

Meeting of:	<b>Cabinet</b>
Date of Meeting:	<b>Monday, 08 March 2021</b>
Relevant Scrutiny Committee:	Environment and Regeneration
Report Title:	Dinas Powys Transport Network WelTAG Stage Two Plus
Purpose of Report:	To update Cabinet on progress with the WelTAG Stage Two Plus Outline Business Case and make recommendations for the next steps.
Report Owner:	Cabinet Member for Neighbourhood Services and Transport
Responsible Officer:	Miles Punter - Director of Environment and Housing Services
Elected Member and Officer Consultation:	Cabinet Member for Neighbourhood Services and Transport Cabinet Member for Regeneration and Planning Head of Neighbourhood Services and Transport Group Manager Transport Services Passenger Transport Manager Operational Manager Engineering Accountant Environment and Housing Services Operational Manager Finance Head of Regeneration and Planning Legal Services (Committee Reports)
Policy Framework:	This report is a matter for Executive decision by Cabinet
<p>Executive Summary:</p> <ul style="list-style-type: none"> <li>This Report provides Cabinet with an update on progress of the Dinas Powys Transport Network WelTAG Stage Two Plus Outline Business Case study.</li> <li>The Stage Two plus study has been completed by technical consultants Arcadis Consulting Ltd and assessed the Do-minimum scenario plus four options in consideration of an enhanced transport network through the Dinas Powys transport corridor, including: Option A - Bypass – Green Route (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction)</li> </ul>	

Option B - Bypass – Pink Route (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction, inclusive of an interim roundabout near Murch Road)

Option C - Multi-modal

Option D - Bypass (Green Route) and Multi-modal

- It is recommended that the study is taken forward for completion of a 12-week statutory public consultation exercise during the 2021/22 financial year subject to funding being approved by Welsh Government for continuation of the work. The consultation would be undertaken prior to a decision being made to progress a preferred option to WelTAG Stage Three.
- On the basis of the current WelTAG Stage Two Plus study, it is considered that Option D has merit in being taken forward for further consideration at the next stage of assessment (subject to the completion of public consultation), based on the potential social, cultural and economic benefits and value for money identified.



## **Recommendations**

1. That progress made on the Dinas Powys Transport Network WelTAG Stage Two Plus study is noted.
2. That subject to Welsh Government providing Local Transport Grant Funding in 2021/22, the project is taken forward for completion of a 12-week statutory public consultation exercise prior to a decision being taken by the Vale of Glamorgan Council to progress to a WelTAG Stage Three study.
3. That this matter is considered by the Environment and Regeneration Scrutiny Committee.

## **Reasons for Recommendations**

1. To update members on progress made on the scheme.
2. A transport grant submission has been made to Welsh Government for 2021/22 to allow for public consultation on the WelTAG Stage Two Plus report in line with WelTAG (2017) guidance. Following that consideration by the Vale of Glamorgan Council to determine whether to go forward to Stage Three with the recommended option.
3. To allow consideration of the matter by the relevant Scrutiny Committee.

## **1. Background**

- 1.1 Arcadis Consulting (UK) Limited ('Arcadis') was commissioned by the Vale of Glamorgan Council to develop and appraise potential options for improving the transport network encompassing corridors from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The appraisal of options has been undertaken in accordance with the Welsh Government's latest version of WelTAG (December 2017) including advice on the appraisal in relation to the Future Generations of Wales (2015) Act Well-being Goals.
- 1.2 The WelTAG Stage One report was previously completed by Arcadis and considered the problems, opportunities and constraints, established objectives and appraised a long list of options. Two options were recommended to be taken forward for WelTAG Stage Two appraisal against the Do-minimum scenario, namely proposals for a new bypass to the east of Dinas Powys and a multi-modal option encompassing interventions for an enhanced sustainable transport network.
- 1.3 An additional option representing a combined bypass and multi-modal option was included for further consideration following recommendations made by the Council's Environment and Regeneration Scrutiny Committee on 14th September 2017. The following options for assessment at Stage Two were endorsed by the Vale of Glamorgan Cabinet on 9th October 2017:

- Do-minimum
- Do-something Option - Bypass
- Do-something Option - Multi-modal
- Do-something Option - Bypass and Multi-modal

**1.4** In addition to Arcadis' WelTAG Stage Two commission to assess the three proposed Do-something options, an extension to the project scope was confirmed by the Vale of Glamorgan Council following a request by Dinas Powys Community Council to assess an alignment connecting from south of the Merrie Harrier junction to the junction of Sully Moors Road and Hayes Road (as opposed to connecting to the A4055 at a point south of Dinas Powys).

**1.5** Following consideration of the options and the development of the Stage Two designs, the following Do-something options were defined for assessment:

- Bypass: Green Alignment (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction).
- Bypass: Pink Alignment (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction, inclusive of an interim roundabout near Murch Road).
- Bypass: Blue Alignment (east and south of Dinas Powys, interconnecting between the A4055 at Merrie Harrier and the B4267 Sully Moors Road/ Hayes Road roundabout).
- Multi-modal.
- Bypass (Green Alignment) and Multi-modal.

**1.6** A draft WelTAG Stage Two report (10015022-ARC-XX-XX-RP-TP-0001) was prepared by Arcadis and presented to the project Review Group on 2nd October 2018. Following consideration of that Report's output, several recommendations were agreed for undertaking in a Stage Two Plus study, including:

- Engagement with Network Rail to understand the constraints and potential costs associated with the construction of a bypass and junction in the vicinity of the railway tunnel.
- Undertake concept design, modelling and costing of suggested improvements to the Merrie Harrier junction to improve capacity.
- Commission strategic traffic modelling of the bypass proposals using the South East Wales Transport Model (SEWTM).
- Consider costs in context of the bypass scheme (Green route) and update the economic appraisal for the Green route.

**1.7** Further to the decision of Cabinet on 15th April 2019 (including the removal of the Blue alignment from the analysis), the WelTAG Stage Two Plus study has subsequently considered the following options in comparison to the Do-minimum scenario:

- Option A: Bypass – Green Route
- Option B: Bypass – Pink Route
- Option C: Multi-modal
- Option D: Bypass (Green Route) and Multi-modal

**1.8** The study has been undertaken in conjunction with the Vale of Glamorgan Council with detailed evidence, data and analysis provided in the accompanying Impacts Assessment Report (10033783-ARC-XX-XX-RP-TP-0002).

## **2. Key Issues for Consideration**

**2.1** The WelTAG Stage Two Plus Outline Business Case study has taken forward and appraised the options in relation to the Five Case Business Model: the strategic, transport, management, financial and commercial cases (Appendix A refers).

**2.2** The WelTAG process for this study is accompanied by an Impact Assessment Report (IAR) (Appendix B refers). Its purpose is to provide a permanent record of the appraisal work on the proposed transport interventions and contains the detailed evidence behind the summary of information provided to decision makers in the Stage reports. The IAR remains a live document for updating throughout the process.

**2.3** The problems within the existing transport corridor have been identified as follows:

Ref	PROBLEMS
1	Poor quality bus stops with limited facilities.
2	Poor interchange facilities at railway stations (including poor parking opportunities).
3	Overcrowding on peak rail services.
4	Overcrowding on peak bus services.
5	Poor infrastructure and local connectivity by walking and cycling.
6	A4055 creating severance within the community (e.g., access to schools and other facilities/ services).
7	High local traffic flows leading to congestion, capacity issues at junctions, environmental impacts (air quality and noise pollution) and unreliable journey times.
8	High use of the car for local and regional trips (e.g., journeys to work).
9	Occurrence of accidents along key strategic routes, especially the A4055.
10	Residential land use development within Vale of Glamorgan will compound existing traffic issues and increase pressure on public transport services.

- 2.4** The objectives as set out below were set for the study in order to address the problems, opportunities and constraints. These were accompanied in the main report by details of what success would look like and how it would be measured:

Ref	OBJECTIVES
1	Support Sustainable Connectivity in the Cardiff Capital Region
2	Facilitate and Support Economic Growth
3	Improving Health and Wellbeing
4	Improved Safety and Security
5	Benefits and Minimised Impacts on the Environment

- 2.5** The objectives have been verified to determine how they contribute towards resolving problems of the study area, the Well-being of Future Generations Act Well-being Goals, the Wales Transport Strategy outcomes, the Welsh Government's Strategic Priorities as set out in the Wales Transport Strategy, and the Economic Action Plan Priorities.

#### STRATEGIC CASE

- 2.6** For the Strategic Case (Outline Business Case; Chapter 2), the options have been assessed in terms of how each would tackle the identified problems, to what extent it meets the objectives, including contributing to local, regional and national well-being objectives, as well as key risks, adverse impacts, constraints and dependencies. The Well-Being goals have been assessed using the framework provided, as guidance to supplement WelTAG. The impacts of the Do-minimum scenario are also set out compared to the Base Year situation.
- 2.7** Overall, the Do-minimum option is considered to have an adverse effect at meeting the objectives, due to the modest levels of funding currently able to be invested in transport infrastructure and public transport services. It assumes that background increases in population and traffic growth exceed investment provision to mitigate increasing impacts and pressure on the existing transport network. It should be noted that policies and programmes are in place to facilitate improved transport services but limited funding means that beneficial enhancements are currently difficult to achieve.
- 2.8** If a bypass is delivered (Option A or Option B), the existing adverse impact of road traffic specifically through Dinas Powys could be reduced. The forecast reduction in traffic is anticipated to alleviate congestion and capacity issues at sensitive junctions within Dinas Powys with potential for improved local journey times and reliability (notably reducing delay at the Murch Road junction); reduce local issues within Dinas Powys associated with air quality and noise pollution; mitigate road safety concerns with the potential for a reduction in the number of local accidents on the existing corridor; reduce severance within the community with improved crossing opportunity for pedestrians and cyclists; and allow greater assimilation of new vehicle trips associated with future residential development within Dinas Powys.

- 2.9** However, improving capacity of the local highway network is likely to strengthen dependence on the private car by making local journeys by private vehicles more attractive and reliable, and whilst a new bypass establishes broadly positive impacts for supporting sustainable connectivity in the Cardiff Capital Region (active travel route and public transport connectivity) and facilitating economic growth, adverse impacts are identified with regard to the environment and regional road safety considerations.
- 2.10** It should be noted that the proposed bypass would not only improve vehicular connections but also active travel connectivity between Cardiff and Barry. The current active travel proposal from Biglis roundabout in Barry to Dinas Powys has been on the Council's integrated network proposals since 2017 and is one of the most requested links in the Vale of Glamorgan. Potentially any new road with active travel infrastructure could negate the need for this link – primarily as most people actively travelling along any proposed route would be doing so to get from Barry to Cardiff and back again. Reduced traffic flow through Dinas Powys (as a consequence of the proposed bypass) could further facilitate improved conditions to support travel by sustainable modes of transport, subject to further consideration of opportunities at the next stage of assessment.
- 2.11** Through delivering enhancements to both services and infrastructure, the multi-modal package (Option C) has the potential to make public transport services more attractive and less complex with greater integration, reducing the dependency on the private car and enabling those without a car to access key services and employment more readily.
- 2.12** Greater regional assimilation to the Cardiff Capital Region could help improve access to employment and services and enable a greater number of people access to key centres containing key services. The extent to which improvements bring benefits is dependent on the wider context of Metro improvements and journey times for buses on the wider network. Moreover, without improvements to the local road network to improve journey times, ongoing congestion issues are anticipated to continue to impact on buses, walkers and cyclists.
- 2.13** With regard to scheme's objectives, the delivery of an enhanced public transport services and infrastructure would promote an improved level of accessibility to key destinations, employment and services. The low number of existing users of sustainable modes does present a challenge to deriving significant mode transfer from car to sustainable travel. The delivery of walking and cycling improvements would have a moderate beneficial impact on health and well-being, as well as improving journey time reliability and providing enhanced public transport provision has the potential to have a beneficial impact on the environment by encouraging some to use more sustainable modes of travel.
- 2.14** A combined bypass and multi-modal option has the potential to establish a comprehensive transport scheme for Dinas Powys with wider benefit to the immediate surrounding areas (Option D). The combining of sustainable measures

throughout the two options could support robust sustainable connectivity in the Cardiff Capital Region. A moderate beneficial score is however retained as improved highway connectivity could make travel by car more attractive and therefore reduce the desirability of public transport locally and regionally.

- 2.15** The journey time and capacity improvements from the bypass would assist public transport and walking and cycling movements through and within Dinas Powys by reducing general traffic volumes. The benefits identified for the economic appraisal have been noted. A moderate score is retained as benefits are not considered to establish a wider strategic impact throughout the south east Wales region with benefits more applicable to Dinas Powys and the immediate surrounding urban areas, most notably Barry.
- 2.16** In light of the neutral impact recognised for the bypass option in isolation, the extensive health and well-being benefits realised as part of the multi-modal option have subsequently been carried forward to the combined option. Whilst a new highway/ bypass designed to current DMRB standards has the potential to enhance safety and security on the local highway network, a strategic economic review of accidents based on SEWTM traffic flows has identified the potential for additional costs associated with the implementation of a bypass. Full economic details are included within Chapter 4 which identifies a cost of £4.33M. The added benefits recognised as part of a multi-modal option have however also been considered to establish an overall neutral score. A neutral impact on the environment was considered applicable for the multi-modal option, the adverse impacts resulting from a new bypass, both in the short (construction) and long (operational) term have been applied to the combined option.

#### TRANSPORT CASE

- 2.17** The four Do-something options have been tested alongside the Do-minimum option as part of the Transport Case (Outline Business Case; Chapter 3). The aim of the Transport Case is to explain the expected impacts of the project, how the project will contribute to the well-being goals and whether a project will provide value for public money. The social, cultural, environmental and economic costs and benefits of each option are considered.
- 2.18** The summary table of impacts across social, cultural, environmental, and economic criteria illustrates that the two bypass options perform the same across all aspects of the appraisal, aside from journey time changes with the interim roundabout included as part of the Pink route. The multi-modal option has less of an adverse environmental impact than the bypass options, whilst all four options present relatively positive social and economic benefits excluding the adverse impacts noted for land and property. The combined bypass (Green route) and multi-modal intervention (Option D) appears to demonstrate the greatest benefits of the four options when assessed against the Do-minimum scenario. The benefits and disbenefits noted for both options separately are brought forward to this combined option.

- 2.19** In terms of the economic appraisal and value for money assessment, the Green route produces a total Present Value of Benefit (PVB) of £63.17M over the 60-year analysis period and a cost of £31.37M. This results in a Net Present Value of £31.80M and an estimated Benefit Cost Ratio of 2.01. This suggests that the scheme could represent high value for money.
- 2.20** The sensitivity test results (which takes into account emerging Covid-19 impacts) show that the Green route produces a total PVB of £53.55M and a cost of £31.37M. This results in a Net Present Value of £22.18M and an initial Benefit Cost Ratio of 1.71. This suggests that the scheme would represent medium value for money. Thus, taking into account recent forecast changes results in a reduced BCR, but still representing medium value for money.
- 2.21** These results do not reflect the qualitative and quantitative information such as reliability and wider economic impacts, which contribute to the calculation of the Adjusted Benefit Cost Ratio and may increase the Value for Money of the scheme further. A full business case would be needed at WelTAG Stage Three to further consider the economic impact of the scheme.

#### FINANCIAL, COMMERCIAL AND MANAGEMENT CASES

- 2.22** In addition, the WelTAG Stage Two report has set out the anticipated financial (Chapter 4), commercial (Chapter 5) and management (Chapter 6) cases, all of which will require further consultation with key stakeholders as the WelTAG assessment evolves into the next stages of appraisal.

#### CONCLUSION

- 2.23** On the basis of the appraisal of options, it is considered that Option D (Green Route and Multi-modal) has merit in being taken forward for further consideration in a Stage Three WelTAG, given the option more comprehensively addresses the issues identified, can contribute positively to well-being goals and objectives and pending further investigations, is likely to be deliverable within technical and financial constraints.
- 2.24** Whilst the Green route has been formally assessed as part of Option D and the option represents the greatest potential for improved journey times (as it would have limited junctions in comparison to the Pink route), the Pink route offers the opportunity to improve connectivity through providing an additional roundabout interconnecting with Murch Road. It may offer longer term strategic benefits, subject to further consultation to determine the most appropriate way forward. Should there be a preference for the Pink route as a preferred way forward for Option D, it would be recommended that additional traffic modelling is completed as part of an early Stage Three WelTAG task to further understand the impacts on the local and strategic (using SEWTM) highway network, including connectivity along Murch Road to its junction with the A4055.

- 2.25** Whilst the option does offer benefits to the Dinas Powys transport network, key junctions will continue to pose a strategic constraint (notably at the Barons Court junction), negating the benefits of journey time savings through Dinas Powys.
- 2.26** It is noted that the climate emergencies introduced by Welsh Government and the Council will be one of several influencing factors in determining the next steps, especially with regard to proposals for a new bypass. Whilst a slight beneficial impact on greenhouse gasses was considered applicable for the option, an Environmental Impact Assessment including completion of a sustainability appraisal would be required at WelTAG Stage Three to fully understand the impacts of the option on greenhouse gas emissions, both in the short (construction) and long (operational) term.
- 2.27** In addition, a bypass for Dinas Powys is not currently included in any funding programme for the Vale of Glamorgan Council or the Welsh Government. Future funding uncertainties are a key risk particularly given public resources as a result of the Covid-19 pandemic. It is anticipated that any proposal would need to demonstrate regional/ national value against other large-scale transport schemes.
- 2.28** The next key step would be for a 12-week public consultation to take place on the WelTAG Stage Two Plus Outline Business Case in order for feedback to be given on the options. The potential for public consultation on the WelTAG Stage Two Plus study is subject to funding approval by Welsh Government and endorsement of the next steps by the Council. This important point is reflected in recommendation 2 and it is important to reference that any progress on this scheme is dependent on successful grant bids to Welsh Government.
- 2.29** A decision on whether to then go forward with the recommended option to a Stage Three assessment is a matter for Council when considering the recommendations of the Review Group based on the appraisal set out in this report and feedback received following completion of a public consultation exercise.

### **3. How do proposals evidence the Five Ways of Working and contribute to our Well-being Objectives?**

- 3.1** The introduction of the WelTAG report sets out an overview of how the approach and proposals of the appraisal evidence the Five Ways of Working and support the seven Well-being goals set out in the Future Generations of Wales Act 2015. The WelTAG guidance states it is required 'to ensure the needs of future generations are considered and understand how well they help public bodies to meet the well-being objectives and maximise their contribution to each of the seven goals.' Consideration should be given to long-term challenges, trends, opportunities, as well as integration, collaboration, involvement and preventing problems from occurring or getting worse.



## Long Term

- 3.2** The Impacts Assessment Report provides the evidence of both current and future problems, trends and opportunities to inform consideration of the long-term perspective and the development of options. This includes consideration of the existing traffic and transport conditions associated with the Dinas Powys transport corridor and the subsequent appraisal of impacts associated with the economy, access to education, jobs and services, health and the environment (notably air quality and noise impacts).
- 3.3** Current traffic congestion and connectivity issues are anticipated to be exacerbated in the future with traffic growth as well as new developments. The options considered in the outline business case offer long-term solutions to address the existing issues, including consideration of the existing highway network to facilitate longer term connectivity enhancements (including design appraisal of the Merrie Harrier junction, for example).

## Prevention

- 3.4** The options under consideration offer the opportunity to prevent/ alleviate as far as possible the future problems and trends from occurring, through the enhancement of the local and strategic highway network. Moreover, the commercial, financial and management cases seek to identify costs and deliverability risks to aid decision making and prevent long-term liabilities for public money by considering all of the issues at the outset.

## Integration

- 3.5** The options under consideration involve the integration of active travel as part of the local and strategic highway network, as well as supporting the potential for enhanced integration with public transport services and facilities as the highway network is enhanced. The WelTAG study has been undertaken in an integrated manner to consider and take account of other schemes and proposals through discussion with stakeholders.

## Collaboration

- 3.6** In undertaking the WelTAG study, there has been collaboration between departments within the local authority and Welsh Government, as well as between stakeholders and Arcadis.

## Involvement

- 3.7** A public consultation was completed at WelTAG Stage One, as well as stakeholder workshops undertaken as part of the Stage One and Stage Two studies. The potential for further public consultation on the WelTAG Stage Two Plus study is subject to funding approval and endorsement of the next steps by

the Vale of Glamorgan Council. A technical review group for the Stage 2 plus study was held on 14th January 2021 and as a result of that meeting a revised version of the study was produced. A copy of these minutes is attached at Appendix C.

#### Well-being Goals

- 3.8** The objectives have been developed through consideration of the well-being goals and this is presented in the strategic case section. The strategic case also considers how each of the options meets the well-being goals. Together this seeks to ensure that achieving the well-being goals are at the centre of the setting of objectives for the study and the emerging interventions.

## **4. Resources and Legal Considerations**

### **Financial**

- 4.1** The study has been financed by Council funding.
- 4.2** The total WelTAG Stage Two Plus value to date is £39,115.65 (excluding VAT).

### **Employment**

- 4.3** Consultants Arcadis Consulting (UK) Ltd have been commissioned to undertake the technical work on this Project as the technical skills required to do so are not available within the Vale of Glamorgan Council.

### **Legal (Including Equalities)**

- 4.4** The appraisal of options has been undertaken in accordance with Welsh Government's latest version of WelTAG (December 2017) including advice on the appraisal in relation to the Well-being goals set out in the Well-being of the Future Generations (Wales) Act 2015.
- 4.5** The Vale of Glamorgan Local Development Plan (2017) was adopted by the Council on the 28th June 2017, which sets out the vision, objectives, strategy and policies for managing development in the Vale of Glamorgan. It also seeks to identify the infrastructure that will be required to meet anticipated growth in the Vale of Glamorgan area up to 2026. The LDP states that priority will be given to schemes that improve highway safety, accessibility, public transport, walking and cycling. The LDP's of the neighbouring Authorities of Bridgend, Cardiff and Rhondda Cynon Taff have also been noted.
- 4.6** The Vale of Glamorgan Local Transport Plan (2015) acknowledges the requirement for a collaborative approach for the future development of the Capital Region. The LTP seeks to identify the sustainable transport measures required to ensure Vale of Glamorgan Council adheres to current requirements and good practice, to allow for a sustainable transport environment for the period 2015 to 2020, as well as looking forward to 2030. The plan therefore

seeks to secure better conditions for pedestrians, cyclists and public transport users and to encourage a modal shift away from the single occupancy car.

- 4.7** The provision of a well organised transport network helps to increase mobility and accessibility.

## **5. Background Papers**

None.

# DINAS POWYS TRANSPORT NETWORK

WelTAG Stage Two Plus | Outline Business Case

FEBRUARY 2021



# Dinas Powys Transport Network

## WelTAG Stage Two Plus | Outline Business Case

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Report No 10033783-ARC-XX-XX-RP-TP-0001

Date FEBRUARY 2021

### VERSION CONTROL

Version	Date	Author	Changes
P01	04/12/2020	MF	Draft No Status
P02	18/12/2020	MF	Confidential Draft   Updated following VGC comments
P03	10/02/2021	MF	Final Version   Updated following the Review Group meeting held on 14/01/2021

This report dated 10 February 2021 has been prepared for the Vale of Glamorgan Council (the “Client”) in accordance with the terms and conditions of appointment dated 10 July 2019 (the “Appointment”) between the Client and Arcadis Consulting (UK) Limited (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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# 1 Introduction

## 1.1 Purpose of the Study

- 1.1.1 Arcadis Consulting (UK) Limited ('Arcadis') was commissioned by the Vale of Glamorgan Council to develop and appraise potential options for improving the transport network encompassing corridors from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The appraisal of options has been undertaken in accordance with the Welsh Government's latest version of WelTAG (December 2017<sup>1</sup>) including advice on the appraisal in relation to the Future Generations of Wales (2015) Act Well-being Goals<sup>2</sup>. This WelTAG Stage Two Plus report presents the development and proportionate appraisal of options through the Dinas Powys corridor.

## 1.2 Context

### Improving Strategic Transport for Dinas Powys | WelTAG Stage One Strategic Outline Case Report (July 2017)

- 1.2.1 The WelTAG Stage One report was prepared by Arcadis and considered the problems, opportunities and constraints, established objectives and appraised a long list of options. Two options were recommended to be taken forward for WelTAG Stage Two appraisal against the do-minimum scenario, namely proposals for a new bypass to the east of Dinas Powys and a multi-modal option encompassing interventions for an enhanced sustainable transport network. An additional option representing a combined bypass and multi-modal option was included for further consideration following recommendations made by the Council's Environment and Regeneration Scrutiny Committee on 14<sup>th</sup> September 2017<sup>3</sup>. The following options for assessment at Stage Two were endorsed by the Vale of Glamorgan Cabinet on 9<sup>th</sup> October 2017:

- Do-minimum
- Bypass
- Multi-modal
- Bypass and Multi-modal

### Dinas Powys Transport Network | WelTAG Stage Two (January 2019) | Draft No Status

- 1.2.2 In addition to Arcadis' WelTAG Stage Two commission to assess the three proposed do-something options, an extension to the project scope was confirmed by the Vale of Glamorgan Council following a request by Dinas Powys Community Council to assess an alignment connecting from south of the Merrie Harrier junction to the junction of Sully Moors Road and Hayes Road (as opposed to connecting to the A4055 at a point south of Dinas Powys).
- 1.2.3 It should be noted that each of the various options presented by the Community Council included a connection to Dinas Road in Penarth. As part of scoping discussions with Vale of Glamorgan Council Officers, it was confirmed that this connection would not be given further consideration as an outline review indicated that highway connectivity at this location would be through a scheduled ancient monument site, and which is also laid out as a public open space and forming part of the landscaping of residential development.

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<sup>1</sup> <https://beta.gov.wales/sites/default/files/publications/2017-12/welsh-transport-appraisal-guidance.pdf>

<sup>2</sup> <https://beta.gov.wales/sites/default/files/publications/2017-12/weltag-2017-supplementary-guidance-the-well-being-of-future-generations-wales-act-2015.pdf>

<sup>3</sup> [http://www.valeofglamorgan.gov.uk/en/our\\_council/Council-Structure/minutes,\\_agendas\\_and\\_reports/minutes/Scrutiny-ER/2017/17-09-14.aspx](http://www.valeofglamorgan.gov.uk/en/our_council/Council-Structure/minutes,_agendas_and_reports/minutes/Scrutiny-ER/2017/17-09-14.aspx)

- 1.2.4 Following consideration of the options and the development of the Stage Two designs, the following options were defined for assessment:
- Bypass | Green Alignment (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction)
  - Bypass | Pink Alignment (east of Dinas Powys interconnecting with the A4055 at Cardiff Road and the Merrie Harrier Junction)
  - Bypass | Blue Alignment (east and south of Dinas Powys, interconnecting between the A4055 at Merrie Harrier and the B4267 Sully Moors Road/ Hayes Road roundabout)
  - Multi-modal
  - Bypass (Green Alignment) and Multi-modal
- 1.2.5 A draft WelTAG Stage Two report (10015022-ARC-XX-XX-RP-TP-0001) was prepared by Arcadis and presented to the project Review Group on 2<sup>nd</sup> October 2018. Following consideration of the report's output, several recommendations were agreed for undertaking in a Stage Two Plus study, including:
- Engagement with Network Rail to understand the constraints and potential costs associated with the construction of a bypass and junction in the vicinity of the railway tunnel.
  - Undertake concept design, modelling and costing of suggested improvements to the Merrie Harrier junction to improve capacity.
  - Commission strategic traffic modelling of the bypass proposals using the South East Wales Transport Model (SEWTM).
  - Consider costs in context of the bypass scheme (Green route) and update the economic appraisal for the Green route.
- 1.2.6 The purpose of the additional work in Stage Two was to provide additional information to inform a decision before proceeding to any options in a Stage Three study. The proposals for additional Stage Two assessment (referred to as Stage Two Plus) were considered and agreed by the Vale of Glamorgan Council Environment and Regeneration Scrutiny Committee and Vale of Glamorgan Council Cabinet over several meetings.
- 1.2.7 The Vale of Glamorgan Council Cabinet meeting held on 18<sup>th</sup> February 2019 resolved:
- (1) T H A T the progress made on the WelTAG studies relating to improving strategic transport in Dinas Powys be noted and that this matter be referred to Environment and Regeneration Scrutiny Committee for consideration.
  - (2) T H A T should grant funding not be available from Welsh Government for the completion of the Stage Two WelTAG work, as identified in paragraph 4.7 of the report, the Head of Neighbourhood Services and Transport be authorised to seek an alternative funding source.
- 1.2.8 The Vale of Glamorgan Council Environment and Regeneration Scrutiny Committee meeting held on 7<sup>th</sup> March 2019 recommended:
- (1) T H A T the progress made on the WelTAG studies relating to improving strategic transport in Dinas Powys be noted.
  - (2) T H A T should grant funding not be available from Welsh Government for the completion of the Stage Two WelTAG work, as identified in paragraph 4.7 of the report, the Committee endorses the authorisation from Cabinet to the Head of Neighbourhood Services and Transport to seek an alternative funding source.
  - (3) T H A T the Head of Neighbourhood Services and Transport progress with Stage Two works for the Green and Pink route exclusively.
  - (4) T H A T the comments of the Scrutiny Committee, as well as the recommendations raised above, be referred to Cabinet for consideration.

1.2.9 The Vale of Glamorgan Council Cabinet meeting held on 15<sup>th</sup> April 2019 resolved:

- (1) T H A T the recommendations of the Scrutiny Committee be noted.
- (2) T H A T the progress made on the WelTAG studies relating to improving strategic transport in Dinas Powys be noted.
- (3) T H A T the decision of Welsh Government in relation to further funding be awaited and should grant funding not be available from Welsh Government for the completion of the Stage Two WelTAG work, as identified in paragraph 4.7 of the report, the Head of Neighbourhood Services and Transport be authorised to seek an alternative funding source.
- (4) T H A T in pursuance of Resolution (2), the Head of Neighbourhood Services and Transport progress with Stage Two works for the Green and Pink routes exclusively.

### Dinas Powys Transport Network | WelTAG Stage Two Plus

1.2.10 Further to the decision of Cabinet on 15<sup>th</sup> April 2019, the WelTAG Stage Two Plus study has considered the following options in comparison to the do-minimum scenario, including the removal of the Blue (bypass) alignment from the analysis:

- Option A | Bypass – Green Route
- Option B | Bypass – Pink Route
- Option C | Multi-modal
- Option D | Bypass (Green Route) and Multi-modal

1.2.11 The study has been undertaken in conjunction with the Vale of Glamorgan Council with detailed evidence, data and analysis underlying the statements made in this report provided in the accompanying Impacts Assessment Report (10033783-ARC-XX-XX-RP-TP-0002).

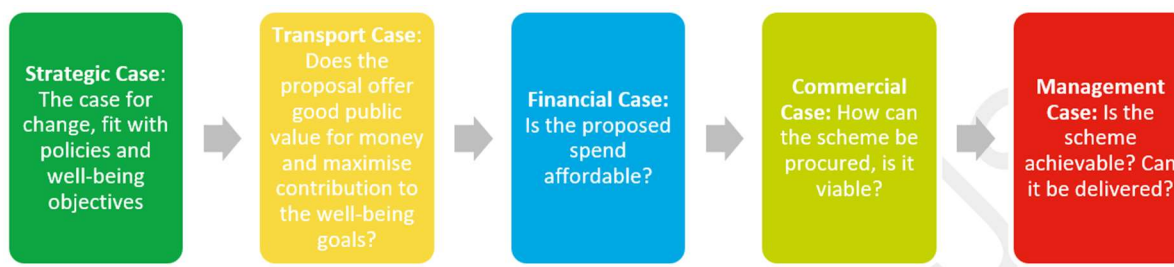
## 1.3 WelTAG Stage Two | Outline Business Case

1.3.1 The WelTAG guidance states that the purpose of the Stage Two: Outline Business Case is to *‘examine in greater detail the short list of options for tackling the problem under consideration.’* During Stage Two, the appraisal team needs to consider how the proposed solution will lead to the desired outcomes, maximising contribution to the objectives and well-being goals, and use this understanding to refine the design of the options and identify key dependencies and constraints.

1.3.2 At the end of the stage, the report should provide the Review Group with the evidence required to select a preferred option to take forward for Stage Three. As such, this Stage Two Plus Outline Business Case report:

- Sets out changes that have occurred in the transport system and wider context since Stage One.
- Describes the process of developing the shortlisted options to a more developed solution.
- Describes how each option would meet the objectives set out in Stage One.
- Presents a Five Case Assessment for each option with a separate presentation of the strategic, transport, management, financial and commercial case for each option and the contribution towards the well-being goals.
- Determines whether there are any transport options that can address the issues identified, contributes positively to the well-being goals and objectives, and can be delivered within technical and financial constraints.
- Makes recommendations as to the preferred option to be taken forward to Stage Three, with recommendations for interim investigations, and establishes the methods to be used for further evidence and work to meet legislative requirements.
- Documents the decisions of the Stage Two Review Group and the basis for these decisions.

1.3.3 The report follows the structure of the Five Case Model used by the Welsh Government:



- 1.3.4 This Stage Two Plus report follows the principle of proportionate appraisal. For the key areas affecting decision making it provides a quantitative appraisal, and some areas of appraisal are largely qualitative. The aim of the report provides stakeholders and decision makers with sufficient information and understanding of the problems and potential solutions to commit further resources to taking forward options to Stage Three. The additional work undertaken for the Stage Two Plus study provides more quantitative information for the appraisal following recommendations and decisions made by the project's assigned Review Group, and the Vale of Glamorgan Council Environment and Regeneration Scrutiny Committee and Cabinet. In accordance with the WelTAG guidance the significance and scale of the impacts throughout the assessment has been appraised using a seven-point scale, as presented in Table 1.

Table 1 WelTAG Seven-Point Assessment Scale

Impact Description	Rating
Large beneficial	++++
Moderate beneficial	++
Slight beneficial	+
Neutral	0
Slight adverse	-
Moderate adverse	---
Large adverse	----

## 1.4 The Appraisal Area

- 1.4.1 The appraisal area encompasses the existing transport corridors from Biglis roundabout, Barry through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The assessment of existing transport corridors considers the highway network and public transport within, through and immediately surrounding Dinas Powys. In addition, the strategic modelling completed using SEWTM considers the wider region to assess impacts.

## 1.5 Well-being of Future Generations (Wales) Act 2015

### Five Ways of Working

- 1.5.1 This section provides an overview of how the approach and proposals set out in this report evidence the Five Ways of Working and support the seven well-being goals set out in the Future Generations of Wales Act 2015. The latest WelTAG guidance has been developed in such a way to ensure that public funds are invested to maximise contribution to the well-being of Wales. The onus is specifically focused upon the delivery of sustainable development, of which will in turn contribute to the achievement of the well-being goals.

- 1.5.2 The WelTAG guidance states it is required ‘to ensure the needs of future generations are considered and understand how well they help public bodies to meet the well-being objectives and maximise their contribution to each of the seven goals.’ Consideration should be given to long-term challenges, trends, opportunities, as well as integration, collaboration, involvement and preventing problems from occurring or getting worse.

#### **Long-term**

- 1.5.3 The Impacts Assessment Report provides the evidence of both current and future problems, trends and opportunities to inform consideration of the long-term perspective and the development of options. This includes consideration of the existing traffic and transport conditions associated with the Dinas Powys transport corridor and the subsequent appraisal of impacts associated with the economy, access to education, jobs and services, health and the environment (notably air quality and noise impacts).
- 1.5.4 Current traffic congestion and connectivity issues are anticipated to be exacerbated in the future with traffic growth as well as new developments. The options considered in the outline business case offer long-term solutions to address the existing issues, including consideration of the existing highway network to facilitate longer term connectivity enhancements (including design appraisal of the Merrie Harrier junction, for example).

#### **Prevention**

- 1.5.5 The options under consideration offer the opportunity to prevent/ alleviate as far as possible the future problems and trends from occurring, through the enhancement of the local and strategic highway network. Moreover, the commercial, financial and management cases seek to identify costs and deliverability risks to aid decision making and prevent long-term liabilities for public money by considering all of the issues at the outset.

#### **Integration**

- 1.5.6 The options under consideration involve the integration of active travel as part of the local and strategic highway network, as well as supporting the potential for enhanced integration with public transport services and facilities as the highway network is enhanced. The WelTAG study has been undertaken in an integrated manner to consider and take account of other schemes and proposals through discussion with stakeholders.

#### **Collaboration**

- 1.5.7 In undertaking the WelTAG study, there has been collaboration between departments within the local authority and Welsh Government, as well as between stakeholders and Arcadis.

#### **Involvement**

- 1.5.8 A public consultation was completed at WelTAG Stage One, as well as stakeholder workshops undertaken as part of the Stage One and Stage Two studies. The potential for further public consultation on the WelTAG Stage Two Plus study is subject to funding approval and endorsement of the next steps by the Vale of Glamorgan Council.

#### **Well-being Goals**

- 1.5.9 The objectives have been developed through consideration of the well-being goals and this is presented in the strategic case section. The strategic case also considers how each of the options meets the well-being goals. Together this seeks to ensure that achieving the well-being goals are at the centre of the setting of objectives for the study and the emerging interventions.

## **1.6 Climate Emergency Declarations | 2019**

- 1.6.1 An important development since completion of the first draft WelTAG Stage Two report in September 2018 has been Welsh Government’s climate emergency declaration in 2019 stating its commitment towards ‘achieving a carbon neutral public sector by 2030 and to coordinating action to help other areas of the economy to make a decisive shift away from fossil fuels, involving academia, industry and the third sector.’ Shortly before this declaration was announced, the Welsh Government

released *Prosperity for All: A Low Carbon Wales*, which sets out 100 policies and proposals to meet the 2020 carbon emissions targets. The plan for 2021-26 is in the process of being prepared.

1.6.2 Moreover, the Vale of Glamorgan Council also announced a climate emergency in 2019 outlining a commitment to deliver its well-being goals as set out in the Corporate Plan '*Strong Communities with a Bright Future*' and the well-being of Future Generations Act, and the progress of initiatives in support of the existing Carbon Management Plan. The Council further recognises that a reduction in carbon emissions can also deliver benefits in terms of new jobs, economic savings and market opportunities. The Council therefore resolved to:

- Join with Welsh Government and other councils across the UK in declaring a global climate emergency in response to the findings of the IPCC report.
- Reduce its own carbon emissions to net zero before the Welsh Government target of 2030 and support the implementation of the Welsh Government's new Low Carbon Delivery Plan, to help achieve the Welsh Government's ambition for the public sector in Wales to be carbon neutral.
- Make representations to the Welsh and UK Governments, as appropriate, to provide the necessary powers, resources and technical support to local authorities in Wales to help them successfully meet the 2030 target.
- Continue to work with partners across the region to develop and implement best practice methods that can deliver carbon reductions and help limit global warming.

1.6.3 The climate emergency is a key influence on the direction of development and infrastructure provision for Wales, as well as an integral component towards shaping future transport schemes as the balance and inter-relationship between sustainable transport initiatives and highway network enhancement is carefully considered. The WelTAG process and the framework provided by the well-being of Future Generations (Wales) Act 2015 enables the output of the report to be considered against the climate emergency declarations, whilst noting that a full sustainability appraisal and assessment of greenhouse gas emissions would be completed at the next stage of appraisal.

## 1.7 Covid-19 | Assessment Impact

1.7.1 As a result of the Covid-19 outbreak in early 2020, all key areas of the WelTAG assessment and appraisal including the case for change and socio-economic, cultural and environmental considerations are anticipated to be affected to a greater or lesser extent beyond expected conditions. At the time of this report, the future medium to longer-term implications of Covid-19 at a local, regional and national level remain extensively unknown and this study has not therefore made any assumptions as to the impacts on these scenarios. The exception to this relates to the value for money analysis that has completed a sensitivity test based on updated changes in TAG Databook v1.14 which takes into account Covid-19 impacts. However, it is anticipated that future work completed with regard to this appraisal and associated studies will increasingly need to consider the implications of the pandemic as information, trends and impacts become more widely known and accepted. This WelTAG Stage Two Plus study remains an assessment broadly based on pre-Covid-19 conditions and for the purposes of the WelTAG appraisal should be viewed with this in mind.

## 1.8 Report Structure

1.8.1 In accordance with the WelTAG guidance the structure of this report is as follows:

- Chapter 2 | Strategic Case
- Chapter 3 | Transport Case
- Chapter 4 | Financial Case
- Chapter 5 | Commercial Case
- Chapter 6 | Management Case
- Chapter 7 | Conclusions and Recommendations



## 2 Strategic Case

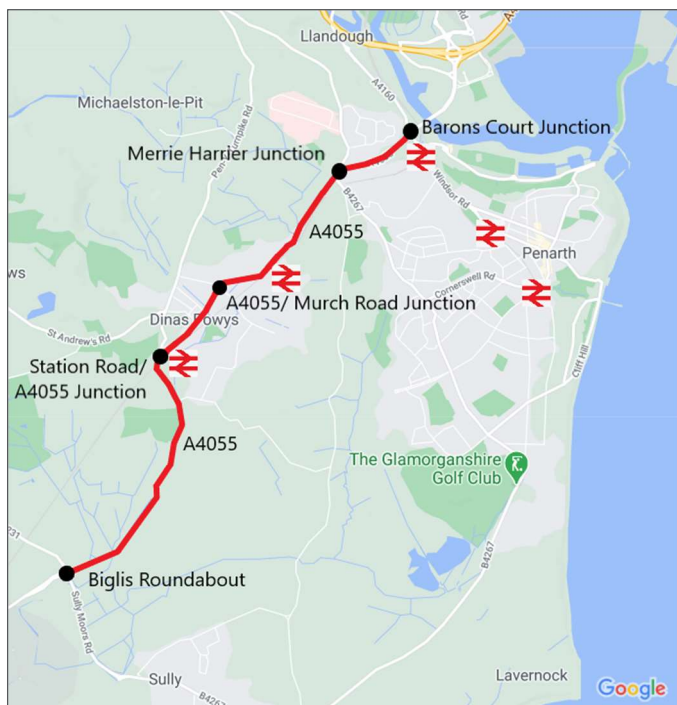
### 2.1 Overview

- 2.1.1 The strategic case addresses the need for change, providing an evidence-based description of the current situation, describes the likely funding situation if no action is taken and presents the reasons why an intervention is required. The strategic case includes analysis of the factors leading to the problem and the development of possible solutions, establishes objectives and provides a narrative as to how each of the solutions is intended to change the situation.

### 2.2 Scope

- 2.2.1 The scope of the study is to consider solutions to improve the strategic transport network encompassing the corridor from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The study area is shown in Figure 1, including key junctions on the corridor.

Figure 1 Study Area<sup>4</sup>



### 2.3 The Case for Change

#### Policy Context

- 2.3.1 The key policy and strategy documents at the local, regional and national levels highlighting the policies and proposed delivery programmes and schemes (subject to the availability of funding) that are relevant to this study are presented in the accompanying Impacts Assessment Report. Of particular relevance is the alignment with national, regional and local policies, as follows:
- Improvements to the strategic transport network from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth have good potential to contribute to the **One Wales: Connecting the Nation – Wales Transport Strategy**. In particular, improvements to the network would improve links and access between key settlements and sites including for journeys between Barry and Cardiff.

<sup>4</sup> Google Maps © 2020

- The study also contributes to the key sustainable transport themes as set out within the **Wales Transport Strategy** including ‘*achieving greater use of the more sustainable and healthy forms of travel*’. The study area currently lacks an effective and encouraging sustainable transport network with limited rail capacity and a basic bus network, and poor walking and cycling connections. As such, options aimed at improving sustainable travel would contribute to the key sustainable transport themes of the strategy.
- The study is committed to investigating and establishing sustainable options which will improve the social, economic, environmental and cultural well-being of Wales. Investment in improved connectivity within the region would make a significant contribution to the goals of the **Well-being of Future Generations (Wales) Act 2015**. In particular, the study aims to put forward options for further assessment which contribute to the prosperity, safety, cohesiveness, resilience, health and equality of Wales.
- The **Vale of Glamorgan Local Transport Plan (LTP)** specifically targets bus priority and highway improvements schemes as key actions for Dinas Powys. The Vale of Glamorgan Council seeks to secure better conditions for pedestrians, cyclists and public transport users and to encourage a modal shift away from the single occupancy car.

2.3.2 The Plan also considers traffic congestion as a key problem in the region, and that highway improvements should be made for those commuters who may need to travel by car. The Plan therefore highlights a combination of improvements as needed to address all elements of the existing inefficiencies of the transport system.

- Investment in connectivity will make substantial contributions to the desired outcomes of the **Vale of Glamorgan Local Development Plan (LDP)**. Various objectives outline the desire for the development of sustainable communities and places which are effectively underpinned by the need for accessibility and connectivity within the region. The Plan also highlights the need for the required infrastructure to be identified to meet the growth anticipated in the Vale of Glamorgan up to 2026. Cycle and bus improvements within the study area are identified within Policy SP7 – Transportation.
- The Plan further notes how ‘*...the South East Wales Transport Alliance (Sewta) Highway Strategy Study (2008) identifies the A4055 through Dinas Powys as a key problem area of the regional road network as a consequence of the scale of traffic and associated congestion. Barry Waterfront to Cardiff Link Road (Dinas Powys Bypass) was viewed as having dual benefits, helping to alleviate traffic congestion and improve road safety on the A4055 through Dinas Powys, while having the potential to improve access to the wider road network. Issues at the Cogan Spur and Merrie Harrier junctions, however, would be difficult to overcome.*’

## 2.4 Summary of Problems, Opportunities and Objectives

2.4.1 The identified issues that require addressing are summarised below, which have been identified through analysing local data, reference to previous feasibility reports and policy, and consultation with stakeholders and members of the public as part of the Stage One WelTAG study. The identified problems are as presented in Table 2.

Table 2 Identified Problems

Reference	Heading
P01	Poor quality bus stops with limited facilities.
P02	Poor interchange facilities at railway stations (including poor parking opportunities).
P03	Overcrowding on peak rail services.
P04	Overcrowding on peak bus services.



Reference	Heading
P05	Poor infrastructure and local connectivity by walking and cycling.
P06	A4055 creating severance within the community (e.g., access to schools and other facilities/ services).
P07	High local traffic flows leading to congestion, capacity issues at junctions, environmental impacts (air quality and noise pollution) and unreliable journey times.
P08	High use of the car for local and regional trips (e.g., journeys to work).
P09	Occurrence of accidents along key strategic routes, especially the A4055.
P10	Residential land use development within Vale of Glamorgan will compound existing traffic issues and increase pressure on public transport services.

2.4.2 The opportunities of the study area have been identified to assist in ensuring that the identified objectives and options are realistic as well as maximise opportunities and take into account the context of the study area. Following feedback from the stakeholder workshop and public consultation in Stage One, the opportunities have been identified as illustrated in Table 3.

*Table 3 Identified Opportunities*

Reference	Opportunity
O1	Proximity to major employment and services means large volume of transport movements to and from Cardiff, from Dinas Powys and Barry and the Vale.
O2	Significant facilities and services in close proximity with potential for access by sustainable modes.
O3	Dinas Powys has good potential accessibility by non-car means.
O4	Metro improvements, including more frequent rail services.
O5	Bus priority and service enhancements.
O6	Walking and cycling improvements.
O7	Highway junction/ off-line capacity improvements.
O8	Road safety improvements.
O9	Interchange improvements in services and facilities.
O10	New Wales and Borders Rail Franchise
O11	Park and Ride facilities.
O12	Promotion and marketing of all transport modes.
O13	Reduce the adverse environmental impacts of the transport system.
O14	New development to be accessible by sustainable transport modes.

## 2.5 Involvement of Stakeholders

### Stakeholders

- 2.5.1 The strategy has been to involve stakeholders throughout the WelTAG stages, including representation on the project's Review Group. The public have been consulted at Stage One to gain feedback on issues, objectives and options. The WelTAG Stage One report has also been taken through the political process, involving presentation to the Vale of Glamorgan Council. There are a wide range of stakeholders for this study, who are in summary:
- Transport operators including Cardiff Bus, New Adventure Travel and the Train Operating Company (formerly Arriva Trains Wales).
  - Interface with Dinas Powys Community Council. The community of Dinas Powys currently experiences the existing traffic levels and are most affected by transport proposals.
  - Transport network providers including Welsh Government/ Transport for Wales and Network Rail.
  - Sustrans.
  - Road haulage businesses (represented by the Road Haulage Association).
  - Vale of Glamorgan Council.

### Stakeholder Consultation

- 2.5.2 During Stage One, a stakeholder workshop was undertaken on Tuesday 7<sup>th</sup> March 2017 at the Parish Hall, Britway Road, Dinas Powys to which stakeholders from across the region representing key employers, public organisations, transport providers and local authorities were invited. The workshop informed all of the key stages of the strategic case, whereby stakeholders were asked to discuss and identify problems, opportunities and constraints, set objectives and identify and discuss potential transport options. In order to inform the discussions at the workshops a draft list of problems, opportunities and constraints were presented. These were derived from a review of existing policy and background reports/ data specific to Dinas Powys. Initial objectives were provided to initiate discussion, alongside a list of potential transport solutions. Throughout the workshop stakeholders discussed the problems, objectives and transport options in groups, which were then fed back to the group as a whole.

### Public Consultation

- 2.5.3 During Stage One, a public consultation event was held on Monday 13<sup>th</sup> March 2017 between 13:30 and 18:30 at the Dinas Powys Parish Hall. The event afforded members of the public the opportunity to provide feedback on the identified options, opportunities, and constraints, as well as consideration and suggestions for the objectives and potential transport options. The event was attended by members of the Arcadis project team and Vale of Glamorgan Council officers to facilitate discussion, with specific workstations and feedback forms provided to capture key information from attendees. The output of the public consultation has also been used to inform this strategic case.

### Review Group

- 2.5.4 Key stakeholder representatives were invited to join the project's Review Group who met at the outset of Stage Two process on Tuesday 16<sup>th</sup> January 2018 to receive a presentation on the findings of the Stage One report and the subsequent methodology and approach associated with development of the Stage Two study. The Review Group met on 2<sup>nd</sup> October 2018 to consider the initial findings. A further WelTAG Stage Two Plus meeting was held on 14<sup>th</sup> January 2021.

## 2.6 Objectives

### Identification of Objectives

- 2.6.1 The objectives for the intervention have been derived from general and transport-specific objectives as set by the Welsh Government and through considering the national well-being goals as set out in

the Future Generations of Wales (2015) Act. This report has set out how stakeholders have informed the development of the objectives and how the proposed objectives positively contribute to Welsh Government policy and well-being.

- 2.6.2 The final objectives for the intervention are as outlined in Table 4. This includes an overview of what success would look like and how this can be measured in the Stage Two assessment.

