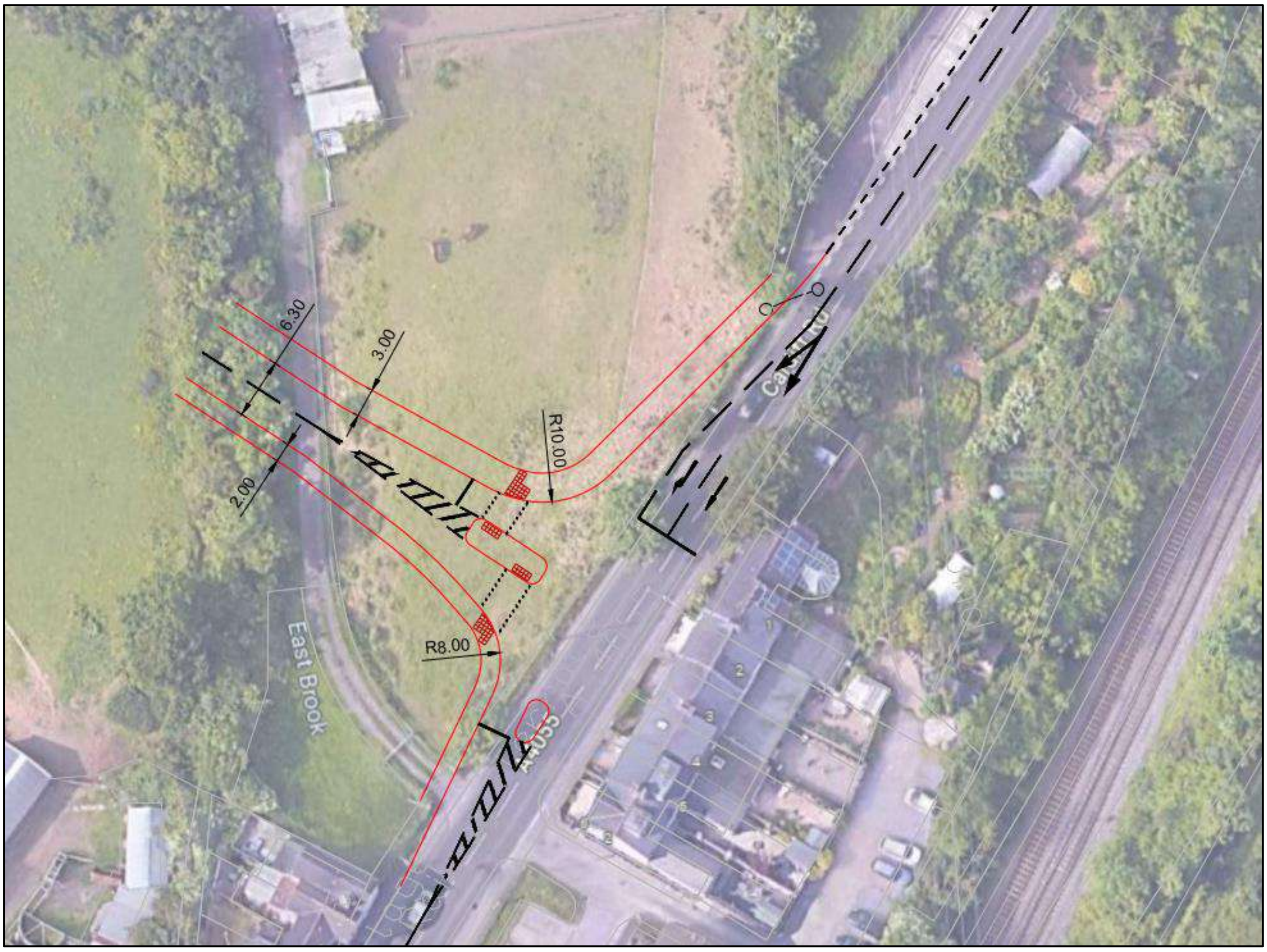


Figure 4.1 Indicative Access Design

4.2 This revised strategy incorporates a right turn lane into the site with the intention to retain the free flow of vehicles along the mainline of Cardiff Road where possible. In addition, the access has been relocated to the south to reduce potential conflict with the bus stop as noted in the comments received from VoG.

4.3 A capacity test of the proposed design has been undertaken with baseline flows obtained from 2022 traffic surveys. Industry standard TEMRPO growth factors have then been applied to ascertain how the arrangement would likely operate in a future year of 2032. The assessment assumes 300 dwellings utilise this access with no alternative vehicular access provided. A summary of the modelling results is provided in **Table 4.1.**

2032 with Development (AM Peak)	DoS (%)	MMQ (PCU)	Delay (s/PCU)
Cardiff Road (east)	30.8	4	6
Cardiff Road (west)	60.4	12	12
Site Access	49.4	3	63
Overall PRC		**49.0%**	
2032 with Development (PM Peak)	**DoS (%)**	**MMQ (PCU)**	**Delay (s/PCU)**
Cardiff Road (east)	53.5	9	8
Cardiff Road (west)	54.2	10	11
Site Access	23.7	1	54
Overall PRC		**65.9%**	

Table 4.1 Modelling Summary

4.4 It is demonstrated in the **Table 4.1** that the development could be accommodated at the proposed site access without detriment to mainline traffic flows.

Pen-Y-Turnpike Road Access

4.5 The response from VoG references an additional access taken from Pen-Y-Turnpike Road to the west. Whilst this may form part of a future access strategy for additional development; it is not part of the access strategy for the 300. Further details are included in Section 5 of this Strategy.

Pedestrian and Cycle Access

4.6 Permeability of the site with surrounding neighbourhoods will be a crucial feature of the design process. The site will be designed to feature a network of active travel links running throughout, allowing for permeability with the surrounding existing network including the pedestrian infrastructure on Cardiff Road.

4.7 The site access has been designed with a 2 metre footway on the southern side which will connect to the existing Cardiff Road footway to the south. On the northern side a 3 metre shared foot/cycleway is proposed which will connect with the existing shared provision to the north. A staggered signalised crossing will be provided for safe routeing across the site access.

4.8 Opportunities to provide active travel links to the surrounding area will be explored and, at this stage, it is considered that these could include connections to:

— Highfield Close

— Georges Row

4.9 In addition to the above, as highlighted previously in Figure 3.4, the site would be well located to take advantage of the planned future cycle routes. In particular, one such route is proposed along the Cardiff Road frontage and opportunities to tie into this connection and enhance where possible would be considered as part of any future development.

4.10 Alongside the above connections, opportunities to enhance the existing network will be considered. For example, there could be an opportunity to provide a new signalised pedestrian crossing on Cardiff Road to the south of the station overbridge creating a more direct pedestrian route to the station for those travelling from the south. Further opportunities could include provision of suitable lighting along key routes such as the link through Seel Park.

Public Transport Access

4.11 The comments received from VoG state a requirement for ‘extensive public transport improvements’ to be provided. As demonstrated in Section 3, there are safe, suitable and convenient links to existing public transport interchanges and these are considered to be sufficient to serve the quantum of development proposed.

Summary

4.12 It is demonstrated that safe and suitable access can be achieved to the site for all users. The proposed vehicular access has been designed with suitable capacity for the expected vehicle trips and additionally will include provision for pedestrians and cyclists, connecting into the existing network as per policy requirements.

4.13 Opportunities to provide active travel links to Highfield Close and Georges Row will be explored and would help to connect the site to the existing settlement to the south such that it acts as a sustainable extension to the town.

4.14 On the basis of the above, it is considered that the site accords with key national planning policy with respect to access by a variety of transport modes.

5 Summary and Conclusions

5.1 This report has been prepared by Vectos on behalf of Persimmon Homes as a Refined Transport Strategy for a residential development on land east of Dinas Powys.

5.2 It is proposed to provide circa 300 dwellings accessed from Cardiff Road (A4055) via a signalised junction with dedicated right turn lane.

5.3 It has been demonstrated that the site is well located with regard to local amenities and public transport, all of which can be accessed via active travel means. In particular, it has been demonstrated that the site accords with key national planning policy as follows:

- PPW11 paragraphs 4.1.10 and 4.1.32 which outline the need for development to be located to encourage travel via sustainable modes and a need for housing, shopping, leisure and other services to be accessible by walking and cycling.

- Priority 2 of The Wales Transport Strategy which requires people and goods to move easily from door to door by accessible, sustainable transport.

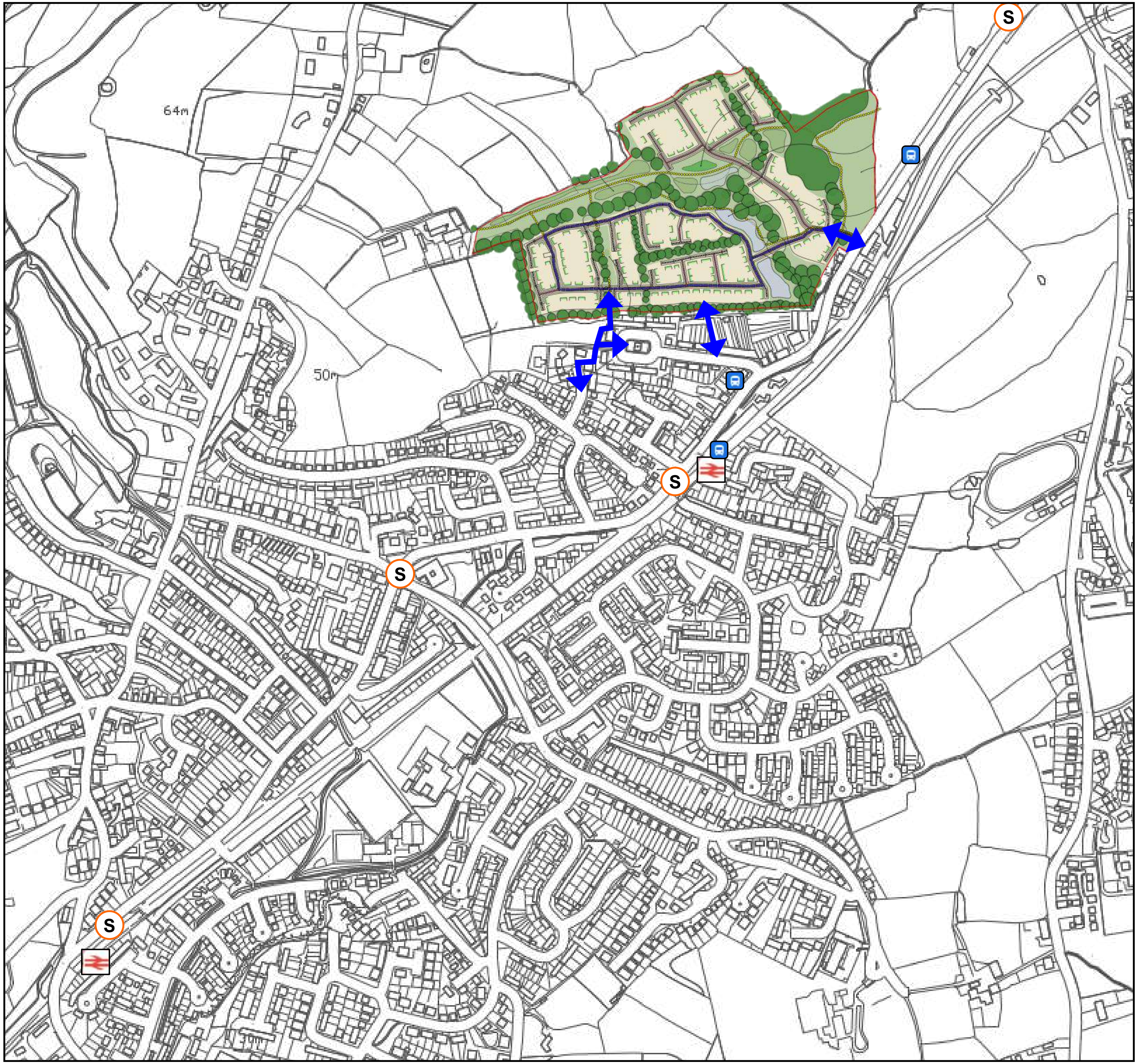
- The third Strategic Place Making Principle of The National Plan 2040 which states that development should be at a walkable scale to enable active and healthy lives with access to local centres and public transport.

- Paragraph 4.2.2 of the Active Travel Act Guidance which highlights that the active travel is designed to serve everyday journeys including to destinations such as school, shops, employment and healthcare facilities.

5.4 It is demonstrated that safe and suitable access can be achieved to the site for all users. The proposed vehicular access has been designed with suitable capacity for the expected vehicle trips and additionally will include provision for pedestrians and cyclists, connecting into the existing network as per policy requirements. In addition, opportunities to provide active travel links to Highfield Close and Georges Row will be explored and would help to connect the site to the existing settlement to the south such that it acts as a sustainable extension to the town.

5.5 This report therefore demonstrates that the site is suitably located for a residential development observing the principles of national policies, and ultimately can deliver the necessary growth in VoG whilst contributing towards a Carbon Neutral goal as per the declared Climate Emergency in Wales.

Figures



Key

- Development Site
- Local Bus Stop
- Station
- Signalised Crossing
- Pedestrian Link Options

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

Figure 3.1 – Site Location Plan

Drawn	Date	Revision
KD	21/08/2023	-

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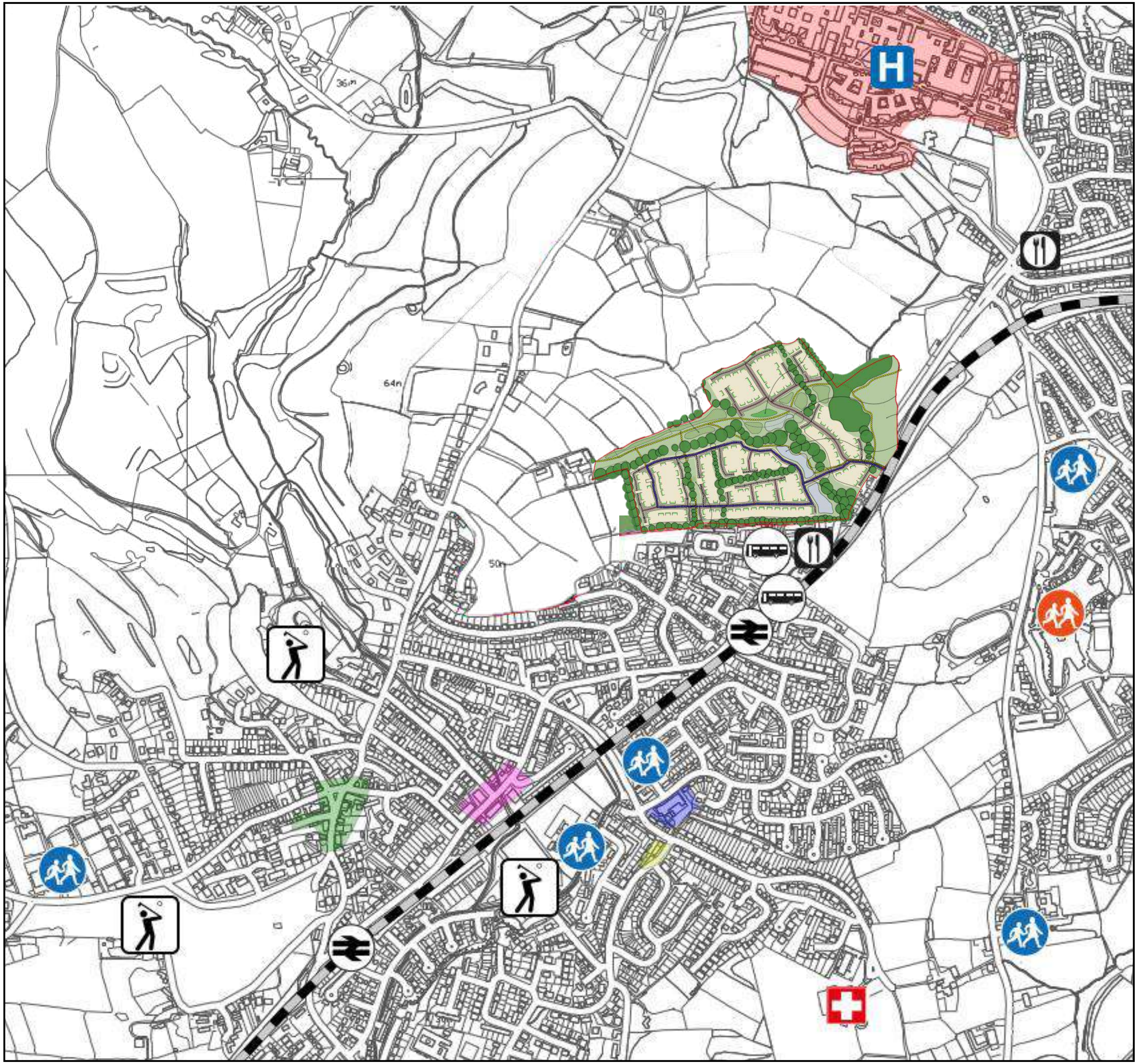

Key

- Development Site
- Local Bus Stop
- Station
- Hospital
- Village Square
- Cardiff Road Retail
- The Parade, Murch
- Camms Corner
- Primary School
- Secondary School
- Restaurant / Bar
- Sport / Leisure

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

Figure 3.2 – Local Amenities

Drawn	Date	Revision
KD	21/08/2023	-

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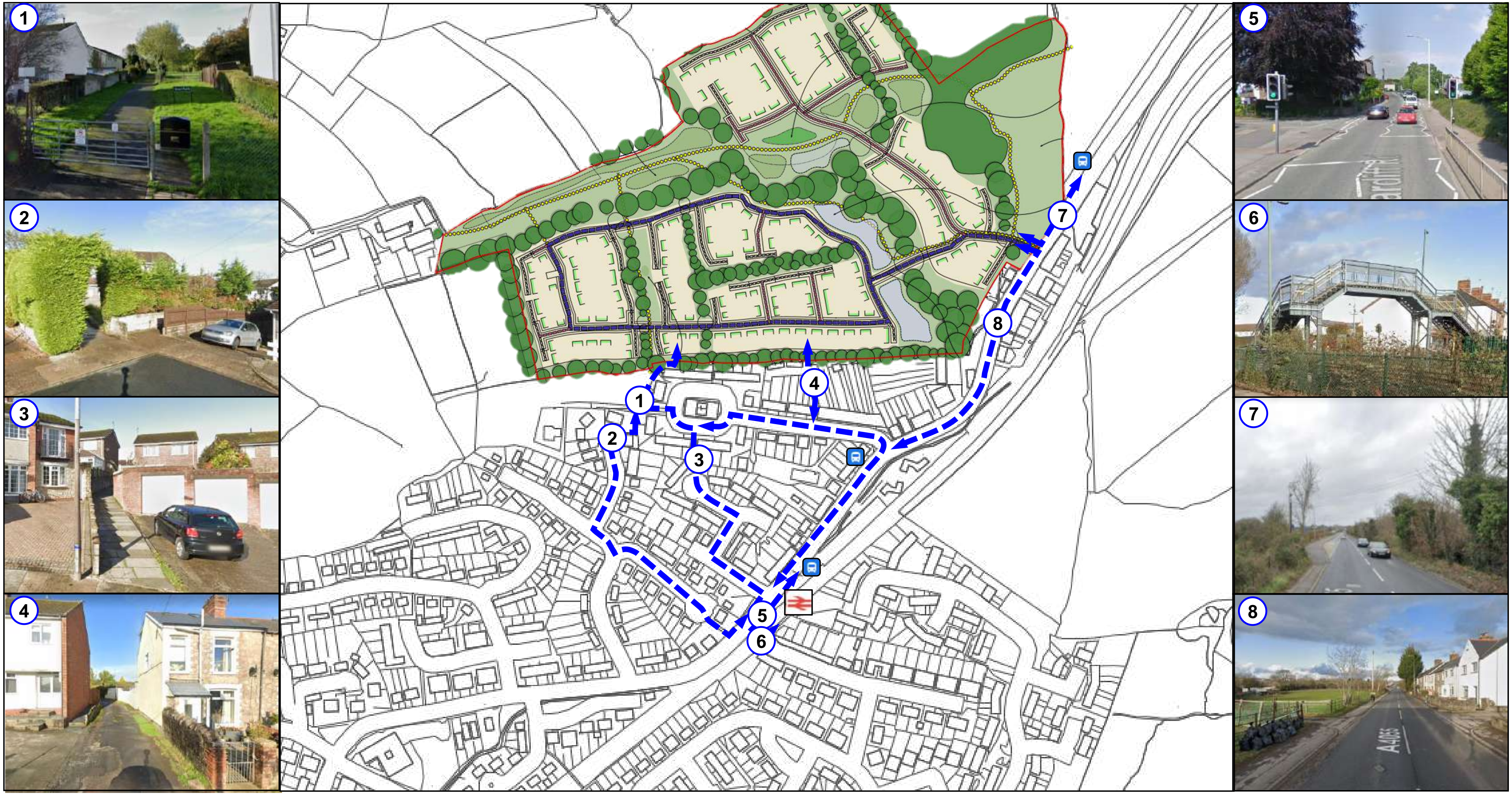
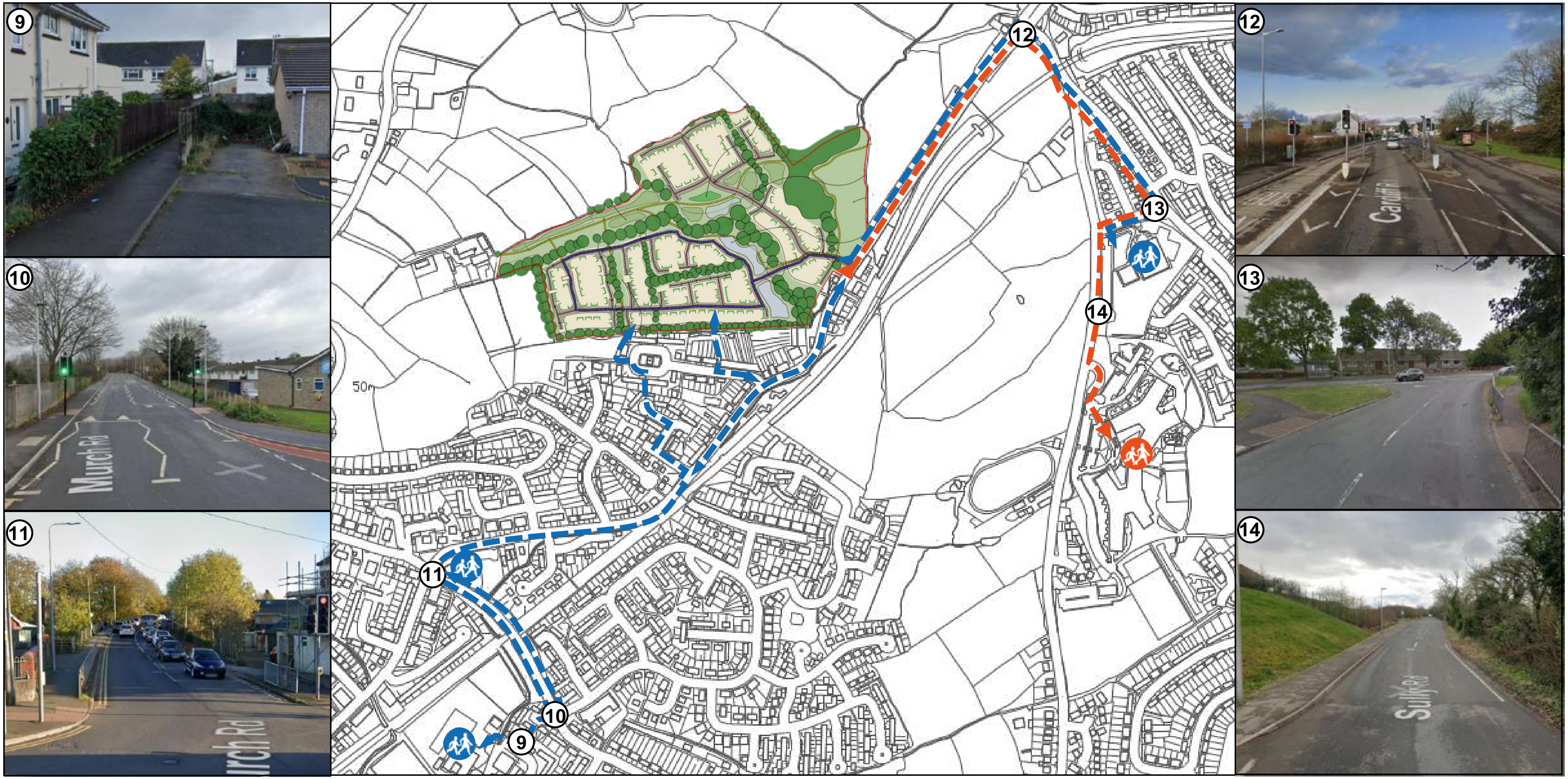


Key

- Development Site
- Local Bus Stop
- Station

Client Persimmon Homes	Drawn KD	Date 21/08/2023	Revision -	
Project Land to the North of Dinas Powys				
Title Figure 3.3 – Routes to Public Transport				



Key

- Development Site
- Primary School
- Secondary School

Client: Persimmon Homes	Drawn: KD	Date: 21/08/2023	Revision: -
Project: Land to the North of Dinas Powys			
Title: Figure 3.4 – Routes to Schools	vectos. PART OF SLR		

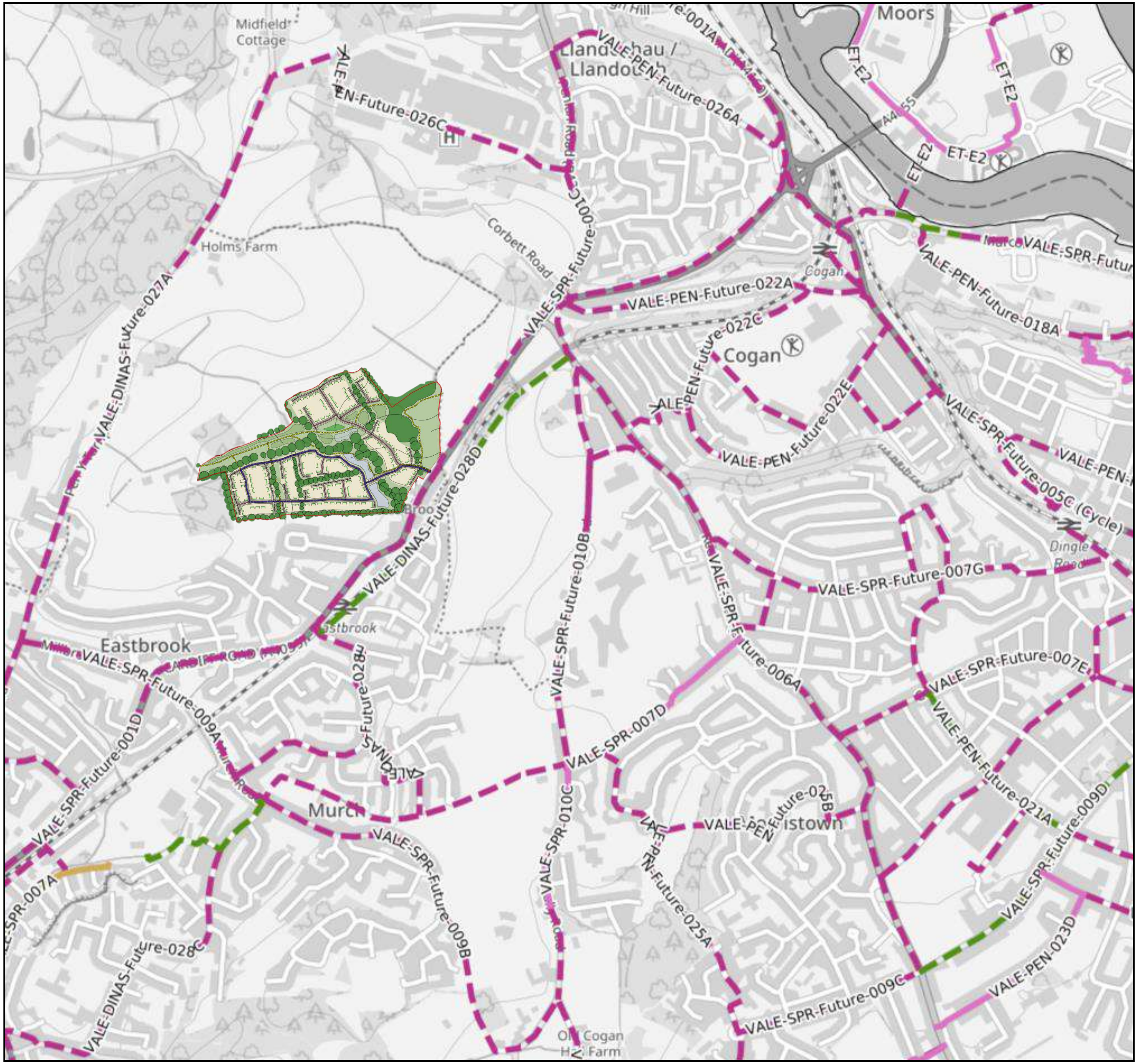
Key

- Development Site
- Village Square
- Cardiff Road Retail
- The Parade, Murch
- Camms Corner

Client	Persimmon Homes
Project	Land to the North of Dinas Powys
Title	Figure 3.4 – Routes to Retail Facilities

Drawn	Date	Revision
KD	21/08/2023	-

vectos. | PART OF SLR



Key

- Development Site
- Future Walking and Cycling Route
- Future Cycling Route
- Existing Cycling Route
- Existing Walking and Cycling Route

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

Figure 3.4 – Future Cycle Links

Drawn	Date	Revision
KD	21/08/2023	-

vectos. | PART OF SLR

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

1 – Link to Highfield Close via Seel Park

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

2 – Link to Powys Close

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

3 – Link to Chapel Close

Drawn	Date	Revision
KD	24/07/2023	-

vectos. PART OF SLR

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

4 – Link to Georges Row

Drawn	Date	Revision
KD	24/07/2023	-

vectos. PART OF SLR

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

5 – Pedestrian Crossing: Cardiff Road Adjacent to Eastbrook Station

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

6 – Pedestrian Overbridge

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

7 – Northbound Bus Stop Adjacent to Proposed Access

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

8 – Cardiff Road Footway (south west of site)

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

9 – Pedestrian Link from Vale Court to Fairoaks

Drawn	Date	Revision
KD	24/07/2023	-

vectos. | PART OF SLR

Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

10 – Pedestrian Crossing: Murch Road to the North of Vale Court

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

11 – Pedestrian Crossing: Cardiff Road / Murch Road / Millbrook Road

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

12 – Pedestrian Crossing: Cardiff Road North

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

13 – Uncontrolled Crossing at Norris Close

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

14 – Footway on Sully Road

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

15 – Pedestrian Crossing: Cardiff Road

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

16 – Uncontrolled Crossings at The Square / Elm Grove / Mill Road

Drawn	Date	Revision
KD	24/07/2023	-

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Client

Persimmon Homes

Project

Land to the North of Dinas Powys

Title

17 – Uncontrolled Crossings at The Square / Highwalls Road / Britway Road

Drawn	Date	Revision
KD	24/07/2023	-

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Appendix A

Transport Strategy (June 2022)

TRANSPORT STRATEGY

Persimmon Homes

Land to the North of Dinas Powys

September 2022

Transport Strategy

vectos.co.uk

Contents

Figures

Appendices

1 Introduction

1.1 Vectos has been appointed by Persimmon Homes to assist with the promotion of the proposed residential development on land to the north of Dinas Powys.

Site Overview

1.2 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station and a number of local bus stops.

1.3 The proposals comprise a development of circa 650-800 dwellings. It is expected that the site would be delivered in two phases with phase 1 comprising circa 400 dwellings at the Cardiff Road frontage and future phases providing the remaining dwellings and primary school to the north.

Policy Context

1.4 The Vale of Glamorgan (VoG) are in the process of preparing a new Local Development Plan (LDP). This Transport Strategy has subsequently been prepared to support the site's allocation within the emerging draft Replacement LDP.

1.5 It is noted that as part of the process VoG have prepared a Review Report (May 2022) which reviews, amongst other things, the delivery of new dwellings during the current Local Development Plan period of 2011-2026.The review report highlights that housing provision to date is below the target within the Local Plan and, in order to reach the target within the Local Plan period, 840 dwellings would have to be constructed annually.

1.6 It is expected based on the above that the replacement LDP will require similar housing targets. It is therefore considered that the proposed development provides an excellent opportunity to provide new housing and integration between the site and Dinas Powys to the south.

Report Structure

1.7 This Transport Strategy will evaluate the existing and future accessibility of the site in relation to local amenities and a range of transport modes. The remainder of this report is structured as follows:

- Section 2 summarises the existing accessibility of the site;
- Section 3 provides a review of planning policy within the context of the proposals;
- Section 4 describes the development proposals, including an access strategy for all modes;
- Section 5 summarises the trends of mobility;
- Section 6 provides a transport strategy for the site;
- Section 7 provides a high-level trip generation review; and,
- Section 8 summarises and concludes the report.

2 Baseline Conditions

Site Location

2.1 The site forms a natural extension to the existing settlement of Dinas Powys which has a range of existing community facilities and amenities as well as a number of public transport facilities including Eastbrook railway station and Dinas Powys railway station.

2.2 Pen-Y-Turnpike Road forms the western boundary of the wider site whilst existing residential areas are located to the south and undeveloped land forms the northern boundary. To the east the site fronts Cardiff Road (A4055), a primary movement corridor between the Vale of Glamorgan and Cardiff.

2.3 The site location in relation to the surrounding area is shown in **Figure 2.1**, below.

Figure 2.1 – Site Location Plan

Local Highway Network

2.4 The local highway network centres around the A4055 Cardiff Road and Pen-Y-Turnpike Road. These roads in the context of the site are illustrated in **Figure 2.2**.

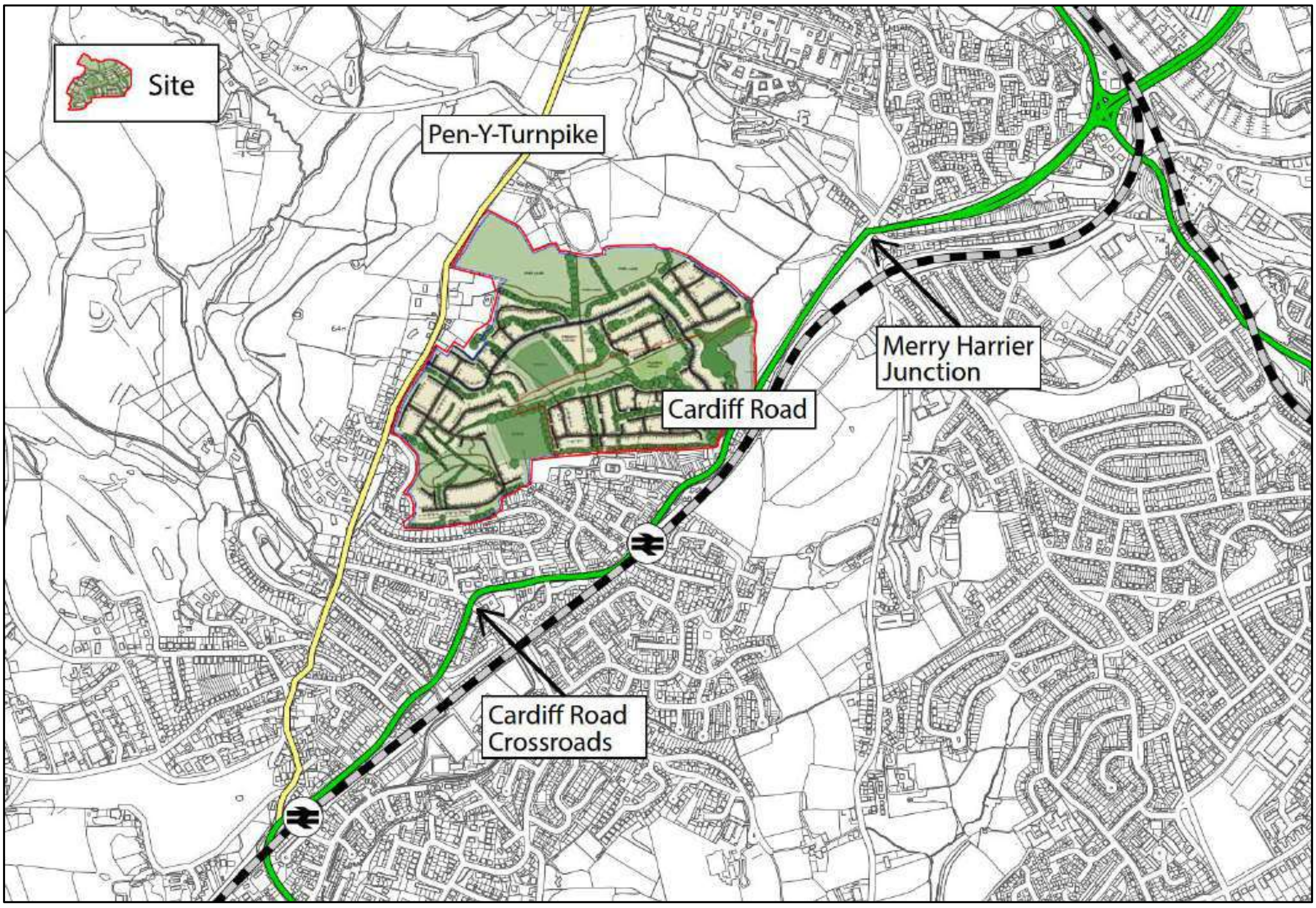


Figure 2.2 – Local Highway Network

Cardiff Road (A4055

2.5 Cardiff Road forms part of the Vale of Glamorgan highway network and provides the main link from Barry to Cardiff. It is the primary road in/out of Dinas Powys and accommodates a number of through-traffic movements associated with commuters, schools and general journeys between Cardiff and the south-eastern areas of the VoG.

2.6 Within the vicinity of the site Cardiff Road is subject to a 30mph speed limit and is a two-way single lane carriageway with the addition of a dedicated bus lane on the north-western side of the road, allowing a short traffic-free route for buses from the edge of Dinas Powys to the 'Merry Harrier' junction.

2.7 Access to the site could be taken via the latter phase of development from Cardiff Road at the south west of the site.

Pen-Y-Turnpike

2.8 Pen-Y-Turnpike is a two-way single carriageway subject to a 30mph speed limit. This increases to 40mph slightly further to the north, adjacent to the northwest edge of the proposed site. The road provides access to a smaller number of residential properties/ farms and links Dinas Powys to Leckwith Road through a semi-rural landscape. It is intended that access to phase 1 of the development would be taken from Pen-Y-Turnpike Road.

Baseline Traffic Flows

2.9 In order to ascertain the existing conditions in the vicinity of the site, automatic traffic counts (ATCs) were undertaken between the 23rd and 29th of June 2022. A summary of the recorded 5-day average traffic flows recorded at the two sites is provided in **Table 2.1** whilst a summary of the 5-day mean average and 85th percentile speeds at each location is provided in **Table 2.2**.

Cardiff Road	Northbound	Southbound	Two-Way
AM Peak (0800-0900)	520	463	983
PM Peak (1700-1800)	610	641	1251
Daily (0700-1900)	7065	6618	13683
Pen-Y-Turnpike Road	**Northbound**	**Southbound**	**Two-Way**
AM Peak (0800-0900)	468	128	596
PM Peak (1700-1800)	136	467	603
Daily (0700-1900)	2424	2601	5025

Table 2.1 – Recorded Traffic Flows

	Mean Average	85th Percentile
Cardiff Road (northbound)	27.3 mph	33.4 mph
Cardiff Road (southbound)	28.1 mph	33.3 mph
Pen-Y-Turnpike Road (northbound)	31.3 mph	37.4 mph
Pen-Y-Turnpike Road (southbound)	29.7 mph	33.3 mph

Table 2.2 – Recorded Speeds

Highway Network Summary

2.10 In the broader context of the wider highway network and settlements south and east of Dinas Powys, these two named roads provide half of the four key route options available to existing vehicle movements linking the western fringes of VoG with Cardiff. The other two routes are the B4267 linking Barry with Penarth and Cardiff and Windsor Road (A4160) /Cogan Spur to the south of Dinas Powys and Port Road (A4050) to the north and west of Dinas Powys routing via Culverhouse Cross.

Personal Injury Collision (PIC) Data

2.11 In order to determine the likely safety of the local highway, CrashMap has been used to ascertain the level of Personal Injury Collisions (PICs) that have occurred in the vicinity of the site over the most recent 5-year period. **Figure 2.3** provides an extract summary of the registered collisions within the study area.

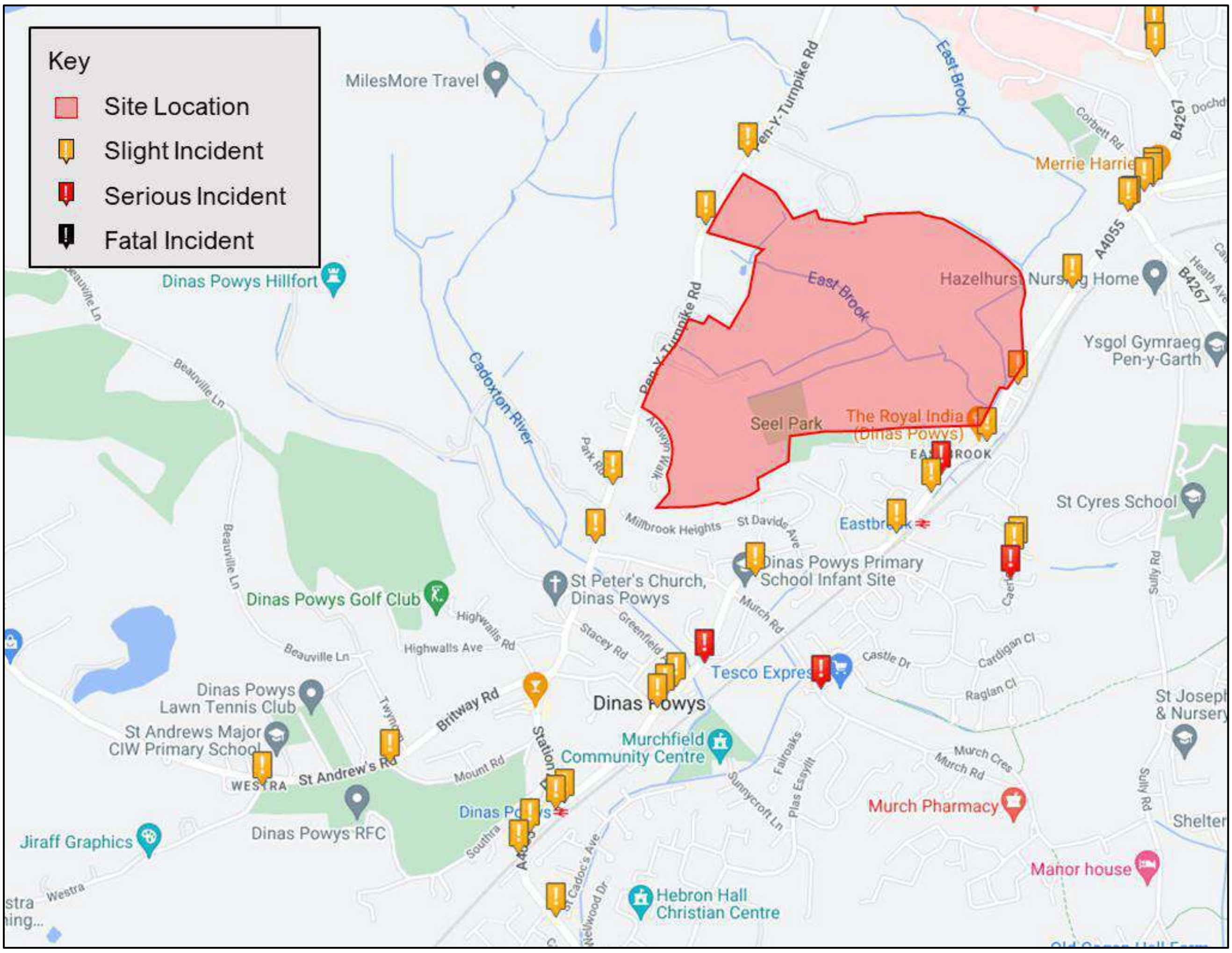


Figure 2.3 – CrashMap Collision Data

2.12 As highlighted in **Figure 2.3**, during the most recent period a total of 32 collisions were recorded comprising 4 serious and 28 slight incidents, no fatalities were recorded. The majority of incidents occurred in the vicinity of local junctions, likely to be attributed to vehicles manoeuvring and changing speed.

2.13 On the basis of the above, that there are no inherent safety issues associated with the existing highway network and junction arrangements in the vicinity of the site.

Active Travel Network

2.14 It is generally accepted that walking and cycling provide important alternatives to the private car and should also be encouraged to form part of longer journeys via public transport. For example, research undertaken by the Chartered Institution of Highways and Transportation (CIHT) outlines that most people would walk to a destination within one mile or cycle for a journey within five miles.

2.15 Moreover, Manual for Streets (MfS) identifies 'walkable neighbourhoods' as being:

"characterised by having a range of facilities within 10 minutes (up to about 800m) walking distance of residential areas which residents may access comfortably on foot."

2.16 However, it is important to recognise that MfS does not consider 800 metres to be a maximum walking distance. Indeed, MfS contends that walking can be used to access a variety of destinations within a range of up to 2 kilometres.

2.17 More recently, there has been an emergence of 20-minute neighbourhoods, based on a design ethos of creating complete, compact and connected neighbourhood, where people can meet their everyday needs within a short walk or cycle. This concept builds upon the notion of walkable neighbourhoods and places designed at pedestrian scale and is supported by a 20-minute neighbourhood guide published by the Town and Country Planning Association in March 2021.

2.18 The concept of walkable neighbourhoods is further captured within Placemaking Wales' Placemaking Guide (2020). Within the guide it is noted that walkable neighbourhoods provide opportunities for reducing car travel to tackle climate change whilst simultaneously improving mental wellbeing and boosting local economies.

Pedestrian Network

2.19 Footways are provided on both sides of Cardiff Road in the vicinity of the site serving the amenities of Dinas Powys, as well as Eastbrook station, to the south. At Cardiff Road leads northeast towards Llandough and the hospital the footway remains along the western side, and is a shared cycleway / footway approximately three metres in width.

2.20 Footways are additionally provided on the southern section of Pen-Y-Turnpike Road. These are provided continuously from approximately 100 metres to the north of the Millbrook Road / Pen-Y-Turnpike Road to the centre of Dinas Powys to the south.

2.21 There are two signalised crossing facilities on Cardiff Road that assist pedestrians in gaining access to bus stops and Eastbrook Station. To the east, a puffin crossing forming part of the bus lane control at the Cardiff Road / Redlands Road junction provides a safe crossing between bus stops and the wider footway network. To the west, an on demand puffin crossing allows pedestrians to cross from the northern side of Cardiff Road providing access to Eastbrook station to the south and the wider footway network.

2.22 In addition to the above, a range of public rights of way operate in the vicinity of the site. An east-west connection between Dinas Powys and Dingle Road can be accessed from Castle Drive to the south of the site. This route further provides a link to connections towards Cosmeston Lakes and Penarth to the south and east respectively.

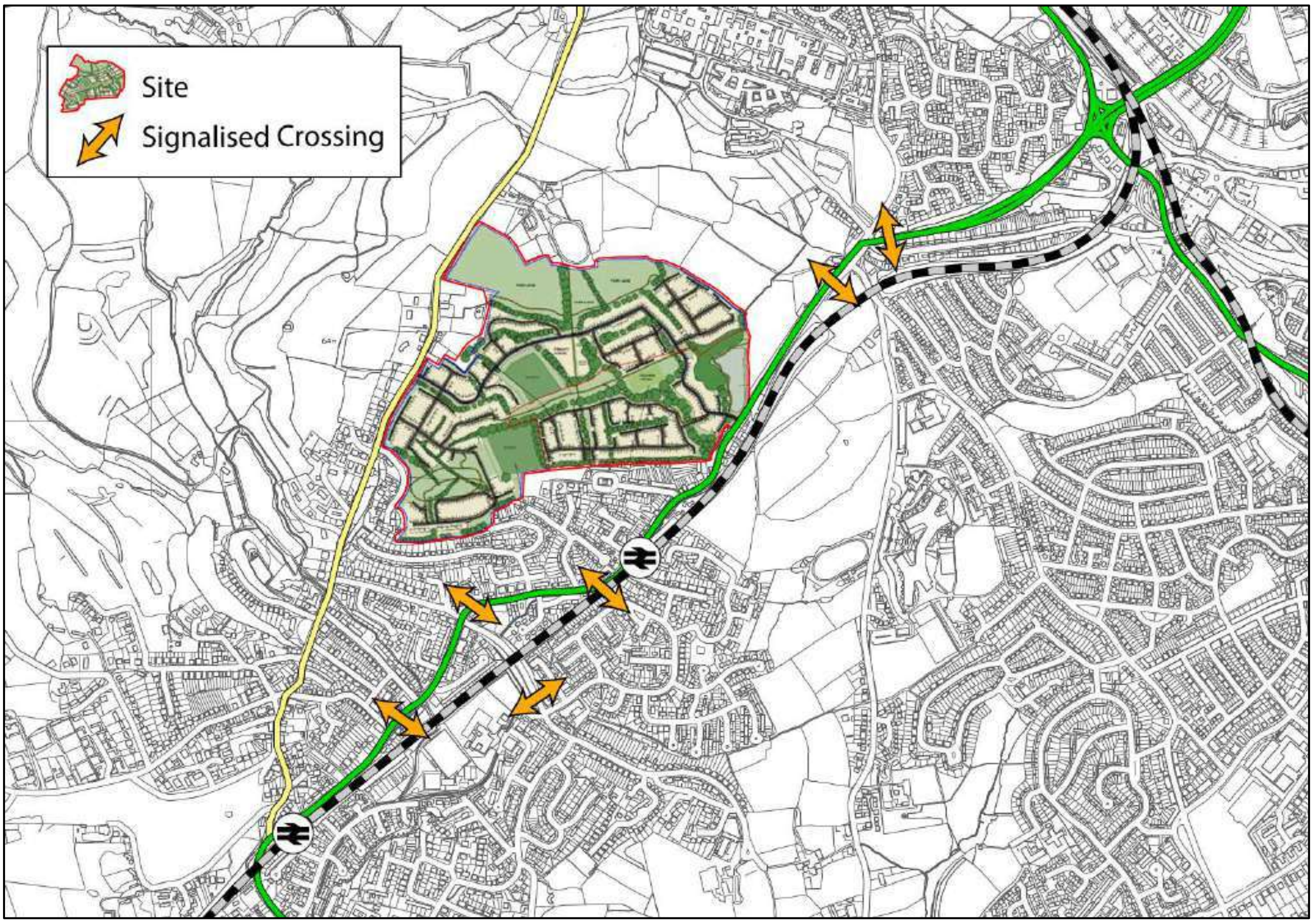


Figure 2.4 – Signalised Crossings

Cycle Network

2.23 As noted, the section of Cardiff Road joining the proposed site to the Merry Harrier junction benefits from a shared footway / cycleway, providing a connection to Llandough and it's associated facilities including the hospital.

2.24 The public rights of way, as described above, operate as shared surface allowing for cyclists and creating traffic-free links towards Dingle Road, Cosmeston Lakes and Penarth.

2.25 Route 88 of the National Cycle Network (NCN) can be accessed at Cosmeston which presently connects Penarth Marina to Cosmeston. From Penarth Marina, a connection to Cardiff Bay and Cardiff city centre, via NCN route 8, can be accessed.

2.26 To the south west, a signed cycle route operates from Cosmeston Lakes towards Barry via Sully largely comprising shared foot/cycleway along the B4267. This link can be used to access the western section of NCN route 88 operating from Barry to Bridgend.

2.27 NCN 88 is currently undergoing consultation within VoG with a proposal to extend the route to Eastbrook railway station, just 400m from the proposed Cardiff Road site access. This is a part of the LDP policy MG 16 (01) - SP 7 (06).

2.28 Numerous assessments have been undertaken of the cycling routes within VoG and specifically within Dinas Powys. These include the Sustrans walking and cycling audits undertaken in 2017 and various consultations of active travel routes. As a result of these, the Barry to Dinas Powys Active Travel Route was expected to live for public consultation in May 2022, although it is yet be made public.

Other Active Travel Network Improvements

2.29 In 2021 the Vale of Glamorgan began consultation on walking and cycling improvements across the council area. As a result, a range of future active travel routes are being considered within the local area, including shared foot/cycle links along Pen-Y-Turnpike Road and Cardiff Road, cycle links towards Cogan and pedestrian connections towards Westra and Lower Penarth.

2.30 In addition to the above, Nextbike launched an electric bike share scheme in VoG in November 2020 with pilot stations provided in Penarth, Cosmeston, Llandough and Sully. Following a successful launch it is proposed to install further stations, including at Dinas Powys, it is noted that no schedule or further details relating to location are available.

2.31 It is proposed to improve the NCN route 88 connection in other areas, linking the existing sections to provide a coastal route connecting Newport, Cardiff, Bridgend and Margam Country Park. To date, the following sections are operational:

- Caerleon to Newport
- Newport to Marshfield
- Cardiff City Centre to Penarth / Cosmeston
- Barry to Ewenny

2.32 As such, further works to connect Marshfield with Cardiff City Centre and Cosmeston to Barry will be considered.

Local Amenities

2.33 There are a plethora of local amenities available within Dinas Powys and the surrounding area including shops, schools, employment areas, leisure facilities, Llandough Hospital as well as excellent access to public transport opportunities such a buses and trains.

2.34 The village, although having a population of close to 10,000, benefits from a community feel spread across different areas which the proposed site can benefit from, as well as providing additional facilities which can further support the local area and community feel.

2.35 Existing residents of Dinas Powys often walk or cycle to local destinations, with the village square providing a typical village feel with pubs, hairdressers, takeaways, shops and other professional services. Other retail areas include The Parade (Tesco, post office, bank, takeaways, other retail), Camms Corner (florist, retail, professional services), the Cardiff Road retail units (garage, petrol station, vet, NISA local, takeaways, professional services.

2.36 From the south of the site, there are good connections in the form of footways primarily along Cardiff Road leading to most facilities. The facilities within the vicinity of the site are detailed in **Table 2.3**. All distances and times are calculated using google maps, which accounts for gradients and road crossings, and are taken from the proposed access at Cardiff Road.

Public Transport	Distance (m)	Walk Time(mins)	Cycle Time(mins)
Eastbrook Bus Stop (NB)	240	3	1
Eastbrook Bus Stop (SB)	300	4	1
Eastbrook Railway Station	400	5	1
Education	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Dinas Powys Primary School	850	10	2
Pen Y Garth Primary School	900	12	3
Murch Primary School	1400	16	4
St Josephs Primary School	1900	24	7
St Andrews Major Primary School	2200	29	10
St Cyres Secondary School	1200	16	4
Stanwell Secondary School	2300	30	12
Retail, Food & Drink, Other	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
The Parade (Murch)	1100	13	4
Cardiff Road Retail Units	1200	14	3
Camms Corner	1400	17	4
Dinas Powys Village Square	1500	19	6
Healthcare	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Llandough Hospital	1100	16	6
Murch Pharmacy & Medical Centre	1700	18	6
Sport & Leisure	**Distance (m)**	**Walk Time(mins)**	**Cycle Time(mins)**
Dinas Powys Football Club	1700	21	6
Dinas Powys Golf Club	1800	23	8
Dinas Powys Athletic Club	2200	27	9

Table 2.3 – Local Amenities

2.37 The location of these facilities in the context of the site is set out in **Figure 2.5**.

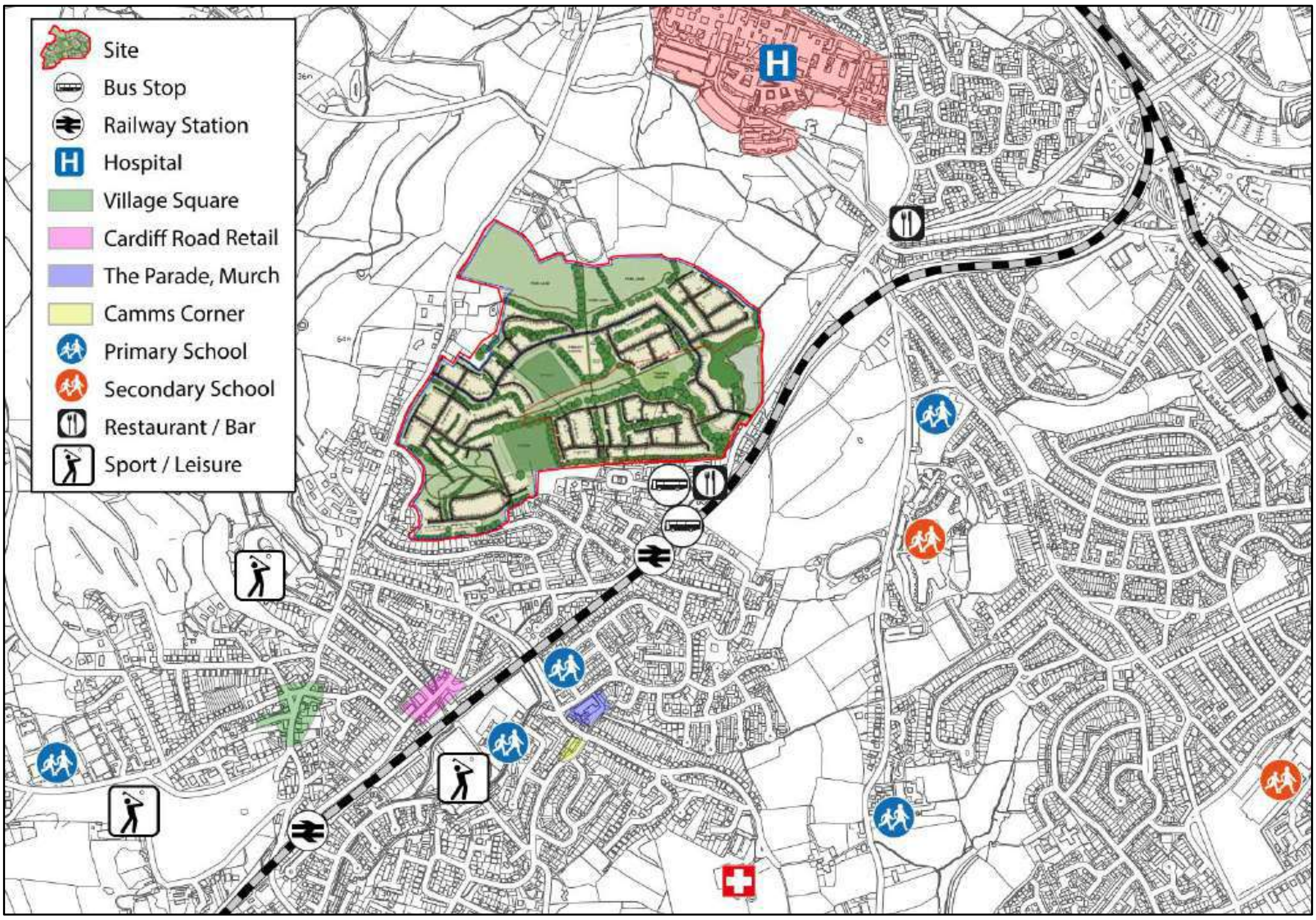


Figure 2.5 – Local Amenities

2.38 As well as being well located in order to make use of existing facilities in a community which is typically centred around being able to walk to these amenities, the site will also provide its own facilities which will enhance the surrounding area and also somewhat minimise trips off-site.

Public Transport Network

2.39 The site is well placed to make good use of the local existing public transport infrastructure, including bus and rail.

Bus

2.40 The nearest bus stops to the site are the 'Eastbrook' stops on Cardiff Road, with the northbound stop being approximately 260m from the proposed site access and the southbound stop being approximately 300m from the proposed site access.

2.41 The northbound bus stop benefits from a shelter and bench, as well as a flagpole and timetabling information. The southbound stop has a flagpole and timetabling information, and on-road bus stop marking.

2.42 Both of these stops are served by the 89A, 93, 95 and 304 services of which details are included in **Table 2.4**.

Number	Route	Frequency			Operator
		Mon-Fri	Saturday	Sunday	
89A	Cardiff – Dinas Powys	120	120	N/A	Adventure Travel
	Dinas Powys - Cardiff	120	120	N/A	
93	Cardiff - Morrisons	60	N/A	N/A	Cardiff Bus
	Morrisons - Cardiff	60	N/A	N/A	
95	Heath Hospital - Barry Island	30	30	60	Cardiff Bus
	Barry Island – Heath Hospital	30	30	60	
304	Llantwit Major – Cardiff	60	60	120	Adventure Travel
	Cardiff – Llantwit Major	60	60	120	

Table 2.4 – Local Bus Services

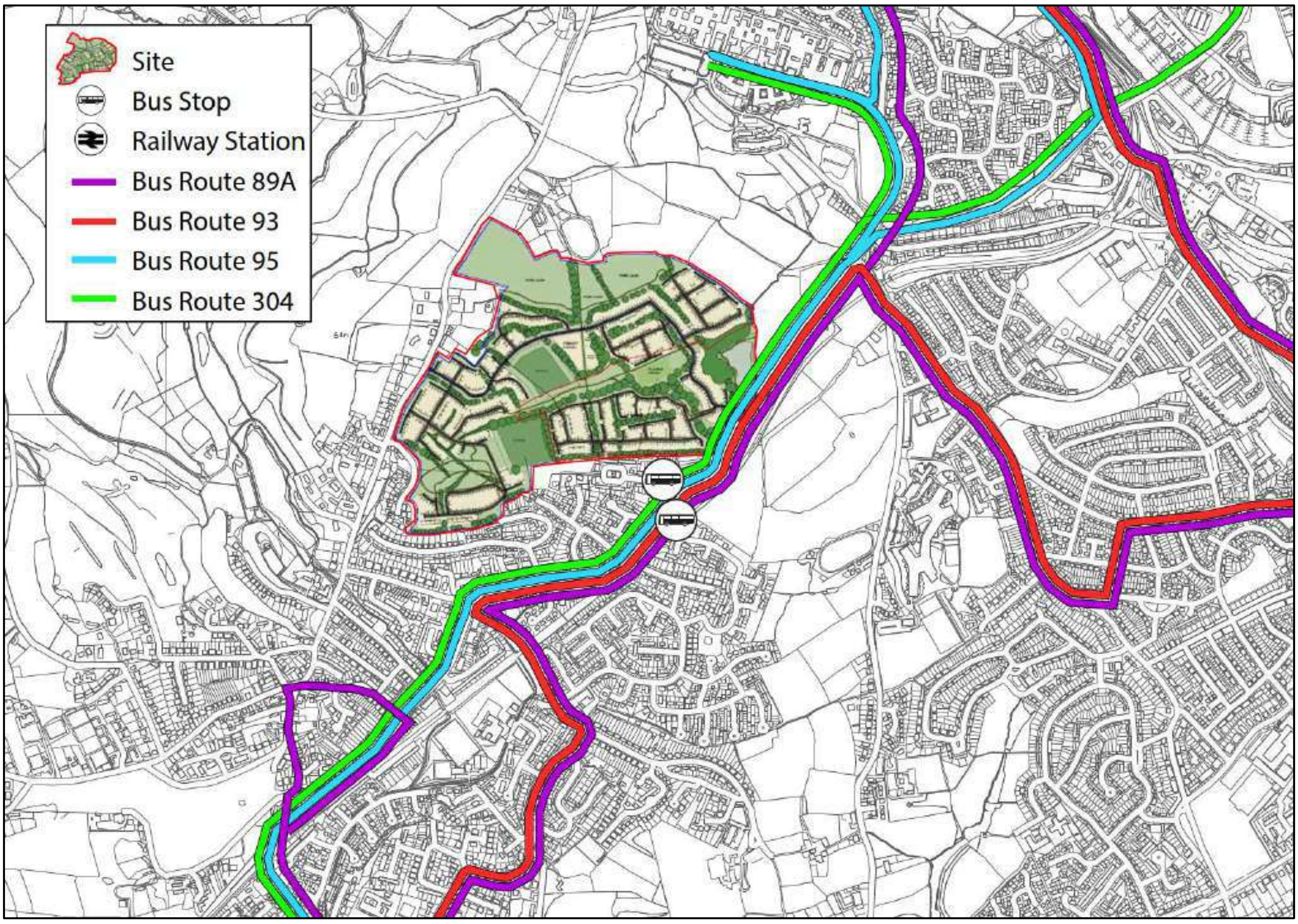


Figure 2.5 – Bus Routes

Rail

2.43 Dinas Powys benefits from two railway stations, the nearest of which is Eastbrook. Eastbrook railway station is approximately 400m from the proposed site access along Cardiff Road. It can be currently accessed by pedestrians via the footways along Cardiff Road, with the most convenient location to cross Cardiff Road being the signalised crossing just to the south of the station which also provides access to the pedestrian footbridge.

2.44 Station facilities at Eastbrook include self-service ticket machines (found on the Barry-bound platform 2), waiting shelters, a station car park, and customer information points with a train running information. Access to both platforms is via ramp; platform interchange without steps requires exiting the station and re-entering

2.45 Passenger services are operated by Transport for Wales as part of the Valley Lines network. Typical Monday-Saturday off-peak service sees trains from Eastbrook depart twice per hour for Merthyr Tydfil via the main Cardiff stations, twice per hour for Aberdare via Cardiff, three times per hour for Barry Island via Dinas Powys and Barry Docks, and once per hour for Bridgend via Dinas Powys, Barry Docks, Cardiff Airport, and Llantwit Major. Evening services see these trains operate every 30 minutes each direction; on Sundays, trains run twice an hour to Barry Island, two hourly to Bridgend, and twice or thrice an hour to Cardiff.

2.46 The railway stations and routes are illustrated in **Figure 2.6**

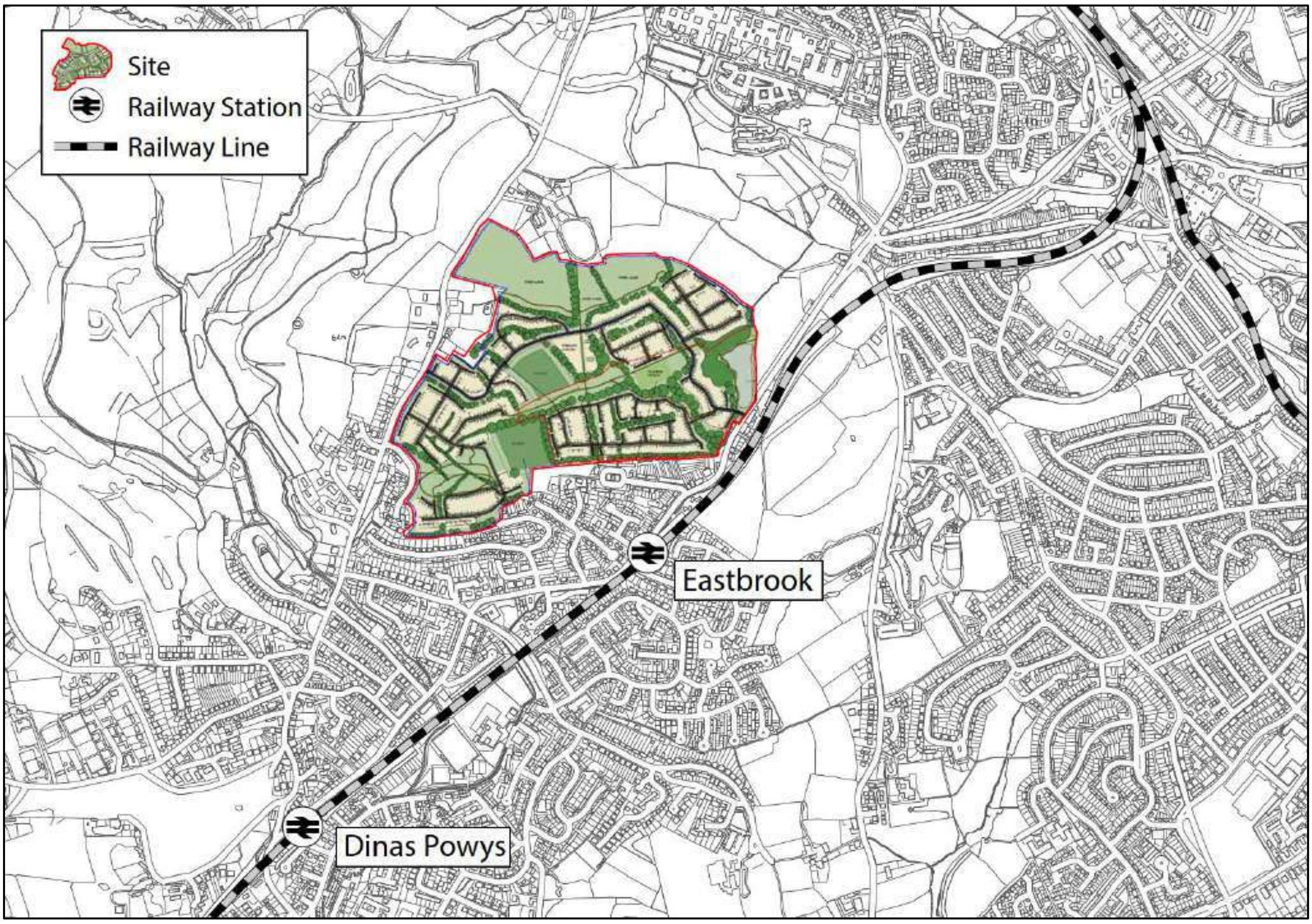


Figure 2.6 – Railway Stations

Summary

2.47 The site excellently located to take advantage of local facilities, and benefits from a good surrounding active travel network. There are a good range of public transport options, including Eastbrook station which provides a direct connection into Cardiff and towards Barry. The site is sustainably located and forms a natural extension to the existing settlement of Dinas Powys.

3 Policy Context

3.1 This section of the report outlines relevant policies for development and transport in Wales, which are cognisant of one another and follow a common theme; moving towards carbon reduction in the promotion of communities, virtual and active mobility, followed by public transport with private vehicle trips at the bottom of the hierarchy. This hierarchy is demonstrated in **Figure 3.1**.

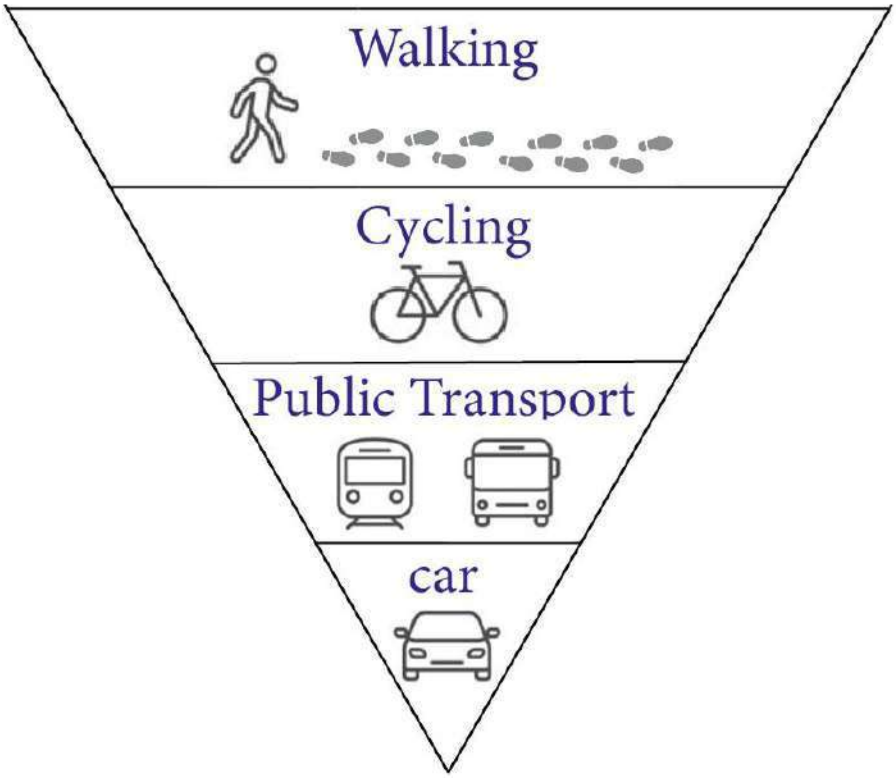


Figure 3.1 – Transport Hierarchy (Active Travel Act Guidance 2021)

Planning Policy Wales (Edition 11) (February 2021)

3.2 Planning Policy Wales Edition 11 (PPW11) sets out the land use planning policies of the Welsh Government. The primary objective of PPW11 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."

3.3 Section 4 of PPW11 concerns Active and Social places. It asserts that Active and Social Places are those which provide well-connected cohesive communities and further state that a 'Resilient Wales' is supported by protecting existing communities and natural environments whilst well-connected infrastructure and facilities closer to where people live.

3.4 Furthermore, with regards to sustainable transport, PPW11 advises that, in the context of active and social places, developments should encourage modal shift and be easily accessible by walking, cycling and public transport, by virtue of their location, design and provision of on and off-site sustainable transport infrastructure.

3.5 A key theme throughout PPW is the aim of reducing reliance on travel by private car, and the adverse impacts of motorised transport on the environment and people's health, by prioritising and increasing active travel and public transport. Additionally, it states that development proposals must seek to maximise accessibility by walking, cycling and public transport, by prioritising the provision of appropriate on-site infrastructure and, where necessary, mitigating transport impacts through the provision of off-site measures, such as the development of active travel routes, bus priority infrastructure and financial support for public transport services.

3.6 It is Welsh Government policy to require the use of a sustainable transport hierarchy in relation to new development, which is; walking, cycling, ultra-low emission vehicles and public transport. To this extent, paragraph 4.19 relates specifically to sustainable transport and states:

"The Welsh Government is committed to reducing reliance on the private car and supporting a modal shift to walking, cycling and public transport. Delivering this objective will make an important contribution to decarbonisation, improving air quality, increasing physical activity, improving the health of the nation and realising the goals of the Well-being of Future Generations Act."

Llwybr Newydd – The Wales Transport Strategy (May 2021)

3.7 The new Transport Strategy for Wales sets out the 'new path' that will shape the transport system over the next 20 years. It is a "new way of thinking that places people and climate change at the front and centre of our transport system". This document crucially defines the climate emergency as one of the biggest defining issues of our time, and the need to achieve net zero by 2050.

3.8 This seeks to improve the social, economic, environmental and cultural well-being of Wales. It contains seven well-being goals which local authorities as well as other public bodies must seek to achieve in order to improve well-being both now and in the future several of which support this strategy's promotion of sustainable travel.

3.9 The strategy sets out three urgent priorities which are illustrated in **Figure 3.2**.

Priority 1	Priority 2	Priority 3
Bring services to people in order to reduce the need to travel.	Allow people and goods to move easily from door to door by accessible, sustainable transport.	Encourage people to make the change to more sustainable transport.

Figure 3.2 – Wales Transport Strategy Priorities

3.10 Priority 1 seeks to reduce the need for people to use their cars on a daily basis by:

— Supporting remote working in line with Welsh Government target of 30% remote working;

— Locate new public services close to where people live and to existing public transport routes;

— Design new developments to be walk and cycle friendly from the outset;

— Maximise the use of land close to transport hubs;

— Improve access to fast and reliable broadband; and

— Set aside land for multi-modal hubs to transfer freight to smaller vans or e-cargo bikes for last mile deliveries.

3.11 The mobility strategy for the site will continue to be developed to meet these criteria including provision of a mobility hub as well as consideration for a community concierge facility to handle last mile deliveries, in accordance with the aspirations of Priority 1.

3.12 Priority 2 aims to achieve a shift away from private car use to more sustainable transport modes, enabling more people to walk, cycle, and use public transport, as well as low-emissions vehicles. It is expected that the inclusion of a mobility hub will allow future residents and visitors to switch between transport types and therefore be confident about leaving the car behind.

3.13 Infrastructure will be future-proofed where possible to adapt to climate change and facilitate more sustainable transport choices. In addition, new infrastructure will give priority to interventions that support walking and cycling, public transport and ultra-low emissions vehicles over other private motor vehicles.

3.14 Priority 3 seeks to encourage people to change their travel behaviour to use low carbon, sustainable transport. This will be done through (but not limited to):

— Developing a range of behaviour-change projects;

— Move from individual vehicle ownership to shared solutions;

— Reduce the cost of sustainable travel; and

— Support digital innovation.

3.15 Through the development design, on site mobility hub and promotion of active travel, the development will meet these priorities with the overall aim being to encourage an accessible, sustainable and efficient transport system.

Future Wales – The National Plan 2040 (February 2021)

3.16 'Future Wales – the National Plan 2040' (Future Wales) is the national development framework, setting the direction for development in Wales to 2040. Future Wales strongly considers the Well-Being of Future Generations (Wales) Act 2015, which gives a legally-binding common purpose – the seven well-being goals – for national government, local government, local health boards and other specified public bodies. It details the ways in which these bodies must work, and work together, to improve the well-being of Wales.

3.17 Future Wales recognises that Placemaking is at the heart of the planning system in Wales, and that this policy establishes a strategic placemaking approach and principles to support planning authorities to shape urban growth and regeneration.

3.18 Policy Two of Future Wales is titled Shaping Urban Growth and Regeneration – Strategic Placemaking. It states that Urban growth and regeneration should be based on the following strategic placemaking principles:

- creating a rich mix of uses;
- providing a variety of housing types and tenures;
- building places at a walkable scale, with homes, local facilities and public transport within walking distance of each other;
- increasing population density, with development built at urban densities that can support public transport and local facilities;
- establishing a permeable network of streets, with a hierarchy that informs the nature of development;
- promoting a plot-based approach to development, which provides opportunities for the development of small plots, including for custom and self-builders; and
- integrating green infrastructure, informed by the planning authority's Green Infrastructure Assessment.

3.19 Within its Strategic Placemaking Principles, Future Wales considers mix of uses, variety of housing, walkable scale, density, street network, plot-based development and green infrastructure.

3.20 Of vital importance to new developments such as the proposed site is the concept of the 'walkable scale'. This strategic placemaking principle states that to enable active and healthy lives, people should be able to easily walk to local facilities and public transport.

Active Travel (Wales) Act 2013 (October 2013)

3.21 The Active Travel (Wales) Act aims to make it easier for people to walk and cycle in Wales and makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve their infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport.

3.22 By connecting key sites such as workplaces, hospitals, schools and shopping areas with active travel routes, the Act will encourage people to rely less on their cars when making short journeys and make implementing successful Travel Plans easier.

Active Travel Act Guidance (July 2021)

3.23 The Active Travel Act Guidance was first published in July 2021 and is issued using the powers of the Welsh Ministers to give guidance under sections 2(6), 2(9), 3(4), 4(5), 5(2) and 7(2) of the Active Travel Act.

3.24 The act requires local authorities in Wales to produce maps of walking and cycling networks, and to deliver year on year active travel improvements along the mapped routes and their related facilities. These routes should be coherent, direct, safe, comfortable and attractive. The maps shall now be known as Active Travel Network Maps (ATNM) – showing existing routes and future routes which shall combine the Existing Routes Map and the Integrated Network Map required by the act.

3.25 As well as creating the infrastructure, the act includes provision for making people aware of the existing and future routes through the publication of the maps and for the promotion of active travel as a means of transport.

3.26 The active travel network is designed to serve everyday journeys. These are also known as utility journeys – trips with a purpose rather than purely for leisure. Examples of destinations which can be considered to form an everyday or utility journey include; school or other educational establishments, local shops, employment sites, healthcare facilities, and other destinations people travel to for a purpose.

3.27 **Figure 3.3** is an extract of Table 4.1 within the guidance which provides a guide for network development in relation to reasonable distances that would be travelled by each respective mode for everyday journeys.

	Less than 1km	Up to 3km	Up to 5km	Up to 8km	Up to 12km	Up to 24km
	Many users	Many users	Some users	Few users	Few users	Few users
	Many users	Many users	Many users	Many users	Some users	Few users
	Many users	Many users	Many users	Many users	Some users	Some users

Figure 3.3 – Active Travel Guidance Table 4.1

3.28 Two out of every three journeys are less than five miles in length – an achievable distance to cycle for most people, with many shorter journeys also suitable for walking. For school children the opportunities are even greater: three quarters of children live within a 15-minute cycle ride of a secondary school, while more than 90% live within a 15-minute walk of a primary school.

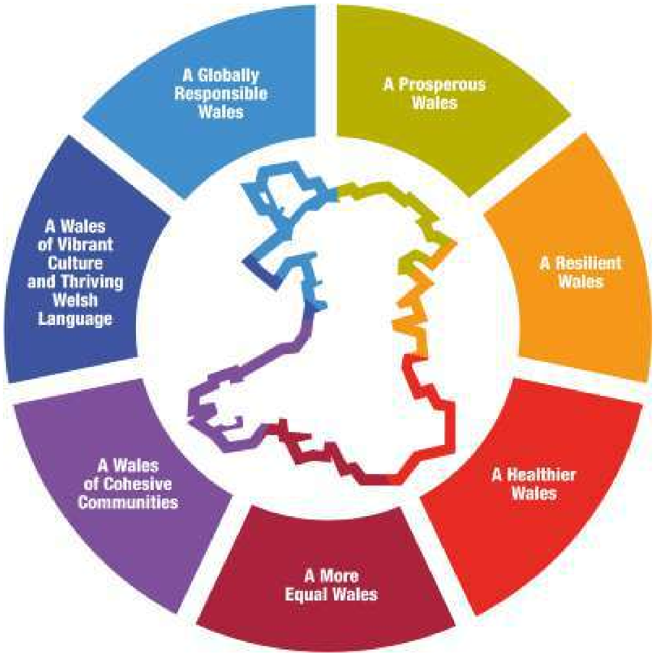
3.29 The guidance further states that developments that do not adequately make provision for walking and cycling should not be approved. This may include adequate off-site improvements for pedestrians and cyclists using existing highways that are affected by the development. The site has the potential provide excellent pedestrian links allowing for residents of the site to connect with the local area, as well as providing active travel benefits for the existing community.

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

3.30 Wales faces a number of challenges now and in the future, such as climate change, poverty, health inequalities and jobs and growth.

3.31 The Well-being of Future Generations Act puts in place seven well-being goals that will help to tackle these challenges. The Act makes it clear the listed public bodies must work to achieve all of the goals, not just one or two.

3.32 In terms of the impact of the goals on develop and travel, the first goal of 'A Prosperous Wales' recognises the need for an innovative, productive and low carbon society and is somewhat all-encompassing of the other goals and the need for sustainable travel options and low carbon communities.



South East Wales Strategic Development Plan

3.33 The Welsh Government published Future Wales: The National Plan 2040 in February making it the first ever national development plan in the United Kingdom. All Strategic Development Plans (SDPs) and Local Development Plans (LDPs) prepared in Wales now have to be in general conformity with Future Wales.

3.34 Following its release, the South East Wales SDP is due to be the first SDP to formally commence preparation in February 2022. This will introduce a tier of regional planning to address matters transcending Local Authority boundaries.

3.35 Most local authorities are currently in the process of reviewing their LDPs and are at different stages in the process of preparation; with tighter phosphate target levels in Special Areas of Conservation set by Natural Resources Wales causing delays to several reviews.

3.36 It is proposed that SDP's will allow "larger than local issues such as housing numbers, strategic housing allocations, strategic employment sites, strategic green infrastructure routes, supporting transport infrastructure which cuts across a number of LPA areas to be considered and planned for in an integrated and comprehensive way."

Vale of Glamorgan Local Development Plan 2011-2026

3.37 The presently adopted Local Development Plan (LDP) provides an overview of the local planning policies against which future development is assessed. Whilst a Replacement LDP is in the process of being prepared, it is considered that the existing document provides a suitable base against which to consider the proposals.

3.38 The LDP includes a number of key strategic objectives to steer development within VoG, of particular relevance are the following:

- Develop sustainable communities with opportunities for living, working, learning and leisure for all.
- Ensure development makes a positive contribution towards lowering the impacts of climate change.
- Reduce the need for residents to travel and provide greater access to more sustainable modes of transport.

3.39 The site is well located to form a natural extension to Dinas Powys, enhancing the existing community with facilities such as a new primary school. In addition, the proposed development would be supported by a comprehensive mobility strategy to encourage future users to travel via sustainable transport modes.

3.40 Policy SP3 considers the need for housing and identifies a need for the provision of 9460 new dwellings within the LDP period up to 2026. A recent review report has highlighted that housing provision to date is below the target within the Local Plan and, in order to reach the target within the Local Plan period, 840 dwellings would have to be constructed annually. It is therefore considered that the site is well placed to assist in reaching housing targets.

Summary

3.41 The principles of the development proposals comply with the transport related planning policies discussed within this chapter. Situated to the north of Dinas Powys, the site will seek to reduce the need to travel in the first instance with more sustainable modes of transport promoted for journeys beyond the site. This will be aided through design and continued promotion of the transport hierarchy placing pedestrian and cycle movements at the forefront of all development.

4 Proposed Development

Overview

4.1 The proposals comprise a development of 650-800 dwellings to act as a natural extension to the existing settlement of Dinas Powys. It is anticipated that the site would be delivered in two phases with phase 1 comprising circa 400 dwellings at the Cardiff Road frontage and future phases comprising the remaining dwellings, primary school and further ancillary uses to the north.

4.2 An initial masterplan is illustrated in **Figure 4.1** highlighting phase 1 of the proposals as well as the future development area to the north.

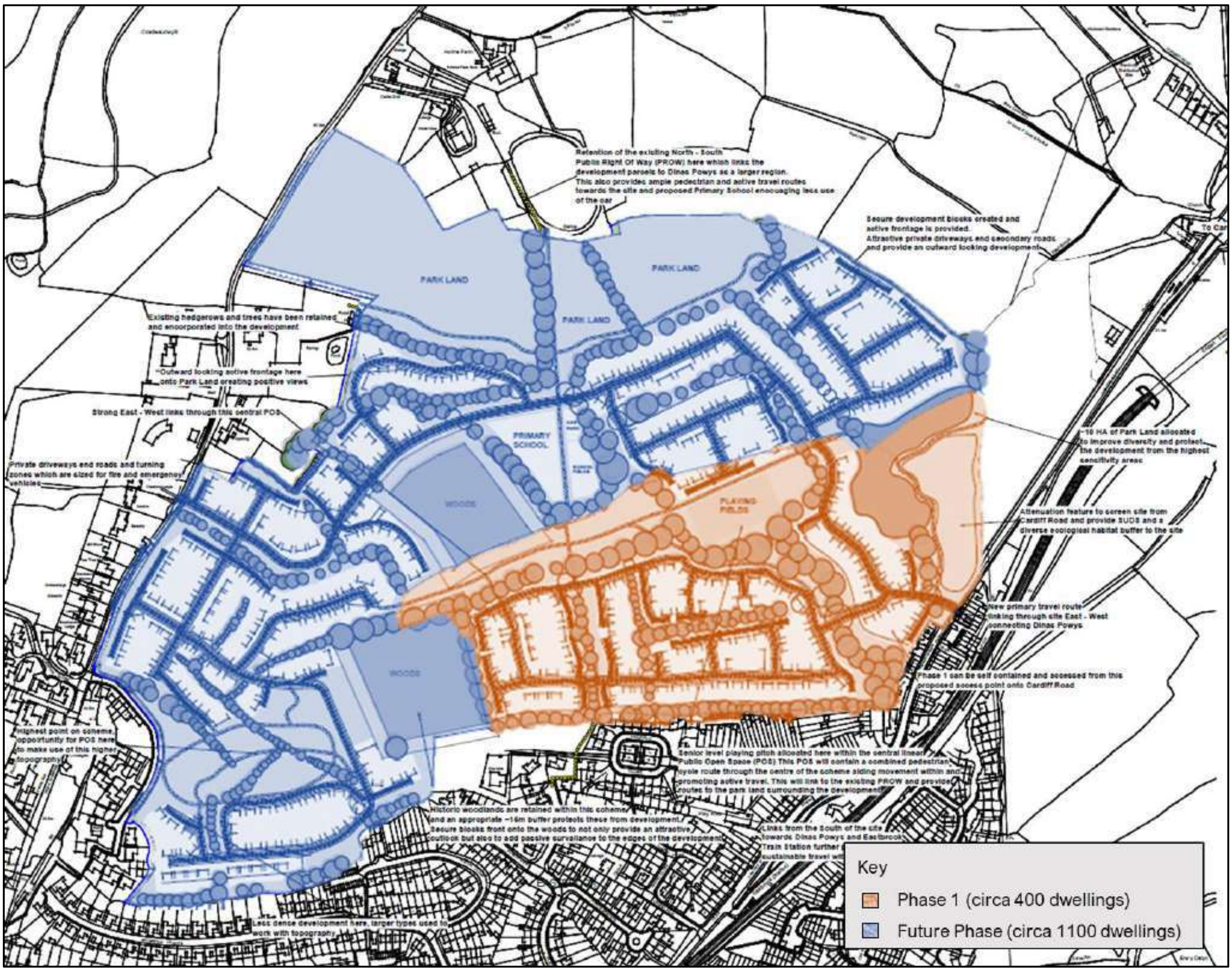


Figure 4.1 – Initial Masterplan

Masterplan

4.3 The development will be designed from the outset with movement by two feet and two wheels as a first choice. There are four key stages to creating a socially inclusive community that encourages community interaction in such a way to promote non-motorised travel modes, prioritising active travel followed by the use of the bus and rail. These stages are;

- Design;
- Choice;
- Behaviour; and
- Network Management.

4.4 Design is in terms of creating communities, where public interaction, outdoor and indoor, is the norm. Where friends and day-to-day activities are nearby and easy to get to, and where it is not an automatic reaction when leaving home to get into a car. The site is both well placed to take advantage of the proximity of a range of day-to-day facilities, and will be designed to enhance this.

4.5 The site design will be of a pedestrian scale where walking, cycling, and accessing public transport will be easy, and vehicle intimidation will be at its minimum. This approach is consistent with the movement hierarchy outlined in planning policy as highlighted in Section 2 of this report.

4.6 Choice is in terms of providing the infrastructure and facilities to minimise reliance on any single option. This widens social inclusion, and for instance, makes contributing to commuter car congestion on average more of a choice and less of a necessity. Through increased real choices a change in behaviour can be affected. The proposals will introduce and maintain any sustainable transport options and seek to encourage a net travel behavioural change in line with policy aims.

4.7 Behaviour is in terms of educating people in the options and consequences. It brings together awareness, health, environment, and personal convenience. One of the 'by design' aims is to create an environment where fewer people automatically choose to use their cars when leaving their homes, therefore decreasing the impact on the road network and on carbon emissions.

4.8 Network Management is in terms of managing the road network in accord with the user hierarchy set out by the Welsh Government in Planning Policy Wales (Edition 11) and Llwybr Newydd, prioritising walking and cycling above all else.

4.9 Development at the site will be visioned based on these themes and design principles.

Access Strategy

4.10 The access strategy for the development considers how safe and suitable access can be achieved by all users across a range of transport modes.

Pedestrian and Cycle Access

4.11 Permeability of the site with surrounding neighbourhoods will be a crucial feature of the design process. The site will be designed to feature a network of active travel links running throughout, allowing for permeability with the surrounding existing network including the pedestrian infrastructure on Cardiff Road.

4.12 Active travel infrastructure will be provided at all points of access to the site. In addition, two key active travel links will be provided comprising a north-south connection utilising an existing PRoW Holmes

Farm in the north and Highfield Close in the south. A similar east-west link will be provided connecting to the southern end of Pen-Y-Turnpike Road and on to Dinas Powys.

Vehicle Access

4.13 Phase 1 will be accessed from Cardiff Road. Whilst the access design is not fixed at this stage, it is anticipated that it will comprise a signalised junction with dedicated right turn lane on Cardiff Road. This strategy will further allow for a convenient crossing for pedestrians between the site and the southern side of Cardiff Road. An indicative access arrangement is included at **Appendix A**.

4.14 It is expected that the future phases would be served by a spine road utilising the Cardiff Road connection, as outlined above, and connecting to Pen-Y-Turnpike Road to the west.

Parking Strategy

4.15 Parking will be provided in accordance with Vale of Glamorgan standards as set out in the 'Revised Parking Standards SPG.'

4.16 The standards provide a zonal approach to parking policy with the site abridging Zone C, associated with suburban or near urban areas, and Zone E, associated with deep rural areas. As the proposed development will act as an extension to the existing settlement of Dinas Powys, it is considered that the standards associated with Zone C are most applicable. The resulting residential parking standards are summarised in **Table 4.1**.

	Resident Car Parking	Visitor Car Parking	Electric Vehicle	Cycle
Houses	1 space per bedroom (maximum 3 spaces)	1 space per 5 dwellings	10% of resident and visitor space to provide active EV charging facilities	Assumed provision within curtilage of dwelling
Flats				1 stand per 5 bedrooms

Table 4.1 – Residential Parking Standards

4.17 The proposed development will comply with the above parking standards, ensuring that there is no parking stress on the adjacent highway network, whilst seeking to not overprovide as to encourage unnecessary car ownership.

5 Changing Mobility

Overview

5.1 Mobility is a function of placemaking and is about accessing day to day facilities such as schools, shops, family and friends, healthcare, and the workplace. Strategic sites such as Land to the East of Dinas Powys, allow for a planned and coordinated approach to development, ensuring provision of effective mobility infrastructure. The aim of this approach is first and foremost to reduce the need to travel and offering a range of choice in how to travel.

5.2 Transport policy, which promotes active travel and places single occupancy car use at the bottom of the movement hierarchy, is intrinsically linked to health policy. Rising obesity is caused by sedentary lifestyles, and there is now a cross over between transport and health in prioritising investment in, and use of, active (walking and cycling) travel corridors to deliver transport objectives and health objectives.

5.3 The common threads through local and national policy are:

- Mobility, access to day to day and other facilities, is fundamental to liveability;
- Mobility must be provided through a plethora of realistic choices; and,
- The highest priority travel choices are ‘those which are most space efficient, most energy efficient, are likely to result in good community integration, and those which combat a sedentary lifestyle.

5.4 In the context of the site, it is therefore crucial to consider the strategy of the development in tandem with the wider Dinas Powys area.

Changing Trends in Mobility

5.5 The way that people understand mobility has changed, is changing and will continue to change in the future. Mobility is about accessing day-to-day facilities, such as schools, shops, friends, healthcare, and the workplace.

5.6 Per capita travel in terms of distance has decreased significantly over the past decade, and is now 10% lower than in the mid 2000’s. Each person makes significantly fewer trips now than they used to, and the car driving mileage per adult has dropped significantly. The historic correlation between income, costs and travel are weakening, with car driving per adult declining despite motoring costs remaining stagnant. The link between economic growth and travel has weakened.

5.7 Car use is falling most dramatically amongst younger people (younger than 35). Since 1996/98 the miles travelled by car by men aged 17-34 has reduced by 47%, and by women by 15%. Younger people are increasingly relying on public transport for their travel when compared to previous generations and are much less wedded to the car. The changing lifestyles are resulting in a car-oriented existence becoming less common amongst younger people.

5.8 Research shows a change in attitudes towards travel, such as:

— Cars are increasingly viewed as 'appliances not aspirations'

— There is a growing body of understanding of travel options

— Use of technology for communication and work whilst travelling is easier and safer by non-car modes

— For business travel there is some travel substitution by home working and video conferencing

— There is a growing disconnection between car ownership and car use leading to a wider use of alternatives including vehicle and journey sharing

5.9 These changes in attitude are set to accelerate, with the catalysts of the Central Government initiatives to promote healthier living, and the recently announced ban on all new diesel and petrol cars and vans by 2030.

5.10 There is an expectation borne out of emerging evidence that travel habits will continue to evolve so that a greater proportion of people will be travelling less, and using more socially inclusive mobility methods, such as walking, cycling, car sharing and public transport.

5.11 There is also increasing acknowledgement by local and national governments and individuals on the impact unsustainable travel can have on the environment. That is evident by the increasing number of local authorities, including Vale of Glamorgan Council, who have declared a climate emergency. Through reducing the need to travel unsustainably, the impact of transport on the environment can be reduced. This in part is the reasoning given by Welsh Government for aiming for 30% of the Welsh workforce to work from home in the longer term.

Local Living

5.12 Local living or 'liveability' is at the forefront of people's minds right now and 15-minute neighbourhoods are based upon a design ethos of creating complete, compact, and connected neighbourhoods where people can meet their everyday needs within a short walk or cycle.

5.13 This is not a new concept and historically many towns and cities have evolved around a model similar to a 15-minute neighbourhood. The emergence of these walkable places to live has grown around the world, and the need for them has only been quickened by the Covid-19 pandemic which has put a spotlight on the importance of the liveability of where we live.

5.14 This idea presents multiple benefits including boosting local economies, improving people's health and wellbeing, increasing social connections in communities, and tackling the climate change emergency.

5.15 The features of a 15-minute neighbourhood include a range of facilities provided within towns and cities, and it may be that some of these facilities are situated within the surrounding area and are not required on site. The masterplan of the wider development features a primary school and it is expected that other non-residential uses will serve the site. Furthermore, the facilities of Dinas Powys are within a 15 to 20 minute walk for future residents and therefore accessed easily from the site.

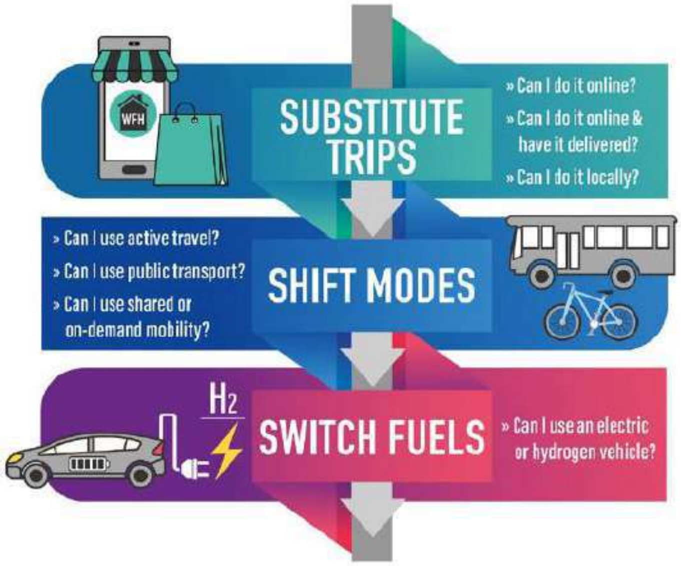
Vision and Validate

5.16 Building on the 15-minute neighbourhood principles, the mobility strategy for the site will embrace a vision and validate approach to minimise the need for travel.

5.17 The mobility strategy supports the vision by following the SAM (sustainable accessibility and mobility) Framework (RTPI, Net Zero Transport: the role of spatial planning and place-based solutions. January 2021).

5.18 This basic hierarchy is summarised in the 'Sustainable Accessibility and Mobility (SAM) Framework', a tool created by Vectos to help planners and designers prioritise interventions in the following order:

- **Substitute Trips** and replace the need to travel beyond your community. This can include working from home more, centralised delivery provision such as Amazon lockers, and provision of on-site education facilities.
- **Shift Modes** to use active, public and shared forms of transport when foot and cycle are not suitable. This can be improved through provision of mobility hubs featuring public transport stops, car sharing and bike hire facilities.



- **Switch Fuels** for any trips that must be made by car, ensuring the vehicle is zero emission. This will be aided by provision of electric vehicle charging infrastructure throughout the site.

Mobility as a Service (Maas)

5.19 Mobility-as-a-Service (MaaS) is at the forefront of change, and is a concept of combining services from public and private transport providers in one place which allows users to create and manage trips, which they can then pay for from a single account, typically a single app.

5.20 MaaS can be delivered by a range of innovative new mobility services complementing more established transport modes, and can include:

- Demand Responsive Transport;

- Active Travel Corridors;
- Bike sharing /electric bike schemes;
- Car clubs/carpooling;
- Virtual mobility;
- Personalised Travel Planning;
- Mobility Hub; and
- Workhubs (the 'third-place).

5.21 One single initiative will not deliver mobility, but the combination of these services and the collection of access to each service in a single location (or app) will provide people with the Mobility and choice they desire.

6 Transport Strategy

6.1 The transport strategy for the site draws upon the various trends in mobility, change in attitudes towards travel and opportunities to reduce the need to travel beyond the local area. The phase 1 transport strategy forms the first part of the wider strategy for the full development of circa 1500 dwellings.

Community Infrastructure

6.2 It is expected that a mobility hub will be provided as part of the phase 1 development and this will be where the MaaS services would be available, offering numerous sustainable modes of travel for residents to choose from in one place. It is expected that services could include bike hire, electric vehicle charging facilities and access to a car club vehicle, the final level of service to be provided will develop alongside the final masterplan for the site.

6.3 It is considered that the mobility hub could be combined with a community concierge service and community hub to provide a cohesive and connected approach to living. As such, additional services that could be offered may include:

— Centralised delivery services such as Amazon lockers.

— Retail facilities such as a local food store.

— Working facilities such as a café or hireable desk space.

6.4 The above also feeds into the concept of a third place, with facilities available at these hubs to enable third place working and retain trips within the site.

Mobility Hub Concept

Active Travel

6.5 Designing the site to a pedestrian scale allows for the maximum opportunity to provide social inclusion. Pedestrian and cycle routes are designed to ensure full permeability through the site including connections through cul-de-sacs, and all internal routes will benefit from ample natural surveillance ensuring they are not only convenient links, but secure and attractive also.

6.6 Active travel infrastructure will be provided at all points of access to the site. In addition, two key active travel corridors will be provided comprising a north-south connection utilising an existing PRoW Holmes Farm in the north and Highfield Close in the south. A similar east-west corridor will be provided connecting to the southern end of Pen-Y-Turnpike Road and on to Dinas Powys.

Bike Sharing

6.7 Bike sharing schemes can make cycling as a travel mode more accessible and salient. Nextbike (now known as OVOBikes) is the bike shared provider within Vale of Glamorgan and Cardiff. This scheme has fixed docking points, various levels of fees and monthly memberships. The scheme is set to be expanded to include Dinas Powys in the near future and it is considered that this could be developed in tandem with the provision of new active travel links throughout the site and to existing provision in order to promote and encourage cycling, either as the main mode of transport for or as part of a multi-modal journey.

Scooters

6.8 The UK Government is currently taking part in 'Future Transport Zone' trials for e-scooter hire, with a view of making them legal to use on a road. Similarly in Wales, the Welsh Government are exploring their use across Wales.

6.9 GOiA are leading the charge on the electric micro-mobility future with the launch of e-scooter rental opportunities. They are currently in talks with Local Authorities across Wales and the rest of the UK to offer e-scooters in towns and cities (subject to government agreement).

Public Transport

6.10 Pedestrian links to existing public transport interchanges will be retained and enhanced as part of the development proposals. For example, the north-south active travel corridor connecting to Highfield Close will provide a convenient link to existing bus stops on Cardiff Road for future residents. Furthermore, the proposed signalised site access junction will create a safe crossing of Cardiff Road connecting residents to Eastbrook station.

Community Transport

6.11 Community transport can be key in unlocking development to people of all ages, providing support to those who are unable to drive with a level of flexibility around pick-up and drop-off locations to minimise walking distance.

6.12 The site is located within an area already served by a range of community transport services, these comprise the Greenlinks Community Transport service and the Dinas Powys Voluntary Concern (DPVC) minibus service.

6.13 The Greenlinks Community Transport service provides minimis hire opportunities alongside weekly 'on-demand' bus services and a rural vale to Cardiff service. Users are required to call a freephone number by midday one working day before travel to secure a space on their chosen service.

6.14 The DPVC community transport service operates an accessible minibus with fortnightly shopping visits to a local supermarket provided as well as transport to regular social activities within the local community such as coffee mornings. DPVC further offer a service for medical / health appointments which makes daily trips to the Dinas Powys medical centre as well as offering travel to Llandough Hospital.

Personalised Bus Services

6.15 Zeelo is a great example of a 'mobility platform that manages transportation requests from multiple passengers headed in different directions with a free-floating fleet of vans and minibuses'.

6.16 Journeys are performed based on both pre-booking and on-demand booking. Passengers can book and manage their rides through client branded mobile apps and designated websites, and are able to track current, future and past rides. Zeelo's solution flexes according to public needs, responding to changing demand and various trip type requirements.

Travel Planning

6.17 Personalised Travel Planning (PTP) can have a significant impact on travel behaviour and travel patterns, helping to achieve more sustainable travel practices and healthier lifestyles, which in turn contribute to a more socially inclusive community and help protect the environment. PTP can be effective both amongst existing residents and communities and in new developments.

6.18 PTP provides tailored information directly to the individual on sustainable mobility options through a one to one discussion with a PTP Adviser. The personal approach and specifically tailored information can lead to a greater propensity for behavioural change than a one-size-fits-all approach.

6.19 PTP will be considered as part of future development at the site to enable residents to make the most of the wide range of travel choices that will be available, and to contribute to instilling sustainable travel behaviour from the outset.

Vehicles

6.20 Whilst the overarching aim of the mobility strategy is to reduce trips undertaken by car, it is acknowledged that on occasion there is not a suitable alternative. Therefore opportunities to reduce the potential impact of vehicle trips must also form part of any mobility strategy at the site.

Car Clubs

6.21 A car club allows multiple people to access and drive one vehicle, for example, several people in the same community would drive the car on different days of the week. As such, car clubs offer the convenience of owning a private vehicle without the costs associated with fuel, servicing and repairs.

6.22 Access without ownership is becoming more common in modern-day living. Across the UK in 2007 there were approximately 32,000 members of a car club, a decade later this figure has soared to around 250,000 members.

6.23 Studies have demonstrated that each shared car replaces between eight and eleven private cars. Car clubs are becoming more prominent in towns and cities across the UK, and car club spaces can be located strategically at key destinations, major employment sites, transport hubs, and town and city centres. The membership of car clubs is increasing, reflecting people's changing attitudes towards mobility.

6.24 The provision of car clubs will encourage people to adopt more sustainable travel habits with the knowledge that should an emergency arise, the need to travel home quickly, or the need to run an errand, collect a parcel, or vary their journey in another way, there is a flexible option which can be used as required on-demand.

Electric Vehicle Charging

6.25 The recently announced ban on all new diesel and petrol cars and vans by 2030 highlights that EVs will be the primary form of private vehicles in the near future. As such, the development will commit to providing passive EV charging infrastructure in every dwelling, as well as ensuring the site-wide electricity infrastructure can accommodate this, so that future residents can choose EVs in the future knowing that there is both the reliable infrastructure and capacity to charge their EVs at home.

6.26 In addition, charging facilities for visitors to the site will be provided in accordance with VoG standards. It is expected that some level of EV charging facility would also be provided at any mobility or community hub provided at the site.

Summary

6.27 Ultimately, the aim of the Transport Strategy is to seek to minimise the quantum of trips that occur external to the site, and to ensure that these trips are made by sustainable modes. This can be achieved by a significant number of residents at Phase 1 working from home with reliable broadband and local facilities which mitigate the need for travelling further afield. Phase 1 can also remove existing trips from the highway network by providing a community, education and retail facilities.

7 Trip Assessment

7.1 It is considered that a vision and validate approach to future trip generation should be used in context of the transport strategy and planning policy.

Trip Internalisation

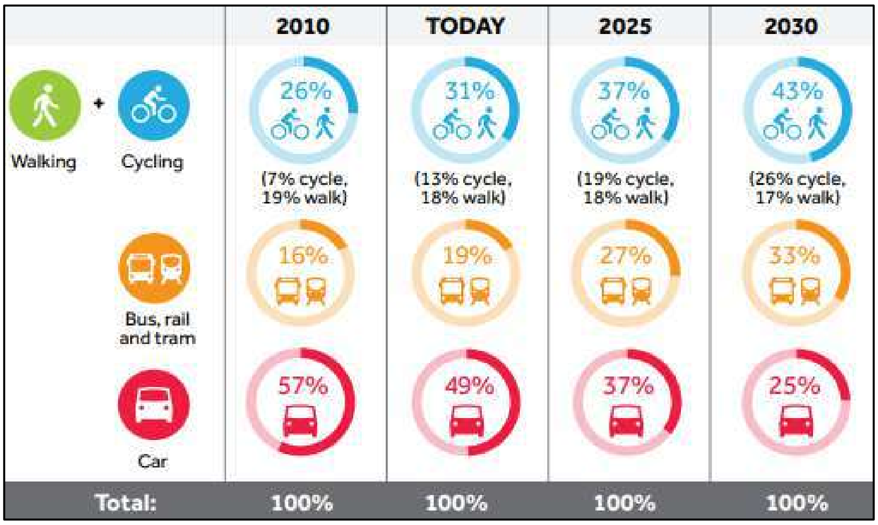
7.2 The site has the potential to provide a mobility hub and community facilities whilst it is anticipated that the future wider development would also provide education facilities in the form of a primary school.

7.3 Based on industry standard data, the majority of travel is for reasons of education and leisure (including incidental shopping). Commuting and business form other reasons for travel, with a marked increase in working from home or from a Third Place in the community since the onset of the pandemic. A trend which is expected to last. By design, the opportunity for internalisation of day-to-day trips within the local community will be maximised by the site.

The 50/50 Split

7.4 Given the context of the location the site to Dinas Powys and the western border of Cardiff, Cardiff's LDP notes the intention of the council to achieve a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport.

7.5 The figure to the right, shown within the Cardiff Transport White Paper, published in 2020, shows the great progress Cardiff has already achieved in meeting this policy. It also indicates the ambition of the council to go further in reducing car usage through a mixture of public transport and active travel.



Working From Home

7.6 A Briefing Paper was published by the independent Wales Fiscal Analysis (WFA), a research body within Cardiff University's Wales Governance Centre in July 2020, two months before the Welsh Government announced its target of 30% working from home in September 2020.

7.7 The paper outlines how 39.9% of Welsh jobs could be done from home and 65.5% of employees have reported that they were able to produce more work per hour working from home during COVID-19, and therefore they would like to continue working mainly from home in the future. This indicates that there is both potential and desire for a proportion of the population to continue working from home after COVID-19, whether that be full time or shared between home working and a traditional work environment. As such, the Welsh Government aspiration of 30% working from home is both realistic and appears achievable.

7.8 A step-change in home working is already happening, with many large companies publicly reducing office or desk space for employees on the basis than many or all will continue to work flexibly in the UK (for example KPMG, HSBC, Lloyds Banking Group, Unilever).

Trip Generation

7.9 A high-level trip generation assessment has been undertaken to determine the likely impact of phase 1 on the surrounding transport network. The assessment has been undertaken as follows:

- Person trip rates have been obtained from the TRICS database associated with similar sized developments in similar locations.
- Trip purpose has been determined with consideration for data within the National Travel Survey (NTS) which divides trips into commuting, education, leisure, retail and other purposes.
- An adjustment to commuting trips has been made to account for the Welsh Government aim of 30% of people working from home in the future.
- An additional internalisation of primary school trips has been undertaken to account for the proposed primary school to be provided within the future phases of development.
- Mode share data has been obtained from the 2011 Census for commuting trips whilst NTS data has been used to inform mode split for other trip purposes.

7.10 A summary of the expected trip generation by mode for all purposes is provided in **Table 7.1** whilst a full summary is attached at **Appendix B**.

Mode	AM Peak (0800-0900)			PM Peak (1700-1800)		
	Arr.	Dep.	Tot.	Arr.	Dep.	Tot.
Train	1	6	7	6	3	9
Bus, minibus or coach	9	38	47	12	5	16
Taxi	0	1	1	2	1	4
Motorcycle or scooter	0	0	0	1	0	1
Car driver	24	100	123	115	8	164
Car passenger	5	23	28	45	19	67
Bicycle	2	8	10	4	2	6
Foot	25	104	127	39	16	52
Other	1	5	6	2	1	3
Work from Home	5	21	26	27	11	38
Total	**73**	**305**	**377**	**253**	**105**	**360**

Table 7.1 – Trip Generation by Mode

7.11 **Table 7.1** demonstrates that, during the morning peak hour, the proposed development could generate in the order of 54 public transport trips, 137 active travel trips and 123 vehicle trips. In the evening peak hour, it could be expected to result in 25 public transport trips, 58 active travel trips and 113 vehicle trips.

7.12 It is considered that through the implementation of the transport strategy as outlined in Section 6 and internalisation opportunities that the level of vehicle trips could be substantially reduced. As such, the above assessment is considered to be a worst-case scenario.

Trip Distribution

7.13 The 2011 Census data has been investigated in order to determine the distribution of vehicle trips from the site, based on the 'WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)' records. This exercise has been undertaken in order to determine routes that vehicle trips generated by the site will take, and thus allowing for an assessment of the proposed development's impact on the junctions surrounding the site.

7.14 The MSOA used as the point of origin for this distribution exercise is 'The Vale of Glamorgan 006', the Mid-Layer Super Output Area (MSOA) in which the site resides. The destination MSOAs include every MSOA within England and Wales.

7.15 The trip distribution has been initially categorised into vehicles travelling north and south from the site access along Cardiff Road. Following this, the traffic adjudged to be travelling north has been distributed through each arm of the 'Merry Harrier' junction.

7.16 All vehicle trips have been distributed using the online Google Maps 'Directions' tool, and professional judgement has been applied to routing closer to the site, on occasions when two or more routes could be taken to a destination. In these situations, the common solution has been to split the trips equally between the routes.

7.17 The distribution is demonstrated in **Table 7.2**, clearly setting out the split between Cardiff Road (North) and Cardiff Road (South).

Route		Census Trips	Percentage
Cardiff Road (North)	Penlan Road	430	20%
	Barry Road	1118	52%
	Redlands Road	133	6%
Cardiff Road (South)		467	22%
Total		**2,148**	**100%**

Table 7.2 – Vehicle Trip Distribution

7.18 As demonstrated, 22% of traffic has been distributed south form the site access along Cardiff Road, with the remaining 78% distributed to the north. Of the 78% of traffic distributed north to the Merry Harrier junction, 20% is distributed along Penlan Road (towards Leckwith), 52% along Barry Road (towards the Baron's Court junction) and 6% along Redlands Road (towards Penarth).

Junction Impact Assessment

7.19 Following the distribution exercise, a junction impact assessment has been undertaken in order to assess the impact of the development on local junctions.

7.20 The 2022 base flows have therefore been compared with the proposed number of trips forecast to be associated with the development in the AM and PM peaks, and the results subsequently analysed.

7.21 The two junctions assessed are the signalised Merry Harrier junction to the north, and the signalised Cardiff Road crossroads to the south. **Table 7.3** sets out the forecast junction impacts based on the 2022 traffic surveys and the trip generation / distribution exercise.

Junction	Time Period	Total Junction Flows		
		2022 Base	Development	% Impact
Merry Harrier Junction	AM Peak 0800-0900	2461	97	3.9%
	PM Peak 1700-1800	2686	127	4.7%
Cardiff Road Crossroads	AM Peak 0800-0900	1466	27	1.8%
	PM Peak 1700-1800	1843	35	1.9%

Table 7.3 – Junction Impact Assessment

7.22 As is demonstrated within **Table 7.3**, the highest impact on total flows at any junction is at the Merry Harrier Junction in the PM peak, with a maximum impact of 4.7%.

7.23 Whilst there is not a uniformly accepted threshold at which junction modelling should be undertaken, it is pertinent to note that Environmental Assessments typically refer to transport impacts warranting further investigation when traffic flows increase by more than 10% in sensitive locations and 30% in those areas that are not considered sensitive. The lower threshold is consistent with what are generally accepted to reflect typical daily fluctuations in exiting traffic flows.

7.24 When viewed in this context the information presented at **Table 7.3** would suggest that the increases in development related traffic would not warrant further detailed investigation. Indeed, historic guidance prepared by the CIHT suggested that detailed modelling would only normally be required once traffic flows increased by 5%.

7.25 It is therefore considered that the impact of the proposed development will not have a perceptible effect on the current operational capacity of the Merry Harrier junction nor the Cardiff Road crossroads junction.

8 Junction Modelling

8.1 As noted in Section 4 the proposed development would be accessed via a signalised junction with Cardiff Road. The proposed arrangement has been modelled within the industry standard LinSig software to ascertain the likely operation during peak hours.

Assessment Scenarios

8.2 A baseline scenario has been informed by traffic surveys undertaken in June 2022. A TEMPRO growth factor, accounting for expected growth in the local area, has been applied to provide a 2032 'without development' scenario. The following growth factors have been used:

— AM Peak 1.0724

— PM Peak 1.0741

8.3 The development traffic as outlined in Section 7 has been added to the 2032 'without development' scenario to provide a 2032 'with development' scenario.

Modelling Results

8.4 LinSig considers the relationship between the traffic flow and the capacity of a road, referred to as Degree of Saturation (DoS). In addition, LinSig shows the Practical Reserve Capacity (PRC) of the junction as a percentage, which indicates the amount of residual capacity of a junction.

8.5 A summary of the modelling results is provided in **Table 8.1** whilst the full modelling outputs are attached at **Appendix C**.

	Maximum DoS	Maximum Queue	PRC
2032 With Development AM	46.2%	6.3	94.9%
2032 With Development PM	55.9%	11.7	60.9%

Table 8.1 – Modelling Results Summary

8.6 As outlined in **Table 8.1,** the proposed site access arrangement is expected to operate well within the theoretical capacity of the junction following the inclusion of development traffic and therefore is suitable to serve the development proposals.

9 Summary and Conclusion

9.1 This report has been prepared by Vectos on behalf of Persimmon Homes to outline the Transport Strategy for the wider development and initial access arrangements for phase 1 of a residential-led development on land east of Dinas Powys.

9.2 It is proposed to provide circa 400 dwellings in the first phase of a larger 650-800 dwelling development along with provision for a primary school. Phase 1 will be accessed from Cardiff Road (A4055) via a signalised junction with dedicated right turn lane. It is expected that the future phases would be served by a spine road utilising the Cardiff Road connection, as outlined above, and connecting to Pen-Y-Turnpike Road to the west.

9.3 The site benefits from connections to Dinas Powys, as well as nearby public transport interchanges, which will be enhanced as part of the development proposals. The Transport Strategy for the site seeks to build on the existing links and encourage future residents and visitors to travel via sustainable modes of transport.

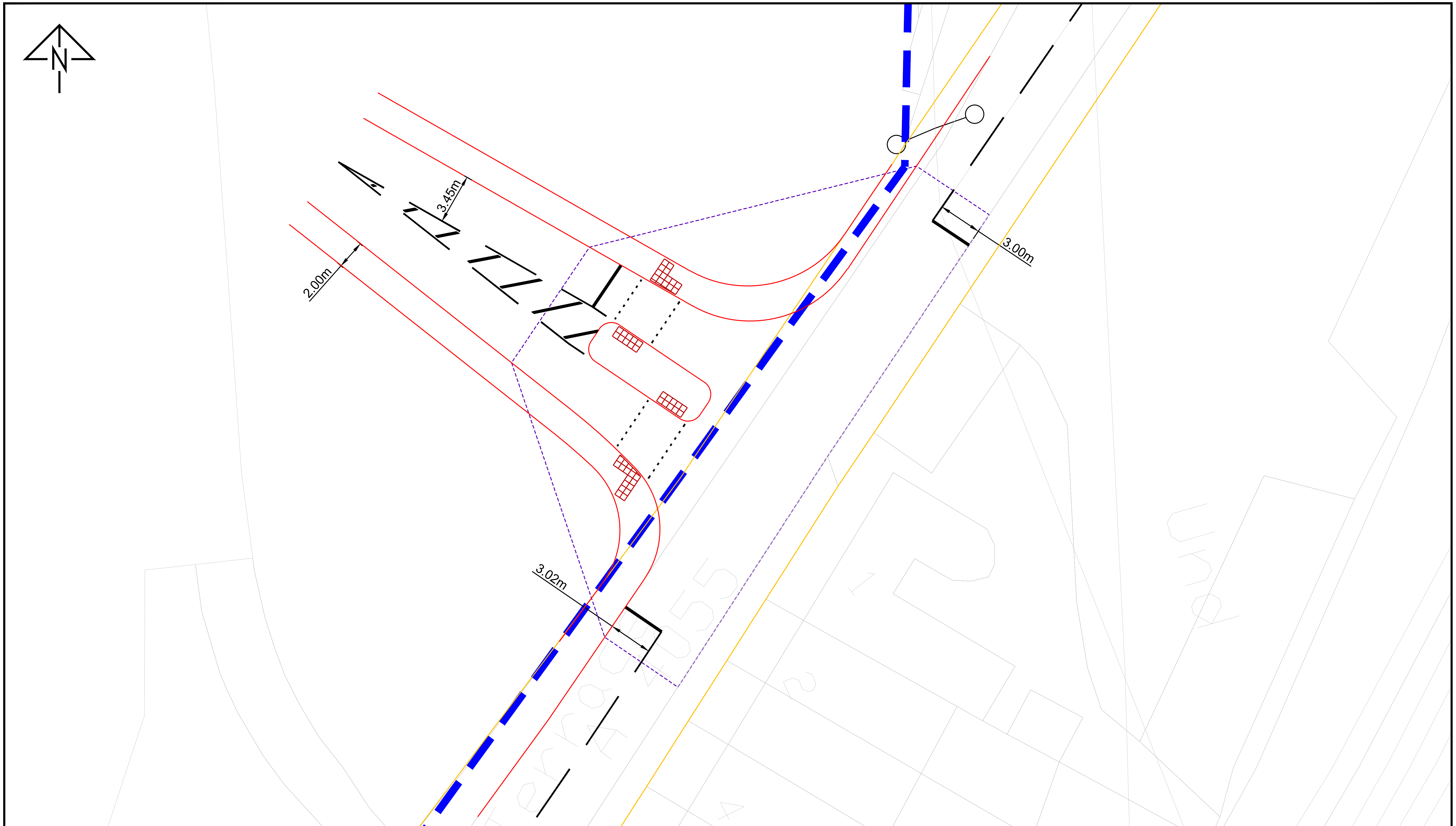
9.4 It is anticipated that this can be enhanced by a significant number of residents at Phase 1 working from home with reliable broadband and local facilities which mitigate the need for travelling further afield and align with Welsh Government working from home aspirations.

9.5 Junction modelling has been undertaken of the proposed site access to ascertain its suitability to serve the development. It has been demonstrated that the proposed site access arrangement is expected to operate well within the theoretical capacity of the junction following the inclusion of development traffic and therefore is suitable to serve the proposals.

9.6 This report demonstrates that the site is suitably located for a residential development observing the principles of national policies, and ultimately can deliver the necessary growth in VoG whilst contributing towards a Carbon Neutral goal as per the declared Climate Emergency in Wales.