*Table 4 Final Proposed Objectives*

Ref	Objective	What will success look like?	How will success be measured?
1	Support Sustainable Connectivity in the Cardiff Capital Region	Improved efficiency, reliability, resilience, and connectivity of movement (people and freight by sustainable modes).  Reduced community severance in Dinas Powys including improvements to local connectivity.	Journey times  Traffic volumes  Bus journey times
2	Facilitate and Support Economic Growth	Improved inclusive, integrated and affordable access to key services and employment.  Reduce issues of over-capacity on travel modes.	Frequency and provision of public transport capacity
3	Improving Health and Wellbeing	Greater uptake of active travel (both recreation and necessary trips).  Improved air quality and reduced noise pollution within the community.	Length of walking and cycling links provided or improved  Air quality and noise pollution measurement
4	Improved Safety and Security	Improved actual and perceived safety and security of travel by all modes.	Accident rates per vehicle kilometre
5	Benefits and Minimised Impacts on the Environment	Reduction in the negative impacts on the local and global environment (natural and built).  Reduce air and noise pollution within the community and adaptation to the effects of climate change.	Number of ecological features affected  Air quality and noise pollution measurement

### Verification of Objectives

- 2.6.3 The objectives have been verified to determine how they contribute to:

- Resolving problems of the study area.
- The Well-being of Future Generations Act Well-being Goals.
- Wales Transport Strategy outcomes.
- The Welsh Government's Strategic Priorities as set out in the Wales Transport Strategy.
- The Economic Action Plan Priorities.

2.6.4 Table 5 illustrates the extent to which the objectives address the identified transport problems. The appraisal demonstrates that each of the identified problems are directly addressed by at least one objective.

Table 5 Relationship of Objectives to Problems

Objectives	Potential Problems									
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10
1	++	++	++	++	++	+++	++	++	++	++
2	++	++	+++	+++	++	++	++	++	++	++
3	+	+	+	+	+	0	++	+	++	++
4	+	+	0	0	+	++	0	0	+++	++
5	++	++	++	++	++	+	++	++	+	++

2.6.5 The WelTAG guidance states that ‘when using WelTAG it is essential to comply with the duties set out in the Well-being of Future Generations (Wales) Act 2015. They are to follow the sustainable development principle through following the five ways of working and set well-being objectives that maximise contribution to the seven well-being goals.’ Table 6 shows a positive relationship between the objectives and the seven well-being goals.

Table 6 Relationship of Objectives to Well-being Goals

Well-being of Future Generations (Wales) Act 2015 Outcomes		Objectives				
		1	2	3	4	5
Seven Well-being Goals	A prosperous Wales	++	+++	++	++	++
	A resilient Wales	++	+++	++	++	++
	A healthier Wales	++	++	+++	+	++
	A more equal Wales	++	++	+	++	+
	A Wales of cohesive communities	++	+	+	+	+
	A Wales of vibrant culture and Welsh language	0	+	+	0	0
	A globally responsible Wales	+++	++	++	0	+++

2.6.6 In addition, the objectives have been assessed against the Wales Transport Strategy outcomes as outlined in Table 7. A positive relationship has been identified. Table 8 shows a positive relationship between the objectives and the Strategic Priorities as set out in the Wales Transport Strategy. Table 9 shows the relationship between the objectives and the priorities of the Economic Action Plan for Wales.

Table 7 Objectives Relating to the WTS Outcomes

Wales Transport Strategy Outcomes		Objectives				
		1	2	3	4	5
Social	Improve access to healthcare	+	+++	0	0	0
	Improves access to education, training and lifelong learning	+	+++	0	0	0
	Improving access to shopping and leisure facilities	+	+++	0	0	0
	Encourage healthy lifestyles	0	0	+++	0	0
	Improve the actual and perceived safety of travel	+	0	0	+++	0
Economic	Improve access to employment opportunities	+	+++	0	0	0
	Improve connectivity within Wales and internationally	+	0	0	0	0
	Improve the efficient, reliable and sustainable movement of people	+++	+++	++	0	++
	Improve access to visitor attractions	+	+++	0	0	0
Environmental	Increase the use of more sustainable materials	0	0	0	0	+++
	Reduce the contribution of transport to Greenhouse gas emissions	+	0	++	0	+++
	Adapt to the impacts of climate change	+	0	++	0	+++
	Reduce the contribution of transport to air pollution and other harmful emissions	+	0	++	0	+++
	Improve the impact of transport on the local environment	+	0	++	0	+++
	Improve the impact of transport on our heritage	0	+	0	0	+++
	Improve the impact of transport on biodiversity	0	0	++	0	+++

Table 8 Objectives Relating to the Wales Transport Strategy: Strategic Priorities

Strategic Priorities	Objectives				
	1	2	3	4	5
Reducing Greenhouse gas emissions and other environmental impacts from transport	0	++	++	0	+++
Integrating local transport	++	+++	++	+	0
Improving access between key settlements and sites	+++	+++	0	0	0
Enhancing international connectivity	++	0	0	0	0
Increasing safety and security	+	0	0	+++	0

Table 9 Objectives Relating to the Economic Action Plan Priorities

Strategic Priorities	Objectives				
	1	2	3	4	5
Support people and businesses to drive prosperity	++	+++	+	0	0
Tackle regional inequality and promote fair work	++	+++	++	0	0
Drive sustainable growth and combat climate change	++	++	+	0	+++
Build ambition and encourage learning for life	+	++	++	0	0
Equip everyone with the right skills for a changing world	0	++	++	0	0
Deliver modern and connected infrastructure	+++	++	0	+++	++
Promote and protect Wales' place in the world	++	++	+	0	+

## 2.7 WelTAG Stage Two Plus | Option Development

2.7.1 This section identifies the process undertaken to develop options to enable the appraisal and provides an overview of the options.

- Option A | Bypass – Green Route
- Option B | Bypass – Pink Route
- Option C | Multi-modal
- Option D | Bypass (Green Route) and Multi-modal

### Option A | Bypass – Green Route and Option B | Bypass – Pink Route

2.7.2 The following section outlines design development of two alignments interconnecting between the A4055 at Cardiff Road and the Merrie Harrier junction, referred to as the Green route and the Pink route.

2.7.3 The Green route seeks to avoid existing environmental constraints to form a route between a location south of Dinas Powys on Cardiff Road and the Merrie Harrier junction. The Pink route follows the same principles but allows for a roundabout to be developed that could link to Murch Road, to the east of Dinas Powys. The alignments as shown in [Appendix A](#) are based on the following assumptions:

- Alignments comply with Design Manual for Roads and Bridges (DMRB) and contains no departures from standard for a 60mph speed limit (100kph design speed) single carriageway. Carriageway width of 3.65m per lane + 1m hardstrips (total carriageway width of 9.3m) plus verge width of 2.5m either side of the carriageway.
- A 3.5m wide cycleway has been included to one side of the bypass.
- A total cross section width of 17.8m plus earthworks slopes where required.
- The alignment has been developed to fit into the landscape and where possible avoid constraints as provided by Vale of Glamorgan Council.
- The vertical alignment is based on 5m OS contours which have an accuracy to +/- 2m.

- Earthworks are assumed to be 1 in 3 embankment and cutting slopes – to be confirmed at a later stage subject to ground investigation and the materials present.
- Outfall points for drainage are not known at this stage and therefore costs have been estimated.

2.7.4 It should be noted that this is a feasibility option study and in order to confirm its accuracy further surveys, investigations and design development will be required including a topographical survey, environmental surveys, ground investigation and stakeholder consultation.

#### **Standards Used**

2.7.5 All current alignments considered are compliant with DMRB and in accordance with TD 9, TD 27 and TA 90 which were current at the time of the design. It is noted that these standards have now changed and should the option/s progress to WelTAG Stage Three, designs would be updated using the latest standards.

#### **Junctions**

2.7.6 The alignments include for junctions at locations highlighted on drawing numbers 10015022-ARC-XX-XX-DR-HE-0004 and 0008). However, the junctions shown have not been detail designed as part of the current proposals and have been shown for illustrative purposes. Traffic data and survey work would be required in order to inform the design of each junction.

#### **Murch Road Roundabout**

2.7.7 The Pink route allows for a roundabout to be incorporated which could link to Murch Road. The design arrangement has been based on a normal roundabout with an Inscribed Circle Diameter (ICD) of 45.2m to accommodate a potential new access to/ from Murch Road and potentially the proposed St Cyres development.

2.7.8 It is assumed that a compliant access to/ from Murch road and potentially the proposed St Cyres development from the roundabout can be achieved (this would be subject to a fully compliant design and confirmation from planning) although costs for developing this access have not been included within the estimates provided. The roundabout is shown for illustrative purposes only to demonstrate the potential for accessibility. Earthworks have been estimated and additional design work would be required to confirm detailed design development.

#### **Merrie Harrier Junction**

2.7.9 The WelTAG Stage Two Plus study has taken forward a feasibility appraisal of the Merrie Harrier junction assessing the potential for significant improvements to alleviate existing congestion issues. For the purposes of the bypass options, two junction arrangements were considered which both provide a dual carriageway from the proposed Cardiff Road roundabout (located at the northern end of the bypass) through to the existing dualled section of road on the A4055. The two options are similar with regard to the alignment and impact on infrastructure and adjacent properties, and to incorporate the enhanced dual section along the A4055 the options would require the existing Merrie Harrier pub to be demolished.

2.7.10 The options are defined as follows with the associated drawings included in [Appendix B](#):

- Option 1A | Interconnect with the proposed bypass around Dinas Powys (includes a right-hand turn from the A4055 to B4267).
- Option 1B | Interconnect with the proposed bypass around Dinas Powys (removes the right-hand turn from the A4055 to B4267).

2.7.11 The junction arrangements are based on the following key features:

- Alignment complies with the DMRB for a 30/ 40mph speed limit. The width of the overall carriageway including bus lane, cycleway and relevant safety zones is 19.1m.
- A 3.0m wide cycleway to one side of the bypass with a 0.5m safety zone between the bus lane and cycle lane has been included in all options. The proposed shared cycleway will continue to the Barons Court junction to interconnect with the existing, although there will be a section which

is below the desired width due to the restrictions imposed by the existing large retaining wall. This is shown on the drawings detailing the design.

- The vertical alignment has not been assessed other than the embankment height along the northern side of the A4055.
- All designs require a retaining wall alongside the northern edge of the A4055 to support the embankment and properties above. Based on available data, this has been estimated at circa 5m in height. The type of wall along with the foundations cannot be confirmed at this stage and further detail design and survey information would be required.
- Outfall points for drainage are not known at this stage (costs have been estimated).

2.7.12 It should be noted that the Merrie Harrier options represent a feasibility design and to confirm their accuracy, further surveys, investigations and design analysis would be required, including the completion of topographical and environmental surveys, ground investigation and stakeholder consultation.

2.7.13 To support the proposed junction designs, an accompanying report outlining the traffic impact analysis of the junctions has been completed to consider the suitability of the interventions (Impacts Assessment Report). Whilst Option 1B (bypass option with right turn ban) would provide the best option in terms of capacity and resilience, Option 1A is also forecast to operate within capacity and retains the right turn towards the hospital – the only concern is potential queuing that may occur on the A4055 Barry Road northbound between the Merrie Harrier junction and the bypass roundabout. For the purposes of the strategic traffic modelling exercise and following consultation with the Vale of Glamorgan Council project team, Option 1A was assumed as the preferred arrangement, with retention of the right turn movement.

#### **Scheme Interface with the Vale of Glamorgan Railway Line**

2.7.14 A key item retained as part of the original WelTAG Stage Two study was the interface between the Cogan railway tunnel (situated on the Vale of Glamorgan railway line) and the potential Cardiff Road (A4055) 4-arm roundabout located towards the northern end of the proposed bypass routes. The constraint considered was in relation to the roundabout being partially situated over the existing Cogan Tunnel, encompassing the roundabout's ICD, its eastern arm that interconnects with Redlands Road (B4267) and the southern arm interconnecting with the new proposed bypass.

2.7.15 The WelTAG Stage Two Plus study was tasked with further analysis of this constraint, to consider the loading implications of the proposal on the railway tunnel that underlies the site, the likely implications of this, as well as the requirements for a tunnel assessment prior to construction of the proposed works. A Basic Asset Protection Agreement (BAPA) was set up between the Vale of Glamorgan Council and Network Rail concerning the tunnel to assist in developing and reviewing proposals. The accompanying report (Dinas Powys WelTAG Stage Two Plus; Technical Note; Cogan Tunnel; 10015022-ARC-REP-ECV-000001) is included as part of the Impacts Assessment Report and concludes that due to the depth of cover overlying Cogan Tunnel, any increase in loading from the proposal can be considered negligible. It can therefore be concluded that a structural assessment of the tunnel will not be required.

2.7.16 The report further concludes that construction of the proposed roundabout on the land overlying Cogan Tunnel may be feasible, provided that ground investigation surveys are undertaken to confirm the presence and location of the suspected construction shaft. If the shaft is located then a 22m exclusion zone would be required to surround it, which would influence the general arrangement/ layout of the proposed roundabout at this location.

#### **Public Rights of Way**

2.7.17 There are a number of Public Rights of Way (PRoW) affected by both of the considered options. It is anticipated that crossings will be rationalised by PRoW re-alignment and provision of crossing points under/ over the bypass alignment to maintain existing PRoW. Where PRoW cross the bypass alignment in-fill, culverts have been considered and where it crosses in-cut, 3m wide bridges have been used.



## Active Travel

- 2.7.18 The proposed bypass would not only improve vehicular connections but also active travel connectivity between Cardiff and Barry. The current active travel proposal from Biglis roundabout in Barry to Dinas Powys has been on the Council's integrated network proposals since 2017 and is one of the most requested links in the Vale of Glamorgan. Potentially any new road with active travel infrastructure could negate the need for this link – primarily as most people actively travelling along any proposed route would be doing so to get from Barry to Cardiff and back again. Reduced traffic flow through Dinas Powys (as a consequence of the proposed bypass) could further facilitate improved conditions to support travel by sustainable modes of transport, subject to further consideration of opportunities at the next stage of assessment.
- 2.7.19 Dinas Powys is very much seen as part of a potential strategic active travel network that would join with Penarth, Sully and Barry and provide access to and from Cardiff Bay and the city centre. A joint piece of work is due to be undertaken in 2021/22 with Cardiff, Vale of Glamorgan and Newport councils working together to look at interconnectivity along the corridor from Newport through Cardiff and onto Barry. This will form part of an enhanced active travel network through the three authority areas and the potential road scheme with active travel infrastructure would support this aspiration.

## Constraints

- 2.7.20 Table 10 outlines the potential constraints associated with the route alignments.

*Table 10 Constraints – Green and Pink Routes*

Constraint	Description
Floodplain within proximity to Cardiff Road	To the south of each alignment where they tie into Cardiff Road, a floodplain is shown (refer drawings: 10015022-ARC-XX-XX-DR-HE-0006 and 0010). It is likely a Flood Consequence Assessment (FCA) will need to be produced and agreed with Natural Resources Wales (NRW) and some form of flood compensation mitigation will be required. In addition, and to use for mitigation, both options show a surplus of material which if required could be utilised to slightly lift the road, however this may impact on the tie in to Cardiff Road so would therefore need to be considered in further detail once flood levels are known. The floodplain presented as part of the WelTAG Stage Two Plus study is based on data available at that time (2018), whereby future more detailed appraisal would likely consider the requirement for updated hydrology modelling to be completed (subject to consultation with NRW) to inform the scheme impacts.
Development Site	All options have been designed to avoid impacting on the consented development site situated to the east of Dinas Powys. The Pink route utilises a roundabout which will allow the addition of an entrance and exit arm from Murch Road, however only the roundabout has been included within the estimated costs, the entrance/ exit arm would be additional.
Ancient Woodland	The study area contains areas of ancient woodland. The highway alignments have been optimised to minimise impact, but in some locations small impacts are possible although would be limited to the outer areas.
Dinas Powys/ Penarth/ Sully	The Green and Pink routes both bypass Dinas Powys to the east and avoid Penarth and Sully to the east and south.
Archaeology	Similar to the ancient woodland, the area currently under consideration is also scattered with archaeology. It could be expected that there is unknown archaeology within the area, of which cannot be shown on the constraints plans. Considered options have been developed to avoid known archaeology within the area and based on their existing alignments, the options do not affect any known archaeology shown on the plans provided by Vale of Glamorgan Council.

## Risks

2.7.21 Table 11 outlines the potential risks associated with the bypass alignments.

*Table 11 Route Alignment Risks*

Risk	Description
Topographic Survey Data	Topographic survey data is OS contours at 5m intervals and is accurate to +/- 2m which could affect earthworks and accuracy of design.
Unknown Archaeology	Unknown archaeology could be encountered during construction.
Cogan Railway Tunnel	Ground investigations are required to confirm the presence and location of the suspected construction shaft. If the shaft is located then a 22m exclusion zone would be required to surround it, which would influence the design of the roundabout arrangement at this location.
Excavated Material	Excavated material to be used as suitable fill material may be classed as unsuitable, therefore requiring import or additional import of suitable fill material and export of unsuitable.
Health and Safety	All considered health and safety hazards have been highlighted on drawings numbers 10015022-ARC-XX-XX-DR-HE-0016 and 10015022-ARC-XX-XX-DR-HE-0017.
Merrie Harrier Junction	The bypass options assume significant improvements can be realised at the Merrie Harrier junction to improve capacity. For details of the enhancements, see <a href="#">Appendix B</a> .

## Assumptions

2.7.22 As shown on drawing numbers 10015022-ARC-XX-XX-DR-HE-0004 and 0008, access along Cross Common Road would need to be terminated, with access from either end to properties along the route and no direct through route will be allowed. A junction with the bypass alignment at Green Lane would need to be incorporated into the design.

2.7.23 A full compliant design has not been undertaken on the junctions, but it is considered that costs for the construction of the possible accesses are allowed for within the optimism bias and risk allowance.

## Environmental Constraints

2.7.24 Environmental constraints provided by the Vale of Glamorgan Council have been used to help inform the design. Alignments have been developed and where possible have been designed to avoid environmentally sensitive areas

## Cardiff Road Corridor

2.7.25 It is noted that the reduction in traffic flows along Cardiff Road as a result of a new bypass could tempt a proportion of car users to maintain their journey through Dinas Powys as journey time reliability is improved. Whilst costs associated with the implementation of route corridor measures have not been captured as part of the Stage Two Plus assessment, consideration of user behaviour throughout the Cardiff Road corridor would require careful consideration at the next stage of appraisal, including a review of measures to discourage car trips through Dinas Powys (e.g., implementation of a formal 20mph zone<sup>5</sup> and traffic calming infrastructure), whilst considering measures and opportunities to encourage sustainable trips by walking, cycling and public transport.

<sup>5</sup> <https://gov.wales/sites/default/files/publications/2020-07/20mph-task-force-group-report.pdf>

## Option C | Multi-modal

### Overview

- 2.7.26 The provision of a multi-modal option was identified as part of the Stage One study. The multi-modal option would provide the residents of Dinas Powys, as well as people who travel through Dinas Powys to access Barry, Penarth and Cardiff with alternative modes of transport to the private car. For the Stage Two Plus study a more detailed multi-modal option has been developed. The option covers all sustainable modes of transport namely bus, rail, walking and cycling and is summarised in Table 12 under the four sub-headings accordingly. The option provides a programme of individual projects across all sustainable travel modes, which range from projects that are currently being developed in order to apply for Welsh Government funding in the short-term to projects that are programmed regionally in the medium to long-term. The supporting plans have been included as [Appendix C](#).

Table 12 Multi-modal Option

Item	Interventions
Bus Park and Ride	Bryn y Don Park and Ride
Bus Service and Infrastructure Enhancements	Bus Service Enhancements Bus Stop Enhancements Merrie Harrier Junction Merrie Harrier to Barons Court Junction Bus Lane
Rail Service and Infrastructure Enhancements	Eastbrook Station Upgrade Dinas Powys Station Upgrade Vale of Glamorgan Line Service/ Capacity Enhancement Cogan Station Interchange
Active Travel   Walking and Cycling	Barry to Dinas Powys Cycle Route Merrie Harrier to Barons Court Dinas Powys to Penarth Connections Dinas Powys Network Regional Active Travel Initiative Nextbike/ E-cycle Hire

### Bus Park and Ride

- 2.7.27 A Bus Park and Ride scheme on the western side of Dinas Powys has been included as part of the option. The Park and Ride could be located within Parc Bryn y Don and could be accessed by the existing junction with Cardiff Road.
- 2.7.28 An area covering approximately 14,780m<sup>2</sup> for the Park and Ride car park has been identified. The area is to the west of the C2 Flood Zone. The Vale of Glamorgan Supplementary Planning Guidance (SPG) – Parking Standards (March 2015) requires standard parking spaces to be 4.8m x 2.6m with internal roads a minimum of a 6m width to facilitate suitable manoeuvrability.
- 2.7.29 Disabled car parking spaces need to be 4.8m x 3.6m. The dimensions have been applied to estimate the number of car parking spaces that could be accommodated at Bryn y Don. Based on the available data and a preliminary desk-top exercise, approximately 500 standard parking spaces could be provided inclusive of disabled parking bays.

- 2.7.30 Additional detailed analysis would need to be undertaken, including detailed topographical surveys to confirm with greater accuracy the number of spaces that could be provided as well as further understanding of land ownership constraints. Using Spons to determine an overall cost rate, an average of £123.20 per m<sup>2</sup> <sup>6</sup>has been identified with preliminaries of around 25%. Taking this into account, a cost estimate for the carpark has been calculated at £2.3M. Detailed topographical surveys would be required along with a detailed cost estimate.
- 2.7.31 Following consultation with the local bus operators to inform the draft Stage Two report in 2018, the options of either providing a dedicated bus service to facilitate the Park and Ride or to utilise existing bus services operating along the A4055 Cardiff Road past Parc Bryn y Don (with an enhanced frequency) were discussed. It is considered that existing services with an enhanced service frequency together with the option to provide additional express services to/ from Cardiff city centre would be the most suitable option, which would have the added benefit of providing enhanced service frequency at bus stops along the existing route through Dinas Powys. It would be proposed that a service calling at the Park and Ride site every 20 minutes would be suitable, increasing to a preferred service frequency of every 15 minutes. However, the exact details would need to be further discussed with bus operators.

### Bus Service and Infrastructure Enhancements

- 2.7.32 The bus enhancement proposals include infrastructure improvements, such as bus stop enhancements, improvements at the Merrie Harrier junction and a bus lane between Merrie Harrier and Barons Court junctions, together with bus service enhancements. The options have been developed in initial consultation with local bus operators.
- 2.7.33 The suggested elements of the bus service and infrastructure enhancements is provided within Table 13. This focuses on potential options that could be delivered to improve service provision. Following initial consultation with local bus operators there is considered to be scope to increase both the enhancement of existing services and provision of additional services.
- 2.7.34 For the service enhancements, further detailed and updated consultations would be required with local bus operators, as well as neighbouring local authorities (i.e., Cardiff Council). It is essential that the whole route of the bus services is considered, as the performance of the bus services through Dinas Powys are impacted by other sections of the route such as delays along Leckwith Road on the route into Cardiff city centre.

Table 13 Bus Enhancements

Item	Description
Bus Service Enhancement	This option focuses on enhancing the existing bus service provision operating through Dinas Powys. This could include for example increasing the frequency of the existing Cardiff Bus Services 93 (Barry – Cardiff) from every 30 minutes hourly to every 30 minutes hourly and Service 95 (Barry Island – Cardiff & UHW) to every 15 or 20 minutes, especially at times when frequency is less than its current Monday – Saturday daytime 20-minute frequency between Barry Island and Cardiff City Centre, with the option of providing some of these services as express services into and out of Cardiff city centre. Likewise, the current 2-hourly Monday – Saturday Service 89A (Dinas Powys – Cardiff) and Service 304 (Llantwit Major – Cardiff) that are both operated by New Adventure Travel could also be increased with additional finance following a competitive tender exercise and providing there are no competition issues with competing operators and their commercial services. Another potential option would be to extend frequency and route of the daytime services operated along the routes into the evening and weekends. There is potential for additional routes connecting Dinas Powys to neighbouring settlements, places of employment etc.

<sup>6</sup> Based on 2018 prices

Item	Description
Bus Stop Enhancement	Deliver the improvements required at each of the bus stops in order to achieve the recognised standard as set out in the Sustainable Transport Assessment Background Paper (further information in Table 14).
Merrie Harrier Junction	<p>The WelTAG Stage Two Plus study has taken forward a feasibility review of the Merrie Harrier junction assessing the potential for significant improvements to alleviate existing congestion issues. A proposed junction arrangement (reference Option 2) has been considered that provides a dual carriageway northbound from south of the Merrie Harrier junction through to the existing dualled section of road on the A4055. The proposal is similar to Option 1A and Option 1B with regard to the alignment and impact on infrastructure and adjacent properties, although does not assume implementation of a bypass. To incorporate the enhanced dual section along the A4055, the option would require the existing Merrie Harrier pub to be demolished. The Option 2 arrangement as shown on the accompanying drawing (<a href="#">Appendix B</a>) is based on the following key features:</p> <ul style="list-style-type: none"> <li>• Alignment complies with the DMRB for a 30/ 40mph speed limit. The width of the overall carriageway including bus lane, cycleway and relevant safety zones is 19.1m.</li> <li>• A 3.0m wide cycleway to one side of the bypass with a 0.5m safety zone between the bus lane and cycle lane has been included for in all options. The proposed shared cycleway will continue to the Barons Court Junction to interconnect with the existing, although there will be a section which is below the desired width due to the restrictions imposed by the existing large retaining wall. This is shown on the drawings detailing the design.</li> <li>• The vertical alignment has not been assessed other than the embankment height along the northern side of the A4055.</li> <li>• All designs require a retaining wall alongside the northern edge of the A4055 to support the embankment and properties above. Based on available data, this has been estimated at circa 5m in height. The type of wall along with the foundations cannot be confirmed at this stage and further detail design and survey information would be required.</li> <li>• Outfall points for drainage are not known at this stage (costs have been estimated).</li> </ul> <p>It should be noted that the Merrie Harrier arrangement represents a feasibility design and to confirm its accuracy, further surveys, investigations and design analysis would be required, including the completion of topographical and environmental surveys, ground investigation and stakeholder consultation. To support the proposed junction design, traffic impact analysis of the junction has been completed to consider the suitability of the intervention (see accompanying report within the Impacts Assessment Report). Option 2 provides improvements to the existing layout in terms of capacity and improved pedestrian and cycle facilities, with all approaches forecast to operate within capacity in both the 2036 AM and PM peak hour.</p>
Merrie Harrier to Barons Court Bus Lane	Provide a bus lane and bus gate on the Barry Road link before the Barons Court junction, in order to allow buses to make all possible turning movements in a controlled manner. The option creates a new third lane heading eastbound and utilising some of the land on the northern side of the carriageway. This will retain the two general traffic lanes heading eastbound, but still create bus priority on the link, with a bus lane of approximately 270m. Furthermore, provision has been made for a 2.5m wide combined footway/ cycleway on the north side of the link, directly adjacent to the proposed bus lane. In order to accommodate both the bus lane and footway/ cycleway provision, there will be a requirement to install approximately 300m of retaining wall of varying height (max 2.4m).

- 2.7.35 With regards to bus stop infrastructure, it is anticipated that standards for bus stop infrastructure will be developed as part of the Metro, with a consistent approach across the Capital City Region. However, at present the upgrade of bus stops in line with the Vale of Glamorgan Council proposals is included in the multi-modal package. The Council proposes to improve bus stop infrastructure by introducing Gold, Silver and Bronze standards depending on bus stop location, land availability and usage for example (Vale of Glamorgan LDP 2011-2026 Sustainable Transport Assessment Background Paper, September 2013).
- 2.7.36 An assessment of bus stop standards was completed as part of the Capita Dinas Powys to Cardiff Corridor Bus Priority Measures Report (May 2015) which identified works to establish one gold bus stop, two silver bus stops and six bronze bus stops. These proposals have been costed as part of the financial case for the multi-modal option.

### Rail Enhancements

- 2.7.37 The rail enhancements have been included in Table 14 and cover three main elements encompassing Eastbrook railway station upgrade, Dinas Powys railway station upgrade, and Vale of Glamorgan (Rail) Line service enhancements. Consultation with Transport for Wales and Network Rail would be required in order to determine the proposed interventions and timescales. It should be noted that as of 7<sup>th</sup> February 2021, Welsh Government has taken the Wales and Borders rail franchise into public ownership with Transport for Wales operating the Wales and Borders rail services under the subsidiary Transport for Wales Rail Ltd. This approach follows a significant fall in passenger numbers during the Covid-19 pandemic. The proposals establish a new relationship between Transport for Wales, Keolis and Amey which will be made up of three key components.
- 2.7.38 In addition, the individual aspects of each of the rail station enhancements projects would require specific consideration to determine their viability in the longer term. This would include an evaluation of station improvements, their costing and delivery timescales.

Table 14 Rail Enhancement Proposals

Proposal	Description
Eastbrook Rail Station Upgrade	<ul style="list-style-type: none"> <li>• Station Travel Plan</li> <li>• New enclosed waiting shelters</li> <li>• Additional secure cycle storage</li> <li>• Additional and enhanced lighting</li> <li>• Improved CCTV</li> <li>• Addition of customer help points</li> <li>• Improved customer information</li> <li>• General improvements to the station environment</li> <li>• Explore option to reconfigure the car park reconfiguration (to increase availability of spaces)</li> <li>• Explore feasibility of providing step free access to the platforms</li> <li>• Explore option of providing additional car parking capacity off Cardiff Road to the north-west of Eastbrook Station (site to be identified)</li> </ul>
Dinas Powys Rail Station Upgrade	<ul style="list-style-type: none"> <li>• Station Travel Plan</li> <li>• New enclosed waiting shelters</li> <li>• Additional secure cycle storage</li> <li>• Additional lighting</li> </ul>

Proposal	Description
	<ul style="list-style-type: none"> <li>Improved CCTV</li> <li>Additional of customer help points</li> <li>Improved customer information</li> <li>General improvements to the station environment</li> </ul>
Vale of Glamorgan Line Service Enhancements	<p>As part their commitment to the South East Wales Metro programme, Transport for Wales have outlined a number of proposals the following of which will affect the rail corridor either directly or indirectly through Dinas Powys<sup>7</sup>:</p> <ul style="list-style-type: none"> <li>Two trains per hour between Cardiff and Bridgend via Vale of Glamorgan from December 2023.</li> <li>Remove Pacer trains.</li> <li>Retain the link from Penarth, Barry and Bridgend to destinations north of Cardiff Central using new tri-mode trains (overhead electric, battery and diesel) from December 2023.</li> <li>Introduce three new Community Rail Partnerships, recruiting a Community and Stakeholder Manager and nine Community and Customer Ambassadors.</li> <li>Provide ticket machines at all South Wales Metro stations.</li> <li>Introduce pay-as-you-go for users of smartcards.</li> </ul>

2.7.39 In addition to the proposed rail interventions outlined in Table 14, the Vale of Glamorgan Council has taken forward a separate study considering options for a Transport Interchange at Cogan Station, which is seeking to further enhance the station and provide facilities sufficient for the utilisation of this station as a strategic hub within the South Wales Metro programme. Whilst continuation of the WelTAG Stage Three study for the 2021/22 financial year is subject to funding approval, the overarching scheme is aiming to:

- Deliver a transport interchange catering for rail, bus and taxi services and providing for linkages to the local active travel routes with integrated bike facilities, electrical charging facilities and services supportive of the interchange.
- Provide for a mixed-use development by delivering a masterplan which is inclusive of housing provision.

### Active Travel | Walking and Cycling

2.7.40 The walking and cycling proposals cover connections within Dinas Powys, as well as connecting Dinas Powys to nearby settlements including Barry, Penarth and Cardiff. The walking and cycling proposals are summarised in Table 15.

Table 15 Walking and Cycling Proposals

Item	Description
Barry to Dinas Powys Shared Use Walking and Cycling Route	<ul style="list-style-type: none"> <li>A new pedestrian and cycling link along the A4055 Cardiff Road between the Biglis roundabout and Dinas Powys. It is recognised that a continuous shared use route along the A4055 through Dinas Powys is difficult to achieve but improvements would be sought.</li> </ul>

<sup>7</sup> <http://tfw.gov.wales/whats-happening-south-east-wales>



Item	Description
	<ul style="list-style-type: none"> <li>This is a strategic link to connect Barry and Cardiff as two of the key settlements in South East Wales, as well as to providing a localised connection between Barry and Dinas Powys.</li> </ul>
Merrie Harrier to Barons Court	<ul style="list-style-type: none"> <li>A4055 Barry Road   Along the north side of the A4055 between the Merrie Harrier junction to the Barons Court junction – provide a 3m shared walking and cycling facility (along the majority of its length) alongside the proposed bus lane.</li> <li>Project delivery proposed as part of the bus lane delivery but can be delivered as a standalone project.</li> <li>Provision of a shared use facility between Andrew Road and Redlands Road</li> <li>Project delivery could be delivered as part of junction modification proposals but can be delivered as a standalone project subject to funding and inclusion as an Active Travel initiative.</li> </ul>
Dinas Powys to Penarth Connections	<ul style="list-style-type: none"> <li>Connections between Dinas Powys and Cosmeston.</li> <li>This is completed with a tarmacked route from Sully Road to Lavernock Road that can be accessed from Dinas Powys via the top of Murch Road.</li> </ul>
Dinas Powys Network	<ul style="list-style-type: none"> <li>Based on the improvements identified in Vale of Glamorgan Council's Pedestrian and Cycling Integrated Network Maps produced for Dinas Powys (a requirement of the Active Travel (Wales) Act 2013).</li> <li>The other walking and cycling proposals presented (i.e., the Barry to Dinas Powys Cycle Route, Merrie Harrier to Barons Court and Dinas Powys to Penarth Connections) are also included in the Integrated Network Maps for Dinas Powys.</li> </ul>
Regional Active Travel Initiative*	<ul style="list-style-type: none"> <li>A joint piece of work is due to be undertaken in 2021/22 with Cardiff, Vale of Glamorgan and Newport councils working together to look at interconnectivity along the corridor from Newport through Cardiff and onto Barry. This will form part of an enhanced active travel network through the three authority areas.</li> </ul>
Nextbike/ E-cycle Hire*	<ul style="list-style-type: none"> <li>With the recent success of the Nextbike e-cycle hire scheme in Penarth, docking stations are being added to Sully this financial year (2020/21) and it is proposed, funding dependant, to add additional docking stations into Dinas Powys in the 2021/22 financial year. The e-cycle hire scheme runs in conjunction with the Cardiff scheme and as such it provides infrastructure for and promotes active travel between neighbouring authorities.</li> </ul>

*\*Not costed at this stage of the appraisal*

## Option D | Bypass (Green Route) and Multi-modal

- 2.7.41 For the purposes of the Stage Two Plus WelTAG assessment, the bypass and multi-modal option is inclusive of the Green route proposal. The option description is a combination of the interventions as presented in section 2.7.

## 2.8 Appraisal of Options

- 2.8.1 The shortlisted options have been assessed in terms of how each would tackle the identified problems, to what extent it meets the objectives (including contributing to local, regional, and national well-being objectives) as well as key risks, adverse impacts, constraints and dependencies. The extent to which the option meets the objectives is described using the WelTAG seven-point assessment scale as set out in Table 1. For the strategic case, the impacts of the do-minimum are also set out compared to the base year situation. This enables an understanding of what will happen if only limited investment is made in the transport connections and provides a basis for comparing the performance of the do-something options.



Table 16 Option Appraisal | Do-minimum

Do-minimum			
<b>Description</b>		<p>Assume continued delivery of transport enhancements via the LTP and utilising existing sources of funding but assumes no step change in the level of funding or delivery of any major transport enhancements within the study area (assumes current levels of investment). Assumes the continuation of rail services, local bus services and community transport at a similar level as present utilising funding at similar levels to existing.</p> <p>Assumes continued work by local authorities and stakeholders to deliver improvements to the transport network, with the overall aim of addressing the identified problems and the outcomes of the relevant transport policies.</p> <p>It is recognised that the enhancement of services and infrastructure as part of the new rail franchise and the South Wales Metro are committed improvements. However, in this appraisal, these are included in the multi-modal option given that the details are currently emerging.</p>	
<b>How it tackles the problems</b>		Limited available funding (both capital and revenue) and resources are unlikely to make a step change in overcoming the identified problems.	
<b>Objectives</b>	<b>Overall</b>	<p>Overall, the do-minimum option is considered to have an adverse effect at meeting the objectives, due to the modest levels of funding currently able to be invested in transport infrastructure and public transport services. It assumes that background increases in population and traffic growth exceed investment provision to mitigate increasing impacts and pressure on the existing transport network. It should be noted that policies and programmes are in place to facilitate improved transport services but limited funding means that beneficial enhancements are currently difficult to achieve.</p> <p>A negative impact on the environment is forecast as the traffic levels through Dinas Powys would continue to increase, whilst the limited funding means that there is currently poor to moderate accessibility to services and a moderate road safety record, as well as a limited promotion and delivery of transport schemes to promote health and well-being. The increased traffic at the key junctions of the Merrie Harrier, Barons Court and Murch Road is anticipated to lead to increased delay on the corridor, with all junctions operating over capacity in the do-minimum scenario. The additional delay and congestion may lead to an impact on economic growth in the south east Vale. These problems cannot be addressed without sufficient committed funding and sources to have a beneficial impact.</p>	
	<b>1</b>	Support Sustainable Connectivity in Cardiff Capital Region	---
	<b>2</b>	Facilitate Economic Growth	---
	<b>3</b>	Improving Health and Well-being	-
	<b>4</b>	Improved Safety and Security	-
	<b>5</b>	Benefits and Minimised Impacts on the Environment	-
<b>Key Risks</b>		Potential reductions in available funding and resources leading to poor investment in public transport and local highway infrastructure. Do-minimum option may not be publicly acceptable, and not being seen to tackle existing issues.	
<b>Adverse Impacts</b>		<p>The anticipated increase in annual traffic volumes (general background traffic growth plus local LDP development) is anticipated to have an adverse impact on the environment compared to the existing situation.</p> <p>Potential for a deterioration in highway safety, especially along the A4055 and at key junctions.</p>	

Do-minimum	
	<p>Potential for adverse socio-economic opportunities with reducing accessibility to sustainable travel opportunities.</p> <p>Continued overcrowding on public transport services impacting on accessibility to jobs and services.</p> <p>Deterioration of the Cardiff Road corridor encompassing environmental issues, increase journey time delay and anticipated worsening of highway junction capacity.</p> <p>Potential that increased traffic re-routes to avoid congested corridor and has impacts on other areas of the south east Vale.</p>
<b>Constraints</b>	The option is considered to be relatively unconstrained although any restriction with regard to the availability of funding and resources could jeopardise standard maintenance/ enhancement proposals.
<b>Dependencies</b>	Continued development of centralised services and socio-economic opportunities within key urban settlements surrounding Dinas Powys adding increasing pressure on the existing transport infrastructure and services, as well as an increased need to travel to access these services.

Table 17 Option A | Bypass – Green Route

Option A   Bypass – Green Route	
<b>Description</b>	<p>Construction of a new 60mph single carriageway bypass to the east of Dinas Powys interconnecting with the A4055 approximately 0.9km south of the A4055 Cardiff Road/ Cross Common Road priority junction, extending northwards to the east of Dinas Powys through primarily green wedge land and interconnecting with the A4055 at its junction with the B4267 just south of the Merrie Harrier junction.</p> <p>The WelTAG Stage Two design has been developed with the potential to provide integral public transport infrastructure and suitable crossings to retain east/ west connectivity for walking and cycling.</p> <p>Implementation of the Green route has assumed significant enhancements to the Merrie Harrier junction to facilitate wider benefits of route journey time improvements. The revised junction arrangement developed to support the WelTAG Stage Two Plus assessment is included within <a href="#">Appendix B</a>, with the junction interconnecting to a standard roundabout to the south west of Merrie Harrier providing connectivity to Cardiff Road, Redlands Road and a new bypass.</p> <p>In addition, a new 3-arm roundabout at the southern end of the bypass would facilitate connectivity to the A4055 Cardiff Road for access northbound towards Dinas Powys and southbound towards Barry.</p>
<b>How it tackles the problems</b>	<p>The implementation of a new bypass at this location has the potential to tackle the following problems – P06 / P07 / P09 / P10.</p> <p>If a bypass is delivered, the existing adverse impact of road traffic specifically through Dinas Powys could be reduced. The forecast reduction in traffic is anticipated to:</p> <ul style="list-style-type: none"> <li>• Alleviate congestion and capacity issues at sensitive junctions within Dinas Powys with potential for improved local journey times and reliability (notably reducing delay at the Murch Road junction).</li> <li>• Reduce local issues within Dinas Powys associated with air quality and noise pollution.</li> <li>• Mitigate road safety concerns with the potential for a reduction in the number of local accidents on the existing corridor.</li> </ul>

Option A   Bypass – Green Route		
		<ul style="list-style-type: none"> <li>Reduce severance within the community with improved crossing opportunity for pedestrians and cyclists.</li> <li>Allow greater assimilation of new vehicle trips associated with future residential development within Dinas Powys.</li> </ul> <p>However, improving capacity of the local highway network is likely to strengthen dependence on the private car by making local journeys by private vehicles more attractive and reliable.</p> <p>Some of the improvements noted, including environmental and congestion, have the potential to be displaced onto the new road. Moreover, improved journey times through Dinas Powys may result in traffic continuing to use Cardiff Road but at increased speed that would potentially require mitigation measures.</p>
Objectives	Overall	<p>A new bypass has the potential to support sustainable connectivity in the Cardiff Capital Region by improving local journey times for bus trips through Dinas Powys allowing for greater reliability and the potential to attract increased patronage. Improved journey times could however make travel by car more attractive and therefore reduce the desirability of public transport locally and regionally. Moreover, connectivity within Dinas Powys could be improved. A slight beneficial impact is therefore considered appropriate.</p> <p>Traffic modelling completed to support the assessment of the bypass has demonstrated a measurable improvement in journey times between the Biglis roundabout and the Merrie Harrier junction. A minor beneficial impact could be achieved with regard to facilitating economic growth as accessibility is improved within and through the area.</p> <p>A neutral impact is considered for improvements to health and well-being with the potential for improvements to air quality and noise pollution on the A4055 through Dinas Powys being displaced onto a new bypass impacting on local residents.</p> <p>A slight beneficial impact is assigned to safety and security as forecast reductions in traffic flow through Dinas Powys could be achieved together with implementation of</p> <p>Whilst a new highway/ bypass designed to current DMRB standards has the potential to enhance safety and security on the local highway network, a strategic economic review of road traffic accidents based on SEWTM traffic flows has identified the potential for additional costs associated with the implementation of a bypass. Full economic details are included within Chapter 4 which identifies a cost of £4.33M.</p> <p>The option could establish a moderate adverse impact with regard to the environment as a bypass would:</p> <p>(1) Be implemented predominantly on existing green wedge land.</p> <p>(2) Have the potential increase in road traffic/ car use as more people could choose to drive due to time savings and greater journey time reliability.</p> <p>(3) Establish the displacement of existing air quality and noise pollution from the A4055 Cardiff Road to the new road. This could be considered a large adverse impact but needs to be considered against the likely environmental benefits local to Cardiff Road through Dinas Powys.</p>
	O1	Support Sustainable Connectivity in Cardiff Capital Region +
	O2	Facilitate Economic Growth ++
	O3	Improving Health and Well-being 0
	O4	Improved Safety and Security -
	O5	Benefits and Minimised Impacts on the Environment --

Option A   Bypass – Green Route	
<b>Key Risks</b>	<p>Requires a high level of capital investment.</p> <p>At present the route is not included in the LDP thus there are planning risks in taking it forward. The route would be through the green wedge policy area between Dinas Powys and Penarth.</p> <p>Moreover, there are significant funding constraints in short to medium term programmes and design and development work required to take the proposal forward.</p> <p>A bypass for Dinas Powys is not currently included in any funding programme for the Vale of Glamorgan or the Welsh Government. Future funding uncertainties are a key risk particularly given public resources as a result of the Covid-19 pandemic. It is anticipated that any proposal would need to demonstrate regional/ national value against these other large-scale transport schemes.</p> <p>Impacts on properties in the vicinity of the route and associated land acquisitions (time and cost).</p> <p>Environmental considerations, including the potential for protected species to be located along the route, archaeology, flooding and ancient woodland issues to address.</p> <p>Reduced traffic flows within Dinas Powys could lead to increased traffic speeds. Improved road conditions within Dinas Powys has the potential to retain and possibly attract increased development pressure and traffic growth, alleviating the benefits of traffic reduction sought through the implementation of a bypass.</p> <p>Route uncertainties make it difficult to fully understand the engineering constraints, potential costs and associated impacts at this stage of the analysis. In particular, the uncertainties associated with a significant enhancement of the Merrie Harrier junction.</p> <p>The inability for the bypass to establish effective improvements to junctions and journey time reliability, particularly to the north of the new route, with the Barons Court junction remaining a significant constraint to journey time. For the purposes of the WelTAG Stage Two Plus study, it is assumed that constraints associated with the Merrie Harrier junction can be suitably mitigated, as set out in the options discussion.</p>
<b>Adverse Impacts</b>	<p>Potential adverse impact on the environment and biodiversity.</p> <p>Potential to encourage more journeys to be undertaken by car or Heavy Goods Vehicles (HGVs).</p> <p>Impact on residents situated adjacent or in close proximity to the bypass alignment.</p> <p>Impact on local communities during construction.</p> <p>Delay to road users (car, HGVs and public and community transport) during construction of new junctions.</p> <p>The option requires removal of the Merrie Harrier public house, together with anticipated impacts on land/ property boundaries to accommodate enhancements to the Merrie Harrier junction. A topographical survey would be required at Stage Three to understand the full implications.</p> <p>Would require a high level of capital investment, which may have implications on the delivery of other capital schemes in the region for a number of years, including the delivery of more sustainably driven measures.</p>
<b>Constraints</b>	<p>Availability of funding and resources.</p> <p>Land ownership constraints.</p> <p>Route uncertainties, in particular with the assumed Merrie Harrier improvements, make it difficult to fully understand the engineering constraints and potential costs.</p>

Option A   Bypass – Green Route	
	<p>Environmental considerations including the potential for protected species along the bypass alignment.</p> <p>The climate emergencies declared by Welsh Government and the Vale of Glamorgan Council will establish a key influence on the direction of development and infrastructure provision for Wales, as well as an integral component towards shaping future transport schemes as the carbon impacts (both from construction and from transport operations) of options will need to be carefully considered.</p>
<b>Dependencies</b>	<p>Need to address more strategic corridor issues associated with the Barons Court junction in particular, in order to maximise journey time benefits.</p> <p>Impacts on available revenue/ maintenance budgets.</p> <p>Ability to acquire all land required to facilitate the proposal.</p>

Table 18 Option B | Bypass – Pink Route

Option B   Bypass – Pink Route	
<b>Note: The option appraisal is as described for the Green route with the following amendments confirmed.</b>	
<b>Description</b>	<p>The option is as described for the Green route in Table 17, with the addition of a roundabout to be incorporated into the scheme. The roundabout has been based on a normal roundabout with an ICD of 45.2m to accommodate a potential new access onto it from Murch Road. It is assumed that a compliant access from Murch Road to the roundabout can be achieved although costs for developing this access have not been included within the estimates provided. The roundabout is shown for illustrative purposes to demonstrate it would be feasible to allow an access onto the roundabout. It would be anticipated that provision of a roundabout would lead to changes in traffic patterns on Murch Road, as a new connection is formed between the centre of Dinas Powys and the bypass. This would require further detailed analysis during design and development of a bypass, to determine the local traffic impacts.</p>

Table 19 Option C | Multi-modal

Option C   Multi-modal	
<b>Description</b>	<p>The multi-modal option considers the delivery of short (up to five years), medium (up to ten years) and long (more than 10 years) term improvements within the study area across a range of sustainable modes. The option includes a range of enhancements to the existing public transport network including enhancements to bus and rail services and associated infrastructure/ interchanges. In the short term, this could encompass relatively 'quick win' deliverables (subject to funding) including robust enhancements to passenger facilities which have the potential to have a measurable impact on transport provision within the study area, alongside a programme of active travel improvements.</p>
<b>How it tackles the problems</b>	<p>The option has the potential to tackle the following problems – P1 / P2 / P3 / P4 / P5 / P6 / P7 / P8 / P9 / P10.</p> <p>Through delivering enhancements to both services and infrastructure, the multi-modal package has the potential to make public transport services more attractive and less complex with greater integration, reducing the dependency on the private car and enabling those without a car to more readily access key services and employment.</p> <p>Greater regional assimilation to the Cardiff Capital Region could help improve access to employment and services and enable a greater number of people access to key centres containing key services. The extent to which improvements bring benefits is dependent</p>

Option C   Multi-modal			
		<p>on the wider context of Metro improvements and journey times for buses on the wider network. Moreover, without improvements to the local road network to improve journey times, ongoing congestion issues are anticipated to continue to impact on buses, walkers and cyclists.</p> <p>The delivery of a new bus lane between the Merrie Harrier and Barons Court junctions has the potential improve both journey times and journey time reliability for bus services through the study area.</p>	
Objectives	Overall	The delivery of an enhanced public transport services and infrastructure would promote an improved level of accessibility to key destinations, employment and services. The low number of existing users of sustainable modes does present a challenge to deriving significant mode transfer from car to sustainable travel. The delivery of walking and cycling improvements would have a moderate beneficial impact on health and well-being, as well as improving journey time reliability and providing enhanced public transport provision has the potential to have a beneficial impact on the environment by encouraging some to use more sustainable modes of travel.	
	O1	Support Sustainable Connectivity in Cardiff Capital Region	++
	O2	Facilitate Economic Growth	+
	O3	Improving Health and Well-being	+
	O4	Improved Safety and Security	+
	O5	Benefits and Minimised Impacts on the Environment	+
Key Risks		<p>The package of measures would involve a moderate to high level of cost, depending on the level of public transport improvements included.</p> <p>Availability of funding to support the package of measures.</p> <p>Environmental considerations (time and cost) associated with a Park and Ride site and rail station enhancements, and time cost impacts associated with land acquisition.</p> <p>Is there sufficient demand for additional services and routes to justify the investment when availability of funding is diminishing?</p> <p>Increasing pressure on available funding and resources to support public transport, both initial investment and ongoing support.</p>	
Adverse Impacts		<p>Development of park and ride site and bus lane improvements could result in adverse environmental impacts.</p> <p>Impact on local communities during construction of improvements to highways, walking and cycling and rail interchange enhancements.</p> <p>Delay to road users (car, HGVs and public and community transport) during construction.</p>	
Constraints		<p>Availability of funding and resources, environmental considerations and land ownership.</p> <p>Requires integration with local and community transport services, which are reliant on other funding sources and private operators and such integration is therefore not guaranteed.</p> <p>Journey times dependent on the existing road network and its existing limitations.</p> <p>Improvements to journey time and journey quality are dependent on significant highway improvements and hence investment.</p>	

Option C   Multi-modal	
	Requires local bus services and community transport to be of a sufficient frequency and coverage to enable a large number of people to be able to readily access the regional services.
<b>Dependencies</b>	<p>Impacts on available revenue/ maintenance budgets.</p> <p>All of the individual identified schemes along the corridor would need to be delivered to enable the full scheme benefits to be achieved.</p> <p>Welsh Government priorities and committed expenditure.</p>

Table 20 Option D | Bypass (Green Route) and Multi-modal

Option D   Bypass (Green Route) and Multi-Modal Option			
<b>Description</b>		The option encompasses a combination of the Green route and multi-modal option.	
<b>How it tackles the problems</b>		The option has the potential to tackle the following problems – P1 / P2 / P3 / P4 / P5 / P6 / P7 / P8 / P9 / P10.	
<b>Objectives</b>	<b>Overall</b>	<p>A combined bypass and multi-modal option has the potential to establish a comprehensive transport scheme for Dinas Powys with wider benefit to the immediate surrounding areas.</p> <p>The combining of sustainable measures throughout the two options could support robust sustainable connectivity in the Cardiff Capital Region. A moderate beneficial score is however retained as improved highway connectivity could make travel by car more attractive and therefore reduce the desirability of public transport locally and regionally.</p> <p>The journey time and capacity improvements from the bypass would assist public transport and walking and cycling movements through and within Dinas Powys by reducing general traffic volumes.</p> <p>The benefits identified for the economic appraisal have been noted. A moderate score is retained as benefits are not considered to establish a wider strategic impact throughout the south east Wales region with benefits more applicable to Dinas Powys and the immediate surrounding urban areas, most notably Barry.</p> <p>In light of the neutral impact recognised for the bypass option in isolation, the extensive health and well-being benefits realised as part of the multi-modal option have subsequently been carried forward to the combined option.</p> <p>Whilst a new highway/ bypass designed to current DMRB standards has the potential to enhance safety and security on the local highway network, a strategic economic review of accidents based on SEWTM traffic flows has identified the potential for additional costs associated with the implementation of a bypass. Full economic details are included within Chapter 4 which identifies a cost of £4.33M. The added benefits recognised as part of a multi-modal option have however also been considered to establish an overall neutral score.</p> <p>Whilst a neutral impact on the environment was considered applicable for the multi-modal option, the adverse impacts resulting from a new bypass, both in the short (construction) and long (operational) term have been applied to the combined option.</p>	
		<b>O1</b>	Support Sustainable Connectivity in Cardiff Capital Region ++
		<b>O2</b>	Facilitate Economic Growth ++
		<b>O3</b>	Improving Health and Well-being +++

Option D   Bypass (Green Route) and Multi-Modal Option			
	O4	Improved Safety and Security	0
	O5	Benefits and Minimised Impacts on the Environment	-
Key Risks		See Table 17 and Table 19 for summary of two options.	
Adverse Impacts		See Table 17 and Table 19 for summary of two options.	
Constraints		See Table 17 and Table 19 for summary of two options.	
Dependencies		See Table 17 and Table 19 for summary of two options.	



## 3 Transport Case

### 3.1 Overview

- 3.1.1 The aim of the transport case is to explain the expected impacts of the project, how the project will contribute to the well-being goals and whether the project will provide value for public money. The transport case presents the approach and assessment of impacts of each option under the headings of social, cultural, environmental and economic, and an evidence-based assessment of the following:
- What the impacts will be?
  - The scale of those impacts.
  - Where will they occur?
  - Who/ what will experience them?
- 3.1.2 All WelTAG Stage Two Plus do-minimum and do-something options have been assessed, namely:
- Do-minimum (the impacts are assessed against the base year, whereas each of the do-something options is compared to the do-minimum)
  - Option A | Bypass – Green Route
  - Option B | Bypass – Pink Route
  - Option C | Multi-modal
  - Option D | Bypass (Green Route) and Multi-modal

### 3.2 Approach to Impact Assessment

#### Background Information

- 3.2.1 The anticipated impact of the bypass on traffic and the economic, social and environmental impacts has been quantified through the use of SEWTM. A model run was commissioned by the Vale of Glamorgan Council assuming implementation of the Green route given this represents the greatest potential for improved journey times in comparison to the Pink route, which is inclusive of an additional roundabout interconnecting with Murch Road. A technical note setting out the methodology for the economic appraisal is included as part of the Impacts Assessment Report.
- 3.2.2 Model flows, journey times and user benefits were obtained for the Base Year 2015 and for the With and Without Scheme in 2036. This has enabled Arcadis to undertake a cost benefit analysis for the proposed bypass, including accident benefits and prepare a Transport Economic Efficiency (TEE) table for the option. There would need to be an update to the business case at WelTAG Stage Three using SEWTM and incorporating any refinements to the options. The results of the cost benefit analysis have been considered and a qualitative commentary provided to support corresponding analysis of the bypass.
- 3.2.3 Where possible, other impacts have been quantified. At this stage social, cultural and environmental impacts have been assessed through measurement of receptors likely to be affected, but this is prior to environmental and technical surveys being undertaken as well as a full Environmental Impact Assessment, which will be needed to progress an option in Stage Three.

#### Social Impacts

- 3.2.4 The social impacts have been assessed where applicable with reference to the guidance in WebTAG Unit A4<sup>8</sup>. The assessment is qualitative with the exception of accidents, for which a quantified analysis has been undertaken using COBALT from the traffic modelling results (and is reported under the economic impacts appraisal). The topics covered are physical activity, security, severance, journey quality, option and non-use values, accessibility and personal affordability.

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<sup>8</sup> <https://www.gov.uk/government/publications/webtag-tag-unit-a4-1-social-impact-appraisal-december-2017>

## Cultural Impacts

- 3.2.5 The Well-being of Future Generations (Wales) Act 2015 has a well-being goal of ‘A Wales of vibrant culture and thriving Welsh language.’ It is noted that this well-being goal will be achieved through ‘a society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.’ For this assessment, the cultural assessment is a qualitative commentary on any impacts on cultural assets and the Welsh language. Cultural assets considered include arts and cultural centres, visitor attractions, sports facilities and cultural heritage.

## Environmental Impacts

- 3.2.6 The environmental impacts appraisal for this Stage Two Plus assessment is based on WebTAG Unit A3<sup>9</sup>. The topics covered are noise, air quality, greenhouse gases, landscape, townscape, historic environment, biodiversity and water environment. At this stage, surveys have not been undertaken and the appraisal has been undertaken using desk top analysis. For landscape and visual impacts and biodiversity, site visits by professionals to identify key issues and constraints have been completed. The Impacts Assessment Report sets out the environmental data utilised to inform the appraisal and includes the accompanying WebTAG worksheets.

## Economic Impacts

- 3.2.7 The economic impacts appraisal considers the changes in journey time, reliability and accidents as derived from the traffic modelling using the outputs from SEWTM in accordance with the WebTAG guidance (TAG Unit A1-1). The methodology for undertaking the modelling by the consultants for Transport for Wales are contained in a technical note within the Impacts Assessment Report. Arcadis has used the outputs to undertake the economic assessment and the WebTAG guidance highlights that wider economic impacts can also be appraised. The Department for Transport (DfT) WebTAG guidance includes assessment of the wider economic benefits related to induced investment, employment effects and productivity impacts (TAG Unit A2-1). A qualitative approach has been taken as a proportionate approach at this stage.

## 3.3 Option Assessment

- 3.3.1 A summary of results is outlined within Table 21 with each of the detailed option assessments contained in [Appendix D](#). Each assessment is in comparison to the 2036 do-minimum scenario. The WelTAG seven-point assessment scale, as set out in Table 1, has been used to present the scale of the impact. The WebTAG worksheets that support analysis of the impacts (where applicable) are included within the Impacts Assessment Report.

Table 21 Impact Assessment Summary

Impact	Do-minimum	Option A Bypass Green Route	Option B Bypass Pink Route	Option C Multi-modal	Option D Bypass and Multi-modal
<b>Social</b>					
Physical Activity	-	+	+	++	++
Journey Quality	---	+++	+++	++	+++
Accidents	-	-	-	+	0
Security	-	++	++	++	++

<sup>9</sup> <https://www.gov.uk/government>

Impact	Do-minimum	Option A Bypass Green Route	Option B Bypass Pink Route	Option C Multi-modal	Option D Bypass and Multi-modal
Access to Employment	--	++	++	++	++
Access to Services	--	++	++	++	++
Affordability	0	0	0	+	+
Severance	-	++	++	+	+++
Option and Non-Use Values	-	+	+	++	++
<b>Cultural</b>					
Cultural Facilities	0	0	0	0	0
Welsh Language	0	0	0	0	0
<b>Environmental</b>					
Noise	-	--	--	0	--
Air Quality	0	-	-	+	0
Greenhouse Gases	0	+	+	+	+
Landscape	0	--	--	-	--
Townscape	-	0	0	0	0
Historic Environment	0	-	-	0	-
Biodiversity	0	--	--	-	--
Water Environment	0	-	-	-	-
Residential Amenity	-	--	--	-	--
<b>Economic</b>					
Journey Time Changes	-	++	+	+	++
Journey Time Reliability Changes	-	++	++	+	++
Transport Costs	-	0	0	+	+
Wider Economic Impacts	0	0	0	+	+
Land and Property	0	--	--	-	--

### 3.4 Value for Money Assessment

#### Background

- 3.4.1 This section sets out the impact on public accounts and the results of the Analysis of Monetised Costs and Benefits (AMCB) based on the Green route bypass option, using costs calculated by Arcadis and the benefits derived from the outputs of the SEWTM assessment. Full discussion of the methodology and results is included as part of the Impacts Assessment Report.

#### Public Accounts

- 3.4.2 The effects of the options on public finances are shown in Table 22, taking into account the impact on the broad transport budget after allowing for changes in revenues. It also includes changes in the broader indirect tax revenues which accrue to the government. The net impact on the transport budget is estimated at £32.40M.
- 3.4.3 The indirect tax revenue values show a decrease in revenue to the wider public finances and, in accordance with WebTAG guidance, are included in the calculation of the Present Value of Benefits (PVB). The sign of the value in the Public Accounts (PA) table is reversed in the AMCB table because the PA table presents costs to the public accounts as positive values. The AMCB tables combine the results from the TEE tables and the PA tables supplemented by information on accidents and environmental effects.

Table 22 Public Accounts (Present Value Costs £M 2010 prices discounted to 2010)

Scheme Costs	Bypass   Green Route
Investment Costs	31.37
Operator Costs	-
Revenue	-
Indirect Tax Revenue	1.03
<b>Net impact</b>	<b>32.40</b>

#### Analysis of Monetised Costs and Benefits

- 3.4.4 The AMCB table combines the results from the TEE table and the PA table and supplements it with the information on accidents. A summary of the results for the scheme appraisal is set out in Table 23.

Table 23 AMCB summary table (prices in £M, discounted to 2010)

	Scheme costs	Bypass   Green Route
A	Accidents	-4.33
B	Economic efficiency: Commuting	24.19
C	Economic efficiency: Other	25.34
D	Economic efficiency: Business	19.00
E	Wider Public Finances (ITR)	-1.03

	Scheme costs	Bypass   Green Route
F	PVB (A+B+C+D+E)	63.17
G	PVC	31.37
H	<b>Net Present Value (F-G)</b>	<b>31.80</b>
I	<b>Benefit Cost Ratio (F/G)</b>	<b>2.01</b>

### Sensitivity Test

3.4.5 A second Economics file has been included with TUBA version 1.9.14, which is consistent with the forthcoming change to TAG Databook v1.14 and the July 2020 Office for Budget Responsibility forecasts, which takes into account Covid-19 impacts. Government guidance states the requirement for scheme promoters to conduct sensitivity tests using TAG Databook v1.14. The changes in TAG Databook v1.14 consist of:

- Reduced growth in forecast GDP per capita, and corresponding changes to forecast values of time and other appraisal values.
- A slight reduction in the share of diesel cars in the fleet mix with a corresponding increase in petrol cars.
- Increased petrol and diesel fuel efficiency for cars and vans in the long run, with a slower rate of improvement in the short-term.
- Stronger electric car efficiency improvement projections, but weaker electric van efficiency improvements.
- The inclusion of fuel efficiency improvement projections for HGVs (efficiency was previously assumed to be constant over time).

3.4.6 The sensitivity test results are as shown in Table 24.

*Table 24 AMCB summary table (prices in £M, discounted to 2010) – Sensitivity Test*

	Scheme costs	Bypass   Green Route
A	Accidents	-4.33
B	Economic efficiency: Commuting	20.84
C	Economic efficiency: Other	21.61
D	Economic efficiency: Business	16.34
E	Wider Public Finances (ITR)	-0.91
F	PVB (A+B+C+D+E)	53.55
G	PVC	31.37
H	<b>Net Present Value (F-G)</b>	<b>22.18</b>
I	<b>Benefit Cost Ratio (F/G)</b>	<b>1.71</b>

### Summary of Economic Appraisal

- 3.4.7 The Green route produces a total PVB of £63.17M and a cost of £31.37M. This results in a Net Present Value of £31.80M and an estimated Benefit Cost Ratio of 2.01. This suggests that the scheme could represent high value for money.
- 3.4.8 The sensitivity test results show that the Green route produces a total PVB of £53.55M and a cost of £31.37M. This results in a Net Present Value of £22.18M and an initial Benefit Cost Ratio of 1.71. This suggests that the scheme would represent medium value for money. Thus, taking into account recent forecast changes results in a reduced BCR, but still representing medium value for money.
- 3.4.9 These results do not reflect the qualitative and quantitative information such as reliability and wider economic impacts, which contribute to the calculation of the Adjusted Benefit Cost Ratio and may increase the Value for Money of the scheme further.
- 3.4.10 A full business case would be needed at WelTAG Stage Three to further consider the economic impact of the scheme.

## 4 Financial Case

### 4.1 Overview

- 4.1.1 The financial case presents information on whether an option is affordable in the first place and long-term financial viability. It covers both capital and annual revenue requirements over the life cycle of the project and the implications of these for the balance sheet, income and expenditure accounts of public sector organisations.

### 4.2 Option Costs

- 4.2.1 This section sets out the estimated implementation costs for each of the options, including the further development and assessment work required in later WelTAG stages to take the option forward. At this stage, the lifetime costs of the options have therefore not been estimated. The implementation costs encompass the start of WelTAG Stage Three up to and including delivery of the scheme. Costs beyond the scheme delivery would relate to ongoing maintenance and monitoring with the maintenance costs dependent on each option.

#### Bypass Options

##### Assumptions

- 4.2.2 The costing of the bypass options has been developed with the following assumptions:
- The following items have been taken from the average cost of three projects (based on construction cost value) overseen by Arcadis in the last two years.
    - Preliminaries at 25%.
    - Detailed Design at 4.5%.
    - Supervision at 2%.
    - Contractors Fee at 9%.
    - Without NRSWA C2 preliminary enquiries to identify the stats involved we have assumed Statutory Undertakers diversion costs of £1.5M. This is based on our experience of other similar schemes. However, C2 preliminary enquiries at a later stage will be required to confirm the budget.
    - Based on other projects, Employers Agent fees have been assumed at £1.5M, with an estimated Employers Risk of £2.5M.
    - An estimated cost of £3.36M has been placed against the Merrie Harrier junction improvements (Option 1A).
    - Land costs have been calculated for both alignments based on similar projects within the area and prorated against the length.
  - A risk item of 14% has been used to build up the cost for both alignment options.
  - An Optimism Bias (OB) of 30% which is averaged between the Stage One and Stage Two from recommendations in WebTAG Unit 1.2 has also been used, OB is used in order for additional costs that may come about as further investigative and survey works are carried out. It is considered that the 30% is still valid due to the unknowns within the projects such as ground data, additional junctions and possible improvements required to existing junctions.

##### Bill of Quantities Items

- 4.2.3 Table 25 describes the assumptions used in the bill of quantities for the scheme cost estimates.

Table 25 Bill of Quantities Items

Bill Item	Description
Preliminaries	Using live project rates, a percentage of the estimated construction cost of has been used to establish the amount for preliminaries.
Site Clearance	The site clearance has been determined by the extent of the project with boundaries taken to the extent of earthworks. A hedge has been assumed within each parcel of land that the option intersects with, this has been estimated at 30m in length multiplied by the number of parcels. Further site clearance items have been allowed for and are indicated as items as quantities are unable to be estimated at this stage. For these items, values have been taken from a live project.
Fencing	To determine fencing requirements, it has been assumed that the entire length of both sides of the road will require fencing to separate land. Fencing has been assumed to be a Timber Post and Four Rail Fence in accordance with Highways Construction Detail (HCD) HCD/13. Steel gates for Accommodation Works have been allowed for where existing parcels of land have been segregated, this has been determined from analysis of the OS data available. Gates would be in accordance with HCD/H19. Where the bypass passes a number of houses and element of 4m high Acoustic Fencing has been allowed for (based on length).
Road Restraint Systems	Safety barrier has been allowed for within the cost makeup on both sides of the new carriageway in order to protect cyclists from live running traffic and also protect traffic from embankment areas. It is considered that through further design and the completion of a RRRAP Assessment the length of Road Restraint can be reduced.
Drainage	Carriageway drainage has been assumed as a concrete channel placed in the verge areas, which will drain to gullies then into a carrier drain below. Cut-off drainage via concrete channels has also been allowed for at back of cycleway in cuttings. Formal drainage outfall points cannot be determined at this stage however, six outfalls have been allowed for with drainage pipes/headwalls etc in the cost estimate.
Earthworks	Earthworks have been determined using the provided data from the Vale of Glamorgan which has been input into Civils 3D. From this, using 1 in 3 embankments the cut and fill has been determined.
Pavement	<p>The depth of pavement allows for poor ground conditions and therefore can be taken as a possible opportunity once ground conditions are established by undertaking a ground investigation. Taking this into account the greatest depth of sub-base has been allowed within the construction make up of 450mm with a geotextile membrane. Other elements of the pavement make up are as below:</p> <ul style="list-style-type: none"> <li>• Surface Course – 40mm thick</li> <li>• Binder Course – 60mm thick</li> <li>• Base Course – 200mm thick</li> <li>• Sub-Base – 450mm thick</li> <li>• Geotextile membrane</li> </ul>
Footway/ Cycleway	<p>The footway/ cycleway has been positioned on the same side of Dinas Powys on both bypass options, to allow for direct access from the settlement. The shared footway/ cycleway has been designed at 3.5m wide and allows for no segregation of pedestrians and cyclists. The vertical and horizontal alignment will follow that of the bypass option, however where junctions need to be negotiated, there will be localised amendments to the alignment. This would be identified during the next stage of the project where junctions have been designed and greater knowledge of the surrounding area is understood. The makeup of the footway/ cycleway is assumed to be:</p> <ul style="list-style-type: none"> <li>• Surface Course – 40mm thick</li> <li>• Binder Course – 60mm thick</li> <li>• Sub-base – 100mm thick</li> </ul>



Bill Item	Description
Signage and Road markings	An estimate has been allowed for the cost of signs and road markings as £100k for both options, which has been based on similar projects. Carriageway centre line and edge of carriageway ribbed lines have been based on the length of road considered.
Lighting and Electricity	Lighting has been considered at roundabouts and new junctions only, due to the rural nature of the route.
Lighting of Footway/ Cycleway	<p><b>LTN 2/04 states</b> ‘Pedestrians and cyclists dislike using unlit facilities after dark for personal security reasons, particularly when they are located away from well used routes. On facilities alongside existing carriageways, street lighting may be adequate, but old or sub-standard street lighting may need to be replaced to improve conditions to encourage greater use. New lighting may need to be considered on new facilities away from the carriageway. If lighting cannot be provided or is deemed undesirable, a lit on-road alternative should be signed where available. Issues of light pollution should be considered, particularly in rural areas. Adequate lighting and sightlines, and the absence of any hiding places close to the route can help to provide a sense of security for pedestrians and cyclists. This is particularly important for isolated facilities.’</p> <p>Taking this statement into account and in accordance with Sustrans Guidance 5m high columns have been chosen for the length of the cycleway at 35m centre and included within the cost makeup for each option. It is recommended that due to the close proximity to the bypass alignment that a risk assessment be carried out during the next stage to ensure that the lighting doesn’t confuse traffic using the bypass.</p>
Ducting	Communication ducting has been allowed for the entire length of new road, with road crossings included where required.
Structures	The only structures being utilised on both alignments are Non-Motorised User (NMU) bridges which will be designed to allow pedestrians to pass over the bypass to continue on a Public Right of Way. In order to determine the cost of the structures, the square area costs have been calculated from a live project of a similar type bridge that will be required. This square area cost has then been multiplied by the estimated square area for each bridge. Structures have an assumed headroom clearance of 5.3m above exiting ground level with an estimate of 0.7m on top to allow for the structure construction depth.
Accommodation Works and Statutory undertakers	A percentage cost for Accommodation Works has been determined from the average of three live projects, due to the current stage of the project we are unable to determine the extent of Statutory Undertakers works required and any accommodation works due to unknown landowner and extents of land owned by others. Therefore, an amount of £1.5M has been allowed for Statutory Undertakers Works with a 3% value of the construction cost allowed for Accommodation Works.
Landscaping and Environmental Works	A percentage cost for Landscaping and Environmental Works has been determined from the average of 3 live projects, due to the current stage of the project it is difficult to calculate actual costs, therefore it was considered that a percentage allowance of 1.84% would be the best way to inform the cost.

## Option Summary

### Green and Pink Routes

- 4.2.4 Both options allow for the bypassing of Dinas Powys and allow for a compliant DMRB single 60mph carriageway from south of the Merrie Harrier junction to Cardiff Road, however both alignments also have their risks. It is expected that there is further archaeology within the area that is not currently identified on the constraints plan and also the ground conditions are currently unknown. Both options impact on similar environmental constraints, similar PRow and have very similar costs. However, the Pink route does allow for less waste to be disposed of off-site and includes a roundabout to connect onto Murch Road. No large structures are associated with either route however there are

three NMU Bridges and two large box culverts associated with each route to allow the continuance of the PRoWs.

- 4.2.5 The current estimated total cost difference is in the region of £0.71M, this is mainly due to the amount of material to be disposed of offsite. It is anticipated that if a contract is let for further design and construction the amount of material disposed of can be reduced for both options. It should be noted that the cost estimates at this stage have been built up using comparable rates and with assumptions due to the early stage of development. We have followed guidance within the Transport analysis guidance WebTAG, in the application of risk and optimism bias. It is recommended that further survey work and design and cost development in liaison with stakeholders and statutory environmental bodies is required. Table 26 summarises the key features and costs of each of the highway alignments with a detailed cost breakdown included in [Appendix E](#).

*Table 26 Bypass Option Summary including Cost Estimates*

Item	Bypass Green Route	Bypass Pink Route
Length of New Bypass	3,565 metres	3,617 metres
Length of new Carriageway through the docks site	n/a	n/a
Length of existing carriageway upgrade (Hayes Road)	n/a	n/a
Cut and Fill Balance	Disposal of 53,300m <sup>3</sup>	Disposal of 21,600m <sup>3</sup>
Public Right of Way Impacts	2 Bridges/ 3 Culverts	2 Bridges/ 3 Culverts
No of Structures	0	0
Archaeology Affected	1	1
Houses Affected	0	0
Ancient Woodland	1 Area	1 Area
TPO	0	0
<b>Construction Cost</b>	<b>£20,234M</b>	<b>£19,810M</b>
<b>Total Cost including WelTAG Stage Three</b>	<b>£46,320M</b>	<b>£45,610M</b>

## 4.3 Multi-modal Option

- 4.3.1 Table 27 outlines the estimated costs associated with the Multi-modal option.

*Table 27 Multi-modal Option Summary including Cost Estimates*

Item	Description	Estimated Cost
<b>Bus Park and Ride</b>	Costs have been calculated using the Spons directory to determine an overall rate, which advises on an average of £123.20/m <sup>2</sup> with preliminaries of around 25%. It should be noted that these are provisional values and more detailed analysis would need to be	£2,300,000

Item	Description	Estimated Cost
	undertaken, including detailed topographical surveys to confirm with greater accuracy the number of car parking spaces.	
	Bus service connections £150,000 per bus, three buses required for 20 minutes service.	£450,000
<b>Bus Enhancements</b>	<p>Gold    Approximate cost per bus stop   £13,050.00</p> <p>Silver    Approximate cost per bus stop   £12,550.00</p> <p>Bronze    Approximate cost per bus stop   £10,050.00</p> <p>Dinas Powys Bus Stop Enhancements - one gold bus stop (£13,050), two silver bus stops (£25,100) and six bronze bus stops (£60,300).</p>	£98,450
	Merrie Harrier Junction (2020 estimated implementation costs including WelTAG Stage Three)	£7,458,436 <sup>10</sup>
<b>Walking and Cycling</b>	Barry to Dinas Powys Cycle Route (Biglis roundabout to Dinas Powys) – 2015 estimated cost.	£3,500,000
	Connections between Dinas Powys and Cosmeston.	Completed
	Merrie Harrier to Barons Court cycle scheme – standalone cost estimate project (could potentially be delivered as part of the bus enhancements which may identify cost savings).	£3,000,000
<b>Rail Enhancements</b>	Costs are subject to third party project development and have not therefore been estimated as part of this WelTAG Stage Two Plus assessment.	-
	<b>Total</b>	<b>£16,806,886</b>

## 4.4 Funding and Accounting Implications

### Bypass Options

- 4.4.1 There are no certainties with respect to funding sources for the bypass options at present. There is no committed funding identified for scheme delivery and currently a proposal for a Dinas Powys bypass is not named in Welsh Government's National Transport Finance Plan 2018 Update for expenditure over the next two financial years (up to 2020).
- 4.4.2 It is assumed that if funding were available, the scheme would be delivered by the Vale of Glamorgan Council with funding support from Welsh Government and potentially from the Cardiff Capital Region. If any public-sector borrowing is undertaken for the project, it is assumed that this would be paid back over time by the local authority.
- 4.4.3 On-going revenue costs of maintaining the scheme are assumed to be met by the Vale of Glamorgan Council through highways maintenance budgets. The costs of the scheme and ongoing costs are assumed to be captured on the Council's budget accounting procedures, although the source of grant funding would also fall on the grant body (e.g., Welsh Government).

<sup>10</sup> Merrie Harrier Junction Improvement Costs (Option 2) included within [Appendix E](#).

## Multi-modal Option

- 4.4.4 It is assumed that funding for bus service and infrastructure enhancements would be required from local authority funding and Cardiff Capital Region/ Welsh Government funding where applicable. Ongoing revenue costs would typically fall on the bus provider and subsidisation from the local authority.
- 4.4.5 In addition, funding for new walking and cycling routes and enhancements together with a new Park and Ride facility is likely to come from a combination of local authority capital budgets and Welsh Government grants. Ongoing revenue costs following implementation of any new bus services to support the Park and Ride facility would typically be met by the bus provider and subsidisation from the local authority.
- 4.4.6 The multi-modal option has outlined the potential benefits of rail service and infrastructure enhancements assuming implementation of measures outlined by Transport for Wales. It is assumed that funding for rail enhancements is likely to be required as part of the South Wales Metro development, using funding via Cardiff Capital Region/ Transport for Wales/ Welsh Government, as well as other private contributions from developers potentially through Section 106 agreements. Ongoing revenue costs (as well as any income from car parking revenue, for example) would typically fall on the Train Operating Company, whilst further noting plans for Transport for Wales rail services to be brought under Welsh Government control from February 2021 with the takeover from KeolisAmey allowing day-to-day services to be run by a publicly owned company.

## 4.5 Financial Case Assessment

- 4.5.1 The financial case is summarised in Table 28, giving an evaluation of each element for each of the options.

Table 28 Financial Case Assessment

Option	Lifetime Costs of the Project		Source of Funding	Accounting Implications	
<b>Do-minimum</b>	<b>0</b>	The delivery of new capital schemes and the continued support for regional and local bus services, requires capital and revenue funding from the public sector.	Local transport fund (capital – to local authorities from the Welsh Government)	<b>Capital</b>	Welsh Government
				<b>Revenue</b>	Local Authority Welsh Government
<b>Option A Bypass Green Route</b>		High initial capital costs to deliver a new bypass.  Revenue implications are likely to exist throughout the lifetime of the project in terms of maintaining the asset, with the potential to adversely impact on the increasingly stretched local authority revenue budgets.	Local transport fund (capital)	<b>Capital</b>	Welsh Government Local Authority
			Welsh Government (capital)  Local authority funding (capital and revenue)  Road safety grant (capital)	<b>Revenue</b>	Local authority

Option	Lifetime Costs of the Project		Source of Funding	Accounting Implications	
Option B Bypass Pink Route		<p>High initial capital costs to deliver a new bypass.</p> <p>Revenue implications are likely to exist throughout the lifetime of the project in terms of maintaining the asset, with the potential to adversely impact on the increasingly stretched local authority revenue budgets.</p>	<p>Local transport fund (capital)</p> <p>Welsh Government (capital and revenue)</p> <p>Local authority funding (capital and revenue)</p> <p>Road safety grant (capital)</p>	<b>Capital</b>	Welsh Government Local Authority
				<b>Revenue</b>	Local authority
Option C Multi-modal Option		<p>Low to high initial capital costs to implement enhanced rail facilities and interchange. It is anticipated that high costs associated with delivering enhanced rail services would be accommodated by wider regional investment in local routes and therefore not specific to Dinas Powys. Revenue implications are likely to exist throughout the lifetime of the project with any increases in services.</p> <p>Capital costs to deliver bus infrastructure enhancements would be at the commencement of the project. Capital costs to purchase additional buses would be at the commencement of the project, but there would be continued revenue support to maintain the vehicles and purchase replacement vehicles over time. Revenue implications are likely to exist throughout the lifetime of the project.</p> <p>Low to moderate capital costs to deliver walking and cycling enhancements would be at the commencement of the project. Revenue implications are likely to exist throughout the lifetime of the project in terms of maintaining the asset however these are anticipated to be relatively low.</p>	<p>Local transport fund (capital)</p> <p>Welsh Government (capital and revenue)</p> <p>Network Rail</p> <p>Transport for Wales</p> <p>Local authority funding (capital and revenue)</p> <p>Road safety grant (capital)</p> <p>Local Bus Operators</p> <p>S.106 Planning contributions</p>	<b>Capital</b>	Local authorities via the local transport fund from Welsh Government, and allocation of S.106 receipts
				<b>Revenue</b>	Local authorities via the Regional Transport Services Grant and Bus Services Support Grant from Welsh Government Welsh Government

Option	Lifetime Costs of the Project		Source of Funding	Accounting Implications	
<b>Option D</b>  <b>Bypass (Green Route) and Multi-modal</b>		See specific option descriptions.	Local transport fund (capital)  Welsh Government (capital and revenue)  Network Rail Train Operating Company  Local authority funding (capital and revenue)  Road safety grant (capital)  Local Bus Operators  S.106 planning contributions	<b>Capital</b>	Welsh Government  Local Authority (bypass)  Local authorities via the local transport fund from Welsh Government and allocation of S.106 monies
				<b>Revenue</b>	Local authority (bypass)  Local authorities via the Regional Transport Services Grant and Bus Services Support Grant from Welsh Government  Welsh Government  Local authority

## 5 Commercial Case

### 5.1 Overview

- 5.1.1 The commercial case covers whether it is going to prove possible to procure the scheme and then to continue with it in the future. The case considers the level and type of involvement from the private sector, as well as potential effects on the on-going viability of the option/ scheme.

### 5.2 Procurement Strategy

#### Full Business Case and Consents

- 5.2.1 A WelTAG Stage Three study would need to be commissioned to progress development of the full business case for the preferred option. The study would need to undertake the relevant environmental and topographical surveys, together with a ground investigation assessment to support detailed design development. With specific regard to the highway options, the business case would need to be refined with further SEWTM transport modelling to test the final scheme and junction arrangements and provide an update to the cost benefit analysis. A wider economic impact assessment should also be undertaken.
- 5.2.2 With regard to rail service and infrastructure enhancements, this would require technical feasibility work and economic forecasting as part of the Network Rail GRIP/ Transport for Wales Stage process, and to be in alignment with the rail franchise process by Welsh Government and Transport for Wales.
- 5.2.3 At this stage it is anticipated that the Vale of Glamorgan would procure any WelTAG Stage Three study via competitive tender or framework, however the proposed procurement strategy is subject to confirmation.

#### Implementation

- 5.2.4 The process of implementation and post-implementation would also need to be captured through formal completion of WelTAG stages four and five respectively. The principal aims of Stage Four and Five is to record what happens so that lessons can be learnt. They may lead to alterations to the current scheme and will form valuable evidence for use in future WelTAG appraisals. The procurement strategy of these two stages would be subject to confirmation.

### 5.3 Bypass Scheme Implementation

#### Procurement Options

- 5.3.1 Upon completion of a WelTAG Stage Three Study and taking the project through the statutory processes a consultant, contractor or a combination of both would be required to take the project forward through the Detailed Design, Construction and Aftercare. Alternatively, the employer could utilise one of the options below (excluding option C) to complete a WelTAG Stage Three assessment and follow up with taking the scheme through the statutory process. The different procurement options available for this are outlined below:
- **Early Contractor Involvement (ECI)** | Under ECI, the Contractor is appointed under a two-stage design and build Engineering and Construction Contract (ECC) before the final scheme design has been fully developed and priced. The ECI contractor (usually in partnership with a designer) takes the project through the Preliminary Design/Statutory Process (Key Stages 3 & 4) and into Key Stage 6 where the contractor completes the detailed design and construction of the works. This form of procurement misses out the Key Stage 5 element because the contractor is already on board. This procurement method has its advantages where the project is of a larger scale and some aspects of the construction are complex. In this procurement method the contractor would be responsible for the design of the works.
  - **Build Only (Employer's Design)** | Under an Employer's Design Contract, the Employer employs a consultant under a Professional Services Contract (PSC) who takes the project through the



design and statutory process (Key Stages 3 & 4). The Consultant would be required to progress the design through the detailed design stage (Key Stage 6) once the contractor is employed on a construct only contract to complete the construction works. This procurement method is more suited to the smaller simpler type of projects whose scope is very clearly defined and where a contractor wouldn't have much to bring to the design stages. In this procurement method the Employer would be responsible for the design of the works.

- **Design and Build (Employer's Design)** | Under an Employer's Design Contract, the Employer employs a consultant under a Professional Services Contract (PSC) who takes the project through the design and statutory process (Key Stages 3 & 4). Upon completion of the statutory process contractors tender for the work under a design and build contract, which would be let during Key Stage 5. This procurement method is more suited to more straightforward medium size projects that contain elements of the design that could be refined through value engineering by a design and build contractor. In this procurement method the design and build Contractor would be responsible for the design of the works.

### Contract Type

- 5.3.2 Depending on which of the above options chosen, depends on what type of contract will be used. For all options. it is recommended that one of the options from the NEC ECC suite of contracts is used, ideally a Target Cost option (ECC Option C) which provides the client and chosen consultant/ contractor with a fair allocation of risk and also allows for a fair pain/ gain result. Due to the nature of the project, it is not advised to use a Bill of Quantities option (ECC Option B) as this would place the client at risk due to unknown quantities. For the design and Build contract either ECC Option A (Activity Schedule) or Option C would be recommended.

### Procurement Process

- 5.3.3 The procurement process for the Detailed Design, Construction and Aftercare should comply with the corresponding UK Public Contract Regulations 2015 and aligned with the Welsh Government Key Stage Approval process. Given the estimated contract value, an OJEU Prior Information Notice (PIN) would need to be published, giving potential bidders notification of the proposed contract. The PIN will detail the scope of works along with the cost estimate of the scheme. The procurement strategy adopted would follow the OJEU Restricted process as set out in Figure 2. This would mean that potential bidders for the work would need to complete and submit a Pre-Qualification Questionnaire (PQQ).
- 5.3.4 Bidders who successfully complete the PQQ process would then be invited to tender for the works in accordance with the procurement method, whether an ECI or Employers Design contract. Subject to the outcome of the statutory procedures and the performance of the Contractor, the contract also provides a procedure for the Contractor to undertake the detailed design and construction of the works

### Suppliers

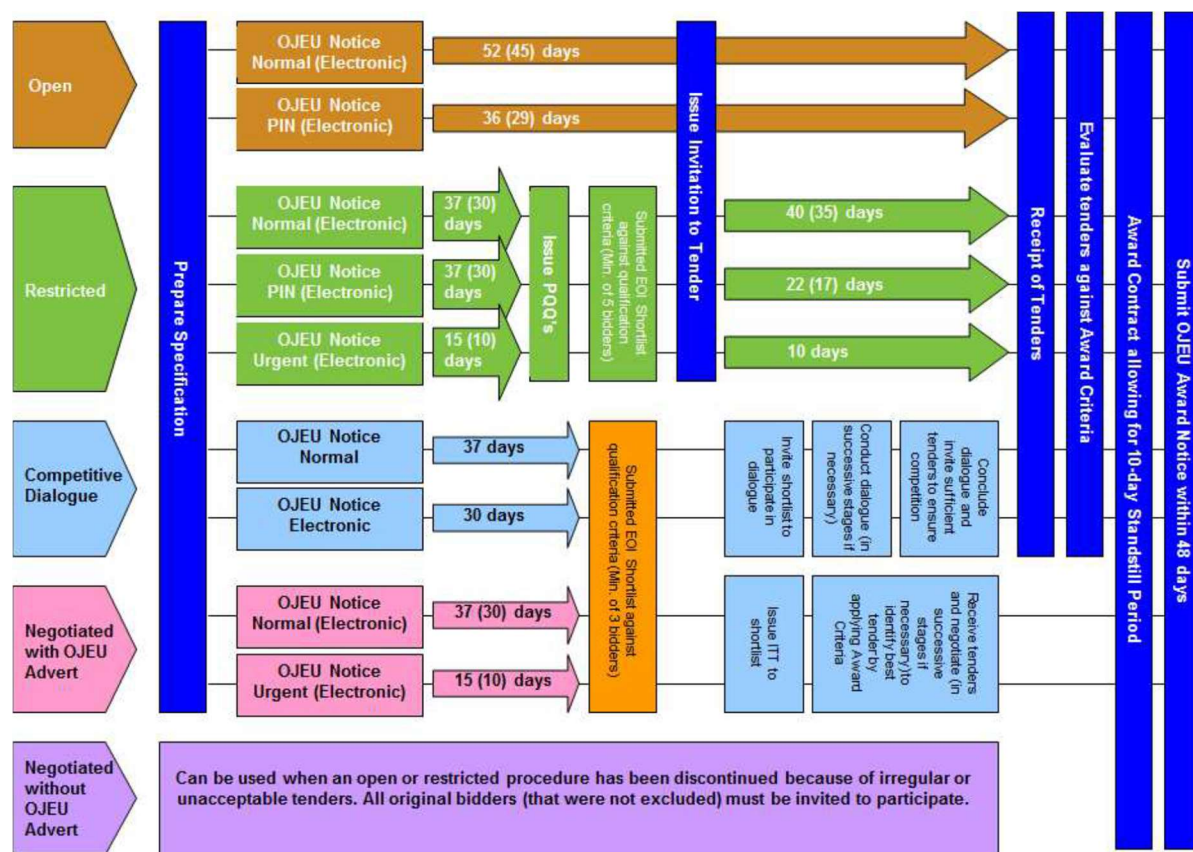
- 5.3.5 The Employer can insert additional clauses into the contract which stipulates that the employed contractor/ consultant should use make use of local resources/ materials/ suppliers where possible. A percentage of overall costs may also be inserted into the contract which ensures the employed contractor/ consultant complies with the relevant clauses and uses all local resources/ materials/ suppliers.

### Contract Length

- 5.3.6 Within the Contract Notice, the duration of the chosen contract is estimated by providing a given an estimated start and end date. In addition, the contract would be likely structured around key stages, aligned to Welsh Government's Transport Division's linear Key Stage Approval process which is used to obtain approval for projects through all stages of design, construction and aftercare.



Figure 2 OJEU Process<sup>11</sup>



## Allocation of Risk

- 5.3.7 The identification of risks would need to be covered in a Project Risk Register following risk workshops conducted throughout the project design stage and further in the construction stage. Allocation of risk would also be specified in the chosen contracts, utilising contract conditions and any additional clauses required by the Employer.

## Payment Mechanisms

- 5.3.8 The chosen contract will stipulate what the payment mechanisms/ arrangements are for each stage. However, the employer may make amendments to these payment process to suit their requirements, any amendments will be detailed in the relevant contract documents. If a Target Cost contract is utilised, a pain/ gain mechanism would need to be developed identifying the necessary share. Therefore, any over-spend or under-spend is shared between the Employer and Consultant/ Contractor in accordance with these share ranges.

## 5.4 Whole Life Cost Assessment

- 5.4.1 There would be on-going revenue support required for each of the options, although these are expected to be greatest for the public transport options (but the extent of each is currently unknown). It is however also anticipated that the delivery of a new bypass would have the potential to adversely impact on existing maintenance budgets which are already under considerable pressure.

<sup>11</sup> Source: <http://www.hacw.nhs.uk/our-services/procurement/ojeu-tenders/>

## 6 Management Case

### 6.1 Overview

- 6.1.1 The management case considers the delivery arrangements for the project and how the project is going to be managed through its lifetime. The management case shows the project is achievable and identifies the different arrangements put in place to deliver the project.

### 6.2 Bypass Options

#### Project Plan

- 6.2.1 How a bypass would be delivered needs to be determined at the next stage, however the two options available are to Procure an ECI Contractor or to Procure via a Design and Build Contract.
- 6.2.2 ECI – design and build contract using the NEC Professional Services and Engineering Construction target cost Contracts. These types of contract have been successfully used on a number of schemes including the A40 Penblewin to Slebech Park, A477 St Clears to Red Roses and A465 Heads of the Valley Dualling, Sections 2 and 3.
- 6.2.3 As mentioned above, which ever procurement method is chosen, the project will need to align with the Welsh Government Approvals Process. The KSA process provides a staged financial approval system to manage the process of projects from inception, through to construction and initial maintenance and complies with the principles of PRINCE2 project management.

#### Legal Requirements

- 6.2.4 The bypass scheme will be required to conform to all legal requirements and would be delivered under the Highways Act 1980 and Acquisition of Land Act 1981, giving powers to the local authority to make orders with respect to side roads and compulsory purchase of land. A planning application would be made under the Town and Country Planning Act 1990 to give consent for the development, which would be accompanied by an Environmental Statement. Design and construction of the project should be undertaken with due consideration of the following:
- Construction (Design and Management) Regulations 2015
  - Equality Act 2010
  - Active Travel (Wales) Act 2013
  - The Wellbeing and Future Generations (Wales) Act 2015
  - Wales Act 2017 and Welsh Language Standards (Welsh Ministers, County and County Borough Councils, and National Park Authorities) Regulations 2015
  - The project should also conform to all EU and UK Environmental Legislation

#### Governance

##### Organisational Structure

- 6.2.5 Depending on the type of procurement method used for further design and construction, the anticipated core parties involved in the delivery of the project would be:
- The Employer | Representing the Vale of Glamorgan Council.
  - The Employer's Agent | Acting as the Vale of Glamorgan Council's representative, providing financial, project management, contract and technical advice throughout the project.

##### ECI Contract (ECI)

- 6.2.6 ECI Contractor – commissioned to develop the outline design, undertake EIA, prepare the required drawings and documents for planning approval, undertake the required public consultation and if successful then to undertake the detailed design, construction and aftercare of the project.

- 6.2.7 ECI Contractor's Designers – employed by the ECI Contractor to carry out the preliminary environmental and engineering design for the preferred route and consents and orders process, and to complete detailed design.

#### **Design and Build Contract (Employer's Design)**

- 6.2.8 Designers – commissioned by the Employer to carry out the preliminary environmental and engineering design for the preferred route, as well as undertake all activities necessary for the consents and orders process.
- 6.2.9 Design & Build Contractor – commissioned to undertake the detailed design, construction and aftercare of the project.

#### **Employers Design (Employer's Design)**

- 6.2.10 Designers – commissioned by the Employer to carry out the preliminary environmental and engineering design for the preferred route, as well as undertake all activities necessary for the consents and orders process, and to complete detailed design.
- 6.2.11 Build Only Contractor – commissioned by the employer at Key Stage 6 to carry out the construction of the works based on the employer's detailed design.

#### **Project Reporting**

- 6.2.12 The project would be managed following the principles of the PRINCE2 project management process combined with a compatible web-based project management system. The Key Stages of the project will form the Stage Boundaries within PRINCE2 and will require Project Board approval. The project will be led by the Vale of Glamorgan Council as the Employer.

#### **Communication and Stakeholder Management**

- 6.2.13 To ensure the management of stakeholders and communication on the project is managed correctly, a Communications Plan should be drafted which identifies how all communications between project team members and external parties will be managed. All parties adhering to the communications plan should ensure that the needs of the Employer are met, and the project is delivered successfully.

#### **Risk Management**

- 6.2.14 Risk will be managed on the project in accordance with the procedures set out in the latest version of the Value for Money Manual – Risk Analysis and Management. A risk workshop should be conducted early in the next stage of the project (WelTAG Stage Three). A Risk Register should then be developed and reviewed and updated (where required) as a minimum every three months throughout the project's duration.

#### **Monitoring and Evaluation**

- 6.2.15 Monitoring that would be required to be undertaken during the life of the project is outlined below:
- Environmental aftercare
  - Annual Environmental Performance and Monitoring Report (AEPMR)
  - Health and Safety File
  - Safety audits following completion of design and then construction works
- 6.2.16 WelTAG 2017 includes the requirement for a detailed monitoring and evaluation plan to be drawn up in Stage Three. This plan would describe what evidence would be used in the project's evaluation report and how it will be collected. Evidence is required on the actual inputs used when implementing the scheme and during its on-going operation, what was actually delivered, the impacts experienced, to what extent the intervention met its objectives and how they were achieved.

## 6.3 Multi-modal Option

- 6.3.1 It is anticipated that the delivery of bus enhancements, walking and cycling improvements and a new Park and Ride facility would be managed by the Vale of Glamorgan Council utilising Welsh Government grant funding where available. Subject to confirmation, it would be assumed that Welsh Government/ Transport for Wales would be responsible for the delivery of rail enhancements, with implementation of service and infrastructure improvements the responsibility of Network Rail and Transport for Wales. The management and delivery of the scheme would likely follow Network Rail GRIP/ Transport for Wales stage processes encompassing scheme initiation and feasibility, option selection, design development, construction and project close out. The development of rail enhancements would be anticipated to be progressed in close consultation with integral stakeholders as well as through public consultation.

## 6.4 Review Group

- 6.4.1 A Review Group has been set up to guide this stage of the WelTAG process and has met previously to discuss the project. The membership of the group has been confirmed by the Vale of Glamorgan Council and comprises representation from:

- Welsh Government
- The Vale of Glamorgan Council including officers and local councillors
- Dinas Powys Community Council
- Llandough Community Council
- Barry Town Community Council
- Cardiff Capital Region
- Cardiff Council
- Transport for Wales
- Network Rail
- Sustrans
- Cardiff Bus
- New Adventure Travel
- Easyway
- First Cymru
- Taxi/ PHV Association
- Freight Transport Association
- Road Haulage Association

## 7 Conclusions and Recommendations

### 7.1 Introduction

- 7.1.1 The range of options considered in this report include bypass routes, a package of multi-modal measures, and a combination of a bypass and multi-modal option. The WelTAG Stage Two Plus report has developed and appraised these options to address the study objectives and thereby counter the problems identified and contribute to the goals of the Well-being of Future Generations (Wales) Act 2015, together with Welsh Government strategies and outcomes.
- 7.1.2 This study represents an outline business case, for which a quantitative assessment of the value for money of the scheme and appraisal of the social, environmental, cultural and economic impacts has been undertaken.
- 7.1.3 At the end of Stage Two, the guidance sets out that the report should:
- Determine whether there are any transport options that can address the issues identified, contributes positively to the well-being goals and objectives, and can be delivered within technical and financial constraints.
  - Select a preferred option to be taken forward to WelTAG Stage Three.
  - Agree the methods to be used to provide additional evidence where required for Stage Three.
  - Identify any legislative requirements that need to be met during Stage Three.
  - Document the decisions of the Stage Two Review Group, and the basis for these decisions.
- 7.1.4 The Stage Two Plus study follows on from the previous Stage Two report and the Review Group recommendations to undertake additional investigations to inform the decision-making process, encompassing the following key activities:
- Engagement with Network Rail to understand the constraints and potential costs associated with the construction of a bypass and junction in the vicinity of the railway tunnel.
  - Undertake concept design, modelling and costing of suggested improvements to the Merrie Harrier junction to improve capacity.
  - Commission strategic traffic modelling of the bypass proposals using the South East Wales Transport Model (SEWTM).
  - Consider costs in context of the bypass scheme (Green route) and update the economic appraisal for the Green route.

### 7.2 Options Overview

#### Do-minimum

- 7.2.1 The work undertaken to inform this study has identified that the current transport corridor is very congested, with traffic saturating the existing A4055 and consequently impacting on key junctions. Moreover, this is anticipated to be exacerbated in the future do-minimum scenario with traffic growth, although certain environmental factors such as local air quality conditions are anticipated to gradually improve as a shift away from petrol and diesel vehicles gathers momentum. In addition, the public transport services suffer from overcrowding and poor-quality facilities and the walking and cycling network is currently limited.

#### Option A | Bypass – Green Route and Option B | Bypass – Pink Route

- 7.2.2 The appraisal indicates that a bypass may offer value for money, although it is likely to have environmental and amenity impacts and require substantial public funding. Of the bypass options, the Green route offers the highest potential benefits, although an additional bypass junction within close proximity of Murch Road (as represented by the Pink option) may present strategic

opportunities subject to consideration of future development aspirations for Dinas Powys and the surrounding areas.

- 7.2.3 The transport case summary appraisal table shows that the Green and Pink routes perform similarly in terms of the social, environmental, cultural and economic assessment. The only discernible difference is the addition of a roundabout to accommodate a potential new access onto it from Murch Road, with a slight reduction in journey time benefits when compared with the Green route.
- 7.2.4 On the basis of greatest economic benefits, the Green route was assessed given this represents the greatest potential for improved journey times in comparison to the Pink route. The alignment produces a total PVB of £63.17M and a cost of £31.37M under the Core TUBA scenario. This results in a Net Present Value of £31.80M and an initial Benefit Cost Ratio of 2.01, suggesting that the scheme would represent high value for money. The sensitivity test results which take account of recently released traffic forecasts as a result of the Covid-19 pandemic, show that the Green alignment produces a total PVB of £53.55M and a cost of £31.37M. This results in a Net Present Value of £22.18M and a reduced Benefit Cost Ratio of 1.71 suggesting that the scheme would still represent medium value for money, should traffic levels in the main forecast be overestimated. In addition, the level of journey time savings to users' totals £68.53M (sensitivity test = £58.79M).
- 7.2.5 The value for money results do not reflect the qualitative and quantitative information such as reliability and wider economic impacts, which contribute to the calculation of the Adjusted Benefit Cost Ratio and may increase the Value for Money of the scheme further. A full business case would be needed to further consider the economic impact of the scheme, although it is recognised that economic performance is only one of the elements which must be accounted for in decision making.
- 7.2.6 The environmental impacts are comparable between the two alignments. Adverse impacts are observed for a range of factors including noise, air quality, landscape, historic environment, biodiversity, water environment and residential amenity. Detailed surveys would be required at WelTAG Stage Three to fully establish baseline conditions within the study area, allowing for the accurate and complete assessment of impacts, together with the design of an appropriate mitigation strategy for the scheme. A full Environmental Impact Assessment would be required to support this appraisal.
- 7.2.7 The implementation of a DMRB compliant single carriageway road with a national speed limit and integral walking and cycling infrastructure demonstrates positive change with regard to social impacts:
- For access to employment, the traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £24.19M for commuters and £20.24M for business.
  - For access to services, the traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £25.33M for other consumers than commuters or business.
- 7.2.8 The traffic forecasting has also enabled a calculation of accident benefits using the DfT software COBALT. In contrast to the benefits noted above, the results show adverse scheme impacts with a regional increase in accident costs of £4.33M (over the 60-year period in 2010 prices) in comparison to a without scheme scenario. The strategic analysis demonstrates that the scheme could establish a slight increase in accidents (seven additional accidents) representing 57 forecast casualties.