Appendix A

Indicative Site Access Arrangement



REV.	DETAILS	DRAWN	CHECKED	DATE
A	Staggered Crossing added.	KR	KD	06.09.22

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

- Land Ownership Boundary (shown indicatively)
- Adopted Highway Boundary
- Junction Intervisibility

Cardiff Road, Dinas Powys

Persimmon Homes

Proposed Access General Arrangement Signalised Junction

vectos. PART OF SLR

Ground Floor, Helmont House, Churchill Way, Cardiff CF10 2HE
t: 02920 720 860 e: vectos@vectos.co.uk

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
KR	KD	22.06.22	1:250 at A3	194849_PD01	A

Appendix B

Trip Generation Calculations

Land to the East of Dinas Powys: Trip Generation

Proposed Residential Development

TOTAL UNITS	400

Vehicle Trip Rates

House Type	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Private Houses	0.180	0.764	0.944	0.635	0.263	0.898
TOTAL	**72**	**306**	**378**	**254**	**105**	**359**

Trip Purpose

National Travel Survey Table NTS0502: Trip start time by trip purpose (Monday to Friday only): England, 2015/19

Purpose	08:00-08:59	17:00-17:59
Commuting	20%	32%
Business	3%	3%
Education	29%	3%
Escort education	23%	2%
Shopping	4%	12%
Other work, other escort and personal business	14%	20%
Visiting friends / entertainment / sport	3%	20%
Holiday / Day trip / Other	4%	8%
All purposes	**100%**	**100%**

Person Trips by Purpose

Purpose	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Work based trips [1]	17	70	87	89	37	126
Primary Education trips [2*]	13	54	66	4	2	6
Secondary Education trips [2*]	25	105	130	8	3	12
Leisure/recreation trips [3]	5	21	26	71	29	101
Retail trips [4]	3	12	15	30	13	43
Other [5]	10	43	53	51	21	72
TOTAL	**72**	**306**	**378**	**254**	**105**	**359**

1. Commuting and business
2. Education and Escort education
3. Visiting friends, holidays, etc...
4. Shopping
5. Other work, other escort and personal business
**Total education trips have been split based on 34% Primary and 66% Secondary according to the Nomis 2011 Census Age Structure and Population (Vale of Glamorgan 008 Output*

Education Split	Primary	Secondary
Census 2011 Age Structure (Vale of Glamorgan 008)	34%	66%

Actual Mode Share

Mode	Purpose					
	Work [1]	Primary [3]	Secondary [3]	Leisure [2]	Retail [2]	Other [2]
Train	5%	0%	2%	3%	1%	1%
Bus, Minibus or Coach	4%	0%	31%	4%	6%	4%
Taxi	0%	0%	0%	2%	1%	1%
Motorcycle, Scooter or Moped	1%	0%	0%	0%	0%	0%
Driving a Car or Van	76%	0%	27%	38%	46%	48%
Passenger in a Car or Van	5%	0%	0%	33%	19%	26%
Bicycle	2%	6%	3%	2%	1%	1%
On Foot	5%	94%	34%	16%	25%	19%
Other	1%	0%	4%	1%	1%	1%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

1. 2011 Census Journey to Work Data - Vale of Glamorgan 008
2. Average number of trips (trip rates) by purpose and main mode (NTS0409a): England, 2019
3. Usual mode of travel to school by age group: England 2019 (NTS0615) Primary (5-10 years) Secondary (11-16 years)

Work based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	1	2	3	3	1	4
Bus, Minibus or Coach	0	2	3	3	1	4
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	1
Driving a Car or Van	9	37	46	48	20	67
Passenger in a Car or Van	1	3	3	3	1	5
Bicycle	0	1	1	1	1	2
On Foot	1	3	3	3	1	5
Other Method of Travel to Work	0	0	1	1	0	1
Work from Home	5	21	26	27	11	38
TOTAL	**17**	**70**	**87**	**89**	**37**	**126**

Wales work from home proportion *30%*

Primary Education based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	0	0	0	0
Bus, Minibus or Coach	0	0	0	0	0	0
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	0	0	0	0	0	0
Passenger in a Car or Van	0	0	0	0	0	0
Bicycle	1	3	4	0	0	0
On Foot	12	51	62	4	2	6
Other Method of Travel to Work	0	0	0	0	0	0
TOTAL	**13**	**54**	**66**	**4**	**2**	**6**

Secondary Education based trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	2	2	0	0	0
Bus, Minibus or Coach	8	33	40	2	1	4
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	7	28	35	2	1	3
Passenger in a Car or Van	0	0	0	0	0	0
Bicycle	1	3	4	0	0	0
On Foot	8	36	44	3	1	4
Other Method of Travel to Work	1	4	5	0	0	0
TOTAL	**25**	**105**	**130**	**8**	**3**	**12**

Leisure/recreation trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	1	1	2	1	3
Bus, Minibus or Coach	0	1	1	3	1	4
Taxi	0	0	1	2	1	2
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	2	8	10	27	11	38
Passenger in a Car or Van	2	7	9	23	10	33
Bicycle	0	0	1	2	1	2
On Foot	1	3	4	12	5	16
Other Method of Travel to Work	0	0	0	1	0	1
TOTAL	**5**	**21**	**26**	**71**	**29**	**101**

Retail trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	0	0	0	0
Bus, Minibus or Coach	0	1	1	2	1	2
Taxi	0	0	0	0	0	0
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	1	6	7	14	6	21
Passenger in a Car or Van	1	2	3	6	2	11
Bicycle	0	0	0	0	0	0
On Foot	1	3	4	8	3	8
Other Method of Travel to Work	0	0	0	0	0	0
TOTAL	**3**	**12**	**15**	**30**	**13**	**43**

Other trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	0	0	1	0	0	1
Bus, Minibus or Coach	0	2	2	2	1	3
Taxi	0	0	0	0	0	1
Motorcycle, Scooter or Moped	0	0	0	0	0	0
Driving a Car or Van	5	21	26	25	10	35
Passenger in a Car or Van	3	11	14	13	5	18
Bicycle	0	0	0	0	0	1
On Foot	2	8	10	10	4	14
Other Method of Travel to Work	0	0	0	0	0	1
TOTAL	**10**	**43**	**53**	**51**	**21**	**72**

Total person residential trips	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Train	1	6	7	6	3	9
Bus, Minibus or Coach	9	38	47	12	5	16
Taxi	0	1	1	2	1	4
Motorcycle, Scooter or Moped	0	0	0	1	0	1
Driving a Car or Van	24	100	123	115	48	164
Passenger in a Car or Van	5	23	28	45	19	67
Bicycle	2	8	10	4	2	6
On Foot	25	104	127	39	16	52
Other Method of Travel to Work	1	5	6	2	1	3
TOTAL	**73**	**305**	**377**	**253**	**105**	**360**

Appendix C

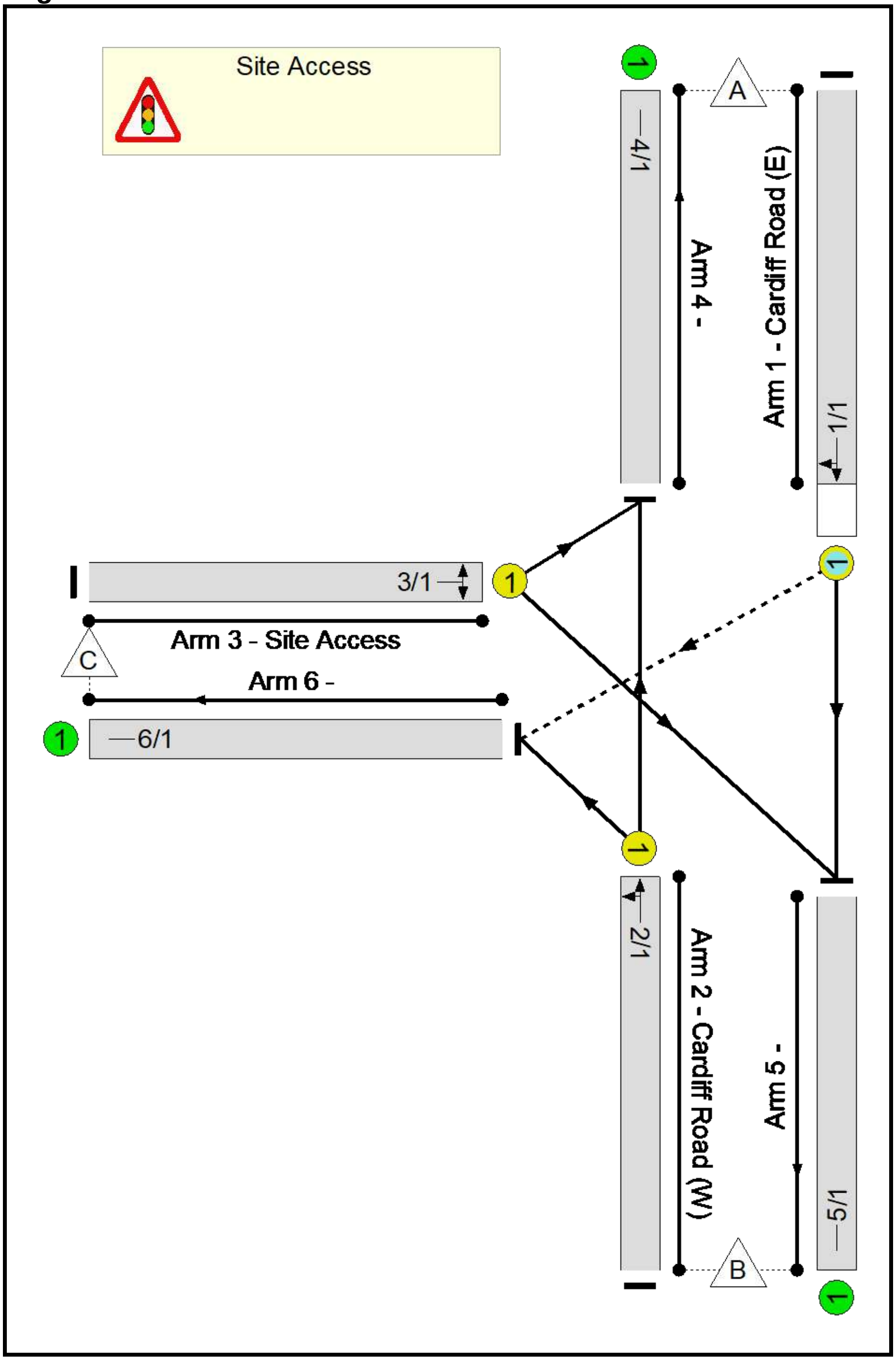
Junction Modelling Output Files

Full Input Data And Results

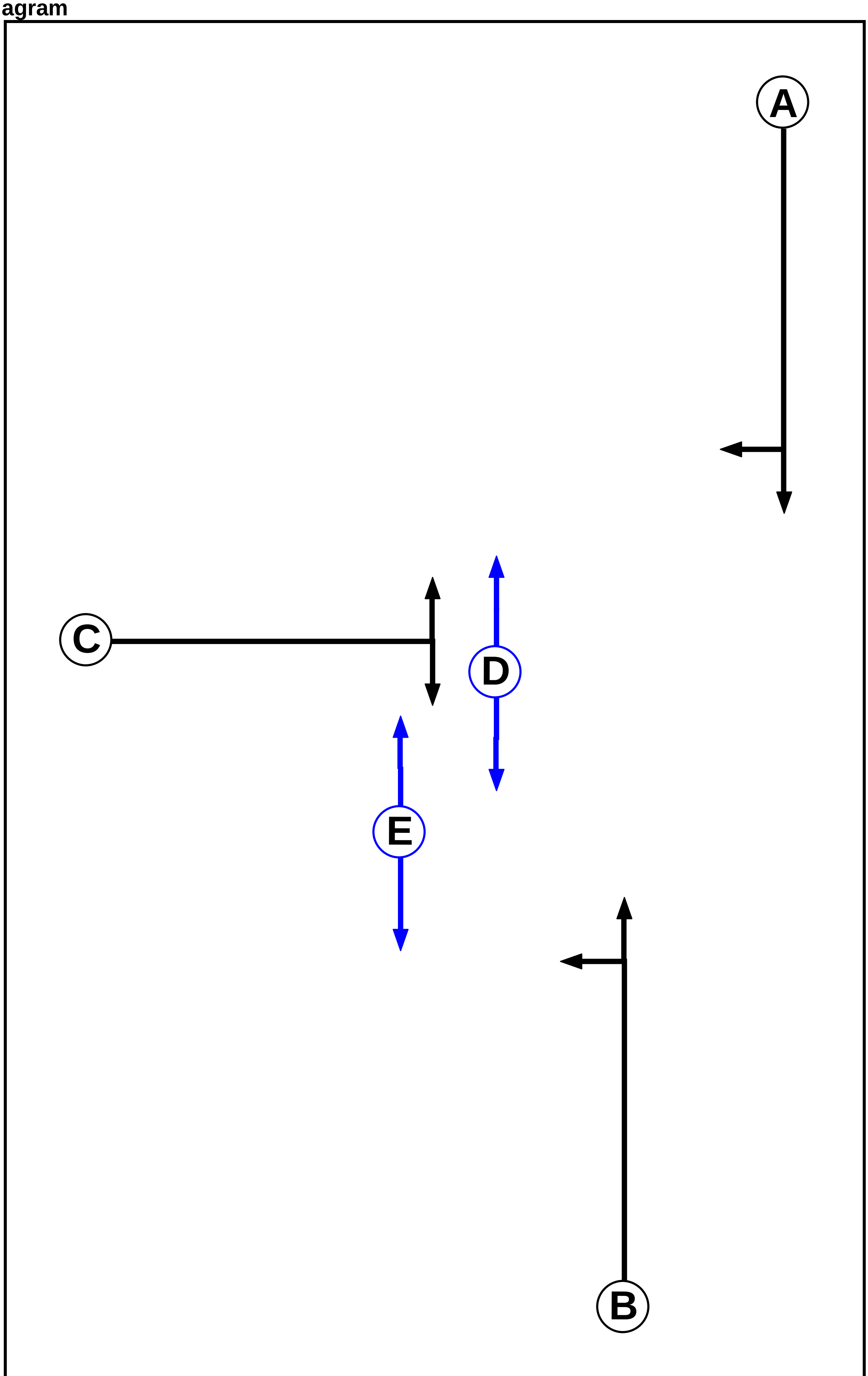
User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 - Site Access (PD01) - V3.lsg3x
Author:	Ben Stone
Company:	Vectos, part of SLR
Address:	

Network Layout Diagram



Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Pedestrian		5	5
E	Pedestrian		5	5

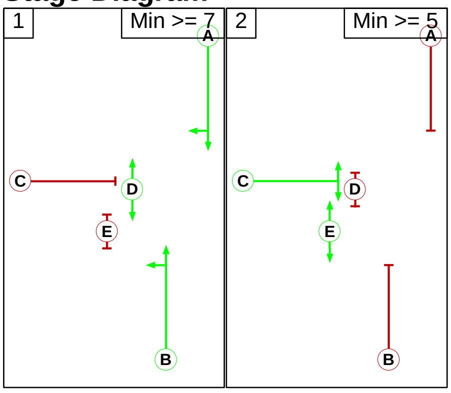
Phase Intergreens Matrix

	Starting Phase					
Terminating Phase		A	B	C	D	E
	A		-	5	-	8
	B	-		5	-	7
	C	5	5		5	-
	D	-	-	5		-
	E	5	5	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	C E

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

	To Stage		
From Stage		1	2
	1		8
	2	5	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Site Access											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
1/1 (Cardiff Road (E))	6/1 (Right)	1439	0	2/1	1.09	All	2.00	-	0.50	2	2.00

Full Input Data And Results

Lane Input Data

Junction: Site Access													
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Cardiff Road (E))	O	A	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	12.50
2/1 (Cardiff Road (W))	U	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Ahead	Inf
											Arm 6 Left	10.00
3/1 (Site Access)	U	C	2	3	60.0	Geom	-	3.15	0.00	Y	Arm 4 Left	10.00
											Arm 5 Right	12.50
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 + Dev AM'	08:00	09:00	01:00	
2: '2022 + Dev PM'	17:00	18:00	01:00	
3: '2032 + Dev AM'	08:00	09:00	01:00	
4: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	416	78	494
	B	734	0	22	756
	C	19	5	0	24
	Tot.	753	421	100	1274

Traffic Lane Flows

Lane	Scenario 1: 2022 + Dev AM
Junction: Site Access	
1/1	494
2/1	756
3/1	24
4/1	753
5/1	421
6/1	100

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	84.2 %	1879	1879
				Arm 6 Right	12.50	15.8 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	97.1 %	1907	1907
				Arm 6 Left	10.00	2.9 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	79.2 %	1687	1687
				Arm 5 Right	12.50	20.8 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	676	37	713
	B	642	0	10	652
	C	90	25	0	115
	Tot.	732	701	47	1480

Traffic Lane Flows

Lane	Scenario 2: 2022 + Dev PM
Junction: Site Access	
1/1	713
2/1	652
3/1	115
4/1	732
5/1	701
6/1	47

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	94.8 %	1903	1903
				Arm 6 Right	12.50	5.2 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	98.5 %	1911	1911
				Arm 6 Left	10.00	1.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	78.3 %	1688	1688
				Arm 5 Right	12.50	21.7 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	447	78	525
	B	787	0	22	809
	C	19	5	0	24
	Tot.	806	452	100	1358

Traffic Lane Flows

Lane	Scenario 3: 2032 + Dev AM
Junction: Site Access	
1/1	525
2/1	809
3/1	24
4/1	806
5/1	452
6/1	100

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	85.1 %	1881	1881
				Arm 6 Right	12.50	14.9 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	97.3 %	1907	1907
				Arm 6 Left	10.00	2.7 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	79.2 %	1687	1687
				Arm 5 Right	12.50	20.8 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	726	37	763
	B	689	0	10	699
	C	90	25	0	115
	Tot.	779	751	47	1577

Full Input Data And Results

Traffic Lane Flows

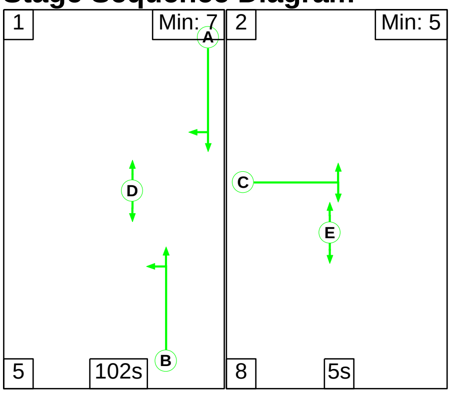
Lane	Scenario 4: 2032 + Dev PM
Junction: Site Access	
1/1	763
2/1	699
3/1	115
4/1	779
5/1	751
6/1	47

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.2 %	1904	1904
				Arm 6 Right	12.50	4.8 %		
2/1 (Cardiff Road (W))	3.00	0.00	Y	Arm 4 Ahead	Inf	98.6 %	1911	1911
				Arm 6 Left	10.00	1.4 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	10.00	78.3 %	1688	1688
				Arm 5 Right	12.50	21.7 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram

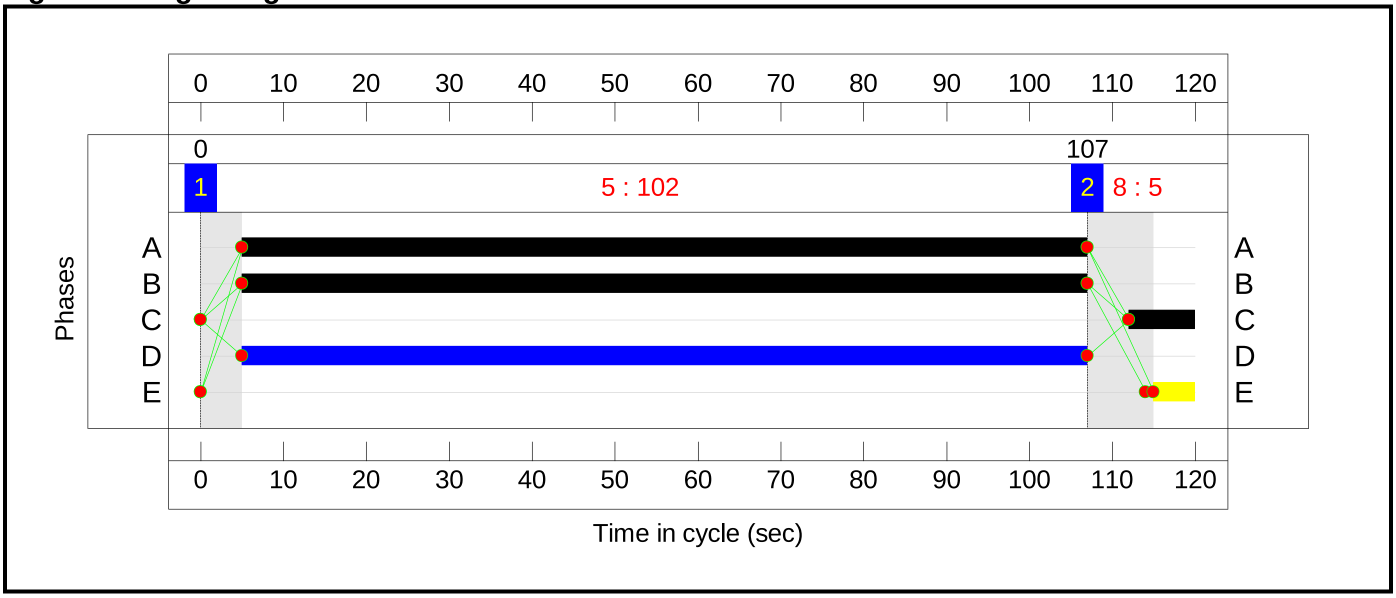


Full Input Data And Results

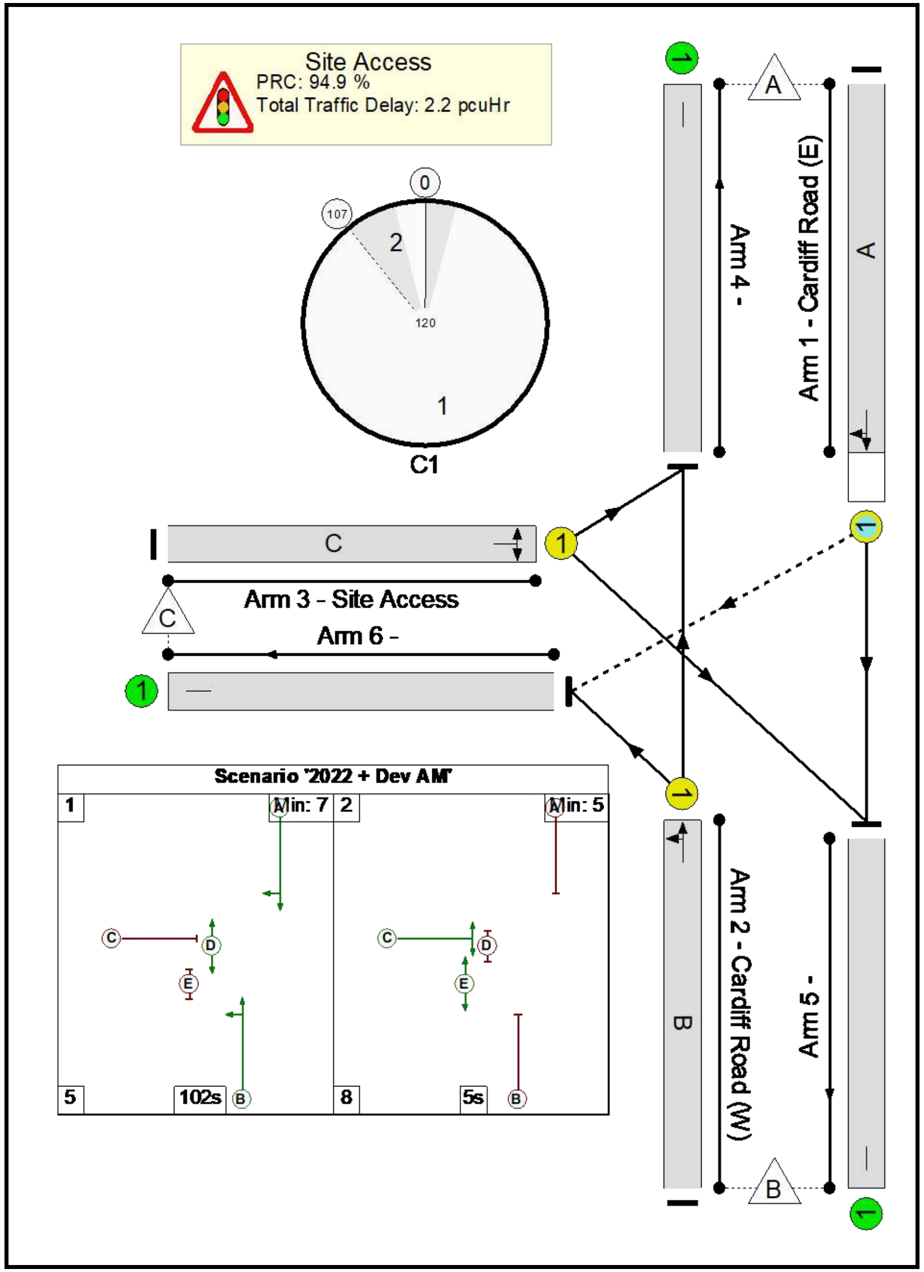
Stage Timings

Stage	1	2
Duration	102	5
Change Point	0	107

Signal Timings Diagram



Full Input Data And Results
Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.2%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.2%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	102	-	494	1879	1122	44.0%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	102	-	756	1907	1637	46.2%
3/1	Site Access Left Right	U	N/A	N/A	C		1	8	-	24	1687	127	19.0%
4/1		U	N/A	N/A	-		-	-	-	753	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	421	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	100	Inf	Inf	0.0%

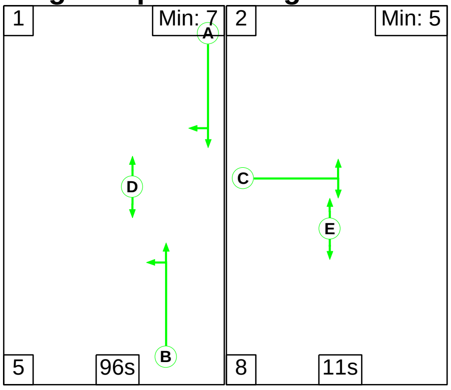
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**77**	**0**	**1**	**1.2**	**0.9**	**0.0**	**2.2**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**77**	**0**	**1**	**1.2**	**0.9**	**0.0**	**2.2**	**-**	**-**	**-**	**-**
1/1	494	494	77	0	1	0.4	0.4	0.0	0.9	6.3	5.2	0.4	5.6
2/1	756	756	-	-	-	0.4	0.4	-	0.8	4.0	5.9	0.4	6.3
3/1	24	24	-	-	-	0.3	0.1	-	0.5	69.7	0.7	0.1	0.9
4/1	753	753	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	421	421	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	100	100	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 94.9 Total Delay for Signalled Lanes (pcuHr): 2.18 Cycle Time (s): 120
PRC Over All Lanes (%): 94.9 Total Delay Over All Lanes(pcuHr): 2.18

Full Input Data And Results

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

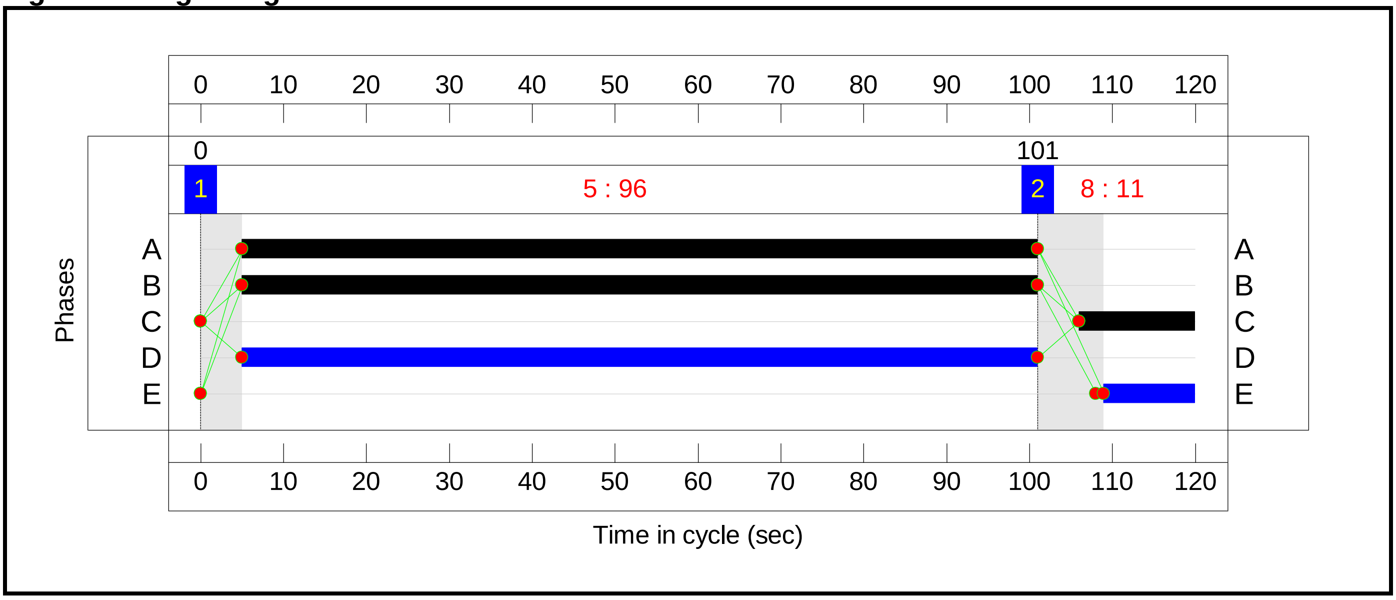
Stage Sequence Diagram



Stage Timings

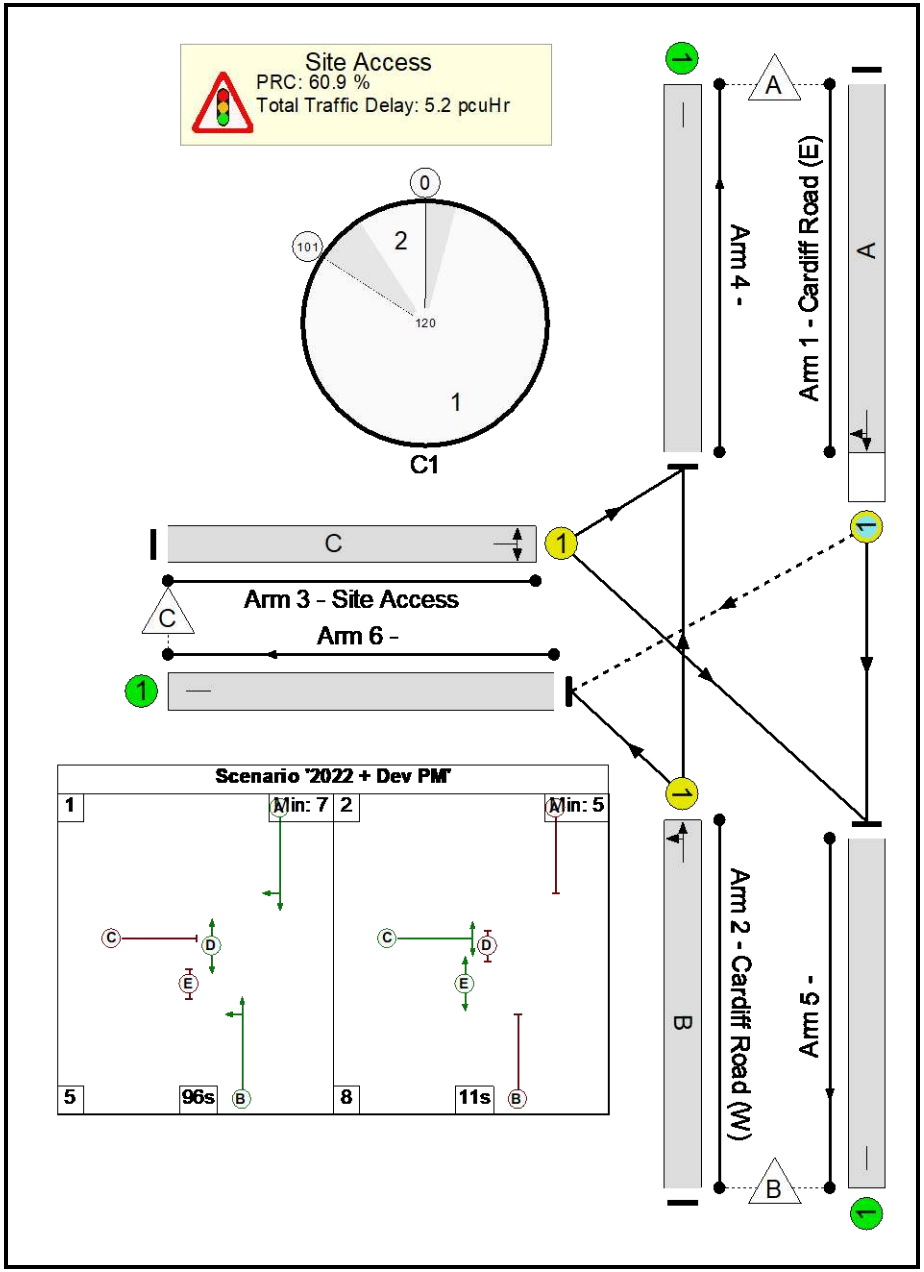
Stage	1	2
Duration	96	11
Change Point	0	101

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**55.9%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**55.9%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	96	-	713	1903	1275	55.9%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	96	-	652	1911	1545	42.2%
3/1	Site Access Left Right	U	N/A	N/A	C		1	14	-	115	1688	211	54.5%
4/1		U	N/A	N/A	-		-	-	-	732	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	701	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	47	Inf	Inf	0.0%

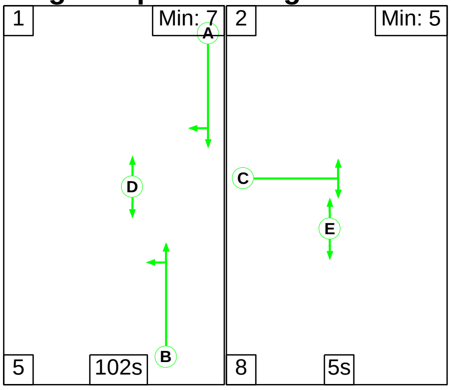
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**36**	**0**	**1**	**3.6**	**1.6**	**0.0**	**5.2**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**36**	**0**	**1**	**3.6**	**1.6**	**0.0**	**5.2**	**-**	**-**	**-**	**-**
1/1	713	713	36	0	1	1.4	0.6	0.0	2.1	10.5	11.1	0.6	11.7
2/1	652	652	-	-	-	0.6	0.4	-	1.0	5.4	6.2	0.4	6.5
3/1	115	115	-	-	-	1.6	0.6	-	2.2	67.8	3.6	0.6	4.2
4/1	732	732	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	701	701	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	47	47	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 60.9 Total Delay for Signalled Lanes (pcuHr): 5.22 Cycle Time (s): 120
PRC Over All Lanes (%): 60.9 Total Delay Over All Lanes(pcuHr): 5.22

Full Input Data And Results

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

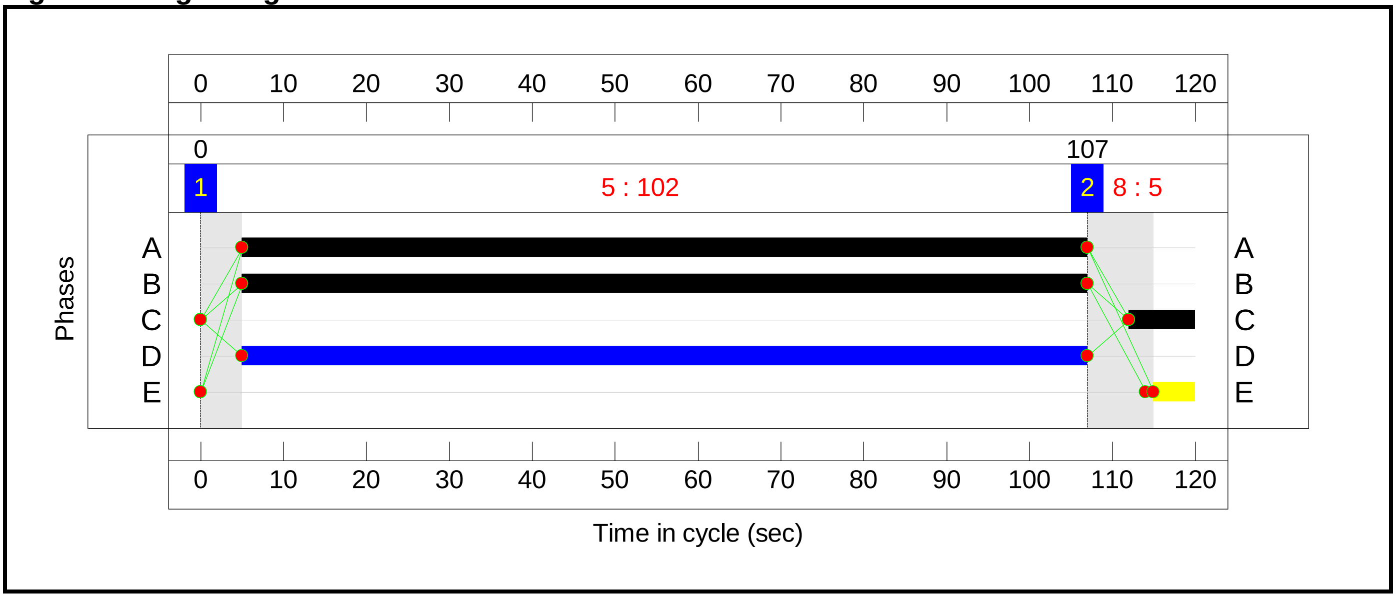
Stage Sequence Diagram



Stage Timings

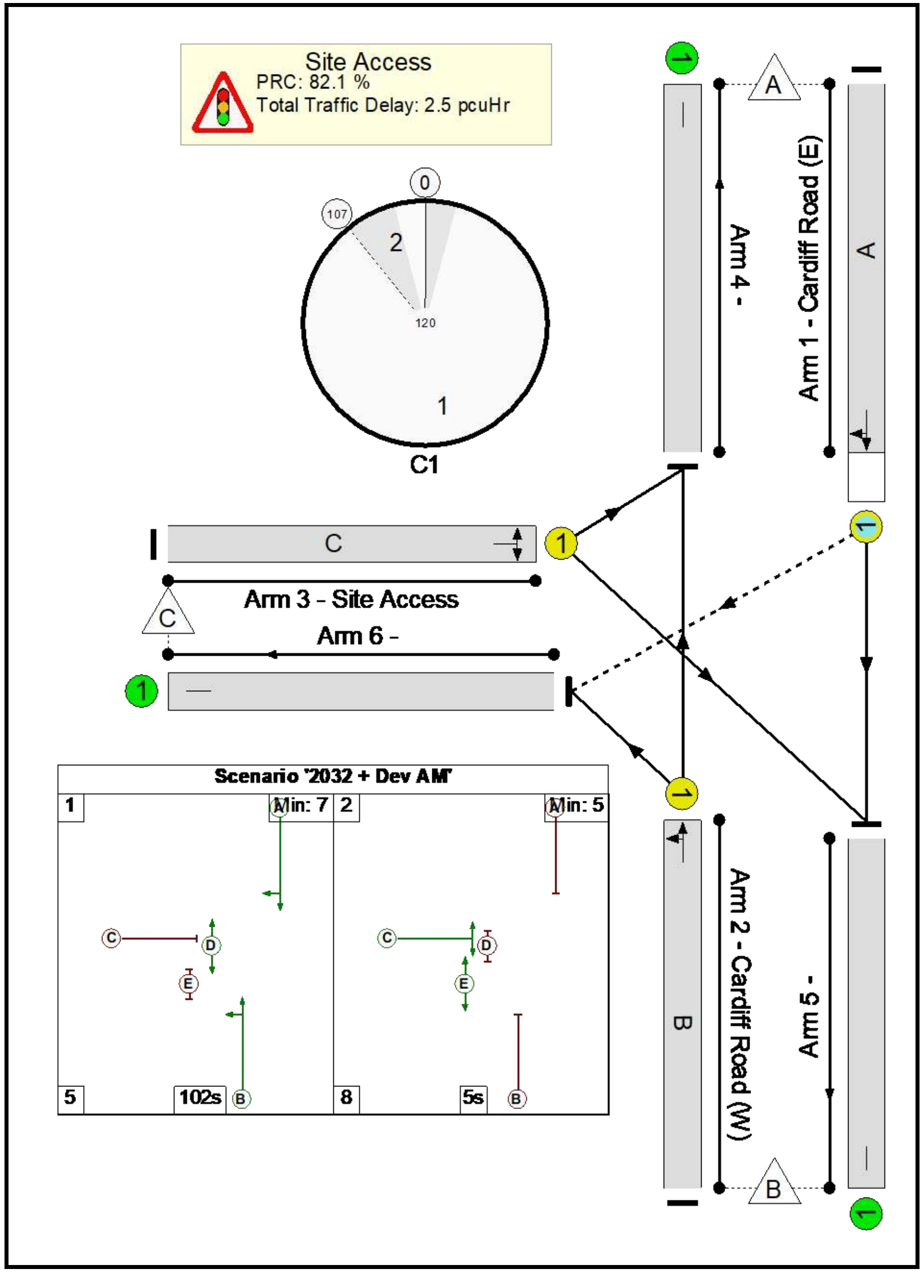
Stage	**1**	**2**
Duration	102	5
Change Point	0	107

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**49.4%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**49.4%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	102	-	525	1881	1079	48.6%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	102	-	809	1907	1637	49.4%
3/1	Site Access Left Right	U	N/A	N/A	C		1	8	-	24	1687	127	19.0%
4/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	452	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	100	Inf	Inf	0.0%

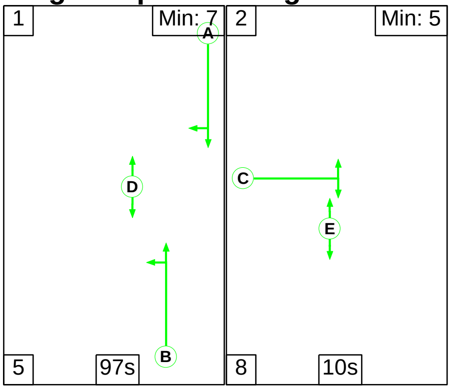
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**77**	**0**	**1**	**1.4**	**1.1**	**0.0**	**2.5**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**77**	**0**	**1**	**1.4**	**1.1**	**0.0**	**2.5**	**-**	**-**	**-**	**-**
1/1	525	525	77	0	1	0.6	0.5	0.0	1.1	7.4	6.3	0.5	6.7
2/1	809	809	-	-	-	0.5	0.5	-	1.0	4.3	6.5	0.5	7.0
3/1	24	24	-	-	-	0.3	0.1	-	0.5	69.7	0.7	0.1	0.9
4/1	806	806	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	452	452	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	100	100	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 82.1 Total Delay for Signalled Lanes (pcuHr): 2.50 Cycle Time (s): 120
PRC Over All Lanes (%): 82.1 Total Delay Over All Lanes(pcuHr): 2.50

Full Input Data And Results

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

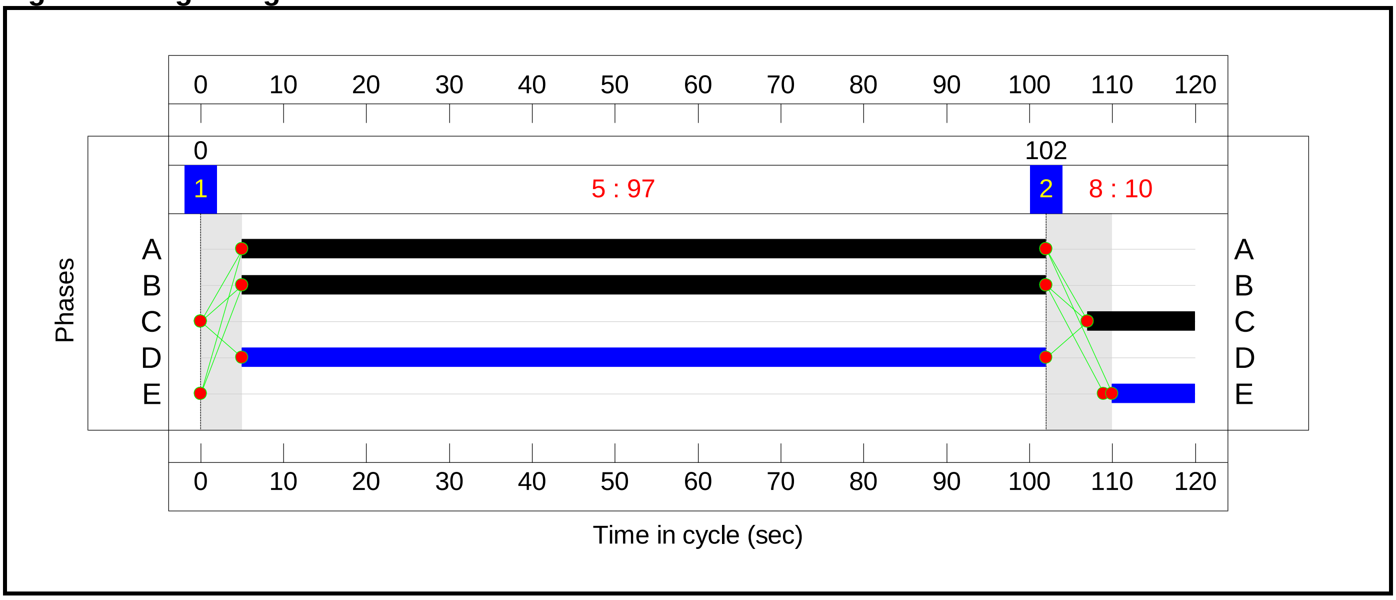
Stage Sequence Diagram



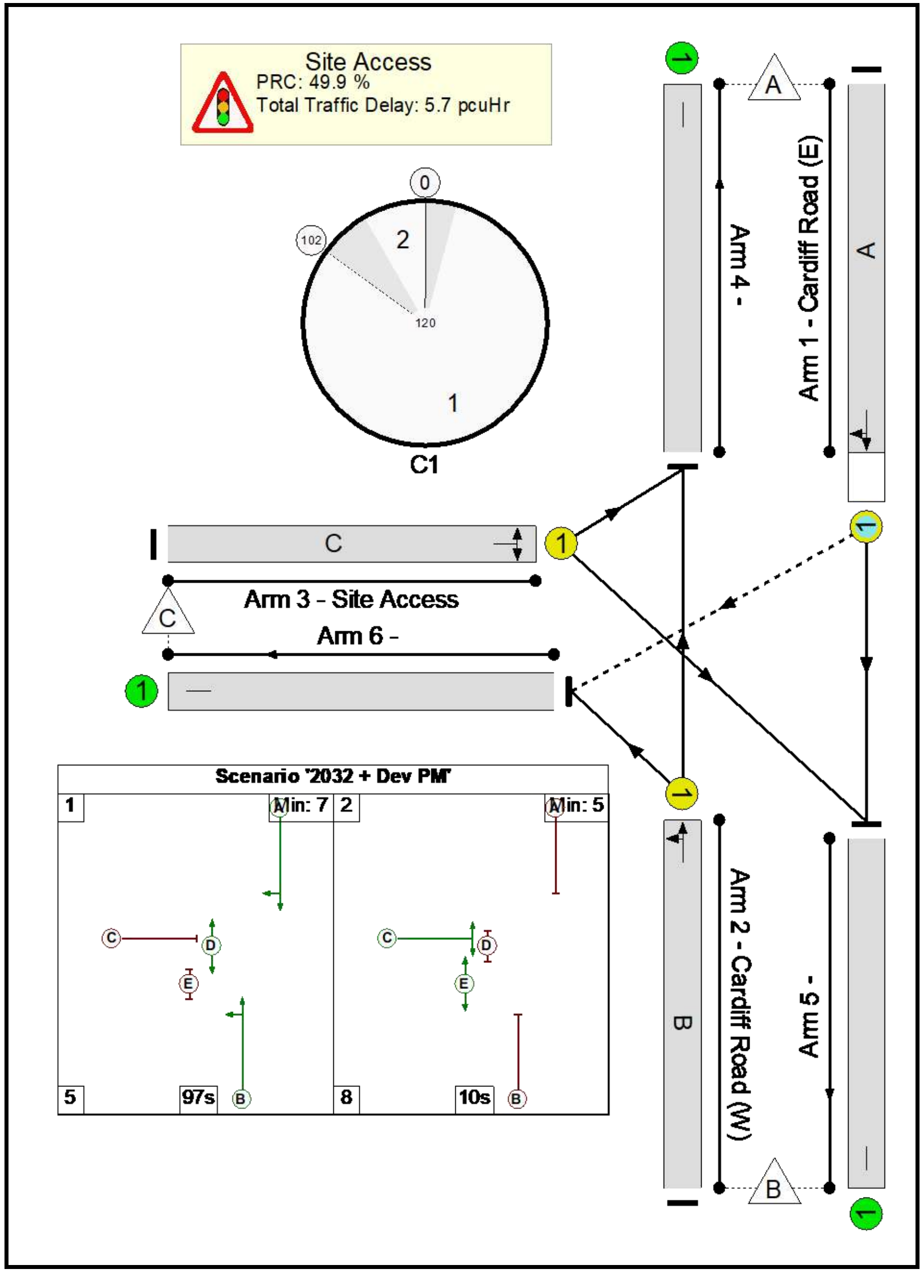
Stage Timings

Stage	1	2
Duration	97	10
Change Point	0	102

Signal Timings Diagram



Full Input Data And Results
Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.1%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.1%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A		1	97	-	763	1904	1271	60.1%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	B		1	97	-	699	1911	1561	44.8%
3/1	Site Access Left Right	U	N/A	N/A	C		1	13	-	115	1688	197	58.4%
4/1		U	N/A	N/A	-		-	-	-	779	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	751	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	47	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**36**	**0**	**1**	**3.8**	**1.8**	**0.0**	**5.7**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**36**	**0**	**1**	**3.8**	**1.8**	**0.0**	**5.7**	**-**	**-**	**-**	**-**
1/1	763	763	36	0	1	1.6	0.7	0.0	2.4	11.2	12.3	0.7	13.0
2/1	699	699	-	-	-	0.6	0.4	-	1.0	5.3	6.6	0.4	7.0
3/1	115	115	-	-	-	1.6	0.7	-	2.3	71.9	3.6	0.7	4.3
4/1	779	779	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	751	751	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	47	47	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 49.9 Total Delay for Signalled Lanes (pcuHr): 5.69 Cycle Time (s): 120
PRC Over All Lanes (%): 49.9 Total Delay Over All Lanes(pcuHr): 5.69

Appendix B

Highways Comments – Vale of Glamorgan

Vale of Glamorgan Replacement Local Development Plan 2021 - 2036 Highway Development Responses to Candidate Sites.

Site Reference.	444
Observations By:	James Aitken
Date:	2nd June 2023
Location:	Land North of Dinas Powys
Proposal: (Residential / Commercial)	Residential
Number of Units	850

---- ~ ----

Further to a recent site inspection carried out in relation to the above LDP candidate site. The Highway Development Section would inform the Local Planning Authority that the site lies on land to the North of Dinas Powys with two possible access points to the East and West of the site boundary. To the East being a potential new access off Cardiff Road (A4055) and to the West a potential new access off Pen-y-turnpike Road. A site of this size should provide two access points or one access point capable of withstanding the traffic volumes for the size of the proposed site.

Both access locations are subject to 30mph speed limits and there appears to be lack of available active travel links. Cardiff Road does suffer with regular congestion issues in both directions and there will need to be robust evidence to support any new junction along this stretch of highway. Pen-y-turnpike Road is a known commuter route to Cardiff. It is also recognized from the master plan that a school is proposed within the site boundary.

There is a concern that it may not be feasible to link the proposed site via active travel to the surrounding area due to local highway constraints/land issues. Based on present legislation the site will need to ensure that all sustainable modes of transport including active travel can link to/from the site to gain full support of the highway authority and demonstrated in a robust Transport Assessment.

1. Access off Pen-y-turnpike Road is achievable to the North of Ardwyn Walk. The site frontage along this stretch is wide and could be easily set back to provide a new junction. Dependent on the suitability of an access off Cardiff Road, this junction may require more than a priority T-junction with ghost island right hand turn lane. A robust TA will need to be provided and if only feasible to provide one access at this location then the likely hood is a more substantial junction is required either a roundabout or signalised junction. TA will need to demonstrate capacities and a suitable junction type.

2. There are concerns with regard to significant intensification of use of Pen-y-turnpike Road and in particular the junction with Leckwith Road to the North. This is an acute junction with safety concerns and the likelihood is that this junction will need to be improved given the scale of the proposed site.

3. A secondary access off Cardiff Road could be provided however given the issue along Cardiff Road with congestion a TA will need to demonstrate is suitability. There is limited space for a new junction and to the North there is a bus layby. This could need to be incorporated into any new junction. Any new junction at this location will likely require the upgrading/improvement to the Merrie Harrier junction which a TA will need to model along with other junctions to be agreed as part of a scoping study.

4. There will likely need to be improvements to the Cardiff Road A4055/Murch Road/Millbrook Road junction adjacent to Dinas Powys Primary school. A robust TA will need to demonstrate that the proposed site would not cause the junction to become close to or over capacity.

5. There is a concern that the proposed candidate site will not link the site via active travel to Dinas Powys and the wider area. Along Pen-y-turnpike Road there is limited width and as you travel South there appears to be no available width to accommodate an active travel link. There could potentially be scope to connect an active travel route to the South via an existing path which connects to Highfield Close. The land with which the path is located is under the ownership of Parks and Open Spaces with the Local Authority. New developments should have good connectivity and be accessible via active travel to all local amenities as per the Active Travel Act 2021 and any such site will need to ensure this is feasible.

6. The site is situated in between two proposed walking and cycling routes and there is the potential for these routes to unlock the site to active travel links. It is unclear the timescales for implementation however the proposed site developers should be mindful of these proposed routes and will require a link through the site to connect the two routes even if one or both are yet to be constructed.

7. Extensive public transport improvements should be provided along with the implementation of the site including internally and along the existing adopted highway.

8. Links will need to be investigated to the Eastbrook Train station and the site should contribute to improvements at the train station for the betterment of more sustainable modes of transport.

The Highway Development Section would inform the Planning Authority that it is essential that a development of this size and nature **<u>MUST</u>** be accompanied by a robust and comprehensive Scoping Study to be agreed by the Local Planning / Highway Authority and a comprehensive Transport Assessment being undertaken to evaluate the affects the proposed change of use will have on the surrounding highway network and how they will be addressed by carrying out off site highway improvements / public transport facilities and other sustainable modes of transport like cycling and walking.

<u>Consideration of smaller parcel only with access off Cardiff Road – 250 Units</u>

1. As per the above comments the feasibility of any access onto Cardiff Road will need to be determined as part of a robust Transport Assessment. There are concerns due to the neighboring junctions and their capacity and the capacity of any new junction due to traffic volumes along Cardiff Road.

2. A priority T-junction in this location could be problematic based on the size of the proposed parcel and therefore a TA may require a more substantial junction to be constructed. There are issues here with available land for any highway improvement schemes such as a ghost island or roundabout. Third party land constraints exist and a bus lane is present to the North West of the proposed site access so any scheme will need to ensure it is feasible based on land take.

3. The site may not be able to accommodate connectivity via active travel due to limited space along Cardiff Road. Other locations at the Southern end of the site will need to be investigated to confirm it the site can be accessed via walking and cycling.

4. Any new junction at this location will likely require the upgrading/improvement to the Merrie Harrier junction which a TA will need to model along with other junctions to be agreed as part of a scoping study. There will likely also need to be improvements to the Cardiff Road A4055/Murch Road/Millbrook Road junction adjacent to Dinas Powys Primary school.

5. Public transport infrastructure improvements will need to be provided as part of this development although locations are limited along Cardiff Road and the site may need to accommodate bus shelters within the site with a suitable roundabout then to enable buses to leave the site and continue on their route.

Enclosures :- (i) Photographs taken during Site inspection, dated

(ii) Copy of Site Location Plan produced by VOGC Planning Policy Section

(iii) Extract Copy of Computerised Highway Adoption Records (Original A3)

(iv) Copy of Welsh Governments Proposed Active Travel Map

(v) Land ownership for playing field and path to Highfield Close

(i)

Possible access loction off Pen-Y-Turnpike Road – Looking South

Looking South along Pen-Y-Turnpike Road further down

Constrains for active travel route to the South of the possible access location.

Possible active travel link via Highfield Close and Parks area

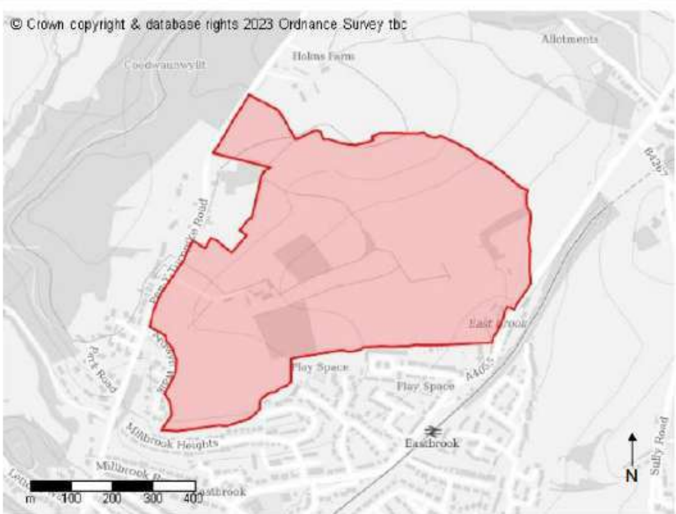
Possible access location off Cardiff Road with bus lane

Possible access location off Cardiff Road showing land constraints – looking South West

(ii)

Replacement Local Development Plan Candidate Site Register
Cynllun Datblygu Lleol Newydd Cofrestr Safleoedd Ymgeisiol

RLDP CDLN



Site ID No/Rhif Adnabod y Safle:
444

Site name/Enw'r Safle:
Land north of Dinas Powys/Tir i'r gogledd o Ddinas Powys

Settlement/Setliad:
Dinas Powys

Gross Site Area (Ha) / Arwynebedd Gros y Safle (Ha):
44

Existing Use Category / Categori Defnydd Presennol:
Agricultural Land/Tir Amaethyddol

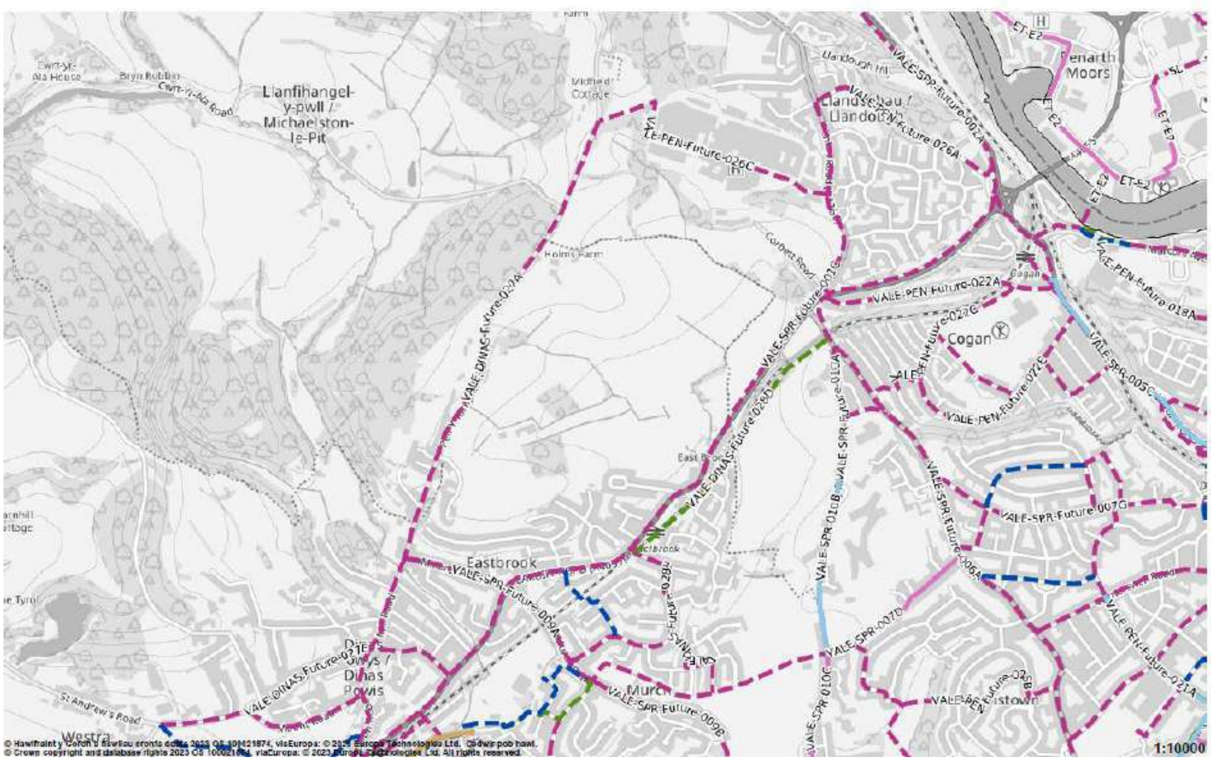
Proposed Use Category / Categori Defnydd Arfaethedig:
Housing/Tai

94

(iii)


Cadoxton River
The Grange
Holms Farm
CORBETT ROAD
PEN-Y-TURNPIKE ROAD
Holms Farm
A4055 (CARDIFF ROAD)
Case Hill Wood
Eastbrook
POWYS DRIVE
PW
ST DAVID AVENUE
PEN-Y-TURNPIKE ROAD
MILLBROOK ROAD
BROOKSIDE
Eastbrook
Sch
PW

(iv)

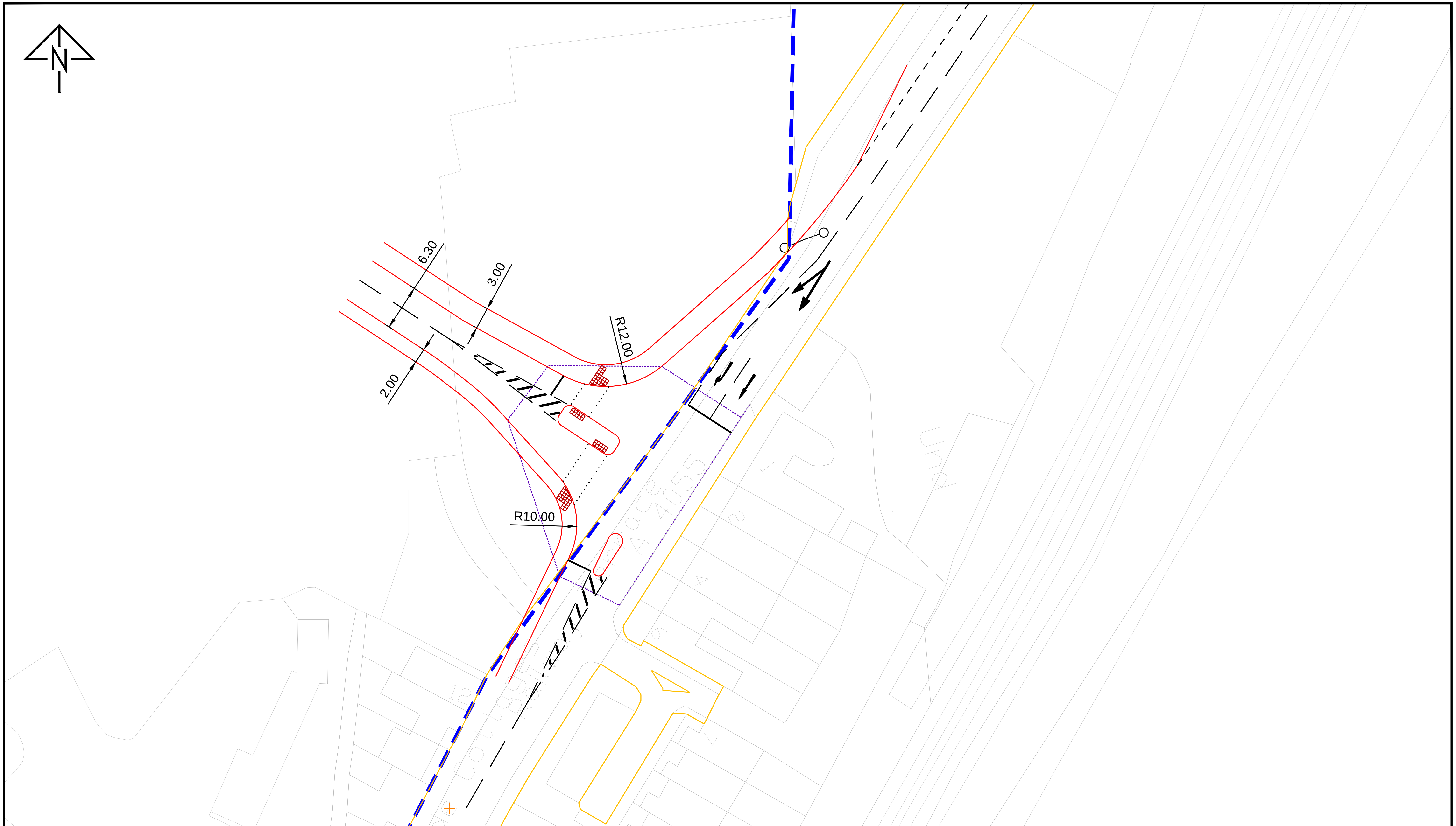

Llanfihangel-y-pwll / Michaelston-le-Pit
Penarth Moors
VALE-PEN-Future-026C
Llandochau / Llandough
VALE-DINAS-Future-029A
VALE-PEN-Future-022A
Cogan
VALE-PEN-Future-018A
VALE-SPR-Future-007G
Eastbrook
Dinas Powys
Murch
VALE-SPR-Future-009B
VALE-DINAS-Future-027E
1:10000

(v)

...d]	[Asset_No]	[Title_Deed]	[HMLR_WA]	[Premises_use]	[Land_description]	[Street]	[Locality]	[Town]	[Committee]	[Property_Rights]	[Checked_date]
...32	12901	000469	CYM438080	147	Play Area Seel Park	Highfield Close	Dinas Powys Ward	Dinas Powys	Parks & Open Spaces	Freehold	10/03/2009

Appendix C

Proposed Access Strategy



REV.	DETAILS	DRAWN	CHECKED	DATE
-	-	-	-	-

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

Land Ownership Boundary (shown indicatively)

Adopted Highway Boundary

Junction Intervisibility

Cardiff Road, Dinas Powys

Persimmon Homes

Proposed Access General Arrangement
Signalised Junction

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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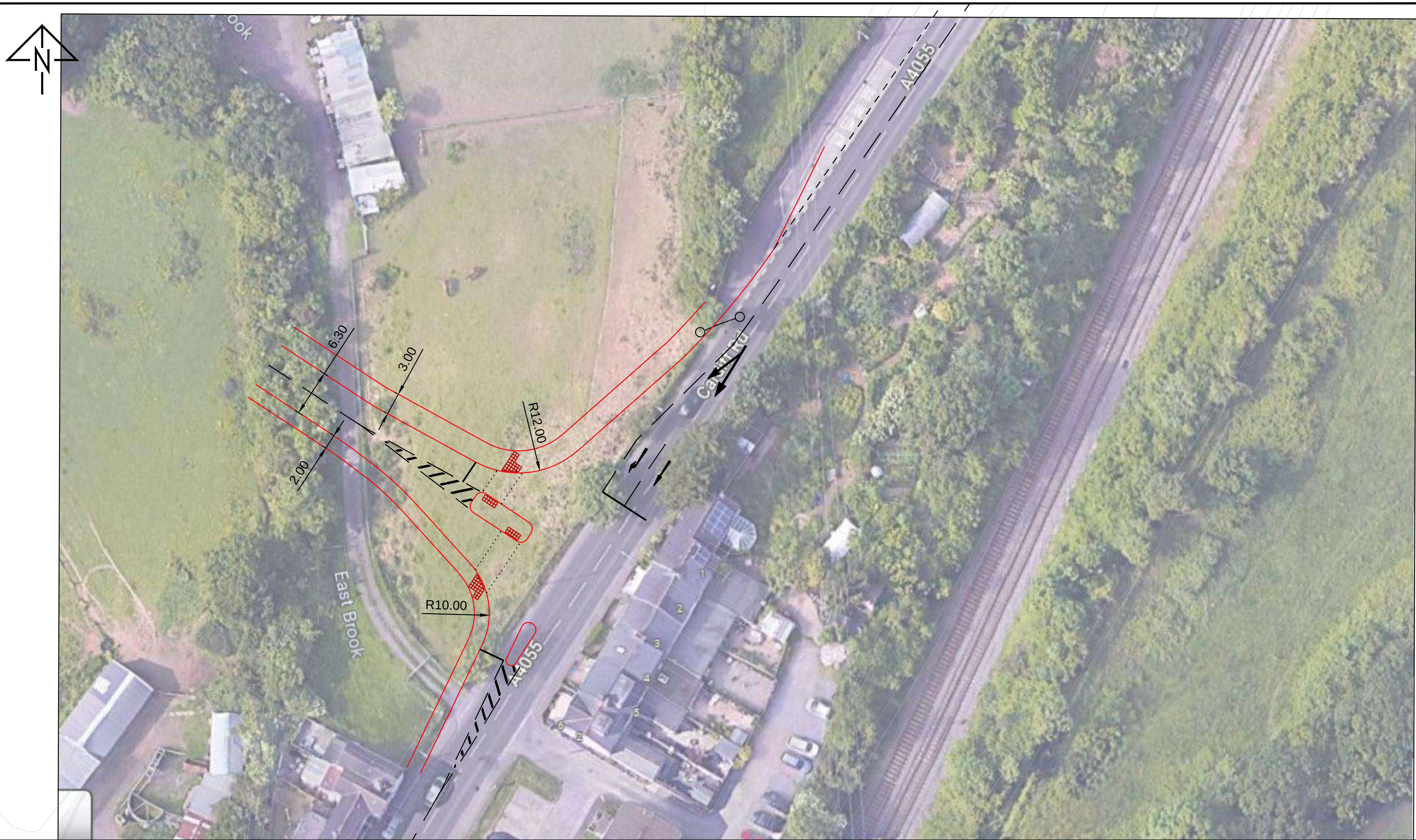


REV.	DETAILS	DRAWN	CHECKED	DATE
-	-	-	-	-

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Cardiff Road, Dinas Powys

Persimmon Homes

Proposed Access General Arrangement
Aerial Overlay

SLR

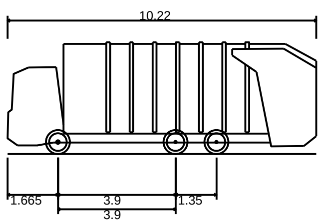
DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
KR	KD	19.07.23	1:500 at A3	226510_SK02	-

REV.	DETAILS	DRAWN	CHECKED	DATE
-	-	-	-	-

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Phoenix 2-17N (with Elite 2 6x2 RS chassis)



Overall Length	10.220m
Overall Width	2.250m
Overall Body Height	3.707m
Min Body Ground Clearance	0.260m
Track Width	2.250m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	7.900m

Cardiff Road, Dinas Powys

Persimmon Homes

Swept Path Analysis
10.2m Refuse Vehicle
Servicing

SLR

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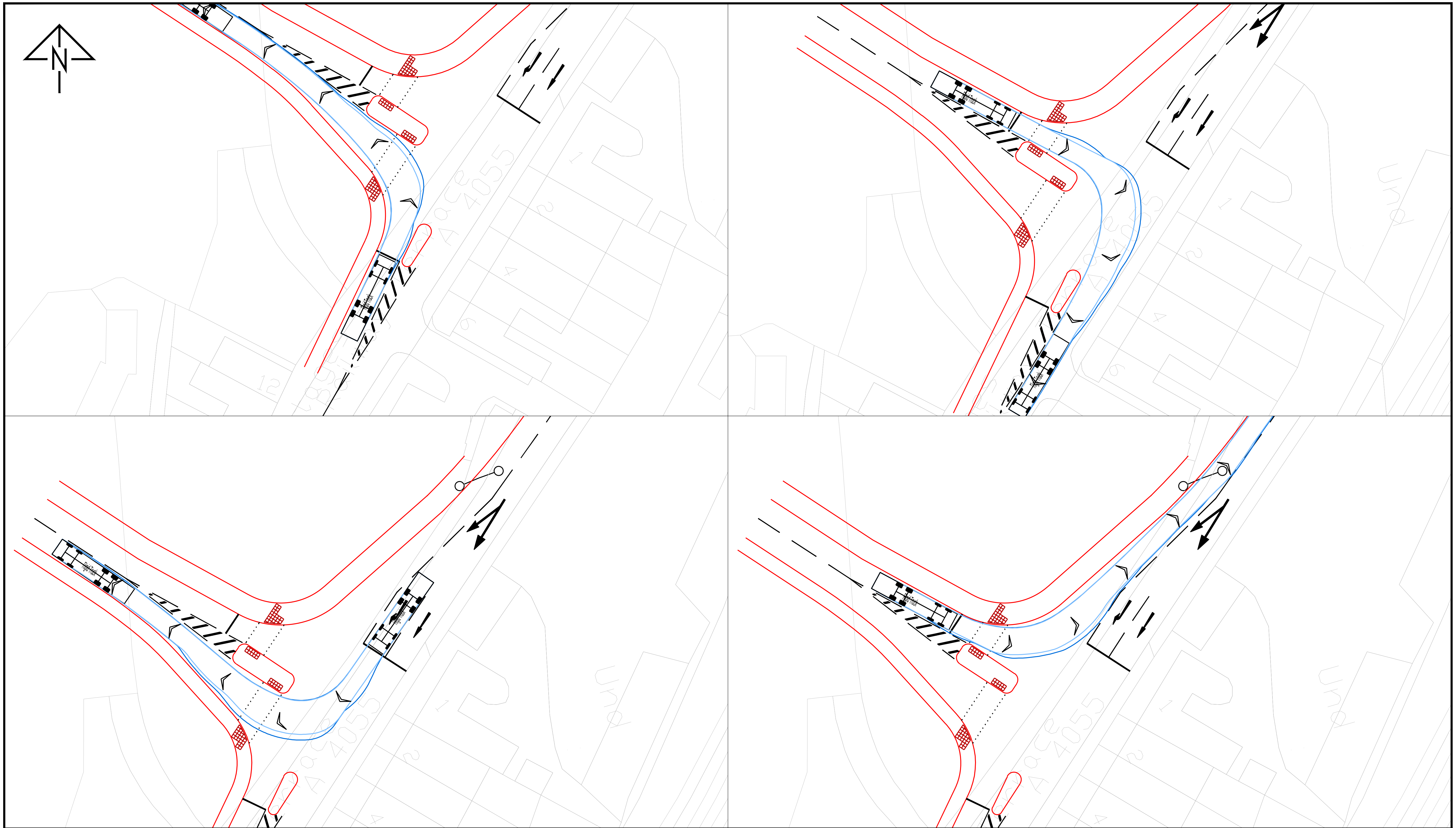

REV.	DETAILS	DRAWN	CHECKED	DATE
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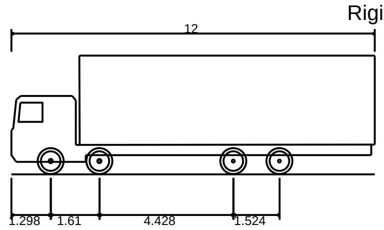
Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

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
Kerb to Kerb Turning Radius	11.900m

Cardiff Road, Dinas Powys

Persimmon Homes

Swept Path Analysis
12m Rigid Truck
Servicing

SLR

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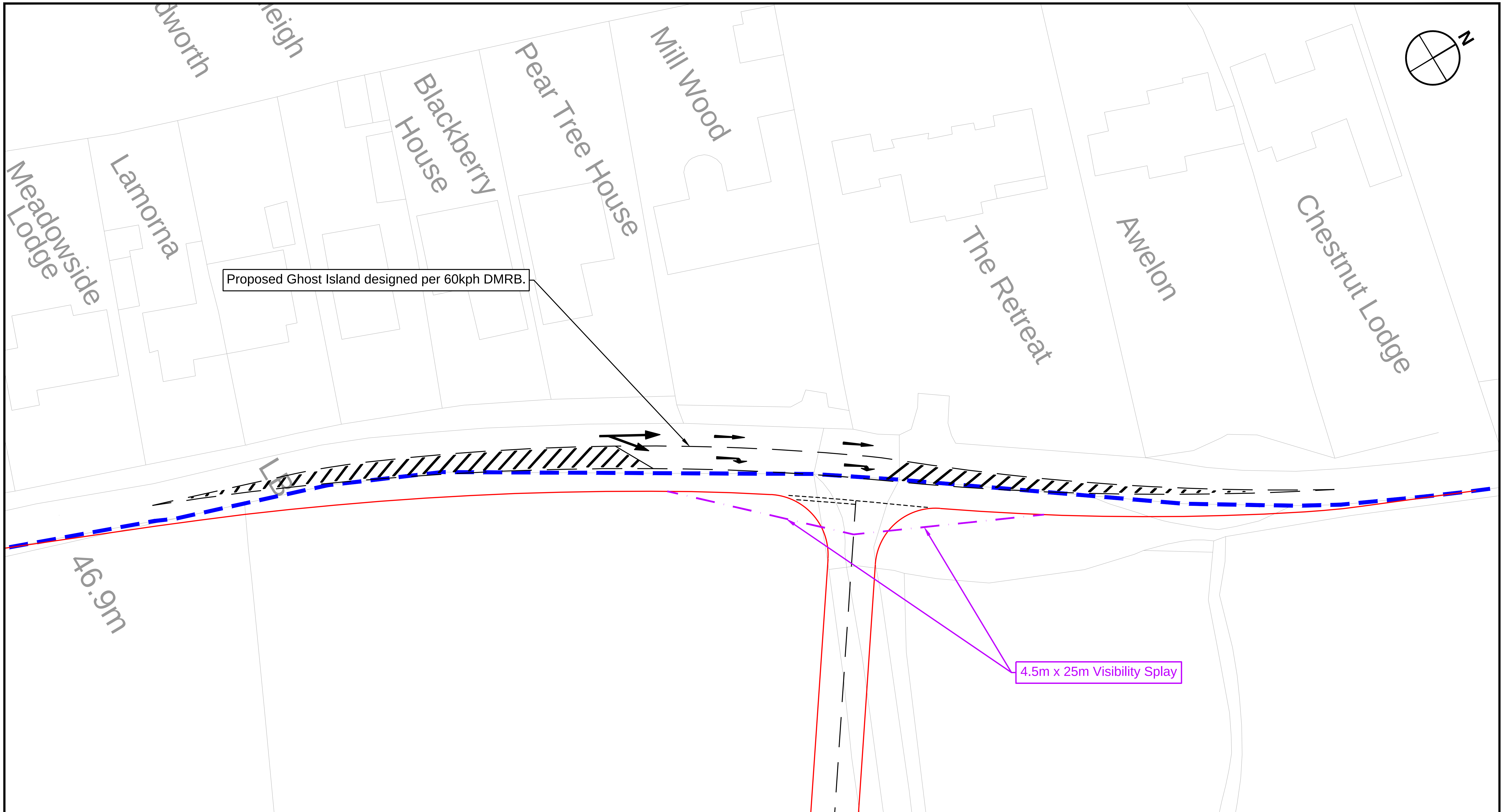


REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

INFORMATION ONLY

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

Land Ownership Boundary (shown indicatively)

Pen-y-Turnpike Road, Dinas Powys

Persimmon Homes

Proposed Ghost Island Right Turn

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
KR	KD	28.07.23	1:500 at A3	226510_PD04	.