#### **Scheme Interface with the Vale of Glamorgan Railway Line**

- 7.2.9 A key item retained as part of the original WelTAG Stage Two study was the interface between Cogan railway tunnel (situated on the Vale of Glamorgan railway line) and the potential Cardiff Road (A4055) 4-arm roundabout located towards the northern end of the proposed bypass routes. The constraint considered was in relation to the roundabout being proposed to be partially situated over the existing Cogan Tunnel, encompassing the roundabout's ICD, its eastern arm that interconnects with Redlands Road (B4267) and the southern arm interconnecting with the new proposed bypass.



- 7.2.10 The WelTAG Stage Two Plus study was tasked with further analysis of this constraint, to consider the loading implications of the proposal on the railway tunnel that underlies the site, the likely implications of this, as well as the requirements for a tunnel assessment prior to construction of the proposed works. A Basic Asset Protection Agreement (BAPA) was set up between the Vale of Glamorgan Council and Network Rail concerning the tunnel to assist in developing and reviewing proposals.
- 7.2.11 The accompanying report included as part of the Impacts Assessment Report (Dinas Powys WelTAG Stage Two Plus; Technical Note; Cogan Tunnel; 10015022-ARC-REP-ECV-000001) concludes that due to the depth of cover overlying Cogan Tunnel, any increase in loading from the proposal can be considered negligible. It can therefore be concluded that a structural assessment of the tunnel will not be required.
- 7.2.12 The report further concludes that construction of the proposed roundabout on the land overlying Cogan Tunnel may be feasible, provided that ground investigation surveys are undertaken to confirm the presence and location of the suspected construction shaft. If the shaft is located then a 22m exclusion zone would be required to surround it, which would influence the general arrangement/ layout of the proposed roundabout at this location.

#### **Traffic Capacity Constraints at Key Junctions**

- 7.2.13 The original WelTAG Stage Two analysis completed in 2019 undertook traffic modelling analysis at several key junctions (Murch Road, Merrie Harrier and Barons Court using LinSig and Vissim) to understand how the corridor will function in future and the impact of the various options. The modelling work is set out in detail within the Impacts Assessment Report. The analysis confirmed that the junctions are at or above capacity at present and this will worsen in the do-minimum scenario.
- 7.2.14 In response to this, the WelTAG Stage Two Plus study has assumed a significant upgrade to the Merrie Harrier junction having completed a feasibility appraisal (reference Option 1A) and the corresponding traffic impact assessments demonstrate that an enhanced junction would operate within capacity.
- 7.2.15 However, with regard to the Barons Court junction, in the future year the junction is over saturated with significant queuing. Minor changes to cycle times have been included in modelling to minimise capacity issues. Possible improvements would involve enabling three lanes of traffic travelling straight ahead from Barry Road to the Cogan Spur in the northbound direction, although space is extensively limited and given that this may require widening of the bridge, it is questionable whether this is a feasible or desirable option.
- 7.2.16 With a bypass, the proposed roundabout junction with Redlands Road is anticipated to function within capacity, subject to queue back, and the Murch Road junction would experience less delay due to reduced traffic on the existing A4055. Creation of a bus lane between the Merrie Harrier and Barons Court junctions is feasible in terms of capacity, although requires significant costs to benefit a relatively small number of buses.

#### **Option C | Multi-modal**

- 7.2.17 The benefits of multi-modal measures are harder to quantify at this stage but would offer more travel options and potential for sustainable travel. The multi-modal option considers the delivery of short (up to five years), medium (up to ten years) and long (more than 10 years) term improvements within the study area across a range of sustainable modes. The option includes a range of enhancements to the existing public transport network including enhancements to bus and rail services and associated infrastructure/ interchanges. In the short term, this could encompass quick win deliverables (subject to funding), including robust enhancements to passenger facilities which have the potential to have a measurable impact on transport provision within the study area, alongside a programme of active travel improvements.
- 7.2.18 The WelTAG Stage Two Plus study has now assumed a significant upgrade to the Merrie Harrier junction (reference Option 2) to facilitate enhanced connectivity through the junction for all vehicles,

including buses. However, as noted for the bypass options, significant capacity issues would be retained at the Barons Court junction. With the exception of cultural impacts (considered to be neutral), the multi-modal option is considered to establish positive benefits with regard to socio-economic impacts and assumes less of an environmental impact to that demonstrated for the bypass options.

### Option D | Bypass (Green Route) and Multi-modal

- 7.2.19 Overall, the highest performing option appears to be the combination of the Green bypass route and multi-modal measures. The benefits and disbenefits noted for both options separately are brought forward to this combined option.

## 7.3 Preferred Transport Option

- 7.3.1 On the basis of the appraisal of options, it is considered that Option D (Green Route and Multi-modal) has merit in being taken forward for further consideration in a Stage Three WelTAG, given the option more comprehensively addresses the issues identified, can contribute positively to well-being goals and objectives and pending further investigations, is likely to be deliverable within technical and financial constraints.
- 7.3.2 Whilst the Green route has been formally assessed as part of Option D and the option represents the greatest potential for improved journey times (as it would have limited junctions in comparison to the Pink route), the Pink route offers the opportunity to improve connectivity through providing an additional roundabout interconnecting with Murch Road. It may offer longer term strategic benefits, subject to further consultation to determine the most appropriate way forward.
- 7.3.3 Whilst the option does offer benefits to the Dinas Powys transport network, key junctions will continue to pose a strategic constraint (notably at the Barons Court junction), negating the benefits of journey time savings through Dinas Powys.
- 7.3.4 It is noted that the climate emergencies introduced by Welsh Government and the Vale of Glamorgan Council will be one of several influencing factors in determining the next steps, especially with regard to proposals for a new bypass. Whilst a slight beneficial impact on greenhouse gasses was considered applicable for the option, an Environmental Impact Assessment including completion of a sustainability appraisal would be required at WelTAG Stage Three to fully understand the impacts of the option on greenhouse gas emissions, both in the short (construction) and long (operational) term.
- 7.3.5 In addition, a bypass for Dinas Powys is not currently included in any funding programme for the Vale of Glamorgan Council or the Welsh Government. Future funding uncertainties are a key risk particularly given public resources as a result of the Covid-19 pandemic. It is anticipated that any proposal would need to demonstrate regional/ national value against other large-scale transport schemes.

## 7.4 WelTAG Stage Three

- 7.4.1 The potential for public consultation on the WelTAG Stage Two Plus study is subject to funding approval and endorsement of the next steps by the Vale of Glamorgan Council. A decision on whether to then go forward with the recommended option to a Stage Three assessment is a matter for the Vale of Glamorgan Council when considering the recommendations of the Review Group based on the appraisal set out in this report and feedback received following completion of a public consultation exercise.
- 7.4.2 As set out in the guidance, the WelTAG Stage Three study purpose *'is to make a full and detailed assessment of the preferred option to inform a decision as to whether or not to proceed to implementation.'* It should therefore be noted that until such time as a Review Group and the Council has considered the outcomes of a Stage Three study, and the statutory planning processes have taken place, no decision would be made to deliver a scheme.
- 7.4.3 The guidance on Stage Three notes that the detailed design and appraisal work should be used to refine the design and to inform any complementary measures that are needed in order to more fully



realise the benefits of the proposal and seek to maximise contribution to the well-being goals, whilst helping to mitigate any adverse impacts and resolving potential conflicts. The completion of Stage Three will provide much of the information needed for applications to funding organisations and any mode-specific appraisal procedures.

7.4.4 A Stage Three assessment will require the preparation of a full business case and an Environmental Statement (ES) based on the undertaking of an EIA. Whilst the scope of the ES would be formally agreed during the process, it is anticipated that it would be undertaken in accordance with DMRB Guidance<sup>12</sup> which requires consideration of the following topics:

- Air Quality
- Climate
- Cultural Heritage
- Landscape and Visual Effects
- Biodiversity
- Geology and Soils
- Material Assets and Waste
- Noise and Vibration
- Population and Human Health
- Road Drainage and Water Environment

## 7.5 Option D | Bypass (Green Route) and Multi-modal

7.5.1 Subject to a decision on moving forward for further work on the recommended option, a WelTAG Stage Three study with the EIA would need to include the aspects set out below. This can be undertaken in a stepped manner with surveys undertaken to clarify risks and impacts as a first stage, which would make prudent use of public resources.

### Surveys and Investigations

7.5.2 With regard to the Cogan railway tunnel, it is recommended that the following information is obtained at the next stage of the scheme:

- Formally identify where the suspected tunnel shaft is located by undertaking further ground investigations including offset probe drilling.
- Undertake an overhead/ buried services search of the proposed site.
- Infrequent tunnel walkthroughs will be required during the works to ensure that the tunnel is not sustaining any obvious damage during/ as a result of the works. If the advice given in the accompanying technical note (10015022-ARC-REP-ECV-000001) is adhered to then no ongoing Network Rail monitoring will be required.

7.5.3 A full programme of environmental surveys and investigations would need to be undertaken, agreed through the EIA scoping process. Further surveys which would help to de-risk the scheme include:

- Phase 2 habitat surveys of the corridor including woodland habitats to identify potential for protected species.
- Devise and undertake a programme of ecological surveys including European protected species and ancient woodland surveys, agreeing scope with County ecologists and NRW.

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<sup>12</sup> [https://standardsforhighways.co.uk/dmr/b/search?discipline=SUSTAINABILITY\\_AND\\_ENVIRONMENT](https://standardsforhighways.co.uk/dmr/b/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT)

- Undertake a desk top study of archaeological remains and identify requirements and undertake further investigations including geophysical surveys and potentially trial trenching.

### Design Considerations

- 7.5.4 The Stage Two Plus proposals are concept based on known information. For a Stage Three, topographical survey information would be required together with information on land ownership boundaries and constraints. The design up to the planning stage should consider the following:
- Design of the interconnecting bypass junctions including the Cardiff Road roundabout (south of Dinas Powys) and Cardiff Road/ Redlands Road roundabout (north of Dinas Powys).
  - Design of the Merrie Harrier junction (assuming implementation of design Option 1A).
  - Minimising visual and noise intrusion through landscaping and other mitigation measures.
  - Ecological mitigation.
  - Drainage and water quality mitigation.
  - Archaeological mitigation.
  - Consideration of carbon impacts and measures to achieve gain through construction design and mitigation.
  - There would be advantages in considering the feasibility of improvements at the Barons Court junction regarding the ongoing congestion issues. This could assist in maximising the strategic benefits of a bypass together with providing enhanced connectivity for public transport services.
- 7.5.5 Should there be a preference for the Pink route as a preferred way forward for Option D, it would be recommended that additional traffic modelling is completed as part of an early Stage Three WelTAG task to further understand the impacts on the local and strategic (using SEWTM) highway network, including connectivity along Murch Road to its junction with the A4055.

### Business Case

- 7.5.6 At Stage Three there is a need for the preparation of a full business case with a revised economic appraisal. The updated version of the SEWTM Base Year and Reference Case should be used to test a refined scheme taking account of updated developments and transport schemes.

## 8 Glossary of Terms and Acronyms

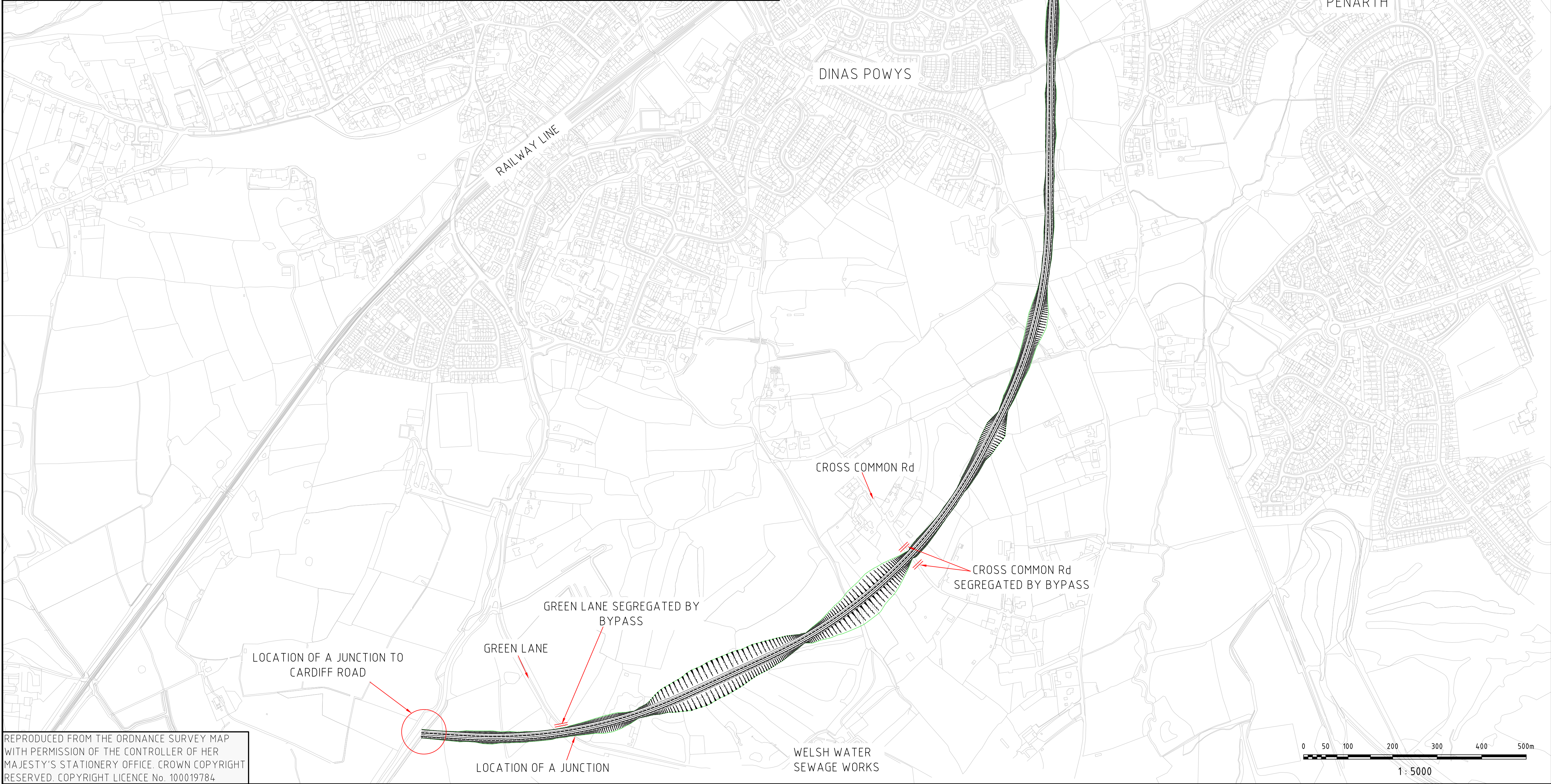
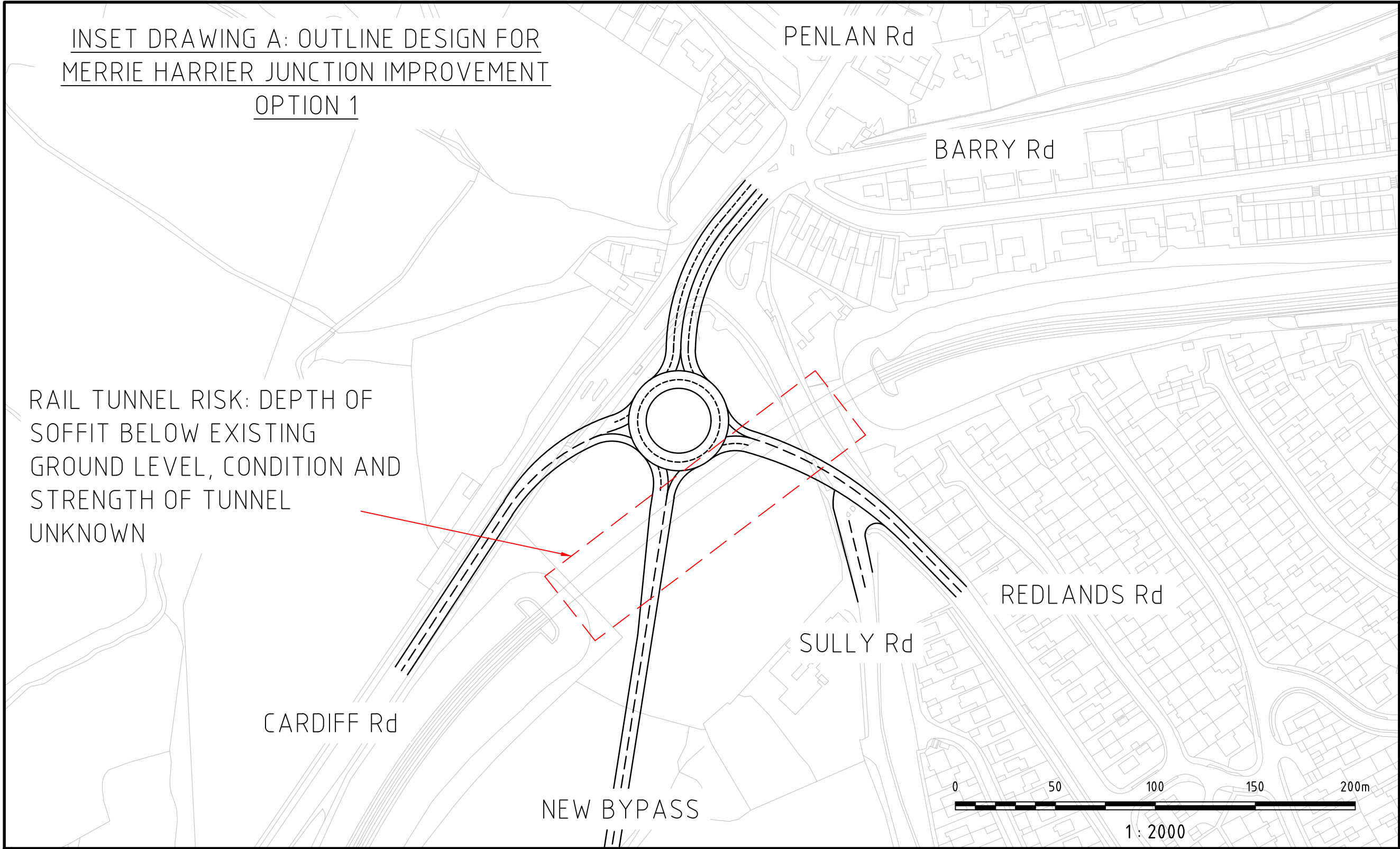
AEPMR	Annual Environmental Performance and Monitoring Report
AMCB	Analysis of Monetised Costs and Benefits
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
BCR	Benefit Cost Ratio
CCTV	Closed-Circuit Television
CDM	Construction (Design and Management) Regulations
COBALT	<b>CO</b> st and <b>B</b> enefit to <b>A</b> ccidents – <b>L</b> ight <b>T</b> ouch
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
D&B	Design & Build
ECI	Early Contractor Involvement
ED	Employers Design
EU	European Union
FCA	Flood Consequence Assessment
HCD	Highways Construction Detail
HGV	Heavy Goods Vehicle
KPH	Kilometres per Hour
KS	Key Stage
LDP	Local Development Plan
LinSig	Design and assessment tool for traffic signal junctions and urban networks
LTN	Local Transport Note
LTP	Local Transport Plan
MCC	Manual Classified Counts
MPH	Miles per Hour
NMU	Non-Motorised User
NO2	Nitrogen Dioxide
NPV	Net Present Value
NRSA	New Roads and Street Works Act 1991 (and amendments)
NTEM	National Trip End Model
OB	Optimism Bias
OJEU	Official Journal of the European Union
OS	Ordinance Survey
PA	Public Accounts
PIN	Prior Information Notice
PQQ	Pre-Qualification Questionnaire

PRINCE2	<b>PR</b> ojects <b>IN</b> Controlled <b>E</b> nvironments
PRoW	Public Right of Way
PVB	Present Value of Benefits
RRRAP	Road Restraints Risk Assessment Process
Sewta	South East Wales Transport Alliance
SEWTM	South East Wales Transport Model
SINC	Site of Nature Conservation
SPG	Supplementary Planning Guidance
TEE	Transport Economic Efficiency
TEMPro	Trip End Model Presentation Program
UK	United Kingdom
Vissim	Microscopic Multi-modal traffic flow simulation software package
WebTAG	Web-based Transport Analysis Guidance
WelTAG	Welsh Transport Appraisal Guidance
WFD	Water Framework Directive
WIMD	Welsh Index of Multiple Deprivation
WTS	Wales Transport Strategy

**APPENDIX A**

**Option A | Green Route and Option B | Pink Route Plans**





**NOTES:**

OPTION 1 AND OPTION 2 OF THE MERRIE HARRIER JUNCTION IMPROVEMENT CAN BE ADOPTED FOR BOTH THE GREEN AND PINK ALIGNMENT. OUTLINE DESIGN OF OPTION 2 CAN BE FOUND IN DRAWING 10015022-ARC-XX-XX-DR-HE-0008.

**LEGEND:**

Rev	Date	Description	Drawn	Check	Approv
P1.0	08/03/18	FIT FOR INFORMATION			

**Client**

**VALE OF GLAMORGAN**

**PROJECT:**  
Dinas Powys  
WeiTAG S2

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**TITLE:**

**GREEN OPTION ALIGNMENT**

Designed	R. ELLIS	Signed	Date
Drawn	R. ELLIS	Signed	08MAR2018
Checked	M. THOMAS	Signed	08MAR2018
Approved	G. HARRIS	Signed	08MAR2018
Scale:	1:5000	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S2	Project Number:	10015022

Suitability Description:

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Drawing Number:  
10015022-ARC-XX-XX-DR-HE-0004

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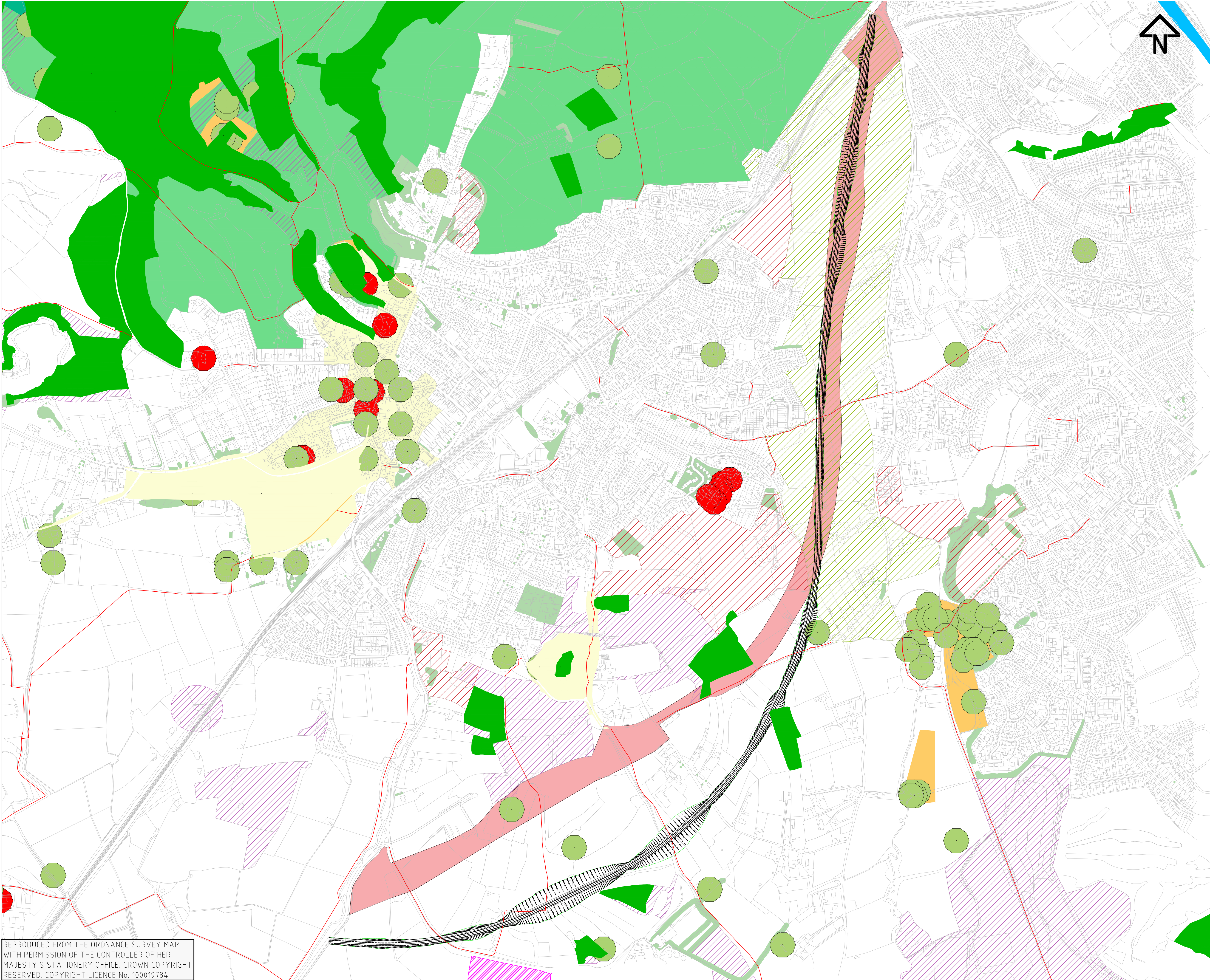
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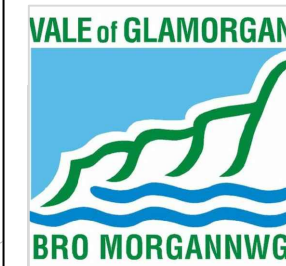
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NOTES:

LEGEND:

- PUBLIC RIGHT OF WAY
- SITE OF SPECIAL SCIENTIFIC INTEREST
- SITES OF IMPORTANCE FOR NATURE CONSERVATION
- TREE PRESERVATION ORDER
- SPECIAL LANDSCAPE AREAS
- AIR QUALITY MANAGEMENT AREA
- ANCIENT MONUMENTS
- LISTED BUILDINGS
- CONSERVATION AREA
- CADW PARKS AND GARDENS
- ANCIENT WOODLAND
- GREEN WEDGE
- ARCHAEOLOGY FEATURE
- UDP ROUTE
- LOCAL DEVELOPMENT PLAN

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**Client**

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**GREEN OPTION ALIGNMENT  
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ENVIRONMENTAL CONSTRAINTS**

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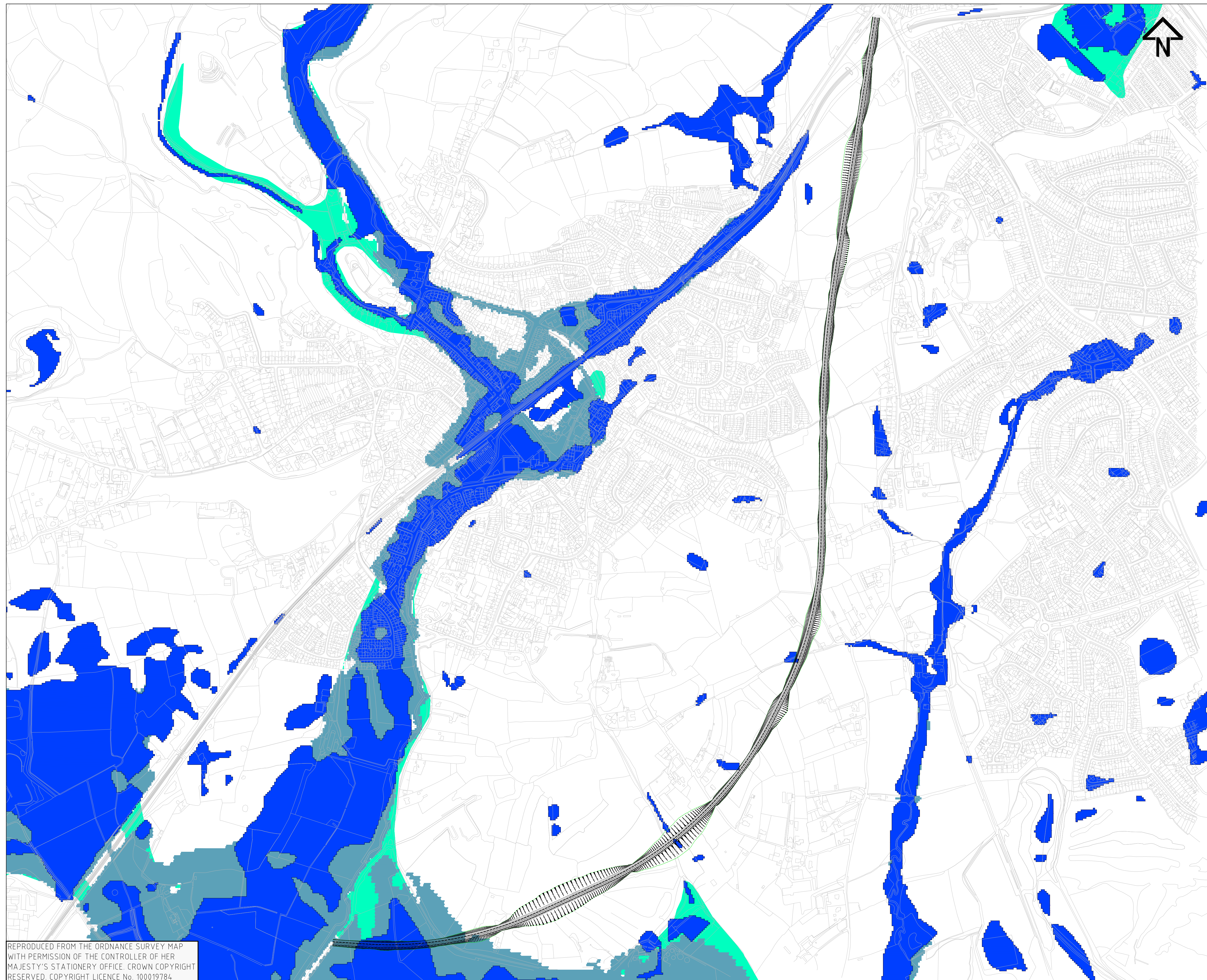
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Drawing Number:  
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Revision:  
P.1.0





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 FLOOD ZONE B  
 FLOOD ZONE C1  
 FLOOD ZONE C2

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Approved	G. HARRIS	Signed	07MAR2018
Scale:	1:5000	Datum:	AOD
Original Size:	A1	Grid:	OS
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Suitability Code:	02	Project Number:	
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Drawing Number:  
10015022-ARC-XX-XX-DR-HE-0006

Revision:	P1.0
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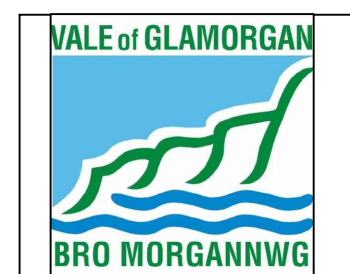


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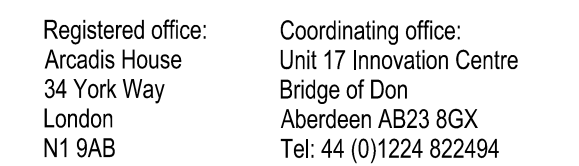
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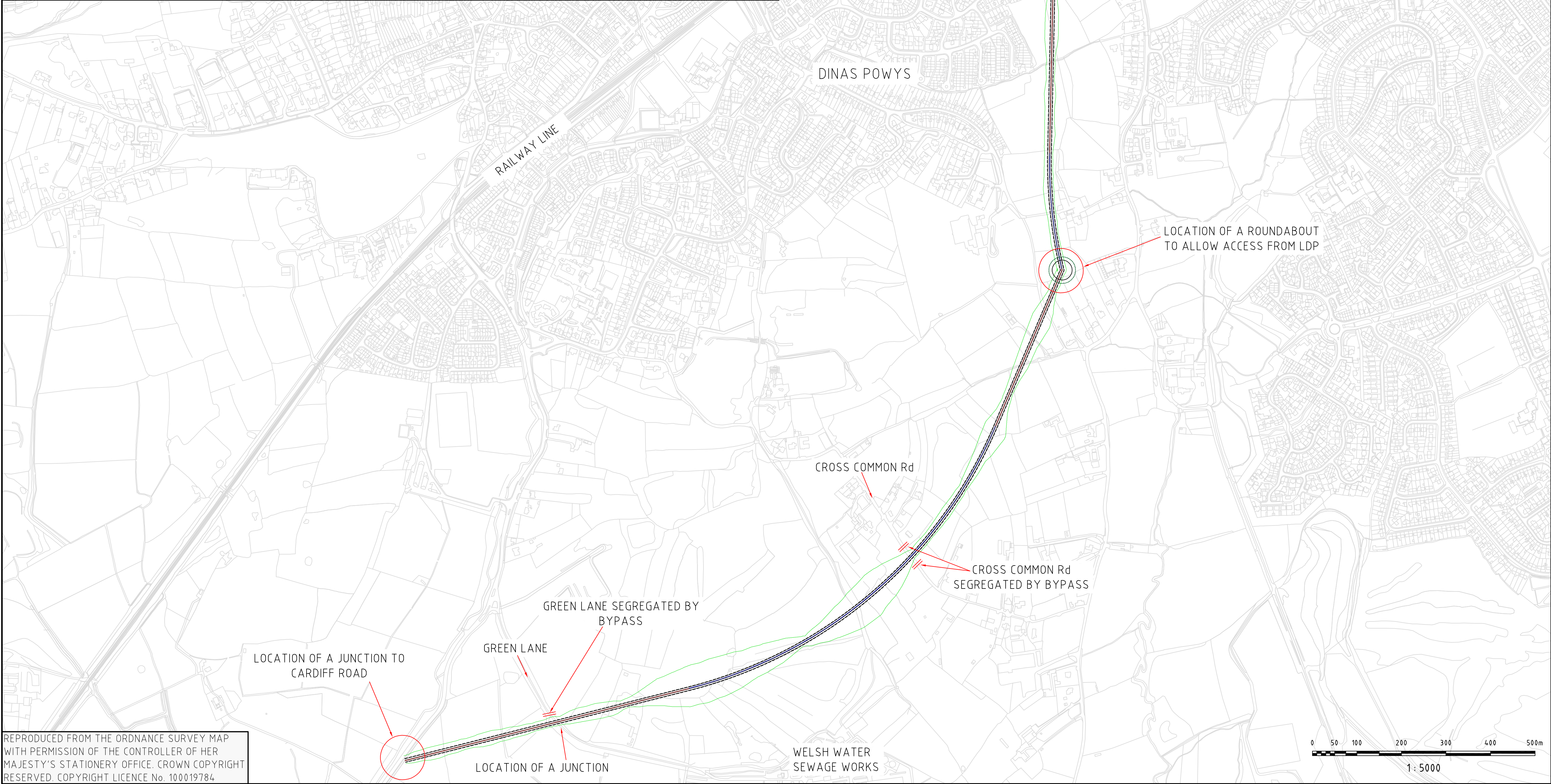
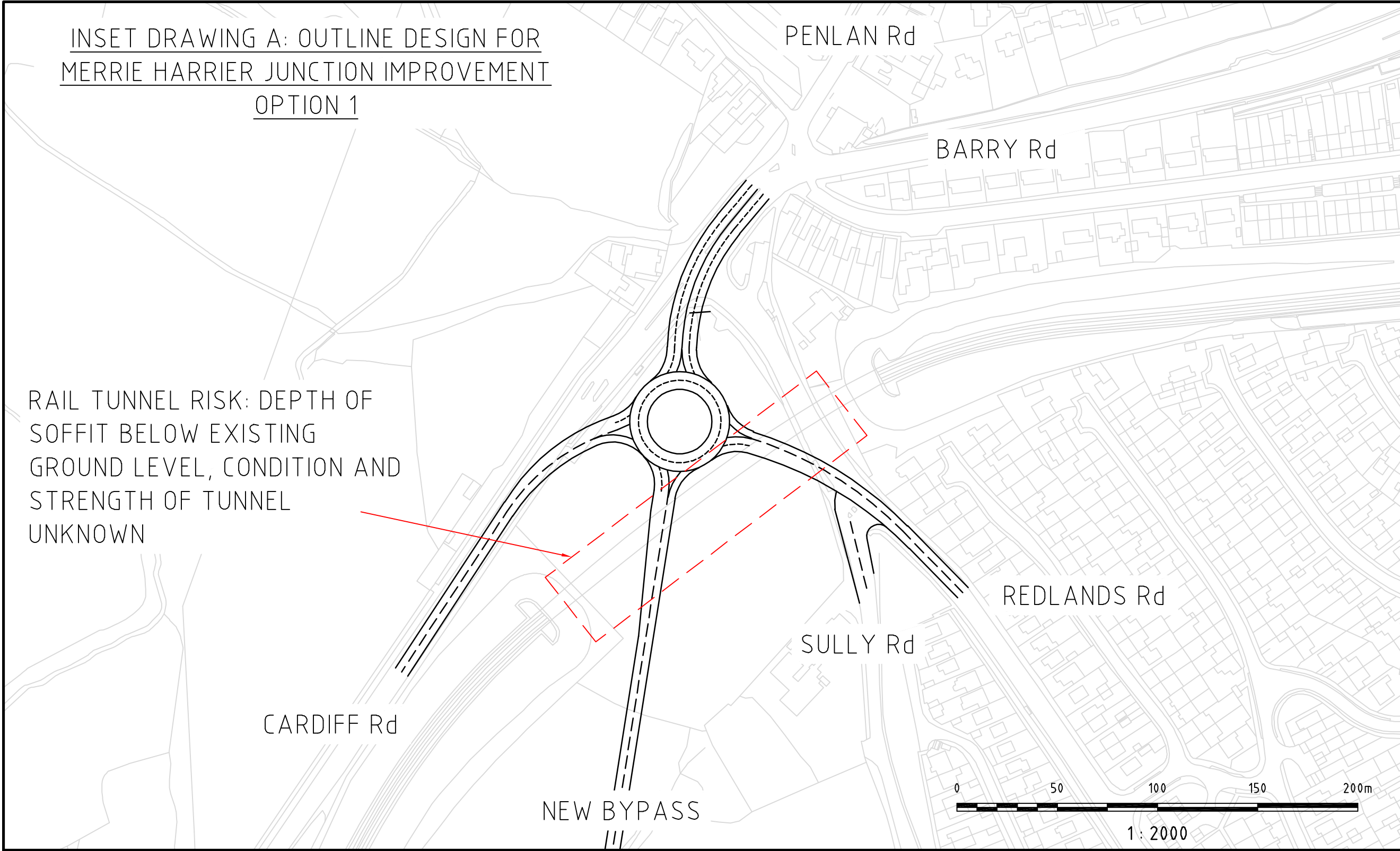
GREEN OPTION  
LONGSECTION

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**NOTES:**

OPTION 1 AND OPTION 2 OF THE MERRIE HARRIER JUNCTION IMPROVEMENT CAN BE ADOPTED FOR BOTH THE GREEN AND PINK ALIGNMENT. OUTLINE DESIGN OF OPTION 1 CAN BE FOUND IN DRAWING 10015022-ARC-XX-XX-DR-HE-0004.

**LEGEND:**

Rev	Date	Description	Drawn	Check	Approv
P1.0	01/03/18	FIT FOR INFORMATION			

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**VALE OF GLAMORGAN**

**PROJECT:**  
Dinas Powys  
WeITAG S2

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**PINK OPTION ALIGNMENT**

Designed	R. ELLIS	Signe	Date	01MAR2018
Drawn	R. ELLIS	Signe	Date	01MAR2018
Checked	M. THOMAS	Signe	Date	01MAR2018
Approved	G. HARRIS	Signe	Date	01MAR2018
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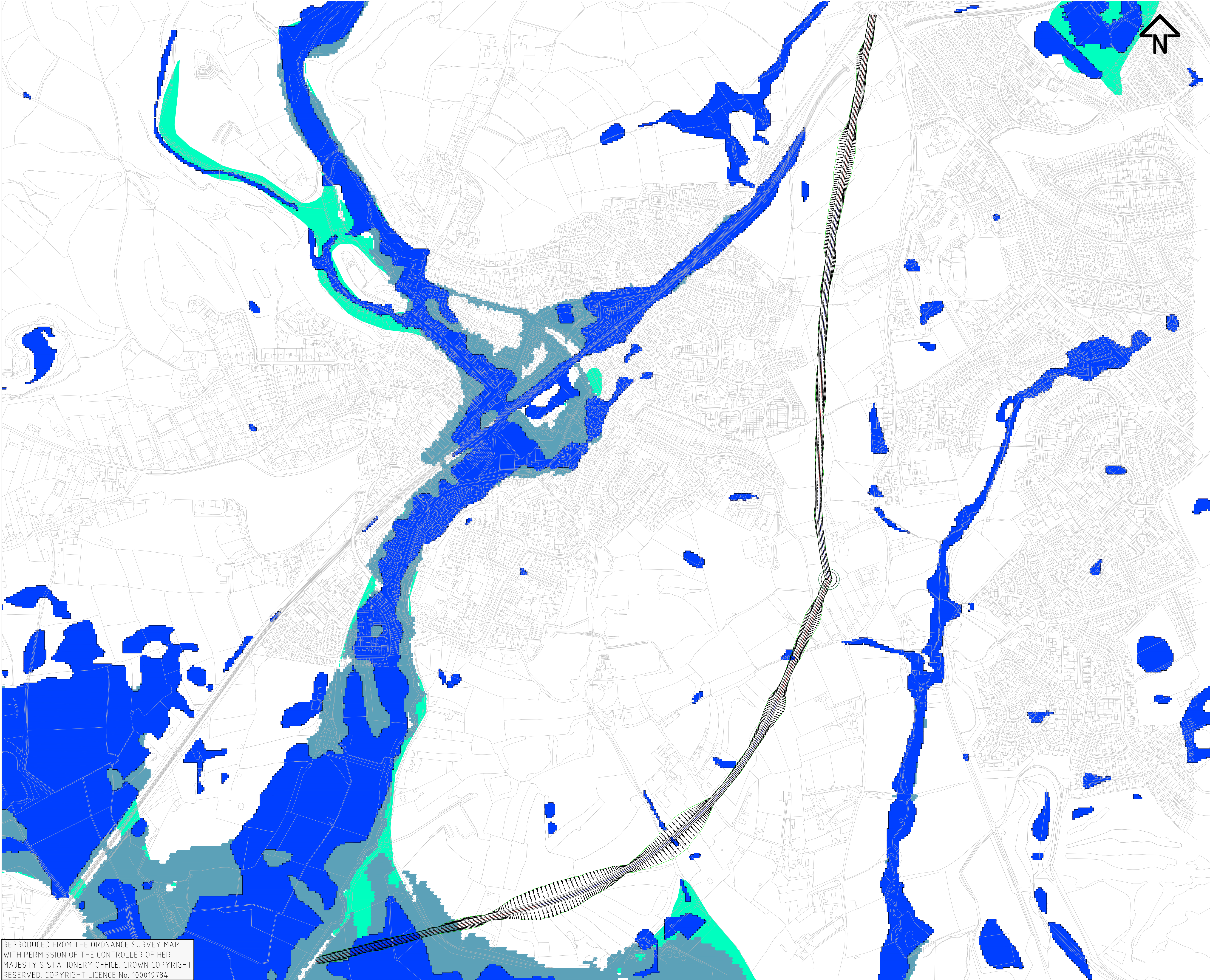
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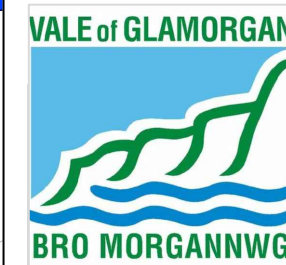
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NOTES:

LEGEND:

- FLOOD ZONE B
- FLOOD ZONE C1
- FLOOD ZONE C2

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WITH  
FLOOD ZONES**

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Suitability Description:

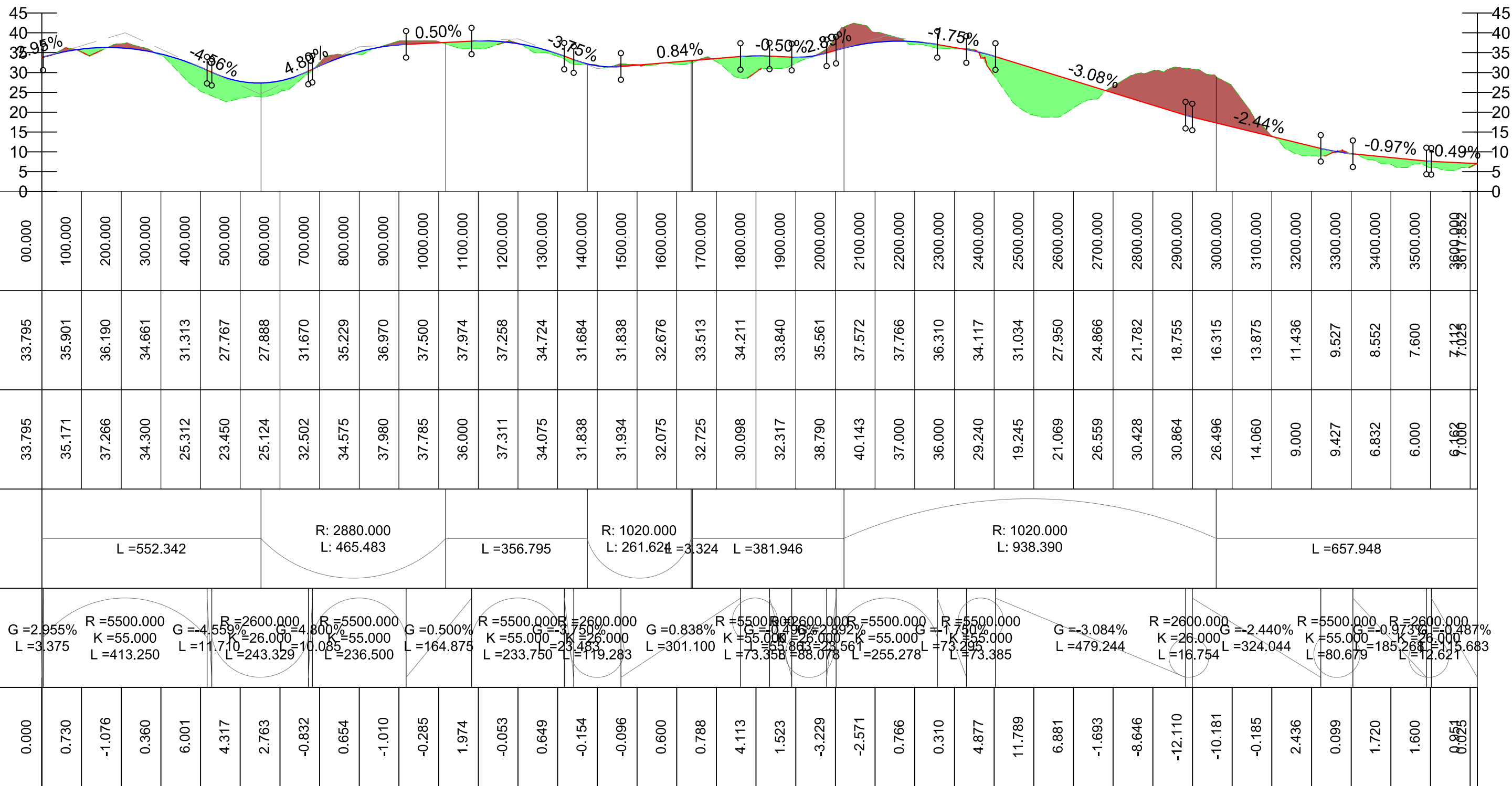
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Option 3 - Pink R2 Alignment  
SCALE: H 1:10000,V 1:1000  
DATUM: 0.000



**APPENDIX B**

**Merrie Harrier Improvements**



OUTLINE DESIGN FOR MERRIE HARRIER  
JUNCTION IMPROVEMENT

SHARED CYCLE ROUTE TO TIE INTO  
EXISTING AT BARONS COURT  
JUNCTION

Hazard 1

Hazard 2

Hazard 3

Hazard 4

Hazard 5

Hazard 6

Hazard 7

Hazard 8

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

The following notes highlight significant (ie unusual or difficult to manage) residual hazards identified by the designer. Typical hazards that should be identified by a competent contractor are not included. The contractor shall carry out the works using an approved safe system of work. Further information on hazards can be found in the hazard elimination schedule.

Decomissioning / Demolition

1. Overhead Electric Cables
2. Potential Asbestos in Demolition of Buildings
3. Working Alongside Live Traffic
4. Deep Excavations
5. Pedestrians on Public Rights of Way
6. Close Proximity to the Communities of Llandough, Cogan & Dinas Powys
7. Working at Height
8. Railway Line

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	DESIGNATED BUS LANE
	PROPOSED RETAINING WALL

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MERRIE HARRIER  
JUNCTION DESIGN  
OPTION 1A

Designed	N. CLEMENTS	Signed	Date: 22OCT2019
Drawn	N. CLEMENTS	Signed	Date: 22OCT2019
Checked	M. THOMAS	Signed	Date: 22OCT2019
Approved	D. ROWLANDS	Signed	Date: 22OCT2019
Scale:	1:1000	Datum:	AOD
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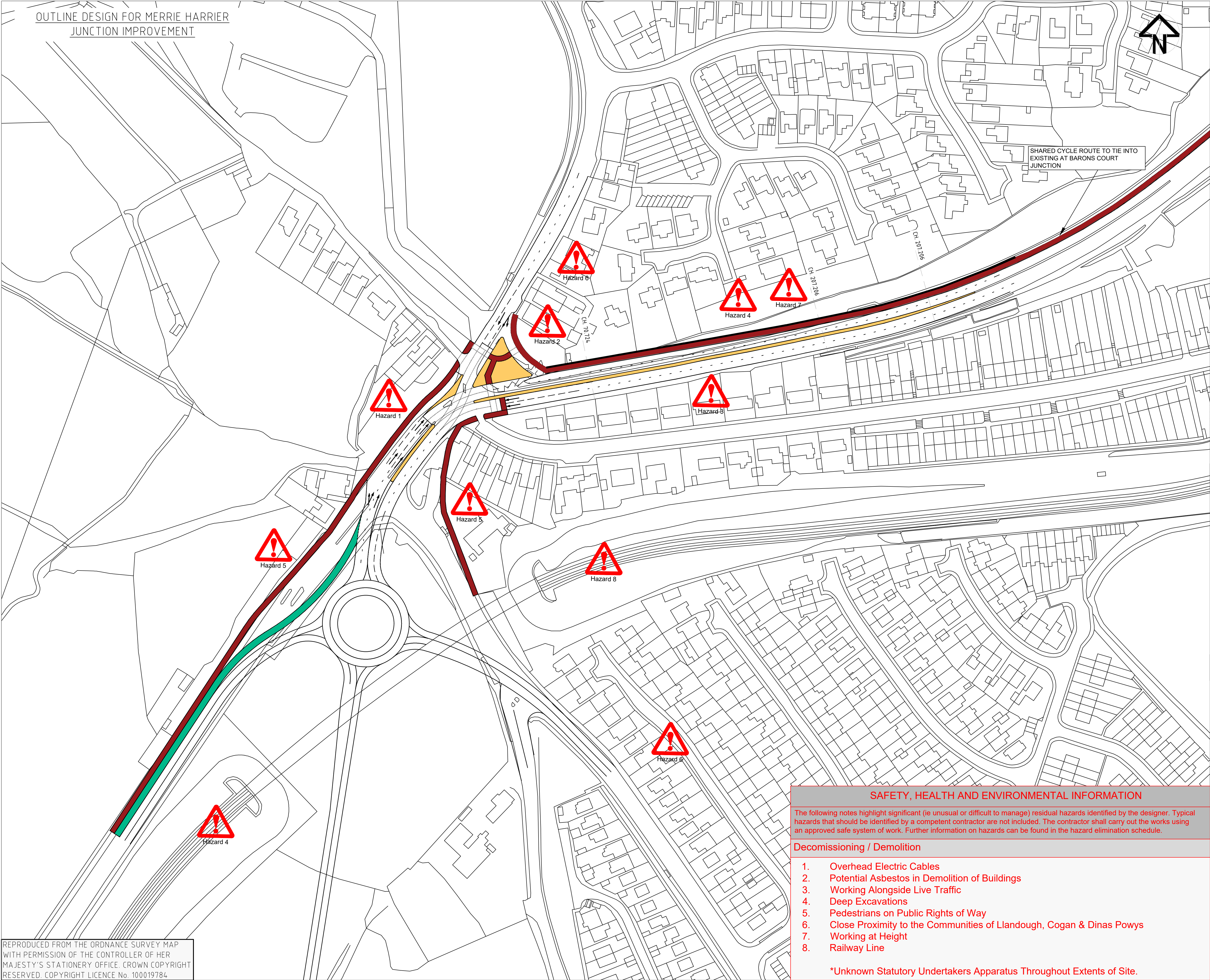
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NOTES:

LEGEND:

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OUTLINE DESIGN FOR MERRIE HARRIER  
JUNCTION IMPROVEMENT



NOTES:

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- TRAFFIC ISLAND
- DESIGNATED BUS LANE
- PROPOSED RETAINING WALL

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Suitability Description:

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\*Unknown Statutory Undertakers Apparatus Throughout Extents of Site.

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# MERRIE HARRIER JUNCTION

## Alternative Junction Design Analysis

SEPTEMBER 2019



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---

# Merrie Harrier Junction

## Alternative Junction Design Analysis

Author Jonathan Gunasekera

Checker David Carrignon

Approver Matthew Fry

Report No 001

Date NOVEMBER 2019

### VERSION CONTROL

Version	Date	Author	Checker	Approver	Changes
1.0	18/10/2019	JG	DC	MF	Draft for Comments
1					

This report dated 13 November 2019 has been prepared for Vale of Glamorgan(the "Client") in accordance with the terms and conditions of appointment dated 13 November 2019 (the "Appointment") between the Client and **Arcadis Consulting (UK) Limited** ("Arcadis") for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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# 1 Introduction

## 1.1 Context

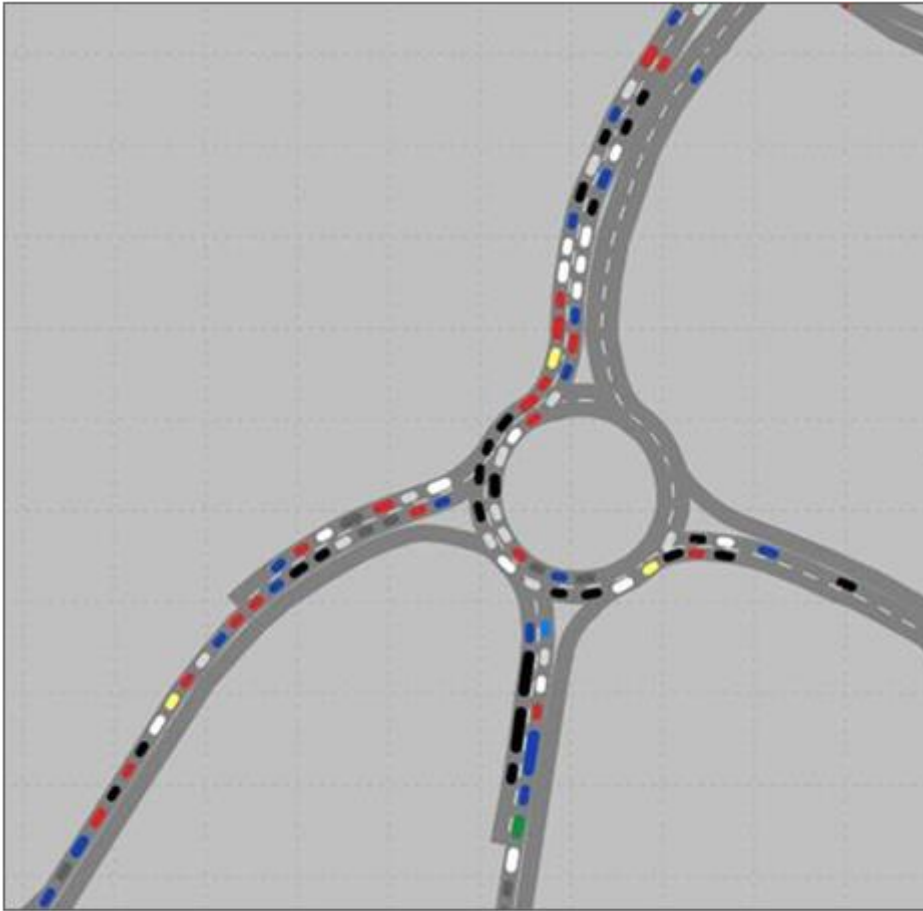
Arcadis has been commissioned by the Vale of Glamorgan Council to undertake a traffic study and initial concept scheme development for the Merrie Harrier junction that includes an option for the integration of a bypass around the town of Dinas Powys.

As part of the Dinas Powys WelTAG Stage Two study, a bypass option (Green alignment) was developed for the corridor that tied-in to the south of the Merrie Harrier junction. The proposal involved the implementation of a roundabout, shown in Image 1. VISSIM traffic modelling undertaken as part of the study identified the following:

- The A4055 Barry Road northbound operated above practical capacity in both the 2036 AM and PM peak hours;
- The queue on the northbound approach to the Merrie Harrier junction is predicted to exceed the stacking capacity between the Merrie Harrier junction and the proposed Bypass Roundabout;
- The queuing resulted in blocking back through the roundabout and created a gridlock effect (see Image 2); and
- Possible improvements to the junction include the introduction of two lanes of traffic on the A4055 Barry Road approach northbound to increase the stacking capacity on this approach.



Image 1: Proposed Bypass Roundabout to the south of the Merrie Harrier Junction



*Image 2: Gridlock due to blocking back from Merrie Harrier Junction*

## 1.2 Purpose of Study

The purpose of this design analysis is to review the initial design and identify potential improvements to the Merrie Harrier junction that could deliver the required capacity improvements for with and without the bypass scheme.

## 1.3 Content

This report is structured as follows:

- Chapter 2 lists the received traffic data;
- Chapter 3 presents the early traffic assessment results; and
- Chapter 4 provides the conclusions and recommendations of the study.

## 2 Data

The data used as part of this study are:

- ACAD drawings of the existing and proposed arrangement;
- 2036 model volumes from the Dinas Powys WeITAG Stage Two study; and
- Dinas Powys WeITAG Stage Two study traffic modelling results.

## 3 Proposed Interventions

### 3.1 Option 1a – Bypass Option

The Dinas Powys WeITAG Stage Two study proposed carriageway way widening at the Merrie Harrier to provide two lanes northbound to increase the stacking and capacity of the A4055 Barry Road approach. This improvement is intended to resolve the issue of blocking back from the Merrie Harrier junction which had a significant impact on the operation of the proposed bypass roundabout.

In addition to the proposed traffic capacity improvements, the pedestrian, public transport and cycle facilities at the Merrie Harrier were also investigated by the Highways Design team.

The proposed improvements at the junction as part of Option 1a are as follows:

1. Northbound bus priority lane that ties into the A4055 northbound after the proposed bypass roundabout;
2. The northbound A4055 approach to the Merrie Harrier junction widened to two lanes from the proposed bypass roundabout. This then flares to three lanes to provide a separate left filter lane with a segregated stopline;
3. Signalised pedestrian crossings have been introduced onto B4267 Penlan Road; and
4. A4055 Barry Road carriageway has been dualled in both directions with a flared right turn bay on the approach to the Merrie Harrier junction.

The proposed signal coordination plan is shown in Image 3 below, note that stages 2 and 4 include pedestrian phases and can be operated as demand dependent.

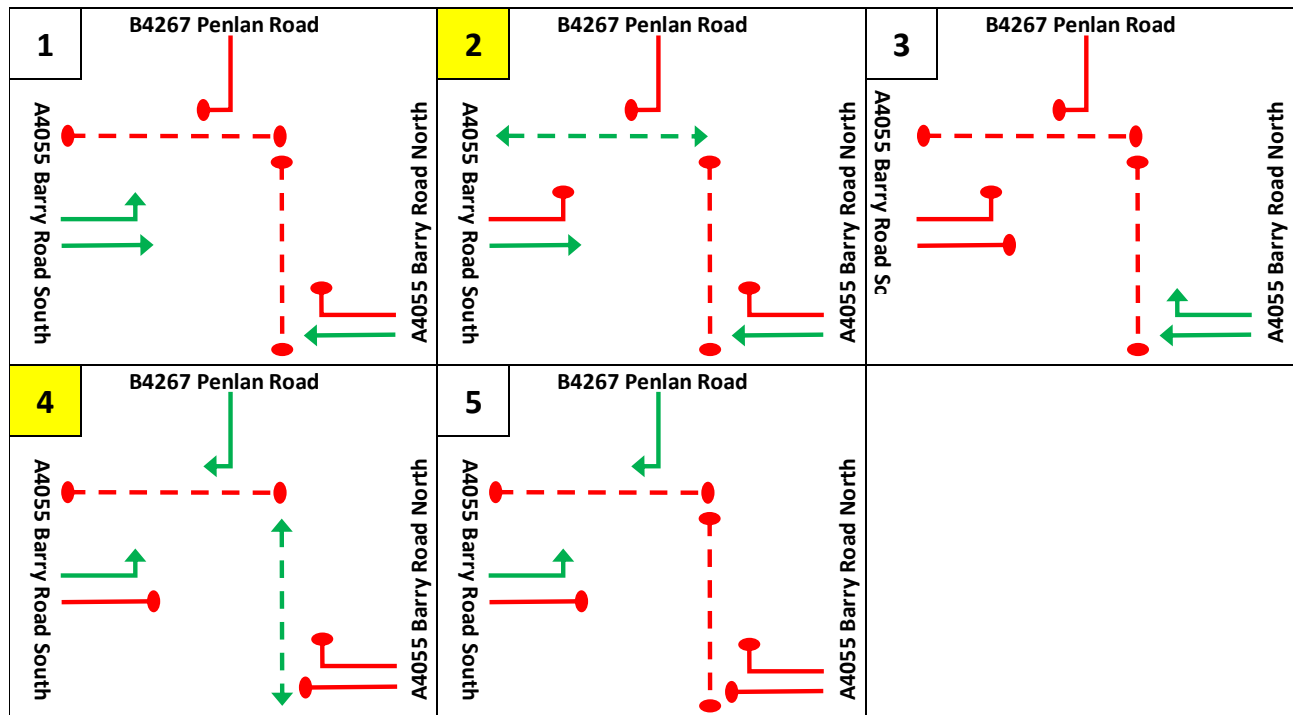


Image 3: Option 1a Staging Plan (Demand Dependent Stages Highlighted in Yellow)



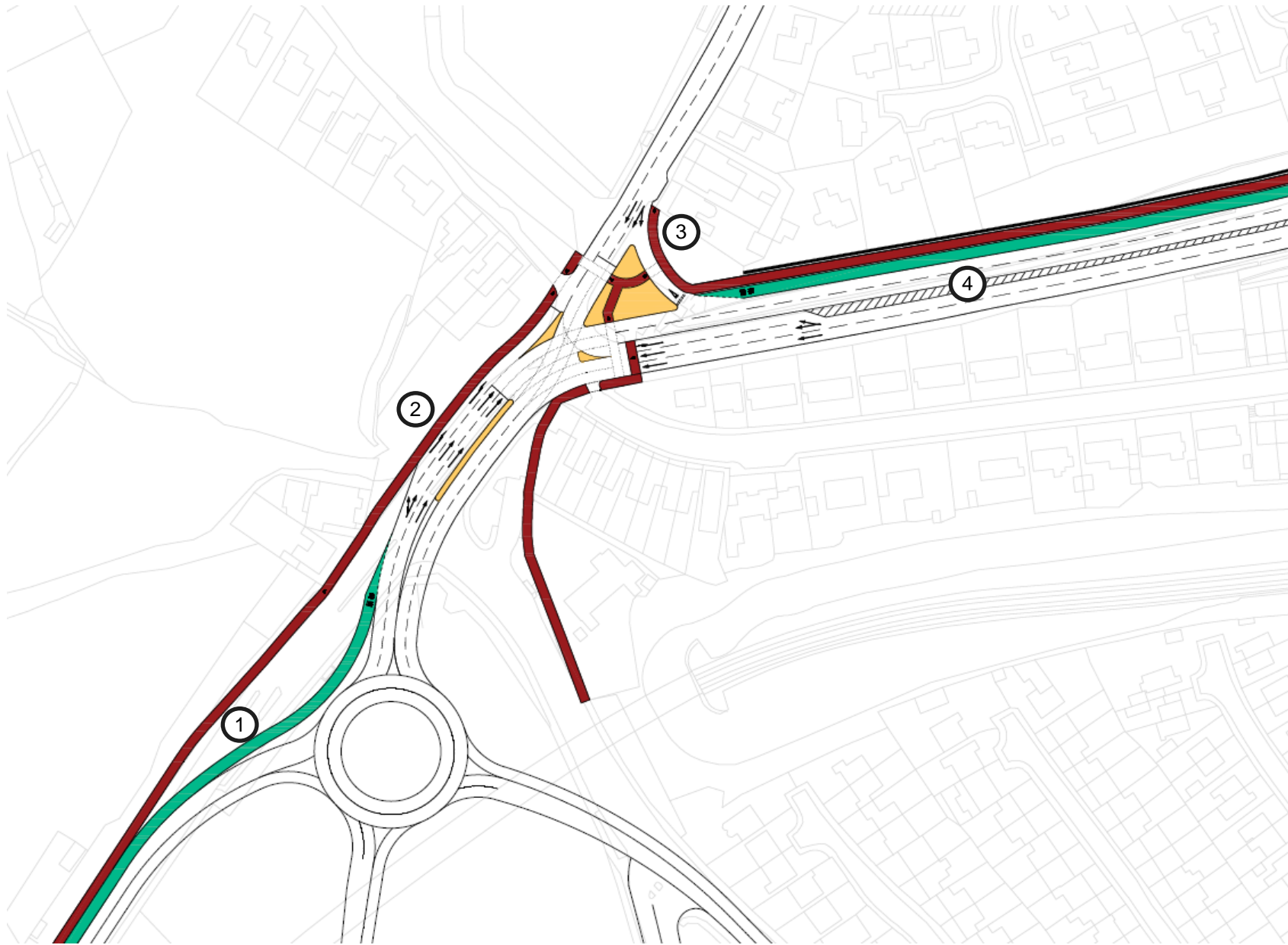


Image 4: Option 1a with proposed Bypass Roundabout

## Traffic Modelling

Traffic modelling was undertaken for the proposed Merrie Harrier layout for the 2036 forecasted traffic demand identified as part of the Dinas Powys WelTAG Stage Two study. The critical section for the overall junction operation is the A4055 northbound approach to the Merrie Harrier junction. In the proposed layout there is approximately 100m of two lanes between the bypass roundabout and the northbound stoplines at the Merrie Harrier junction. This provides enough stacking capacity for approximately 17 PCUs per lane before the queue would block back to the roundabout (1 PCU = 5.75m).

For the junction modelling it has been assumed that the pedestrian crossings will be called once every other cycle with a cycle time of 90 seconds. The 2036 traffic modelling results for the proposed layout shown in Image 3 are presented in Table 1.

Table 1 2036 AM and PM Traffic Modelling Results

Traffic Movement	Lane	2036 AM Peak 07:45 – 08:45			2036 PM Peak 16:00 – 17:00		
		Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU	Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU
A4055 Barry Road Southbound	1	47.6%	9.6	7.9	43.7%	7.5	9.4
	2/3	70.8%	5.6	50.6	41.9%	6.1	12.7
A4055 Barry Road Northbound	1/2	73.7%	12.3	16.3	56.7%	7.2	13.6
	3	60.6%	12.3	18.7	45.8%	8.1	16.5
Penlan Road	1	14%	0.5	6.1	34.9%	1.4	7.1
	2/3	59.6%	4.2	42.7	71.7%	6.7	39.9

Based upon the traffic modelling results all approaches are expected to operate within practical capacity in both the 2036 AM and PM peak hour. The only concern is the A4055 Barry Road northbound mean maximum queue which is predicted to reach 24.6 PCUs out of a total storage capacity of 37 PCUs. Whilst this is not predicted to exceed the storage capacity of the section between the bypass roundabout and the Merrie Harrier junction, further investigation using microsimulation may be required to rule out this possibility.

A potential option to resolve the queuing issue would be to ban the A4055 Barry Road Southbound right turn into Penlan Road and allow the to use the roundabout to U-turn back into Penlan Road. This would reduce the number of stages required at the Merrie Harrier junction and simplify the signal coordination plan required. Currently there is only a small window where the southbound right turners into Penlan Road, this is in Stage 3 in the plan shown in Image 2. This can be reallocated to the through movements by the removal of this stage.

### 3.2 Option 1b – Bypass Option with Southbound Right Turn Banned

Option 1b follows a similar layout as Option 1a but with the A4055 Barry Road Southbound Right Turn into Penlan Road banned. Traffic is therefore rerouted via the bypass roundabout in order to access Penlan Road. The greentime that was allocated to the right turn in Stage 3 shown in Image 5 can now be given to the A4055 Barry Road northbound movement, this further reduces the changes of blocking back from the Merrie Harrier junction which was identified as a key issue during the Dinas Powys WelTAG Stage Two study. The revised layout for Option 1b is shown in 6. The updated signal coordination plan is shown in 5, Stages 2 and 3 are demand dependent and if there is no pedestrians demand then the junction could operate a very simple two stage plan using Stages 1 and 4 shown in 5. For the purposes of the traffic modelling in this assessment it has been considered that the pedestrian crossings will be called once every other cycle and the cycle time for the junction has been retained at 90 seconds.

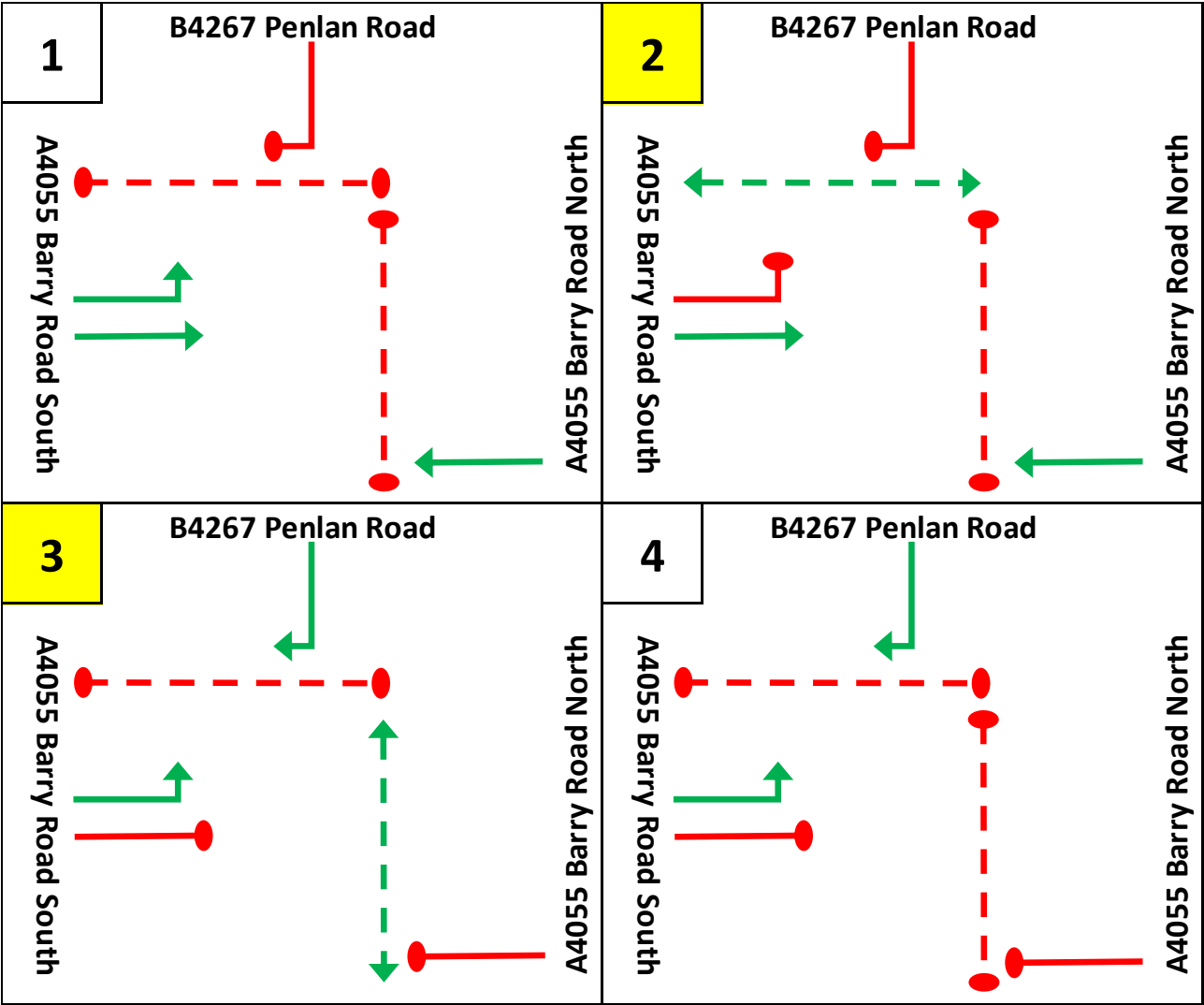


Image 5: Option 1b Staging Plan (Demand Dependent Stages Highlighted in Yellow)

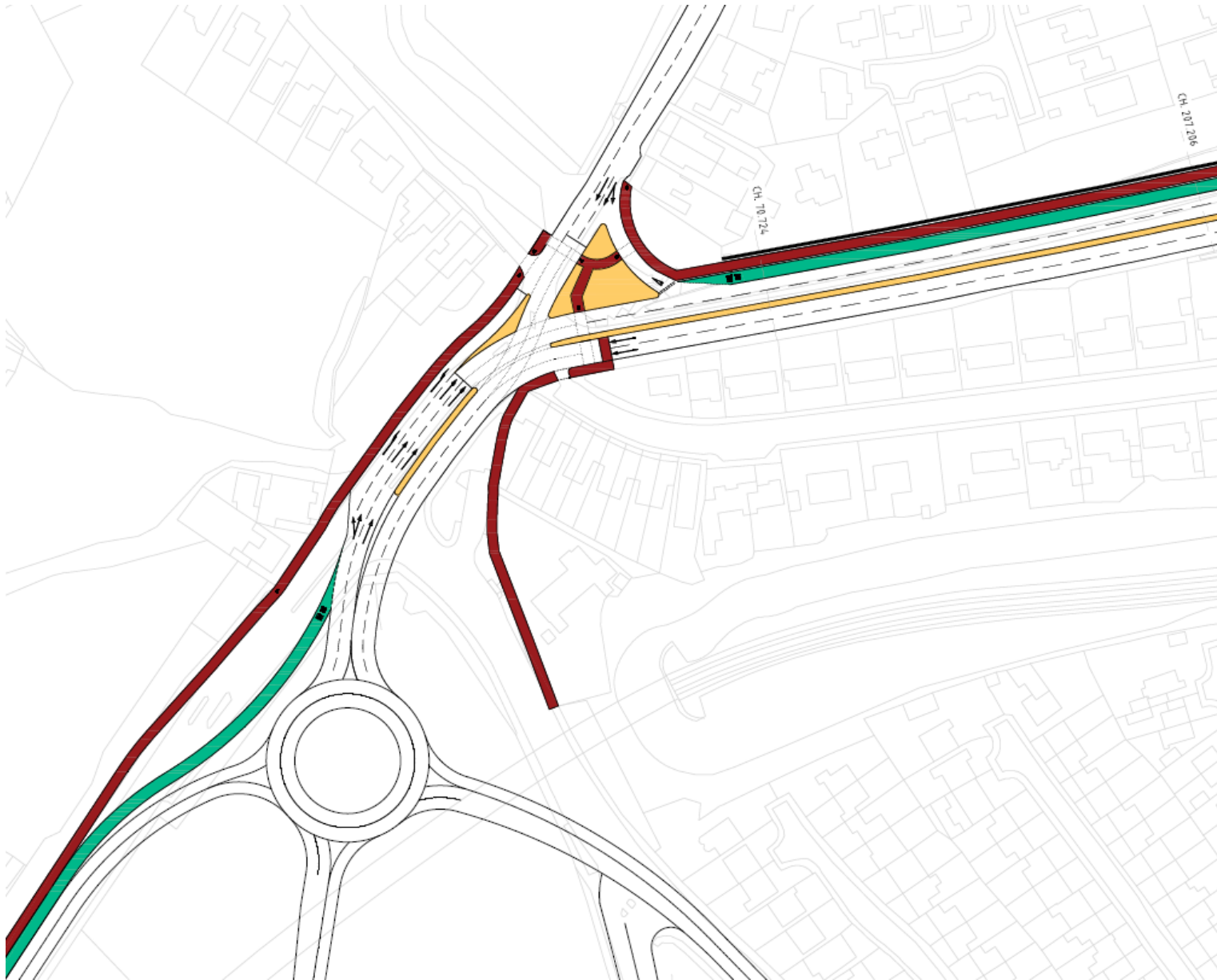


Image 6: Option 1a with proposed Bypass Roundabout

## Traffic Modelling

The 2036 traffic modelling results for the proposed layout shown in Image 3 are presented in Table 2.

Table 2 2036 AM and PM Traffic Modelling Results

Traffic Movement	Lane	2036 AM Peak 07:45 – 08:45			2036 PM Peak 16:00 – 17:00		
		Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU	Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU
A4055 Barry Road Southbound	1	31.7%	5.0	6.1	43.8%	7.3	8.8
	2	32.4%	5.1	6.2	43.8%	7.3	8.8
A4055 Barry Road Northbound	1/2	66.0%	9.7	6.9	49.3%	6.9	6.9
	3	46.1%	8.8	8	36.9%	8.9	8.9
Penlan Road	1	14.0%	0.5	5.3	35.5%	1.4	6.8
	2/3	58.7%	4.0	43.3	73.1%	7.2	42.5

Based upon the traffic modelling results all approaches are expected to operate within practical capacity in both the 2036 AM and PM peak hour. There is also a reduction in the DoS, mean maximum queue and average delay/ PCU on all approaches compared with Option 1a. This is due to the simplification of the traffic signal plan at the Merrie Harrier junction. The main improvement is to the A4055 Barry Road northbound which gets at least 10% more green time per cycle in Option 1b compared with Option 1a. The queues in the internal section between the Merrie Harrier junction and the bypass roundabout have also reduced.

In order to understand the impact on the southbound right turn movement into Penlan Road the a comparison of the journey time (seconds) and delay per PCU has been provided between Option 1a and Option 1b.

Table 3 Comparison of Delays and Travel Times for the A4055 Barry Road Southbound Right Turn in Options 1a and 1b

Option	2036 AM Peak 07:45 – 08:45			2036 PM Peak 16:00 – 17:00		
	Journey Time (s)	Av. Undelayed Time (s)	Av. Delay/PCU (s)	Journey Time (s)	Av. Undelayed Time (s)	Av. Delay/PCU (s)
Option 1a	85.7	29	56.7	70.1	29	41.1
Option 1b	64.7	48	16.7	70.5	48	22.5

A comparison of the journey times for the A4055 Barry Road Southbound Right Turn in Options 1a and 1b shown in Table 3, indicate that banning the right turn results in a longer undelayed journey time. This is to be expected as the vehicles are required to U-turn via the bypass roundabout in Option 1b which increases the required travel distance. However, the benefits of reducing the number of stages at the junction results in far less delay per PCU compared with Option 1a. The overall journey time for the right turn is predicted to be lower in Option 1b for the 2036 AM peak hour, this is because the average delay per PCU for the right turn in this scenario is high in Option 1a. In the 2036 PM peak hour the journey times for the right turn are predicted to be similar.

It is recommended that Option 1b carried forward for the with bypass option as it provides greater resilience to the operation of the bypass roundabout and the Merrie Harrier junction. Further investigation into the provision of an emergency access for ambulances could also be undertaken that would allow emergency vehicles to still make the right turn. This would involve banning the right turn for general traffic only and creating a refuge area for emergency vehicles to use.

### 3.3 Option 2 – No Bypass

In addition to the improvements associated with the bypass roundabout option, options to improve existing operation of the Merrie Harrier junction were also considered. The key aims are to improve the traffic flow continuity between the A4055 Barry Road / B4267 Redlands Road junction and the A4055 Barry Road / B4267 Penlans Road as well as the pedestrian and cycle infrastructure.

The proposed improvements at the junction as part of Option 2 are as follows:

1. Reallocating the lanes in the central section between the two junctions so that there are three lanes in the northbound direction and two lanes in the southbound direction. Note that in this layout the left filter has been removed and the nearside lane is now shared for ahead and left;
2. Signalised pedestrian crossings have been introduced onto B4267 Penlan Road; and
3. A4055 Barry Road carriageway has been dualled in both directions with a flared right turn bay on the approach to the Merrie Harrier junction.

The key improvement to the Merrie Harrier junction in Option 2 is to the northbound section between the two signalised T-junctions. A focal point of the improvement is to preserve the integrity of the central reservoir between the junctions and improve pedestrian and cyclist facilities and safety. The proposed staging plan for Option 2 is shown in Image 7 and the proposed layout is shown in Image 8.

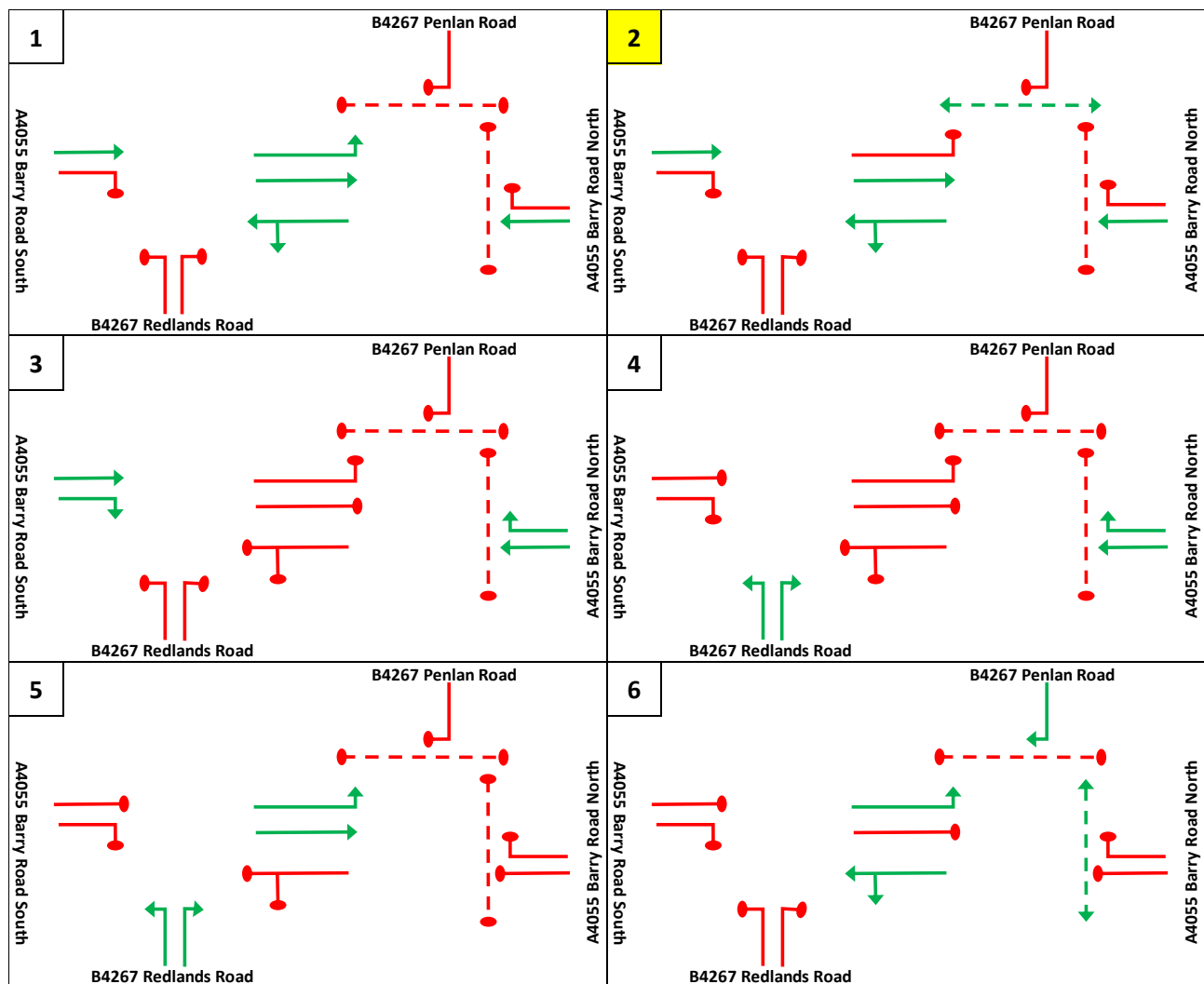


Image 7: Option 1a Staging Plan (Demand Dependent Stages Highlighted in Yellow)



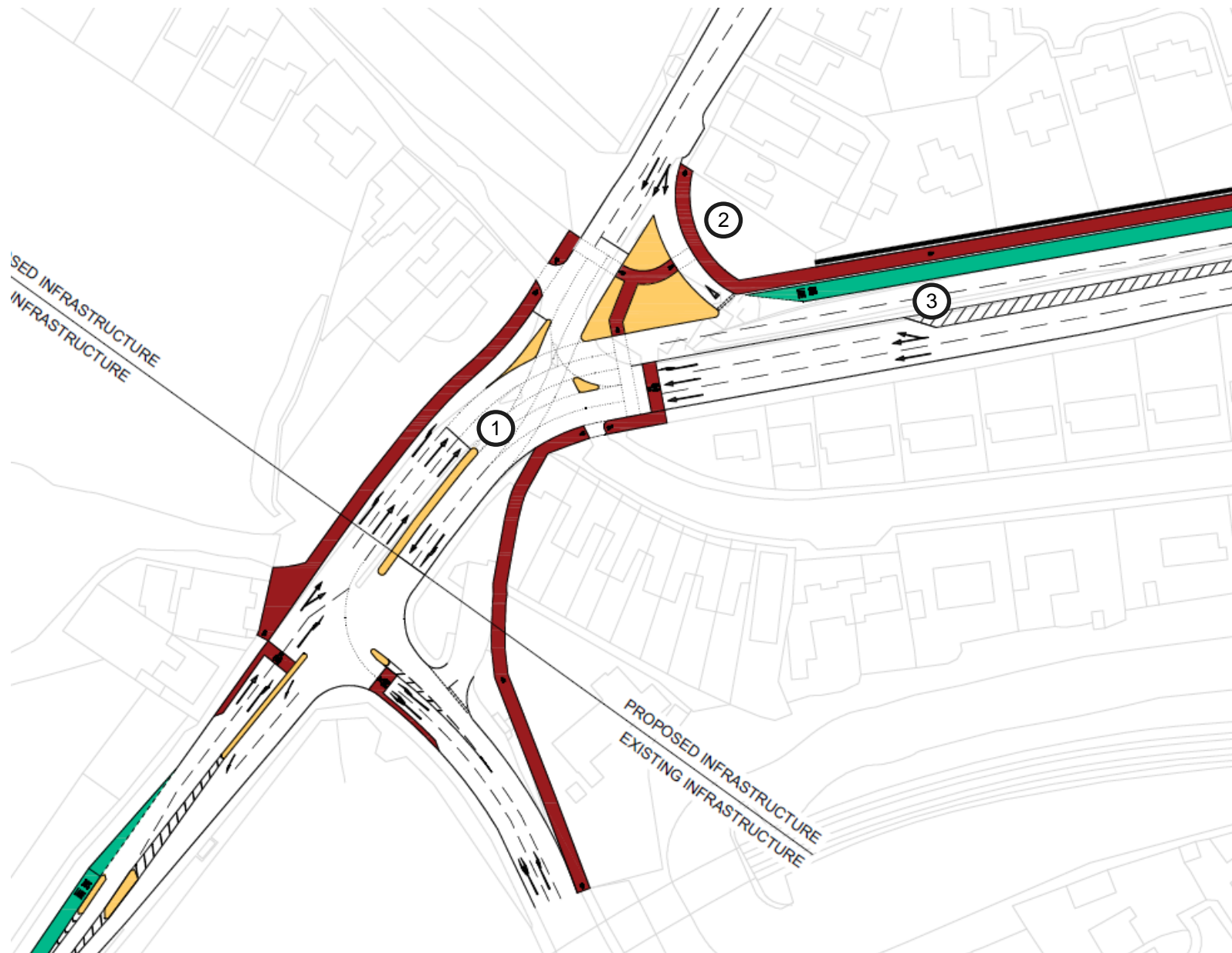


Image 8: Option 1a with proposed Bypass Roundabout

## Traffic Modelling

Traffic modelling was undertaken for Option 2 using the 2036 forecasted traffic demand identified as part of the Dinas Powys WeITAG Stage Two study. The key improvements are proposed on the sections between the A4055 Barry Road / B4267 Redlands Road junction and the A4055 Barry Road / B4267 Penlans Road junction.

For the junction modelling it has been assumed that the pedestrian crossings will be called every cycle with a cycle time of 160 seconds. The 2036 traffic modelling results for the proposed layout shown in Image 8 are presented in Table 4.

Table 4 2036 AM and PM Traffic Modelling Results

Traffic Movement	Lane	2036 AM Peak 07:45 – 08:45			2036 PM Peak 16:00 – 17:00		
		Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU	Degree of Saturation	Mean Max Queue (PCUs)	Av. Delay/PCU
A4055 Barry Road Southbound	1	44.5%	12.7	27.9	64.5%	19.8	40.5
	2/3	87.4%	10.9	65.6	74.4%	19.5	44.8
Redlands Road	1	79.9%	21.6	61.6	76.1%	14.6	74.3
	2	79.9%	21.5	61.7	76.6%	15.1	74.4
A4055 Barry Road Northbound	1/2	83.7%	32.6	45	77.9%	28	42.4
Penlan Road	1	14.4%	0.4	6.1	35.9%	1.4	7.5
	2/3	77.0%	10.1	84.5	78.1%	16.6	66.1

Based upon the traffic modelling results all approaches are expected to operate within practical capacity in both the 2036 AM and PM peak hour. The A4055 Barry Road southbound in the 2036 AM peak hour is predicted to be approaching practical capacity with a DoS 87.4%. This is primarily due to the volume of right turners into Penlan Road in the AM peak hour.

Note that in Stage 4, the B4267 Redlands Road operates when the central reservoir northbound is on red. The stage length needs to be limited to a maximum of 17 seconds so that it does not overfill the internal reservoir. The traffic modelling indicates that there will be a moving queue from the B4267 Redlands Road during this stage that will be flushed through the junction in Stage 5. This is shown by the 2036 AM peak hour queue storage graph shown in Image 9. The stationary queue is not predicted to exceed the storage capacity of the internal reservoir.

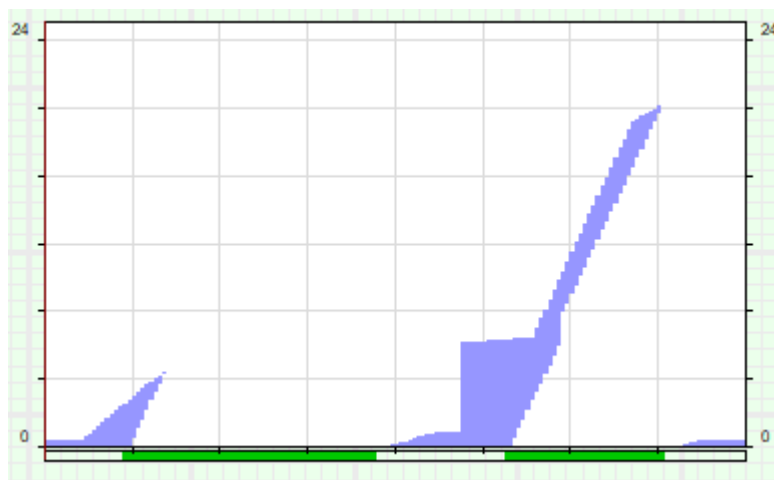


Image 9: 2036 AM Peak Hour Queue Storage Graph for the A4055 Barry Road Northbound Internal Reservoir Section



## 4 Conclusion

Following traffic analysis of the junction an optioneering process to find a suitable intervention for the with and without Bypass options. Three key layouts were considered, these included:

- Option 1a – Bypass Option;
- Option 1b – Bypass Option with Right Turn Ban; and
- Option 2 – No bypass.

Option 1b – Bypass Option with Right Turn Ban would provide the best option in terms of capacity and resilience. Further investigation into how emergency vehicles will access the hospital may need to be considered if the right turn ban is considered undesirable. Option 1a is predicted to operate within practical capacity and still retains the right turn towards the hospital. The only concern is potential queuing that may occur on the A4055 Barry Road northbound between the Merrie Harrier junction and the Bypass roundabout. Whilst it is not predicted to exceed the stacking capacity, this option does not offer the same resilience as Option 1b.

Option 2 provides improvements to the existing layout in terms of capacity and improved pedestrian and cycle facilities. It should be noted that a moving queue is predicted through the northbound internal storage section during Stage 4, this stage should therefore be kept below a stage length of 17 seconds so as not to overload the internal reservoir.