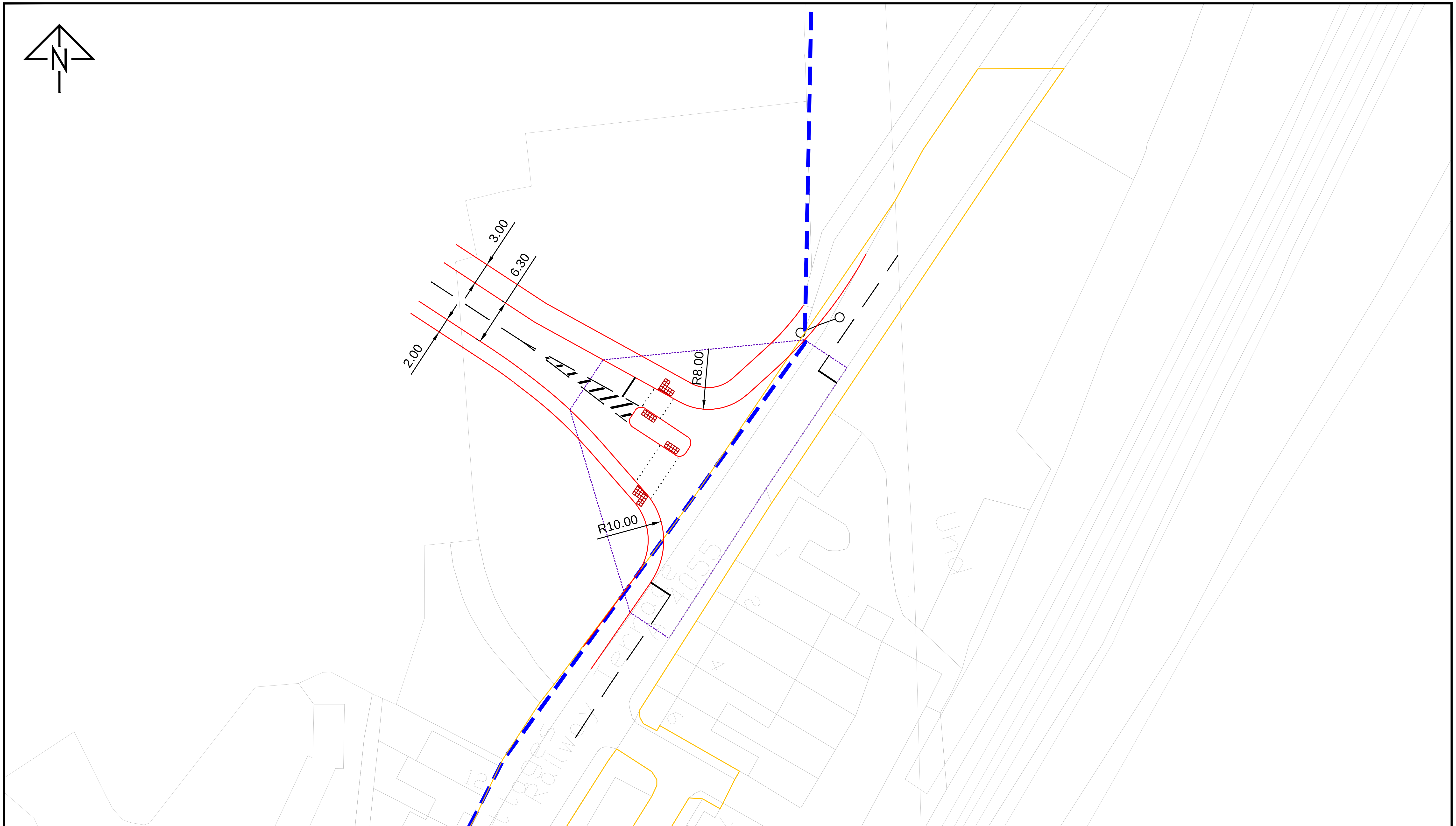
Appendix C Access Options

Land to the North of Dinas Powys

Persimmon Homes

SLR Project No.: 226510

02/02/2024



REV.	DETAILS	DRAWN	CHECKED	DATE
A	Staggered Crossing added.	KR	KD	06.09.22
B	Junction Relocated	KR	KD	13.10.23

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

Land Ownership Boundary (shown indicatively)

Adopted Highway Boundary

Junction Intervisibility

Cardiff Road, Dinas Powys

Persimmon Homes

Proposed Access General Arrangement
Signalised Junction

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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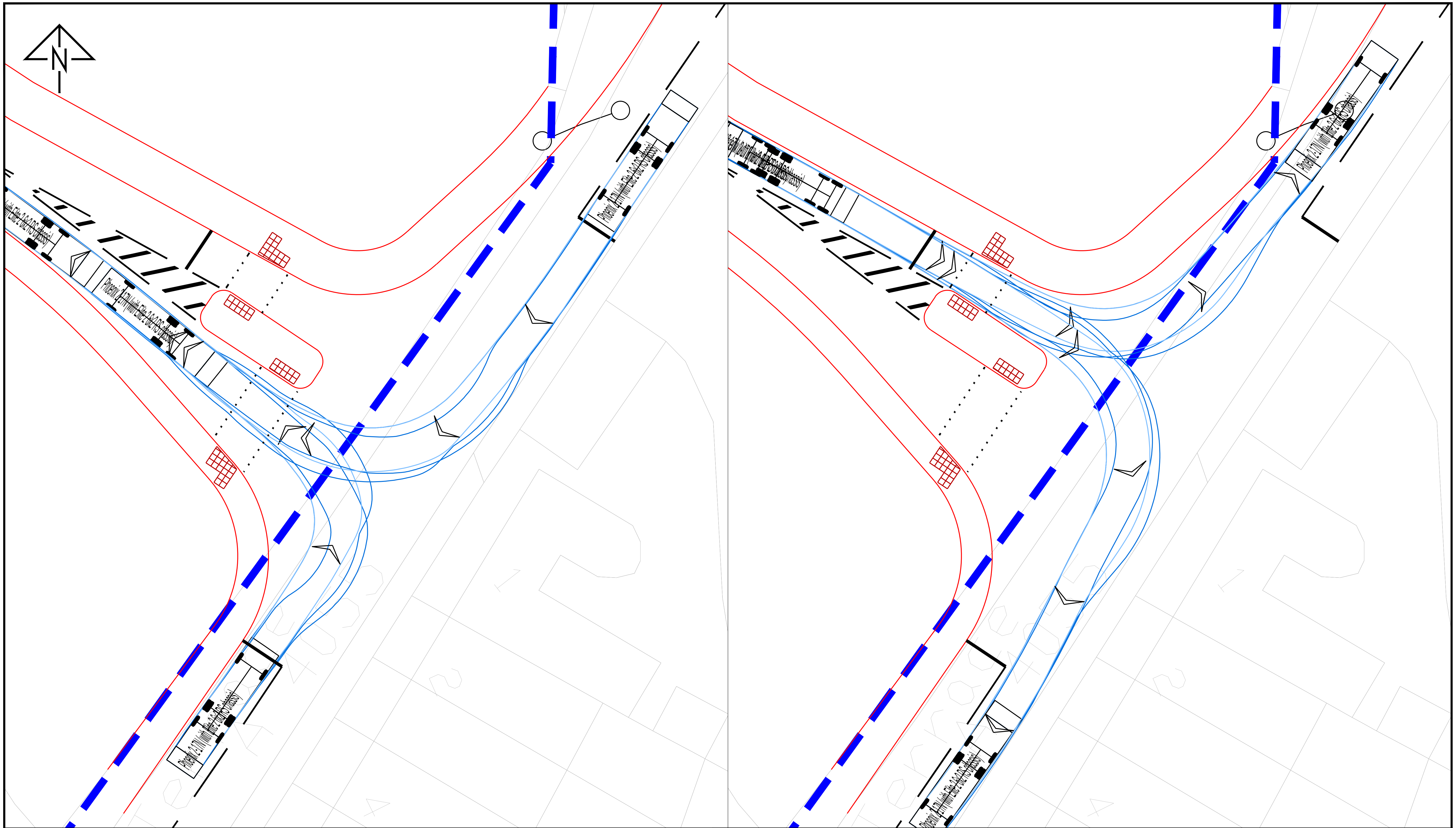
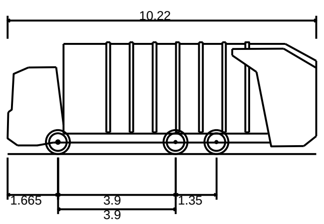


REV.	DETAILS	DRAWN	CHECKED	DATE
A	Staggered Crossing added.	KR	KD	06.09.22
B	Junction Relocated	KR	KD	13.10.23

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Phoenix 2-17N (with Elite 2 6x2 RS chassis)



Overall Length	10.220m
Overall Width	2.250m
Overall Body Height	3.707m
Min Body Ground Clearance	0.260m
Track Width	2.250m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	7.900m

Cardiff Road, Dinas Powys

Persimmon Homes

Swept Path Analysis
10.2m Refuse Vehicle
Servicing

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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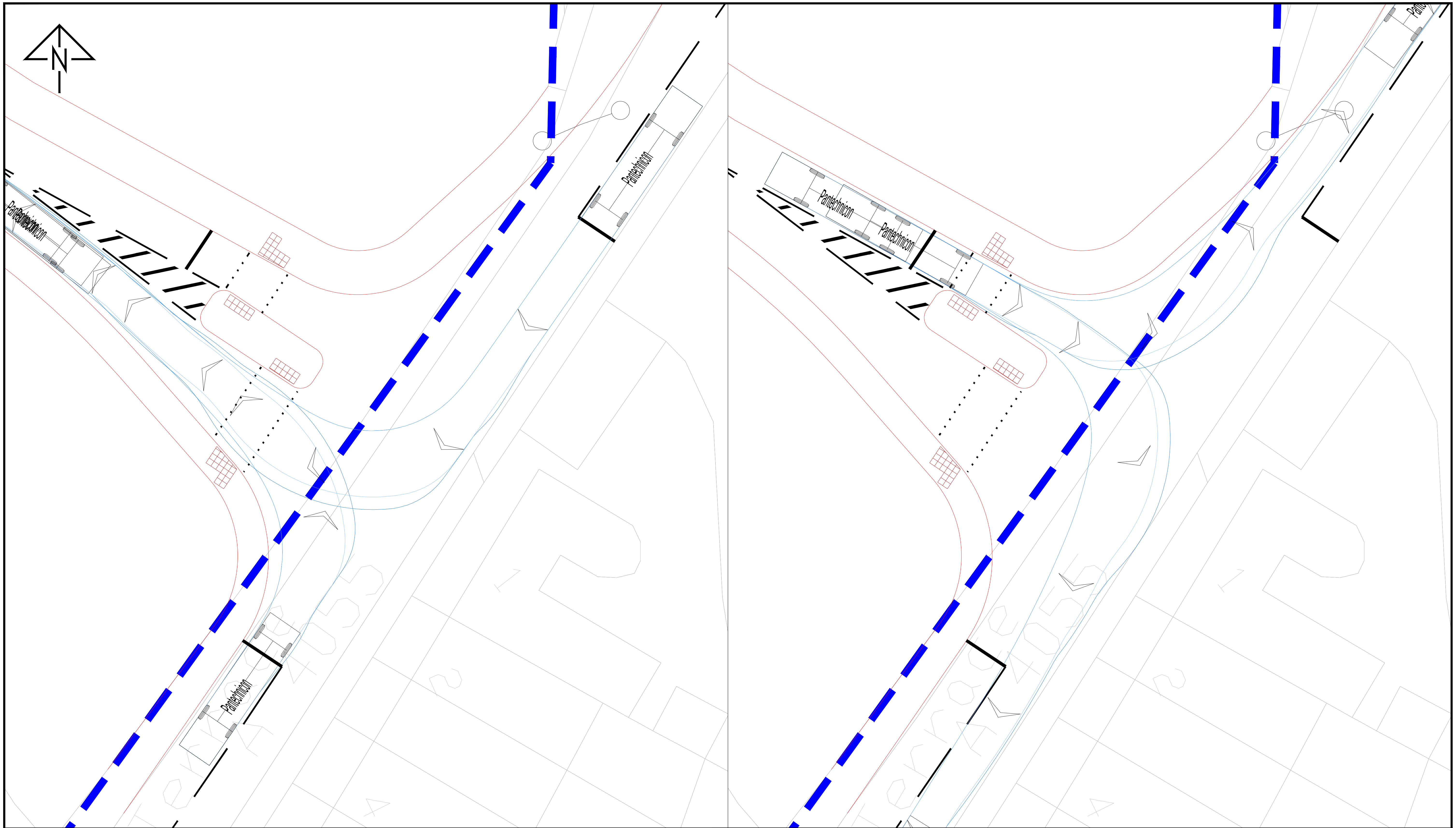

REV.	DETAILS	DRAWN	CHECKED	DATE
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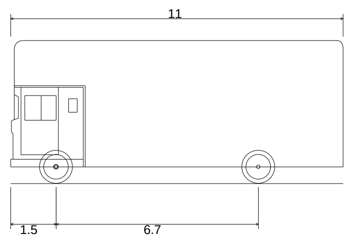
Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Pantechnicon



Overall Length	11.000m
Overall Width	2.500m
Overall Body Height	4.730m
Min Body Ground Clearance	0.541m
Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	12.200m

Cardiff Road, Dinas Powys

Persimmon Homes

SLR

Swept Path Analysis
Pantechnicon

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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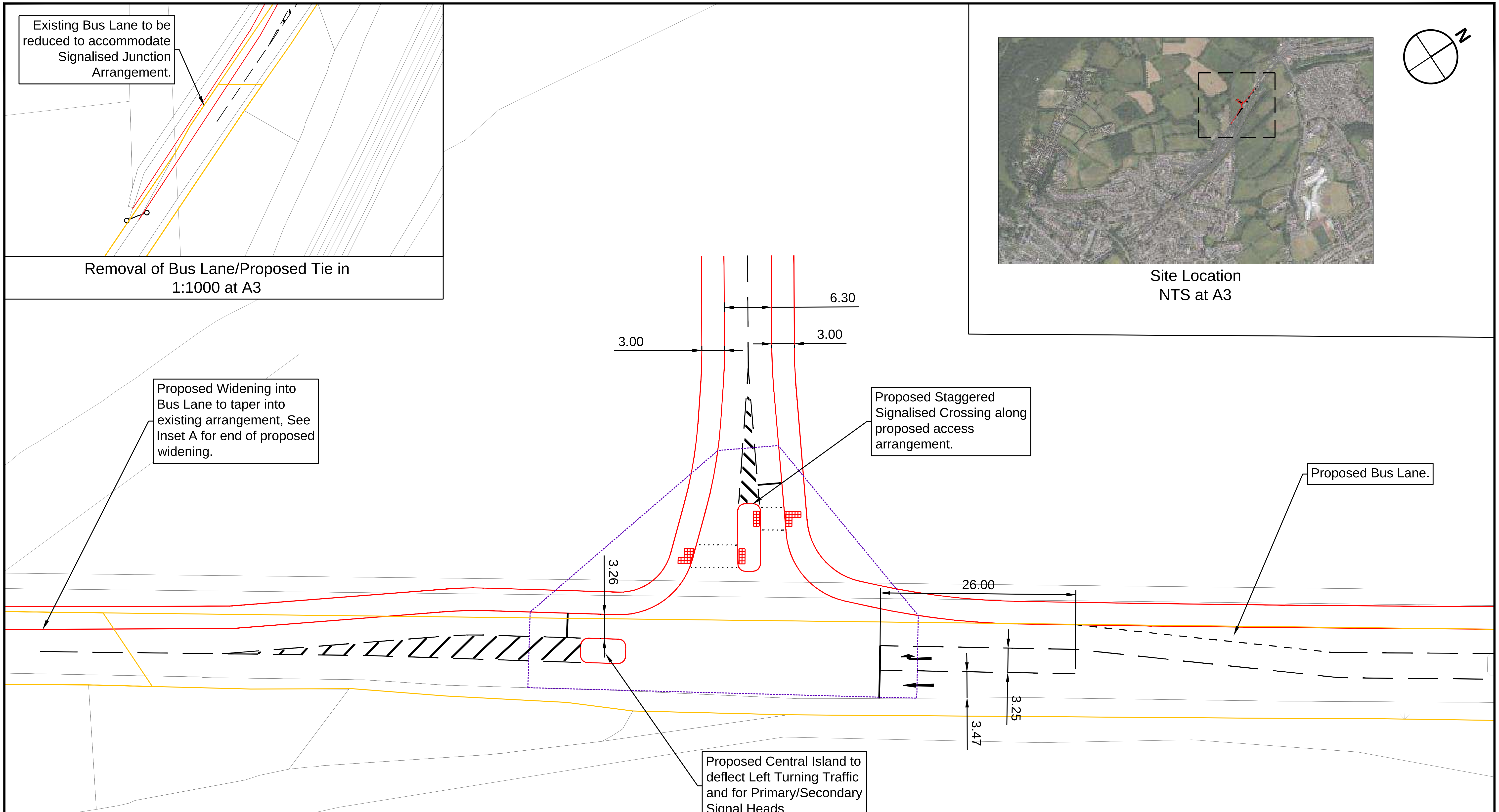

REV.	DETAILS	DRAWN	CHECKED	DATE
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INFORMATION ONLY

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Key

Adopted Highway Boundary

Junction Intervisibility

Cardiff Road, Dinas Powys

Persimmon Homes

Proposed Access General Arrangement
Signalised Junction Additional Land

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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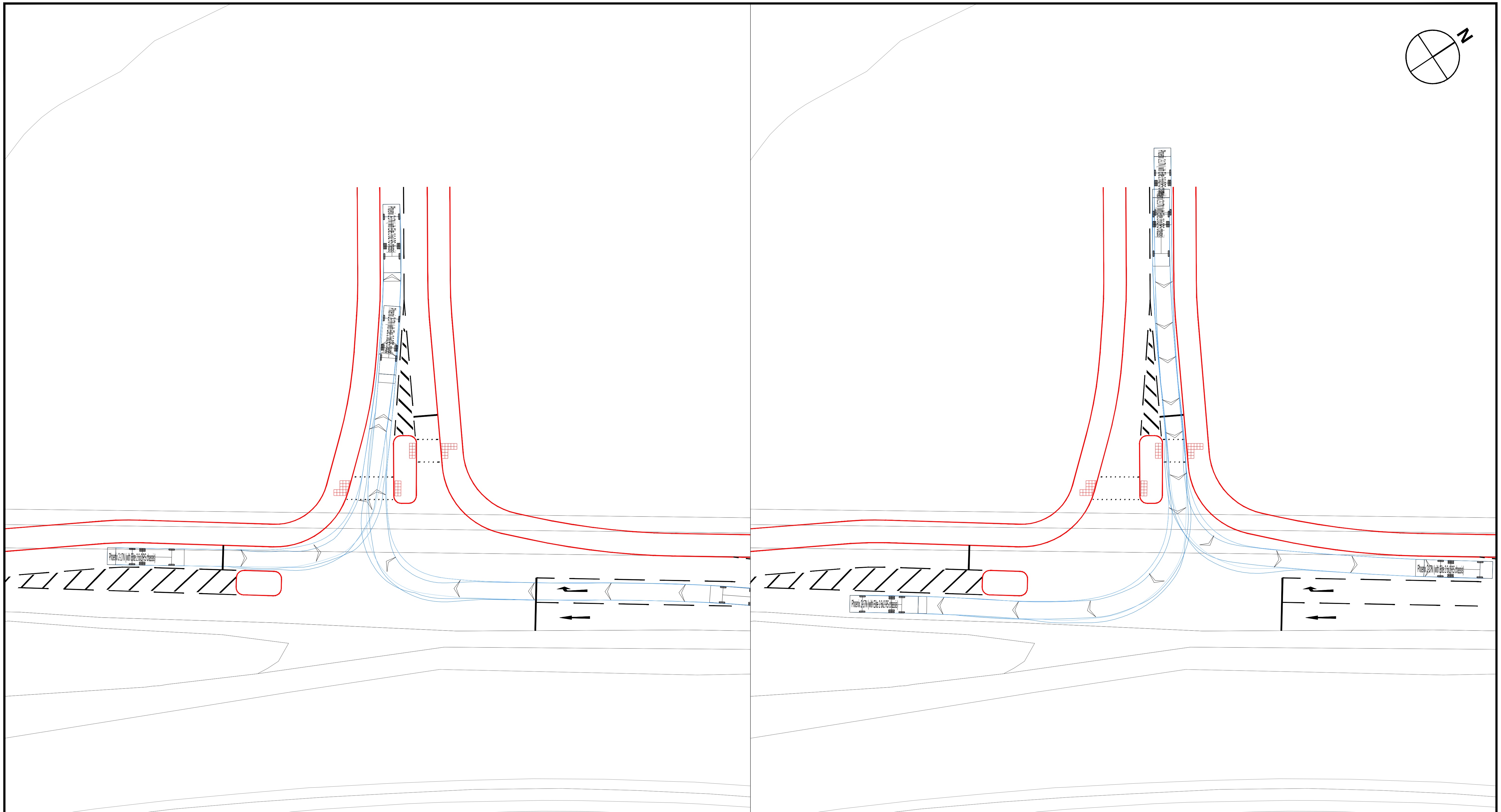


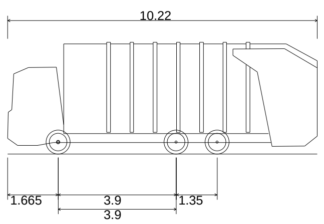
REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

INFORMATION ONLY

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Phoenix 2-17N (with Elite 2 6x2 RS chassis)



Overall Length	10.220m
Overall Width	2.250m
Overall Body Height	3.707m
Min Body Ground Clearance	0.260m
Track Width	2.250m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	7.900m

Cardiff Road, Dinas Powys

Persimmon Homes

Swept Path Analysis
10.2m Refuse Vehicle
Servicing

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
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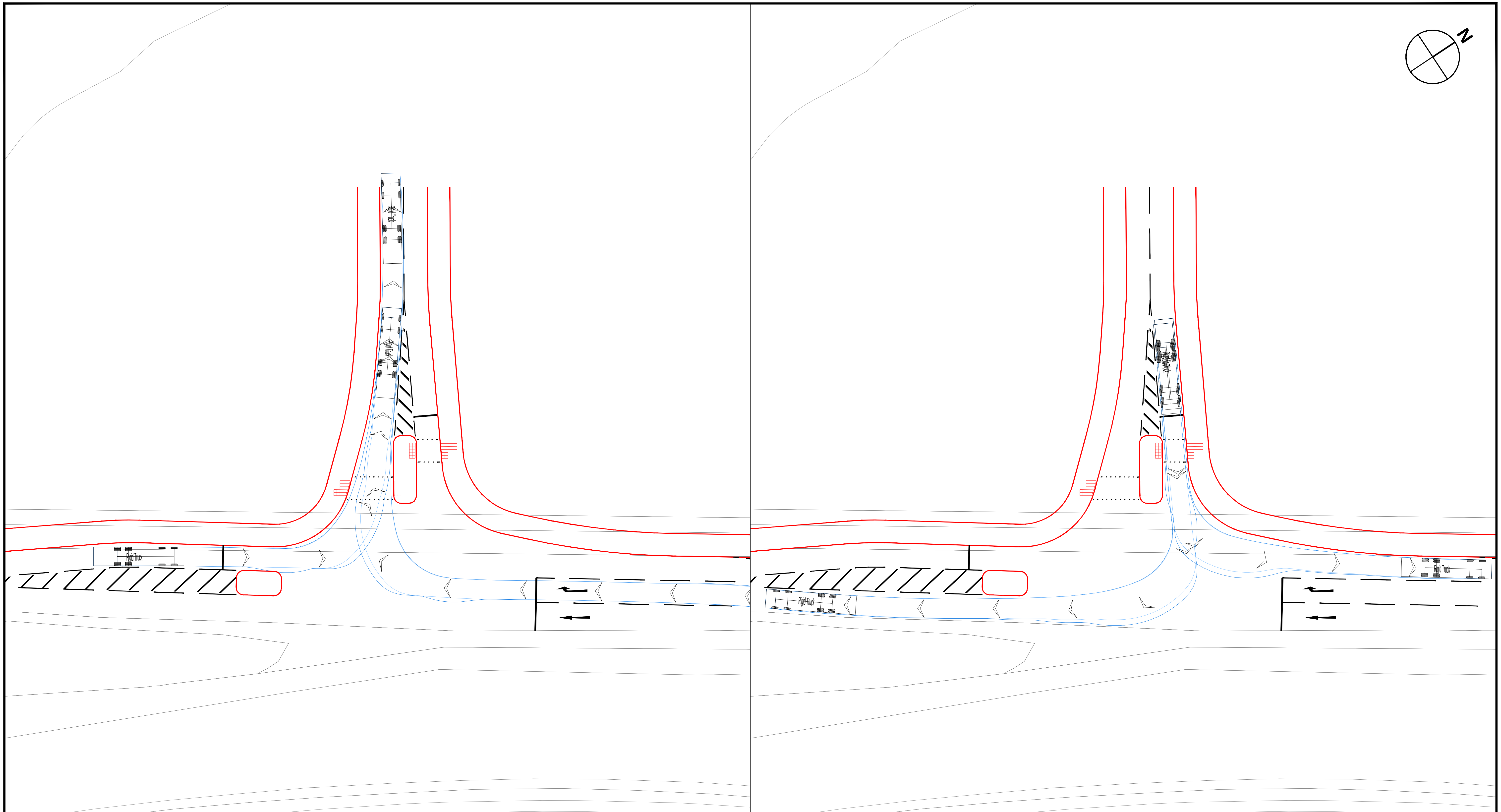


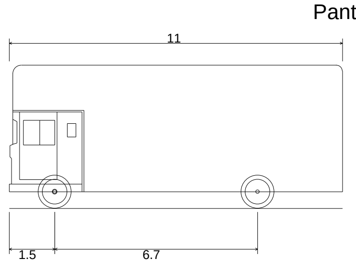
REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

INFORMATION ONLY

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

Pantechnicon



Overall Length	11.000m
Overall Width	2.500m
Overall Body Height	4.730m
Min Body Ground Clearance	0.541m
Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	12.200m

Cardiff Road, Dinas Powys

Persimmon Homes

Swept Path Analysis Pantechnicon

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
KR	KD	19.07.23	1:500 at A3	194849_AT_C02	-

Appendix D Junction Modelling Outputs

Land to the North of Dinas Powys

Persimmon Homes

SLR Project No.: 226510

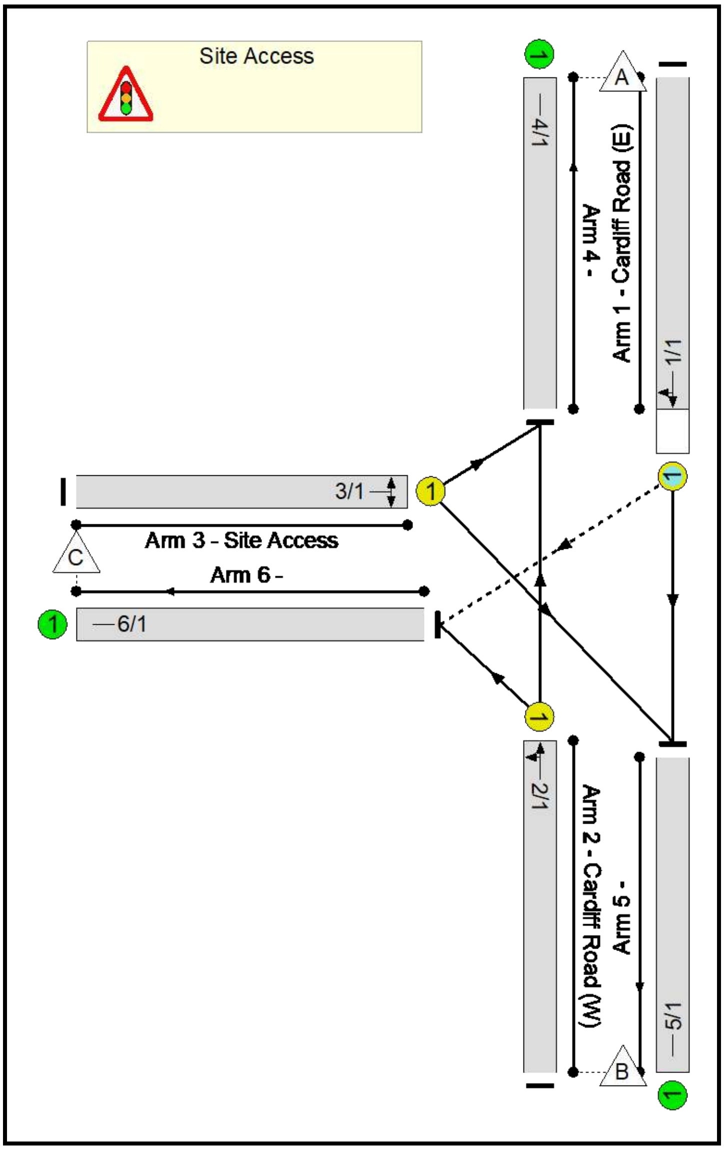
02/02/2024

Full Input Data And Results

User and Project Details

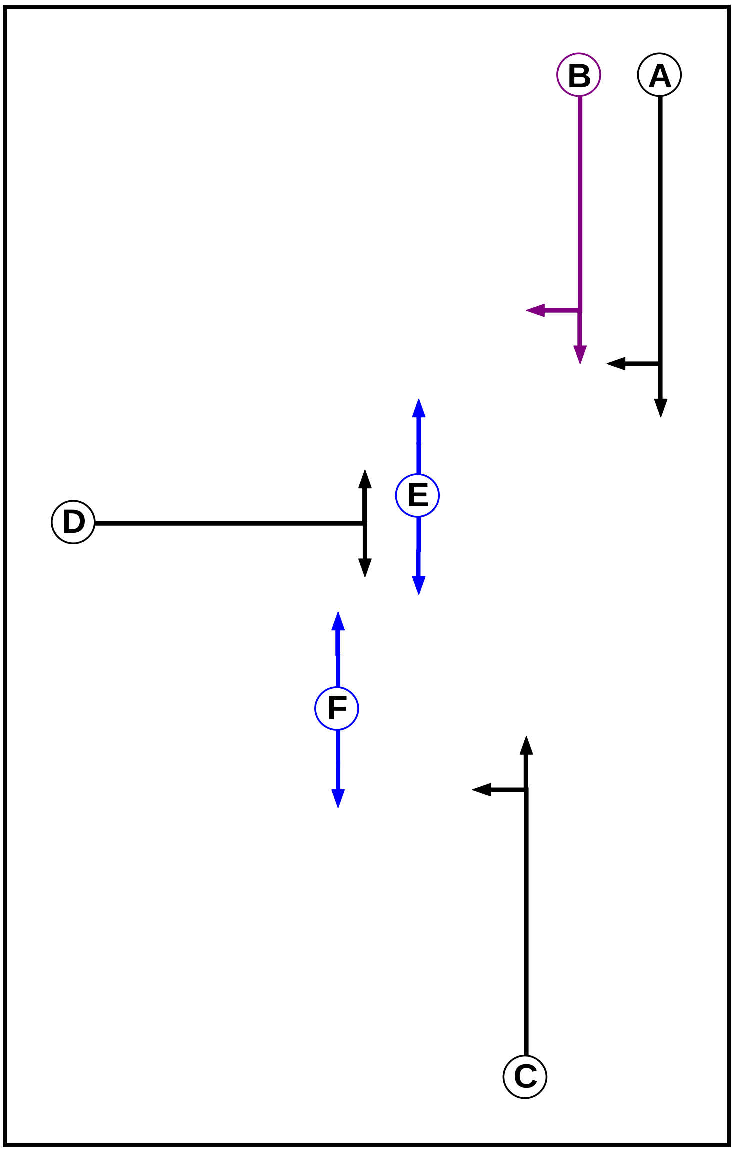
Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 - Site Access (PD01 Rev B) - V1.lsg3x
Author:	Ben Stone
Company:	SLR
Address:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Ind. Arrow	A	4	4
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		5	5
F	Pedestrian		5	5

Full Input Data And Results

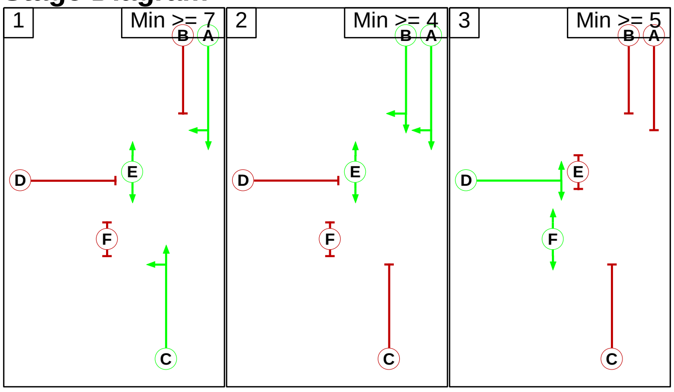
Phase Intergreens Matrix

		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	-	5	-	8
	B	-		5	5	-	8
	C	-	5		5	-	7
	D	5	5	5		5	-
	E	-	-	-	5		-
	F	9	9	9	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A C E
2	A B E
3	D F

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage		
		1	2	3
From Stage	1		5	8
	2	5		8
	3	9	9	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Site Access											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
1/1 (Cardiff Road (E))	6/1 (Right)	1439	0	2/1	1.09	All	2.00	-	0.50	2	2.00

Full Input Data And Results

Lane Input Data

Junction: Site Access												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Cardiff Road (E))	O	A B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	7.00
2/1 (Cardiff Road (W))	U	C	2	3	60.0	Geom	-	3.20	0.00	Y	Arm 4 Ahead	Inf
											Arm 6 Left	12.00
3/1 (Site Access)	U	D	2	3	60.0	Geom	-	3.15	0.00	Y	Arm 4 Left	12.00
											Arm 5 Right	10.00
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 + Dev AM'	08:00	09:00	01:00	
2: '2022 + Dev PM'	17:00	18:00	01:00	
3: '2032 + Dev AM'	08:00	09:00	01:00	
4: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
		A	B	C	Tot.
Origin	A	0	416	14	430
	B	734	0	4	738
	C	59	16	0	75
	Tot.	793	432	18	1243

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 1: 2022 + Dev AM
Junction: Site Access	
1/1	430
2/1	738
3/1	75
4/1	793
5/1	432
6/1	18

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	96.7 %	1902	1902
				Arm 6 Right	7.00	3.3 %		
2/1 (Cardiff Road (W))	3.20	0.00	Y	Arm 4 Ahead	Inf	99.5 %	1934	1934
				Arm 6 Left	12.00	0.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	78.7 %	1707	1707
				Arm 5 Right	10.00	21.3 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	675	68	743
	B	642	0	19	661
	C	28	8	0	36
	Tot.	670	683	87	1440

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 2: 2022 + Dev PM
Junction: Site Access	
1/1	743
2/1	661
3/1	36
4/1	670
5/1	683
6/1	87

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	90.8 %	1878	1878
				Arm 6 Right	7.00	9.2 %		
2/1 (Cardiff Road (W))	3.20	0.00	Y	Arm 4 Ahead	Inf	97.1 %	1928	1928
				Arm 6 Left	12.00	2.9 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	77.8 %	1707	1707
				Arm 5 Right	10.00	22.2 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	446	14	460
	B	787	0	4	791
	C	59	16	0	75
	Tot.	846	462	18	1326

Traffic Lane Flows

Lane	Scenario 3: 2032 + Dev AM
Junction: Site Access	
1/1	460
2/1	791
3/1	75
4/1	846
5/1	462
6/1	18

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	97.0 %	1903	1903
				Arm 6 Right	7.00	3.0 %		
2/1 (Cardiff Road (W))	3.20	0.00	Y	Arm 4 Ahead	Inf	99.5 %	1934	1934
				Arm 6 Left	12.00	0.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	78.7 %	1707	1707
				Arm 5 Right	10.00	21.3 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
		A	B	C	Tot.
Origin	A	0	725	68	793
	B	689	0	19	708
	C	28	8	0	36
	Tot.	717	733	87	1537

Full Input Data And Results

Traffic Lane Flows

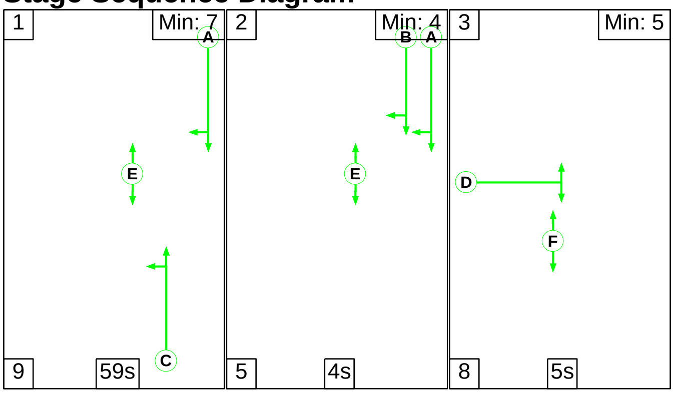
Lane	Scenario 4: 2032 + Dev PM
Junction: Site Access	
1/1	793
2/1	708
3/1	36
4/1	717
5/1	733
6/1	87

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.00	0.00	Y	Arm 5 Ahead	Inf	91.4 %	1880	1880
				Arm 6 Right	7.00	8.6 %		
2/1 (Cardiff Road (W))	3.20	0.00	Y	Arm 4 Ahead	Inf	97.3 %	1929	1929
				Arm 6 Left	12.00	2.7 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	77.8 %	1707	1707
				Arm 5 Right	10.00	22.2 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

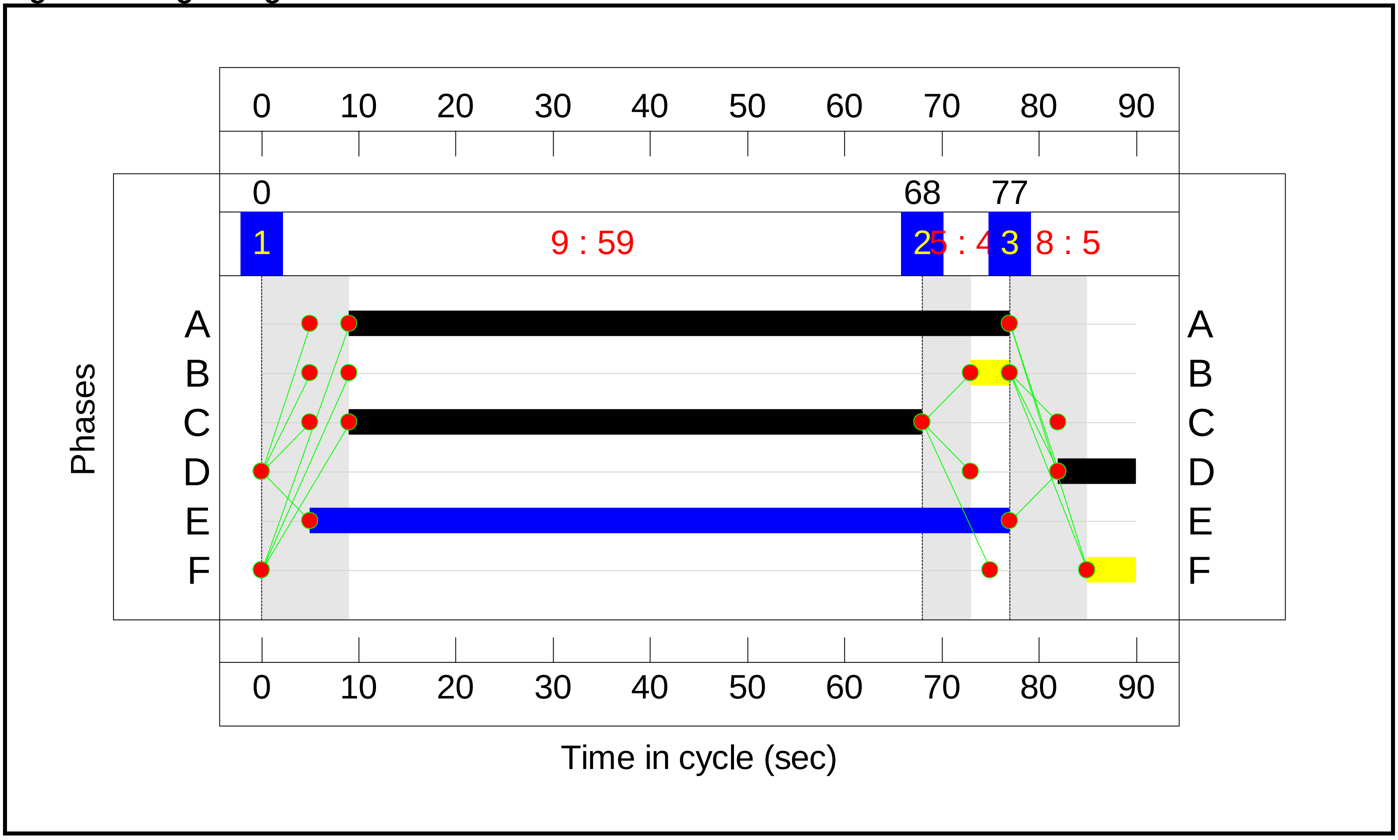
Stage Sequence Diagram



Stage Timings

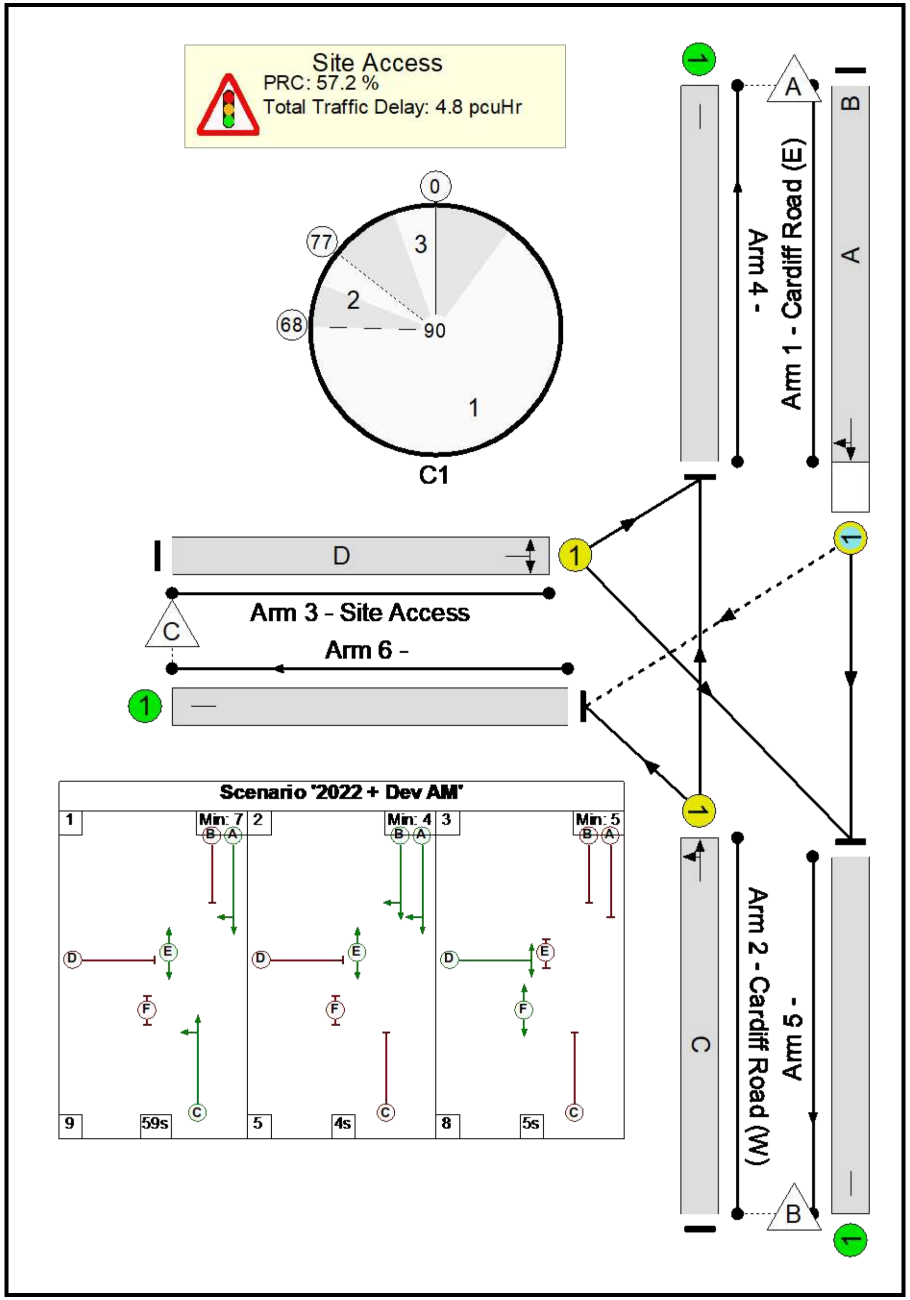
Stage	1	2	3
Duration	59	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**57.2%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**57.2%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A	B	1	68	4	430	1902	1041	41.3%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	59	-	738	1934	1289	57.2%
3/1	Site Access Left Right	U	N/A	N/A	D		1	8	-	75	1707	171	43.9%
4/1		U	N/A	N/A	-		-	-	-	793	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	432	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	18	Inf	Inf	0.0%

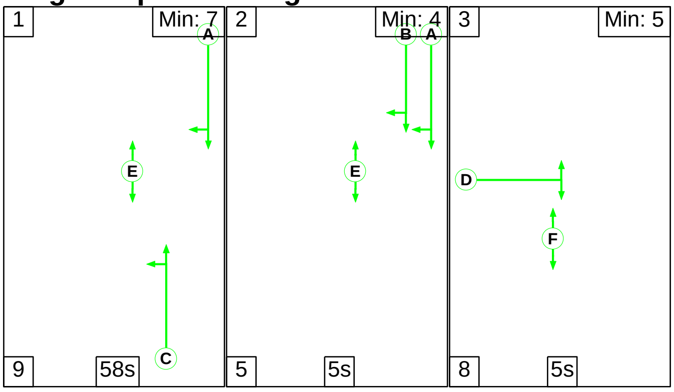
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**13**	**1**	**0**	**3.4**	**1.4**	**0.0**	**4.8**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**13**	**1**	**0**	**3.4**	**1.4**	**0.0**	**4.8**	**-**	**-**	**-**	**-**
1/1	430	430	13	1	0	1.0	0.4	0.0	1.3	11.1	6.1	0.4	6.4
2/1	738	738	-	-	-	1.7	0.7	-	2.3	11.3	9.8	0.7	10.5
3/1	75	75	-	-	-	0.8	0.4	-	1.2	56.8	1.7	0.4	2.1
4/1	793	793	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	432	432	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	18	18	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 57.2 Total Delay for Signalled Lanes (pcuHr): 4.83 Cycle Time (s): 90
PRC Over All Lanes (%): 57.2 Total Delay Over All Lanes(pcuHr): 4.83

Full Input Data And Results

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

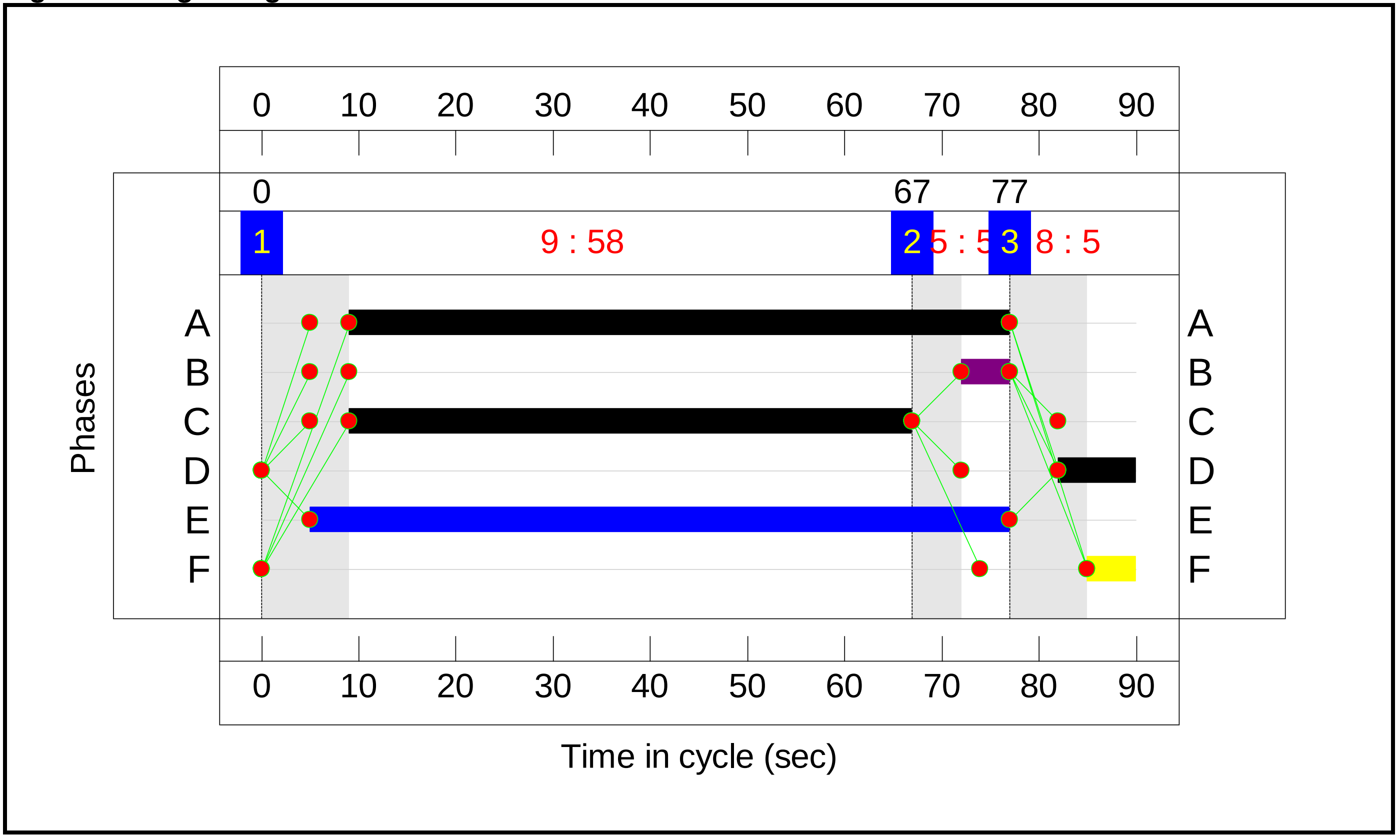
Stage Sequence Diagram



Stage Timings

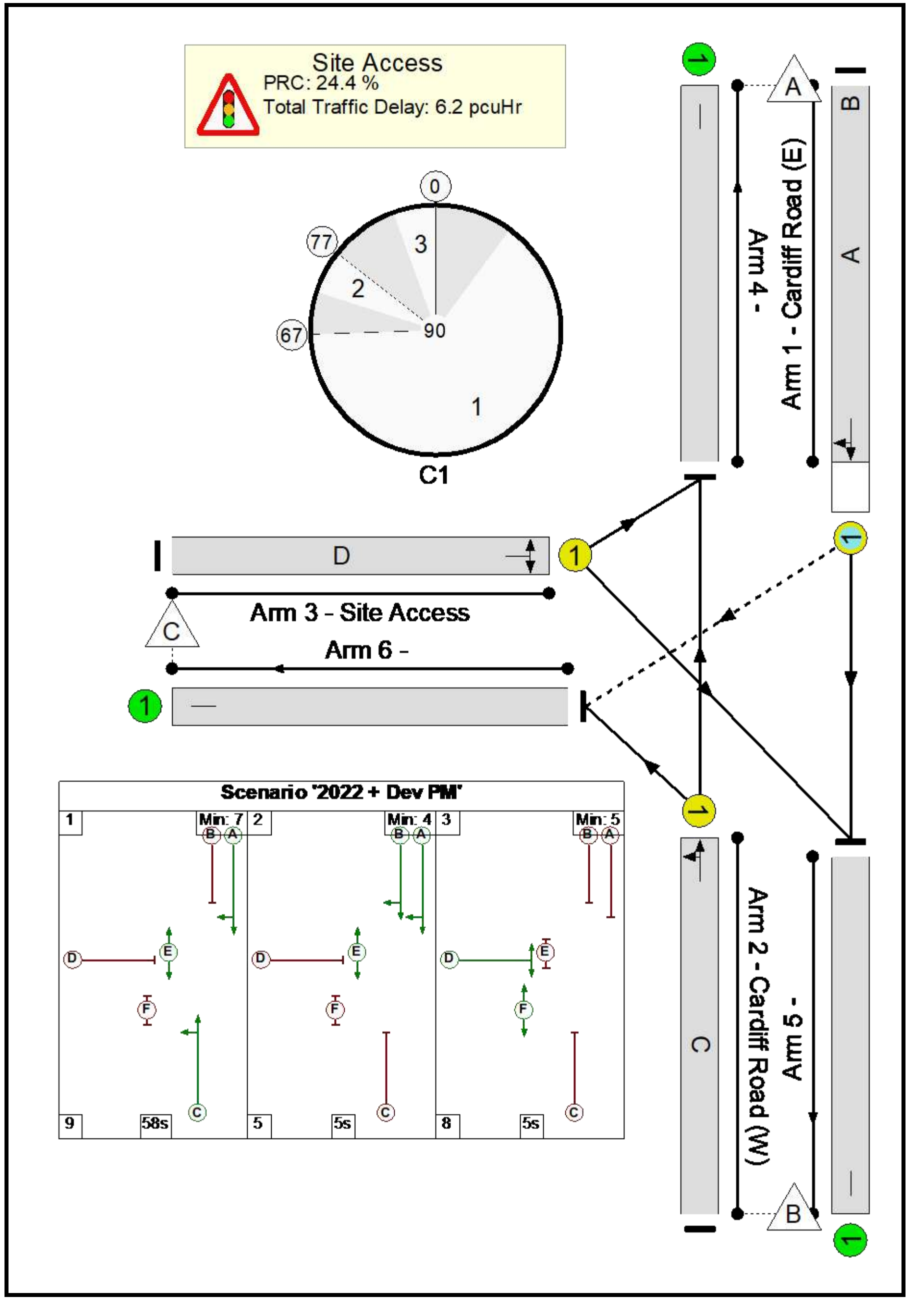
Stage	1	2	3
Duration	58	5	5
Change Point	0	67	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**72.3%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**72.3%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A	B	1	68	5	743	1878	1027	72.3%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	58	-	661	1928	1264	52.3%
3/1	Site Access Left Right	U	N/A	N/A	D		1	8	-	36	1707	171	21.1%
4/1		U	N/A	N/A	-		-	-	-	670	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	87	Inf	Inf	0.0%

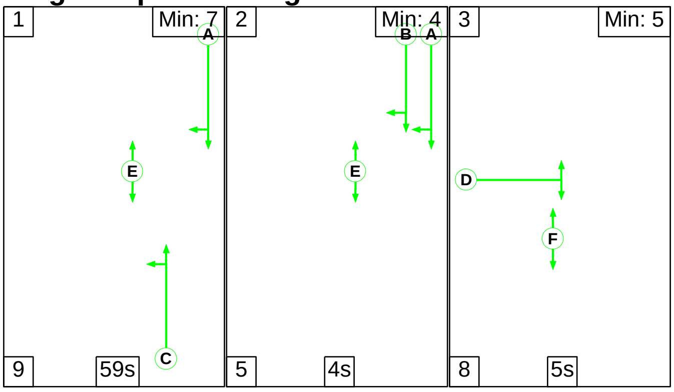
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**60**	**6**	**2**	**4.2**	**2.0**	**0.1**	**6.2**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**60**	**6**	**2**	**4.2**	**2.0**	**0.1**	**6.2**	**-**	**-**	**-**	**-**
1/1	743	743	60	6	2	2.3	1.3	0.1	3.6	17.6	13.0	1.3	14.3
2/1	661	661	-	-	-	1.5	0.5	-	2.0	11.1	8.6	0.5	9.2
3/1	36	36	-	-	-	0.4	0.1	-	0.5	50.6	0.8	0.1	1.0
4/1	670	670	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	683	683	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	87	87	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 24.4 Total Delay for Signalled Lanes (pcuHr): 6.19 Cycle Time (s): 90
PRC Over All Lanes (%): 24.4 Total Delay Over All Lanes(pcuHr): 6.19