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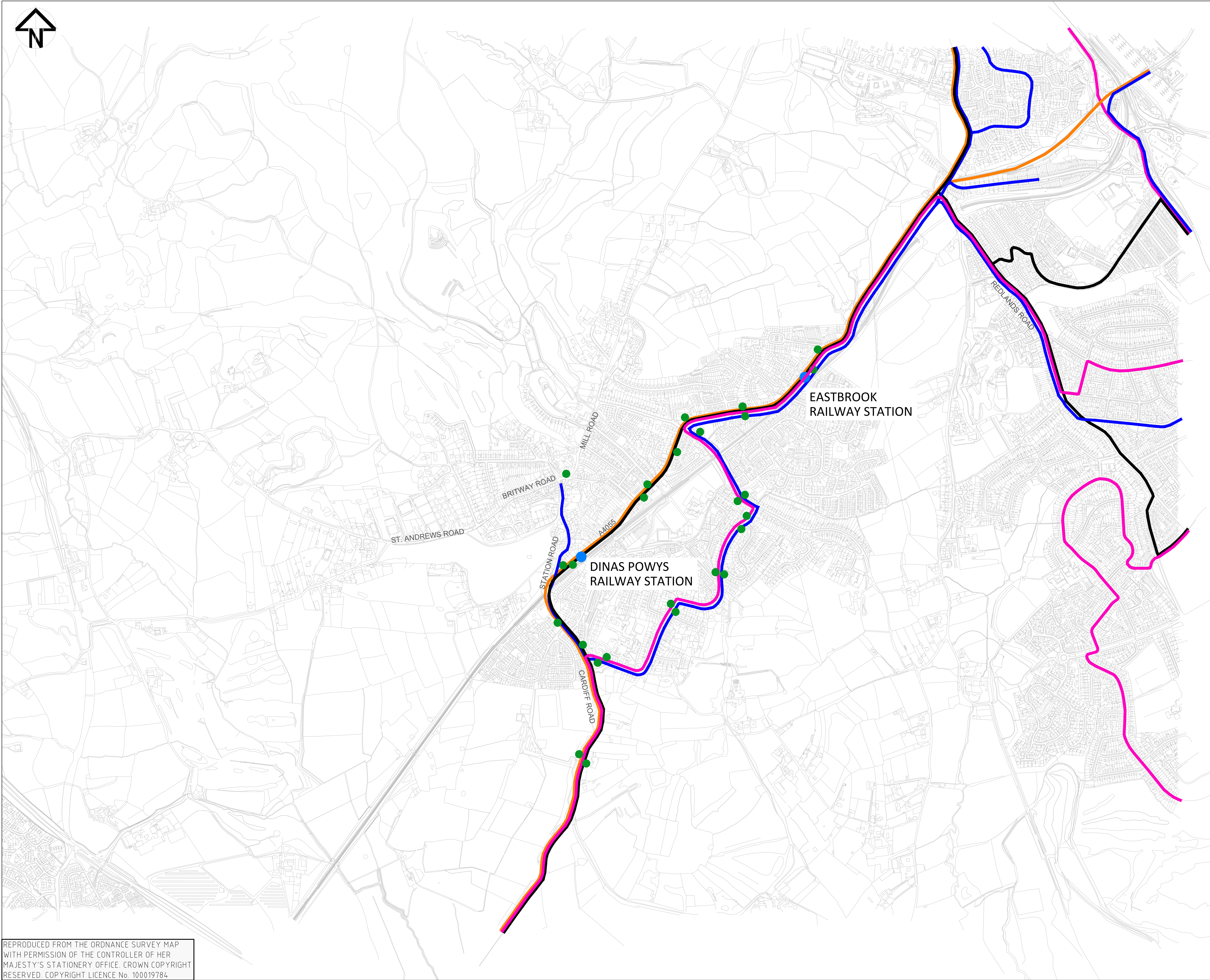
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**APPENDIX C**

**Multi-modal Plans**





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NOTES:

- RAILWAY STATION
- BUS STOPS
- BUS SERVICES:
  - 95, 95A, 95B
  - 93
  - 304
  - 89A

Rev	Date	Description	Drawn	Check	Approv
P01	20FEB18	FOR INFORMATION PURPOSES ONLY	MS	MT	GH

Client

VALE OF GLAMORGAN

PROJECT:  
Dinas Powys  
WeITAG S2

Site

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Drawn	M. SMITH	Signed	20FEB2018
Checked	M. THOMAS	Signed	Date
Approved	G. HARRIS	Signed	20FEB2018
Scale:	NA	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S2	Project Number:	10015022

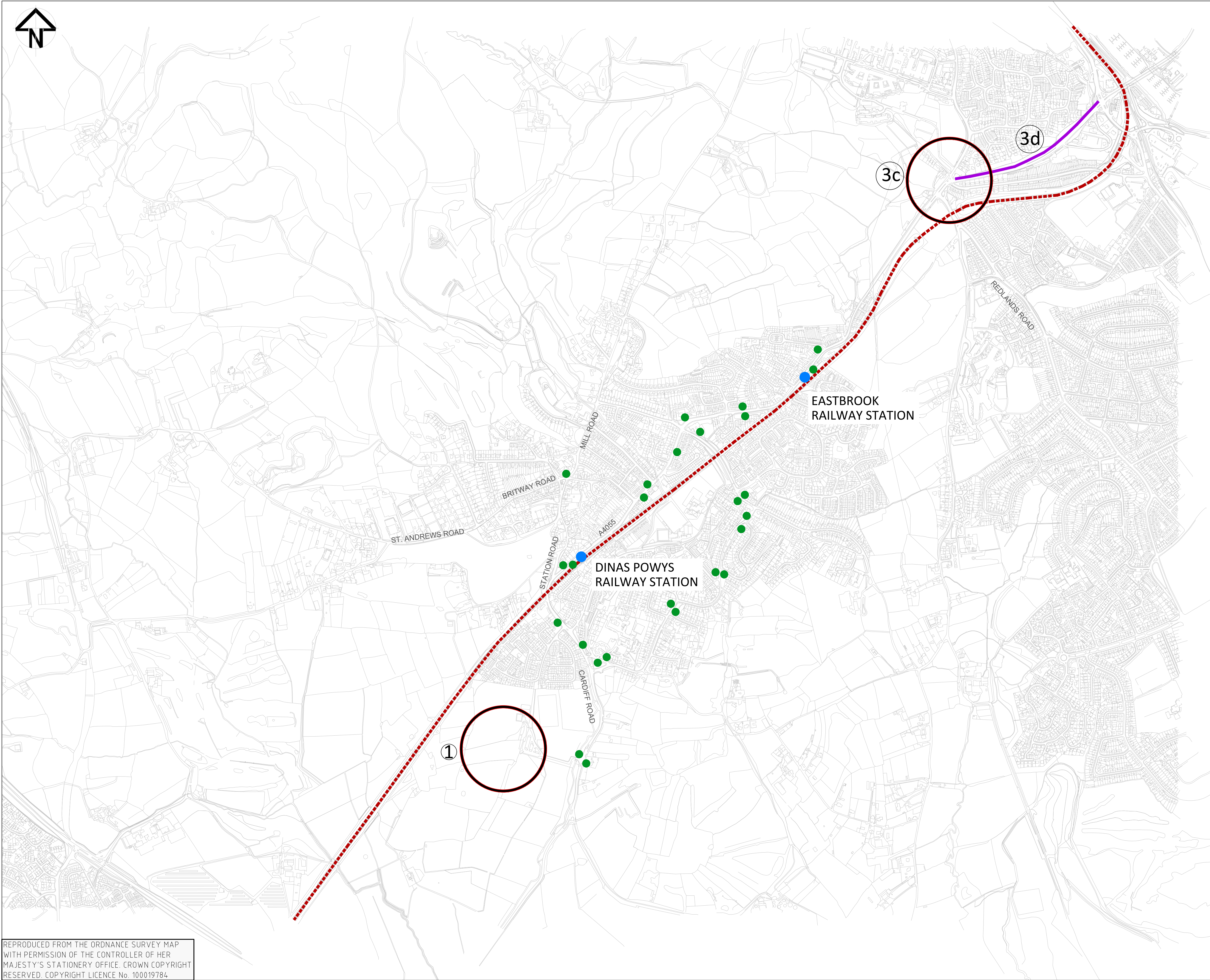
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10015022-ARC-XX-XX-DR-HE-0012

Revision:  
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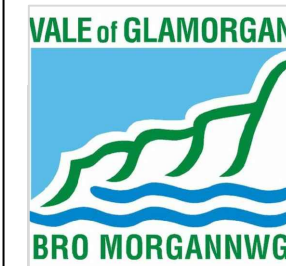
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#### NOTES:

- BUS BASED PARK & RIDE
- RAIL ENHANCEMENTS:
  - VALE OF GLAMORGAN LINE SERVICE ENHANCEMENT
  - RAIL WAY UPGRADE
- BUS ENHANCEMENT:
  - BUS STOP ENHANCEMENT
  - MERRIER HARRIER JUNCTION
  - MERRIER HARRIER JUNCTION TO BARONS COURT JUNCTION BUS LANE

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P01	20FEB18	FOR INFORMATION PURPOSES ONLY	MS	MT	GH

#### Client



VALE OF  
GLAMORGAN

PROJECT:  
Dinas Powys  
WeITAG S2

#### Site

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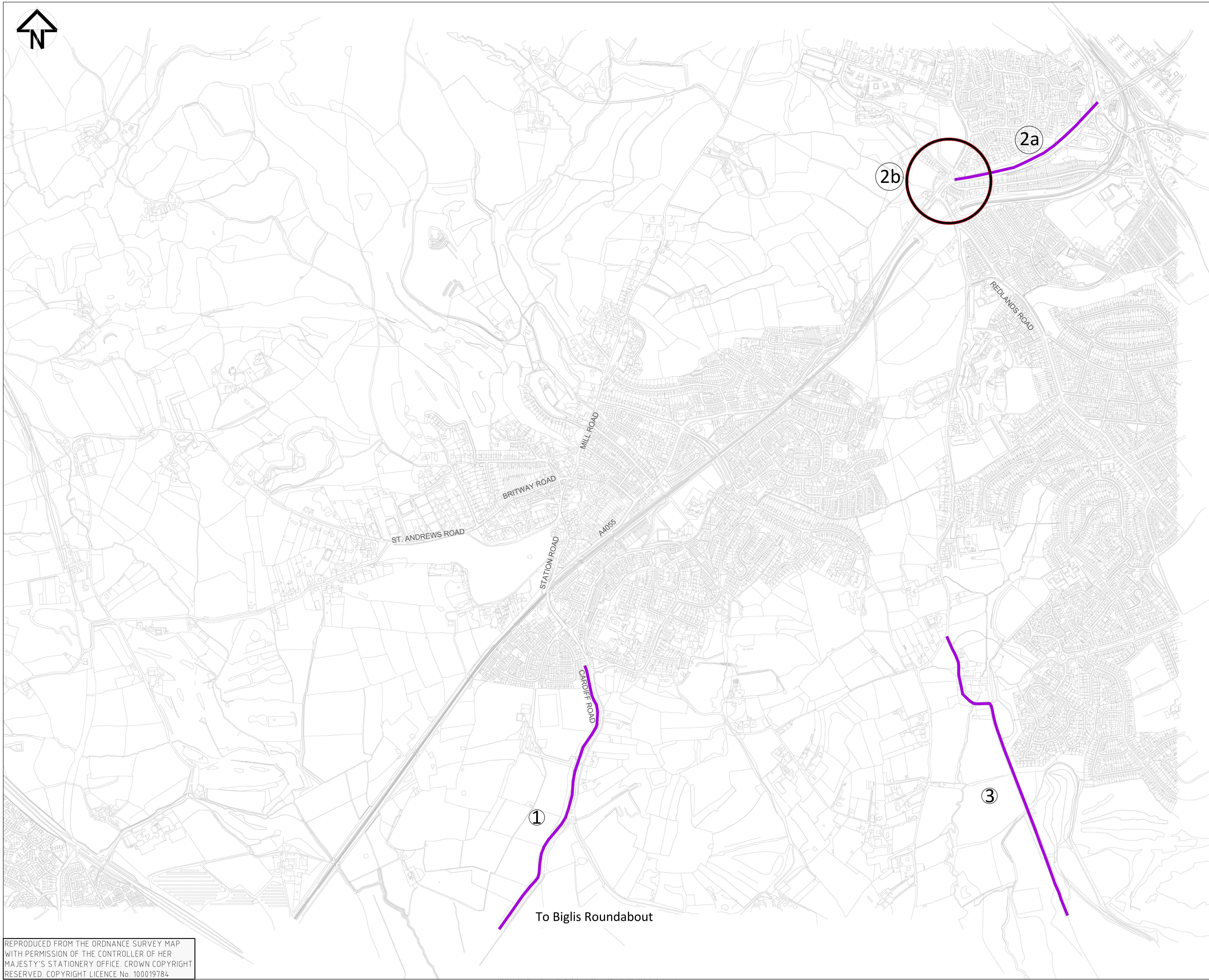
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TRANSPORT ROUTES

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Drawn	M. SMITH	Signed	20FEB2018
Checked	M. THOMAS	Signed	Date
Approved	G. HARRIS	Signed	20FEB2018
Scale:	NA	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S2	Project Number:	10015022

Suitability Description:  
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10015022-ARC-XX-XX-DR-HE-0013	P01





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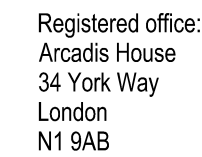
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- 2A. MERRIER HARRIER JUNCTION TO BARONS COURT JUNCTION
- 2B. MERRIER HARRIER JUNCTION
3. DINAS POWYS TO PENARTH CONNECTIONS

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PROJECT:  
Dinas Powys  
WelTAG S2

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TITLE:

Designed	R. ELLIS	Signed	Date 20FEB2018
Drawn	M. SMITH	Signed	Date 20FEB2018
Checked	M. THOMAS	Signed	Date 20FEB2018
Approved	G. HARRIS	Signed	Date 20FEB2018
Scale:	NA	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	S2	Project Number:	10015022

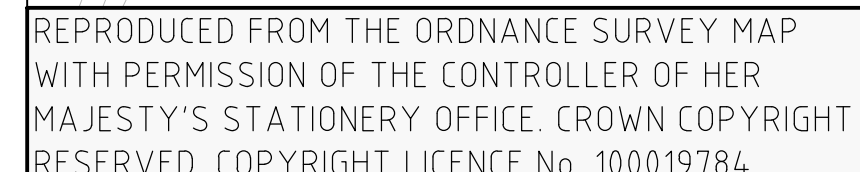
Suitability Description:

**INFORMATION PURPOSES**  
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10015022-ARC-XX-XX-DR-HE-0014

Revision:  
P01





Print Date: 2018-03-06 11:37:50

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SITE AREA = 14780m<sup>2</sup>  
Standard Parking Spaces = 526  
Disabled Parking Spaces = 12

CARDIFF ROAD

P1.0	06/03/18	FIT FOR INFORMATION	RE	MT	GH
Rev	Date	Description	Drawn	Check	Approv



PROJECT:  
Dinas Powys  
WelTAG Stage 2  
Appraisal

Barry

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## PROPOSED PARK AND RIDE AREA

Suitability Description:
--------------------------

# CONCEPT DESIGN FIT FOR INFORMATION

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10015022-ARC-XX-XX-DR-HE-0015

Revision:	P1.0
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**APPENDIX D**

**Transport Case Appraisal Tables**



Do-minimum		
	Impacts	Scale
<b>Social</b>		
Physical Activity	A slight adverse impact on physical activity, due to low levels of funding currently being invested in the infrastructure.	-
Journey Quality	The highway network forms the backbone of the transport network however the volume of traffic on Cardiff Road would increase by circa 5% to 7% between 2026 and 2036 (SEWTM modelling output). This will exacerbate existing traffic issues using the highway through the study area. The junction capacity modelling work as part of the Vissim model identifies that delay at the Barons Court and Murch Road junctions will increase in the do-minimum with traffic growth. All junctions are anticipated to be significantly over capacity in the 2036 do-minimum. A step change in the level of investment in the infrastructure is required to deliver journey quality improvements.	---
Accidents	A number of accidents have been identified within the study area, particularly through the A4055 Cardiff Road link through Dinas Powys. This is anticipated to increase with future traffic growth on the congested corridor. A step change in the level of investment in the infrastructure is required to deliver road safety improvements.	-
Security	A slight adverse impact on security due to low levels of funding currently being invested in the infrastructure and associated security measures.	-
Access to Employment	Dinas Powys is situated near to key employment settlements most notably Cardiff and Barry, however existing public transport services and infrastructure provision would require an increased level of funding to deliver improved accessibility to employment.  The car (or van) is the dominant mode of travel to work across Dinas Powys, as with the Vale of Glamorgan and South East Wales as a whole. 79% of those from Dinas Powys drive to work (including passengers) compared with 76% of South East Wales as a whole. Journey times by car or van to employment would be expected to deteriorate in the do-minimum due to traffic growth on the corridor.	---
Access to Services	The Welsh Index of Multiple Deprivation (WIMD) 2014 for access to services deprivation identifies that large parts of the study area are ranked in the least deprived lower super output areas. Some areas retain a moderate ranking in terms of access to services. A large proportion of retired people live within the study area, who tend to be more reliant on public and community transport to participate fully in the community and get access to essential social and healthcare facilities.  Increasing pressures on available budgets are subsequently putting increased pressure on the provision of bus services. An increased level of funding is however required to deliver improved access to services, particularly for younger and retired people who are more reliant on public transport. Moreover, journey times by car or van to	---

Do-minimum		
	services would be expected to deteriorate in the do-minimum due to traffic growth on the corridor.	
Affordability	Problems many people in the region encounter in accessing work, education and healthcare because of lack of available, affordable transport (Cardiff Capital Region Metro Study; 2013). This is not anticipated to change in the do-minimum compared to the existing situation.	0
Severance	The A4055 Cardiff Road passes through the centre of Dinas Powys. High traffic volumes including HGVs passing through the settlement have an impact on communities with a limited number of viable crossing points available. This would increase in the future year with traffic growth.	-
Option and Non-Use Values	There is high use of the private car within and through Dinas Powys, especially for access to employment. Services and employment are relatively centralised within Dinas Powys and nearby urban centres however the available alternate mode options are not always considered viable to accommodate many journey needs (including the available frequency of services and capacity). An increased level of funding is required to deliver realistic and attractive alternatives to the private car.	-
Cultural		
Cultural Facilities	No impact identified.	0
Welsh Language	No impact identified.	0
Environmental		
Noise	Road transport is the dominant mode of transport for journeys in the region (2011 Census) and thus contributes to noise pollution. No quantitative data on noise levels is available at this stage but it would be anticipated that traffic noise would increase with anticipated increases in traffic levels in the do-minimum	-
Air Quality	Road transport is the dominant mode of transport for journeys in the region (2011 Census) and thus contributes to air pollution. There are no Air Quality Management Areas (AQMA) within the study area. According to the 2016 Air Quality Progress Report for Vale of Glamorgan, the overall air quality across the Vale of Glamorgan complies with regulations to protect human health. Data for 2012 however has highlighted that at some locations road traffic emissions of nitrogen dioxide (NO <sub>2</sub> ) are at, or close to, the relevant annual average concentration of 40ug/m <sup>3</sup> . These locations include Cogan Roundabout and Cardiff Road, Dinas Powys. Increasing traffic levels would be anticipated to exacerbate air quality issues, however the air quality monitoring shows reducing emissions and with changes in the composition of fuels in vehicles over time, air quality changes in the do-minimum are considered likely to be neutral.	0

Do-minimum		
Greenhouse Gases	See note for Air Quality. Road transport is the dominant mode of transport for journeys in the region (2011 Census) and thus contributes to greenhouse gas emissions. In the do-minimum, traffic levels will increase which may affect emissions, although the changes in the composition of fuels in vehicles over time, greenhouse gas emissions are considered likely to be neutral.	0
Landscape	No impact identified.	0
Townscape	The strategic road network passes through the centre of Dinas Powys. The high levels of traffic flow is considered to have an adverse impact on the community worsening in future years.	-
Historic Environment	No impact identified.	0
Bio-diversity	No impact identified.	0
Water Environment	No impact identified.	0
Residential Amenity	The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. A slight adverse impact on residential amenity has subsequently been identified as adverse impacts on noise and air pollution, accidents and severance due to increasing traffic levels increasingly affect those living especially close to Cardiff Road through Dinas Powys.	-
Economic		
Journey Time Changes	The increasing levels of traffic are anticipated to lead to reduced journey times in the do-minimum, with congestion through the Dinas Powys corridor and delay at the key junctions. A step change in the level of investment in the infrastructure is required to deliver journey time improvements.	-
Journey Time Reliability Changes	The increasing levels of traffic are anticipated to lead to further impacts on the reliability of journey times in the do-minimum, with congestion through the Dinas Powys corridor and resilience of the key junctions. A step change in the level of investment in the infrastructure is required to deliver journey time reliability improvements.	-
Transport Costs	The rising cost of transport including high fuel prices is making owning and running a car an increasing obstacle, whilst the availability of public transport and other modes of transport is not always a viable alternative. A step change in the level of investment in services and infrastructure is required to deliver viable alternatives the car at an affordable cost.	-
Wider Economic Impacts	No impact identified.	0
Land and Property	No impact identified.	0

Option A   Bypass – Green Route		
	Impacts	Scale
Social		
Physical Activity	It is expected that a new bypass would have a slight beneficial impact on physical activity with the integral provision of segregated walking and cycling infrastructure. It could also improve conditions for walkers and cyclists along the A4055 existing transport corridor through Dinas Powys as a reduction in traffic flow are experienced.	+
Journey Quality	<p>The broadly qualitative assessment has been completed using journey quality factors outlined within TAG Unit A4.1.6 encompassing traveller care, travellers' views and traveller stress.</p> <p><b>Travellers Views</b>   The existing highway route interconnecting through Dinas Powys is urbanised, predominantly bounded by existing residential properties. In contrast, a new bypass would be situated east of Dinas Powys within an extant Green belt with the potential to enhance a traveller's view of the surrounding area. It would however be noted that whilst slight betterment would be envisaged, the outer fringes of the surrounding urban areas would remain within view from the bypass alignment with the subsequent potential for landscaping to mitigate what might be considered adverse scenery.</p> <p><b>Traveller Stress</b>   A range of factors can affect a traveller's exposure to driver stress primarily encompassing frustration, fear of potential accidents and route uncertainty. Whilst there is unlikely to be a notable improvement regarding route uncertainty, it is anticipated that there would be a betterment with regard to traveller stress following implementation of a new road.</p> <p>Using data extracted from the SEWTM modelling work completed for the study, the A4055 Cardiff Road would experience significant reductions in traffic flow following implementation of a bypass. Two-way 24hr flows to the south of Dinas Powys are forecast to reduce by from 24,335 to 11,914 representing a 51% reduction. And just to the north of Dinas Powys traffic flows are forecast to reduce from 20,807 to 5,338 representing a 74% reduction. It is important to note that the trip flow analysis represents the redistribution of trips on the highway network (assuming the implementation of a new bypass), as opposed to the creation of new vehicle trips.</p> <p>A new link has also demonstrated an improvement to journey times along a bypass with the potential to reduce frustration associated with extant congestion and delay experienced along the existing A4055 Cardiff Road link through Dinas Powys. This benefit is however lessened by the retention of driver delay at the interconnecting Barons Court junction, on the assumption improvements can be realised at the Merrie Harrier junction.</p> <p>It is noted that the reduction in traffic flows along Cardiff Road as a result of a new bypass could tempt a proportion of car users to maintain their journey through Dinas Powys as journey reliability is improved. Whilst costs associated with the implementation of route corridor measures have not been captured as part of the Stage Two Plus assessment, consideration of user behaviour throughout the Cardiff Road corridor would require careful consideration at the next</p>	+++

Option A   Bypass – Green Route		
	<p>stage of appraisal, including the consideration of measures to discourage car trips through Dinas Powys (e.g., implementation of a formal 20mph zone<sup>1</sup> and traffic calming infrastructure), whilst considering measures and opportunities to encourage sustainable trips by walking, cycling and public transport.</p> <p><b>Traveller care</b>   This factor is considered less influential with regard to the bypass with cleanliness, facilities and information factors considered to retain a neutral impact against the do-minimum scenario. Improvements would however be identified with regard to the traveller's environment with enhanced driver capability anticipated as a result of a new and improved route, as well as potential to establish an improved condition and smoothness of ride.</p> <p>The implementation of a bypass would provide further benefits to walkers and cyclists through enhanced infrastructure provision and interconnectivity. Implementation of an integral shared walking/ cycling route would provide improved traveller care (information, environment), views (similar benefits to those noted for the highways review), and stress with perceived reductions in frustration and fear of potential accidents. Whilst no new public transport infrastructure or services are specifically included as part of this option, the new road would facilitate more attractive journeys for buses with similar highway benefits as noted herewith.</p> <p>In line with TAG Unit A4.1.6, a large beneficial score has been applied to the scoring as the number of travellers affected is estimated to be in excess of 10,000 users per day based on the reassignment of traffic from the existing A4055 Cardiff Road link to a new bypass.</p>	
Accidents	<p>The DfT's program COBALT (COst and Benefit to Accidents Light Touch) has been used to undertake the analysis of the impacts on accidents as part of the economic appraisal of the road scheme. The accident impact assessment has been performed using the method set out in the COBALT manual. It is used to forecast changes in the number of accidents and casualties and estimate the monetary value of these impacts.</p> <p>The analysis indicates that following the implementation of a new bypass there could be an increase in accidents from 640 to 647 against the do-minimum scenario, a total of 7 additional accidents occurring within the study area over a 60-year assessment period (2025 – 2084) representing an increase of 57 casualties throughout the strategic model area. The overall monetary cost is calculated as £4.33M.</p>	-
Security	<p>A review of security has been completed in line with TAG Unit A4.1.4 (Security Impacts) to assess the implementation of the route alignment. The guidance notes that there are no formal guidelines for road users. However, the guidelines set out readily apply to road users whilst considering the security indicators in relation to road users as:</p>	++

<sup>1</sup> <https://gov.wales/sites/default/files/publications/2020-07/20mph-task-force-group-report.pdf>

Option A | Bypass – Green Route

- Road users are more vulnerable to crime in circumstances where they are required to stop their vehicles or travel at slow speeds, such as at the approaches to signals or in congested conditions.
- Road users are more vulnerable to crime at locations where they are required to leave their vehicles, such as at service stations and car parks.
- The importance of each indicator is likely to vary according to the location and nature of the road; for example, emergency call facilities are likely to be more important than surveillance when considering a rural road.

**Site perimeters, entrances and exits** | It would be anticipated that a new bypass designed to current DMRB standards would present the opportunity for robust, high quality demarcation to support enhanced security for users.

**Formal surveillance** | In the absence of a baseline assessment, it would be proposed that a new bypass constructed in line with current DMRB standards would improve formal surveillance through the transport corridor. The specific requirements for CCTV monitoring systems and emergency call points would be clarified during detailed design, however at this stage of the assessment a slight betterment is considered a reasonable assumption.

**Informal surveillance** | No improvement to informal surveillance has been considered applicable with a new bypass in place. The existing route through an urban area already establishes moderate levels of informal surveillance against a new route through a less urbanised area, albeit with a design implemented that would likely support open visibility of the alignment.

**Landscaping** | Implementation of robust landscaping along the bypass route is anticipated as part of detailed design development to positively contribute towards good visibility (design/ planting). In the long term the establishment of hedgerow would be anticipated although this is likely to be managed so as to maintain suitable safety and security for users of the bypass including pedestrians and cyclists.

**Lighting and visibility** | Highway lighting for the benefit of vehicles has only been considered at new junctions. This will be implemented to current standards to enhance upon existing provision. In addition, and in accordance with Sustrans guidance, 5m high lighting columns have been chosen for the length of the cycleway at 35m intervals and included within the cost makeup for the option. It is however recommended that due to the close proximity to the bypass alignment that a risk assessment be carried out during the next stage to ensure that the lighting does not adversely affect traffic using the bypass.

Whilst the total number of travellers affected is in excess of 10,000 users per day (see SEWTM output), a moderate score has been applied when considering the changes in the level of the security indicators and the relative importance of the indicators.



Option A   Bypass – Green Route		
Access to Employment	<p>The transport user benefits assessment completed to assess the route option has quantified user and provider benefits (£M PVB 2010 prices discounted to 2010) for the new link are forecast to be:</p> <ul style="list-style-type: none"> <li>£24.19M for commuters.</li> <li>£20.24M for business.</li> </ul> <p>This indicates that the bypass could afford benefits for access to work and for businesses in the local area. This would include accessibility to strategic sites by providing a new link with reduced journey times and improved journey time reliability, although journey time reliability would be somewhat adversely affected by ongoing congestion at ley junctions including Barons Court.</p>	++
Access to Services	<p>The transport user benefits assessment completed to assess the route option has quantified user and provider benefits (£M PVB 2010 prices discounted to 2010) for the new link are forecast to be:</p> <ul style="list-style-type: none"> <li>£25.33M for other consumers.</li> </ul> <p>This indicates that the bypass could afford benefits for access to services in the area by providing a new link with reduced journey times and improved journey time reliability, although journey time reliability would be somewhat adversely affected by ongoing congestion at ley junctions including Barons Court.</p>	++
Affordability	<p>The potential to divert trips from the car to public transport as a result of likely improved journey time and journey time reliability for buses is mitigated by the potential for the option to retain the car as the dominant mode of travel in the region.</p>	0
Severance	<p>An assessment has been completed to consider the impact that a new bypass would have on severance through the transport corridor, both for the new route alignment and existing A4055 Cardiff Road. The assessment has been completed in line with TAG Unit A4.1.5 (Severance Impacts).</p> <p>A new route bypassing Dinas Powys is forecast to reduce daily traffic flows through Dinas Powys on the A4055 Cardiff Road with up to 74% reductions in traffic flow over a 24hr period. The greatest impact is likely to be applicable to pedestrians, however reduced traffic flow through Dinas Powys is anticipated to retain a large beneficial impact for both modes of travel.</p> <p>In contrast, the current alignment is shown to sever Cross Common Road and Green Lane. It would be proposed that a new junction is provided to retain accessibility to Green Lane which is currently utilised to access the Cog Moors Wastewater Treatment works. Further consideration will need to be given to Cross Common Road to identify the mitigation required to retain accessibility to properties/ buildings from north and south of the bypass alignment.</p> <p>The bypass alignment affects a number of PRow. It is anticipated that crossings will however be rationalised by public right of way re-alignment and/ or provision of crossing points under/ over the bypass alignment to maintain existing connectivity and to effectively establish a neutral impact. Culverts have been assumed where</p>	++



Option A   Bypass – Green Route		
	PRoW cross the bypass alignment at in-fill sections, and where it crosses through cut sections 3m wide bridges have been assumed.	
Option and Non-Use Values	The implementation of a new bypass has the potential to encourage trips made by bus as journey times and reliability improve, as well as potentially increasing the resilience of the road network by alleviating high traffic flows along key sections of the existing highway, most notably the Cardiff Road through Dinas Powys.	+
<b>Cultural</b>		
Cultural Facilities	No impact identified.	0
Welsh Language	No impact identified.	0
<b>Environmental</b>		
Noise	<p>Road transport is the dominant mode of transport for journeys in the study area (2011 Census) and thus contributes to noise pollution. This review is not yet quantifiable in the absence of quantitative data, but a moderate adverse impact is considered reasonable to assume whilst also noting the impacts from short-term construction noise associated with the new route.</p> <p>The results acquired from the traffic assessment suggest as much as 74% of existing A4055 Cardiff Road vehicles could transfer to a bypass suggesting a significant reduction in noise pollution could be experienced through central Dinas Powys. However, this transference of trips also establishes a new noise pollution source along the bypass alignment with the potential to adversely impact dwellings situated to the east of Dinas Powys and west of Penarth. In most cases mitigation measures should be available to help alleviate any associated short and long-term noise pollution but this would need to be considered against the potential to establish adverse landscape impacts (e.g. implementation of noise bunds).</p> <p>The traffic noise impacts would however need to be modelled in accordance with DMRB to quantify the noise impacts and consider the detailed propagation path for the alignment. This would allow for a detailed comparison of all bypass alignments against the do-minimum scenario and quantify the number of properties that would be adversely affected as well as the number of properties that would benefit from a new bypass proposal.</p>	-
Air Quality	Road transport is the dominant mode for journeys in the region (2011 Census) and thus contributes to air pollution. There are no AQMA within the study area. Based upon the 2016 Air Quality Progress Report for the Vale of Glamorgan, the overall air quality across the county complies with regulations to protect human health. Data from the 2012 Air Quality Progress Report highlighted that at some locations road traffic emissions of Nitrogen Dioxide (NO <sub>2</sub> ) were at, or close to, the relevant annual average concentration of 40 ug/m <sup>3</sup> . These were recorded away from the project's study area at Culverhouse Cross (Vale of Glamorgan, 2013).	-

Option A   Bypass – Green Route		
	<p>Implementation of a new highway alignment has the potential to improve local air quality through Dinas Powys with a reduction in local traffic flows forecast, especially for those currently situated adjacent to the existing A4055 Cardiff Road.</p> <p>In contrast, the implementation of new highway infrastructure is likely to establish a deterioration in local air quality along a new bypass alignment with the potential to adversely affect those living within proximity of a bypass. Additionally, the construction of a new road has the potential to encourage increased travel by private car as traffic conditions through Dinas Powys are improved. Whilst provision of an integral walking/ cycling route would help mitigate this impact it is unlikely to fully alleviate the adverse impacts identified herewith.</p> <p>The impact is not yet quantifiable in the absence of quantitative data, but a slight adverse impact is considered reasonable to assume at this stage of the analysis given the possible impacts noted. The impact of construction on managing air quality/ dust as well as vibration impacts would also need to be considered.</p>	
Greenhouse Gases	<p>The change in greenhouse gas emissions with the bypass compared to the Do-Minimum has been calculated as an output of the traffic modelling. This gives a benefit valued at £0.626M. The reduction in emissions will be based on the reduced overall journey distances and journey time through the corridor.</p>	+
Landscape	<p>A range of factors have been assessed as part of the WebTAG analysis for landscape, including pattern, tranquillity, cultural and landcover, together with an overarching summary of character. It is subsequently considered that a bypass will reduce tranquillity, farmland will be lost and previously unlit landscape will be lit, field patterns and open spaces disrupted, and long-distance views will be interrupted including an adverse impact on the night time setting.</p> <p>Impacts can be mitigated through landscape design along route, retention or planting of new hedges and design of elevated road sympathetic to local landscape character. Moreover, good landscape design is needed to mitigate lighting impacts at night. Overall, the impact is assessed as moderate adverse.</p>	---
Townscape	<p>The area of townscape is characterised around the large village of Dinas Powys with low density residential areas predominantly consisting of cul-de-sac roads. There are isolated individual properties located within the surrounding agricultural landscape to the south and east of Dinas Powys. The Dinas Powys Conservation Area is notable for its architecture from three phases of developing which reflects the expansion of the village (pre-1880s, 1880s to 1930s, late 20th Century).</p> <p>As the road alignment is both linear and bypass Dinas Powys, it is considered that the alignment would not result in a significant change in the layout, density and mix, scale, appearance, or land-use of the townscape establishing neutral impacts for these variables.</p> <p>A slight adverse impact is however noted with regard to human interaction as access to and quantity of open space between Dinas</p>	0

Option A   Bypass – Green Route		
	<p>Powys (Murch) and Lower Penarth would likely be negatively impacted by the development of a bypass.</p> <p>In contrast, and whilst the alignment would not result in a significant change in the cultural aspect of the townscape, with the alignment bypassing Dinas Powys this would divert traffic away from the village which could enhance its overall heritage character. Central Dinas Powys could also be adversely affected by increased traffic speeds (unless mitigated) in light of any reduced traffic flows experienced.</p>	
Historic Environment	<p>The baseline assessment has completed a thorough analysis of known environmental and land-use characteristics for the study area and identified an overall slight adverse impact on the historic environment.</p> <p>The historic resource of the study area is characterised predominately by agricultural land comprising both arable and pasture to the east, south east of Dinas Powys and west of Penarth. Surrounding this agricultural land are the built-up urban settlements of Dinas Powys and Lower Penarth. The following have been identified within 500m of the bypass alignment:</p> <ul style="list-style-type: none"> <li>• One area of Registered Common Land.</li> <li>• One Scheduled Monument (Cogan Deserted Medieval Village) separated in to three pockets.</li> <li>• Eight Listed Buildings (seven Grade II and one Grade II*).</li> <li>• Multiple 'known' archaeological sites (Roman, Medieval and Post-Medieval features). There is potential for as yet unidentified buried archaeological assets to be present within the bypass alignment footprint.</li> </ul> <p>There are no Registered Parks and Gardens, Conservation Areas, World Heritage Sites, Historical Landscapes or Registered Battlefields located within 500m of the bypass alignment. The designated heritage assets are mainly associated with domestic buildings.</p> <p>Eight of the listed buildings within 500m of the bypass alignments are located within the Green wedge between Dinas Powys and Lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of Lower Penarth. The Dinas Powys Conservation Area is located approximately 1km west of the alignments.</p> <p>The bypass alignment has the potential to have a slight adverse impact on 'unknown' non-designated heritage assets, as well as the potential to directly impact on buried archaeological remains which could result in the permanent and irreversible loss of assets.</p> <p>A neutral impact has been determined on the settings of the Listed Buildings and Scheduled Monument with a slight beneficial impact identified on the Conservation Area as it is anticipated this would divert traffic from the centre of Dinas Powys.</p>	
Bio-diversity	<p>Pop Hill Site of Special Scientific Interest (SSSI) is within 100m of the western end of the route and the edge of one Site of Importance for Nature Conservation (SINC). The edge of two areas of ancient</p>	

Option A   Bypass – Green Route	
	<p>woodland are likely to be impacted. Priority habitats are present along the bypass alignment and there is potential for a variety of protected and priority species to be present and therefore could be affected by both route proposals.</p> <p>It is anticipated at this stage that the majority of impacts can be mitigated for through standard techniques in accordance with the relevant best practice guidelines. The scheme is considered to have up to a moderate adverse impact on biodiversity due to the potential loss and damage of ancient woodland and Pop Hill SINC.</p> <p>The Pink alignment, as it comprises three roundabouts, is likely to lead to the loss of more habitat than the Green alignment (one roundabout) but otherwise there is little to differentiate the routes, from an ecological perspective, until further surveys are completed.</p> <p>It should also be noted that the current route alignment will adversely impact on land being purchased by Dŵr Cymru Welsh Water to provide replacement woodland habitat as compensation for loss of woodland resulting from extending the Cog Moors Wastewater Treatment Works. The woodland is being planted specifically for dormice and will be covered by a 10-year management plan which forms part of the licence application, and if approved will form part of a legally binding document. As a minimum it would be assumed that replacement habitat would need to be provided to compensate for any woodland lost (regardless of whether any dormice are present or not). There would be a need to provide more woodland (most likely at cost) than being lost (usually an additional 10-15%) and this would likely need to be connected to the Dŵr Cymru Welsh Water Cog Moors site to allow dormouse dispersal. The full impacts and potential for route alignment at this location would need to be confirmed as part of a Stage Three WelTAG assessment.</p>
Water Environment	<p>The potential impacts to the 'main rivers' and ordinary water courses concerns a possible accidental spillage, construction activities and routine run-off. This potential impact requires further investigation at Stage Three as the River Cadoxton has achieved a moderate Water Framework Directive score.</p> <p>Following further investigations, mitigation measures may be required as part of the design. A construction environmental management plan should be put in place during the construction of the alignment which will minimise the risk of pollution to watercourses during construction.</p> <p>Three ordinary watercourses are crossed as part of both the bypass alignment. Sections of the route cross the floodplain to the south west of the alignments in a Flood Zone C2/B. The floodplain is associated with the Cadoxton River for which the NRW flood maps confirms that flood risk is moderate to high in the areas where the alignment interacts with the floodplain. Potential effects include for the loss of floodplain storage volume and impediment of floodplain flow paths. To mitigate, there may be a need to provide compensation storage and culverts through embankments to maintain continuity of flow conveyance. Any new crossings of smaller watercourses also have the potential to impact flood risk, careful design of crossings should avoid impacts/ mitigate risks.</p>

Option A   Bypass – Green Route		
Residential Amenity	<p>The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. The combined assessment from the above indicates that the properties in Dinas Powys will largely benefit from reductions in traffic through the village. A large number of properties to the east of Dinas Powys and west of Penarth will however experience adverse impacts due to proximity of the alignment, anticipated to give a moderate adverse impact. There is potential for these impacts to be mitigated as part of design development of the bypass however there may also be impacts of visual intrusion based on longer distance views.</p>	---
<b>Economic</b>		
Journey Time Changes	<p>The implementation of a bypass designed to current DMRB standards is anticipated to result in measurable improvements in journey times. As a result of increased average speeds between Biglis roundabout and the Merrie Harrier junction, a nine minute time saving for northbound journeys has been forecast during the AM peak and a three minute saving in the PM peak. For southbound journeys, time savings of 3 minutes in the AM peak and 13 minutes in the PM peak have been calculated.</p> <p>The scheme user and provider benefits are subsequently estimated to have a total discounted value in 2010 prices and values appraised over 60 years, of £69.76M which represents a significant beneficial improvement. There is also the potential, if active travel measures are delivered, that additional benefits to walkers and cyclists could be realised through enhanced infrastructure provision.</p> <p>Journey time and journey time reliability would be constrained by key strategic junctions including Barons Court, assuming the scheme is able to deliver assumed enhancements to the Merrie Harrier junction. This has resulted in the assignment of a moderate score.</p>	++
Journey Time Reliability Changes	<p>It is anticipated that the implementation of a bypass designed to current DMRB standards could establish measurable improvements in journey time reliability between Biglis roundabout and the Merrie Harrier junction. Analysis completed suggests journey time improvements of up to 10 minutes for northbound trips and 13 minutes for southbound trips.</p> <p>Journey time and journey time reliability would be constrained by key strategic junctions including Barons Court, assuming the scheme is able to deliver assumed enhancements to the Merrie Harrier junction. This has resulted in the assignment of a moderate score.</p>	++
Transport Costs	<p>Transport costs for road users are anticipated to reduce compared to the do-minimum reflecting the journey time savings. With regards to public transport operating costs, existing bus services would be anticipated to benefit from reduced traffic through Dinas Powys and the opportunity to use the new route of good standard. It is therefore anticipated that delivery of a new road link and associated junction improvements would have a negligible impact on transport costs compared to the do-minimum option as the benefits</p>	0

Option A   Bypass – Green Route		
	recognised are likely to be offset by the scheme encouraging trips to be made car.	
Wider Economic Impacts	It is anticipated that some additional wider economic impacts associated with the option could be realised. This may include induced investment through additional strategic development arising as a result of improved connectivity between the local urban centres of Barry and Cardiff. However, the bypass option predominantly focusses on addressing a local connectivity issue through an extant transport corridor and therefore significant benefits to medium/ large commercial businesses are arguably less likely to be significantly realised in areas beyond the study area.	0
Land and Property	<p>Implementation of a bypass will require significant areas of land, in addition to land adjacent to existing routes to facilitate the on-line highway improvements. The exact extent and potential costs are unknown at this stage and would require further exploration, however a cost allowance has been included, as identified in the Financial Case.</p> <p>The option is anticipated to have the following impacts on residential and business properties:</p> <ul style="list-style-type: none"> <li>• Number of buildings directly impacted by alignment = 0</li> <li>• Number of buildings with potential for some land take = 0</li> <li>• Number of residential properties with potential impacts by virtue of close proximity = 3 (house off Cross Common Road, property west of Sully Road, property accessed off Murch Road and Sully Road)</li> </ul> <p>In addition, the bypass would cross over the tunnel for the railway line, to the south of the Merrie Harrier junction, which is anticipated to require property agreements with Network Rail. It should be noted that at this stage information on land holdings impacted is not known. Impacts are assessed as moderate given the relatively low number of properties impacted for a scheme of this length.</p>	–

Option B   Bypass – Pink Route		
<b>Note: The impact assessment scoring is as identified for the Green alignment with the following amendments confirmed.</b>		
	Impacts	Scale
<b>Economic</b>		
Journey Time Changes	The implementation of a bypass designed to current DMRB standards is anticipated to result in measurable improvements in journey times. As a result of increased average speeds between Biglis roundabout and the Merrie Harrier junction, a nine minute time saving for northbound journeys has been forecast during the AM peak and a three minute saving in the PM peak. For	+



### Option B | Bypass – Pink Route

	<p>southbound journeys, time savings of 3 minutes in the AM peak and 13 minutes in the PM peak have been calculated.</p> <p>The scheme user and provider benefits are subsequently estimated to have a total discounted value in 2010 prices and values appraised over 60 years, of £69.76M which represents a significant beneficial improvement. There is also the potential, if active travel measures are delivered, that additional benefits to walkers and cyclists could be realised through enhanced infrastructure provision.</p> <p>Journey time and journey time reliability would be constrained by key strategic junctions including Barons Court, assuming the scheme is able to deliver assumed enhancements to the Merrie Harrier junction. This has resulted in the assignment of a moderate score.</p> <p>The implementation of a roundabout mid-way through the bypass alignment (to facilitate access to Murch Road) is likely to establish a slightly reduced journey time benefit to that identified for the Green alignment. The extent of any delay would be subject to the completion of traffic capacity assessment. It will also alter traffic patterns using the bypass and Murch Road. In the interim it is considered appropriate to assign a reduced slight benefit for the bypass alignment.</p>	
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### Option C | Multi-Modal Option

	Impacts	Scale
<b>Social</b>		
Physical Activity	It is expected that implementation of the multi-modal option would have a moderate beneficial impact on physical activity with the potential to encourage sustainable travel throughout the study area.	++
Journey Quality	<p>The broadly qualitative assessment has been completed using the journey quality elements noted within TAG Unit A4.1.6 (Journey Quality Impacts).</p> <p>With regards to traveller care, it is considered that improvements to cleanliness, facilities, information provision and environment would all be recognised following implementation of the multi-modal option.</p> <p>There is also potential betterment with regard to traveller stress with improvements to fear of potential accidents and route uncertainty. Enhancements made to the public transport network and walking/ cycling routes can reassure travellers, reduce safety concerns and actively promote travel by sustainable means for a broad spectrum of society. This would perhaps be especially applicable for disabled, elderly and younger passengers. In addition, the provision of enhanced timetables, network maps and way-finding can lead to improved route certainty, an additional contributory factor when seeking to enhance the perception of safety and security for passengers.</p>	++



Option C   Multi-Modal Option		
	A neutral impact for traveller frustration has been applied subject to road robust layout/ geometry and condition improvements being provided especially at key junctions to maximise the potential for bus users, walkers and cyclists to make good progress along a route. A neutral impact has subsequently also been applied to traveller's views with negligible improvements recognised as a result of the multi-modal option.	
Accidents	Through the delivery of improved walking and cycling infrastructure, and enhanced public transport services and interchange facilities there is the potential to improve road safety through the removal of pinch points, severance, improving the standard of the highway network, and encouraging people to travel by more sustainable means.	+
Security	The broadly qualitative assessment completed using the journey quality elements noted within TAG Unit A4.1.6 (Security Impacts).  The implementation of multi-modal design features could establish a moderate beneficial impact for travellers using sustainable modes of travel with the potential to attract users away from the dominant use of the car. It is assumed that a range of design features would be applied to current standards as part of detailed development to establish robust improvements to security including for example the provision of CCTV systems designed to encourage staff and passenger/ user surveillance; landscaping designed to maximise the potential for informal surveillance; appropriate fencing to clearly demarcate exits, entrances and site perimeters; good lighting design to maximise natural light as well as attention to lighting at signing, information, waiting/ shelter and help points; and good provision of emergency phones, public telephones/ wi-fi and information on emergency help procedures.	++
Access to Employment	Rail services within the study area accessed from Dinas Powys and Eastbrook railway stations already interconnect with the key urban settlements throughout the region, however the option for enhanced rail services and interchange facilities together with bus service/ infrastructure enhancements would further improve accessibility to employment, notably in Cardiff, Barry and Bridgend. The provision of walking and cycling and a new Park and Ride facility would further support improved interconnectivity to employment.	++
Access to Services	Rail services within the study area accessed from Dinas Powys and Eastbrook railway stations already interconnect with the key urban settlements throughout the region, however the option for enhanced rail services and interchange facilities together with bus service/ infrastructure enhancements could further improve accessibility to services. The provision of walking and cycling and a new Park and Ride facility would further support improved interconnectivity to services.	++
Affordability	Rising cost of transport is resulting in many households struggling to afford to own and run a car. The provision of enhanced public transport and walking and cycling options has the potential to	+

Option C   Multi-Modal Option		
	make travel more affordable for some sections of society, most notable the young and the older sections of society.	
Severance	With improvements to walking and cycling crossing points, most notably across the A4055 Cardiff Road and interconnectivity within the wider Dinas Powys community, severance is anticipated to be reduced. In addition, the traffic modelling has identified a measurable reduction in traffic flow through Dinas Powys affording the opportunity for improved connectivity. Traffic growth would be forecast to impact on any reduced traffic flows regardless and subsequently a moderate impact is estimated.	+
Option and Non-Use Values	<p>In line with TAG Unit A4.1.7, 'Option and non-use values should be assessed if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).'</p> <p>This option includes for a range of specific measures to enhance public transport. Moreover, the implementation of integral walking and cycling infrastructure also affords some opportunity for alternate modes of travel away from use of the private car. A score of moderate beneficial is therefore considered reasonable given the range of additional opportunities from the proposed option.</p>	++
<b>Cultural</b>		
Cultural Facilities	No impact identified.	0
Welsh Language	No impact identified.	0
<b>Environmental</b>		
Noise	<p>Road transport is the dominant mode of transport for journeys in the region (2011 Census) and thus contributes to noise pollution. The improvements in public transport has the potential to encourage a mode shift away from the private car to the bus thus has the potential to improve noise pollution.</p> <p>The proximity of the rail line and stations to residential properties in Dinas Powys and Eastbrook means that local noise pollution may increase in Dinas Powys with an increase in rail services. Overall and at this stage of the assessment, it is considered that the delivery of an integrated public transport system that benefits from highway works and improvements to public transport, walking and cycling would have a neutral impact on noise. No quantitative data is available at this stage.</p>	0
Air Quality	Road transport is the dominant mode for journeys in the region (2011 Census) and thus contributes to air pollution. There are no AQMAs within the study area and based on the 2016 Air Quality Progress Report for the Vale of Glamorgan, the overall air quality across the county complies with regulations to protect human health. Data from the 2012 Air Quality Progress Report	+

Option C   Multi-Modal Option		
	<p>highlighted that at some locations road traffic emissions of Nitrogen Dioxide (NO<sub>2</sub>) were at, or close to, the relevant annual average concentration of 40 ug/m<sup>3</sup>. However, these were recorded away from the project's study area at Culverhouse Cross (Vale of Glamorgan, 2013).</p> <p>Implementation of an enhanced integrated public transport has the potential to improve local air quality through Dinas Powys with the opportunity to transfer transport user trips from the car to public transport. This would be particularly beneficial to those situated adjacent to the A4055 Cardiff Road where existing traffic flows are high.</p> <p>The impact is not yet quantifiable in the absence of quantitative data, but a slight beneficial impact is considered reasonable to assume at this stage of the analysis given the perceived impacts noted. The impact of construction (in relation to the Park and Ride facility especially) on managing air quality/ dust as well as vibration impacts would also need to be considered.</p>	
Greenhouse Gases	<p>The increase in buses is not expected to have an adverse impact on greenhouse gases compared to the do-minimum option. The improvements in public transport has the potential to encourage a mode shift away from the private car to the bus thus has the potential to mitigate adverse levels of greenhouse gas emissions, whilst the improvements to the highway could encourage some to drive more frequently.</p> <p>It is considered that the delivery of an enhanced integrated public transport system that benefits from highway works and improvements to public transport, walking and cycling would have a slight beneficial impact on greenhouse gas emissions. No quantitative data is available at this stage.</p>	+
Landscape	<p>A range of factors have been assessed as part of the WebTAG analysis for landscape, including pattern, tranquillity, cultural and landcover, together with an overarching summary of character. It is subsequently considered that a multi-modal option will reduce tranquillity and previously unlit landscape will be lit, field patterns and open spaces disrupted, and long-distance views will be interrupted including an adverse impact on the night-time setting. This is particularly with reference to the Park and Ride proposal.</p> <p>Impacts can be mitigated through landscape design, retention or planting of new hedges and design sympathetic to local landscape character. Moreover, good landscape design is needed to mitigate lighting impacts at night.</p>	-
Townscape	<p>The area of townscape is characterised around the large village of Dinas Powys with low density residential areas predominantly consisting of cul-de-sac roads. There are isolated individual properties located within the surrounding agricultural landscape to the south and east of Dinas Powys. The Dinas Powys Conservation Area is notable for its architecture from three phases of developing which reflects the expansion of the village (pre-1880s, 1880s to 1930s, late 20th Century).</p>	0



Option C   Multi-Modal Option		
	<p>To a large extent the multi-modal option utilises existing rail, bus, walking and cycling transport infrastructure within and surrounding Dinas Powys. For the majority of townscape features subsequently assessed including layout, density and mix, scale, appearance, cultural and land-use it is considered that the multi-modal option will have a neutral impact with no significant change in the townscape character of Dinas Powys and Lower Penarth.</p> <p>A slight beneficial impact is identified with regard to the cultural aspect of human interaction with the option potentially establishing an increase of individuals utilising the upgraded public transport and walking and cycling routes helping to mitigate existing high traffic flows through the village.</p>	
Historic Environment	<p>The baseline assessment has completed a thorough analysis of known environmental and land-use characteristics for the study area and identified an overall neutral impact on the historic environment.</p> <p>The historic resource of the study area is characterised predominately by agricultural land comprising both arable and pasture to the east, south east of Dinas Powys and west of Penarth. Surrounding this agricultural land are the built-up urban settlements of Dinas Powys and lower Penarth. The following have been identified within 500m of the multi-modal option:</p> <ul style="list-style-type: none"> <li>• One area of Registered Common Land.</li> <li>• One Scheduled Monument (Cogan Deserted Medieval Village) separated in to three pockets.</li> <li>• Eight Listed Buildings (seven Grade II and one Grade II*) and multiple 'known' archaeological sites (Roman, Medieval and Post-Medieval features). There is potential for as yet unidentified buried archaeological assets to be present within the option's footprint.</li> </ul> <p>There are no Registered Parks and Gardens, Conservation Areas, World Heritage Sites, Historical Landscapes or Registered Battlefields located within 500m of the multi-modal option. The designated heritage assets are mainly associated with domestic buildings.</p> <p>Eight of the listed buildings within 500m of the multi-modal option are located within the green wedge between Dinas Powys and lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of lower Penarth. The Dinas Powys Conservation Area is located within close proximity.</p> <p>The multi-modal option is unlikely to have any impact on 'known' and 'unknown' designated heritage assets and non-designated heritage assets and is unlikely to have any potential direct impact on buried archaeological remains. In addition, the option would not have an effect on the survival of the designated assets, and the effect on the context of the Scheduled Monument and Listed Buildings are likely to be neutral.</p> <p>The impact on the context of the Dinas Powys Conservation Area has the potential to be slight beneficial due to the multi-modal</p>	0

Option C   Multi-Modal Option		
	option potentially reducing traffic through Dinas Powys due to the utilisation of the upgraded public transport routes.	
Bio-diversity	<p>The Park and Ride site is situated to the west of a C2 Flood Zone and adjacent to the southern boundary of the facility is an existing SINC area. Whilst there is no proposal for the Park and Ride facility to encroach upon the SINC, this will need to be considered as part of any detailed design development. As the proposed site is an existing Green field, there is potential for a variety of protected and priority species to be present and therefore could be affected by the proposal. It is anticipated at this stage that the majority of impacts can be mitigated for through standard techniques in accordance with the relevant best practice guidelines. Although no quantitative data is available at this stage, the Park and Ride scheme would be considered to have a slight adverse impact on biodiversity. Further surveys would need to be completed during the detail design analysis to understand the potential adverse impact of the proposal.</p> <p>There is also potential for localised impacts on biodiversity as a result of the walking and cycling measures. The Dinas Powys to Penarth connections proposal as illustrated on plan 10015022-ARC-XX-XX-DR-HE-0014 follows the line of an extant PRoW which interconnects through an existing SINC and SSSI. Environmental constraints have been highlighted within the Barry to Dinas Powys Cycleway/ Footway Review with potential for tree clearance and hedgerow to be adversely impacted. The actual environmental impact will be subject to detailed design development of preferred options highlighted within the sustainable package. Cycleway/ footway enhancements between the Merrie Harrier junction and Barons Court junction and not anticipated to have an adverse impact on biodiversity given their urban context, however this will be subject to review during the development of the detailed design.</p> <p>The remaining elements of the multi-modal option encompassing bus and rail enhancements are anticipated to retain a neutral impact on biodiversity.</p>	-
Water Environment	<p>The potential impacts to the 'main rivers' and ordinary water courses concerns a possible accidental spillage, construction activities and routine run-off. This potential impact requires further investigation as the River Cadoxton has achieved a 'moderate' Water Framework Directive (WFD) score. Following further investigations, mitigation measures may be required as part of the design.</p> <p>A construction environmental management plan should be put in place during the construction of the multi-modal option which will minimise the risk of pollution to watercourses during construction. Three ordinary watercourses are crossed as part of both the multi-modal options (however, these upgrades would utilise the existing infrastructure present).</p> <p>Sections of the multi-modal option (in the vicinity of the park and ride site) are located in floodplain to the south of Dinas Powys in Flood Zones C2/B. The floodplain is associated with the Cadoxton River. Potential effects include for the loss of floodplain storage</p>	-

Option C   Multi-Modal Option		
	volume and impediment of floodplain flow paths if significant works are to take place on the existing transport links. Any new crossings of smaller watercourses also has the potential to impact flood risk, careful design of crossings should avoid impacts/ mitigate risks. It would be recommended that detailed design of a new Park and Ride facility should avoid the flood zone where possible.	
Residential Amenity	The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. The combined assessment from the above indicates that the properties in Dinas Powys may benefit from potential reductions in traffic as a result of enhanced multi-modal infrastructure and services. A small number of properties to the south of Dinas Powys will experience adverse impacts due to the proximity of the Park and Ride scheme, subsequently anticipated to give a minor adverse impact.	-
<b>Economic</b>		
Journey Time Changes	The proposed service enhancements to bus and rail through Dinas Powys has the potential to reduce overall journey times by reducing waiting times and reducing overcrowding (which leads to waiting for the next train/ bus). The provision of a section of bus lane between the Merrie Harrier and Barons Court junctions has the potential to reduce bus journey times by one to three minutes for each bus. The enhancements assumed to the Merrie Harrier junction would potentially establish significant improvements with regard to journey time reliability at this location. There are a low number of buses at present and thus it is not anticipated that journey time would improve for a significant number of travellers. A minor beneficial impact is envisaged.	+
Journey Time Reliability Changes	The proposed service enhancements to bus and rail through Dinas has the potential to reduce overall journey time reliability by reducing waiting times and reducing overcrowding (which leads to waiting for the next train/ bus). The provision of a section of bus lane between the Merrie Harrier and Barons Court junctions has the potential to reduce bus journey times by one to three minutes for each bus and make service times more reliable for that short section. The enhancements assumed to the Merrie Harrier junction would potentially establish significant improvements with regard to journey time reliability at this location. There are a low number of buses at present and thus it is not anticipated that journey time would improve for a significant number of travellers. A minor beneficial impact is envisaged.	+
Transport Costs	Rising cost of transport is resulting in many households struggling to afford to own and run a car. The provision of enhanced public transport and walking and cycling has the potential to make travel more affordable for some sections of society, most notable the young and the older sections.  However, any car trips diverted to public transport as a result of service enhancements and improved highway journey times/ reliability could be offset by more prominent forecast increases in	+



Option C   Multi-Modal Option		
	<p>traffic growth as the same benefits are experienced by car users. It is therefore anticipated that delivery of junction/ bus lane improvements would not reduce the transport costs compared to the do-minimum option.</p> <p>The opportunity for more affordable means of travel is therefore mitigated and a slight beneficial impact has been applied.</p>	
Wider Economic Impacts	There is potential to improve access to employment and enable some groups of society who take a fully active role within society, particularly the younger groups who may not be able to afford to own a car or do not drive. The linkages to strategic employment locations such as Cardiff and Barry would be improved through enhanced public transport services.	+
Land	It is expected that land would need to be purchased in order to deliver infrastructure improvements, the exact extent and potential costs of which are unknown at this stage and would require further exploration. The implementation of the walking and cycling connections and Park and Ride facility is therefore currently considered to establish a minor adverse impact on land requirements.	-

Option D   Bypass (Green Route) and Multi-Modal Option		
	Impacts	Scale
<b>Social</b>		
Physical Activity	It is expected that implementation of a new bypass and multi-modal option would have a moderate beneficial impact on physical activity with the potential to encourage sustainable travel in the study area.	++
Journey Quality	The combination of options has the potential to establish a comprehensive transport scheme with benefits to traveller care, views and reduced stress all realised. In line with the WebTAG Unit A4.1.6 guidance (Journey Quality Impacts), a high beneficial score has been retained as the number of users affected is anticipated to be more than 10,000.	+++
Accidents	A neutral score has been assigned to recognise the adverse impacts forecast by the bypass COBALT analysis in comparison to the slight beneficial impacts associated with sustainable transport infrastructure/ services.	0
Security	The implementation of highway and sustainable infrastructure to current design standards could establish robust improvements in actual and perceived safety and security throughout the transport network.	++
Access to Employment	The transport user benefits for a new bypass have been quantified (£M PVB 2010 prices) at £24.19M for commuters and £20.24M for business indicating robust benefits could be realised. Combined	++

Option D   Bypass (Green Route) and Multi-Modal Option		
	with enhancements to sustainable transport opportunities (services and infrastructure) then a moderate beneficial impact for access to employment could be established.	
Access to Services	The transport user benefits for a new bypass have been quantified (£M PVB 2010 prices) at £25.33M for other consumers (excluding commuters and business) indicating robust benefits could be realised. Combined with enhancements to sustainable transport opportunities (services and infrastructure) then a moderate beneficial impact for access to services could be established.	++
Affordability	The potential for a new bypass to divert trips from the car to public transport as a result of likely improved journey time and journey time reliability for buses is mitigated by the potential for a new road to retain the car as the dominant mode of travel in the region. Improving accessibility and experience of using sustainable transport could however mitigate the rising costs of owning a car making travel more affordable for some sections of society.	+
Severance	Both the bypass option and multi-modal option have identified potential improvements to severance as a result of their implementation. A new bypass could significantly reduce traffic flows through Dinas Powys with the likely requirement for mitigation to retain accessibility to properties/ buildings north and south of the bypass alignment. Improvements to sustainable modes of transport could also specifically reduce severance with improved crossing points and connectivity. The combination of options could subsequently establish large beneficial impacts.	+++
Option and Non-Use Values	<p>In line with TAG Unit A4.1.7, 'Option and non-use values should be assessed if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).'</p> <p>This option includes for a range of specific measures to enhance public transport. Moreover, the implementation of integral walking and cycling infrastructure also affords some opportunity for alternate modes of travel away from use of the private car. The option also includes for an additional route option for highways. A score of moderate beneficial is therefore considered reasonable given the range of additional opportunities from the proposed option.</p>	++
<b>Cultural</b>		
Cultural Facilities	No impact identified.	0
Welsh Language	No impact identified.	0
<b>Environmental</b>		
Noise	Whilst a neutral impact was identified for the multi-modal option, the moderate adverse impact applied to the bypass option has been carried over to the combined option. Potential for	---

Option D   Bypass (Green Route) and Multi-Modal Option		
	improvements in noise pollution were noted for central Dinas Powys with significant reductions in traffic flow forecast however the establishment of a new road is likely to establish a new noise source affecting a large number of dwellings to the east of Dinas Powys and west of Penarth.	
Air Quality	The implementation of an enhanced sustainable transport network has the potential to improve local air quality through Dinas Powys, especially along the A4055 Cardiff Road as user trips are encouraged away from the car. In addition, a new bypass could significantly reduce traffic flow through Dinas Powys and help mitigate adverse air quality especially for those situated adjacent to Cardiff Road. These benefits are somewhat mitigated by the implementation of a new bypass establishing new air quality impacts within proximity of the new route.	0
Greenhouse Gases	The change in greenhouse gas emissions with the bypass compared to the Do-Minimum has been calculated as an output of the traffic modelling. This gives a benefit valued at £0.626M. The reduction in emissions will be based on the reduced overall journey distances and journey time through the corridor. The slight benefits realised as part of the sustainable transport improvements are also noted although it is assumed reasonable at this stage of the analysis to retain a slight beneficial score for the combined option until further detailed analysis on greenhouse gas emissions is completed.	+
Landscape	A range of factors have been assessed as part of the WebTAG analysis for landscape, including pattern, tranquillity, cultural and landcover, together with an overarching summary of character. It is subsequently considered that a bypass will reduce tranquillity, farmland will be lost and previously unlit landscape will be lit, field patterns and open spaces disrupted, and long-distance views will be interrupted including an adverse impact on the night time setting. Impacts can be mitigated through landscape design along route, retention or planting of new hedges and design of elevated road sympathetic to local landscape character. Moreover, good landscape design is needed to mitigate lighting impacts at night. Whilst additional adverse impacts have been identified for the multi-modal option, an overall of moderate adverse has been retained with the potential for effective design to mitigate impacts.	-
Townscape	Implementation of a new bypass identified a neutral impact following completion of a WebTAG assessment which considered elements such as layout, density and mix, scale, appearance and land-use. In addition, a neutral impact was also identified for the multi-modal option where only a slight beneficial impact was identified for the cultural aspect of human interaction with the option potentially establishing an increase of individuals utilising an upgraded transport network.	0
Historic Environment	Whilst a neutral impact was considered reasonable for the multi-modal option, the slight adverse impact resulting from a new bypass has been brought forward to the combined option. The WebTAG assessment identified the potential to have a slight adverse impact on 'unknown' non-designated heritage assets, as	-



Option D   Bypass (Green Route) and Multi-Modal Option		
	well as the potential to directly impact on buried archaeological remains which could result in the permanent and irreversible loss of assets.	
Bio-diversity	An impact assessment of biodiversity using WebTAG guidance was completed for a bypass indicating a moderate adverse impact could be realised, predominantly due to the potential loss and damage of ancient woodland and Pop Hill SINC. In addition, a slight adverse impact was also recognised for the multi-modal option given the impact the Park and Ride proposal and walking and cycling measures could have on biodiversity.	---
Water Environment	Both options were separately assessed and identified a slight adverse impact as a result of their implementation. The same impact score has subsequently been assigned for the combined option with impacts recognised to existing floodplains and the potential impacts to the main rivers and ordinary water courses as a result of accidental spillage, construction activities and routine run-off. A construction environmental management plan should be put in place during the construction of the multi-modal option which will minimise the risk of pollution to watercourses during construction.	-
Residential Amenity	The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. The combined assessment from the above indicates that the properties in Dinas Powys will largely benefit from reductions in traffic through the village. A large number of properties to the east of Dinas Powys and west of Penarth will however experience adverse impacts due to proximity of the bypass alignment, anticipated to give a moderate adverse impact. There is potential for these impacts to be mitigated as part of design development of the bypass however there may also be impacts of visual intrusion based on longer distance views. The multi-modal impact is considered neutral.	---
<b>Economic</b>		
Journey Time Changes	<p>The bypass scheme user and provider benefits (in isolation) as a result of improved journey time changes estimated to have a total discounted value in 2010 prices and values appraised over 60 years, is £69.76M M which represents a significant beneficial improvement. There is also the potential that additional benefits to multi-modal trips could also be realised through enhanced infrastructure and service provision.</p> <p>Journey time and journey time reliability would be constrained by key strategic junctions including Barons Court, assuming the scheme is able to deliver assumed enhancements to the Merrie Harrier junction. This has resulted in the assignment of a moderate score.</p>	++
Journey Time Reliability Changes	It is anticipated that the implementation of a bypass designed to current DMRB standards could establish measurable improvements in journey time reliability between Biglis roundabout and the Merrie Harrier junction. Analysis completed suggests	++

Option D   Bypass (Green Route) and Multi-Modal Option		
	<p>journey time improvements of up to 9 minutes for northbound trips and 11 minutes for southbound trips. There is also the potential that additional benefits to multi-modal trips could also be realised through enhanced infrastructure and service provision.</p> <p>Journey time and journey time reliability would be constrained by key strategic junctions including Barons Court, assuming the scheme is able to deliver assumed enhancements to the Merrie Harrier junction. This has resulted in the assignment of a moderate score.</p>	
Transport Costs	Analysis of bypass transport costs identified a neutral impact as the benefits recognised are likely to be offset by the proposal encouraging trips to be made by car as opposed to more sustainable, affordable means. In contrast a slight beneficial impact has been applied as the provision of an enhanced multi-modal network has the potential to make travel more affordable for some sections of society, most notably the young and elderly.	+
Wider Economic Impacts	It is anticipated that some additional wider economic impacts associated with a new bypass could be realised. This may include induced investment through additional strategic development arising as a result of improved connectivity between the local urban centres of Barry and Cardiff. However, the bypass option combined with the multi-modal options will predominantly focus on addressing a local connectivity issues through an extant transport corridor and therefore significant benefits to medium/ large commercial businesses are arguably less likely to be significantly realised in areas beyond the study area.	+
Land and Property	The adverse impacts identified for each of the two options in isolation have been carried through to the combined option. The most significant land impacts are retained for a new bypass with three residential properties potentially affected by the proposal (no buildings are however directly impacted). In addition, adverse impacts were identified for the implementation of a new Park and Ride facility. The exact extent of land requirements and potential costs are unknown at this stage and would require further exploration.	-

**APPENDIX E**

**Transport Costs**



**Dinas Powys WelTAG Study: Stage 2****Green Alignment (includes Merrie Harrier Improvements)**

Cost Estimate		Total
Series 100 - Preliminaries		3,998,454
Series 200 – Site Clearance		186,021
Series 300 – Fencing		405,924
Series 400 – Road Restraint Systems (Vehicle and Pedestrian)		266,935
Series 500 – Drainage and Service Ducts		1,251,785
Series 600 – Earthworks		3,237,556
Series 700 – Pavement		3,361,702
Series 1100 – Kerbs, Footways and Paved Areas		443,491
Series 1200 – Traffic Signs and Road Markings		122,406
Series 1300 – Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		523,678
Series 1500 – Motorway Communications		216,027
Structures		722,202
Series 2700 – Accommodation Works, Works for Statutory Undertakers, Provisional Sums and Prime Cost Items		350,324
Series 3000 – Landscaping and Ecology		214,866
Merrie Harrier Junction Improvements		3,358,259
Cardiff Road Junction		1,575,000
Series Sub-total		<b>20,234,630</b>
*Detailed Design fee %	4.5%	910,558
*Supervision fee %	2.0%	404,693
Detailed Design & Supervision Sub-total		1,315,251
DD, Supervision & Series Sub-total		<b>21,549,881</b>
** KS6 Risk Allowance (Estimate for the area of the Prices and estimate of the remainder of the Prices)	14.0%	3,016,983
**Optimism Bias (44%)	30.0%	6,464,964
Risk, DD, Supervision & Series Sub-total		<b>31,031,829</b>
direct fee percentage	9.0%	2,792,865
Fee, Risk, DD, Supervision & Series Sub-total		<b>33,824,693</b>
Employers Agent Fees		1,500,000
Employers Risk		2,500,000
Statutory Undertakers		2,000,000
Land and Compensation		4,245,614
Further Design and Survey Works		2,250,000
Total Estimate of the remaining prices (EoRP)		<b>46,320,307</b>

**Dinas Powys WelTAG Study: Stage 2 Plus*****Pink Alignment (includes Merrie Harrier Improvements)***

<b>Cost Estimate</b>	<b>%</b>	<b>Total</b>
Series 100 - Preliminaries		3,755,135
Series 200 – Site Clearance		194,241
Series 300 – Fencing		412,620
Series 400 – Road Restraint Systems (Vehicle and Pedestrian)		279,069
Series 500 – Drainage and Service Ducts		1,267,662
Series 600 – Earthworks		2,393,210
Series 700 – Pavement		3,456,555
Series 1100 – Kerbs, Footways and Paved Areas		449,960
Series 1200 – Traffic Signs and Road Markings		122,660
Series 1300 – Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		548,964
Series 1500 – Motorway Communications		218,739
Structures		722,202
Series 2700 – Accommodation Works, Works for Statutory Undertakers, Provisional Sums and Prime Cost Items		329,006
Series 3000 – Landscaping and Ecology		201,790
Development of Roundabout for LDP Site		525,000
Merrie Harrier Junction Improvements		3,358,259
Cardiff Road Junction		1,575,000
Series Sub-total		<b>19,810,071</b>
*Detailed Design fee %	4.5%	891,453
*Supervision fee %	2.0%	396,201
Detailed Design & Supervision Sub-total		1,287,655
DD, Supervision & Series Sub-total		<b>21,097,726</b>
** KS6 Risk Allowance (Estimate for the area of the Prices and estimate of the remainder of the Prices)	14.0%	2,953,682
**Optimism Bias (44%)	30.0%	6,329,318
Risk, DD, Supervision & Series Sub-total		<b>30,380,725</b>
Direct fee percentage	9.0%	2,734,265
Fee, Risk, DD, Supervision & Series Sub-total		<b>33,114,990</b>
Employers Agent Fees		1,500,000
Employers Risk		2,500,000
Statutory Undertakers		2,000,000
Land and Compensation		4,245,614
Further Design and Survey Works		2,250,000
Total Estimate of the remaining prices (EoRP)		<b>45,610,604</b>

**Dinas Powys WeITAG Study - Stage 2 Plus**
**Option 1A**

<b>Cost Estimate</b>		<b>Total</b>
Series 100 - Preliminaries		663,145
Series 200 – Site Clearance		535,808
Series 300 – Fencing		0
Series 400 – Road Restraint Systems (Vehicle and Pedestrian)		0
Series 500 – Drainage and Service Ducts		95,034
Series 600 – Earthworks		105,649
Series 700 – Pavement		390,250
Series 1100 – Kerbs, Footways and Paved Areas		125,882
Series 1200 – Traffic Signs and Road Markings		27,500
Series 1300 – Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		250,000
Structures		1,000,000
Series 2700 – Accommodation Works, Works for Statutory Undertakers, Provisional Sums and Prime Cost Items (Not used)		75,904
Series 3000 – Landscaping and Ecology		46,554
Series Sub-total		<b>3,315,727</b>
*Detailed Design fee %	4.50%	149,208
*Supervision fee %	2.00%	66,315
Detailed Design & Supervision Sub-total		215,522
DD, Supervision & Series Sub-total		<b>3,531,250</b>
** KS6 Risk Allowance (Estimate for the area of the Prices and estimate of the remainder of the Prices)	14.00%	494,375
**Optimism Bias (30%)	30.00%	1,059,375
Risk, DD, Supervision & Series Sub-total		<b>5,084,999</b>
direct fee percentage	9.00%	457,650
Fee, Risk, DD, Supervision & Series Sub-total		<b>5,542,649</b>
Employers Risk	5.00%	165,786
Statutory Undertakers		500,000
Land and Compensation		1,000,000
Further Design and Survey Work		250,000
Total Estimate of the remaining prices (EoRP)		<b>7,458,436</b>



**Dinas Powys WeITAG Study - Stage 2 Plus**
**Option 1B**

<b>Cost Estimate</b>		<b>Total</b>
Series 100 - Preliminaries		671,652
Series 200 – Site Clearance		535,808
Series 300 – Fencing		0
Series 400 – Road Restraint Systems (Vehicle and Pedestrian)		0
Series 500 – Drainage and Service Ducts		95,034
Series 600 – Earthworks		105,649
Series 700 – Pavement		390,250
Series 1100 – Kerbs, Footways and Paved Areas		158,337
Series 1200 – Traffic Signs and Road Markings		27,500
Series 1300 – Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		250,000
Structures		1,000,000
Series 2700 – Accommodation Works, Works for Statutory Undertakers, Provisional Sums and Prime Cost Items (Not used)		76,877
Series 3000 – Landscaping and Ecology		47,151
Series Sub-total		<b>3,358,259</b>
*Detailed Design fee %	4.50%	151,122
*Supervision fee %	2.00%	67,165
Detailed Design & Supervision Sub-total		218,287
DD, Supervision & Series Sub-total		<b>3,576,545</b>
** KS6 Risk Allowance (Estimate for the area of the Prices and estimate of the remainder of the Prices)	14.00%	500,716
**Optimism Bias (30%)	30.00%	1,072,964
Risk, DD, Supervision & Series Sub-total		<b>5,150,225</b>
direct fee percentage	9.00%	463,520
Fee, Risk, DD, Supervision & Series Sub-total		<b>5,613,746</b>
Employers Risk	5.00%	167,913
Statutory Undertakers		500,000
Land and Compensation		1,000,000
Further Design and Survey Work		250,000
Total Estimate of the remaining prices (EoRP)		<b>7,531,659</b>

**Dinas Powys WeITAG Study - Stage 2 Plus**
**Option 2**

<b>Cost Estimate</b>		<b>Total</b>
Series 100 - Preliminaries		663,145
Series 200 – Site Clearance		535,808
Series 300 – Fencing		0
Series 400 – Road Restraint Systems (Vehicle and Pedestrian)		0
Series 500 – Drainage and Service Ducts		95,034
Series 600 – Earthworks		105,649
Series 700 – Pavement		390,250
Series 1100 – Kerbs, Footways and Paved Areas		125,882
Series 1200 – Traffic Signs and Road Markings		27,500
Series 1300 – Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		250,000
Structures		1,000,000
Series 2700 – Accommodation Works, Works for Statutory Undertakers, Provisional Sums and Prime Cost Items (Not used)		75,904
Series 3000 – Landscaping and Ecology		46,554
Series Sub-total		<b>3,315,727</b>
*Detailed Design fee %	4.50%	149,208
*Supervision fee %	2.00%	66,315
Detailed Design & Supervision Sub-total		215,522
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Fee, Risk, DD, Supervision & Series Sub-total		<b>5,542,649</b>
Employers Risk	5.00%	165,786
Statutory Undertakers		500,000
Land and Compensation		1,000,000
Further Design and Survey Work		250,000
Total Estimate of the remaining prices (EoRP)		<b>7,458,436</b>

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# DINAS POWYS TRANSPORT NETWORK

## WelTAG Stage Two Plus | Impacts Assessment Report

FEBRUARY 2021



# Dinas Powys Transport Network

## WelTAG Stage Two Plus | Impacts Assessment Report

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Report No 10033783-ARC-XX-XX-RP-TP-0002

Date FEBRUARY 2021

### VERSION CONTROL

Version	Date	Author	Changes
P01	18/12/2020	OL	Confidential Draft
P02	10/02/2021	OL	Final Version   Updated following the Review Group meeting held on 14/01/2021

This report dated 10 February 2021 has been prepared for the Vale of Glamorgan Council (the “Client”) in accordance with the terms and conditions of appointment dated 10 July 2019 (the “Appointment”) between the Client and **Arcadis Consulting (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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Taking Wales Forward Relationship with Prosperity for All

### APPENDIX B

SEWTM Dinas Powys Bypass (Green Route) Scheme Modelling

### APPENDIX C

Highway Network Traffic

### APPENDIX D

Transport Baseline Conditions

### APPENDIX E

Social Context

### APPENDIX F

WeITAG Stage Two Plus | Economic Appraisal

## APPENDIX G

### Economic Context

## APPENDIX H

### Environmental Context

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# 1 INTRODUCTION

## 1.1 Background

- 1.1.1 Arcadis Consulting (UK) Limited ('Arcadis') was commissioned by the Vale of Glamorgan Council to develop and appraise potential options for improving the transport network encompassing corridors from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The appraisal of options has been undertaken in accordance with the Welsh Government's latest version of WelTAG (December 2017<sup>1</sup>) including advice on the appraisal in relation to the Future Generations of Wales (2015) Act Well-being Goals<sup>2</sup>.

## 1.2 Stage Two Plus Impacts Assessment Report

- 1.2.1 The WelTAG guidance states that the WelTAG report should be supported by an Impacts Assessment Report, which is '*...a live document which is maintained and grows throughout the five WelTAG stages. It becomes a permanent record of the appraisal work on the proposed transport intervention. It contains the detailed evidence behind the summary information provided to decision makers in the Stage reports.*' As such, this Impacts Assessment report has been updated to support the WelTAG Stage Two Plus assessment and includes new information available since the previous report was prepared.

## 1.3 Report Structure

- 1.3.1 The structure of this report is as follows:
- Chapter 2 presents a summary of the policy and legislative framework at the local, regional and national levels.
  - Chapter 3 identifies the transport commitments, proposals and studies within the study area.
  - Chapters 4 to 8 provide an overview of the transport, economic, environmental, social and cultural context of the study area. The appraisal is structured using the impact areas presented in the WelTAG guidance.
  - Chapter 9 summarises the data sources used within the study.

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<sup>1</sup> <https://beta.gov.wales/sites/default/files/publications/2017-12/welsh-transport-appraisal-guidance.pdf>

<sup>2</sup> <https://beta.gov.wales/sites/default/files/publications/2017-12/weltag-2017-supplementary-guidance-the-well-being-of-future-generations-wales-act-2015.pdf>

## 2 LEGISLATIVE, POLICY AND BACKGROUND STUDIES

### 2.1 Introduction

- 2.1.1 This chapter summarises the policy and legislative framework which provides the context for this study.

### 2.2 National Legislation

- 2.2.1 The core national legislation considered within this section are:

- Active Travel (Wales) Act 2013 (and the draft Active Travel Guidance 2020)
- Well-being of Future Generations (Wales) Act 2015
- Future Generations Report 2020
- Planning (Wales) Act 2015
- Public Transport (Wales) Bill 2018
- Environment (Wales) Act 2016
- The Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011
- Welsh Language (Wales) Measure 2011

#### Active Travel (Wales) Act 2013

- 2.2.2 The Active Travel (Wales) Act 2013 ('the Act'), places a legal duty on local authorities to continuously improve infrastructure and routes for pedestrians and cyclists. The Act makes provision for the mapping of active travel routes and related facilities. The Act also seeks to secure new and enhanced active travel routes and facilities and improve provision for walkers and cyclists. The purpose of the Bill is for local authorities to continuously improve their facilities and routes for pedestrians and cyclists (e.g., through provision of shelter, resting and/ or storage facilities). Furthermore, Welsh Ministers are required to publish public annual reports regarding the extent to which walkers and cyclists make active travel journeys in Wales.

- 2.2.3 The Act aims to make active travel the most attractive option for shorter journeys and to connect key sites such as workplaces, hospitals, schools and shopping areas with traffic free routes and cycle lanes. The Welsh Government seeks to enable more people to walk, cycle and generally travel by more active methods, so that:

- More people can experience the health benefits of active travel.
- We reduce our greenhouse gas emissions.
- We help address poverty and disadvantage.
- We help our economy to grow by unlocking sustainable economic growth.

#### Active Travel Guidance 2020

- 2.2.4 The Active Travel Guidance (Consultation Draft 2020) supports local authorities in fulfilling their duties under the Active Travel Act. The revised guidance combines active travel delivery and planning guidance with active travel design guidance – the consultation for the new guidance ended in June 2020 and responses are currently being reviewed.

- 2.2.5 The Welsh Government has developed the following design principles to ensure that all projects receiving funding make the largest possible impact:

- Develop ideas collaboratively and in partnership with communities.
- Facilitate independent walking, cycling and wheeling for everyone, including an unaccompanied child of secondary school age or a less-experienced cyclist.

- Design places that provide enjoyment, comfort and protection.
- Ensure access for all and equality of opportunity in public space.
- Ensure all proposals are developed in a way that is context-specific and evidence-led.
- Schemes should separate people walking, cycling and wheeling from private motor vehicles or prioritise them by considering the following during scheme design:
  - Separation of pedestrians from cyclists and motor traffic through provision of segregated off-carriageway infrastructure, if necessary, through reallocation of road space.
  - Separation of pedestrians and cyclists from motor traffic through the provision of shared-use off-carriageway infrastructure.
  - Improve on-road conditions to encourage an increase in cycle use within existing highway.

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

- 2.2.6 The Well-being of Future Generations (Wales) Act (Welsh Government, 2015) strives to improve the social, economic, environmental and cultural well-being of Wales. The vision is that *'in 2050, Wales will be the best place to live, learn, work and do business.'*
- 2.2.7 The Act makes the public bodies listed in the Act consider the longer-term perspective, engage with people and communities and each other, prevent problems, and deliver a joined-up approach. The goals to represent what the long-term economic, social and environmental well-being of Wales are shown in Figure 1.

Figure 1 Well-being of Future Generations (Wales) Act – Well-being Goals<sup>3</sup>



- 2.2.8 The five ways of working as set out within the Act are:
- Long-term
  - Integration
  - Involvement
  - Collaboration
  - Prevention

<sup>3</sup> <https://gov.wales/docs/dsjlg/publications/150623-guide-to-the-fg-act-en.pdf>



## Application to WelTAG

- 2.2.9 The latest WelTAG guidance has been developed to ensure that public funds are invested in a way that maximises contribution to the well-being of Wales, as set out in the Well-being of Future Generations (Wales) Act. The onus is specifically focused upon the delivery of sustainable development, of which will in turn contribute to the achievement of the well-being goals.
- 2.2.10 Feedback from the Future Generation Commissioner's Office during 2018 on a Stage One report, which was shared by Welsh Government encompassed the following:
- The WelTAG guidance states it is required *'to ensure the needs of future generations are considered and understand how well they help public bodies to meet the well-being objectives and maximise their contribution to each of the seven goals'*. Consideration should be given to long-term challenges, trends, opportunities, as well as integration, collaboration, involvement and preventing problems from occurring or getting worse.
  - The WelTAG guidance states *'it is critical that long-term trends, impacts and consequences are considered so that decisions being made today have a positive impact on future generations. Evidence should be presented on how long-term or future trends, or the impacts of these on potential solutions, have been considered e.g., air quality, climate change, changes in working/commuting patterns, demographic trends etc.'*
  - Evidence should be presented on how scheme objectives and options have been developed/informed through the application of the Five Ways of Working and well-being goals.
  - The Well-being Framework should be applied during the application of the WelTAG Process and would expect to see clearer evidence of how the framework has been applied<sup>4</sup>.
- 2.2.11 These principles have been applied in producing the Outline Business Case and this Impacts Assessment Report.

## Future Generations Report 2020 – Transport

- 2.2.12 Producing a Future Generations Report every five years is a statutory duty of the Future Generations Commissioner. New ways of planning for transport and mobility in Wales are fundamental to the achievement of the well-being goals, in particular, a Resilient Wales, a Prosperous Wales, a Wales of Cohesive Communities, a more Equal Wales and a Healthier Wales. Meeting the requirements of the Well-being of Future Generations (Wales) Act 2015 will provide travel options that are low or zero carbon, reducing air pollution and promoting environmental resilience. It will also help equalise opportunities for all and play a role in supporting healthy lifestyles, improving community cohesion, and creating a well-connected Wales.
- 2.2.13 The report states that Welsh Government should set a national target for modal shift to enable people to adopt low carbon modes of travel. The following recommendations are made:
- Adopt an approach to transport planning that supports 20-minute neighbourhoods.
  - Explore the potential of Mobility as a Service (MaaS) to provide flexible alternative transport solutions.
  - Allocate at least 50% of capital transport spend on improving bus and train services.
  - Use financial powers to explore all levers to achieve ambitious modal shift including increasing fuel duty and company car tax, restricting parking in city centres and introducing a distance-based charge for driving within five miles in urban areas.
  - Fully integrate transport, housing and land use planning to minimise the need for people to travel.
  - Transport for Wales (TfW) Rail Services should ensure it undertakes a comprehensive equality impact assessment at the planning and design stages for any new transport infrastructure.

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<sup>4</sup> <https://futuregenerations.wales/documents/future-generations-framework>

- Explore the business case for introducing free public transport for young people in Wales.

2.2.14 The report recommends that all public bodies, including Welsh Government, should focus on:

- Decisions on transport must reflect the climate emergency.
- Achieve modal shift and reduce our reliance on cars.
- Embracing technology.
- Consider mobility as a route to wider well-being.

### Planning (Wales Act) 2015

2.2.15 The Planning (Wales) Act became law in July 2015 and is a set of provisions that provide a modern legislative framework for the operation of the planning system. The key purposes of the Act are to:

- Strengthen the plan-led approach to planning, by the introduction of the National Development Framework and Strategic Development Plans.
- Providing a modernised framework for the delivery of planning services, by enabling some planning applications to be made directly to Welsh Ministers.
- Make provision for pre-application consultation, and to require local planning authorities to provide pre-application services.
- Reform the development management system to streamline procedures, to ensure that applications are dealt with promptly.
- Improve enforcement and appeal procedures.

### Public Transport (Wales) Bill

2.2.16 The Welsh Government published a White Paper in December 2018 which sets out proposals to improve the legislative framework in Wales for how local bus services are planned and delivered, together with reform of the licensing regime for taxis and private hire vehicles<sup>5</sup>.

2.2.17 A ministerial statement was issued in July 2019<sup>6</sup>. Consultation took place on the White Paper between December 2018 and March 2019. Following the consultation and engagement, work has been underway to build on the White Paper and develop the proposals for a Bill. In the First Minister's legislative statement on 16<sup>th</sup> July 2019, it was confirmed that the Public Transport (Wales) Bill would be included in year four of the current legislative programme.

2.2.18 Building on the wider bus reform agenda and Welsh Government's partnerships with local authorities and bus operators, the Bill will put in place enabling provisions that will provide a suite of tools for local authorities to consider using when planning and delivering bus services, including enhanced partnership working, franchising and local authority run bus services.

2.2.19 The Bill will put in place new information management and sharing arrangements, so that information to the public will be more accessible and reliable, and local authorities will be in a better position to make arrangements to address changes in service provision. The Bill will also amend the eligibility age for the mandatory concessionary fares scheme so that over time it will align with a person's state pension age.

### Environment (Wales) Act 2016

2.2.20 The Environment (Wales) Act 2016 puts in place the legislation needed to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way. It delivers the Programme for Government commitment to introduce new legislation for the environment. This positions Wales as a low carbon, green economy, ready to adapt to the impacts of climate change.

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<sup>5</sup> [https://gov.wales/sites/default/files/consultations/2018-12/improving-public-transport\\_0.pdf](https://gov.wales/sites/default/files/consultations/2018-12/improving-public-transport_0.pdf)

<sup>6</sup> <https://gov.wales/written-statement-update-public-transport-wales-bill-and-wider-bus-reform-agenda>

- 2.2.21 The act has been carefully designed to support and complement work to help secure Wales' long-term well-being, so that current and future generations benefit from a prosperous economy, a healthy and resilient environment and vibrant, cohesive communities. The key parts of the act of relevance to the study are:
- **Part 1** | Sustainable management of natural resources – enables Wales' resources to be managed in a more proactive, sustainable and joined-up way. It also helps to tackle the challenges faced and is focused on the opportunities Wales' resources provide.
  - **Part 2** | Climate change – provides the Welsh Ministers with powers to put in place statutory emission reduction targets, including at least an 80% reduction in emissions by 2050 and carbon budgeting to support their delivery. This is considered vital within the context of existing UK and EU obligations and sets a clear pathway for decarbonisation. It also provides certainty and clarity for business and investment.
  - **Part 7** | Flood and Coastal Erosion Committee and land drainage – clarifies the law for other environmental regulatory regimes including flood risk management and land drainage.

### The Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011

- 2.2.22 The Act came into force in April 2011 and requires public authorities to publish 'equality objectives' and a statement that sets out the steps intended to be taken in order to achieve the objectives and the time frame for doing so. The Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011 is a key piece of legislation that must be taken into account throughout the WelTAG process.

### Welsh Language (Wales) Measure 2011

- 2.2.23 The Welsh Language (Wales) Measure was given royal assent in February 2011 and gives the Welsh language official status in Wales, meaning Welsh should be treated no less favourably than the English language in Wales. The measure also established the role of the Welsh Language commissioner to promote the Welsh language and improve the opportunities for people to use it.

## 2.3 National Policy and Strategies

- 2.3.1 The key national policy and strategy documents reviewed within this section are:

- Wales Transport Strategy (One Wales: Connecting the Nation) (2008)
- Natural Resources Policy (2015)
- Taking Wales Forward 2016-2021 (2017)
- Prosperity for All – The National Strategy (2017)
- Planning Policy Wales: Edition 10 (2018)
- Prosperity for All: Economic Action Plan (2017)
- Prosperity for All: A Low Carbon Wales (2019)
- Future Wales: The National Plan 2040 (Working Draft) (2020)
- Welsh Government: Climate Emergency (2019)
- Cymraeg 2050: Welsh Language Strategy (2018)
- National Transport Finance Plan Update (2018)

### Wales Transport Strategy (One Wales: Connecting the Nation) | 2008

- 2.3.2 The Wales Transport Strategy (One Wales: Connecting the Nation) published in 2008, is a statutory document required by the Transport (Wales) Act 2006 (The Act).
- 2.3.3 The Wales Transport Strategy (WTS), sets out the Welsh Government's aim to improve transport, focusing upon how transport can play a key role in delivering the wider policy agenda of integrating transport with spatial planning, economic development, education, health, social services,



environment and tourism, whilst meeting the strategic agenda and the implementation framework of the (then) Wales Spatial Plan. The vision of the WTS is '*...to promote sustainable transport networks that safeguard the environment while strengthening our country's economic and social life.*'

2.3.4 The Priorities of the WTS are:

- Reducing greenhouse gas emissions and other environmental impacts.
- Improving public transport and better integration between modes.
- Improving links and access between key settlements and sites across Wales and strategically important all-Wales links.
- Enhancing international connectivity.
- Increasing safety and security.

2.3.5 The WTS had three key sustainable transport themes and a number of desired outcomes, which underpin the strategy. The three themes underpinning the strategy were:

- Achieving a more effective and efficient transport system.
- Achieving greater use of the more sustainable and healthy forms of travel.
- Minimising demand on the transport system.

**Proposed Approach to the Wales Transport Strategy Replacement**

2.3.6 During the past decade much has changed including the devolution of more powers to the Welsh Assembly; publication of overlapping legislation (Well-being of Future Generations (Wales) Act 2015; Environment (Wales) Act), while further changes are anticipated arising through delivery of Prosperity for All – The National Strategy (2017), from Local Government reforms; post-Brexit funding and relationships; the new Wales and Border rail franchise and; the devolution of further transport related responsibilities.

2.3.7 It is against this background that the Welsh Government is seeking to develop a new WTS which recognises these recent changes and looks to address future opportunities and challenges.

2.3.8 The overarching policy statement is anticipated to be based on the seven well-being goals and is currently under development.

**Natural Resources Policy | 2015**

2.3.9 The Natural Resources Policy (2015) is the second statutory product of the Environment (Wales) Act. The focus of the Natural Resources Policy document is the sustainable management of Wales' natural resources, to maximise their contribution to achieving goals within the Well-being of Future Generations Act. The policy set out three priorities:

- Delivering nature-based solutions.
- Increasing renewable energy and resource efficiency.
- Taking a place-based approach.

2.3.10 The Natural Resources Policy Statement states that motorised transport and industry are the main Welsh man-made sources of pollution. It is noted that levels of pollution can be lowered through measures employed in identified hotspots and through actions to drive improvements in technology and industrial practices.

2.3.11 Air and noise pollution are considered the two biggest environmental contributors to the burden of disease in the UK. There is an estimated cost of £9-19bn per year owing to fine particulate pollution<sup>7</sup>. It has also been estimated that in Wales in 2010, approximately 1,320 deaths could be attributed to

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<sup>7</sup> [www.gov.uk/air-quality-economic-analysis](http://www.gov.uk/air-quality-economic-analysis)

long-term exposure to fine particles that can be inhaled deep into the lungs<sup>8</sup>. Noise pollution is considered the second biggest environmental contributor to the burden of disease in the UK. The estimated cost of noise pollution is approximately £7-10bn per year<sup>9</sup>. The Natural Resources Policy Statement also indicates that the homes of more than 200,000 people in Wales are exposed to levels of road traffic noise exceeding World Health Organisation noise guidelines.

### Taking Wales Forward 2016 – 2021<sup>10</sup>

2.3.12 Taking Wales Forward published in 2017, sets out how this Government will deliver within this Assembly term. The four cross-cutting strategies are:

- Prosperous and Secure – aim is better jobs, closer to home. We want work and secure housing for all, supported by sustainable growth in our businesses.
- Healthy and Active – commitment to helping improve health and well-being for all.
- Ambitious and Learning – states that everyone deserves the opportunity to achieve their potential and that education changes lives and drives economic growth.
- United and Connected – continue to build a united and connected society, where everyone is respected and valued. The transport actions are:
  - Deliver improvements to the A55, the A40 in West Wales and other trunk roads.
  - Develop a new, not-for-profit, rail franchise and deliver a more effective network of bus services once powers have been devolved.
  - Ensure seamless ticketing arrangements and improved marketing as part of the new travel arrangements for Wales.
  - Ensure better access to active travel for all.

### Prosperity for All – The National Strategy | 2017

2.3.13 The aim of Welsh Government's Prosperity for All (September 2017) is for '*every one of us having a good quality of life, and living in strong, safe communities.*' The strategy takes the key commitments of Taking Wales Forward 2016-2021 and sets out how these fit with the work of the wider Welsh public service. The relationship between the Prosperity for All – The National Strategy (2017), Taking Wales Forward 2016-2021 (2017) and the Well-being and Future Generations Act (2015) is presented in [Appendix A](#).

2.3.14 The Strategy aims to deliver quality health and care services, promote good health and well-being, and build healthier communities and better environments. As part of this, Welsh Government has set out that they will:

- Deliver an integrated public transport network which supports the aim to enable people to travel more actively, by combining different types of transport with walking and cycling.
- Build more purpose-built housing developments located close to easily accessible public transport.

2.3.15 The Strategy acknowledges that attitudes to and expectations of transport are likely to change in ways that one cannot currently anticipate. It is anticipated that travel by private car will remain an important mode of travel for the sparse population of Wales. New powers over buses and the rail franchise also mean that Welsh Government is able to take a more joined up view across all transport modes which will enable to reduce carbon emissions, promote active travel, and get the most from public transport spending.

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<sup>8</sup> [www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air](http://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air)

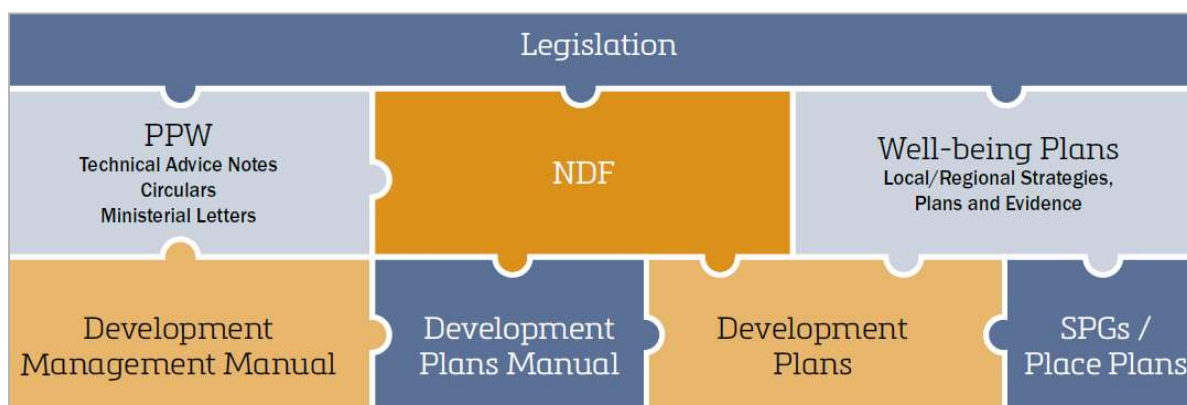
<sup>9</sup> [www.gov.uk/noise-pollution-economic-analysis](http://www.gov.uk/noise-pollution-economic-analysis)

<sup>10</sup> Welsh Government (2016).

## Planning Policy Wales: Edition 10 | 2018

- 2.3.16 Planning Policy Wales (PPW) (December 2018) aims to deliver the vision for Wales set out in the Well-being of Future Generations Act and provides the context for land use planning in Wales. The planning policies are supplemented with a series of Technical Advice Notes (TANs) and policy clarification letters, which together comprise national planning policy.
- 2.3.17 PPW additionally, sets out Welsh Government objectives, strategies and policies related to land use. PPW Edition 10 has been shaped around the policy themes of the well-being goals and updated to reflect the most recent Welsh Government strategies and priorities. PPW Edition 10 includes four key themes: Placemaking, Active and Social Places, Productive and Enterprising Places and lastly Distinctive and Natural Places. The Planning Framework for Wales, within which PPW Edition 10 sits is set out within Figure 2.

Figure 2 Planning Framework for Wales<sup>11</sup>



## Prosperity for All: Economic Action Plan | 2017

- 2.3.18 Welsh Government's Prosperity for All: Economic Action Plan (2017) aims to grow an inclusive economy whereby spreading opportunity and promoting well-being are central to the Plan. The Economic Action Plan aims to contribute towards the delivery of Prosperity for All – The National Strategy.
- 2.3.19 Within the Economic Action Plan, there is a commitment to a Regionally Focussed Model of Economic Development to develop the distinctive strengths of each region in pursuit of inclusive growth and to improve transport integration. The Economic Action Plan includes a five-year programme of transport capital funding through TfW for both transport maintenance and new projects.
- 2.3.20 Welsh Government's approach will be collaborative in order to ensure that efficiency of the transport network is maximised by addressing bottlenecks and pinch points. Collaboration will occur amongst the following actors in particular:
- The new Joint Governance Committee
  - The Chief Regional Officers
  - TfW
  - Local partners, including local authorities and regional transport authorities
- 2.3.21 The Plan aims to deliver infrastructure capable of supporting a range of economic activities and creating attractive places to live, learn, work and invest. The National Transport Finance Plan details the transport infrastructure projects to be delivered. The Economic Action Plan intends to

<sup>11</sup> <https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf>



decarbonise the transport network and improve air quality. In ten years, the aim is for all taxis and buses in Wales to have a zero-carbon footprint.

### Prosperity for All: A Low Carbon Wales

- 2.3.22 Prosperity for All: A Low Carbon Wales (2019), outlines Welsh Government's commitment to tackling climate change. The Plan sets out '*an approach to cut emissions and increase efficiency in a way that maximises wider benefits for Wales, ensuring a fairer and healthier society. It sets out 100 policies and proposals that directly reduce emissions and support the growth of the low carbon economy.*' This latest plan continues the theme of ensuring integration across Welsh Government's strategic policies to decarbonise, including interconnectivity with Prosperity for All: The National Strategy (2017) which outlines decarbonisation as one of six cross-government priorities.
- 2.3.23 The plan (Part 3 – Sector Emission Pathways) outlines Welsh Government's commitment to shift towards active travel and a low carbon public transport system which is accessible to all and contributes to liveable and sustainable communities. There is an overarching aim for the transport sector to reduce emissions by 43% (from baseline levels) by the year 2030 through:
- Behavioural change measures (modal shift to more sustainable travel).
  - Increasing uptake of electric vehicles.
  - Reducing emissions from road and rail transport through vehicle and fuel efficiency measures.
- 2.3.24 The plan identifies that transport in Wales is dominated by the use of the private car, contributing to problems such as air quality issues, congestion and a significant proportion of Wales' CO<sub>2</sub> emissions. To encourage a shift away from use of the private car, a range of proposals and supporting policies are highlighted as follows:
- Proposals:
    - Proposal 12 – Working to achieve a modal shift from car dependency to sustainable forms of transport.
    - Proposal 13 – Significantly increasing modal share of active travel for short journeys.
    - Proposal 14 – Piloting activity to promote the use of zero and ultra-low emission road vehicles.
    - Proposal 15 – Promote the decarbonisation of Private Sector fleets in Wales.
  - Policies:
    - Policy 46 – Increasing active travel.
    - Policy 47 – Increasing travel by rail.
    - Policy 48 – Increasing travel by bus.
    - Policy 49 – Use planning policy to promote sustainable travel and reduce the need to travel.
    - Policy 50 – Increasing the proportion of vehicles which are electric and ultra-low emission.
    - Policy 51 – Plan for and invest in EV charging infrastructure.
    - Policy 52 – Aiming to reduce the carbon footprint of buses to zero by 2028.
    - Policy 53 – Aim to reduce the carbon footprint of taxis and private hire vehicles to zero by 2028.
    - Policy 54 – Reduce transport emission.

### Future Wales: The National Plan 2040 | Working Draft (2020)

- 2.3.25 The National Plan 2040 is a 20-year national spatial plan for Wales (Welsh Government, 2020 – 2040), replacing the current Wales Spatial Plan. Consultation on a draft NDF took place in Summer

2019. The National Plan was presented to the Senedd in September 2020 to scrutinise the proposed changes and publication of the final document should follow in early 2021.

- 2.3.26 The draft vision is to *'help deliver sustainable places across Wales by 2040, by supporting positive placemaking and ensuring that our spatial choices direct development to the right places, make the best use of resources, create and sustain accessible, healthy communities, protect our environment and support prosperity for all.'*
- 2.3.27 Policy 12 – Regional Connectivity states that The Welsh Government will support and invest in improving regional connectivity and will work with TfW, local authorities and partners to deliver the following measures:
- **Active Travel** – Prioritising walking and cycling for all local travel by supporting the implementation of the Active Travel Act to create comprehensive networks of local walking and cycling routes.
  - **Bus** – Improve the legislative framework for how local bus services are planned and delivered and invest in the development of integrated regional and local bus networks.
  - **Metros** – Develop the South East Metro, South West Metro and North Wales Metro to create new integrated transport systems that provide faster, more frequent and joined-up services using trains, buses and light rail.
  - **Ultra-Low Emission Vehicles** – Support the roll-out of suitable fuelling infrastructure to facilitate the adoption of ultra-low emission vehicles, particularly in rural areas.
- 2.3.28 Policy 36 – South East Metro outlines that The Welsh Government supports the development of the South East Metro and will work with local authorities, TfW and other partners to enable its delivery. The policy states that strategic and Local Development Plans must support the South East Metro and planning authorities should plan growth and regeneration to maximise opportunities from better regional connectivity.

### Welsh Government: Climate Emergency<sup>12</sup>

- 2.3.29 In April 2019, following the publication of Prosperity for All: A Low Carbon Wales, the Minister for Environment, Energy and Rural Affairs, on behalf of the Welsh Government, declared a climate emergency in Wales. The announcement drew attention to the significance of evidence from the Intergovernmental Panel on Climate Change. The announcement stated *'that Wales has the determination and ingenuity in Wales to deliver a low carbon economy at the same time as making our society fairer and healthier.'*

### Cymraeg 2050: Welsh Language Strategy

- 2.3.30 The Cymraeg 2050 Strategy was launched in 2018 setting out the vision to reach a million Welsh speakers by 2050, increasing the percentage of the population who use Welsh daily from 10% to 20%. The strategy incorporates three key themes:
- Theme 1: Increasing the number of Welsh Speakers.
  - Theme 2: Increasing the use of Welsh.
  - Theme 3: Creating favourable conditions.
- 2.3.31 The aim of the strategy is to continue to build on evidence about the Welsh language and its speakers as a basis for assessing the effectiveness of interventions and developing Welsh language policy.

### National Transport Finance Plan

- 2.3.32 The National Transport Finance Plan was first published in July 2015. The purpose of the plan being to provide the timescale for financing schemes, the timescale for delivering schemes, detail the

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<sup>12</sup> <https://gov.wales/written-statement-welsh-government-declares-climate-emergency>

estimated expenditure, and identify the likely source of financing to enable delivery. The National Transport Finance Plan 2018 Update provides information on progress since publication and sets out a revised programme for the next three years and beyond. The plan includes both revenue and capital initiatives, ranging from specific schemes to others where further investigatory and development work is required. The following schemes of relevance to the study have been identified:

- R2 – Deliver the actions set out in the Road Safety Framework for Wales (Safe Routes in Communities); Deliver the actions set out in the Road Safety Framework for Wales (Road Safety Capital).
- AT1c – Ensure the Active Travel (Wales) Act 2013 is delivered by: Directing funding for walking and cycling to the delivery of schemes that contribute to active travel.
- AT2 – Deliver the actions set out in the Active Travel Action Plan.
- AT3 – Work with partners to deliver a programme of improvements to the National Cycle Network and that contribute to the objectives of the Active Travel Act.
- NEW 6 – Cardiff and Vale Coastal Sustainable Transport Package – funding allocated from the Local Transport Fund to progress development work.
- RI14 – CP5 Access for All Programme: Undertake feasibility studies/ delivery options report for improved access at Cadoxton station. From 16/17 develop additional accessibility projects.
- RI8 – Develop assessment criteria and, using those criteria, a prioritised list of station improvement proposals to draw down funding from relevant HLOS specific funds (as rail is non-devolved).
- RS1d – Engage with rail industry partners, stakeholders, and passengers to help develop and promote rail services including safety and security.
- BCT12 – Work with local authorities and bus operators to identify congestion and pinch points on the network that impact on bus reliability and punctuality and ensure that solutions are integrated into wider highway improvements programme.
- IT6 – Working with local authorities and Network Rail, identify a network of multi modal transport interchanges, park and ride and park and share hubs and develop a programme to implement.
- IT1 – Make grant funding available to local authorities for transport, including schemes that will help to improve access to employment sites, road safety schemes and schemes that will deliver the Welsh Government's wider priorities.
- IT7 – Work with Local Health Board, Wales Ambulance Services Trust, Community Health Councils, local government, the bus industry and the Community Transport Associations to deliver action plans setting out measures for improving access to healthcare.
- TI1 – Support innovation and the rollout of new technology, particularly where it can lead to development of safe and efficacious modes of transport.