Full Input Data And Results

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

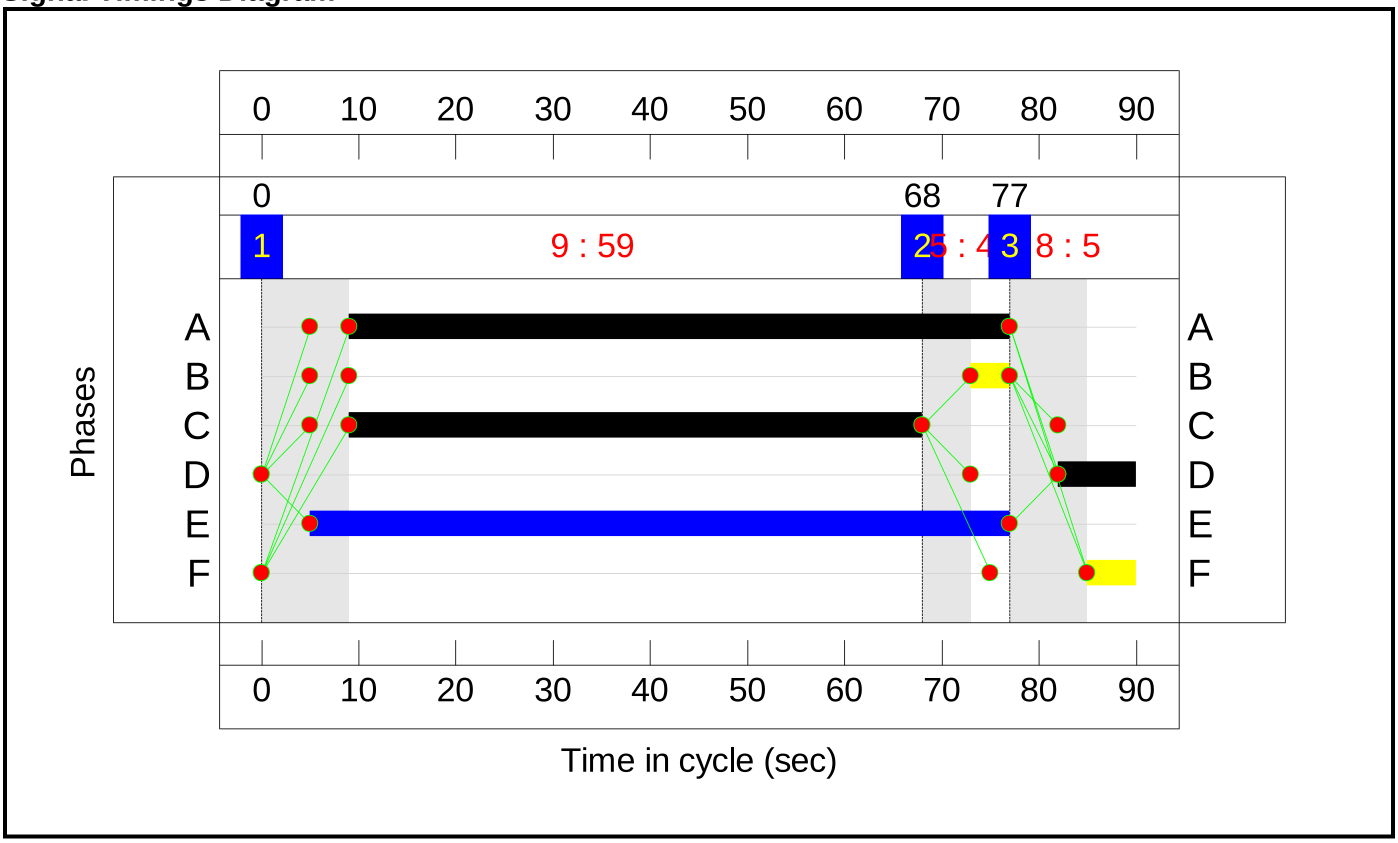
Stage Sequence Diagram



Stage Timings

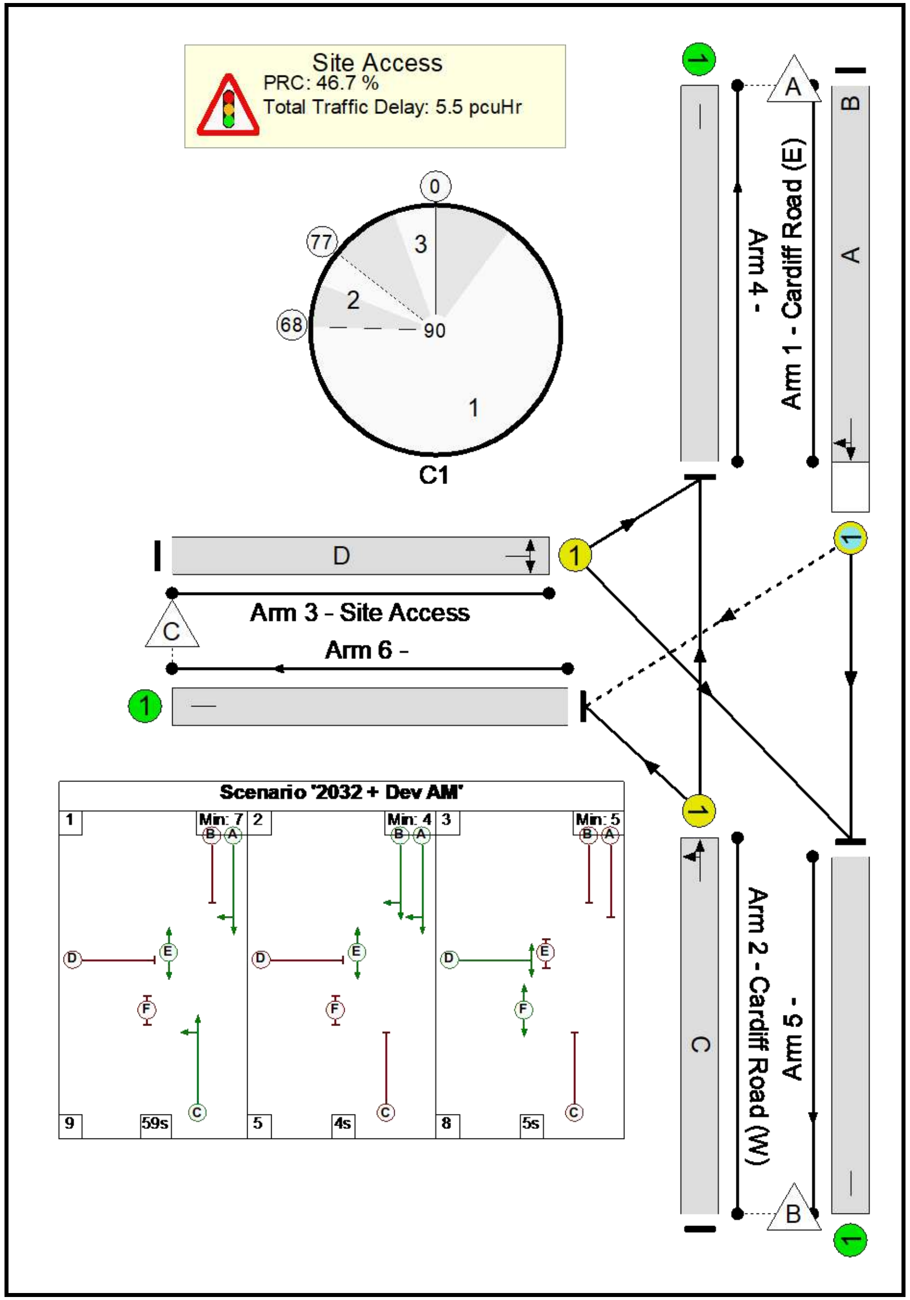
Stage	1	2	3
Duration	59	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**61.3%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**61.3%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A	B	1	68	4	460	1903	999	46.1%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	59	-	791	1934	1289	61.3%
3/1	Site Access Left Right	U	N/A	N/A	D		1	8	-	75	1707	171	43.9%
4/1		U	N/A	N/A	-		-	-	-	846	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	462	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	18	Inf	Inf	0.0%

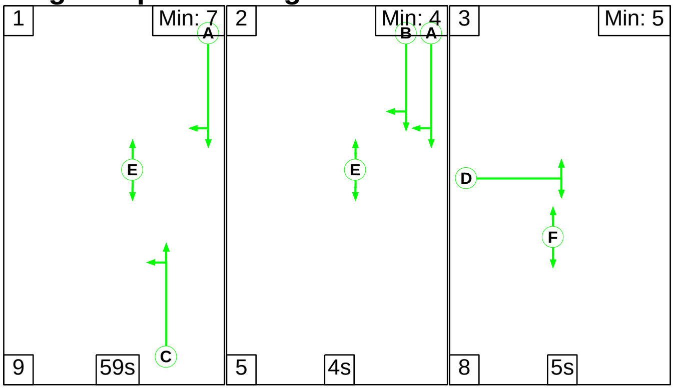
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**13**	**1**	**0**	**3.9**	**1.6**	**0.0**	**5.5**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**13**	**1**	**0**	**3.9**	**1.6**	**0.0**	**5.5**	**-**	**-**	**-**	**-**
1/1	460	460	13	1	0	1.2	0.4	0.0	1.6	12.8	7.0	0.4	7.5
2/1	791	791	-	-	-	1.9	0.8	-	2.7	12.1	11.0	0.8	11.8
3/1	75	75	-	-	-	0.8	0.4	-	1.2	56.8	1.7	0.4	2.1
4/1	846	846	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	462	462	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	18	18	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 46.7 Total Delay for Signalled Lanes (pcuHr): 5.47 Cycle Time (s): 90
PRC Over All Lanes (%): 46.7 Total Delay Over All Lanes(pcuHr): 5.47

Full Input Data And Results

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

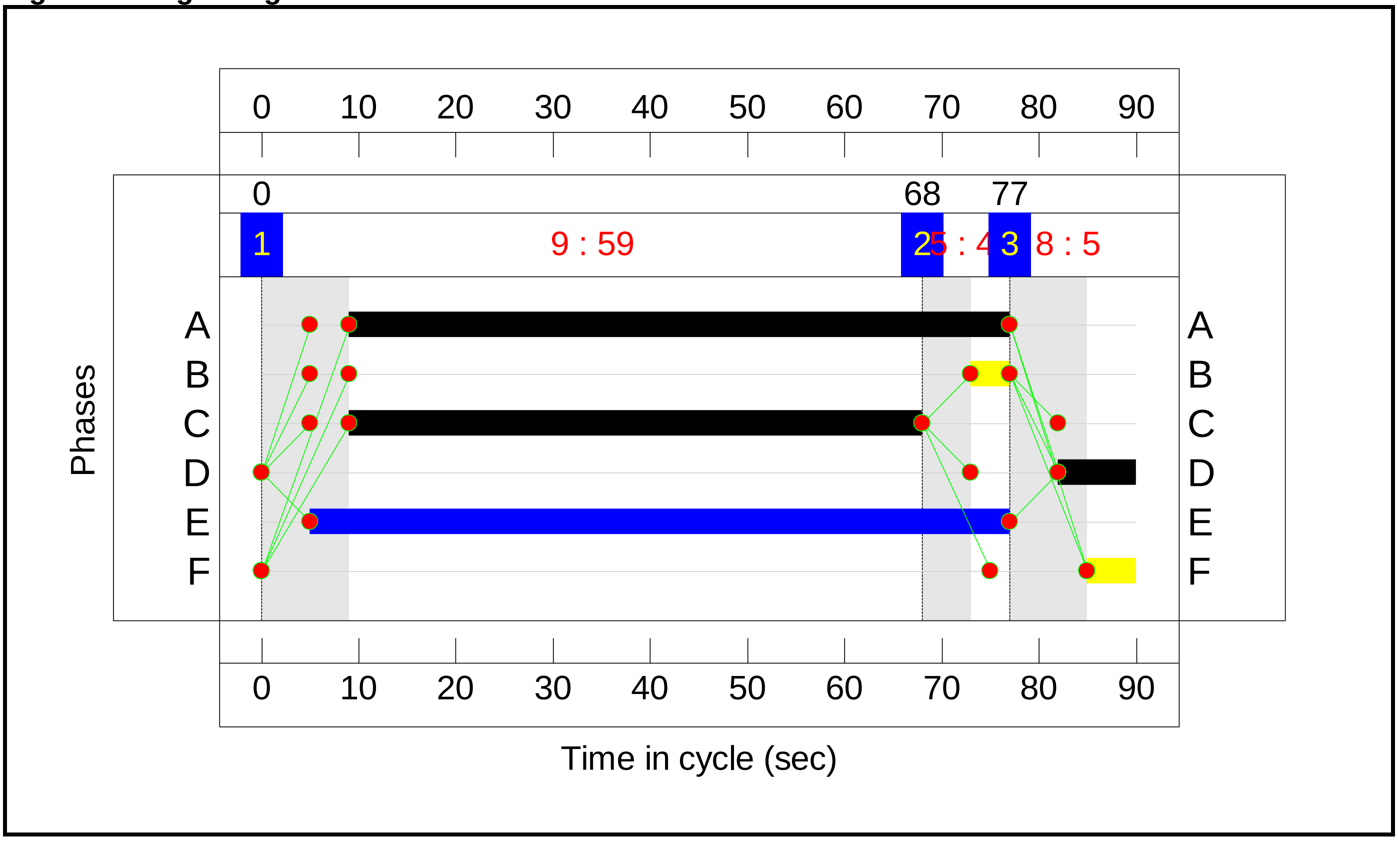
Stage Sequence Diagram



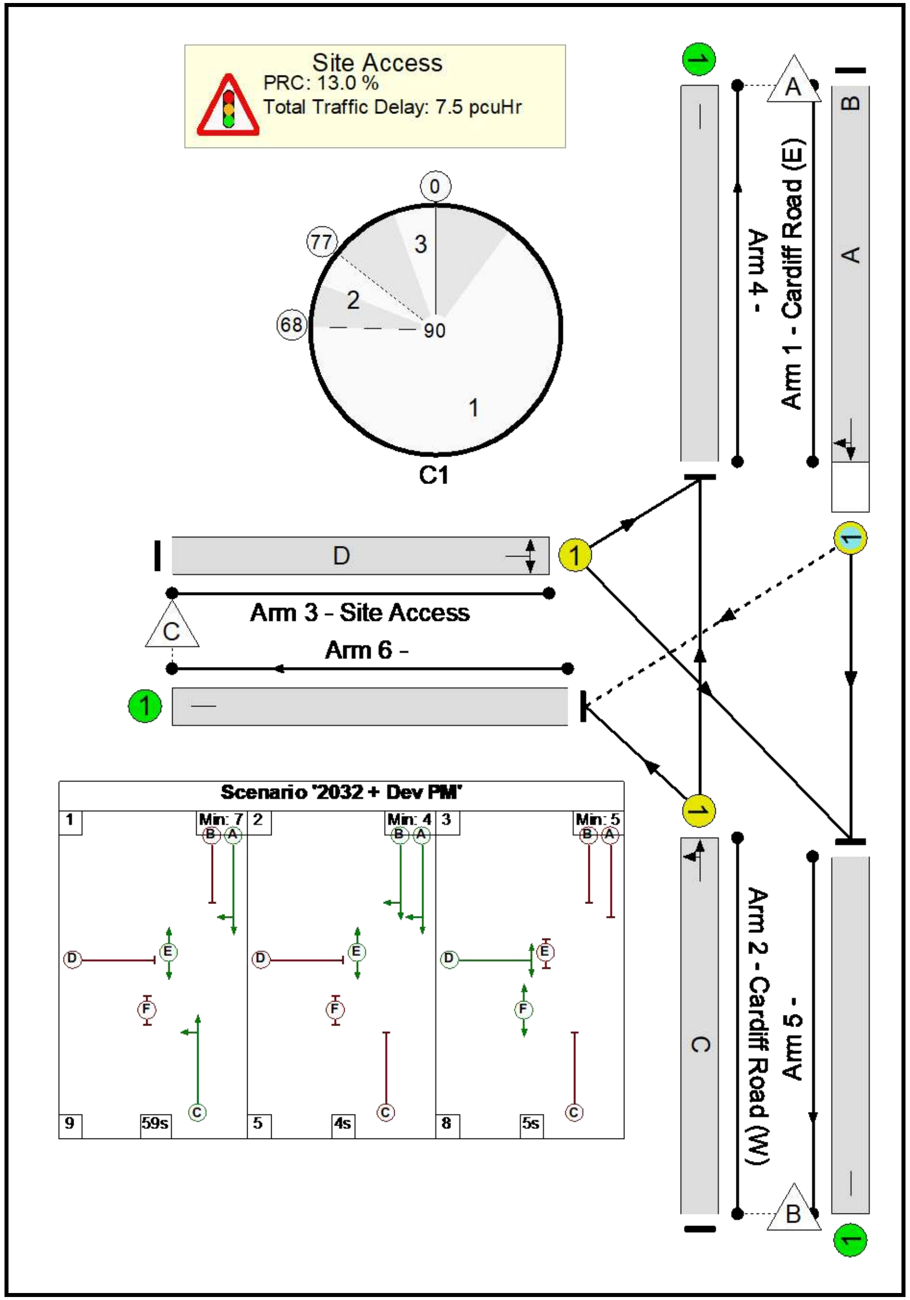
Stage Timings

Stage	1	2	3
Duration	59	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results
Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**79.7%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**79.7%**
1/1	Cardiff Road (E) Ahead Right	O	N/A	N/A	A	B	1	68	4	793	1880	995	79.7%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	59	-	708	1929	1286	55.1%
3/1	Site Access Left Right	U	N/A	N/A	D		1	8	-	36	1707	171	21.1%
4/1		U	N/A	N/A	-		-	-	-	717	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	733	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	87	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**61**	**5**	**2**	**4.7**	**2.7**	**0.1**	**7.5**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**61**	**5**	**2**	**4.7**	**2.7**	**0.1**	**7.5**	**-**	**-**	**-**	**-**
1/1	793	793	61	5	2	2.8	1.9	0.1	4.8	21.7	15.4	1.9	17.3
2/1	708	708	-	-	-	1.6	0.6	-	2.2	11.0	9.2	0.6	9.9
3/1	36	36	-	-	-	0.4	0.1	-	0.5	50.6	0.8	0.1	1.0
4/1	717	717	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	733	733	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	87	87	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

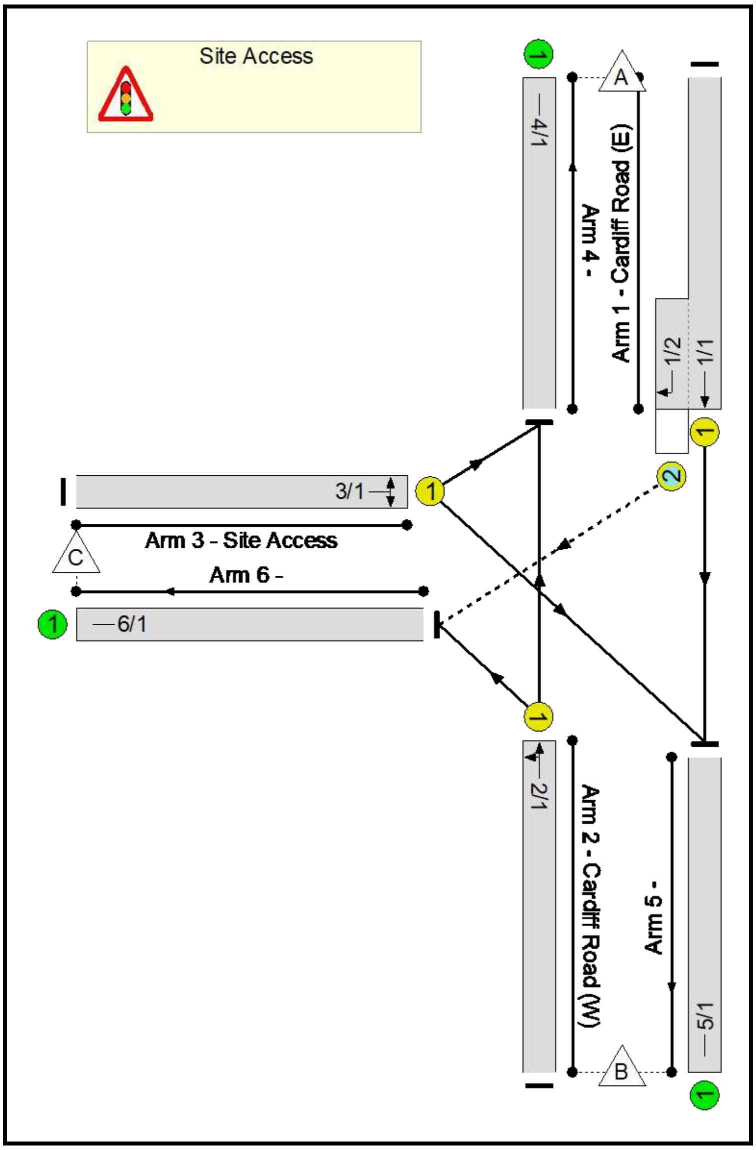
C1 PRC for Signalled Lanes (%): 13.0 Total Delay for Signalled Lanes (pcuHr): 7.46 Cycle Time (s): 90
PRC Over All Lanes (%): 13.0 Total Delay Over All Lanes(pcuHr): 7.46

Full Input Data And Results

User and Project Details

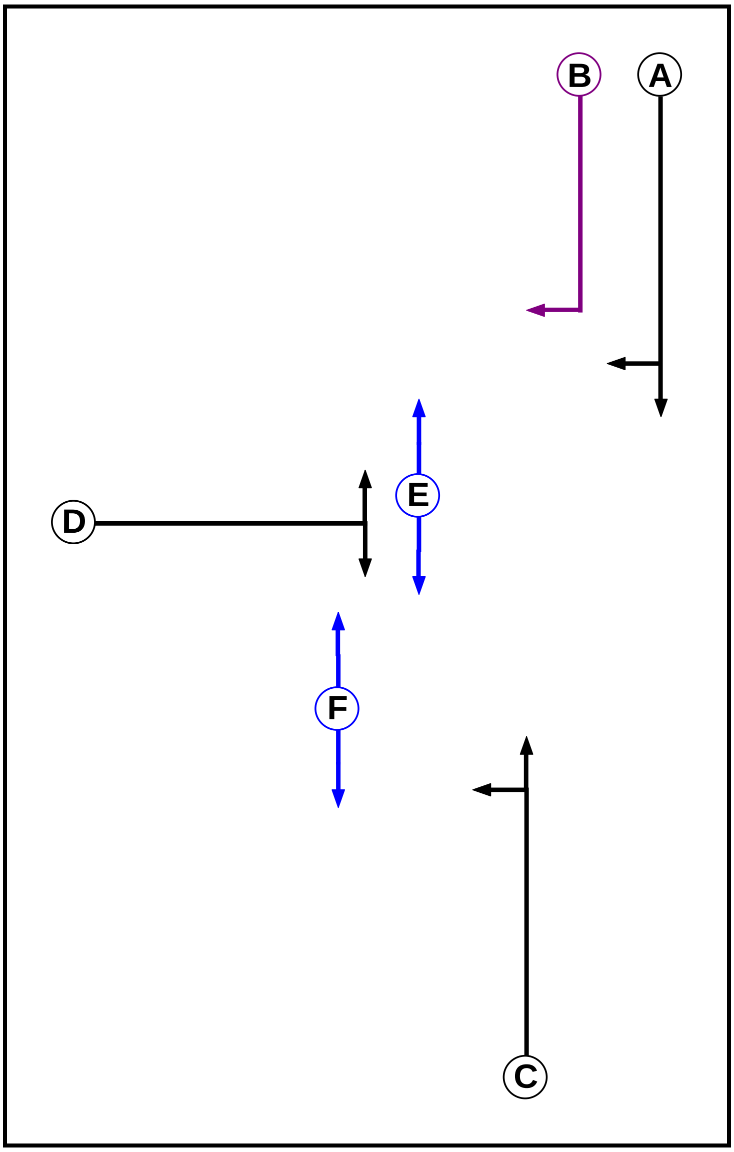
Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 - Site Access (PD05) - V1.lsg3x
Author:	Ben Stone
Company:	SLR
Address:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Ind. Arrow	A	4	4
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		5	5
F	Pedestrian		5	5

Full Input Data And Results

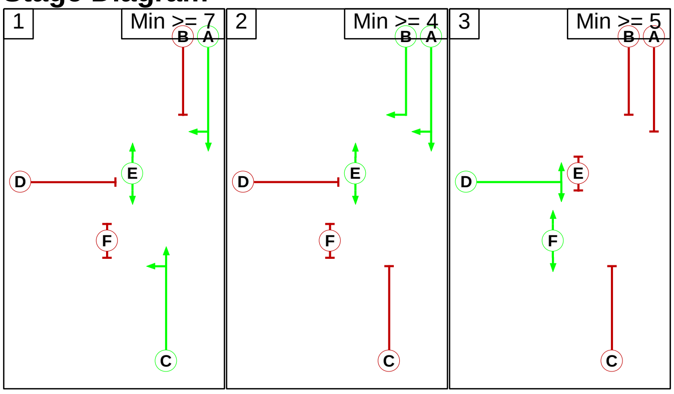
Phase Intergreens Matrix

		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	-	5	-	8
	B	-		5	5	-	8
	C	-	5		6	-	7
	D	5	5	5		5	-
	E	-	-	-	6		-
	F	8	8	8	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A C E
2	A B E
3	D F

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage		
		1	2	3
From Stage	1		5	8
	2	5		8
	3	8	8	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Site Access											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
1/2 (Cardiff Road (E))	6/1 (Right)	1439	0	2/1	1.09	All	2.00	-	0.50	2	2.00

Full Input Data And Results

Lane Input Data

Junction: Site Access												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Cardiff Road (E))	U	A	2	3	60.0	Geom	-	3.47	0.00	Y	Arm 5 Ahead	Inf
1/2 (Cardiff Road (E))	O	A B	2	3	5.0	Geom	-	3.25	0.00	Y	Arm 6 Right	7.00
2/1 (Cardiff Road (W))	U	C	2	3	60.0	Geom	-	3.26	0.00	Y	Arm 4 Ahead	Inf
											Arm 6 Left	12.00
3/1 (Site Access)	U	D	2	3	60.0	Geom	-	3.15	0.00	Y	Arm 4 Left	12.00
											Arm 5 Right	10.00
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 + Dev AM'	08:00	09:00	01:00	
2: '2022 + Dev PM'	17:00	18:00	01:00	
3: '2032 + Dev AM'	08:00	09:00	01:00	
4: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	416	14	430
	B	734	0	4	738
	C	59	16	0	75
	Tot.	793	432	18	1243

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 1: 2022 + Dev AM
Junction: Site Access	
1/1 (with short)	430(In) 416(Out)
1/2 (short)	14
2/1	738
3/1	75
4/1	793
5/1	432
6/1	18

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.47	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1962	1962
1/2 (Cardiff Road (E))	3.25	0.00	Y	Arm 6 Right	7.00	100.0 %	1598	1598
2/1 (Cardiff Road (W))	3.26	0.00	Y	Arm 4 Ahead	Inf	99.5 %	1940	1940
				Arm 6 Left	12.00	0.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	78.7 %	1707	1707
				Arm 5 Right	10.00	21.3 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	675	68	743
	B	642	0	19	661
	C	28	8	0	36
	Tot.	670	683	87	1440

Traffic Lane Flows

Lane	Scenario 2: 2022 + Dev PM
Junction: Site Access	
1/1 (with short)	743(In) 675(Out)
1/2 (short)	68
2/1	661
3/1	36
4/1	670
5/1	683
6/1	87

Lane Saturation Flows

Junction: Site Access								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Cardiff Road (E))	3.47	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1962	1962
1/2 (Cardiff Road (E))	3.25	0.00	Y	Arm 6 Right	7.00	100.0 %	1598	1598
2/1 (Cardiff Road (W))	3.26	0.00	Y	Arm 4 Ahead	Inf	97.1 %	1934	1934
				Arm 6 Left	12.00	2.9 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	77.8 %	1707	1707
				Arm 5 Right	10.00	22.2 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination				
Origin		A	B	C	Tot.
	A	0	446	14	460
	B	787	0	4	791
	C	59	16	0	75
	Tot.	846	462	18	1326

Traffic Lane Flows

Lane	Scenario 3: 2032 + Dev AM
Junction: Site Access	
1/1 (with short)	460(In) 446(Out)
1/2 (short)	14
2/1	791
3/1	75
4/1	846
5/1	462
6/1	18

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Site Access								
1/1 (Cardiff Road (E))	3.47	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1962	1962
1/2 (Cardiff Road (E))	3.25	0.00	Y	Arm 6 Right	7.00	100.0 %	1598	1598
2/1 (Cardiff Road (W))	3.26	0.00	Y	Arm 4 Ahead	Inf	99.5 %	1940	1940
				Arm 6 Left	12.00	0.5 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	78.7 %	1707	1707
				Arm 5 Right	10.00	21.3 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	725	68	793
	B	689	0	19	708
	C	28	8	0	36
	Tot.	717	733	87	1537

Full Input Data And Results

Traffic Lane Flows

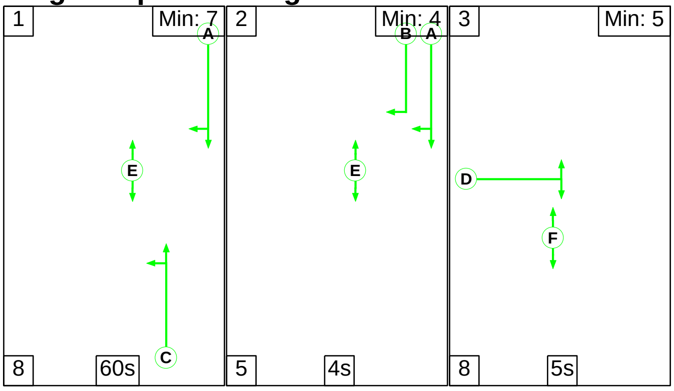
Lane	Scenario 4: 2032 + Dev PM
Junction: Site Access	
1/1 (with short)	793(In) 725(Out)
1/2 (short)	68
2/1	708
3/1	36
4/1	717
5/1	733
6/1	87

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Site Access								
1/1 (Cardiff Road (E))	3.47	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1962	1962
1/2 (Cardiff Road (E))	3.25	0.00	Y	Arm 6 Right	7.00	100.0 %	1598	1598
2/1 (Cardiff Road (W))	3.26	0.00	Y	Arm 4 Ahead	Inf	97.3 %	1935	1935
				Arm 6 Left	12.00	2.7 %		
3/1 (Site Access)	3.15	0.00	Y	Arm 4 Left	12.00	77.8 %	1707	1707
				Arm 5 Right	10.00	22.2 %		
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2022 + Dev AM' (FG1: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram

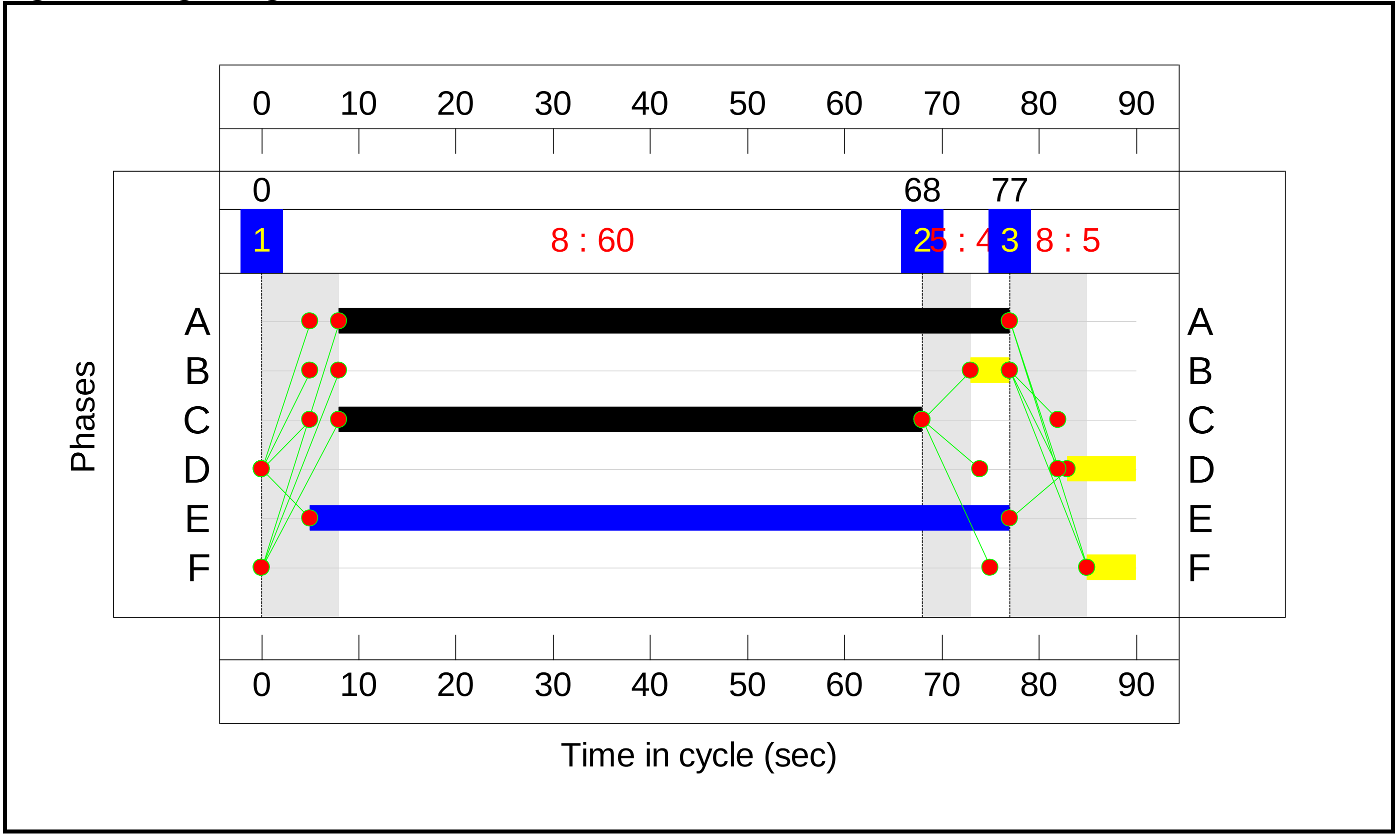


Full Input Data And Results

Stage Timings

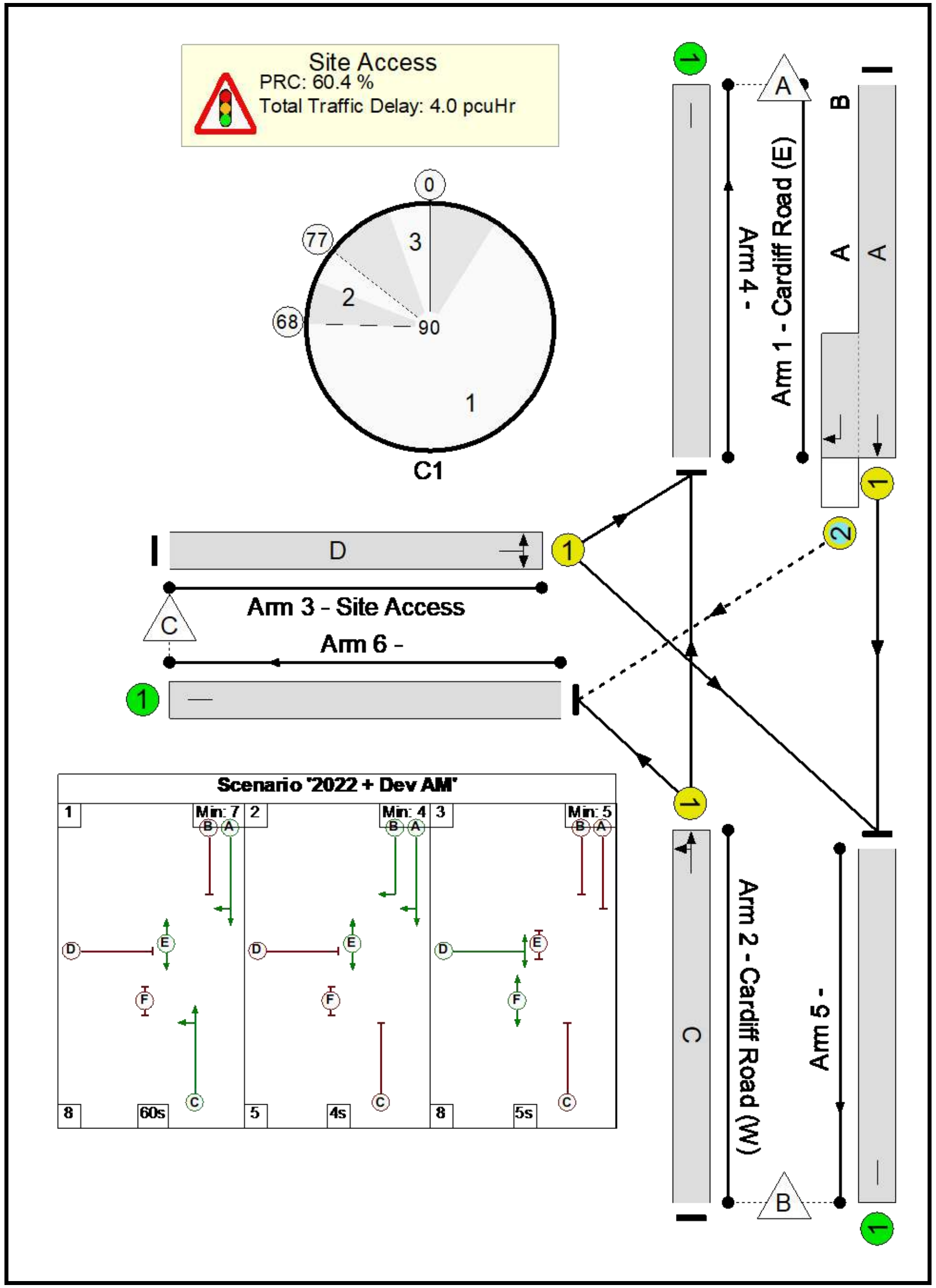
Stage	1	2	3
Duration	60	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**56.1%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**56.1%**
1/1+1/2	Cardiff Road (E) Ahead Right	U+O	N/A	N/A	A	B	1	69	4	430	1962:1598	1477+50	28.2 : 28.2%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	60	-	738	1940	1315	56.1%
3/1	Site Access Left Right	U	N/A	N/A	D		1	7	-	75	1707	152	49.4%
4/1		U	N/A	N/A	-		-	-	-	793	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	432	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	18	Inf	Inf	0.0%

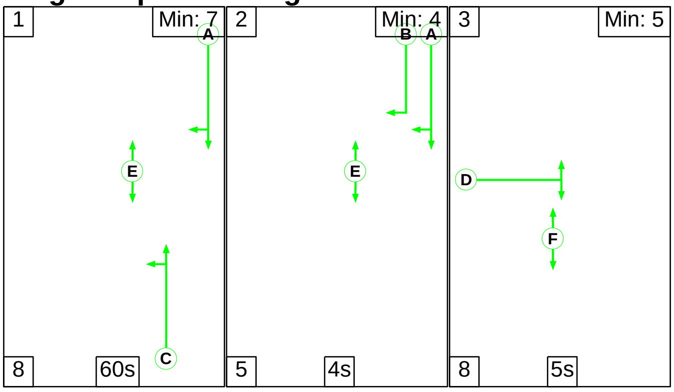
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**13**	**1**	**0**	**2.7**	**1.3**	**0.0**	**4.0**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**13**	**1**	**0**	**2.7**	**1.3**	**0.0**	**4.0**	**-**	**-**	**-**	**-**
1/1+1/2	430	430	13	1	0	0.3	0.2	0.0	0.6	4.6	2.9	0.2	3.1
2/1	738	738	-	-	-	1.5	0.6	-	2.2	10.7	9.4	0.6	10.1
3/1	75	75	-	-	-	0.8	0.5	-	1.3	62.3	1.8	0.5	2.3
4/1	793	793	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	432	432	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	18	18	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 60.4 Total Delay for Signalled Lanes (pcuHr): 4.04 Cycle Time (s): 90
PRC Over All Lanes (%): 60.4 Total Delay Over All Lanes(pcuHr): 4.04

Full Input Data And Results

Scenario 2: '2022 + Dev PM' (FG2: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

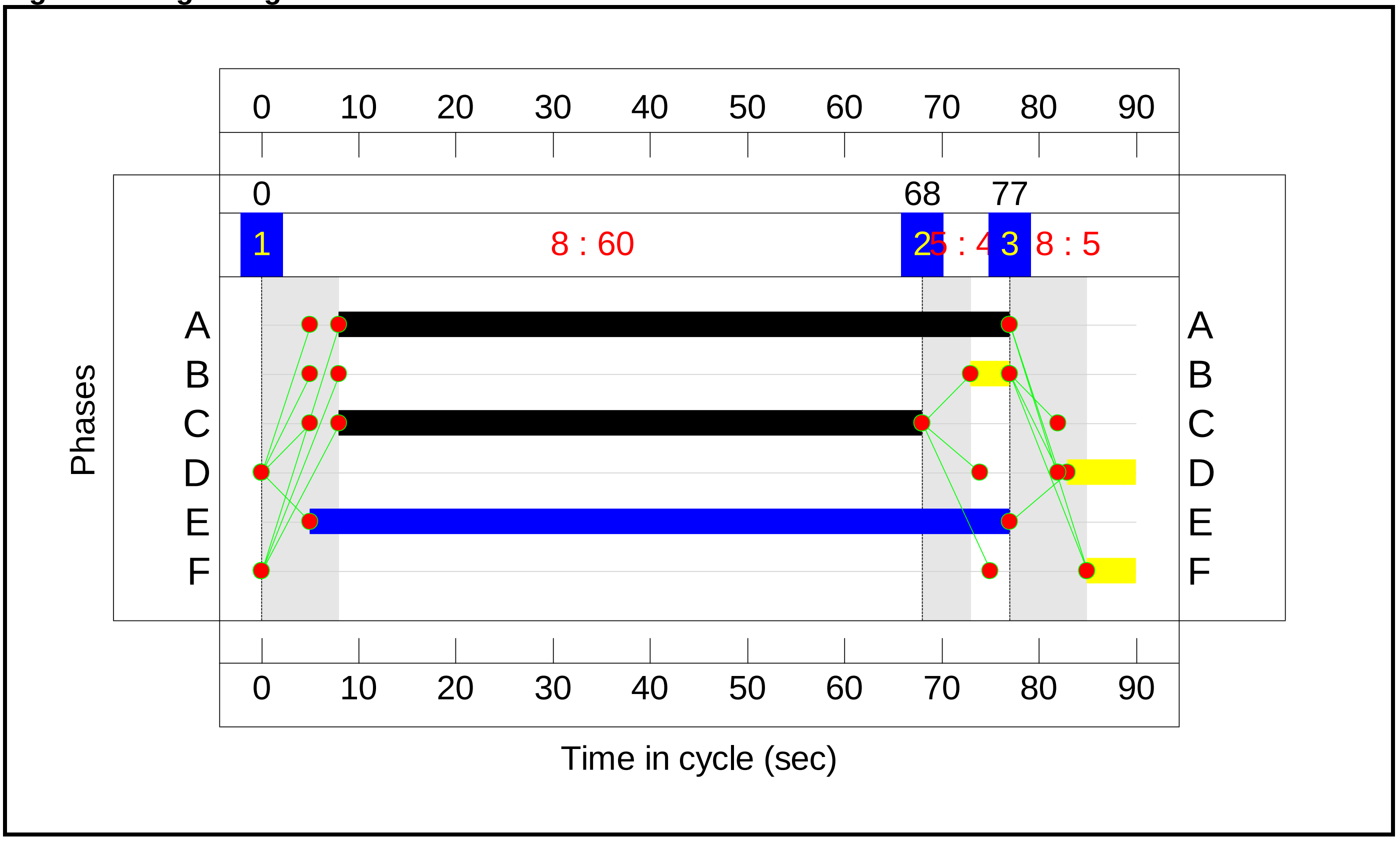
Stage Sequence Diagram



Stage Timings

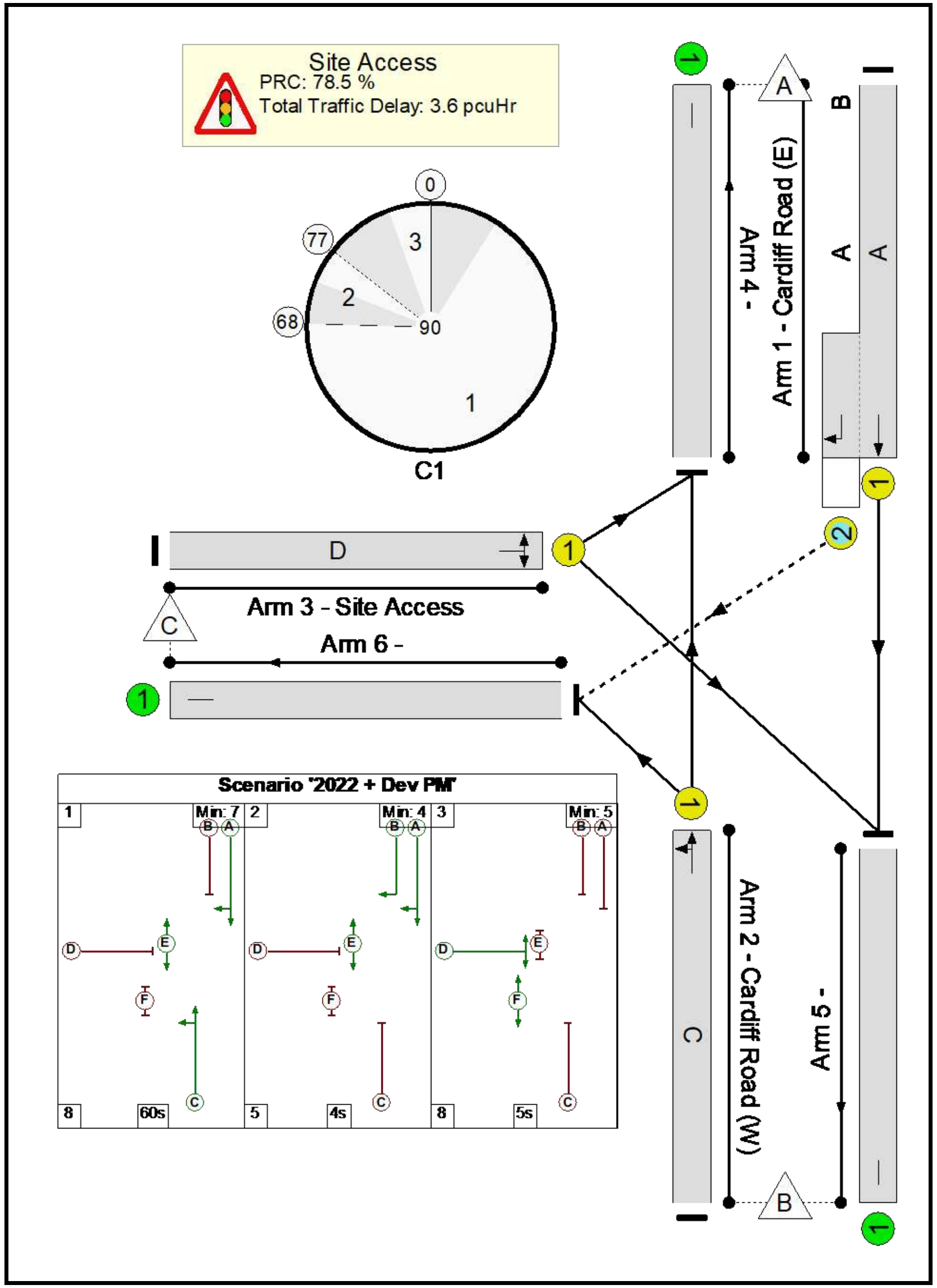
Stage	1	2	3
Duration	60	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**50.4%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**50.4%**
1/1+1/2	Cardiff Road (E) Ahead Right	U+O	N/A	N/A	A	B	1	69	4	743	1962:1598	1383+139	48.8 : 48.8%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	60	-	661	1934	1311	50.4%
3/1	Site Access Left Right	U	N/A	N/A	D		1	7	-	36	1707	152	23.7%
4/1		U	N/A	N/A	-		-	-	-	670	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	87	Inf	Inf	0.0%

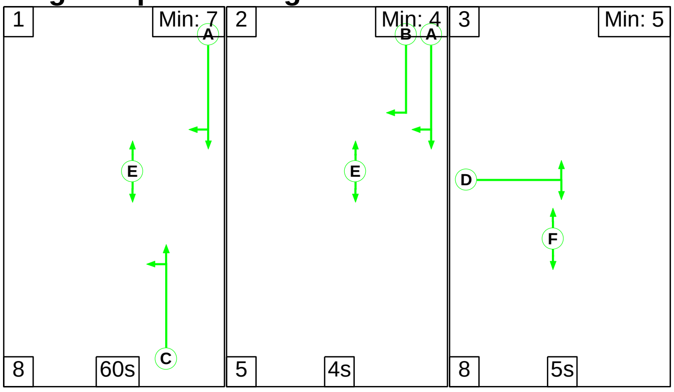
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**61**	**5**	**2**	**2.4**	**1.1**	**0.1**	**3.6**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**61**	**5**	**2**	**2.4**	**1.1**	**0.1**	**3.6**	**-**	**-**	**-**	**-**
1/1+1/2	743	743	61	5	2	0.7	0.5	0.1	1.3	6.1	5.8	0.5	6.3
2/1	661	661	-	-	-	1.3	0.5	-	1.8	9.9	8.1	0.5	8.6
3/1	36	36	-	-	-	0.4	0.2	-	0.5	53.7	0.8	0.2	1.0
4/1	670	670	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	683	683	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	87	87	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 78.5 Total Delay for Signalled Lanes (pcuHr): 3.60 Cycle Time (s): 90
PRC Over All Lanes (%): 78.5 Total Delay Over All Lanes(pcuHr): 3.60

Full Input Data And Results

Scenario 3: '2032 + Dev AM' (FG3: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

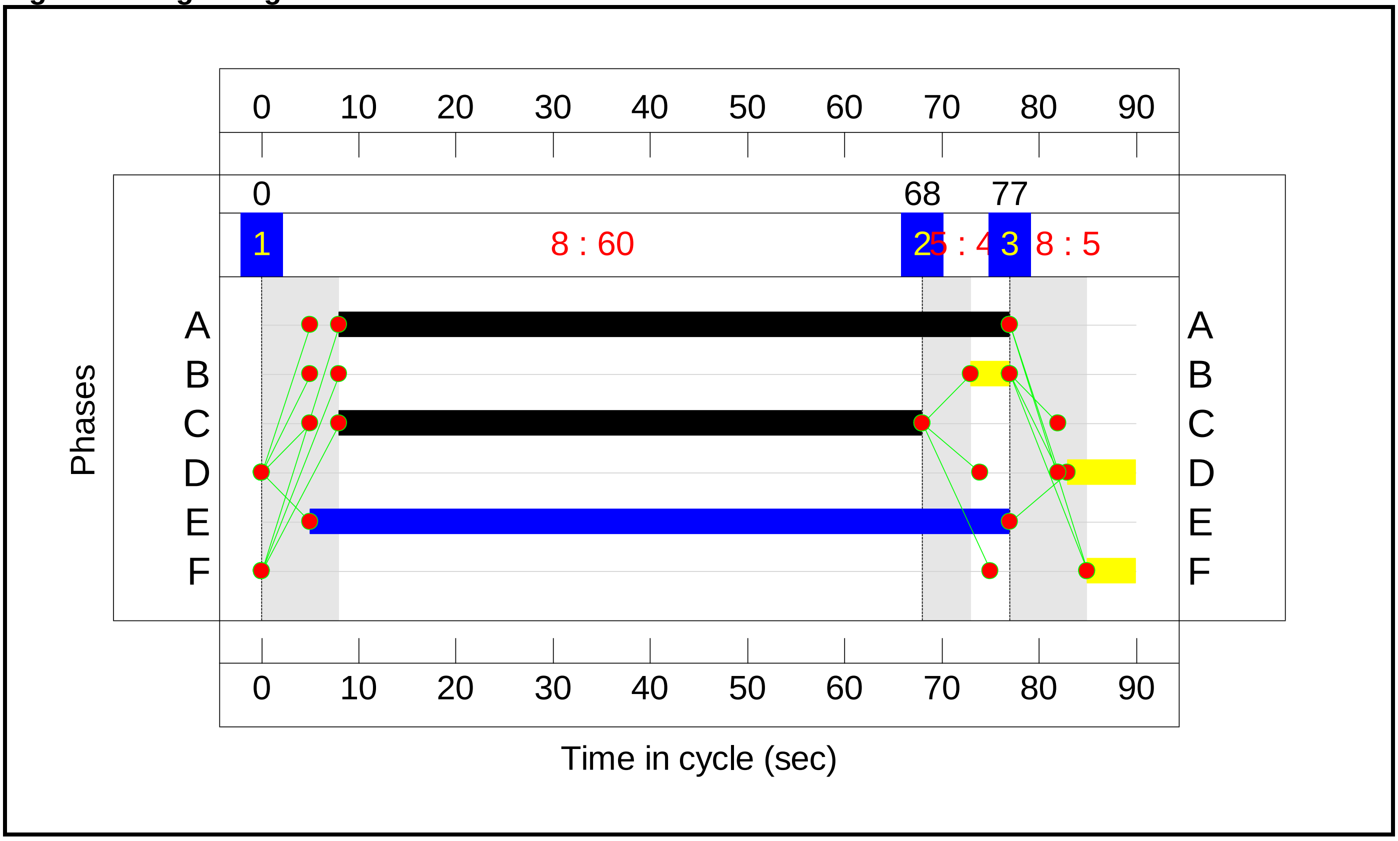
Stage Sequence Diagram



Stage Timings

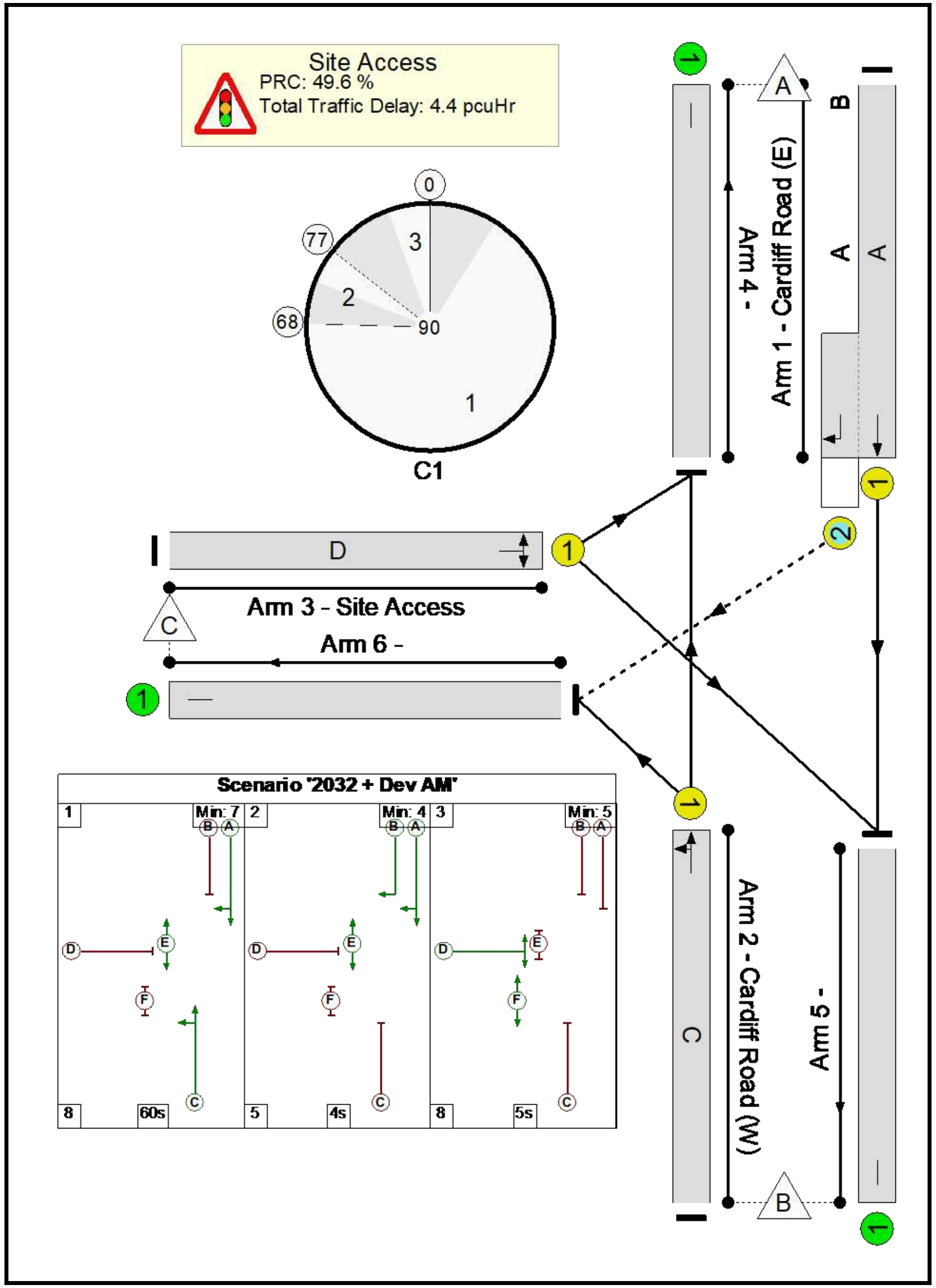
Stage	1	2	3
Duration	60	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.2%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**60.2%**
1/1+1/2	Cardiff Road (E) Ahead Right	U+O	N/A	N/A	A	B	1	69	4	460	1962:1598	1480+46	30.1 : 30.1%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	60	-	791	1940	1315	60.2%
3/1	Site Access Left Right	U	N/A	N/A	D		1	7	-	75	1707	152	49.4%
4/1		U	N/A	N/A	-		-	-	-	846	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	462	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	18	Inf	Inf	0.0%

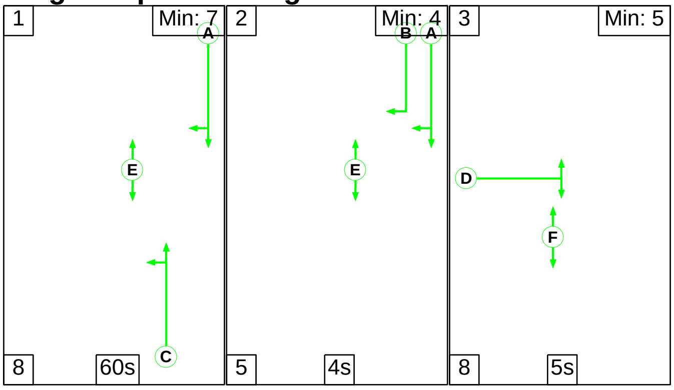
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**13**	**1**	**0**	**2.9**	**1.5**	**0.0**	**4.4**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**13**	**1**	**0**	**2.9**	**1.5**	**0.0**	**4.4**	**-**	**-**	**-**	**-**
1/1+1/2	460	460	13	1	0	0.4	0.2	0.0	0.6	4.8	3.1	0.2	3.3
2/1	791	791	-	-	-	1.7	0.8	-	2.5	11.3	10.5	0.8	11.3
3/1	75	75	-	-	-	0.8	0.5	-	1.3	62.3	1.8	0.5	2.3
4/1	846	846	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	462	462	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	18	18	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 49.6 Total Delay for Signalled Lanes (pcuHr): 4.39 Cycle Time (s): 90
PRC Over All Lanes (%): 49.6 Total Delay Over All Lanes(pcuHr): 4.39

Full Input Data And Results

Scenario 4: '2032 + Dev PM' (FG4: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

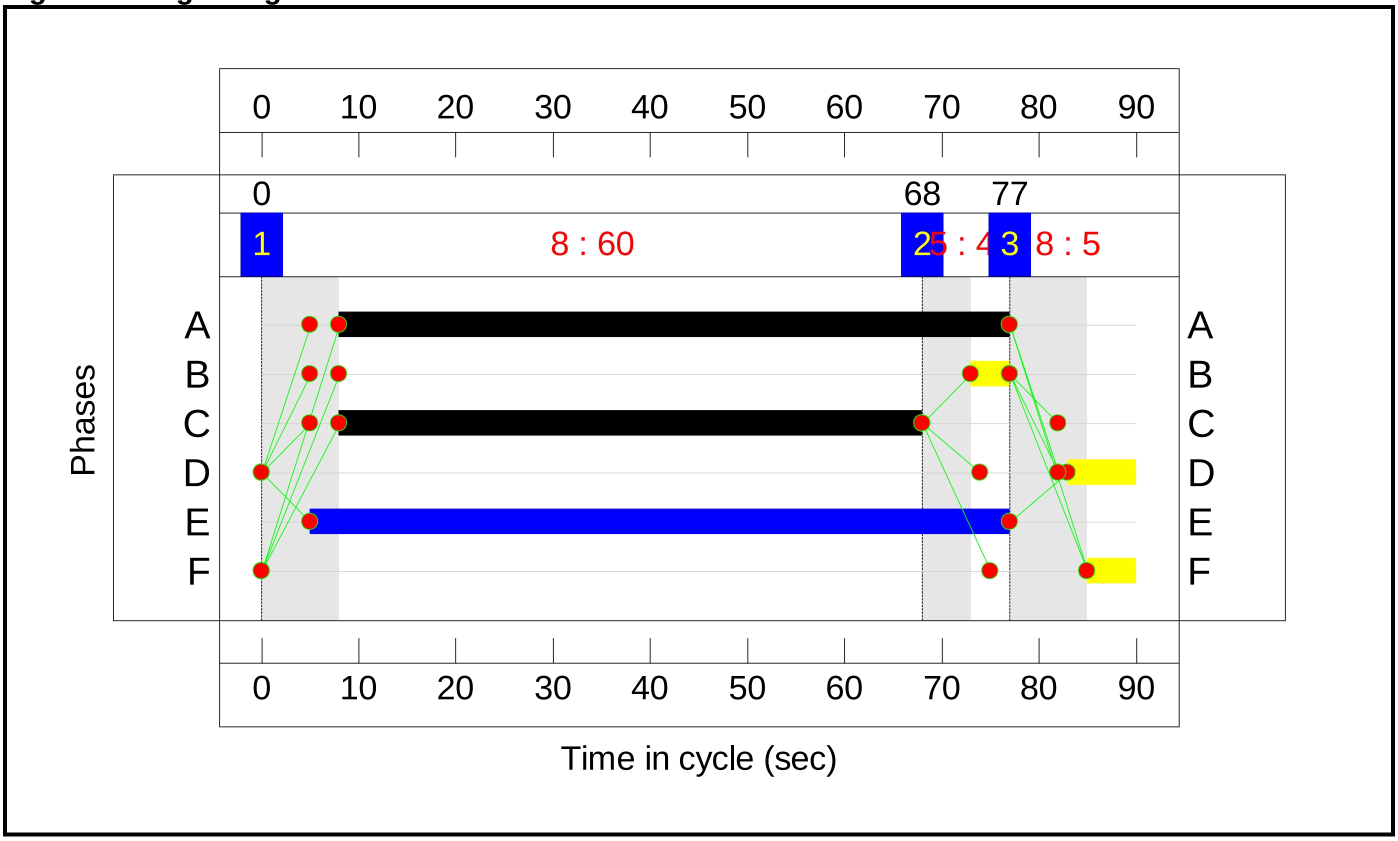
Stage Sequence Diagram



Stage Timings

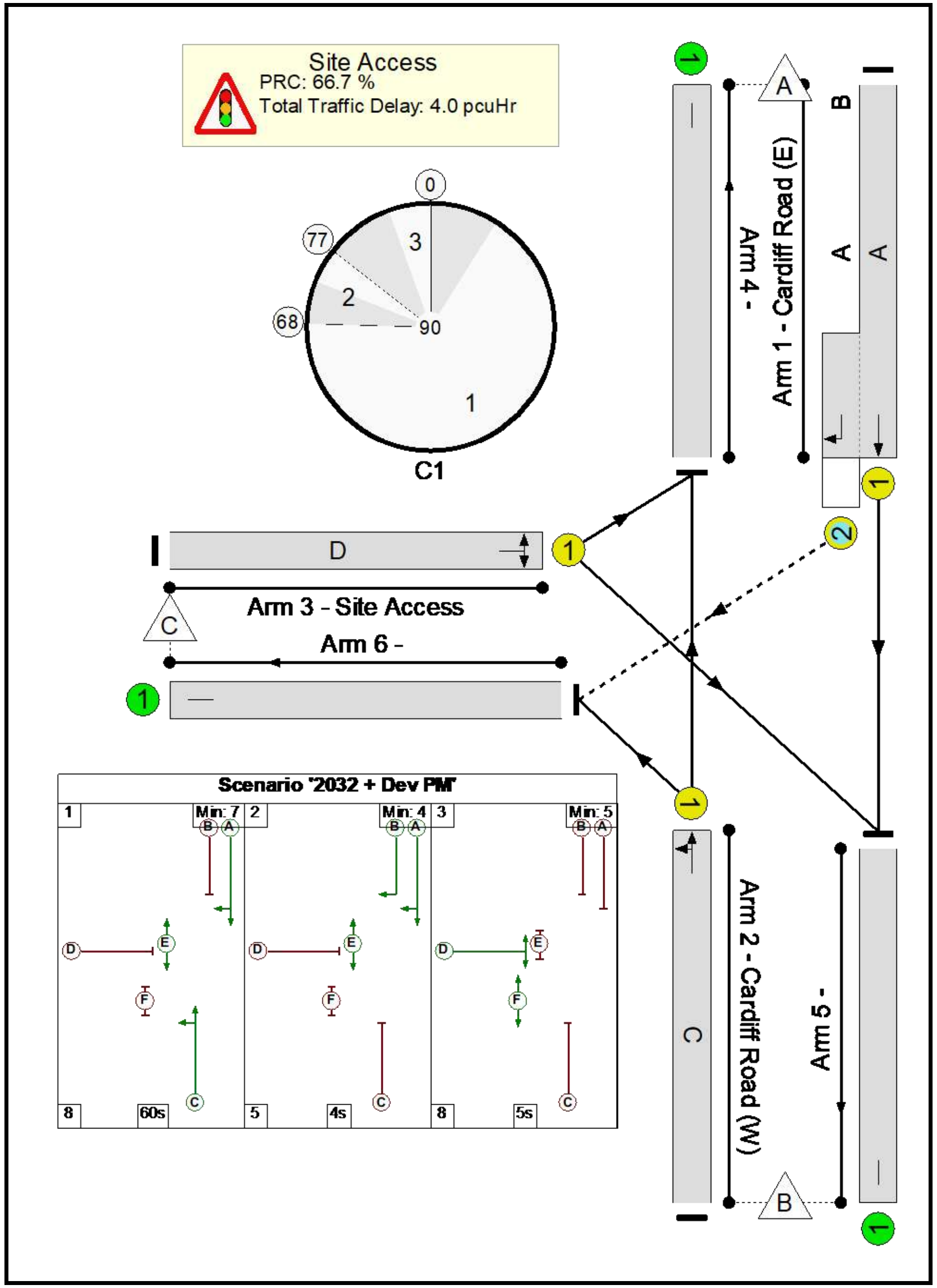
Stage	1	2	3
Duration	60	4	5
Change Point	0	68	77

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**54.0%**
Site Access	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**54.0%**
1/1+1/2	Cardiff Road (E) Ahead Right	U+O	N/A	N/A	A	B	1	69	4	793	1962:1598	1392+131	52.1 : 52.1%
2/1	Cardiff Road (W) Ahead Left	U	N/A	N/A	C		1	60	-	708	1935	1312	54.0%
3/1	Site Access Left Right	U	N/A	N/A	D		1	7	-	36	1707	152	23.7%
4/1		U	N/A	N/A	-		-	-	-	717	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	733	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	87	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**61**	**5**	**2**	**2.6**	**1.3**	**0.1**	**4.0**	**-**	**-**	**-**	**-**
Site Access	**-**	**-**	**61**	**5**	**2**	**2.6**	**1.3**	**0.1**	**4.0**	**-**	**-**	**-**	**-**
1/1+1/2	793	793	61	5	2	0.8	0.5	0.1	1.4	6.4	6.5	0.5	7.1
2/1	708	708	-	-	-	1.4	0.6	-	2.0	10.3	8.9	0.6	9.4
3/1	36	36	-	-	-	0.4	0.2	-	0.5	53.7	0.8	0.2	1.0
4/1	717	717	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	733	733	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	87	87	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

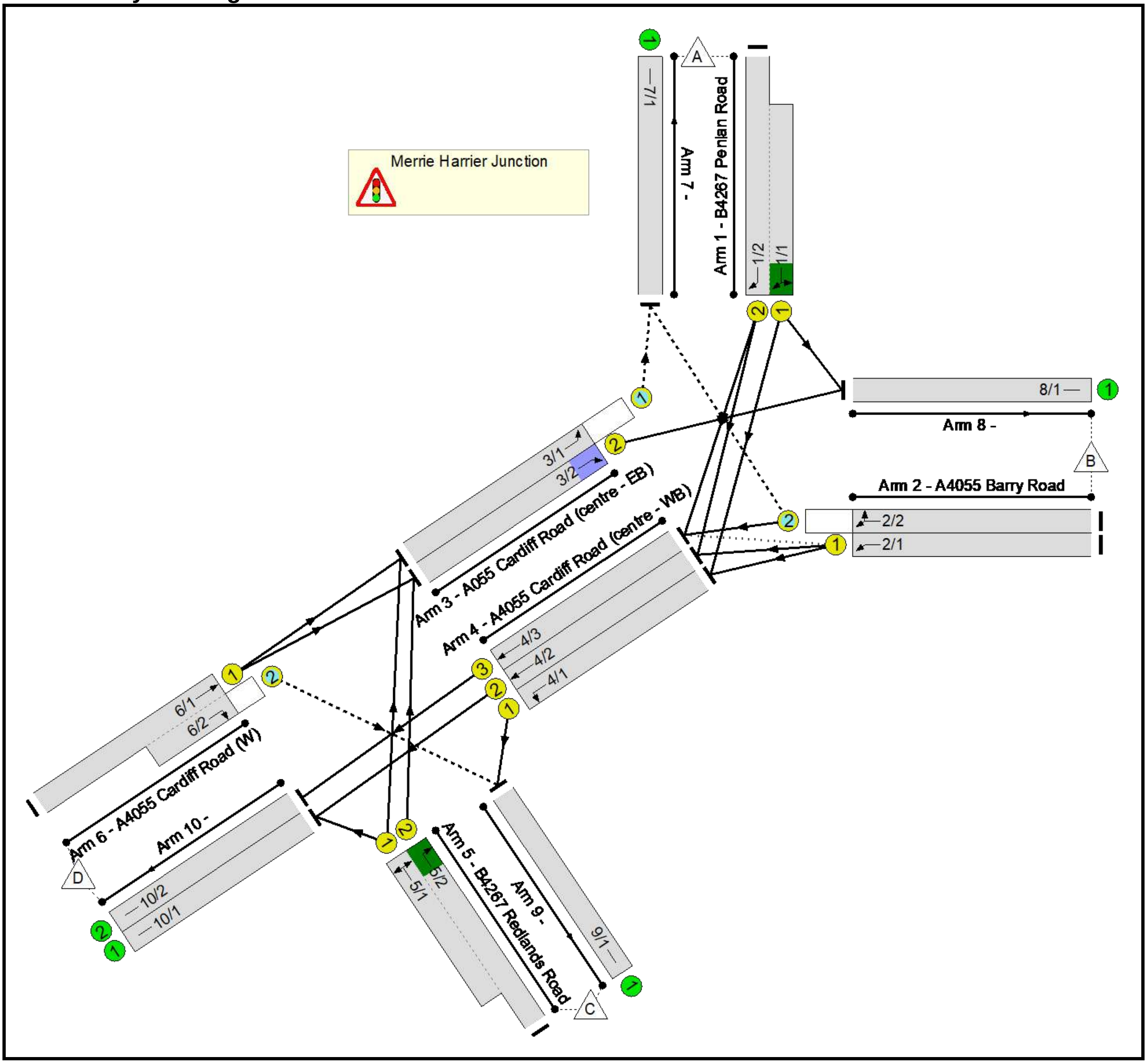
C1 PRC for Signalled Lanes (%): 66.7 Total Delay for Signalled Lanes (pcuHr): 3.98 Cycle Time (s): 90
PRC Over All Lanes (%): 66.7 Total Delay Over All Lanes(pcuHr): 3.98

Full Input Data And Results

User and Project Details

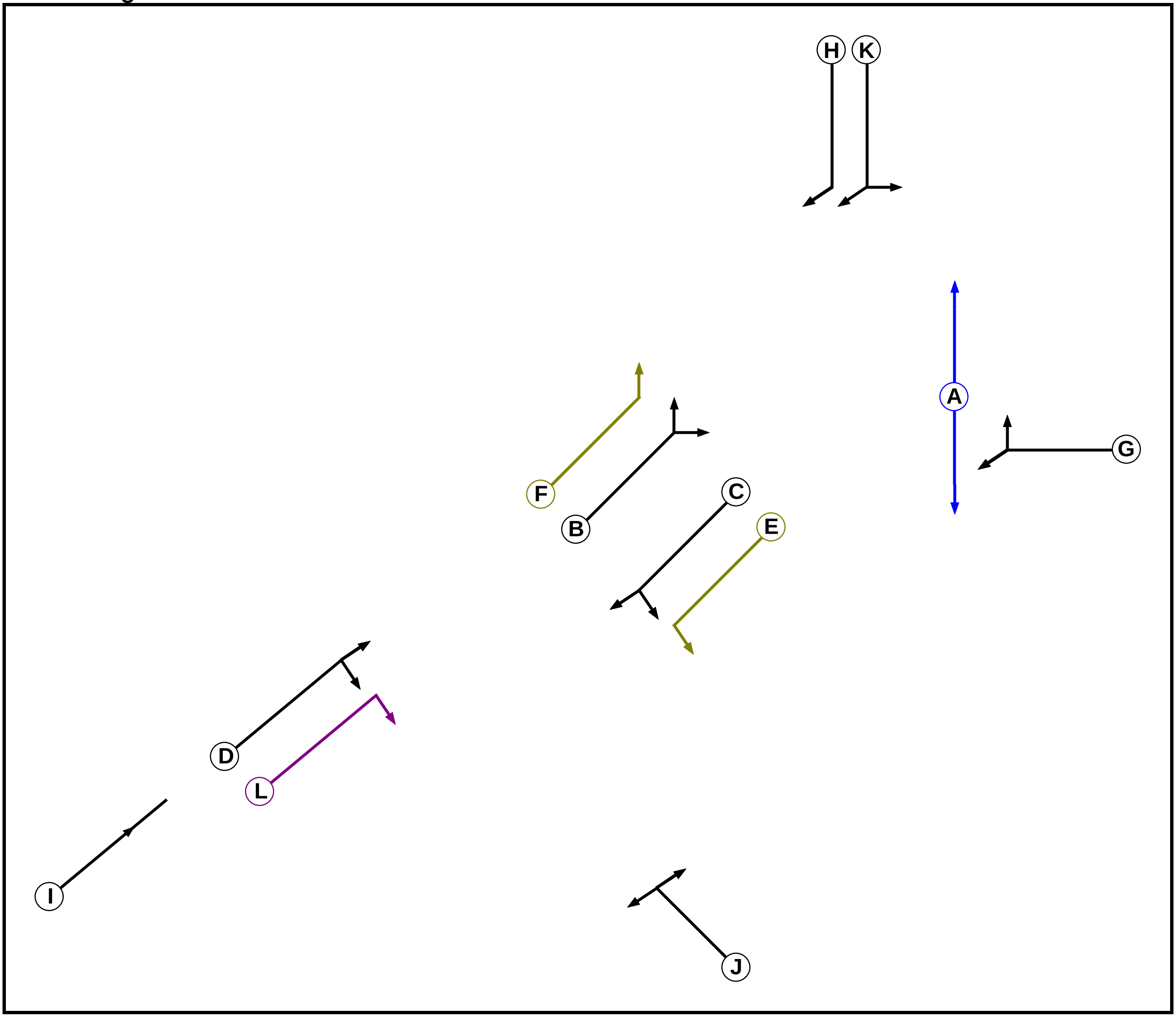
Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 - Merrie Harrier - V1.lsg3x
Author:	Ben Stone
Company:	SLR
Address:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Pedestrian		9	9
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Filter	C	4	0
F	Filter	B	4	0
G	Traffic		7	7
H	Traffic		7	7
I	Traffic		7	7
J	Traffic		7	7
K	Traffic		7	7
L	Ind. Arrow	D	5	5

Full Input Data And Results

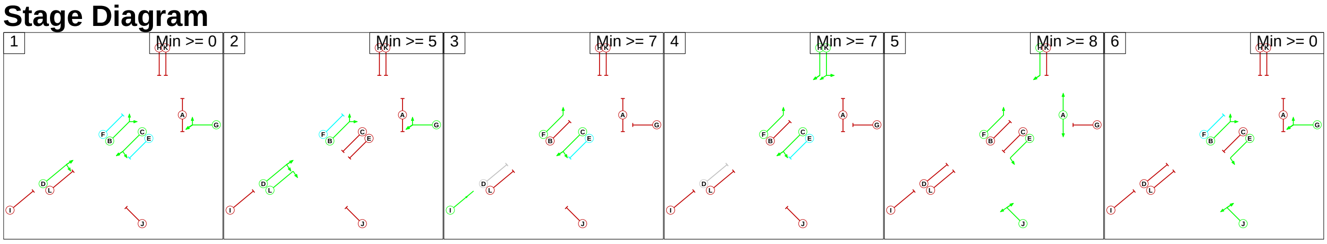
Phase Intergreens Matrix

	Starting Phase												
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		5	-	-	-	-	5	-	5	-	5	-
	B	10		-	-	-	-	-	7	7	-	7	-
	C	-	-		-	-	-	-	-	-	6	-	5
	D	-	-	-		-	-	-	-	-	6	-	-
	E	-	-	-	-		-	-	-	-	-	-	5
	F	-	-	-	-	-		-	-	-	-	-	-
	G	6	-	-	-	-	-		5	5	-	5	-
	H	-	5	-	-	-	-	5		5	-	-	-
	I	8	5	-	-	-	-	5	5		-	5	-
	J	-	-	5	5	-	-	-	-	-		-	5
	K	7	5	-	-	-	-	5	-	5	-		-
	L	-	-	5	-	5	-	-	-	-	5	-	

Phases in Stage

Stage No.	Phases in Stage
1	B C D G
2	B D G L
3	C F I
4	C F H K
5	A E F H J
6	B E G J

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	3	B	Losing	8	8
1	4	B	Losing	8	8
1	5	C	Losing	5	5
2	3	B	Losing	8	8
4	6	C	Losing	7	7

Full Input Data And Results

Prohibited Stage Change

		To Stage					
		1	2	3	4	5	6
From Stage	1		5	15	15	11	6
	2	5		15	7	10	6
	3	5	5		5	8	6
	4	5	5	5		7	13
	5	5	X	5	5		5
	6	5	X	7	7	10	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Merrie Harrier Junction												
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/2 (A4055 Barry Road)	7/1 (Right)	1439	0	3/2	1.09	All	3.00	-	0.50	3	3.00
3/1 (A055 Cardiff Road (centre - EB))	7/1 (Left)	715	0	2/2	0.22	To 7/1 (Right)	3.00	-	0.50	3	3.00
6/2 (A4055 Cardiff Road (W))	9/1 (Right)	1439	0	4/1	1.09	All	2.00	-	0.50	2	2.00
				4/2	1.09	All					
				4/3	1.09	All					

Full Input Data And Results

Lane Input Data

Junction: Merrie Harrier Junction												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (B4267 Penlan Road)	U	K	2	3	13.0	Geom	-	2.80	0.00	Y	Arm 4 Right	18.00
											Arm 8 Left	13.00
1/2 (B4267 Penlan Road)	U	H	2	3	60.0	Geom	-	2.80	0.00	Y	Arm 4 Right	18.00
2/1 (A4055 Barry Road)	U	G	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Ahead	Inf
2/2 (A4055 Barry Road)	O	G	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Ahead	Inf
											Arm 7 Right	8.00
3/1 (A055 Cardiff Road (centre - EB))	O	B F	2	3	6.0	Geom	-	3.25	0.00	Y	Arm 7 Left	20.00
3/2 (A055 Cardiff Road (centre - EB))	U	B	2	3	6.0	Geom	-	3.50	0.00	Y	Arm 8 Ahead	30.00
4/1 (A4055 Cardiff Road (centre - WB))	U	C E	2	3	6.0	Geom	-	3.00	0.00	Y	Arm 9 Left	15.00
4/2 (A4055 Cardiff Road (centre - WB))	U	C	2	3	7.0	Geom	-	3.00	0.00	Y	Arm 10 Ahead	Inf
4/3 (A4055 Cardiff Road (centre - WB))	U	C	2	3	7.0	Geom	-	3.00	0.00	Y	Arm 10 Ahead	Inf
5/1 (B4267 Redlands Road)	U	J	2	3	16.0	Geom	-	3.00	0.00	Y	Arm 3 Right	18.00
											Arm 10 Left	12.00
5/2 (B4267 Redlands Road)	U	J	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 3 Right	15.00
6/1 (A4055 Cardiff Road (W))	U	D	2	3	60.0	Geom	-	3.20	0.00	Y	Arm 3 Ahead	Inf
6/2 (A4055 Cardiff Road (W))	O	D L	2	3	6.0	Geom	-	3.20	0.00	Y	Arm 9 Right	12.00
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-
9/1	U		2	3	60.0	Inf	-	-	-	-	-	-

10/1	U		2	3	60.0	Inf	-	-	-	-	-	-
10/2	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 Observed AM'	08:00	09:00	01:00	
2: '2022 Observed PM'	17:00	18:00	01:00	
3: '2022 + Dev AM'	08:00	09:00	01:00	
4: '2022 + Dev PM'	17:00	18:00	01:00	
5: '2032 AM'	08:00	09:00	01:00	
6: '2032 PM'	17:00	18:00	01:00	
7: '2032 + Dev AM'	08:00	09:00	01:00	
8: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 Observed AM' (FG1: '2022 Observed AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	130	156	66	352
	B	176	0	324	359	859
	C	176	382	0	117	675
	D	99	430	162	0	691
	Tot.	451	942	642	542	2577

Traffic Lane Flows

Lane	Scenario 1: 2022 Observed AM
Junction: Merrie Harrier Junction	
1/1 (short)	286
1/2 (with short)	352(In) 66(Out)
2/1	683
2/2	176
3/1	275
3/2	812
4/1	480
4/2	277
4/3	148
5/1 (short)	293
5/2 (with short)	675(In) 382(Out)
6/1 (with short)	691(In) 529(Out)
6/2 (short)	162
7/1	451
8/1	942
9/1	642
10/1	394
10/2	148

Lane Saturation Flows

Junction: Merrie Harrier Junction								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	54.5 %	1726	1726
				Arm 8 Left	13.00	45.5 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	0.0 %	1613	1613
				Arm 7 Right	8.00	100.0 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	60.1 %	1741	1741
				Arm 10 Left	12.00	39.9 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 Observed PM' (FG2: '2022 Observed PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	162	155	100	417
	B	74	0	379	475	928
	C	123	371	0	129	623
	D	79	528	167	0	774
	Tot.	276	1061	701	704	2742

Traffic Lane Flows

Lane	Scenario 2: 2022 Observed PM
Junction: Merrie Harrier Junction	
1/1 (short)	317
1/2 (with short)	417(In) 100(Out)
2/1	800
2/2	128
3/1	202
3/2	899
4/1	534
4/2	389
4/3	186
5/1 (short)	252
5/2 (with short)	623(In) 371(Out)
6/1 (with short)	774(In) 607(Out)
6/2 (short)	167
7/1	276
8/1	1061
9/1	701
10/1	518
10/2	186

Lane Saturation Flows

Junction: Merrie Harrier Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	48.9 %	1723	1723
				Arm 8 Left	13.00	51.1 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	42.2 %	1728	1728
				Arm 7 Right	8.00	57.8 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	48.8 %	1734	1734
				Arm 10 Left	12.00	51.2 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2022 + Dev AM' (FG3: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	130	156	69	355
	B	176	0	324	368	868
	C	176	382	0	118	676
	D	114	469	167	0	750
	Tot.	466	981	647	555	2649

Traffic Lane Flows

Lane	Scenario 3: 2022 + Dev AM
Junction: Merrie Harrier Junction	
1/1 (short)	286
1/2 (with short)	355(In) 69(Out)
2/1	692
2/2	176
3/1	290
3/2	851
4/1	480
4/2	282
4/3	155
5/1 (short)	294
5/2 (with short)	676(In) 382(Out)
6/1 (with short)	750(In) 583(Out)
6/2 (short)	167
7/1	466
8/1	981
9/1	647
10/1	400
10/2	155

Lane Saturation Flows

<table>
<tr><th colspan="9">Junction: Merrie Harrier Junction</th></tr>
<tr><th>Lane</th><th>Lane Width (m)</th><th>Gradient</th><th>Nearside Lane</th><th>Allowed Turns</th><th>Turning Radius (m)</th><th>Turning Prop.</th><th>Sat Flow (PCU/Hr)</th><th>Flared Sat Flow (PCU/Hr)</th></tr>
<tr><td rowspan="2">1/1
(B4267 Penlan Road)</td><td rowspan="2">2.80</td><td rowspan="2">0.00</td><td rowspan="2">Y</td><td>Arm 4 Right</td><td>18.00</td><td>54.5 %</td><td rowspan="2">1726</td><td rowspan="2">1726</td></tr>
<tr><td>Arm 8 Left</td><td>13.00</td><td>45.5 %</td></tr>
<tr><td>1/2
(B4267 Penlan Road)</td><td>2.80</td><td>0.00</td><td>Y</td><td>Arm 4 Right</td><td>18.00</td><td>100.0 %</td><td>1749</td><td>1749</td></tr>
<tr><td>2/1
(A4055 Barry Road)</td><td>3.00</td><td>0.00</td><td>Y</td><td>Arm 4 Ahead</td><td>Inf</td><td>100.0 %</td><td>1915</td><td>1915</td></tr>
<tr><td rowspan="2">2/2
(A4055 Barry Road)</td><td rowspan="2">3.00</td><td rowspan="2">0.00</td><td rowspan="2">Y</td><td>Arm 4 Ahead</td><td>Inf</td><td>0.0 %</td><td rowspan="2">1613</td><td rowspan="2">1613</td></tr>
<tr><td>Arm 7 Right</td><td>8.00</td><td>100.0 %</td></tr>
<tr><td>3/1
(A055 Cardiff Road (centre - EB))</td><td>3.25</td><td>0.00</td><td>Y</td><td>Arm 7 Left</td><td>20.00</td><td>100.0 %</td><td>1805</td><td>1805</td></tr>
<tr><td>3/2
(A055 Cardiff Road (centre - EB))</td><td>3.50</td><td>0.00</td><td>Y</td><td>Arm 8 Ahead</td><td>30.00</td><td>100.0 %</td><td>1871</td><td>1871</td></tr>
<tr><td>4/1
(A4055 Cardiff Road (centre - WB))</td><td>3.00</td><td>0.00</td><td>Y</td><td>Arm 9 Left</td><td>15.00</td><td>100.0 %</td><td>1741</td><td>1741</td></tr>
<tr><td>4/2
(A4055 Cardiff Road (centre - WB))</td><td>3.00</td><td>0.00</td><td>Y</td><td>Arm 10 Ahead</td><td>Inf</td><td>100.0 %</td><td>1915</td><td>1915</td></tr>
<tr><td>4/3
(A4055 Cardiff Road (centre - WB))</td><td>3.00</td><td>0.00</td><td>Y</td><td>Arm 10 Ahead</td><td>Inf</td><td>100.0 %</td><td>1915</td><td>1915</td></tr>
<tr><td rowspan="2">5/1
(B4267 Redlands Road)</td><td rowspan="2">3.00</td><td rowspan="2">0.00</td><td rowspan="2">Y</td><td>Arm 3 Right</td><td>18.00</td><td>59.9 %</td><td rowspan="2">1741</td><td rowspan="2">1741</td></tr>
<tr><td>Arm 10 Left</td><td>12.00</td><td>40.1 %</td></tr>
<tr><td>5/2
(B4267 Redlands Road)</td><td>3.00</td><td>0.00</td><td>Y</td><td>Arm 3 Right</td><td>15.00</td><td>100.0 %</td><td>1741</td><td>1741</td></tr>
<tr><td>6/1
(A4055 Cardiff Road (W))</td><td>3.20</td><td>0.00</td><td>Y</td><td>Arm 3 Ahead</td><td>Inf</td><td>100.0 %</td><td>1935</td><td>1935</td></tr>
<tr><td>6/2
(A4055 Cardiff Road (W))</td><td>3.20</td><td>0.00</td><td>Y</td><td>Arm 9 Right</td><td>12.00</td><td>100.0 %</td><td>1720</td><td>1720</td></tr>
<tr><td>7/1</td><td colspan="6">Infinite Saturation Flow</td><td>Inf</td><td>Inf</td></tr>
<tr><td>8/1</td><td colspan="6">Infinite Saturation Flow</td><td>Inf</td><td>Inf</td></tr>
<tr><td>9/1</td><td colspan="6">Infinite Saturation Flow</td><td>Inf</td><td>Inf</td></tr>
<tr><td>10/1</td><td colspan="6">Infinite Saturation Flow</td><td>Inf</td><td>Inf</td></tr>
<tr><td>10/2</td><td colspan="6">Infinite Saturation Flow</td><td>Inf</td><td>Inf</td></tr>
</table>

Scenario 4: '2022 + Dev PM' (FG4: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	162	155	117	434
	B	74	0	379	520	973
	C	123	371	0	134	628
	D	86	547	169	0	802
	Tot.	283	1080	703	771	2837

Traffic Lane Flows

Lane	Scenario 4: 2022 + Dev PM
Junction: Merrie Harrier Junction	
1/1 (short)	317
1/2 (with short)	434(In) 117(Out)
2/1	874
2/2	99
3/1	209
3/2	918
4/1	534
4/2	391
4/3	246
5/1 (short)	257
5/2 (with short)	628(In) 371(Out)
6/1 (with short)	802(In) 633(Out)
6/2 (short)	169
7/1	283
8/1	1080
9/1	703
10/1	525
10/2	246

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Merrie Harrier Junction								
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	48.9 %	1723	1723
				Arm 8 Left	13.00	51.1 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	25.3 %	1680	1680
				Arm 7 Right	8.00	74.7 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	47.9 %	1733	1733
				Arm 10 Left	12.00	52.1 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 5: '2032 AM' (FG5: '2032 AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	140	167	70	377
	B	188	0	347	385	920
	C	189	409	0	125	723
	D	106	461	174	0	741
	Tot.	483	1010	688	580	2761

Traffic Lane Flows

Lane	Scenario 5: 2032 AM
Junction: Merrie Harrier Junction	
1/1 (short)	307
1/2 (with short)	377(In) 70(Out)
2/1	732
2/2	188
3/1	295
3/2	870
4/1	514
4/2	297
4/3	158
5/1 (short)	314
5/2 (with short)	723(In) 409(Out)
6/1 (with short)	741(In) 567(Out)
6/2 (short)	174
7/1	483
8/1	1010
9/1	688
10/1	422
10/2	158

Lane Saturation Flows

Junction: Merrie Harrier Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	54.4 %	1726	1726
				Arm 8 Left	13.00	45.6 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	0.0 %	1613	1613
				Arm 7 Right	8.00	100.0 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	60.2 %	1741	1741
				Arm 10 Left	12.00	39.8 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 6: '2032 PM' (FG6: '2032 PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	174	166	107	447
	B	80	0	407	510	997
	C	132	399	0	139	670
	D	84	567	179	0	830
	Tot.	296	1140	752	756	2944

Traffic Lane Flows

Lane	Scenario 6: 2032 PM
Junction: Merrie Harrier Junction	
1/1 (short)	340
1/2 (with short)	447(In) 107(Out)
2/1	907
2/2	90
3/1	216
3/2	966
4/1	573
4/2	393
4/3	224
5/1 (short)	271
5/2 (with short)	670(In) 399(Out)
6/1 (with short)	830(In) 651(Out)
6/2 (short)	179
7/1	296
8/1	1140
9/1	752
10/1	532
10/2	224

Lane Saturation Flows

Junction: Merrie Harrier Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	48.8 %	1723	1723
				Arm 8 Left	13.00	51.2 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	11.1 %	1641	1641
				Arm 7 Right	8.00	88.9 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	48.7 %	1733	1733
				Arm 10 Left	12.00	51.3 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 7: '2032 + Dev AM' (FG7: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	140	167	74	381
	B	188	0	347	394	929
	C	189	409	0	126	724
	D	121	500	179	0	800
	Tot.	498	1049	693	594	2834

Traffic Lane Flows

Lane	Scenario 7: 2032 + Dev AM
Junction: Merrie Harrier Junction	
1/1 (short)	307
1/2 (with short)	381(In) 74(Out)
2/1	741
2/2	188
3/1	310
3/2	909
4/1	514
4/2	302
4/3	166
5/1 (short)	315
5/2 (with short)	724(In) 409(Out)
6/1 (with short)	800(In) 621(Out)
6/2 (short)	179
7/1	498
8/1	1049
9/1	693
10/1	428
10/2	166

Lane Saturation Flows

Junction: Merrie Harrier Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	54.4 %	1726	1726
				Arm 8 Left	13.00	45.6 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	0.0 %	1613	1613
				Arm 7 Right	8.00	100.0 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	60.0 %	1741	1741
				Arm 10 Left	12.00	40.0 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 8: '2032 + Dev PM' (FG8: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	174	166	125	465
	B	80	0	407	555	1042
	C	132	399	0	144	675
	D	92	586	181	0	859
	Tot.	304	1159	754	824	3041

Traffic Lane Flows

Lane	Scenario 8: 2032 + Dev PM
Junction: Merrie Harrier Junction	
1/1 (short)	340
1/2 (with short)	465(In) 125(Out)
2/1	949
2/2	93
3/1	224
3/2	985
4/1	573
4/2	414
4/3	266
5/1 (short)	276
5/2 (with short)	675(In) 399(Out)
6/1 (with short)	859(In) 678(Out)
6/2 (short)	181
7/1	304
8/1	1159
9/1	754
10/1	558
10/2	266

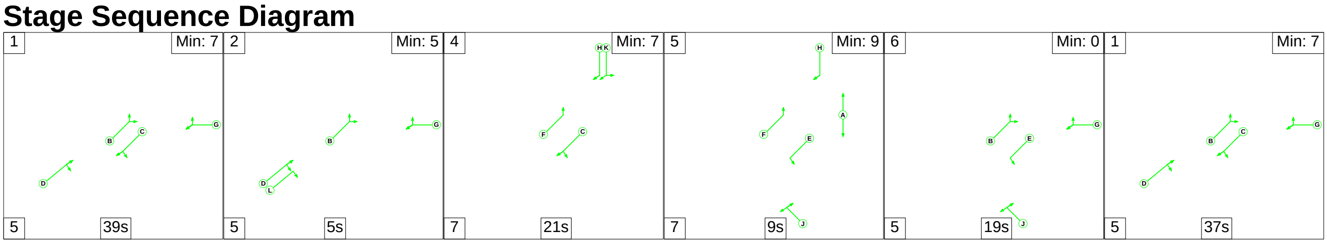
Full Input Data And Results

Lane Saturation Flows

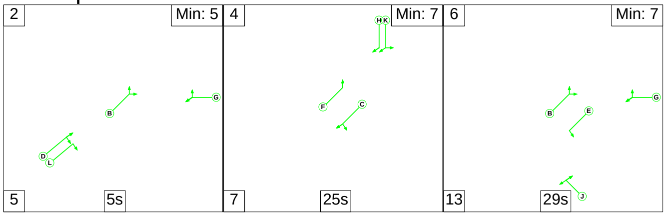
Junction: Merrie Harrier Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	48.8 %	1723	1723
				Arm 8 Left	13.00	51.2 %		
1/2 (B4267 Penlan Road)	2.80	0.00	Y	Arm 4 Right	18.00	100.0 %	1749	1749
2/1 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/2 (A4055 Barry Road)	3.00	0.00	Y	Arm 4 Ahead	Inf	14.0 %	1649	1649
				Arm 7 Right	8.00	86.0 %		
3/1 (A055 Cardiff Road (centre - EB))	3.25	0.00	Y	Arm 7 Left	20.00	100.0 %	1805	1805
3/2 (A055 Cardiff Road (centre - EB))	3.50	0.00	Y	Arm 8 Ahead	30.00	100.0 %	1871	1871
4/1 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 9 Left	15.00	100.0 %	1741	1741
4/2 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
4/3 (A4055 Cardiff Road (centre - WB))	3.00	0.00	Y	Arm 10 Ahead	Inf	100.0 %	1915	1915
5/1 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	18.00	47.8 %	1733	1733
				Arm 10 Left	12.00	52.2 %		
5/2 (B4267 Redlands Road)	3.00	0.00	Y	Arm 3 Right	15.00	100.0 %	1741	1741
6/1 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1935	1935
6/2 (A4055 Cardiff Road (W))	3.20	0.00	Y	Arm 9 Right	12.00	100.0 %	1720	1720
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
9/1	Infinite Saturation Flow						Inf	Inf
10/1	Infinite Saturation Flow						Inf	Inf
10/2	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2022 Observed AM' (FG1: '2022 Observed AM', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



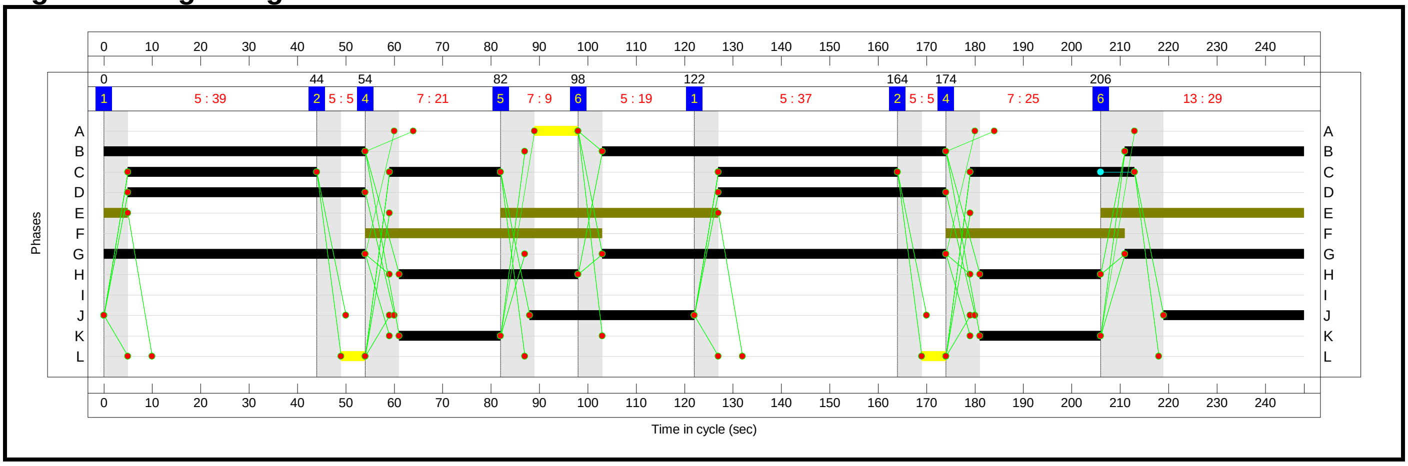
Full Input Data And Results



Stage Timings

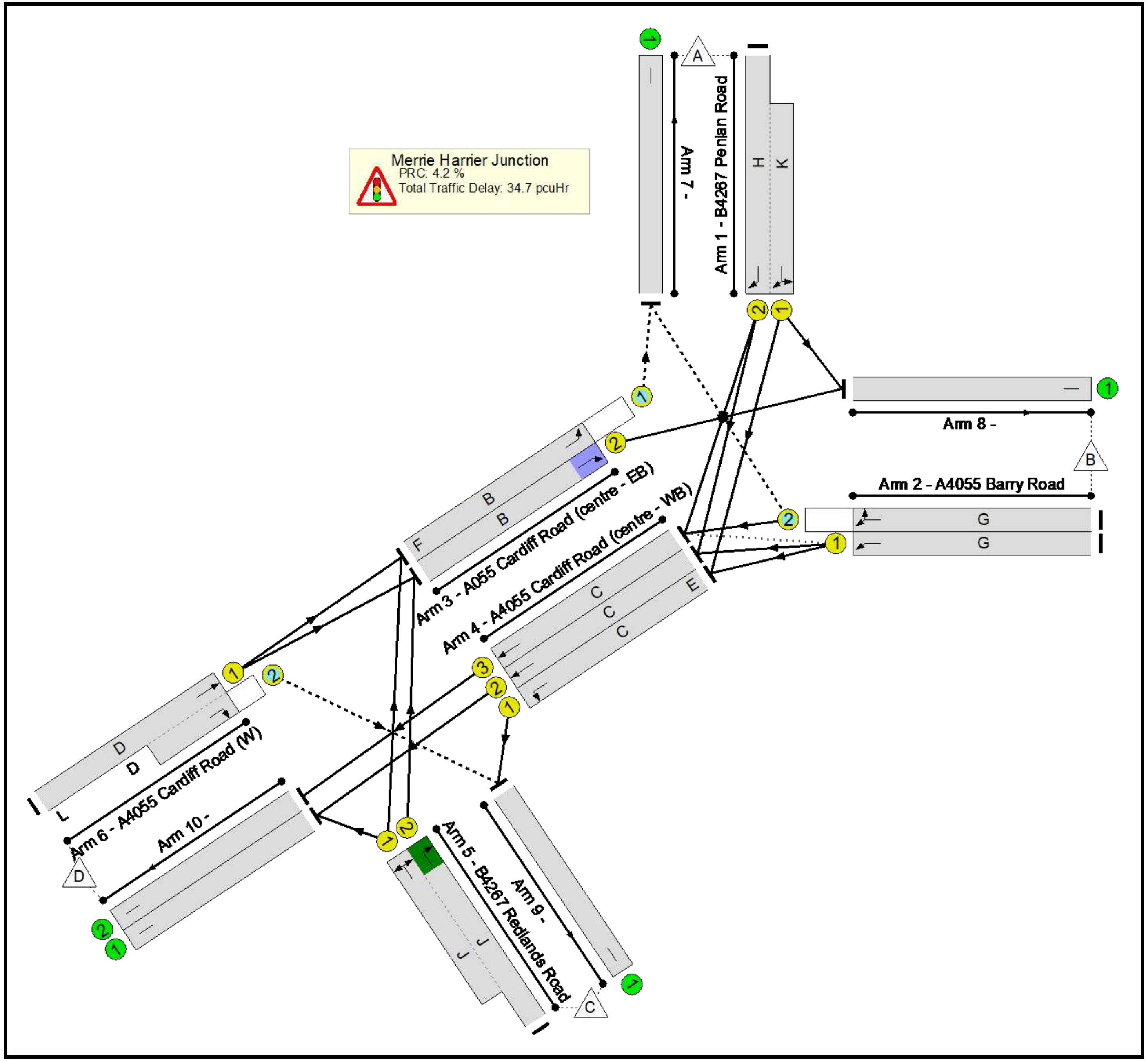
Stage	1	2	4	5	6	1	2	4	6
Duration	39	5	21	9	19	37	5	25	29
Change Point	0	44	54	82	98	122	164	174	206

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

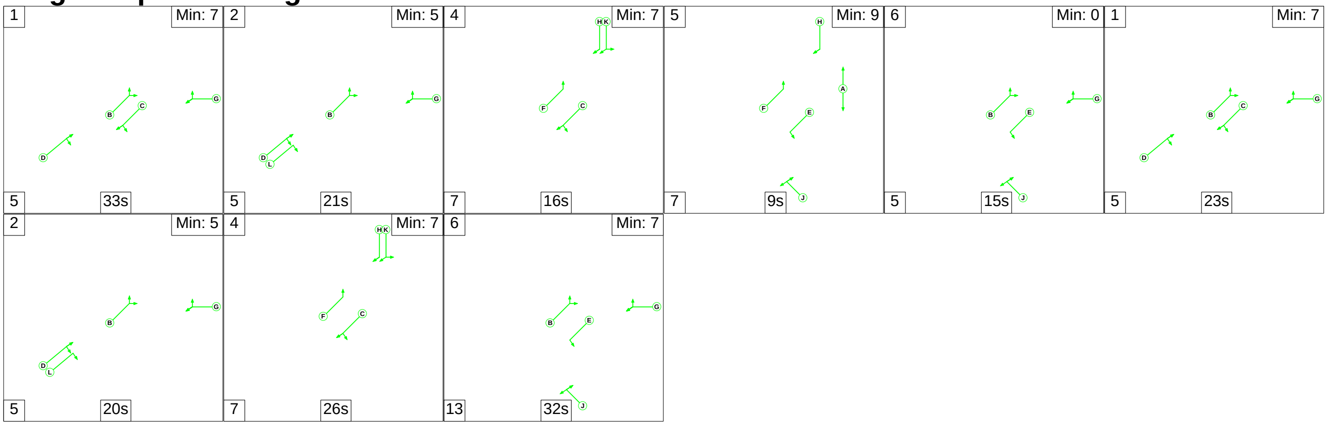
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	**N/A**	-	-		-	-	-	-	**34.7**	**86.4%**	-	-
Merrie Harrier Junction	-	-	**N/A**	-	-		-	-	-	-	**34.7**	**86.4%**	-	-
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	62:46	-	1749:1726	7.2 (1.2+6.1)	85.6 : 85.6%	73.9 (63.8:76.2)	12.4
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	162	-	1915	2.7	53.9%	14.4	14.6
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	162	-	1613	2.6	66.3%	54.1	3.6
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	248	86	1805	0.2	40.6%	2.2	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	162	-	1871	0.3	65.6%	1.2	4.5
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	225	92	1741	0.1	31.1%	0.7	1.5
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	0.7	26.2%	9.1	4.8
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	0.4	14.0%	9.1	3.0
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	63	-	1741:1741	11.0 (6.4+4.6)	86.4 : 86.4%	58.7 (60.3:56.7)	15.9
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	96	10	1935:1720	9.5 (7.1+2.4)	86.0 : 86.0%	49.5 (48.1:54.1)	23.3
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 4.2 Total Delay for Signalled Lanes (pcuHr): 34.71 Cycle Time (s): 248
PRC Over All Lanes (%): 4.2 Total Delay Over All Lanes(pcuHr): 34.71

Full Input Data And Results

Scenario 2: '2022 Observed PM' (FG2: '2022 Observed PM', Plan 1: 'Network Control Plan 1')

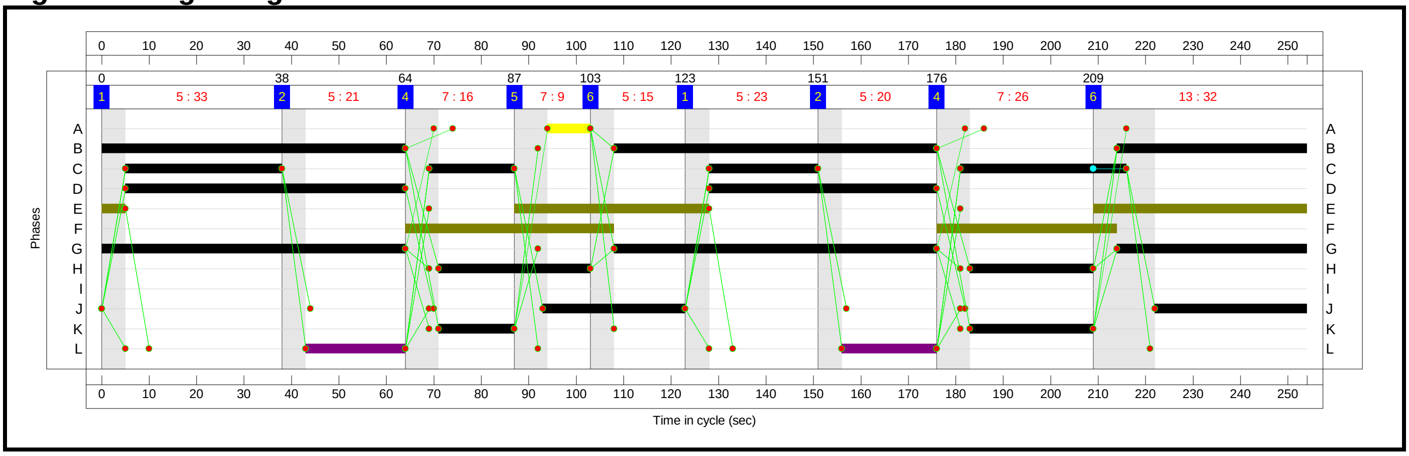
Stage Sequence Diagram



Stage Timings

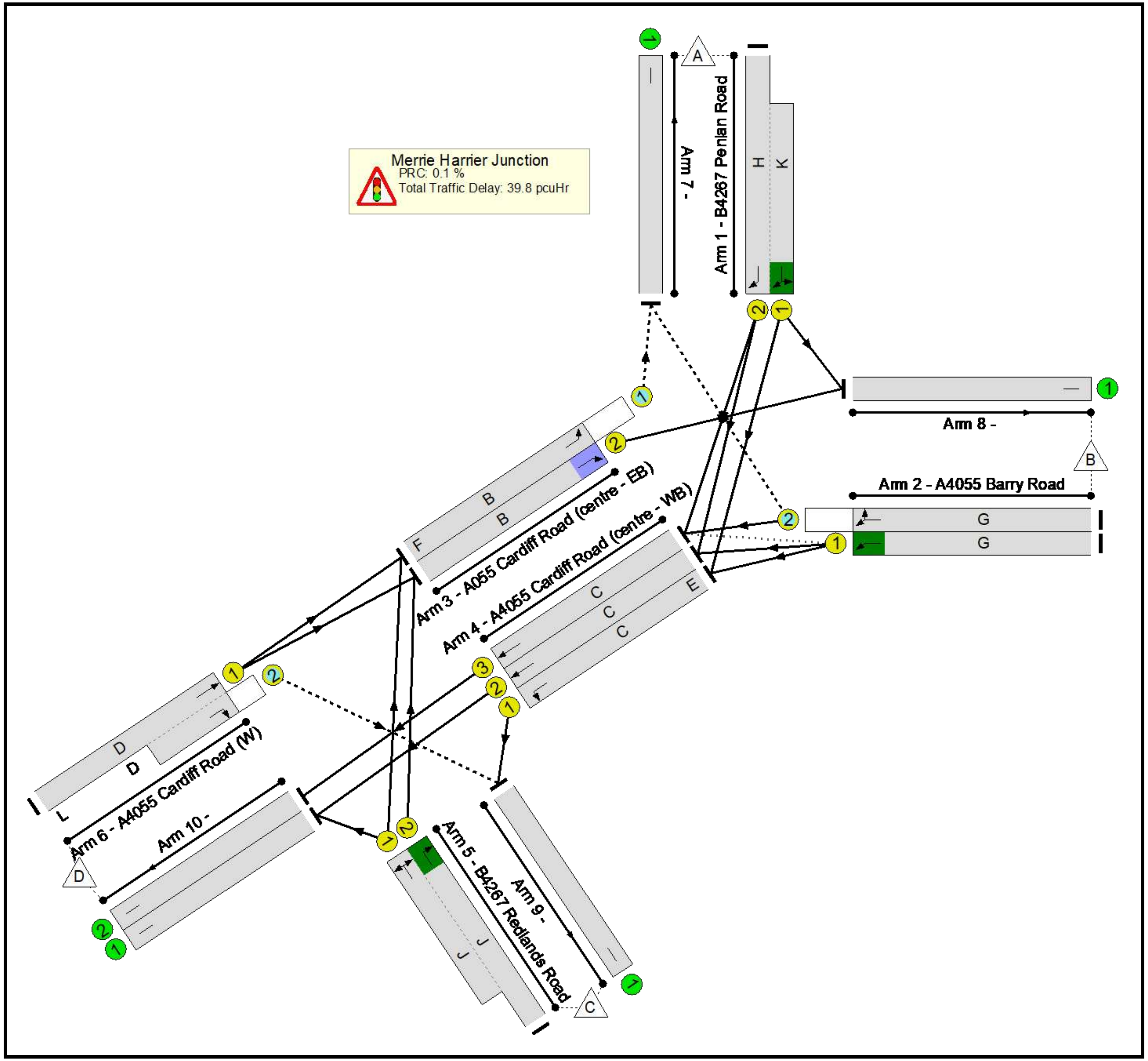
Stage	1	2	4	5	6	1	2	4	6
Duration	33	21	16	9	15	23	20	26	32
Change Point	0	38	64	87	103	123	151	176	209

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

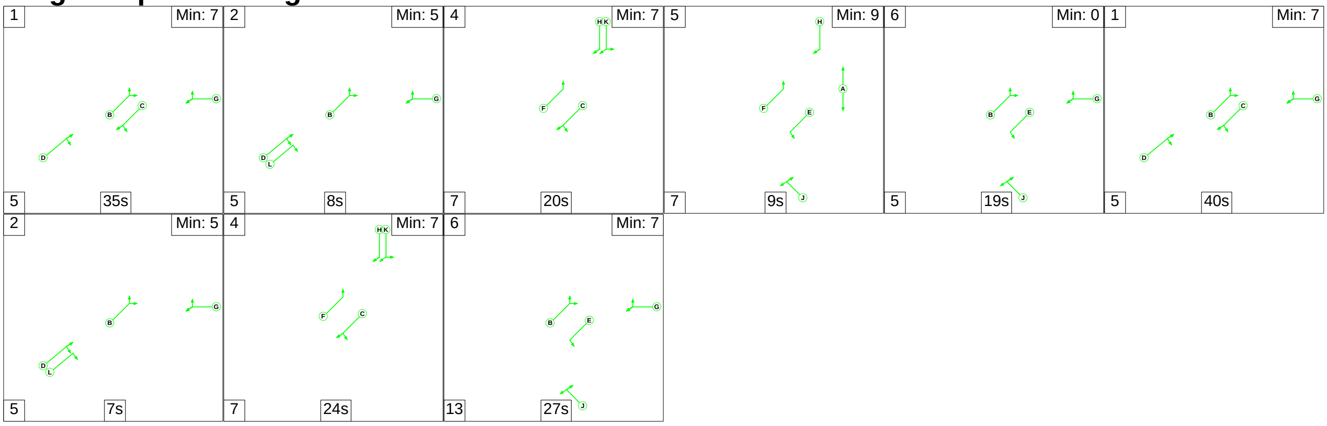
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	**N/A**	-	-		-	-	-	-	**39.8**	**89.9%**	-	-
Merrie Harrier Junction	-	-	**N/A**	-	-		-	-	-	-	**39.8**	**89.9%**	-	-
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	58:42	-	1749:1723	9.5 (2.0+7.5)	89.9 : 89.9%	82.1 (73.6:84.8)	16.1
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	172	-	1915	4.3	66.3%	19.5	20.3
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	172	-	1728	1.4	53.0%	38.4	2.2
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	254	82	1805	0.0	29.1%	0.7	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	172	-	1871	0.3	70.1%	1.3	5.6
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	200	91	1741	0.5	40.0%	3.1	3.6
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	109	-	1915	1.0	45.7%	8.9	6.9
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	109	-	1915	0.4	21.8%	8.1	3.4
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	62	-	1741:1734	10.9 (6.7+4.2)	87.3 : 87.3%	62.9 (64.7:60.2)	16.0
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	107	41	1935:1720	11.5 (8.7+2.8)	89.8 : 89.8%	53.5 (51.5:60.5)	31.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 0.1 Total Delay for Signalled Lanes (pcuHr): 39.77 Cycle Time (s): 254
PRC Over All Lanes (%): 0.1 Total Delay Over All Lanes(pcuHr): 39.77

Full Input Data And Results

Scenario 3: '2022 + Dev AM' (FG3: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

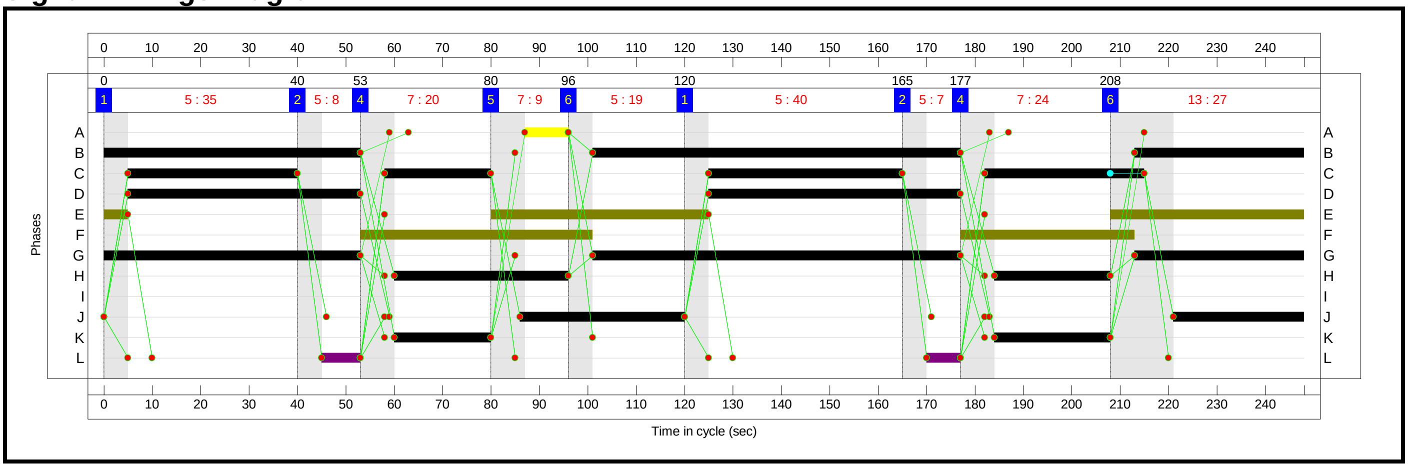
Stage Sequence Diagram



Stage Timings

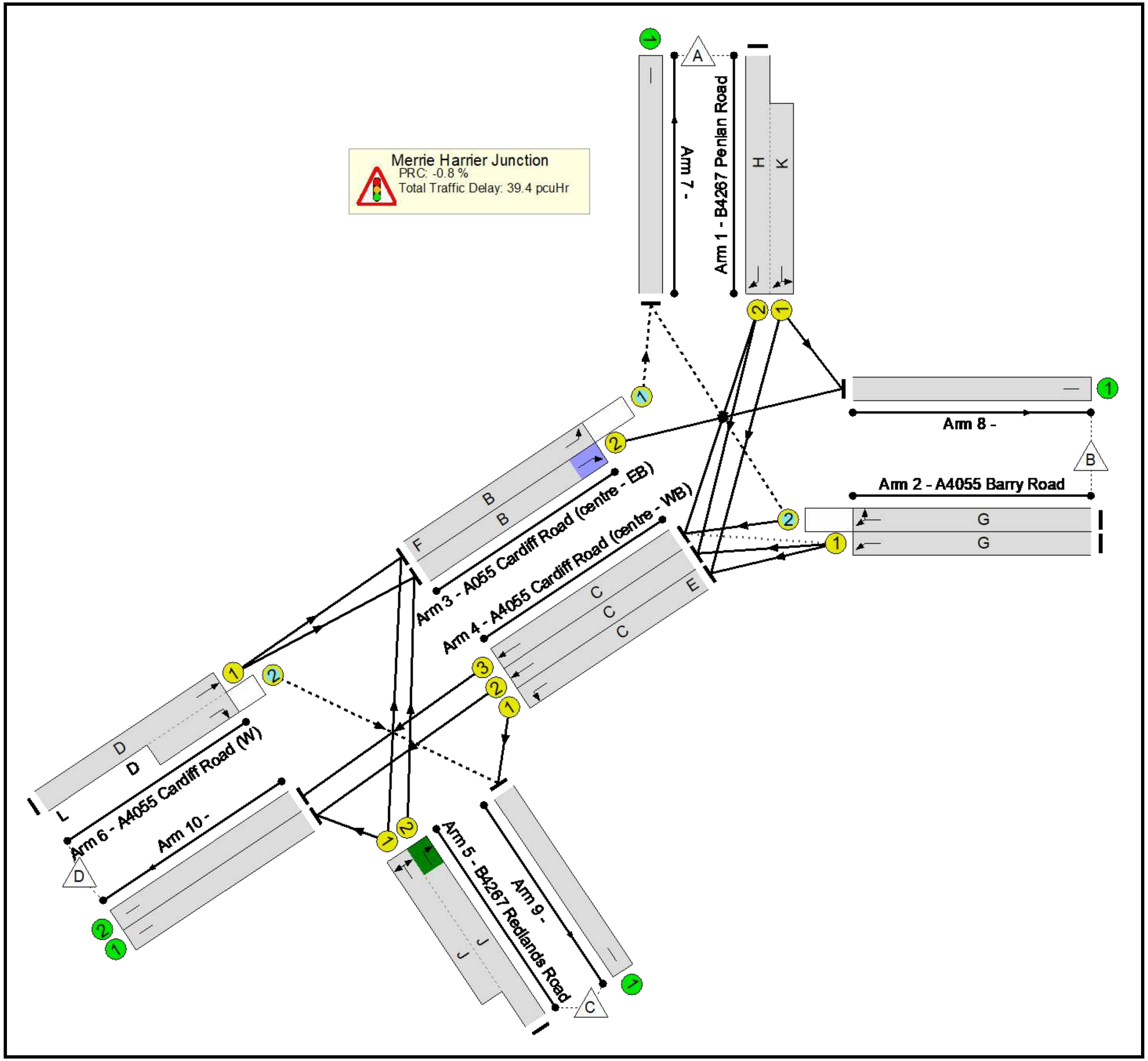
Stage	1	2	4	5	6	1	2	4	6
Duration	35	8	20	9	19	40	7	24	27
Change Point	0	40	53	80	96	120	165	177	208

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

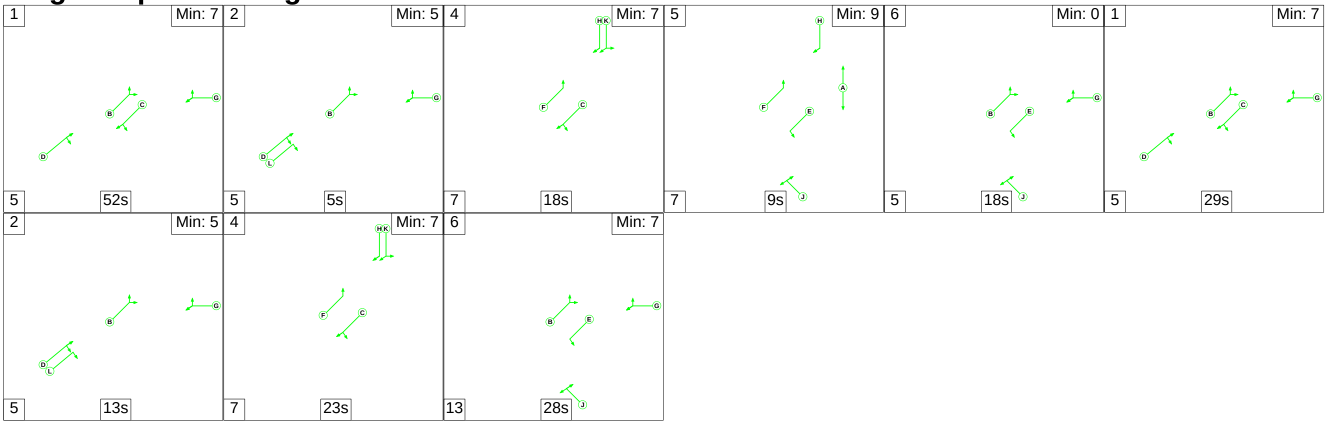
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	**N/A**	-	-		-	-	-	-	**39.4**	**90.7%**	-	-
Merrie Harrier Junction	-	-	**N/A**	-	-		-	-	-	-	**39.4**	**90.7%**	-	-
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	60:44	-	1749:1726	8.2 (1.4+6.8)	89.3 : 89.3%	83.2 (72.8:85.7)	13.4
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	164	-	1915	2.7	54.0%	13.9	14.6
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	164	-	1613	3.0	70.8%	60.5	4.2
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	248	84	1805	0.2	42.6%	2.2	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	164	-	1871	0.3	68.0%	1.3	2.9
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	220	90	1741	0.1	31.8%	0.9	1.8
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	130	-	1915	0.7	27.3%	8.7	4.6
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	130	-	1915	0.4	15.0%	8.8	3.0
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	61	-	1741:1741	12.6 (7.3+5.3)	90.7 : 90.7%	67.2 (69.1:64.9)	17.9
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	100	15	1935:1720	11.2 (8.6+2.7)	90.2 : 90.2%	54.0 (52.8:58.0)	27.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -0.8 Total Delay for Signalled Lanes (pcuHr): 39.36 Cycle Time (s): 248
PRC Over All Lanes (%): -0.8 Total Delay Over All Lanes(pcuHr): 39.36

Full Input Data And Results

Scenario 4: '2022 + Dev PM' (FG4: '2022 + Dev PM', Plan 1: 'Network Control Plan 1')

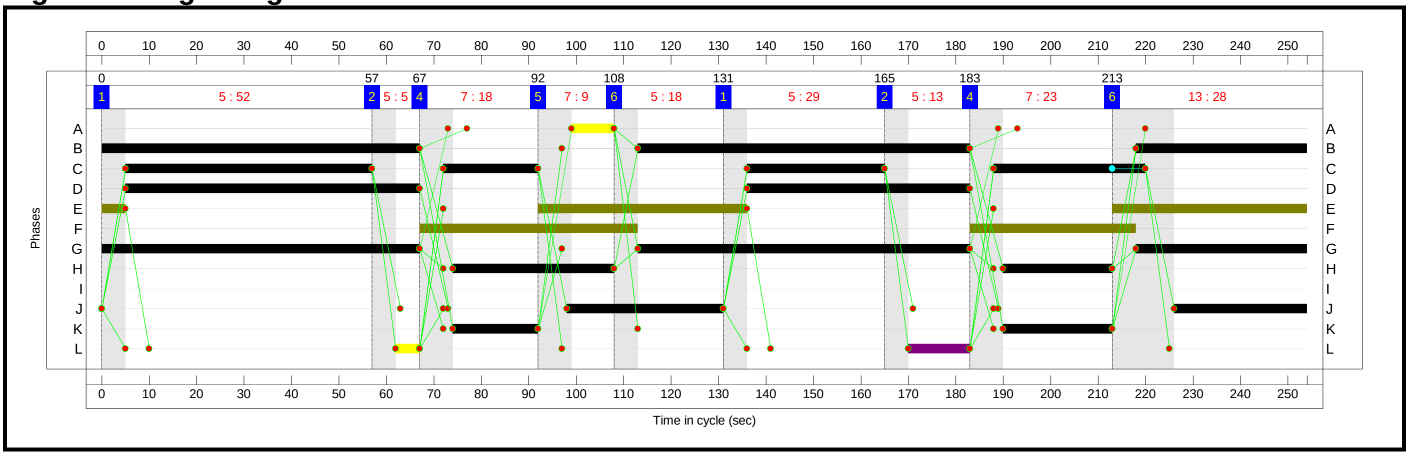
Stage Sequence Diagram



Stage Timings

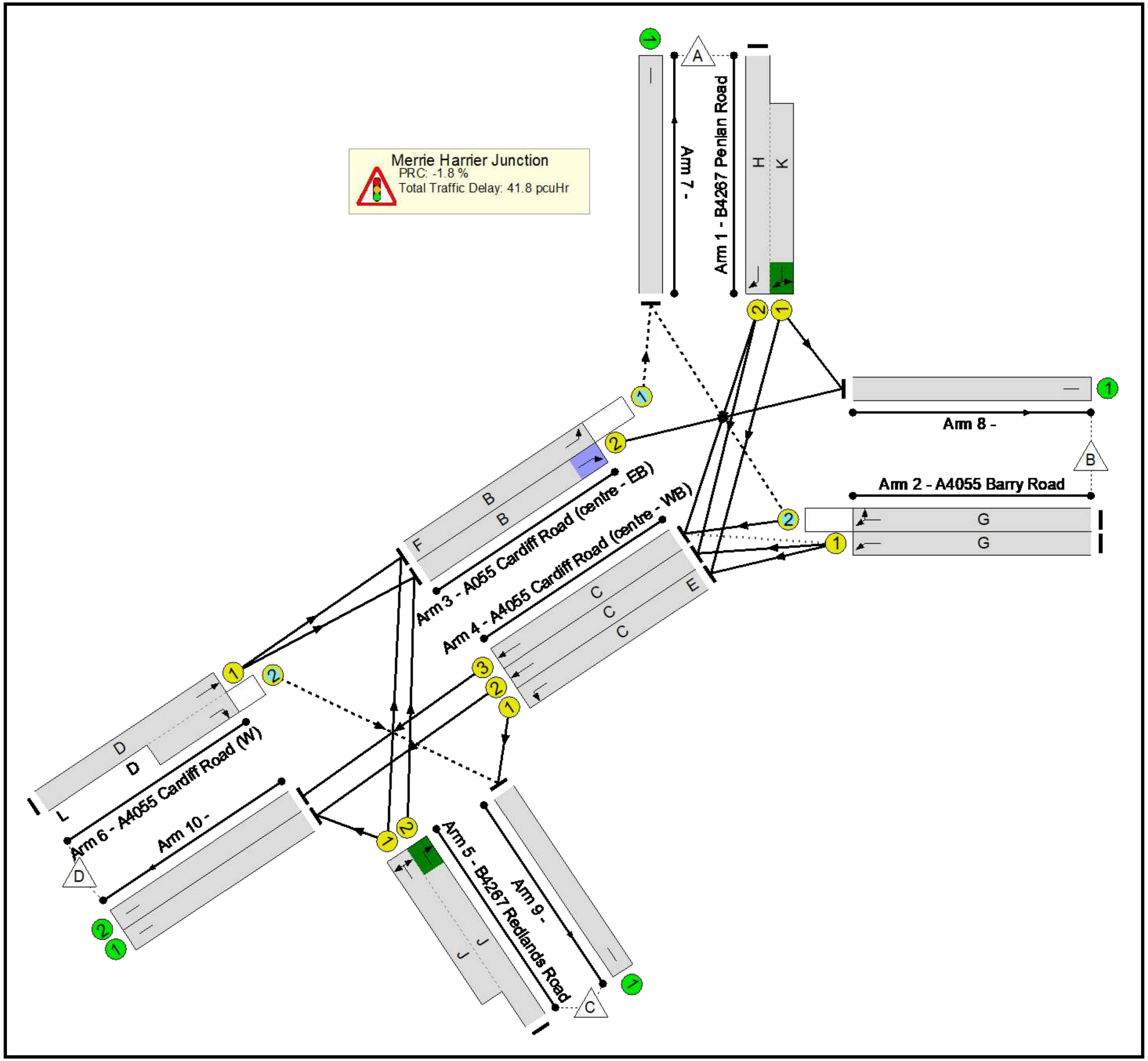
Stage	1	2	4	5	6	1	2	4	6
Duration	52	5	18	9	18	29	13	23	28
Change Point	0	57	67	92	108	131	165	183	213

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

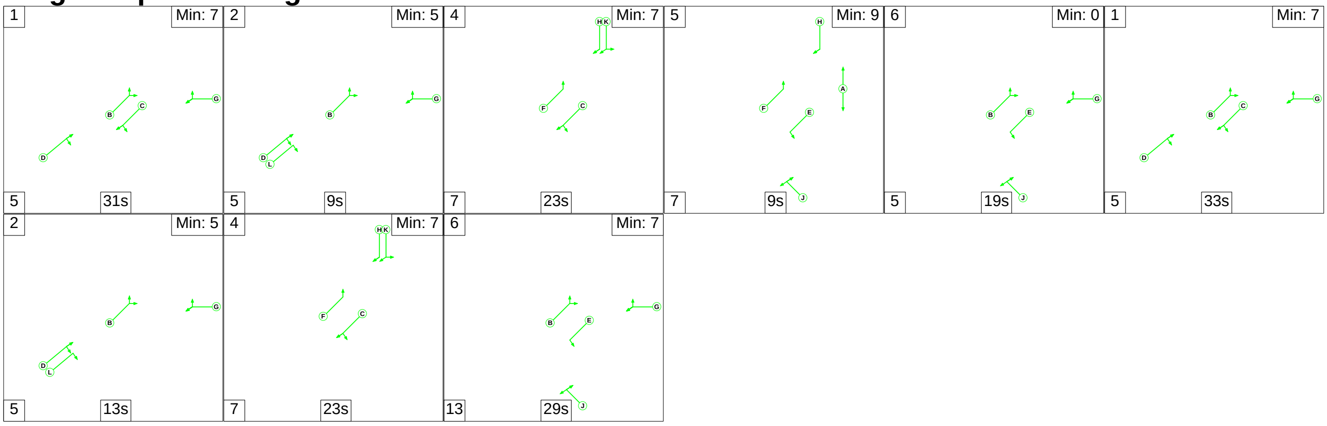
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**41.8**	**91.6%**	**-**	**-**
Merrie Harrier Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**41.8**	**91.6%**	**-**	**-**
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	57:41	-	1749:1723	10.3 (2.5+7.7)	91.6 : 91.6%	85.0 (78.3:87.5)	16.7
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	173	-	1915	3.8	66.2%	15.5	20.9
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	173	-	1680	1.2	44.8%	44.5	1.7
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	254	81	1805	0.0	30.1%	0.7	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	173	-	1871	0.3	71.2%	1.3	2.9
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	223	90	1741	0.2	35.7%	1.2	2.7
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	1.0	37.9%	8.8	6.4
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	0.6	23.8%	8.4	4.7
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	61	-	1741:1733	12.0 (7.3+4.7)	90.2 : 90.2%	68.7 (70.7:65.7)	17.2
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	109	18	1935:1720	12.5 (9.5+3.1)	91.5 : 91.5%	56.1 (53.8:65.0)	30.8
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -1.8 Total Delay for Signalled Lanes (pcuHr): 41.81 Cycle Time (s): 254
PRC Over All Lanes (%): -1.8 Total Delay Over All Lanes(pcuHr): 41.81

Full Input Data And Results

Scenario 5: '2032 AM' (FG5: '2032 AM', Plan 1: 'Network Control Plan 1')

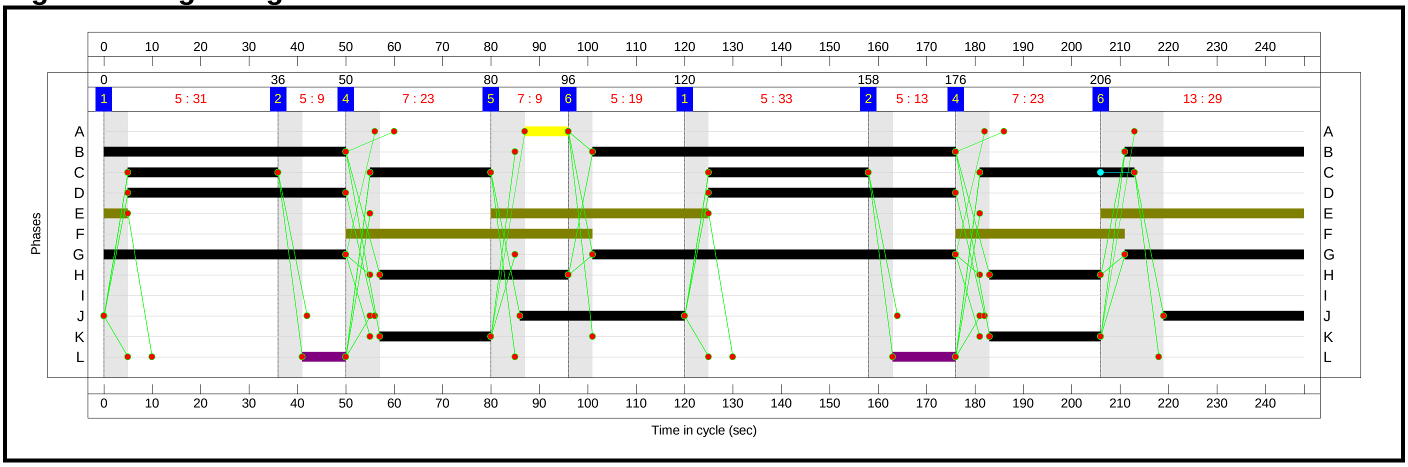
Stage Sequence Diagram



Stage Timings

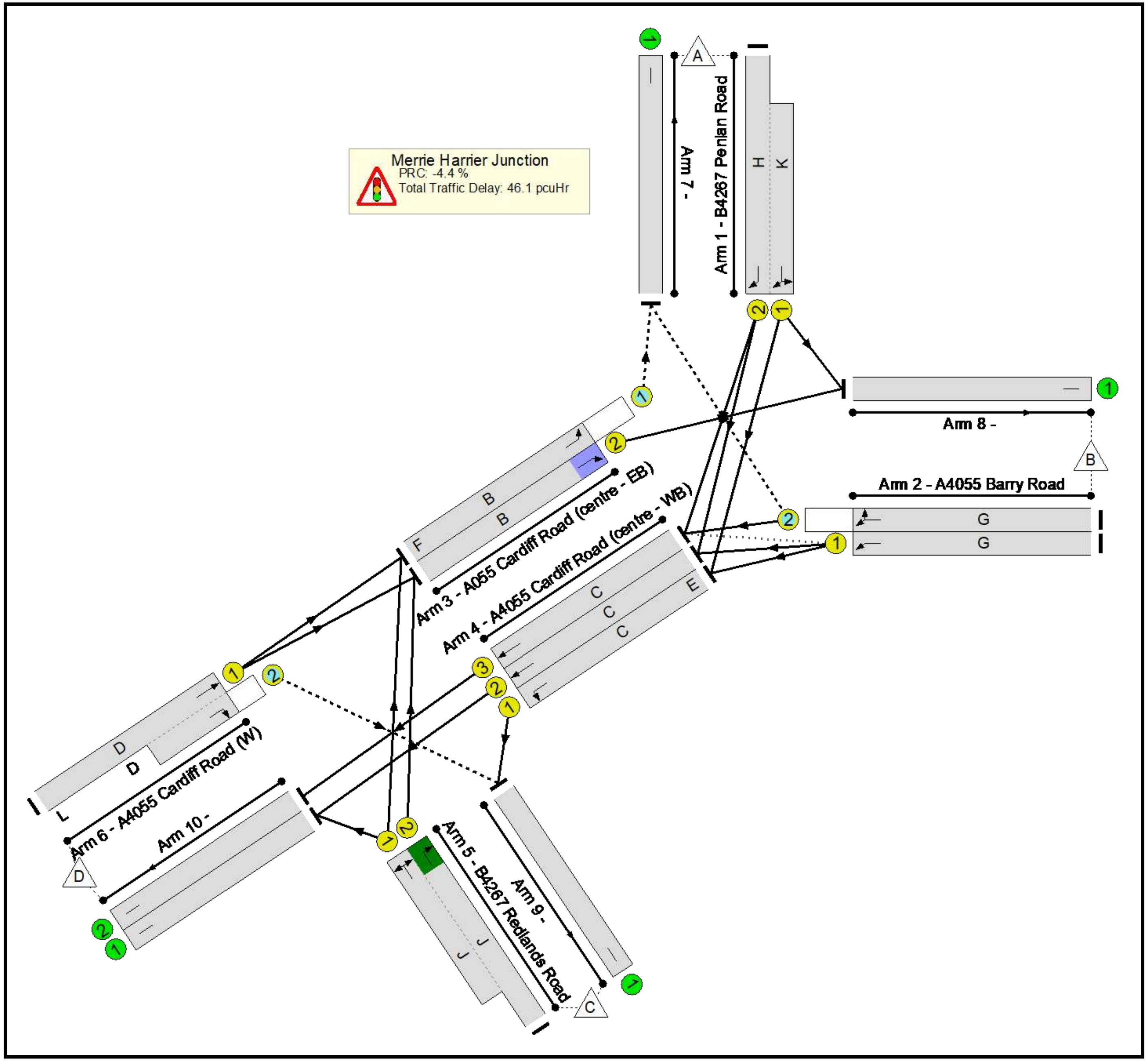
Stage	1	2	4	5	6	1	2	4	6
Duration	31	9	23	9	19	33	13	23	29
Change Point	0	36	50	80	96	120	158	176	206

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

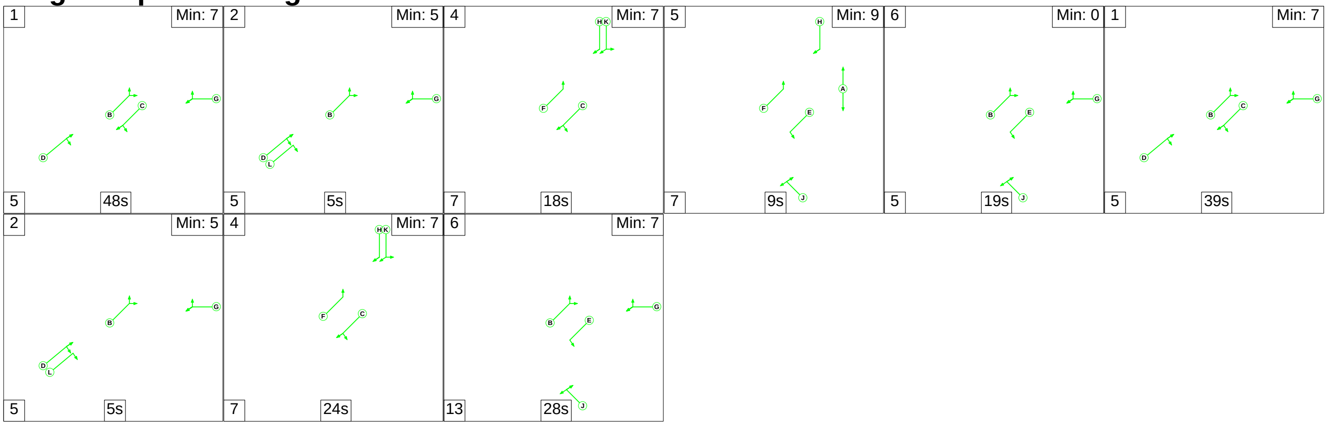
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**46.1**	**94.0%**	**-**	**-**
Merrie Harrier Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**46.1**	**94.0%**	**-**	**-**
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	62:46	-	1749:1726	9.3 (1.5+7.8)	91.9 : 91.9%	89.3 (78.4:91.7)	15.0
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	162	-	1915	3.1	57.8%	15.3	16.9
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	162	-	1613	4.2	80.0%	79.8	5.5
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	248	86	1805	0.2	43.4%	2.6	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	162	-	1871	0.4	70.3%	1.7	4.5
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	213	92	1741	0.2	35.2%	1.4	2.5
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	121	-	1915	0.8	30.8%	9.5	5.0
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	121	-	1915	0.4	16.4%	9.7	3.1
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	63	-	1741:1741	15.0 (8.7+6.3)	94.0 : 94.0%	74.6 (76.5:72.1)	20.7
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	96	22	1935:1720	12.5 (9.3+3.2)	92.2 : 92.2%	60.8 (58.9:66.9)	27.5
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -4.4 Total Delay for Signalled Lanes (pcuHr): 46.12 Cycle Time (s): 248
PRC Over All Lanes (%): -4.4 Total Delay Over All Lanes(pcuHr): 46.12

Full Input Data And Results

Scenario 6: '2032 PM' (FG6: '2032 PM', Plan 1: 'Network Control Plan 1')

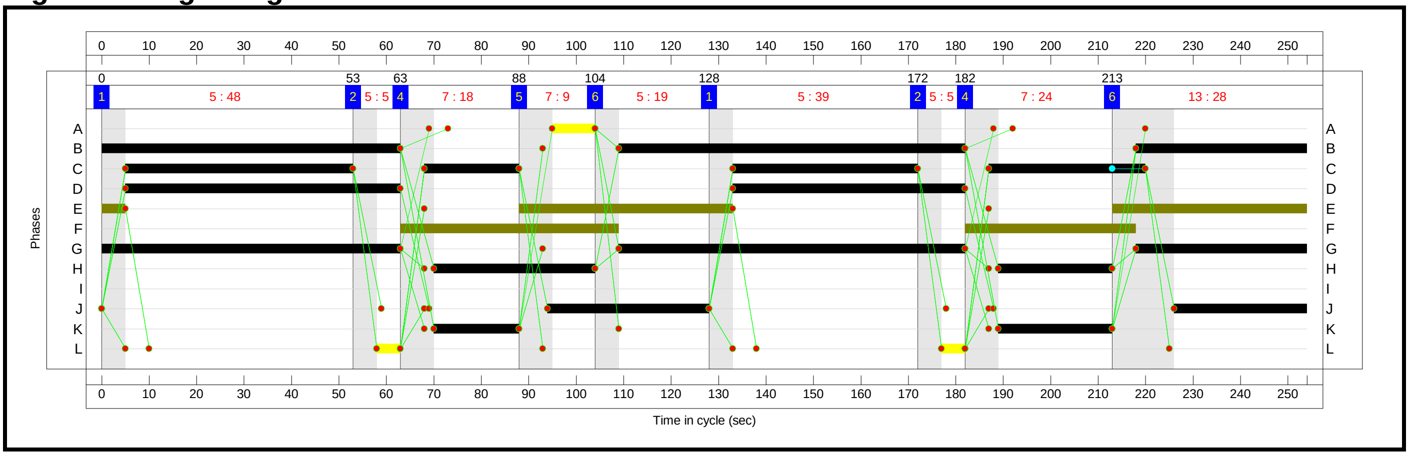
Stage Sequence Diagram



Stage Timings

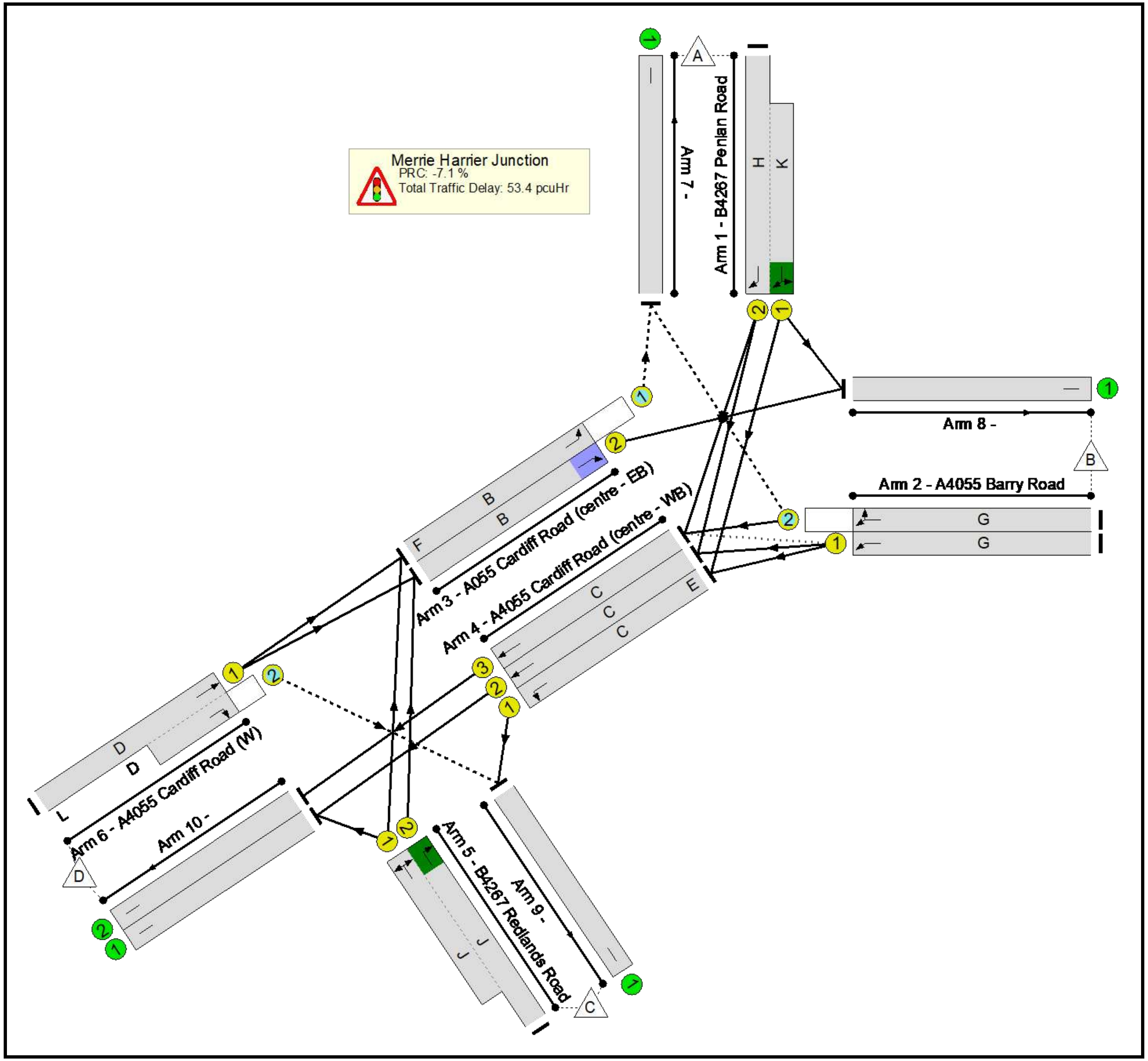
Stage	1	2	4	5	6	1	2	4	6
Duration	48	5	18	9	19	39	5	24	28
Change Point	0	53	63	88	104	128	172	182	213

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

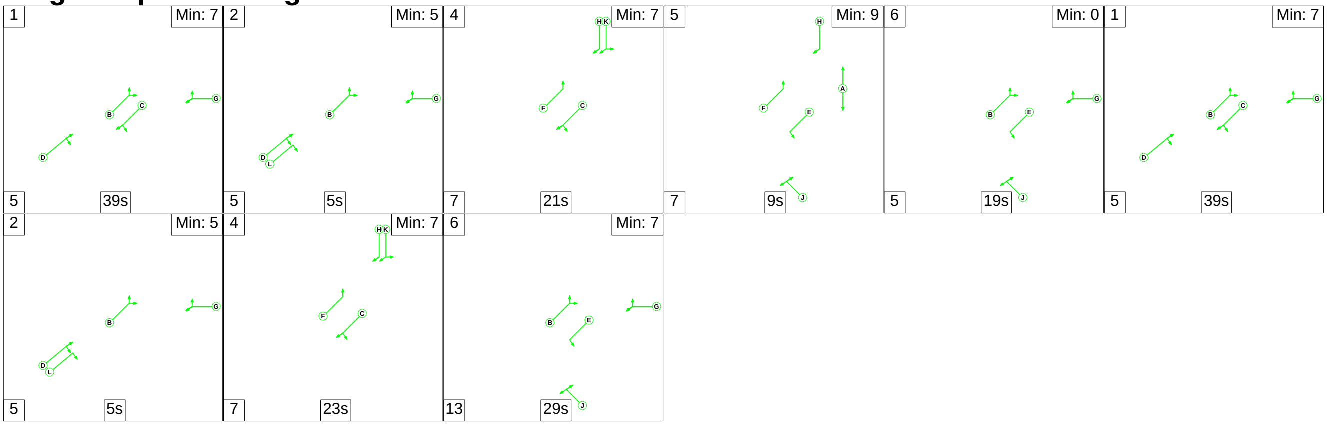
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**53.4**	**96.4%**	**-**	**-**
Merrie Harrier Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**53.4**	**96.4%**	**-**	**-**
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	58:42	-	1749:1723	13.1 (2.9+10.2)	96.4 : 96.4%	105.9 (98.0:108.4)	20.1
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	172	-	1915	4.2	69.1%	16.6	22.5
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	172	-	1641	1.4	48.7%	56.7	1.6
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	254	82	1805	0.0	31.0%	0.8	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	172	-	1871	0.4	75.4%	1.7	3.5
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	231	91	1741	0.1	37.0%	0.7	1.9
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	140	-	1915	0.9	36.2%	8.2	6.5
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	140	-	1915	0.5	20.6%	7.9	4.7
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	62	-	1741:1733	15.6 (9.6+6.1)	95.4 : 95.4%	84.1 (86.3:80.8)	21.1
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	107	10	1935:1720	17.0 (12.8+4.2)	96.3 : 96.3%	73.7 (70.6:85.0)	36.5
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -7.1 Total Delay for Signalled Lanes (pcuHr): 53.38 Cycle Time (s): 254
PRC Over All Lanes (%): -7.1 Total Delay Over All Lanes(pcuHr): 53.38

Full Input Data And Results

Scenario 7: '2032 + Dev AM' (FG7: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

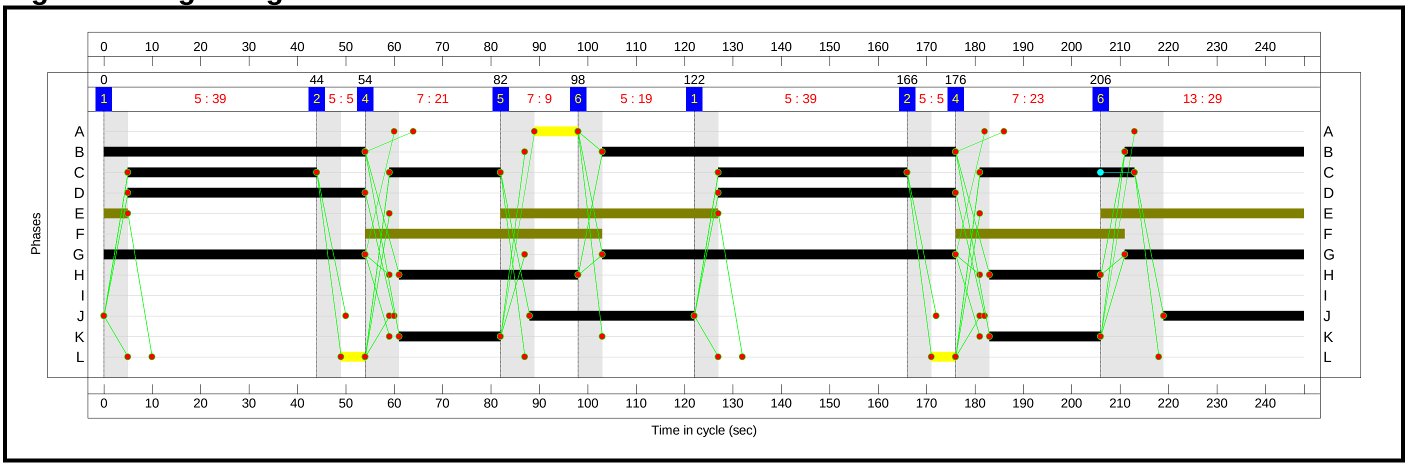
Stage Sequence Diagram



Stage Timings

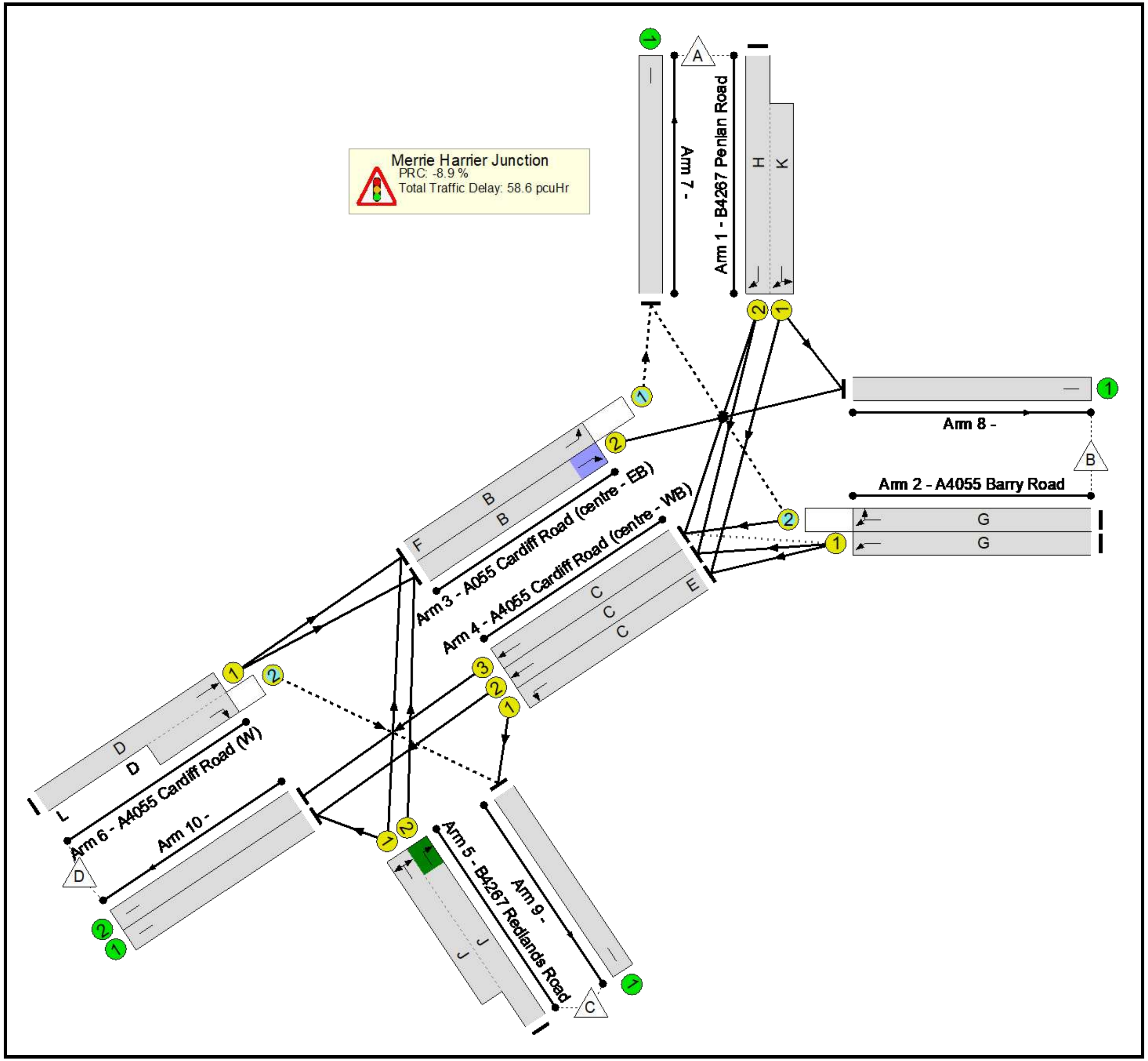
Stage	1	2	4	5	6	1	2	4	6
Duration	39	5	21	9	19	39	5	23	29
Change Point	0	44	54	82	98	122	166	176	206

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

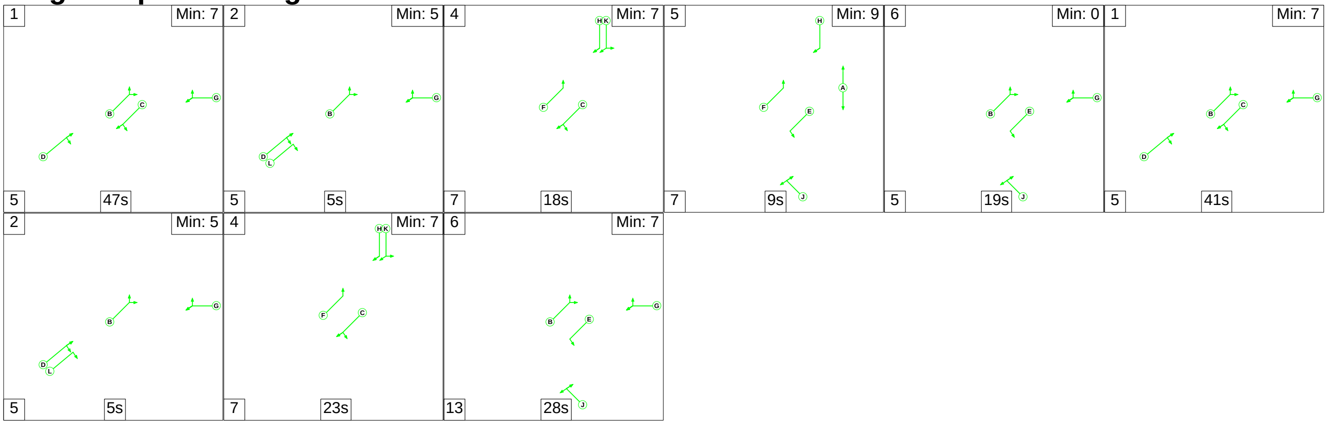
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**58.6**	**98.0%**	**-**	**-**
Merrie Harrier Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**58.6**	**98.0%**	**-**	**-**
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	60:44	-	1749:1726	11.5 (2.0+9.5)	95.9 : 95.9%	109.0 (98.2:111.6)	17.1
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	164	-	1915	3.0	57.8%	14.7	16.7
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	164	-	1613	5.3	86.7%	100.6	7.1
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	248	84	1805	0.2	45.6%	2.4	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	164	-	1871	0.5	72.6%	2.0	3.4
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	225	92	1741	0.1	33.3%	0.7	1.6
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	0.7	28.5%	8.7	5.1
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	133	-	1915	0.4	15.7%	8.8	3.3
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	63	-	1741:1741	18.0 (10.4+7.6)	97.1 : 97.1%	89.5 (91.8:86.5)	23.3
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	98	10	1935:1720	18.9 (14.3+4.5)	98.0 : 98.0%	84.8 (82.9:91.4)	36.7
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -8.9 Total Delay for Signalled Lanes (pcuHr): 58.62 Cycle Time (s): 248
PRC Over All Lanes (%): -8.9 Total Delay Over All Lanes(pcuHr): 58.62

Full Input Data And Results

Scenario 8: '2032 + Dev PM' (FG8: '2032 + Dev PM', Plan 1: 'Network Control Plan 1')

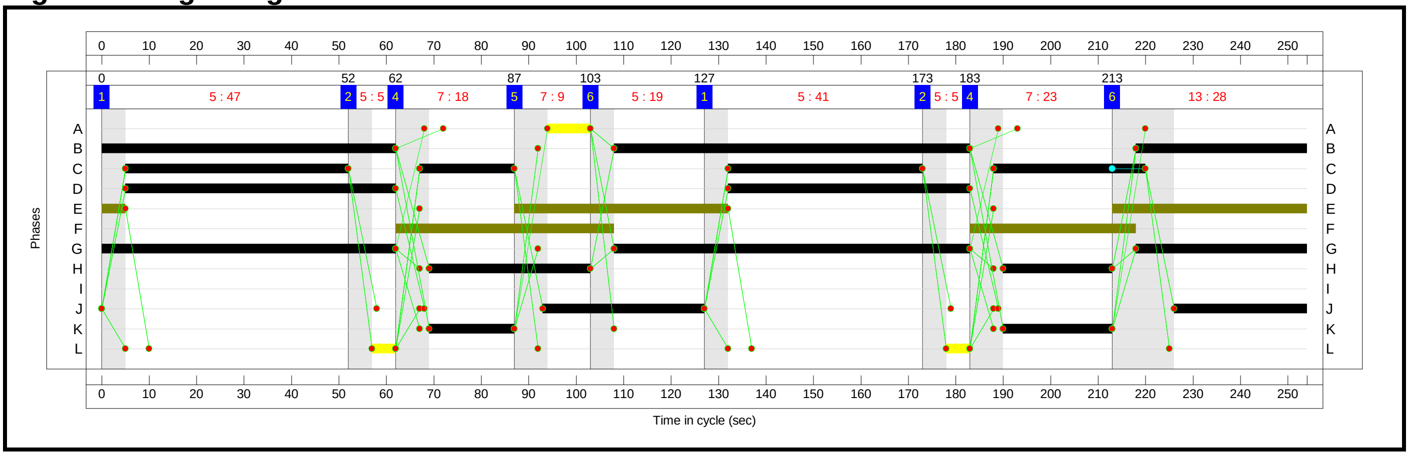
Stage Sequence Diagram



Stage Timings

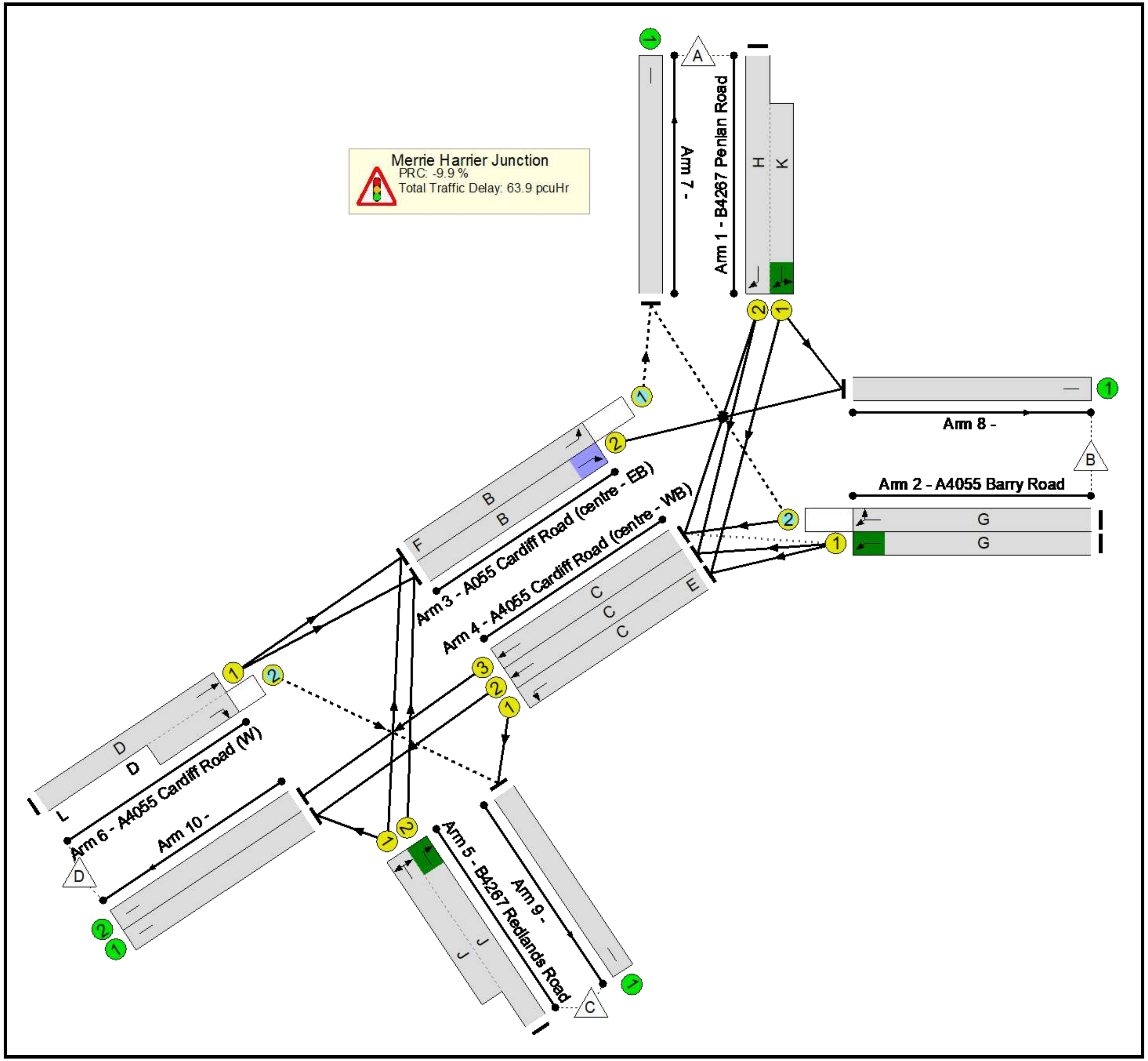
Stage	1	2	4	5	6	1	2	4	6
Duration	47	5	18	9	19	41	5	23	28
Change Point	0	52	62	87	103	127	173	183	213

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**63.9**	**98.9%**	**-**	**-**
Merrie Harrier Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**63.9**	**98.9%**	**-**	**-**
1/2+1/1	B4267 Penlan Road Right Left	U	N/A	N/A	H K		2	57:41	-	1749:1723	15.2 (3.8+11.3)	98.3 : 98.3%	117.3 (110.1:120.0)	21.7
2/1	A4055 Barry Road Ahead	U	N/A	N/A	G		2	173	-	1915	6.4	78.7%	24.2	27.4
2/2	A4055 Barry Road Ahead Right	O	N/A	N/A	G		2	173	-	1649	1.5	51.2%	58.0	1.7
3/1	A055 Cardiff Road (centre - EB) Left	O	N/A	N/A	B	F	2	254	81	1805	0.0	32.1%	0.7	0.0
3/2	A055 Cardiff Road (centre - EB) Ahead	U	N/A	N/A	B		2	173	-	1871	0.6	76.4%	2.2	4.6
4/1	A4055 Cardiff Road (centre - WB) Left	U	N/A	N/A	C	E	4	231	91	1741	0.1	37.0%	0.7	1.9
4/2	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	140	-	1915	0.6	38.1%	5.2	5.9
4/3	A4055 Cardiff Road (centre - WB) Ahead	U	N/A	N/A	C		4	140	-	1915	0.3	24.5%	4.3	3.3
5/2+5/1	B4267 Redlands Road Right Left	U	N/A	N/A	J		2	62	-	1741:1733	17.4 (10.6+6.8)	97.0 : 97.0%	92.8 (95.2:89.3)	22.9
6/1+6/2	A4055 Cardiff Road (W) Ahead Right	U+O	N/A	N/A	D	L	2	108	10	1935:1720	21.8 (16.3+5.5)	98.9 : 98.9%	91.3 (86.6:109.1)	42.1
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
9/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
10/2		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

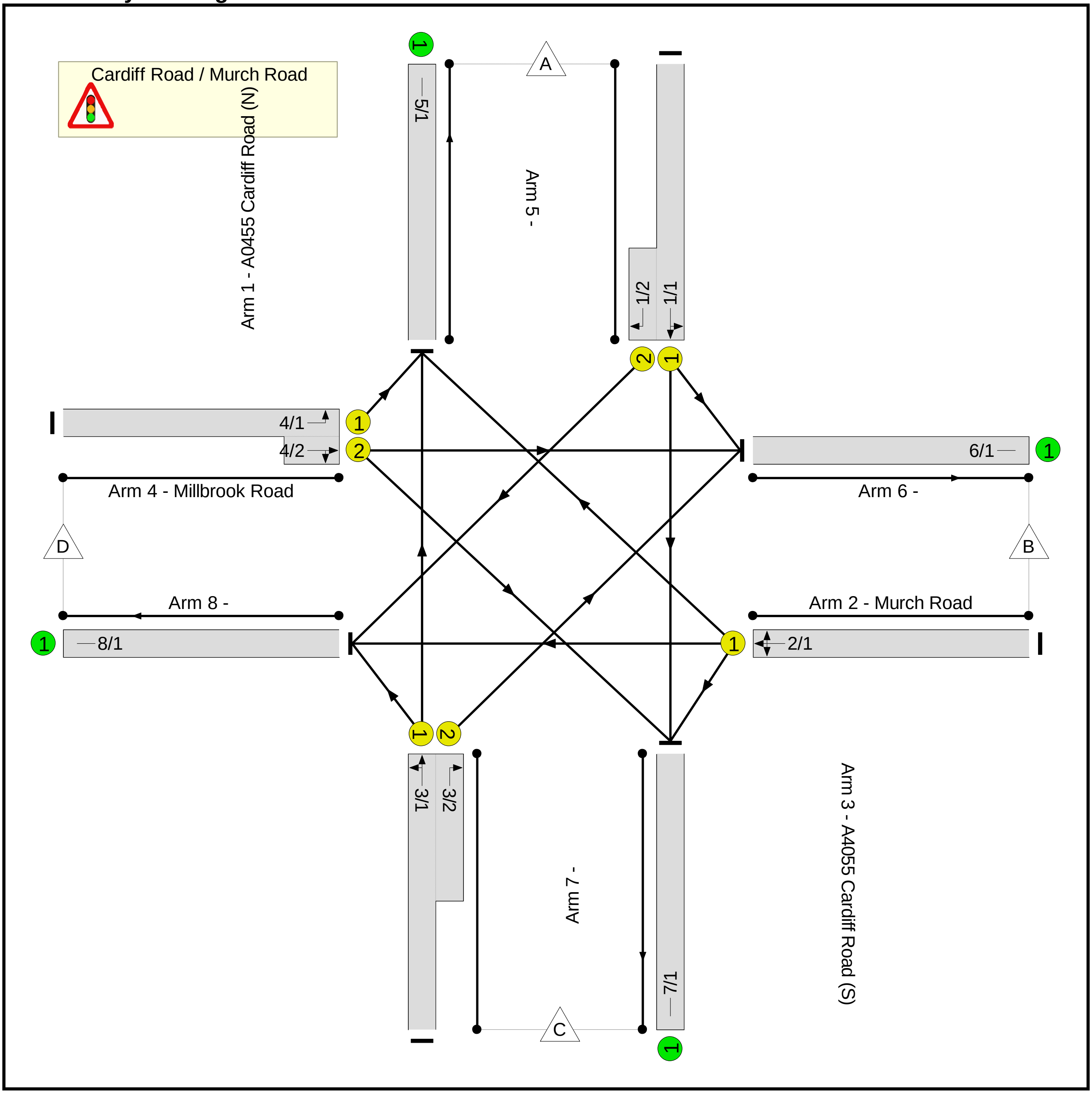
C1 PRC for Signalled Lanes (%): -9.9 Total Delay for Signalled Lanes (pcuHr): 63.89 Cycle Time (s): 254
PRC Over All Lanes (%): -9.9 Total Delay Over All Lanes(pcuHr): 63.89

Full Input Data And Results

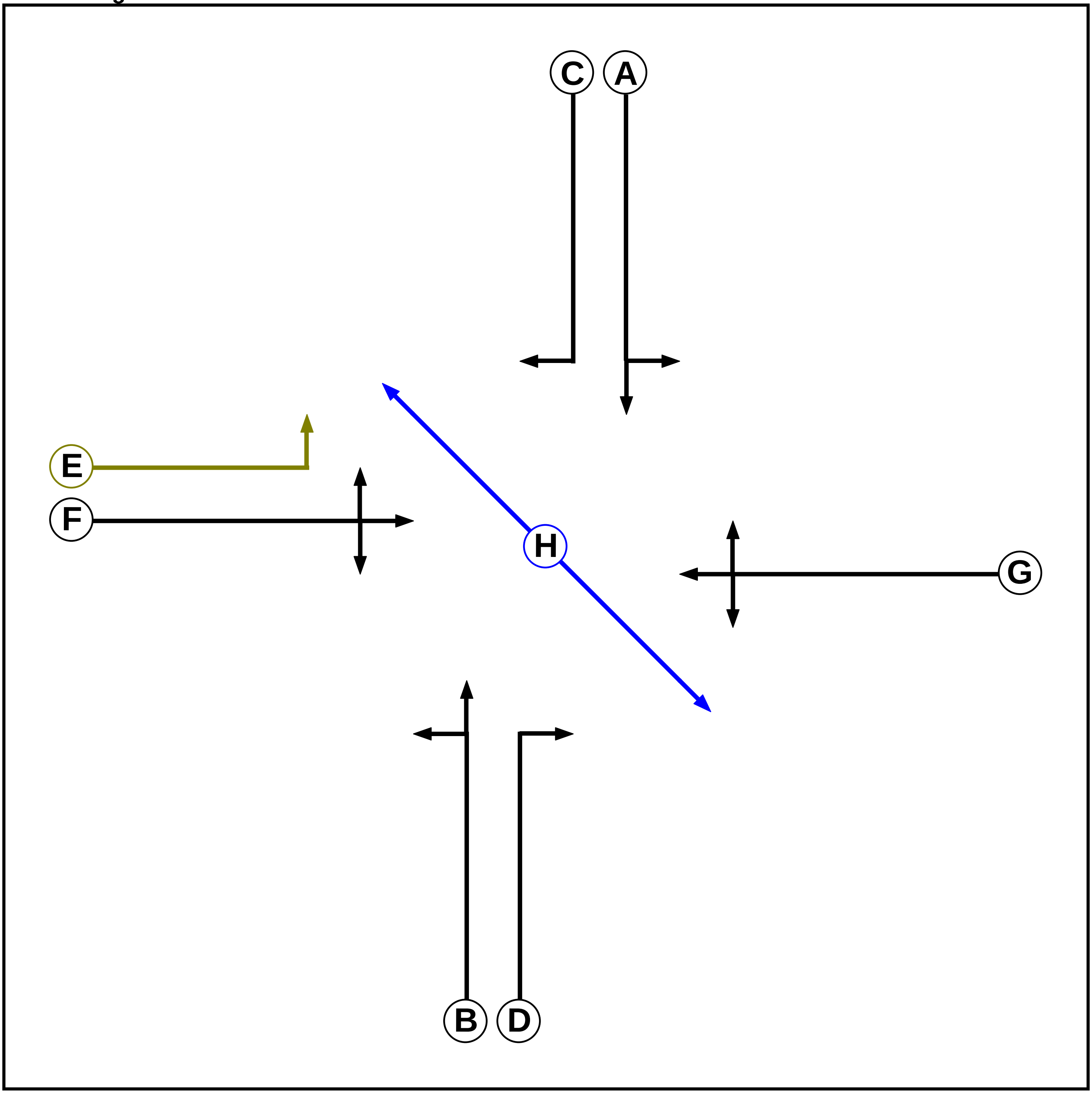
User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	226510 -Cardiff Road_Murch Road- V1.lsg3x
Author:	Ben Stone
Company:	SLR
Address:	

Network Layout Diagram



Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Filter	F	4	0
F	Traffic		7	7
G	Traffic		7	7
H	Pedestrian		10	10

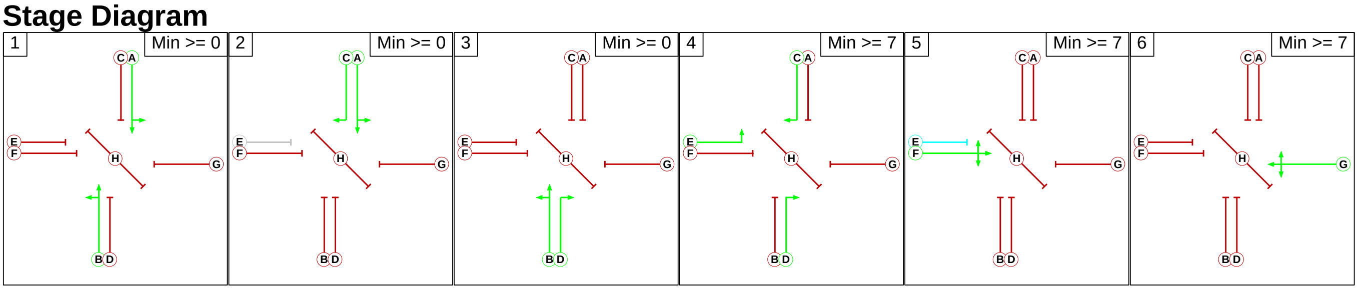
Phase Intergreens Matrix

	Starting Phase								
		A	B	C	D	E	F	G	H
Terminating Phase	A		-	-	6	-	5	6	10
	B	-		6	-	6	6	5	10
	C	-	5		-	-	5	5	10
	D	5	-	-		-	5	5	10
	E	-	5	-	-		-	5	10
	F	6	5	5	6	-		5	10
	G	5	6	6	6	6	5		10
	H	10	10	10	10	10	10	10	

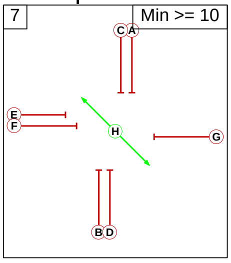
Phases in Stage

Stage No.	Phases in Stage
1	A B
2	A C
3	B D
4	C D E
5	F
6	G
7	H

Stage Diagram



Full Input Data And Results



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage						
		1	2	3	4	5	6	7
From Stage	1		6	6	6	6	6	10
	2	5		6	6	5	6	10
	3	5	6		6	6	5	10
	4	X	X	X		5	X	X
	5	6	6	6	6		5	10
	6	6	6	6	6	5		10
	7	10	10	10	10	10	10	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Cardiff Road / Murch Road
There are no Opposed Lanes in this Junction

Full Input Data And Results

Lane Input Data

Junction: Cardiff Road / Murch Road												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (A0455 Cardiff Road (N))	U	A	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 6 Left	8.00
											Arm 7 Ahead	Inf
1/2 (A0455 Cardiff Road (N))	U	C	2	3	5.0	Geom	-	3.00	0.00	Y	Arm 8 Right	20.00
2/1 (Murch Road)	U	G	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 5 Right	16.00
											Arm 7 Left	12.00
											Arm 8 Ahead	Inf
3/1 (A4055 Cardiff Road (S))	U	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Ahead	Inf
											Arm 8 Left	5.00
3/2 (A4055 Cardiff Road (S))	U	D	2	3	8.0	Geom	-	3.00	0.00	Y	Arm 6 Right	12.00
4/1 (Millbrook Road)	U	F E	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Left	14.00
4/2 (Millbrook Road)	U	F	2	3	3.0	Geom	-	3.00	0.00	Y	Arm 6 Ahead	Inf
											Arm 7 Right	12.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 Observed AM'	08:00	09:00	01:00	
2: '2022 Observed PM'	17:00	18:00	01:00	
3: '2022 + Dev AM'	08:00	09:00	01:00	
4: '2022 + Dev PM'	17:00	18:00	01:00	
5: '2032 AM'	08:00	09:00	01:00	
6: '2032 PM'	17:00	18:00	01:00	
7: '2032 + Dev AM'	08:00	09:00	01:00	
8: '2032 + Dev PM'	17:00	18:00	01:00	

Scenario 1: '2022 Observed AM' (FG1: '2022 Observed AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
Origin		A	B	C	D	Tot.
	A	0	96	456	36	588
	B	135	0	78	98	311
	C	471	33	0	23	527
	D	51	44	27	0	122
	Tot.	657	173	561	157	1548

Traffic Lane Flows

Lane	Scenario 1: 2022 Observed AM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	588(In) 552(Out)
1/2 (short)	36
2/1	311
3/1 (with short)	527(In) 494(Out)
3/2 (short)	33
4/1 (with short)	122(In) 51(Out)
4/2 (short)	71
5/1	657
6/1	173
7/1	561
8/1	157

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	17.4 %	1855	1855
				Arm 7 Ahead	Inf	82.6 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	43.4 %	1833	1833
				Arm 7 Left	12.00	25.1 %		
				Arm 8 Ahead	Inf	31.5 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.3 %	1889	1889
				Arm 8 Left	5.00	4.7 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	62.0 %	1828	1828
				Arm 7 Right	12.00	38.0 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2022 Observed PM' (FG2: '2022 Observed PM', Plan 2: 'Network Control Plan 2')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	150	560	29	739
	B	137	0	80	58	275
	C	560	62	0	8	630
	D	63	104	56	0	223
	Tot.	760	316	696	95	1867

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 2: 2022 Observed PM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	739(In) 710(Out)
1/2 (short)	29
2/1	275
3/1 (with short)	630(In) 568(Out)
3/2 (short)	62
4/1 (with short)	223(In) 63(Out)
4/2 (short)	160
5/1	760
6/1	316
7/1	696
8/1	95

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	21.1 %	1842	1842
				Arm 7 Ahead	Inf	78.9 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	49.8 %	1814	1814
				Arm 7 Left	12.00	29.1 %		
				Arm 8 Ahead	Inf	21.1 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	98.6 %	1907	1907
				Arm 8 Left	5.00	1.4 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	65.0 %	1835	1835
				Arm 7 Right	12.00	35.0 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2022 + Dev AM' (FG3: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	96	472	36	604
	B	135	0	78	98	311
	C	475	33	0	23	531
	D	51	44	27	0	122
	Tot.	661	173	577	157	1568

Traffic Lane Flows

Lane	Scenario 3: 2022 + Dev AM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	604(In) 568(Out)
1/2 (short)	36
2/1	311
3/1 (with short)	531(In) 498(Out)
3/2 (short)	33
4/1 (with short)	122(In) 51(Out)
4/2 (short)	71
5/1	661
6/1	173
7/1	577
8/1	157

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	16.9 %	1856	1856
				Arm 7 Ahead	Inf	83.1 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	43.4 %	1833	1833
				Arm 7 Left	12.00	25.1 %		
				Arm 8 Ahead	Inf	31.5 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.4 %	1889	1889
				Arm 8 Left	5.00	4.6 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	62.0 %	1828	1828
				Arm 7 Right	12.00	38.0 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2022 + Dev PM' (FG4: '2022 + Dev PM', Plan 2: 'Network Control Plan 2')

Traffic Flows, Desired

Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	150	568	29	747
	B	137	0	80	58	275
	C	579	62	0	8	649
	D	63	104	56	0	223
	Tot.	779	316	704	95	1894

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 4: 2022 + Dev PM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	747(In) 718(Out)
1/2 (short)	29
2/1	275
3/1 (with short)	649(In) 587(Out)
3/2 (short)	62
4/1 (with short)	223(In) 63(Out)
4/2 (short)	160
5/1	779
6/1	316
7/1	704
8/1	95

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	20.9 %	1843	1843
				Arm 7 Ahead	Inf	79.1 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	49.8 %	1814	1814
				Arm 7 Left	12.00	29.1 %		
				Arm 8 Ahead	Inf	21.1 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	98.6 %	1907	1907
				Arm 8 Left	5.00	1.4 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	65.0 %	1835	1835
				Arm 7 Right	12.00	35.0 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 5: '2032 AM' (FG5: '2032 AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	103	489	38	630
	B	145	0	84	105	334
	C	505	35	0	25	565
	D	55	47	29	0	131
	Tot.	705	185	602	168	1660

Traffic Lane Flows

Lane	Scenario 5: 2032 AM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	630(In) 592(Out)
1/2 (short)	38
2/1	334
3/1 (with short)	565(In) 530(Out)
3/2 (short)	35
4/1 (with short)	131(In) 55(Out)
4/2 (short)	76
5/1	705
6/1	185
7/1	602
8/1	168

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	17.4 %	1855	1855
				Arm 7 Ahead	Inf	82.6 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	43.4 %	1833	1833
				Arm 7 Left	12.00	25.1 %		
				Arm 8 Ahead	Inf	31.4 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.3 %	1888	1888
				Arm 8 Left	5.00	4.7 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	61.8 %	1828	1828
				Arm 7 Right	12.00	38.2 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 6: '2032 AM' (FG6: '2032 PM', Plan 2: 'Network Control Plan 2')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	161	601	31	793
	B	147	0	86	62	295
	C	601	66	0	9	676
	D	68	112	60	0	240
	Tot.	816	339	747	102	2004

Traffic Lane Flows

Lane	Scenario 6: 2032 AM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	793(In) 762(Out)
1/2 (short)	31
2/1	295
3/1 (with short)	676(In) 610(Out)
3/2 (short)	66
4/1 (with short)	240(In) 68(Out)
4/2 (short)	172
5/1	816
6/1	339
7/1	747
8/1	102

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Cardiff Road / Murch Road								
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	21.1 %	1842	1842
				Arm 7 Ahead	Inf	78.9 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	49.8 %	1814	1814
				Arm 7 Left	12.00	29.2 %		
				Arm 8 Ahead	Inf	21.0 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	98.5 %	1907	1907
				Arm 8 Left	5.00	1.5 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	65.1 %	1835	1835
				Arm 7 Right	12.00	34.9 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 7: '2032 + Dev AM' (FG7: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	103	505	38	646
	B	145	0	84	105	334
	C	509	35	0	25	569
	D	55	47	29	0	131
	Tot.	709	185	618	168	1680

Traffic Lane Flows

Lane	Scenario 7: 2032 + Dev AM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	646(In) 608(Out)
1/2 (short)	38
2/1	334
3/1 (with short)	569(In) 534(Out)
3/2 (short)	35
4/1 (with short)	131(In) 55(Out)
4/2 (short)	76
5/1	709
6/1	185
7/1	618
8/1	168

Lane Saturation Flows

Junction: Cardiff Road / Murch Road								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	16.9 %	1856	1856
				Arm 7 Ahead	Inf	83.1 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	43.4 %	1833	1833
				Arm 7 Left	12.00	25.1 %		
				Arm 8 Ahead	Inf	31.4 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	95.3 %	1888	1888
				Arm 8 Left	5.00	4.7 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	61.8 %	1828	1828
				Arm 7 Right	12.00	38.2 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 8: '2032 + Dev PM' (FG8: '2032 + Dev PM', Plan 2: 'Network Control Plan 2')

Traffic Flows, Desired

Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	161	609	31	801
	B	147	0	86	62	295
	C	620	66	0	9	695
	D	68	112	60	0	240
	Tot.	835	339	755	102	2031

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 8: 2032 + Dev PM
Junction: Cardiff Road / Murch Road	
1/1 (with short)	801(In) 770(Out)
1/2 (short)	31
2/1	295
3/1 (with short)	695(In) 629(Out)
3/2 (short)	66
4/1 (with short)	240(In) 68(Out)
4/2 (short)	172
5/1	835
6/1	339
7/1	755
8/1	102

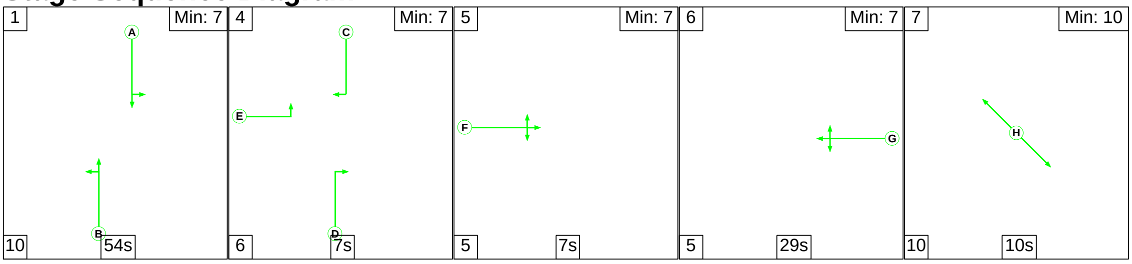
Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
Junction: Cardiff Road / Murch Road								
1/1 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 6 Left	8.00	20.9 %	1843	1843
				Arm 7 Ahead	Inf	79.1 %		
1/2 (A0455 Cardiff Road (N))	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (Murch Road)	3.50	0.00	Y	Arm 5 Right	16.00	49.8 %	1814	1814
				Arm 7 Left	12.00	29.2 %		
				Arm 8 Ahead	Inf	21.0 %		
3/1 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 5 Ahead	Inf	98.6 %	1907	1907
				Arm 8 Left	5.00	1.4 %		
3/2 (A4055 Cardiff Road (S))	3.00	0.00	Y	Arm 6 Right	12.00	100.0 %	1702	1702
4/1 (Millbrook Road)	3.00	0.00	Y	Arm 5 Left	14.00	100.0 %	1730	1730
4/2 (Millbrook Road)	3.00	0.00	Y	Arm 6 Ahead	Inf	65.1 %	1835	1835
				Arm 7 Right	12.00	34.9 %		
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 1: '2022 Observed AM' (FG1: '2022 Observed AM', Plan 1: 'Network Control Plan 1')

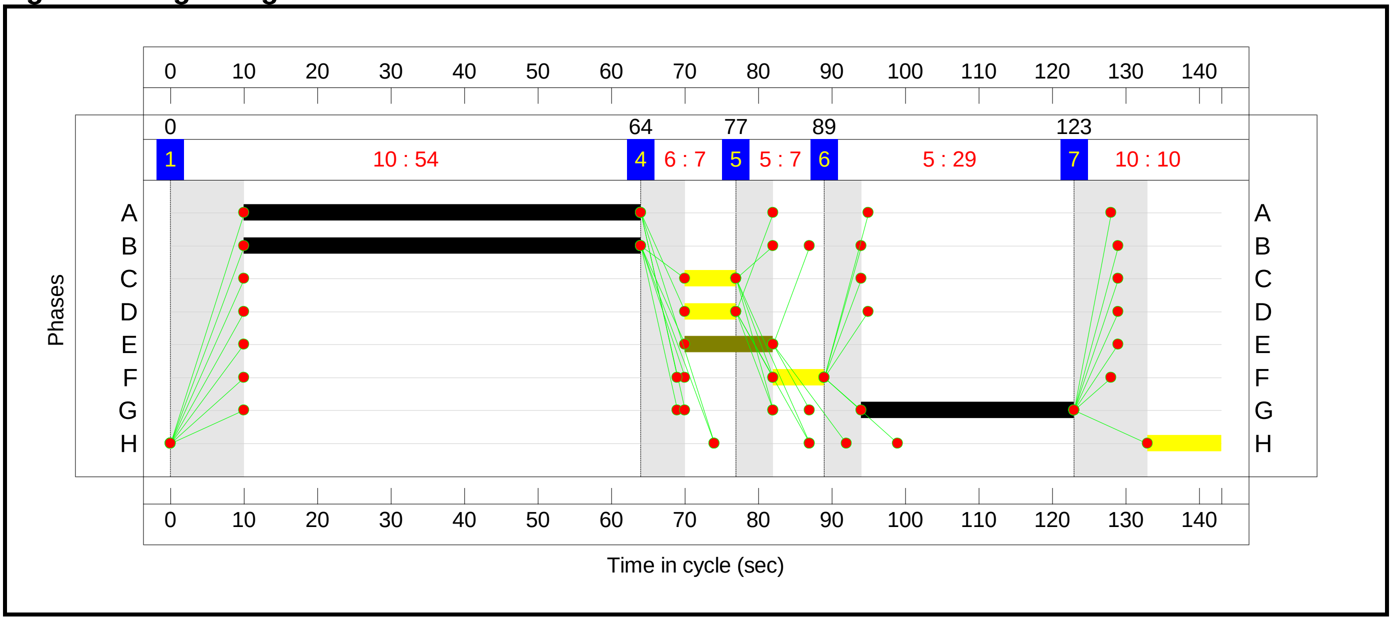
Stage Sequence Diagram



Stage Timings

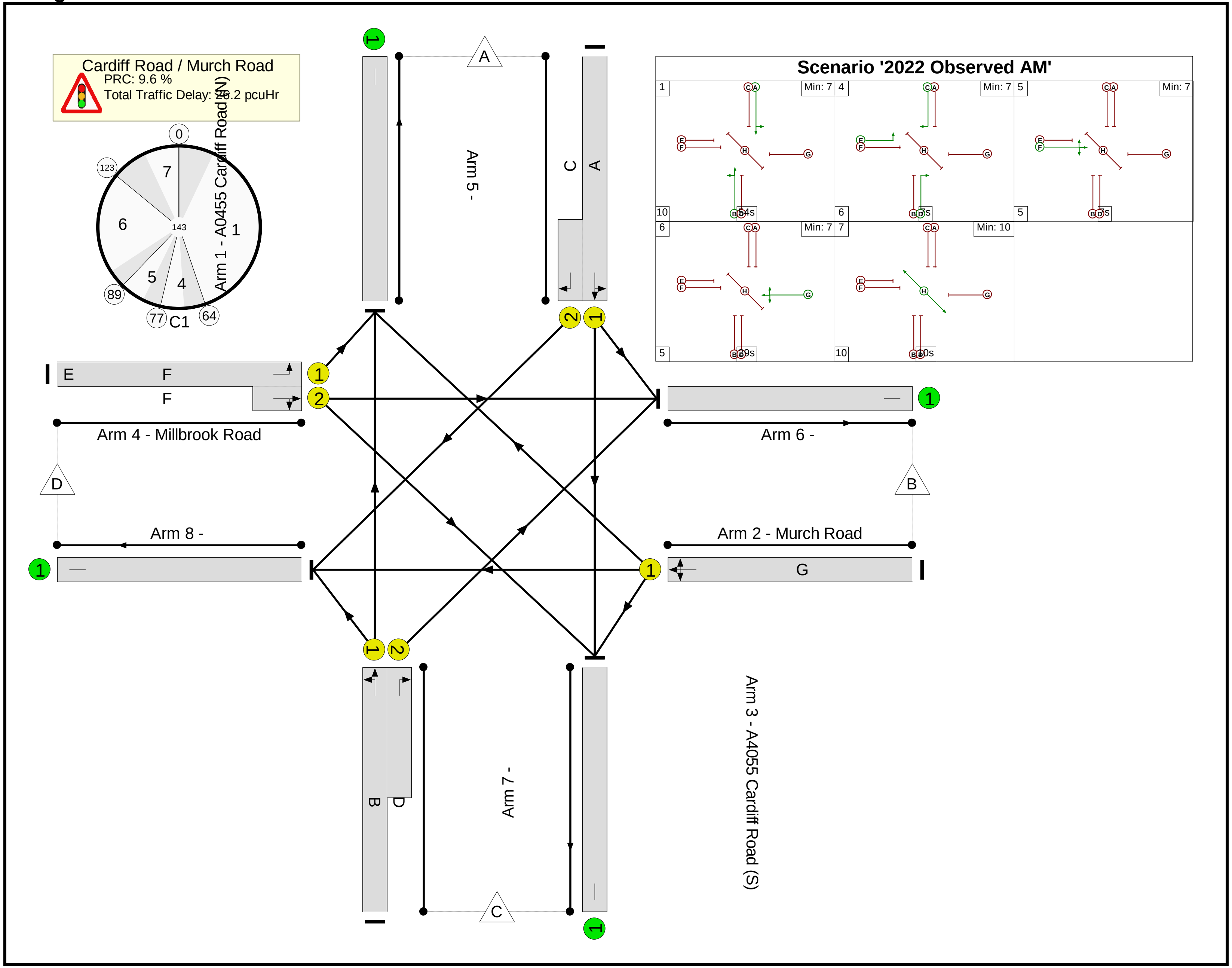
Stage	1	4	5	6	7
Duration	54	7	7	29	10
Change Point	0	64	77	89	123

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Network Results

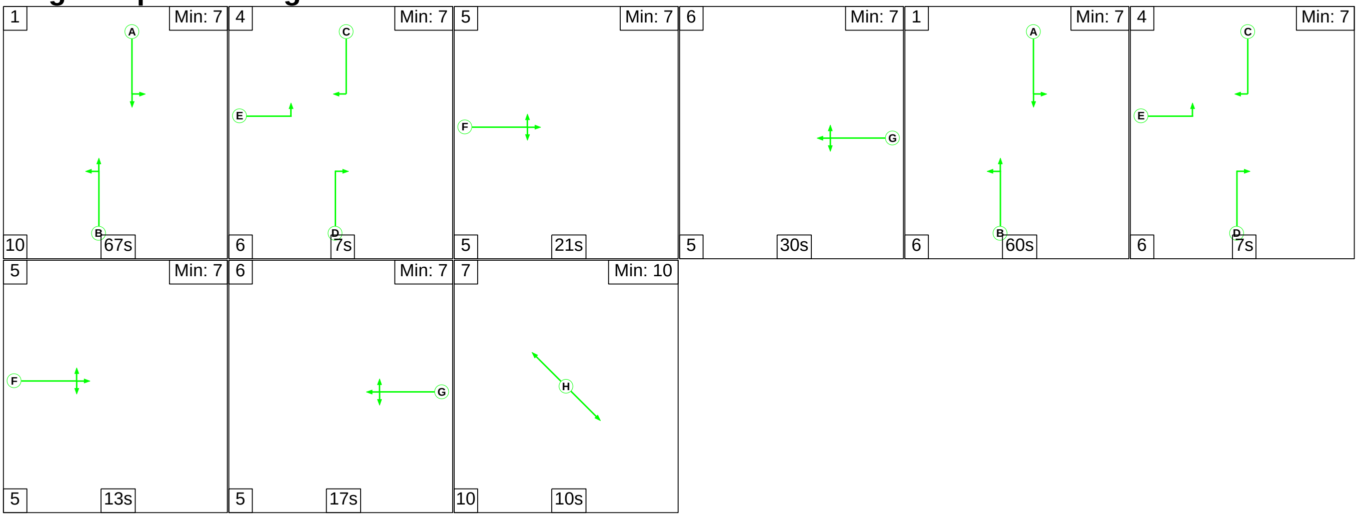
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**26.2**	**82.1%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**26.2**	**82.1%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		1	54:7	-	1855:1781	8.9	82.1 : 82.1%	54.5	22.8
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		1	29	-	1833	6.7	80.9%	77.0	13.8
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		1	54:7	-	1889:1702	6.9	71.3 : 71.3%	47.0	18.3
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	1	19:7	12	1730:1828	3.8	78.8 : 78.8%	111.2	4.4
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 9.6 Total Delay for Signalled Lanes (pcuHr): 26.20 Cycle Time (s): 143
PRC Over All Lanes (%): 9.6 Total Delay Over All Lanes(pcuHr): 26.20

Full Input Data And Results

Scenario 2: '2022 Observed PM' (FG2: '2022 Observed PM', Plan 2: 'Network Control Plan 2')

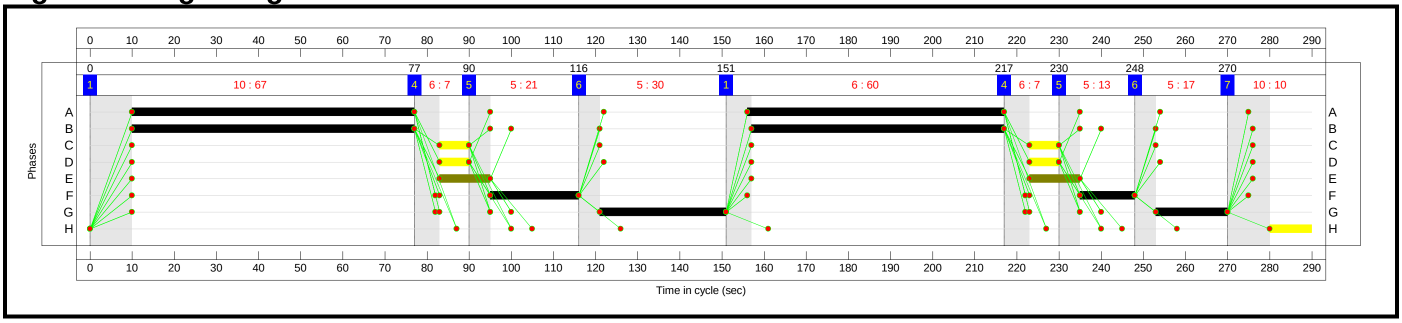
Stage Sequence Diagram



Stage Timings

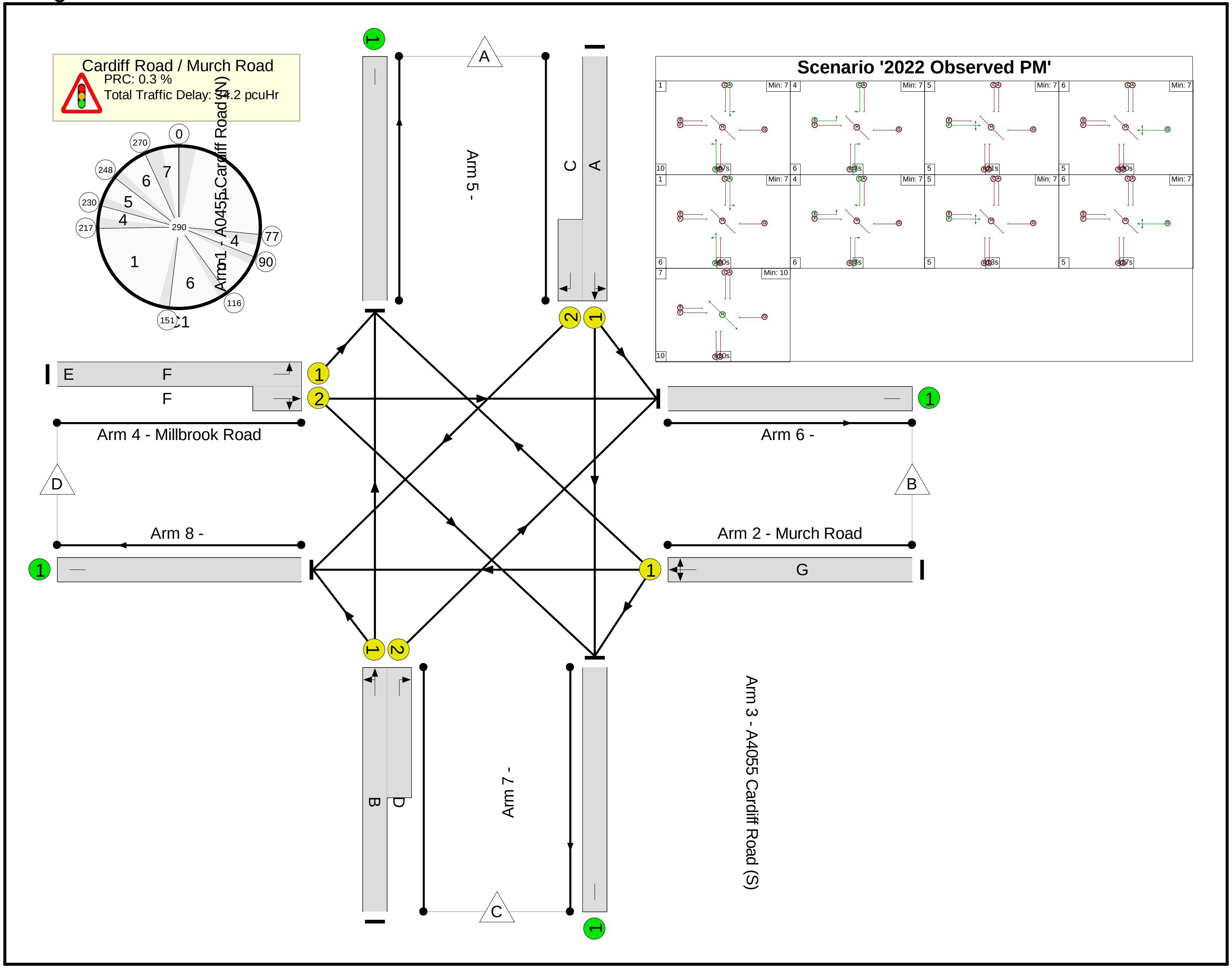
Stage	1	4	5	6	1	4	5	6	7
Duration	67	7	21	30	60	7	13	17	10
Change Point	0	77	90	116	151	217	230	248	270

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

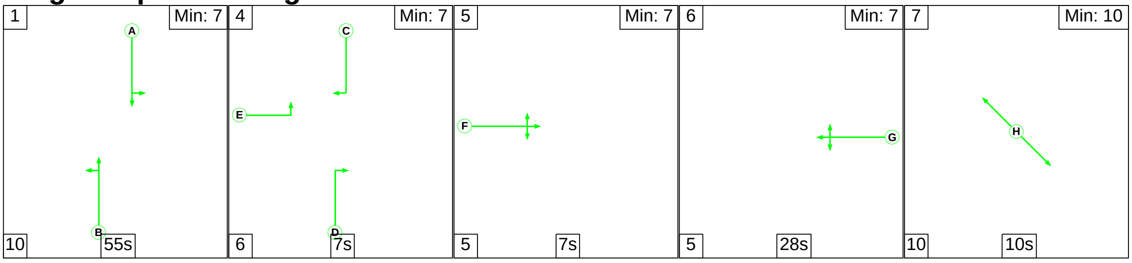
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**34.2**	**89.7%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**34.2**	**89.7%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		2	128:14	-	1842:1781	11.6	89.4 : 89.4%	56.7	31.6
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		2	47	-	1814	8.2	89.7%	107.3	16.2
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		2	127:14	-	1907:1702	7.6	72.9 : 72.9%	43.4	21.5
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	2	58:34	24	1730:1835	6.8	88.1 : 88.1%	109.8	11.3
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 0.3 Total Delay for Signalled Lanes (pcuHr): 34.23 Cycle Time (s): 290
PRC Over All Lanes (%): 0.3 Total Delay Over All Lanes(pcuHr): 34.23

Full Input Data And Results

Scenario 3: '2022 + Dev AM' (FG3: '2022 + Dev AM', Plan 1: 'Network Control Plan 1')

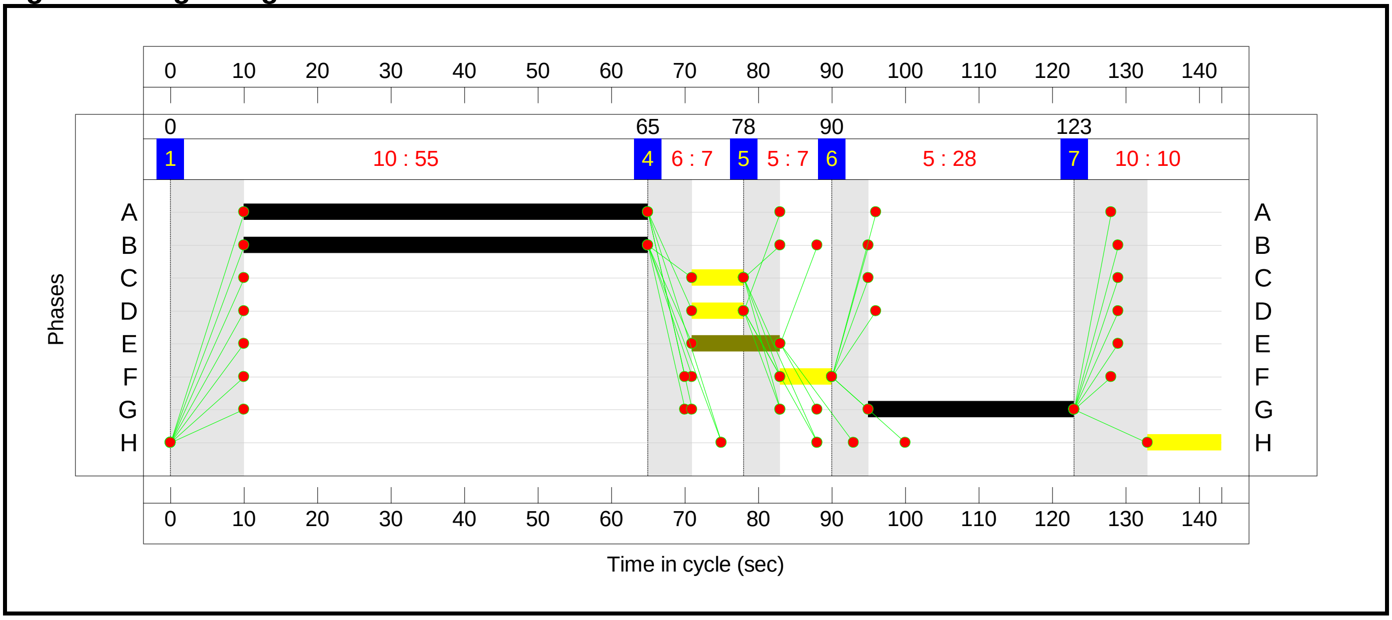
Stage Sequence Diagram



Stage Timings

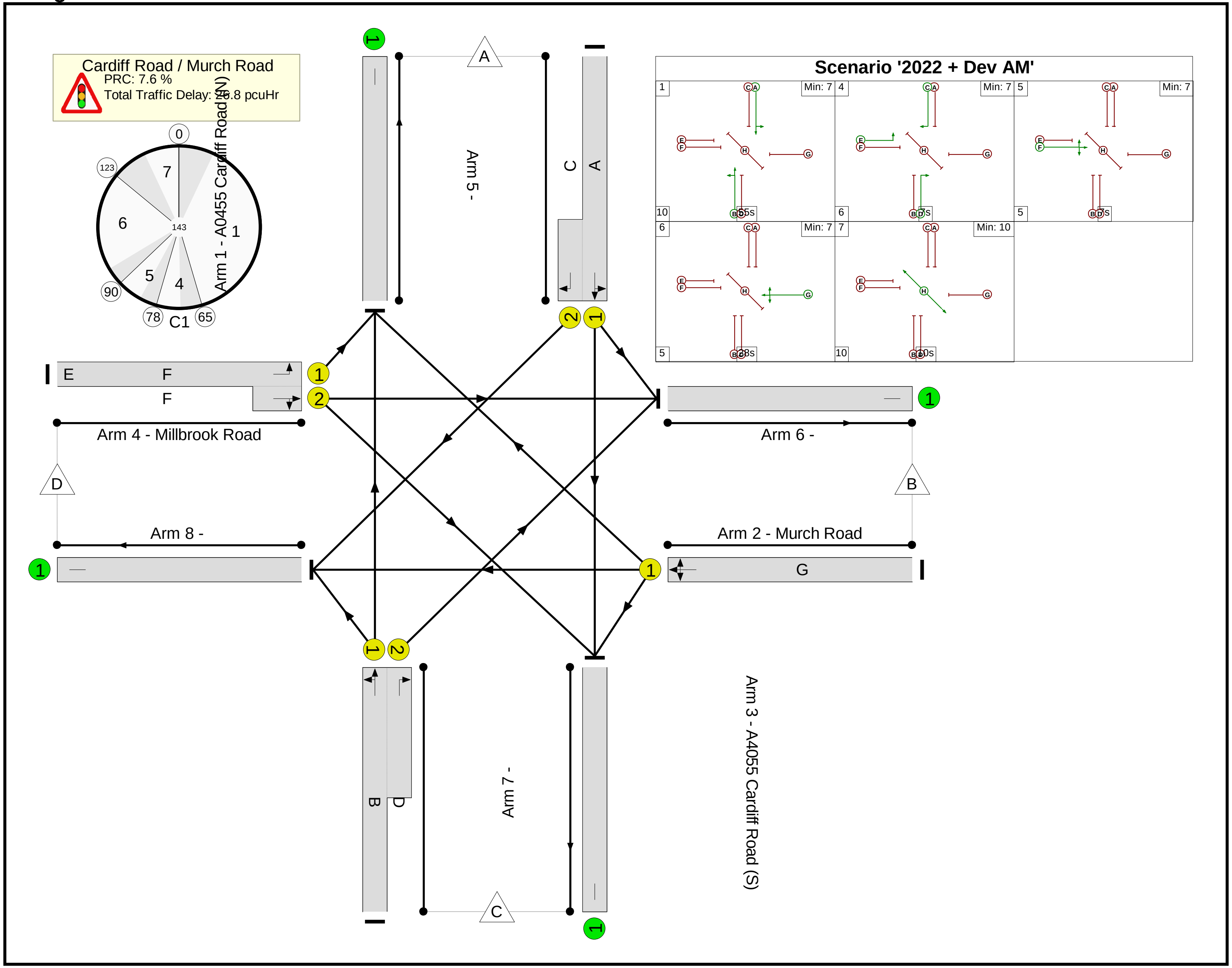
Stage	1	4	5	6	7
Duration	55	7	7	28	10
Change Point	0	65	78	90	123

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

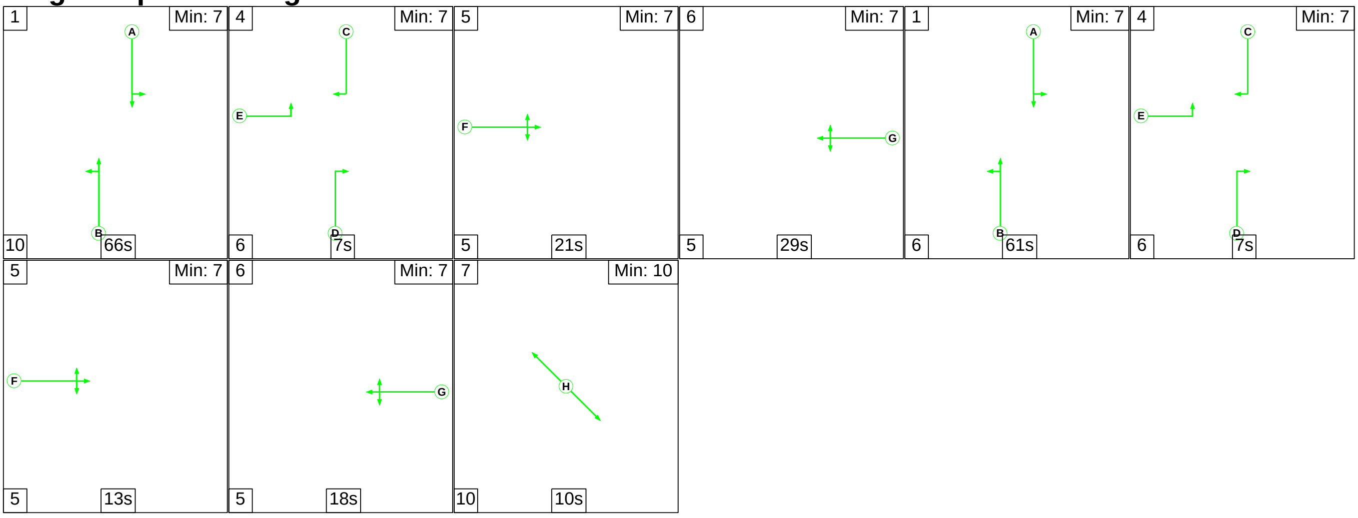
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**26.8**	**83.7%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**26.8**	**83.7%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		1	55:7	-	1856:1781	9.1	82.8 : 82.8%	54.4	23.5
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		1	28	-	1833	7.1	83.7%	82.2	14.2
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		1	55:7	-	1889:1702	6.8	70.5 : 70.5%	45.9	18.2
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	1	19:7	12	1730:1828	3.8	78.8 : 78.8%	111.2	4.4
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 7.6 Total Delay for Signalled Lanes (pcuHr): 26.77 Cycle Time (s): 143
PRC Over All Lanes (%): 7.6 Total Delay Over All Lanes(pcuHr): 26.77

Full Input Data And Results

Scenario 4: '2022 + Dev PM' (FG4: '2022 + Dev PM', Plan 2: 'Network Control Plan 2')

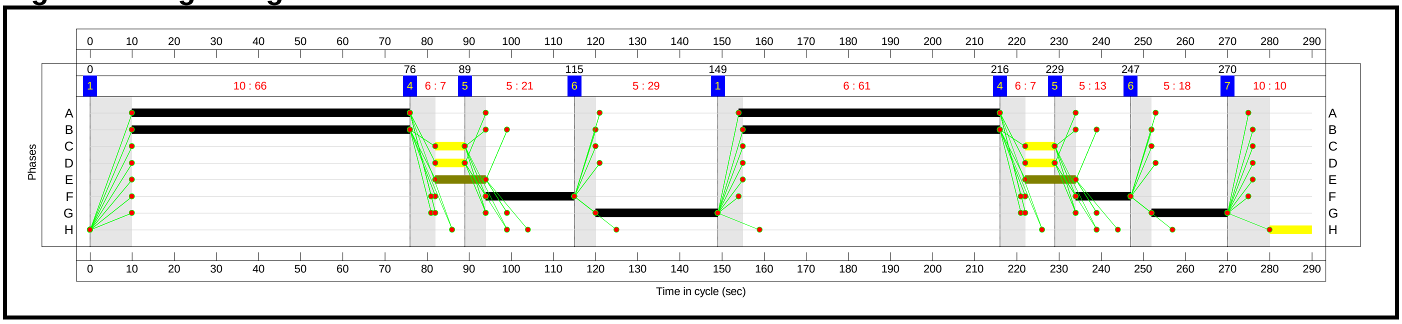
Stage Sequence Diagram



Stage Timings

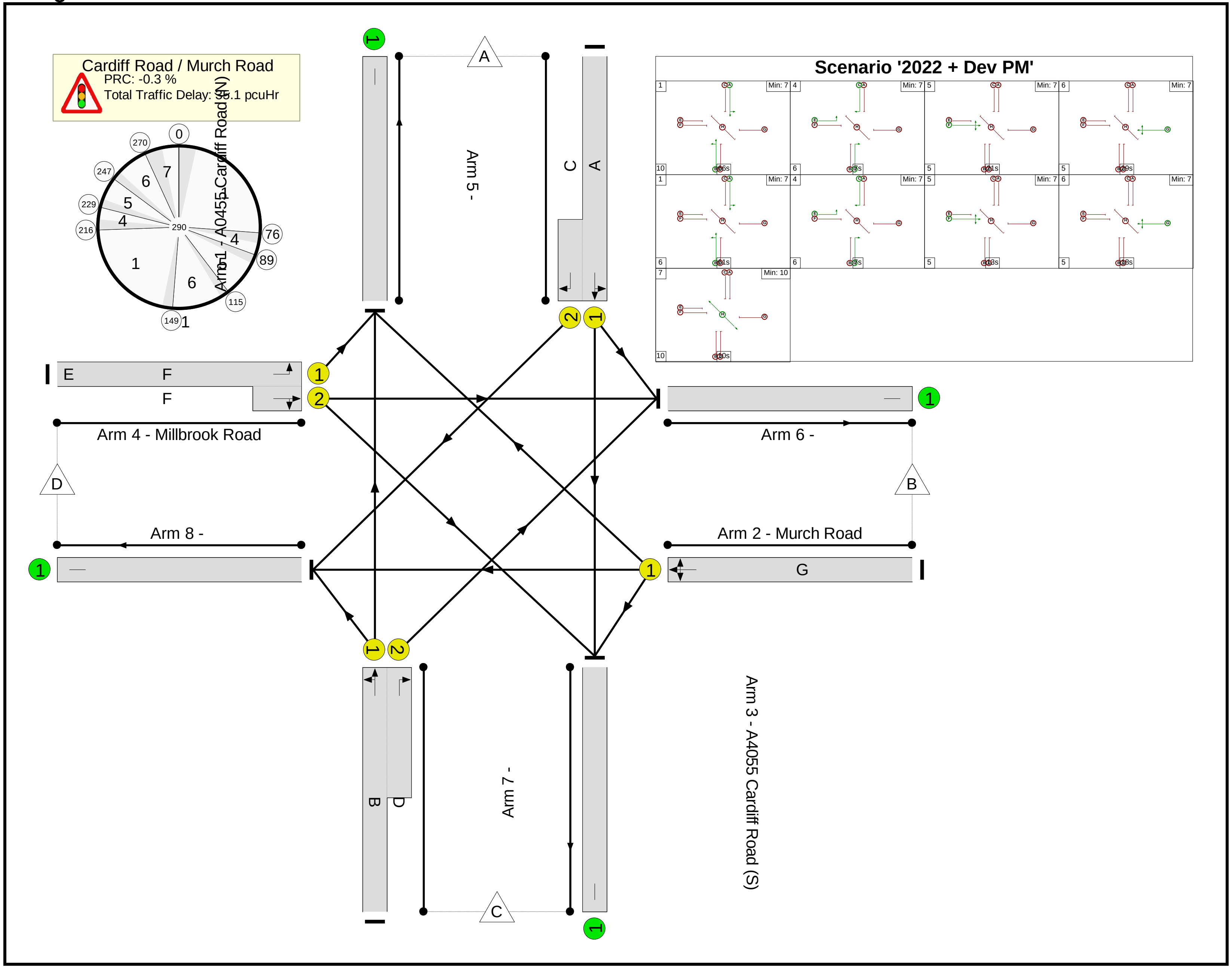
Stage	**1**	**4**	**5**	**6**	**1**	**4**	**5**	**6**	**7**
Duration	66	7	21	29	61	7	13	18	10
Change Point	0	76	89	115	149	216	229	247	270

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

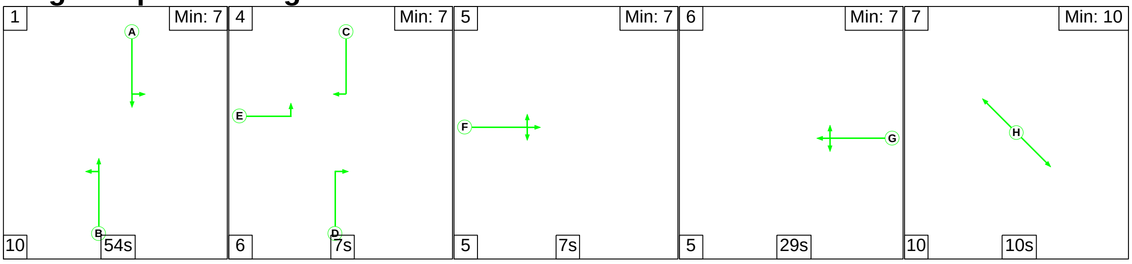
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**35.1**	**90.3%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**35.1**	**90.3%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		2	128:14	-	1843:1781	12.1	90.3 : 90.3%	58.4	32.9
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		2	47	-	1814	8.2	89.7%	107.0	16.0
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		2	127:14	-	1907:1702	8.0	75.2 : 75.2%	44.4	22.8
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	2	58:34	24	1730:1835	6.8	88.1 : 88.1%	109.8	11.3
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -0.3 Total Delay for Signalled Lanes (pcuHr): 35.12 Cycle Time (s): 290
PRC Over All Lanes (%): -0.3 Total Delay Over All Lanes(pcuHr): 35.12

Full Input Data And Results

Scenario 5: '2032 AM' (FG5: '2032 AM', Plan 1: 'Network Control Plan 1')

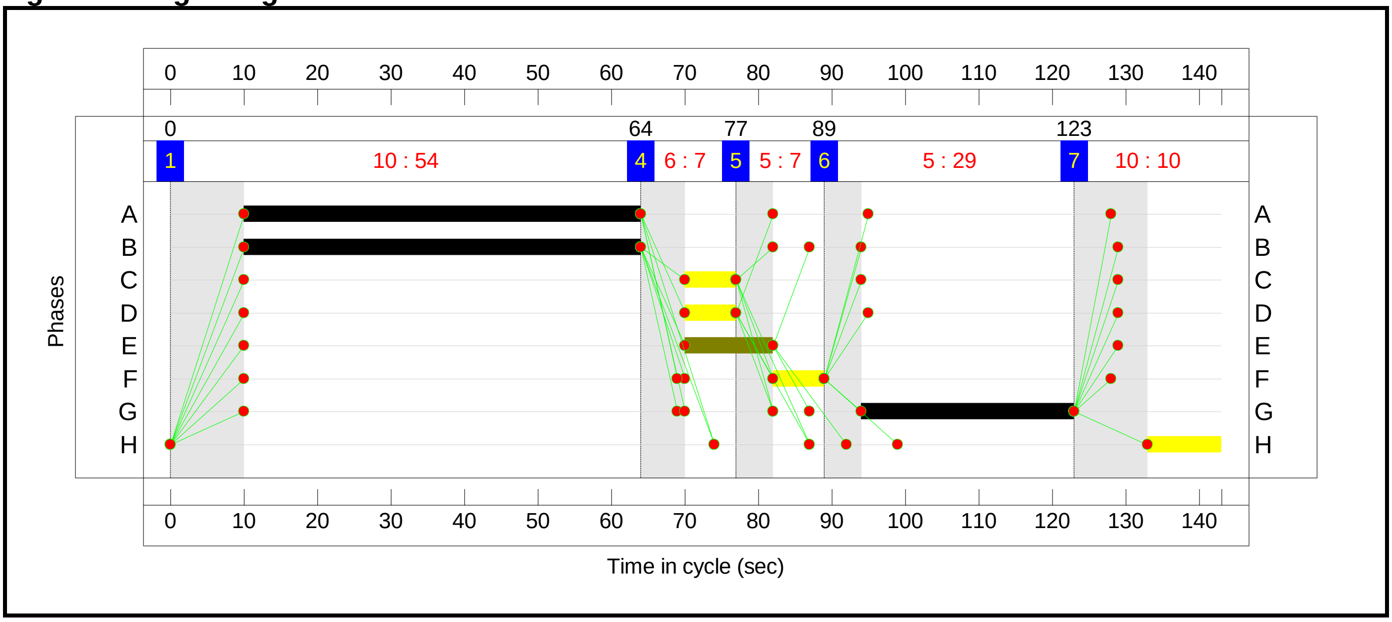
Stage Sequence Diagram



Stage Timings

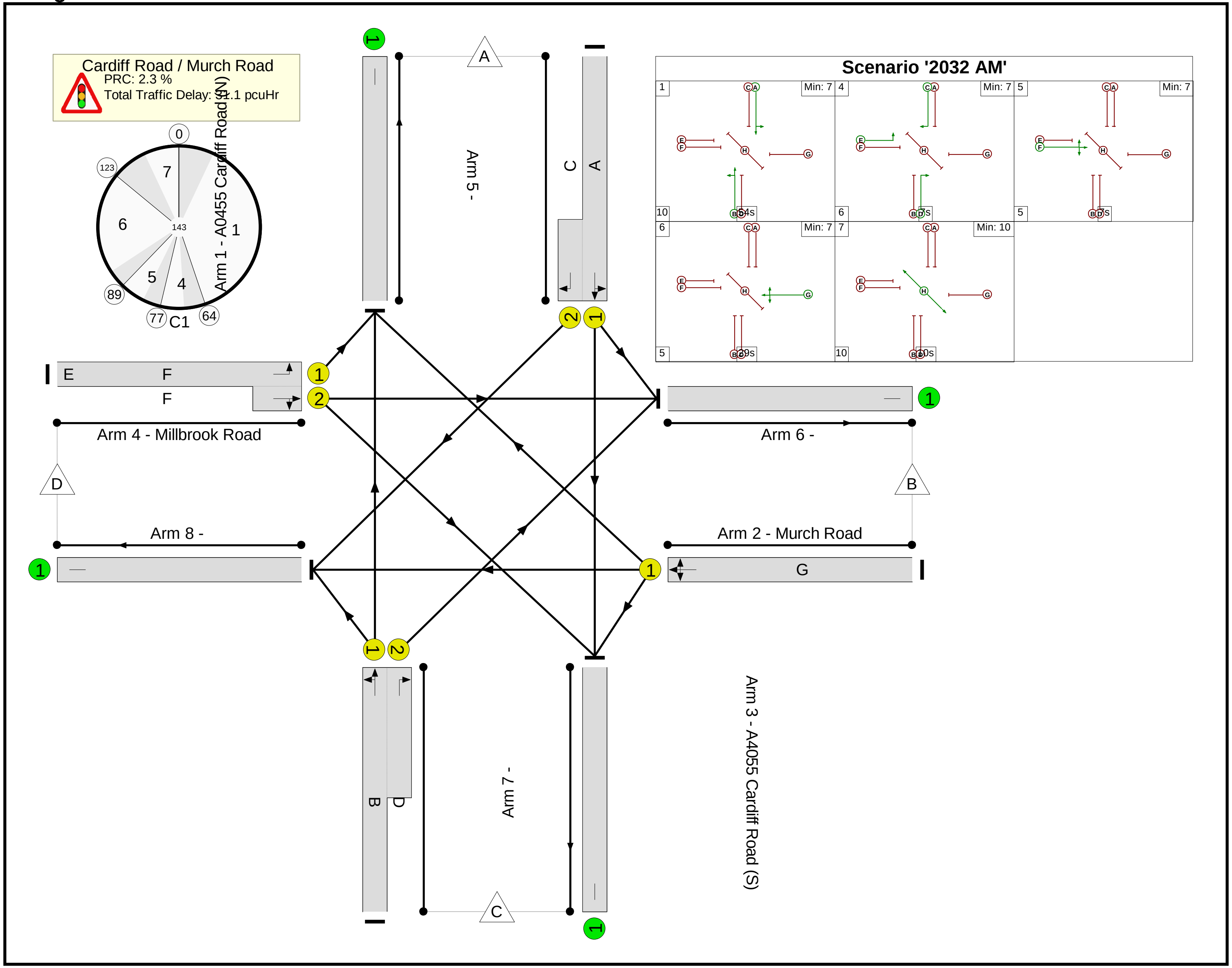
Stage	1	4	5	6	7
Duration	54	7	7	29	10
Change Point	0	64	77	89	123

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

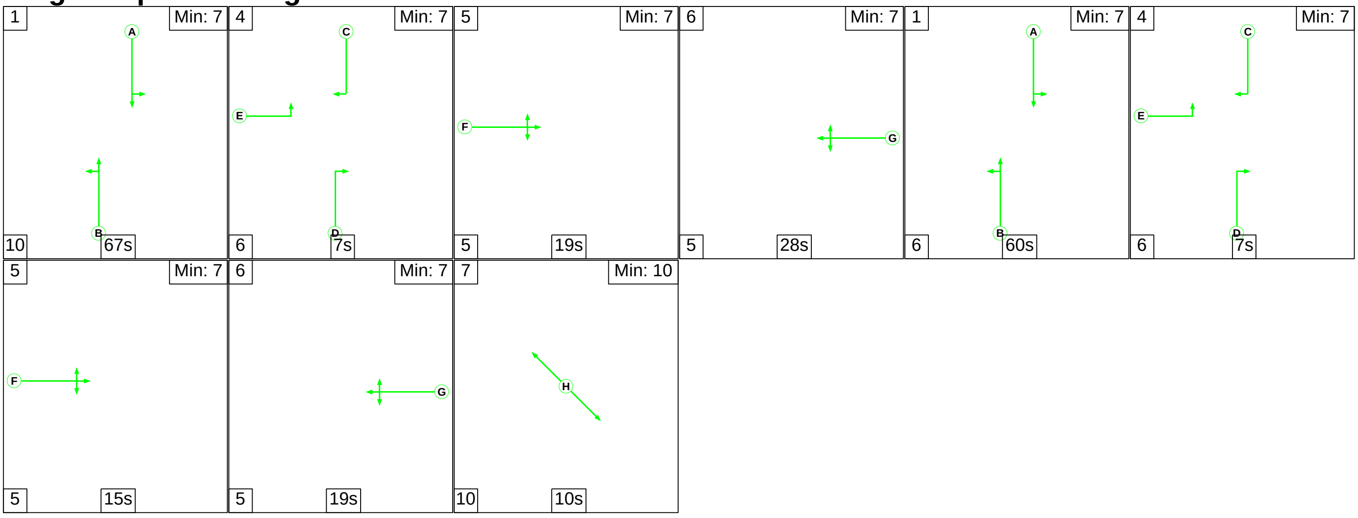
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**31.1**	**88.0%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**31.1**	**88.0%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		1	54:7	-	1855:1781	10.8	88.0 : 88.0%	61.6	26.2
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		1	29	-	1833	8.0	86.9%	86.5	15.8
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		1	54:7	-	1888:1702	7.8	76.4 : 76.4%	49.7	20.4
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	1	19:7	12	1730:1828	4.5	84.4 : 84.4%	124.2	5.2
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 2.3 Total Delay for Signalled Lanes (pcuHr): 31.12 Cycle Time (s): 143
PRC Over All Lanes (%): 2.3 Total Delay Over All Lanes(pcuHr): 31.12

Full Input Data And Results

Scenario 6: '2032 AM' (FG6: '2032 PM', Plan 2: 'Network Control Plan 2')

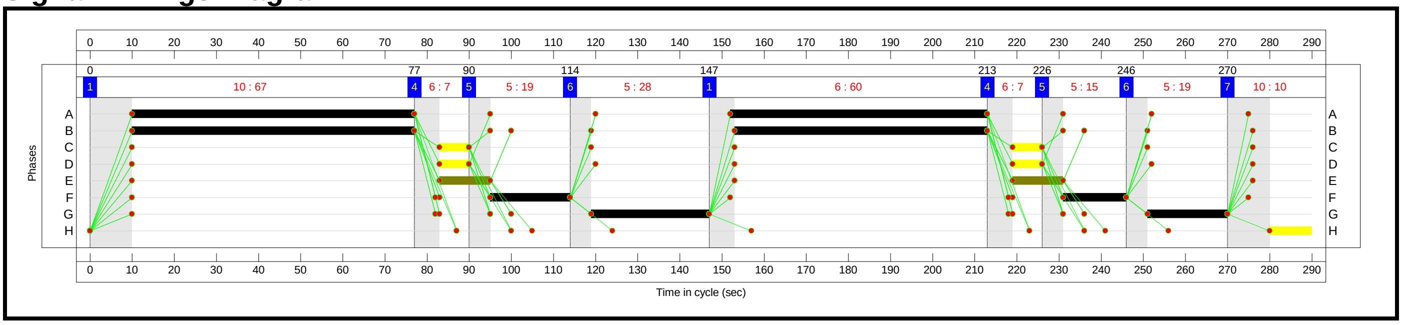
Stage Sequence Diagram



Stage Timings

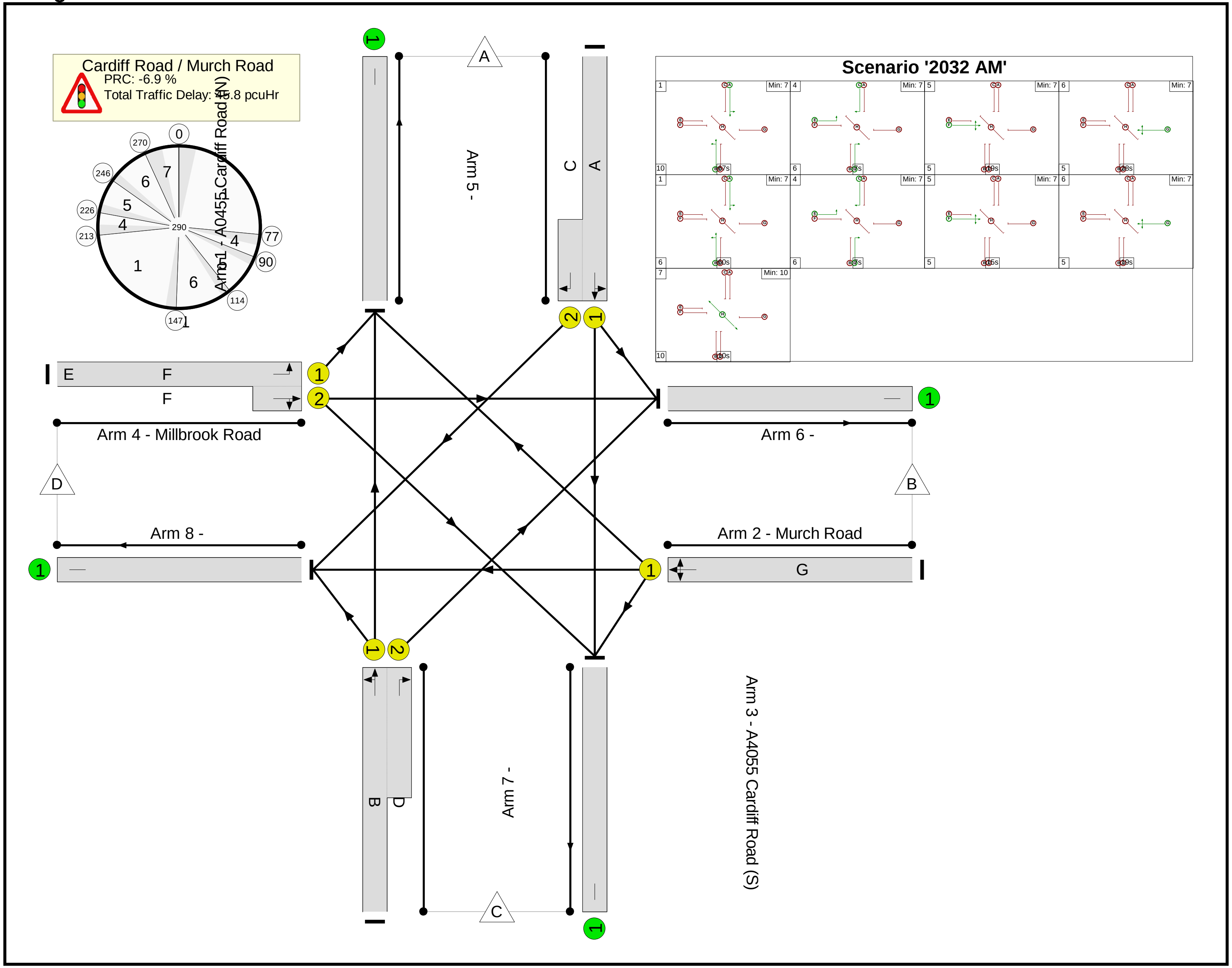
Stage	1	4	5	6	1	4	5	6	7
Duration	67	7	19	28	60	7	15	19	10
Change Point	0	77	90	114	147	213	226	246	270

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



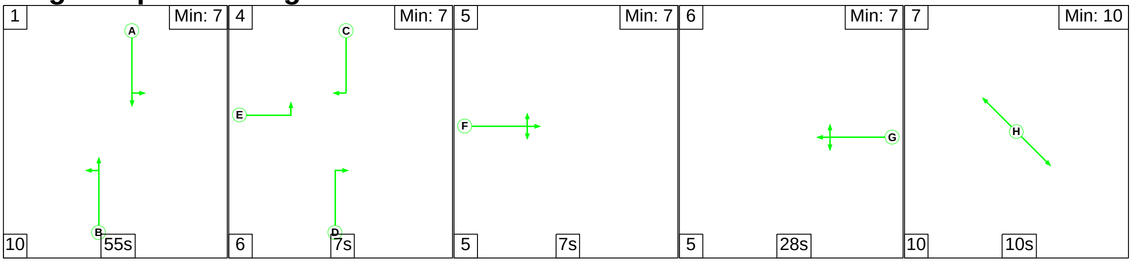
Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**45.8**	**96.2%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**45.8**	**96.2%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		2	128:14	-	1842:1781	16.7	95.9 : 95.9%	76.0	40.8
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		2	47	-	1814	11.2	96.2%	136.5	19.6
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		2	127:14	-	1907:1702	8.7	78.3 : 78.3%	46.4	25.5
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	2	58:34	24	1730:1835	9.2	94.8 : 94.8%	137.8	14.3
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -6.9 Total Delay for Signalled Lanes (pcuHr): 45.83 Cycle Time (s): 290
PRC Over All Lanes (%): -6.9 Total Delay Over All Lanes(pcuHr): 45.83

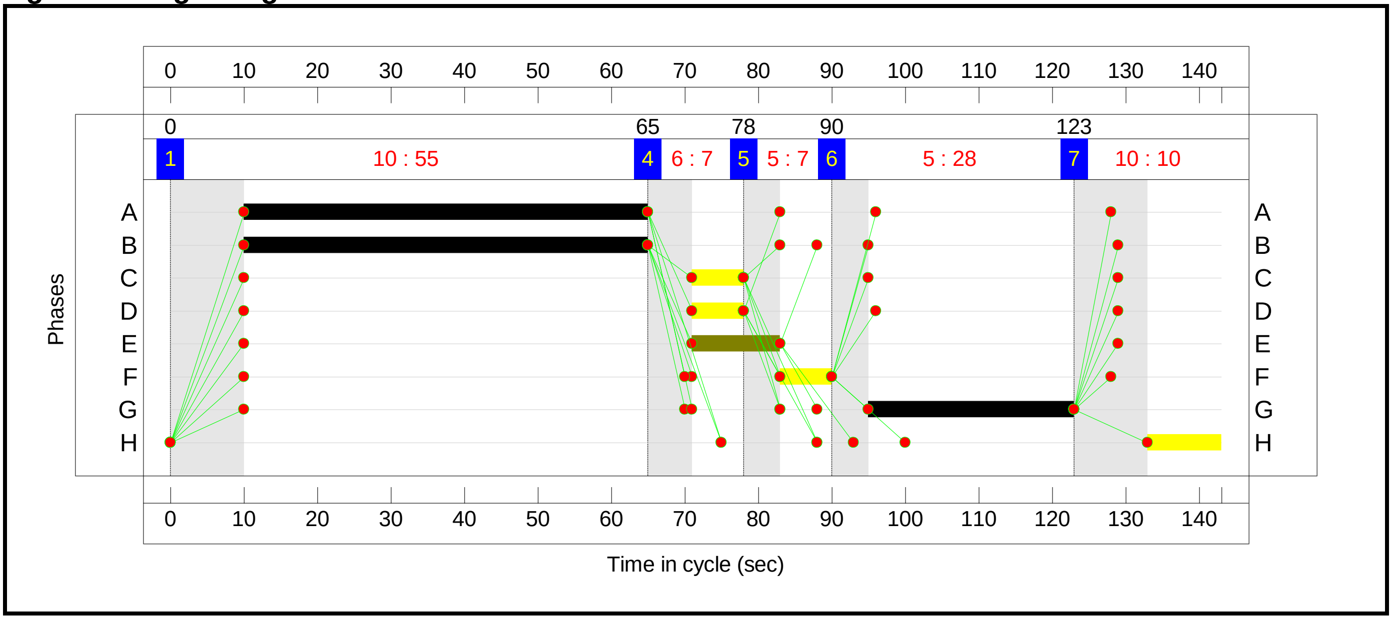
Full Input Data And Results
Scenario 7: '2032 + Dev AM' (FG7: '2032 + Dev AM', Plan 1: 'Network Control Plan 1')
Stage Sequence Diagram



Stage Timings

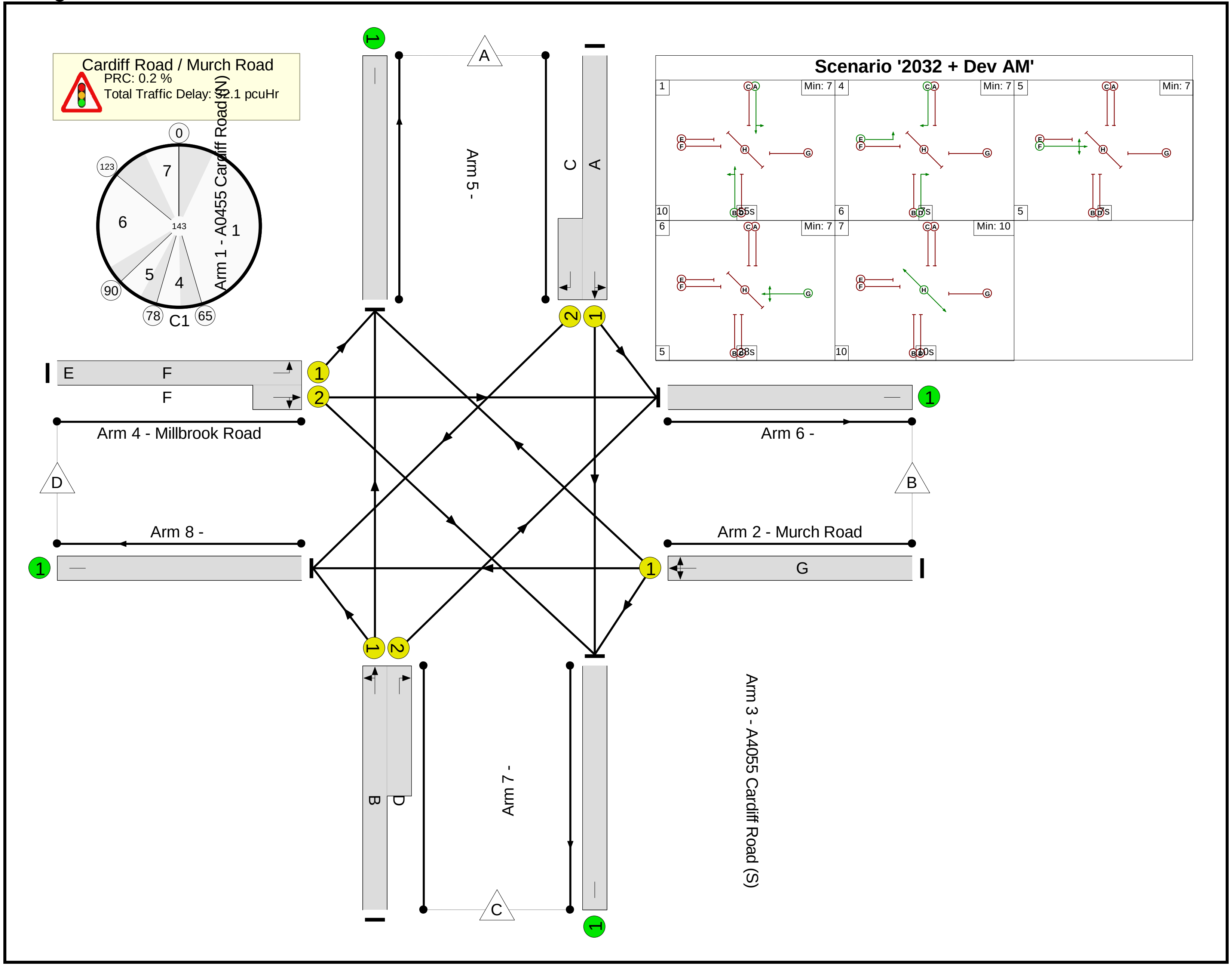
Stage	1	4	5	6	7
Duration	55	7	7	28	10
Change Point	0	65	78	90	123

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Network Results

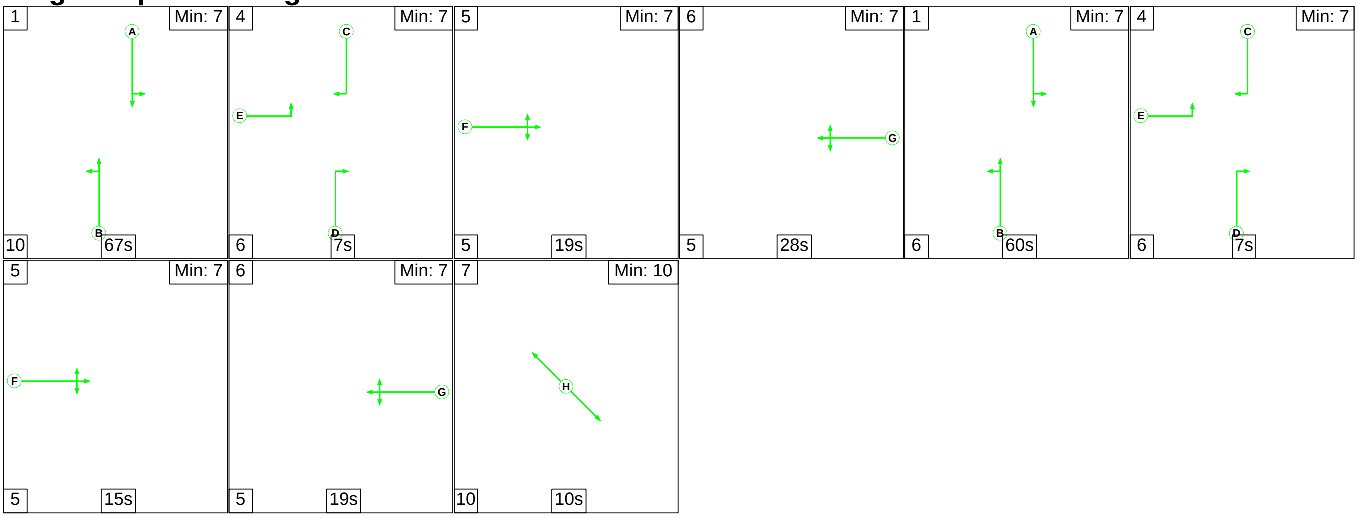
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**32.1**	**89.9%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**32.1**	**89.9%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		1	55:7	-	1856:1781	11.1	88.6 : 88.6%	61.7	27.1
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		1	28	-	1833	8.9	89.9%	95.5	16.6
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		1	55:7	-	1888:1702	7.7	75.6 : 75.6%	48.5	20.3
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	1	19:7	12	1730:1828	4.5	84.4 : 84.4%	124.2	5.2
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 0.2 Total Delay for Signalled Lanes (pcuHr): 32.12 Cycle Time (s): 143
PRC Over All Lanes (%): 0.2 Total Delay Over All Lanes(pcuHr): 32.12

Full Input Data And Results

Scenario 8: '2032 + Dev PM' (FG8: '2032 + Dev PM', Plan 2: 'Network Control Plan 2')

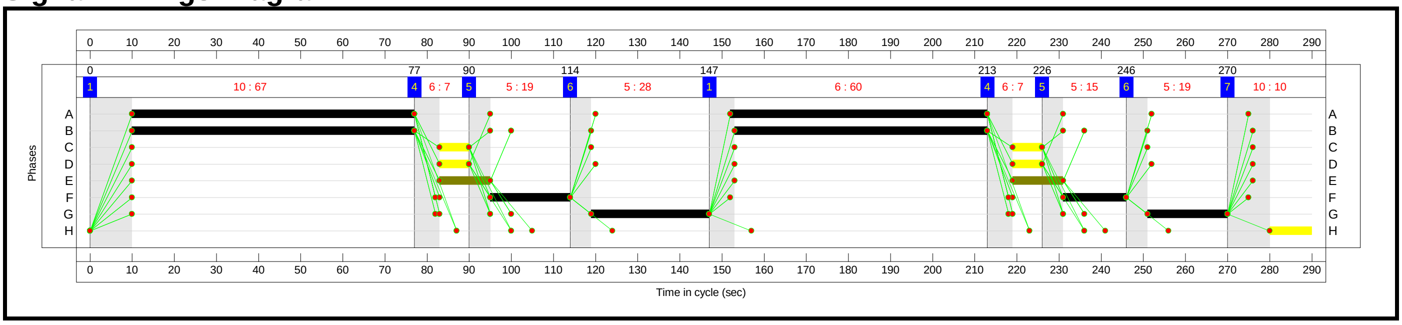
Stage Sequence Diagram



Stage Timings

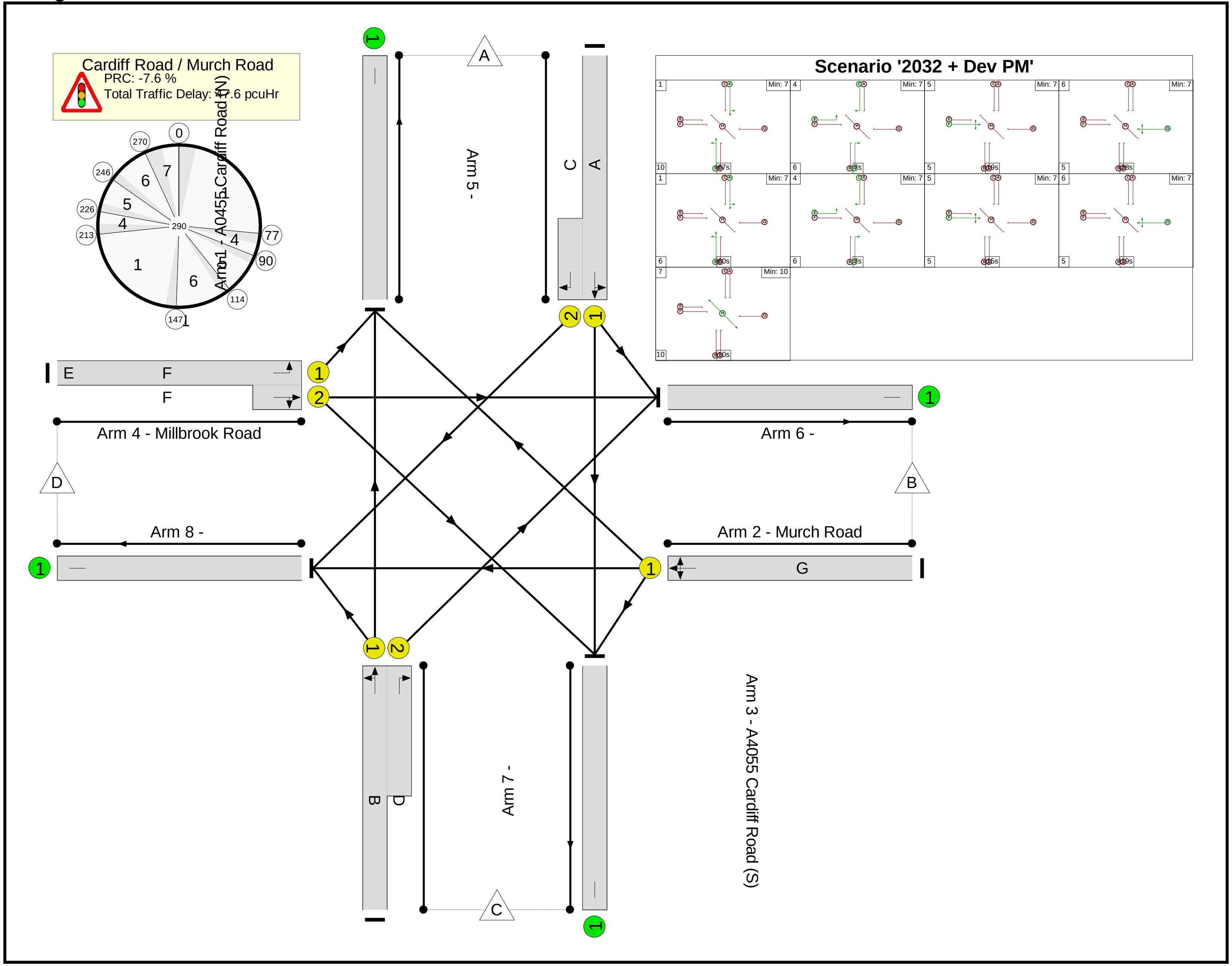
Stage	1	4	5	6	1	4	5	6	7
Duration	67	7	19	28	60	7	15	19	10
Change Point	0	77	90	114	147	213	226	246	270

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Sat Flow (pcu/Hr)	Total Delay (pcuHr)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**47.6**	**96.8%**	**-**	**-**
Cardiff Road / Murch Road	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**47.6**	**96.8%**	**-**	**-**
1/1+1/2	A0455 Cardiff Road (N) Left Ahead Right	U	N/A	N/A	A C		2	128:14	-	1843:1781	18.0	96.8 : 96.8%	80.8	42.4
2/1	Murch Road Right Left Ahead	U	N/A	N/A	G		2	47	-	1814	11.2	96.2%	136.5	19.6
3/1+3/2	A4055 Cardiff Road (S) Ahead Right Left	U	N/A	N/A	B D		2	127:14	-	1907:1702	9.2	80.5 : 80.5%	47.9	26.9
4/1+4/2	Millbrook Road Left Ahead Right	U	N/A	N/A	F	E	2	58:34	24	1730:1835	9.2	94.8 : 94.8%	137.8	14.3
5/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
6/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
7/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0
8/1		U	N/A	N/A	-		-	-	-	Inf	0.0	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): -7.6 Total Delay for Signalled Lanes (pcuHr): 47.59 Cycle Time (s): 290
PRC Over All Lanes (%): -7.6 Total Delay Over All Lanes(pcuHr): 47.59

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