## 2.4 Regional and Local Policy and Strategies

2.4.1 The key local policy and strategy documents reviewed within this section are:

- Vale of Glamorgan Local Development Plan (Adopted 2017)
- Vale of Glamorgan Local Transport Plan

### Vale of Glamorgan Local Development Plan 2011 – 2026 (Adopted 2017).

2.4.2 The Vale of Glamorgan's LDP (2011- 2026) was adopted by the Council on 28th June 2017. The LDP sets out the vision, objectives, strategy and policies for managing development in the Vale of Glamorgan. It also seeks to identify the infrastructure that will be required to meet the growth anticipated in the Vale of Glamorgan up to 2026.



- 2.4.3 The relevant policies to the study area are those that relate to development in the South East Zone. The LDP strategy seeks to promote new development opportunities in the 'South East Zone' (which includes the urban settlements of Barry, Dinas Powys, Llandough (Penarth), Penarth and Sully. The South East Zone accommodates the majority of the Vale of Glamorgan's population and is said to benefit from a wide range of services and facilities including a choice of transport links to Cardiff and the wider region.
- 2.4.4 Barry is identified as a key settlement within the LDP Settlement Hierarchy. Penarth has been identified as a Service Centre Settlement and Dinas Powys a Primary Settlement. A number of specific area objectives have been identified, relevant to this study:
- Barry – Improve access to and within Barry, through strategic and local highway improvements and a range of sustainable transport measures, which will support regeneration whilst at the same time effectively managing congestion on the town's main arterial roads.
  - Penarth – Promote Penarth as a 'sustainable transport town' by encouraging new and enhanced walking and cycling links within the town and between the town and adjoining residential and commercial areas, including Cardiff Bay, and facilitating park and ride provision.
  - Primary Settlement (Dinas Powys) – Promote sustainable transport measures and related facilities in order to reduce dependence on the private car.
- 2.4.5 Strategic Policies include SP7 for transportation. This identifies that sustainable transport improvements that serve the economic, social and environmental needs of the Vale of Glamorgan and promote the objectives of the South East Wales Regional Transport Plan (RTP) and the Local Transport Plan (LTP) will be favoured. The key priorities for the delivery of strategic transportation infrastructure include the following of relevance to the study area:
- A new Barry Island Link Road.
  - Modernisation of the valley lines.
  - Cycle routes at Barry Waterfront to Dinas Powys.
  - Bus park and ride at Cosmeston, Penarth.
  - Bus priority measures at Merrie Harrier Cardiff Road Barry to Cardiff via Barry Road.
- 2.4.6 The policy states that priority will be given to schemes that improve highway safety and accessibility, public transport, walking and cycling.
- 2.4.7 The Plan notes how '*...the South East Wales Transport Alliance (Sewta) Highway Strategy Study (2008) identifies the A4055 through Dinas Powys as a key problem area of the regional road network as a consequence of the scale of traffic and associated congestion. Barry Waterfront to Cardiff Link Road (Dinas Powys By-pass) was viewed as having dual benefits, helping to alleviate traffic congestion and improve road safety on the A4055 through Dinas Powys, while having the potential to improve access to the wider road network. Issues at the Cogan Spur and Merrie Harrier junctions, however, would be difficult to overcome.*'
- 2.4.8 The RTP (2010) states that the scheme offers positive outcomes and should be subject to further development and evaluation within the investment programme. Whilst the Council supports this scheme in principle, it is considered unlikely that it will come to fruition during the Plan period, given the current economic climate and the Welsh Government's preference to make better use of the existing transport system and highway network via the enhancement of public transport routes and provision of new facilities for walking, cycling and rail. Accordingly, the proposed link road/ bypass is not included within the LDP.

### Vale of Glamorgan Local Transport Plan (2015)

- 2.4.9 The Vale of Glamorgan LTP has been established to recognise the diverse economic and social geography, and overlapping labour and housing markets, that exist throughout the Capital Region (which includes Vale of Glamorgan as well as Cardiff, in the vicinity of the study area).

- 2.4.10 Whilst acknowledging the requirement for a collaborative approach for the future development of the Capital Region, the LTP seeks to identify the sustainable transport measures required to ensure the Vale of Glamorgan Council adheres to current requirements and good practices to allow for a sustainable transport environment for the period 2015 to 2020, as well as looking forward to 2030.
- 2.4.11 The plan therefore seeks to secure better conditions for pedestrians, cyclists and public transport users and to encourage a modal shift away from the single occupancy car. The LTP also *'seeks to tackle traffic congestion by securing improvements to the strategic highway corridors for commuters who may need to travel by car.'*
- 2.4.12 The LDP strategic policy in relation to Transportation (SP7) reads as follows. *'Sustainable transport improvements that serve the economic, social and environmental needs of the Vale of Glamorgan and promote the objectives that can be found in the South East Wales RTP 2010 – 2015 will be favoured. Priority will also be given to schemes that improve highway safety and accessibility, public transport, walking and cycling.'*
- 2.4.13 The plan highlights actions required including:
- In partnership with bus operators, negotiate expansion of current bus services, linking to key settlements and interchanges.
  - Encourage use of community transport provision to sustain and entice bus operators/ community transport providers to take over once grown to acceptable sustainable level of patronage.
  - To deliver existing safe routes in communities' schemes identified by schools and the public and encourage more schemes to come forward for consideration and implementation.
  - In partnership with bus operators, negotiate expansion of current services, linking routes where there needs to be interchange and ensuring timings of connections are acceptable. Encourage use of integrated ticketing for services. Increase Community Transport to cater for demand.
  - Provide bus priority for Dinas Powys to Cardiff corridor to include Penarth.
  - Deliver highway improvement schemes at key locations including Dinas Powys.

## 2.5 Background Documents/ Information

- 2.5.1 The key background documents reviewed within this section are:
- Highway Impact Assessment, Deposit LDP Background Paper (2013)
  - Final Sustainability Appraisal Report, Vale of Glamorgan LDP Document (June 2017)
  - Sustainable Transport Assessment (LDP Background Paper; 2013)
  - Sewta Rail Strategy (2013)
  - Cardiff Capital Region Metro Study (2013)
  - Rapid Transport for Cardiff | Scoping, Feasibility, Engineering and Economic Study (2013)

### Highway Impact Assessment, Deposit LDP Background Paper (2013)

- 2.5.2 Capita Symonds was commissioned by the Vale of Glamorgan Council to undertake a capacity assessment of the impact of possible future LDP residential development sites on the strategic highway network. This formed part of the evidence-base for the LDP. Within Dinas Powys, four proposed LDP residential sites were included within the assessment totalling 440 units.
- 2.5.3 Table 1 presents the link and junction capacity assessment results within the study area (based on Ratio of Flow to Capacity (RFC)/ degree of saturation) for the base year and the future year with the LDP proposals having taken place. The table shows that four junctions within the study area were identified as forecast to be over capacity in the future year, namely Cardiff Road/ Murch Road/ Millbrook Road; Merrie Harrier; Barons Court; and Leckwith Road/ Pen-y-Turnpike Road Priority junctions.

Table 1 Link and Junction Capacity Assessment Results

Link / Junction Name	2012 AM	2012 PM	2026 AM	2026 PM
Cardiff Road, Dinas Powys (North) (Link 209)	Within capacity	Within capacity	Within capacity	Within capacity
Barry Road, Barons Court SB (Link 207b)	Within capacity	Within capacity	Within capacity	Within capacity
Barry Road, Barons Court NB (Link 207)	Within capacity	Within capacity	Within capacity	Within capacity
Cardiff Road/ Murch Road/ Millbrook Road (Junction 8)	Over capacity	Over capacity	Over capacity	Over capacity
Merrie Harrier (Junction 9)	At capacity	At capacity	Over capacity	Over capacity
Barons Court (Junction 10)	At capacity	At capacity	Over capacity	Over capacity
Leckwith Road/ Pen-y-Turnpike Road Priority (Junction 12)	Within capacity	Within capacity	Over capacity	Over capacity

### Final Sustainability Appraisal Report, Vale of Glamorgan LDP Document (June 2017)

2.5.4 The Sustainability Appraisal Report forms part of a series of documents for the Vale of Glamorgan LDP revised to reflect the changes made to the Deposit LDP and as a consequence of the September 2015 Focused Changes; and the Matters Arising Changes (September 2016) and Further Matters Arising Changes (February 2017) following the public examination of the LDP. The report identifies a range of sustainability issues for the Vale of Glamorgan, including the following:

- Access for all:
  - Lack of provision for special needs groups, especially mobility impaired e.g., ramps, lifts, hearing loop systems, signage etc. in public buildings, streetscape and new housing developments.
  - Ageing population, therefore more people affected by mobility issues.
- Deprivation:
  - Isolated areas of deprivation especially in Barry and Penarth.
  - Low economic activity (e.g., unemployed).
  - Low educational achievement (e.g., Gibbonsdown and Court).
  - Poor health (Barry, Penarth, St Athan and St Brides).
  - Income inequality.
- Climate change:



- Causes: pollution (pockets of pollution in the eastern Vale) from traffic and industry, over-reliance on energy generated from fossil fuels, loss of woodlands and countryside etc.
- Consequences: increased risk of flooding, changes to farming practices (e.g., growing different crops), impact on biodiversity, economic impact, human lifestyle impact etc.
- Transport and accessibility:
  - Congestion at peak times on key routes to Cardiff.
  - Inappropriate traffic management measures
  - General lack of parking (e.g., town centres, new housing developments etc.).
  - Insufficient public transport (especially in rural Vale).
  - Lack of provision for cyclists and pedestrians.
  - Lack of 'park and ride' and 'park and share' sites'.
  - Increased car ownership.
  - Increased reliability on cars for access to goods and services.
  - Increasing commuter distances to work.
  - Environmental impact of vehicular traffic (e.g., noise, emissions etc.).
- Employment:
  - Reliance on travel to work by car.

### Sustainable Transport Assessment (LDP Background Paper; 2013)

- 2.5.5 The Sustainable Transport Assessment forms part of a series of topic papers prepared by the Vale of Glamorgan Council as part of the evidence base used to inform the production of policies and site allocations for the LDP. This assessment sought to identify the sustainable transport measures required to create and ensure a sustainable transport environment in the Vale of Glamorgan. The Vale of Glamorgan Council is committed to reducing the environment impact of its activities and as such seeks to provide transport infrastructure and transport services to assist the public to choose sustainable travel modes for all journeys where possible. This includes for all new developments to include off-road shared use walking/ cycling routes where possible and cycle signs on main roads where off-road facilities are not practical.

#### Walking and Cycling

- 2.5.6 A number of walking and cycling schemes are noted to have been funded/ proposed in the study area since the RTP Capital programme implementation began in April 2010, these include:
- Barry to Dinas Powys – Funding was granted to carry out feasibility for a new pedestrian and cycling link from the McDonalds roundabout on Cardiff Road Barry to Dinas Powys.
  - The Ash Path, Dinas Powys – Funding to allow the Council to negotiate with landowners to enable the provision of a shared footway/ cycleway on public rights of way 25 and 28c to enable a link between Dinas Powys and Sully Road, Penarth.
  - Opening up access to the Cross Common in Dinas Powys.
  - Footpath improvements linking Dinas Powys with Michaelston Le Pit.
- 2.5.7 It is considered necessary that the strategic route of Barry Waterfront to Dinas Powys is considered for improvement of the national cycle network in the Vale of Glamorgan.

#### Bus

- 2.5.8 The report notes that funding for bus services has declined. There has been a reduction of £8m of Grant throughout Wales despite the agreed objectives of increased patronage and improved services still standing.

2.5.9 The objectives for bus services are as follows:

- To provide and promote safe, attractive and accessible bus and community transport links to key regional centres and destinations.
- To maximise opportunities to maintain and stimulate passenger growth.
- To improve the quality and efficiency of bus and community transport services.
- To address exclusion from the core network through the most appropriate mode, including the use of flexible bus services and community transport.
- To encourage partnership working in information provision, ticketing and service provision.
- To ensure buses and community transport play their full role within the Sewta Metro Plus integrated transport network.
- To provide a foundation for bus infrastructure enhancement programmes.

2.5.10 The LDP supports Bus-Based Park & Ride initiatives as a transport planning tool that can be used to encourage car users to switch to public transport. It is noted that bus-based Park and Ride sites need to be large enough to significantly reduce car traffic on the target corridors. Essential factors to address in the design and implementation of Park and Ride sites include:

- Clear and conspicuous signposting.
- Ease of access to the site.
- Comparative Bus-Based Park & Ride and central area parking tariffs.
- The quality, frequency and reliability of the transit service.
- Journey time advantages over the car.
- Site facilities, such as shelter, passenger information and security measures.

2.5.11 Dinas Powys to Cardiff Corridor and Merrie Harrier Cardiff Road Barry to Cardiff via Barry Road are considered necessary links for the development of bus priority measures. The Vale of Glamorgan Council has implemented one bus priority scheme on Cardiff Road to reach the Merrie Harrier junction. In order for buses to benefit further on the Dinas Powys to Cardiff corridor, further consideration should be given to Leckwith and/ or Barry Road.

### Sewta Rail Strategy (2013)

2.5.12 The Sewta Rail Strategy is a report prepared by Jacobs which sets out the investment which the combined local authorities in South East Wales believe is needed to ensure a robust and efficient rail network over the next 20 years. The strategy is planned to accommodate passengers in comfort and encourage growth of both rail passengers and freight in an environmentally sustainable form.

2.5.13 The Sewta vision for improving the rail network is shared by the Welsh Government and seeks to provide a more attractive transport option with a minimum frequency of half hourly services made up of higher capacity electric trains. The Cardiff Area Signalling Renewal project offers the scope to secure additional capacity at the core of the Valley Lines network, through an enhancement option which will require continued Welsh Government funding support.

2.5.14 Rail demand on the Valley Lines and elsewhere in South East Wales has been growing at a rate significantly above GDP. In order to avoid overcrowding at this high growth rate, significant short-term investment in additional rolling stock is needed as well as medium term rolling stock renewal through Valley Lines electrification. The rail strategy is based on provisions such as providing longer trains to accommodate passenger growth and improving the frequency of existing passenger services.

2.5.15 The strategy identifies various levels of investment, relevant to this study including:

- Additional rolling stock required to strengthen peak train to address passenger growth and to avoid overcrowding.

- Station enhancements including improved station facilities, information, security and access.
- Frequency enhancements on existing lines, including improving the levels of service on selected routes to meet passengers' minimum service level expectations and encourage increased transfer of car trips to rail. Half hourly services along the Vale of Glamorgan Line and additional peak services to reduce overcrowding between Barry and Cardiff.

2.5.16 The study has found that demand exceeds peak capacity on the Vale of Glamorgan Line. Overcrowding is expected to curtail demand in the short term. The former Welsh Government National Transport Plan (2010-2015) proposed to increase the service frequency to half hourly. Recommendations found that train lengthening or frequency enhancement is implemented for as soon as possible.

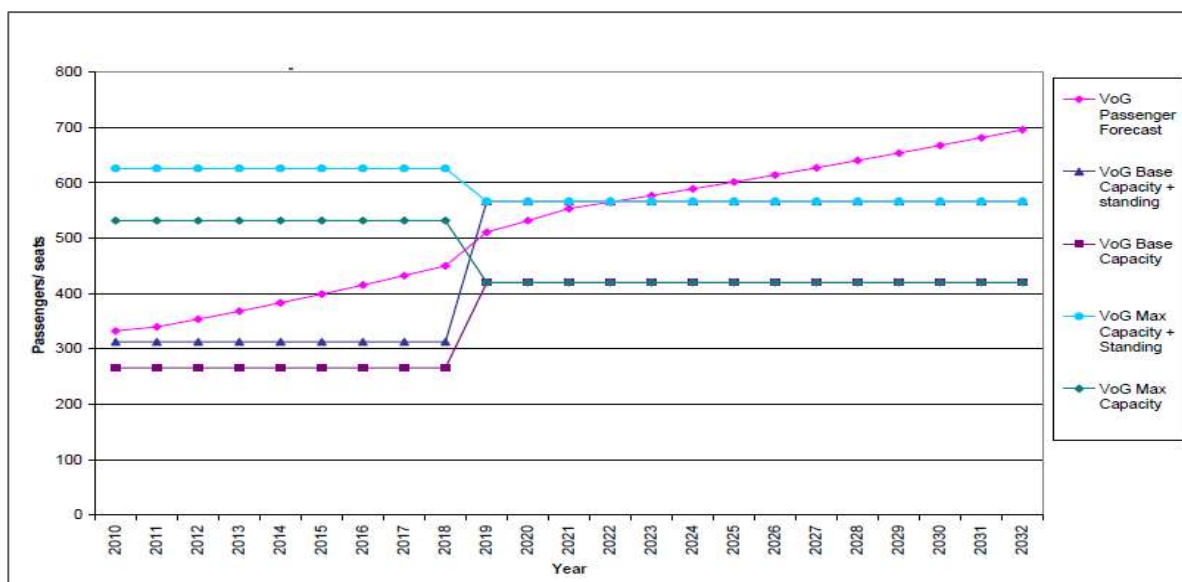
### Cardiff Capital Region Metro Study (2013)

2.5.17 The Metro Study sets out a strategic regional plan for developing the Metro, which is '*a turn up and go integrated transport network that will connect over 70% of the population of the Cardiff City Region, developed in a way that enables and/or enhances developments at strategic sites, maximises economic benefits & facilitates regeneration.*'

2.5.18 The study identifies a number of relevant existing transport problems and key trends:

- Limited integration between rail and bus services.
- Problems many people in the region encounter in accessing work, education and healthcare because of lack of available, affordable transport.
- Limited public transport access to some of the region's major hospitals, schools and other public services.
- The Vale of Glamorgan rail line generally has poor frequencies (with one train an hour).

Figure 3 Demand/ Capacity AM Peak Vale of Glamorgan Line



2.5.19 The Metro's extent includes routes southwest of Cardiff through Dinas Powys (towards Barry before travelling northwest towards Maesteg. Bus/ rail integration improvements at Barry Docks have been identified as an early Metro project that can be delivered incrementally from now until 2020. Improvements to public transport at Cardiff Airport are also highlighted.



Figure 4 Metro Priorities<sup>13</sup>



### Rapid Transport for Cardiff | Scoping, Feasibility, Engineering and Economic Study (2013)

2.5.20 A study to carry out a scoping and feasibility investigation and associated economic assessment of a possible Rapid Transit network for Cardiff, was undertaken by TRL Limited, comprising Appendix M of the Deposit LDP. The report examines the feasibility of several potential rapid transit corridors including; City Centre to Cardiff Bay and Penarth (within the Vale of Glamorgan), considered for further, more detailed study. Feasible alignments have been sought for the following separate sections of the transport corridor:

- City Centre to Cardiff Bay
- Cardiff Bay to Cogan Station
- City Centre direct to Cogan Station
- Cogan Station to Penarth
- Cardiff Bay direct to Penarth

### Wales and Borders Rail Franchise (2018 – 2033)

2.5.21 The new 15-year Wales and Border Rail Franchise commenced in October 2018 with KeolisAmey replacing Arriva Trains Wales as the franchisee. Table 2 outlines the key rail enhancements proposed under the new franchise agreement retained within the South Wales Metro area (Cardiff Capital Region) encompassing Eastbrook Rail Station upgrade, Dinas Powys Station Upgrade, and Vale of Glamorgan Line Rail Service Enhancements. Welsh Government Ministers have since confirmed that TFW rail services are to be brought under Welsh Government control from February 2021 with the takeover from KeolisAmey allowing day-to-day services to be run by a publicly owned

<sup>13</sup> Cardiff Capital Region Metro Study (2013)

company<sup>14</sup>. This follows a significant fall in passenger numbers during the Covid-19 pandemic. The proposals establish a new relationship between TfW, Keolis and Amey which will be made up of three key components as noted within the First Ministers statement (22<sup>nd</sup> October 2020):

- *From February 2021, the delivery of day-to-day rail services will be the responsibility of a new publicly owned subsidiary of Transport for Wales, allowing government to have an even greater role in the delivery of rail services in Wales and the borders, reflective of the new commercial realities of the post Covid-19 environment. With huge uncertainty over passenger revenue, this provides us with the most stable financial base to manage rail services as we emerge from the pandemic.*
- *Infrastructure management and transformation of the Welsh Government-owned Core Valley Lines will continue to be delivered under the current contract. This will provide stability for the programme to ensure effective delivery of the south Wales Metro transformation work which is already underway.*
- *A new partnership with Keolis and Amey, led by Transport for Wales, will be developed, which will allow the people of Wales to continue to draw on the international experience and expertise of these partners to help TfW to deliver important commitments such as integrated ticketing, on demand transport systems, cross modal design and delivery, in addition to the ongoing integration of light and heavy rail.*

2.5.22 Consultation with Transport for Wales, Network Rail and Welsh Government would be required in order to determine the proposed interventions and timescales of the enhancement proposals. In addition, the individual aspects of each of the rail station enhancements projects would require specific consideration to determine their viability in the long run. This would include an evaluation of station improvements, their costing and delivery timescales.

Table 2 Rail Enhancement Proposals (Wales and Border Rail Franchise)

Proposal	Description
Eastbrook Rail Station Upgrade	<p>Station Travel Plan</p> <p>New enclosed waiting shelters</p> <p>Additional secure cycle storage</p> <p>Additional lighting</p> <p>Improved CCTV</p> <p>Additional of customer help points</p> <p>Improved customer information</p> <p>General improvements to the station environment</p> <p>Explore option to reconfigure the car park reconfiguration (to increase availability of spaces)</p> <p>Explore feasibility of providing step free access to the platforms</p> <p>Explore option of providing additional car parking capacity to the north-west of Eastbrook Station</p>
Dinas Powys Rail Station Upgrade	<p>Station Travel Plan</p> <p>New enclosed waiting shelters</p> <p>Additional secure cycle storage</p> <p>Additional lighting</p>

<sup>14</sup> <https://gov.wales/written-statement-future-rail-update>

Proposal	Description
	<p>Improved CCTV</p> <p>Additional of customer help points</p> <p>Improved customer information</p> <p>General improvements to the station environment</p>
Vale of Glamorgan Line Service Enhancements	<p>A number of proposals have been outlined as part of the South East Wales Metro Programme which will affect the rail corridor either directly or indirectly through Dinas Powys<sup>15</sup>:</p> <ul style="list-style-type: none"> <li>• Two trains per hour between Cardiff and Bridgend via Vale of Glamorgan.</li> <li>• Remove Pacer trains.</li> <li>• Retain the link from Penarth, Barry and Bridgend to destinations north of Cardiff Central using new tri-mode trains (overhead electric, battery and diesel).</li> <li>• Introduce three new Community Rail Partnerships, recruiting a Community and Stakeholder Manager and nine Community and Customer Ambassadors.</li> <li>• Provide ticket machines at all South Wales Metro stations.</li> <li>• Introduce pay-as-you-go for users of smartcards.</li> </ul>

### Dinas Powys to Cardiff Corridor Bus Priority Measures (May 2015)

- 2.5.23 In February 2015, Capita was commissioned by the Vale of Glamorgan Council to undertake a study to consider feasible bus priority measures along designated corridors between Dinas Powys and the Cardiff County boundary.
- 2.5.24 Key findings of the study included that the majority of corridors were too constrained to include bus lanes and that highway networks are unlikely to accommodate the 8% demand increase forecast in the next six years. This level of demand increase will be unachievable due to wider network constraints and 'peak spreading' is a realistic prospect. If traffic growth occurs at the rate forecasted and no network improvements are undertaken, an 8% traffic growth would result in a 96% growth in delay in the study area.
- 2.5.25 The study concluded that a more consistent level of bus provision, in line with the Vale of Glamorgan 'Gold Standard', is needed to present a better visual presence and reinforce the viability of public transport as a pleasant and convenient means of travel. Improvements at a few critical junctions would also allow for faster and more reliable public transport movements; reducing delays. Improvements will be focused at the Merrie Harrier junction and Cogan Hill junction.

### Cardiff Council

- 2.5.26 The following documents have also been noted:
- Cardiff LTP (2015)
  - Cardiff Deposit LDP 2006 – 2026 (adopted 2016)

<sup>15</sup> <http://tfw.gov.wales/whats-happening-south-east-wales>



## 3 TRANSPORT BASELINE CONDITIONS

### 3.1 Introduction

- 3.1.1 This chapter presents a summary of the issues and opportunities within the study area. The analysis presented here has informed the identification of problems, objectives and options. It is important to note the baseline transport conditions identified within this chapter are preceding the impacts of Covid-19.
- 3.1.2 The SEWTM Dinas Powys Bypass (Green Route) Modelling report is included in [Appendix B](#).

### 3.2 Highway Network

#### Background

- 3.2.1 The study area encompassing the project scope extension as confirmed by Vale of Glamorgan Council on 3<sup>rd</sup> May 2018 includes the transport corridors from the junctions of Sully Moors Road/ Hayes Road roundabout and Biglis Roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. The highway network provides facilitates movement by the private car, as well as providing the infrastructure for bus transport and walking and cycling links.

- This Impacts Assessment Report has identified that 79% of those travelling to work use a car.
- The Highway Impact Assessment (2013) identifies the strategic highway network, key junction and allocated employment and residential development allocations over the local LDP period.

- 3.2.2 The junctions relevant to this study are:

- The Biglis/ McDonald's roundabout (A4055/ A4231)
- The B4267 Sully Moors Road/ Hayes Road roundabout
- Murch Road/ Cardiff Road, Dinas Powys crossroads
- Merrie Harrier junction, Llandough
- Barons Court junction, Penarth
- Pen-y-Turnpike Road/ Leckwith Road

#### A4055

- 3.2.3 The A4055 Cardiff Road is a single carriageway road from the Biglis roundabout through to a point south of the Merrie Harrier junction. At the Murch Road junction there are two lanes on the Cardiff Road south and north, and Millbrook Road, approaches. A bus lane begins north of Eastbrook Station and runs northbound for 400 metres, joining at the B4267 Redlands Road junction. There are two lanes for traffic northbound between the B4267 Redlands Road and Penlan Road junctions, then the A4055 narrows to a single lane for a 200 metres section east of the Merrie Harrier, before widening to two lanes and then three on approach to the Baron's Court junction. The LDP (2013) recognises the A4055 through Dinas Powys as connecting to the strategic network via the Cogan Spur to the A4232 link road to the M4 Junction 32 and via the A4055 to the A4231 and A4050 to Culverhouse Cross.

#### Manual Classified Turning Counts

- 3.2.4 The WelTAG commission has collected Manual Classified Counts at ten junctions throughout the study area encompassing surveys completed on 23<sup>rd</sup> November 2017 and 15<sup>th</sup> May 2018 as shown in [Appendix C](#). The ten junctions in total where the counts were completed encompassed:
- Biglis Roundabout (A4055/ A4231/ B4267)
  - A4055/ Station Road
  - Milbrook Road/ A4055/ Murch Road

- Merrie Harrier Junction
- Leckwith Rd B4267/ Pen-Y-Turnpike Road
- Barons Court Junction (A4160/ A4055)
- Milbrook Road / Pen-Y-Turnpike Road
- Britway Road/ Mill Road
- Sully Moors Road/ B4267 South Road / Hayes Road
- Ffordd Y Mileniwm/ A4055 Roundabout/ Western arm routes (under the rail line)

### Automatic Number Plate Recognition Surveys

- 3.2.5 A programme of Automatic Number Plate Recognition (ANPR) surveys was completed over the same time periods as for the Manual Classified Counts to establish the point at which trips entered (origin) and left (destination) the study area. The ANPR cameras capture both the registration plate of vehicles passing the cameras and the time at which the registration numbers are recorded. The camera locations are shown in [Appendix C](#). Coloured boxes indicate the location of the cameras, with different colours representing the different directions of the traffic recorded.

### Observed Data

- 3.2.6 The study corridor (A4055 between Biglis roundabout and Barons Court Junction) was divided into six sections for the extraction of traffic flow from the Manual Classified Count data. These sections are shown in [Appendix C](#). The corridor is usually split at the location of junctions, except for the final two sections, Section 12 and Section 13. Here the split happens at the point where the new bypass would connect with the A4055. For each section, the observed traffic flow (vehicles per hour) was extracted from the appropriate Manual Classified Count data. For example, the traffic flow on section 13 is taken from the Manual Classified Count data at the Biglis roundabout arm B. Wherever the flows on a section are available from two counts, one at each end of the section, then the average value is used.

### LDP Transport Assessment

- 3.2.7 As indicated in Table 1, the Capita Symonds Highway Impact Assessment LDP Background Paper (2013) identified that four junctions are subsequently forecasted to be over capacity in the 2026 future year, namely:
- Cardiff Road/ Murch Road/ Millbrook Road
  - Merrie Harrier; Barons Court
  - Leckwith Road/ Pen-y-Turnpike Road
  - Cardiff Road/ Murch Road/ Millbrook Road (also over capacity in 2012)
- 3.2.8 The Sewta RTP identified that an increasing dependence on the car has led to high levels of traffic congestion and an inefficient transport system overall, with traffic congestion costing the local economy £600m a year. Many of the region's roads are said to be close to capacity during the day and exceed capacity during peak hours. Forecast costs of congestion will soon reach £1bn a year in South East Wales alone and continued economic investment will suffer as a result.

### Peak Periods

- 3.2.9 The distribution of traffic flow over the day, by direction, is shown in Figure 5 and Figure 6. Together with above analysis, it was found that the peak periods were:
- AM peak: 07.00 – 10.00hrs
  - PM peak: 16.00 – 19.00hrs
- 3.2.10 The average of vehicles per hour in the AM peak, PM peak and Inter peak (Northbound/ Southbound) are in [Appendix C](#).

Figure 5 Northbound Vehicles per Hour

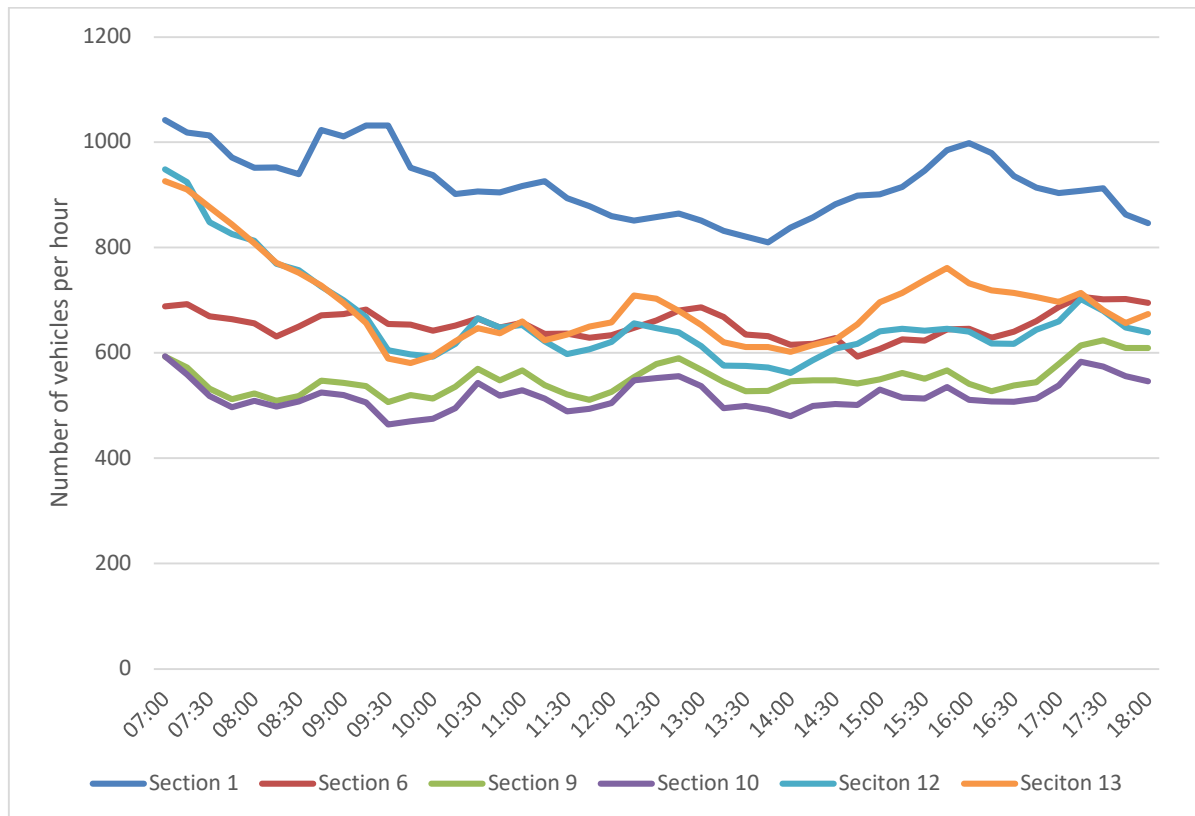
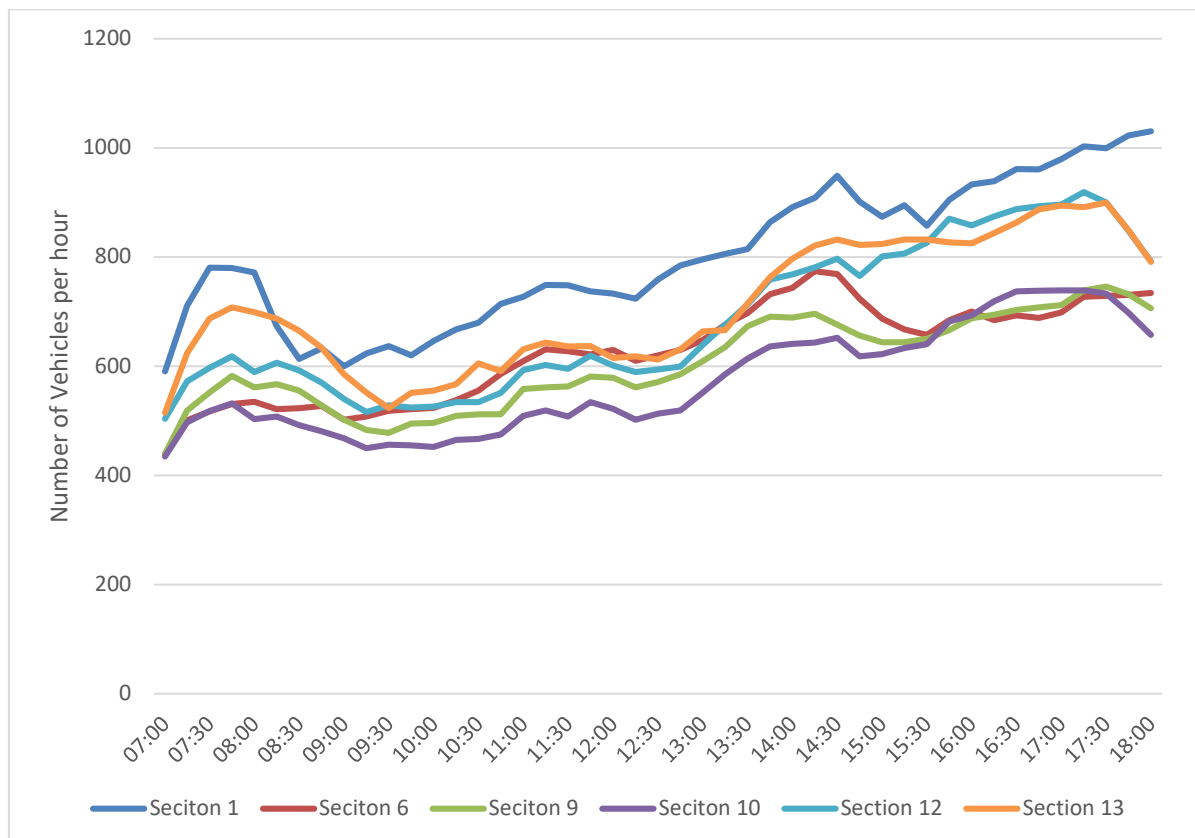


Figure 6 Southbound Vehicles per Hour





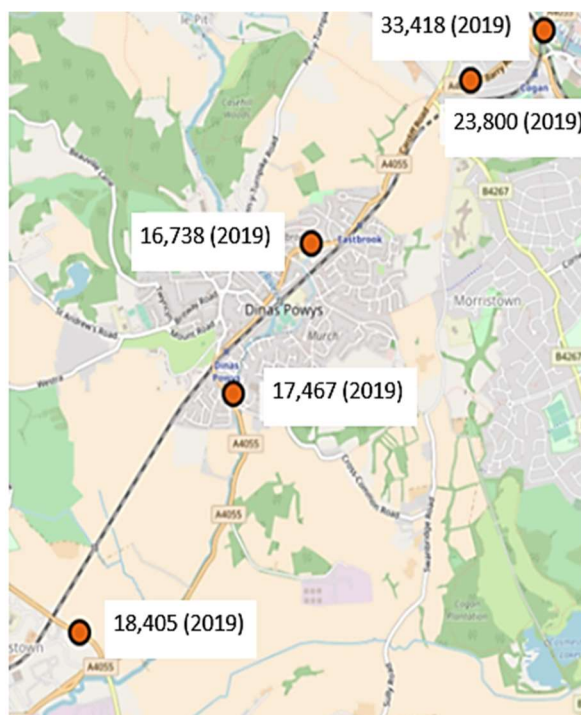
## Department for Transport Traffic Count Data

- 3.2.11 Traffic flows are available from the Department for Transport (DfT) Count Point Data<sup>5</sup> database for five locations within the study area on the A4055, A4231 and A4955. The available Annual Average Daily Flow (AADF) data for 2019 for both total traffic and HGV flows (two-way) is summarised in Table 3. There is a low proportion of HGVs, with the A4231 experiencing the highest proportion of HGV traffic. The AADF locations are presented in Figure 8.

Table 3 AADT flows through Dinas Powys

Road Link	Count Point ID	Total Traffic Flows (2019)	HGVs
A4055	73233	33,418	1.98%
A4055	10630	17,467	2.34%
A4055	78434	16,738	1.94%
A4231	99962	18,405	4.36%
A4955	50578	23,800	1.96%

Figure 7 AADT flows through Dinas Powys (2019)



## 3.3 Walking and Cycling

### Active Travel Routes

#### Existing Route Map

- 3.3.1 Vale of Glamorgan Council has a statutory obligation to prepare an Existing Route Map (ERM) showing routes for walking and cycling which meet the Welsh Government standards. The ERM was

approved by Welsh Government in 2014. [Appendix D](#) shows the designated walking routes within Dinas Powys. There are no cycle routes present on the ERM. A footpath away from the road connects Dinas Powys Train Station to Elm Grove Place.

### **Integrated Network Map**

- 3.3.2 Vale of Glamorgan Council is required to produce and INM setting out a 15-year vision to improve cycling and walking routes across the city, in order to meet the requirements of the Active Travel (Wales) Act 2013. The Council submitted their Integrated Network Maps in November 2017. They included routes that were currently used but may not have met the standard of Active Travel routes, or they were routes that did not exist but were identified within other strategic plans, or through the consultation process.
- 3.3.3 Section 4 of the Active Travel (Wales) Act requires that the next edition of the INM should be submitted by local authorities three years following the previous edition. Due to Covid-19, the submission of the next round of integrated networks maps and updated existing routes maps has been extended to 30 September 2021.
- 3.3.4 [Appendix D](#) includes the cycling and walking INM proposed routes. Various cycling routes are proposed, including along Murch Road (Vale-Prop-DP-C120), Sully Road (Vale-Prop-DP-C110) and Redlands Road (Vale-Prop-PN-C210). A walking and cycling route is proposed along Cardiff Road, connecting Cogan to Palmertown.

### **Existing Conditions**

- 3.3.5 Footways are provided on at least one side of the A4055/ Cardiff Road, from the A4055/ A4160 roundabout heading southwest towards Barry. The footways are considered to be in poor condition along much of the study route. As the A4055 leaves Dinas Powys to the south, there are no footways provided. There are eight signalised pedestrian crossings located along the A4055 route:
- Cogan Junction – full refuge.
  - Merrie Harrier (only on north arm of A4055 – north to Cogan) – no refuge.
  - South of Redlands Road/ A4055 junction – full refuge.
  - Opposite Eastbrook rail station – no refuge.
  - Opposite Dinas Powys Primary School – narrow waiting margin in middle.
  - North of Elm Road/ A4055 junction – no refuge.
  - Dinas Powys rail station – narrow waiting margin in middle.
  - South of Heol Y Frenhines/ A4055 junction – narrow waiting margin in middle.
- 3.3.6 Cycling signs are visible throughout the study area, with priority for cyclists at key junctions: Cogan junction, Merrie Harrier, Redlands Road/ A4055; and A4055/ Murch Road/ Millbrook Road. Moreover, highway on-road cycle markings are provided along the A4055. There is currently poor connectivity by cycling between Dinas Powys and Penarth and Llandough and Barry with no off-road routes, as shown in [Appendix D](#). National Route 88 of the National Cycle Network is a proposed coastal route between Newport, Cardiff, Bridgend and Margam Country Park. At the moment, short sections of the route are open, with a gap in the route between Cosmeston and Barry.

### **Proposals**

- 3.3.7 As set out in the policy section, there are a number of proposed improvements. NCN Route 88 has plans to be extended including between Dinas Powys and Penarth. Some sections of this have been confirmed and constructed, with the remainder currently at varying stages of development. Some sections including along Cardiff Road between Barry and Dinas Powys have already benefitted from initial feasibility and design studies.

- 3.3.8 The Vale of Glamorgan LDP has set objectives to promote Penarth as a ‘*sustainable transport town*’ by encouraging new and enhanced walking and cycling links. As such, connections between Dinas Powys and Penarth are important to support this objective.
- 3.3.9 In the Vale of Glamorgan LDP, Barry Waterfront to Dinas Powys has been identified as a major strategic transport corridor connecting the settlement of Barry to Cardiff. There are currently no walking and cycling facilities linking the Waterfront to Dinas Powys between the Biglis Roundabout on the outskirts of Barry to Dinas Powys. The Council is currently considering the land options to deliver a dedicated off-road shared walking and cycling route to connect these settlements.

## 3.4 Rail

### Rail Infrastructure

- 3.4.1 Dinas Powys is connected to the region via the Vale of Glamorgan Rail Line which connects Bridgend, Barry and Cardiff and locally includes Eastbrook and Dinas Powys rail stations. In addition, Cardiff Airport is located at Rhoose (approximately 12.5km west of Dinas Powys). Railway services in the study area are considered to have good potential and [Appendix D](#) outlines the railway network and railway stations in South Wales. Although rail use for commuting is already high in comparison to South East Wales as a whole, the facilities and services to and from the stations have the potential to be enhanced for the benefit of existing and future users of the network.
- 3.4.2 The Vale of Glamorgan Line was reopened between Barry and Bridgend in 2005 including new stations at Rhoose and Llantwit Major with park and ride facilities<sup>16</sup>. A dedicated shuttle bus also operates between Cardiff Airport and Rhoose Station. Between 2007 and 2018, Network Rail is installing new signalling technology and improving stations and infrastructure to create more capacity and faster, more frequent rail services. Improvements include:
- A new platform at Barry has been built to accommodate a more frequent service.
  - A new southern entrance and a new platform to be able to serve more trains at Cardiff Central.
  - Two new platforms to provide extra capacity and a new station entrance at Cardiff Queen Street<sup>17</sup>.
  - The Cardiff Area Signalling Renewal Stage 3 involves Penarth and Barry branches to Cardiff West Junction (completed in June 2014).<sup>18</sup>
- 3.4.3 As identified in the policy section, the Metro plans and the new franchise will bring enhanced rolling stock and service frequencies. There were previously plans for the electrification of the Vale of Glamorgan line including through Dinas Powys and Eastbrook, although this line does not form part of the Core Valleys Network currently proposed to be electrified.<sup>19</sup>
- 3.4.4 There are two rail stations within the study area namely Dinas Powys and Eastbrook, located on the Vale of Glamorgan Rail Line. Dinas Powys Station<sup>20</sup> does not have a car park or cycle parking provision. Users of the rail station often park on street nearby e.g., on Station Road. Whilst there is step-free access via platform entrances either side of the station, there is no step-free access between platforms with a subway with steps connecting the two platforms. There is no external lighting to the platform entrances. Although there is no dedicated ticket office, accessible ticket machines are available.

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<sup>16</sup> Vale of Glamorgan LDP 2011-2026 (2017)

<sup>17</sup> Dates from: <http://www.railway-technology.com/projects/cardiff-area-signalling-renewal-casr-project/>

<sup>18</sup> Network Rail - <http://www.networkrail.co.uk/wp-content/uploads/2016/11/South-Wales-investment-map.pdf>

<sup>19</sup> Network Rail - <http://www.networkrail.co.uk/wp-content/uploads/2016/11/South-Wales-investment-map.pdf>

<sup>20</sup> National Rail Enquiries



- 3.4.5 Eastbrook Station<sup>21</sup> does have a free car park with 31 spaces and two accessible spaces available, but no cycle parking provision. Again, there is no dedicated ticket office although an accessible ticket machine is provided. There is no step-free access between platforms with access provided via a stepped footbridge. Step free access is available to each of the platforms. There are limited existing facilities at both stations for interchange for cycling. A number of rail stations on the Vale of Glamorgan Line were identified as areas that would require additional park and ride spaces in the short to medium term. Barry Docks Station has been delivered in 2011. A further location at Cogan, Penarth has not been delivered due to issues of deliverability during the Plan period.<sup>22</sup>

### Rail Services

- 3.4.6 The frequency and journey time to a number of key destinations from Dinas Powys and Eastbrook stations is presented in Table 4. A maximum of four train services per hour stop at the stations in both directions linking to a number local and regional destinations throughout South East Wales including Cardiff and Bridgend. Services are reduced on Sunday, with one train every two hours to key destinations including Merthyr Tydfil, Aberdare and Cardiff Airport.

Table 4 Rail Frequency Destinations and Frequencies<sup>23</sup>

Destination	Journey Time	Monday to Saturday Frequency	Sunday Frequency
Dinas Powys			
Cardiff Central	16 minutes	3 per hour	2 per hour
Barry	11 minutes	3 per hour	3 per hour
Pontypridd	45 minutes	3 per hour	2 per hour
Merthyr Tydfil	1 hour 29 minutes	1 per hour	1 every 2 hours
Aberdare	1 hour 20 minutes	1 per hour	1 every 2 hours
Rhoose (Cardiff International Airport)	19 minutes	1 per hour	1 every 2 hours
Bridgend	42 minutes	1 per hour	2 per hour
Eastbrook			
Cardiff Central	11 minutes	3 per hour	2 per hour
Barry	14 minutes	4 per hour	3 per hour
Pontypridd	43 minutes	3 per hour	2 per hour
Merthyr Tydfil	1 hour 26 minutes	1 per hour	1 every 2 hours
Aberdare	1 hour 17 minutes	1 per hour	1 every 2 hours
Rhoose (Cardiff International Airport)	22 minutes	1 per hour	1 every 2 hours
Bridgend	39 minutes	1 per hour	2 per hour

<sup>21</sup> National Rail Enquiries

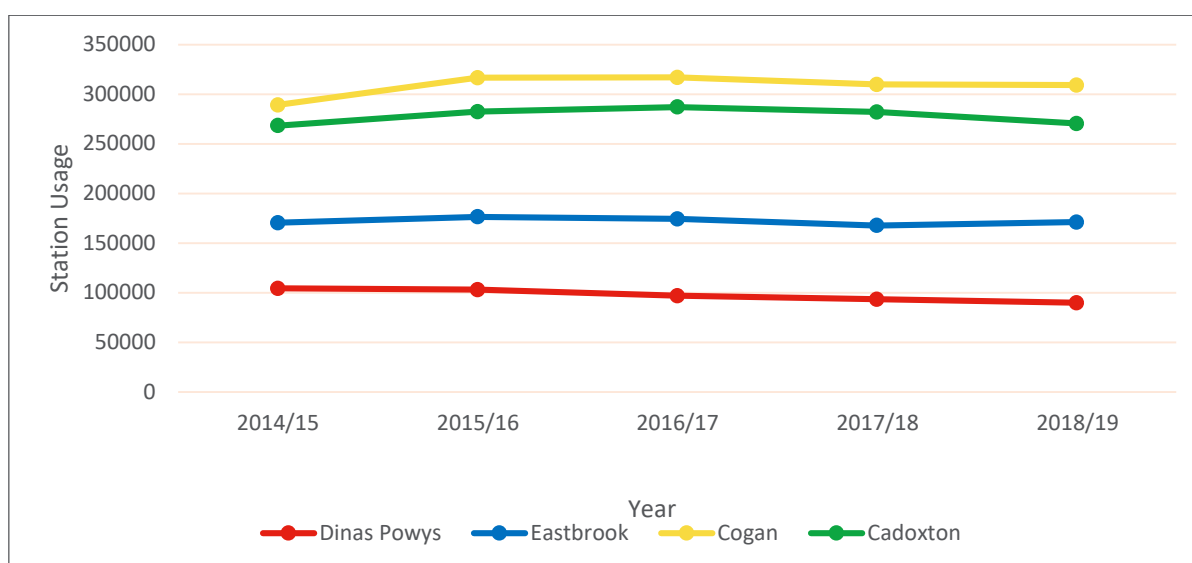
<sup>22</sup> Jacob's (2010) in Vale of Glamorgan LDP 2011-2026 (2013)

<sup>23</sup> National Rail

## Rail Patronage

- 3.4.7 Rail passenger demand in the last ten years on the valley lines has been growing at circa 6% per annum with some local routes experiencing 80% growth between 2000 and 2009, significantly higher than the average for the UK.<sup>24</sup>
- 3.4.8 Figure 9 shows the Rail Station Usage for stations around the study area for 2014/15 to 2018/19, obtained from the Office of Road and Rail<sup>25</sup>. At Dinas Powys rail station (2015/16 – 2018/19), rail patronage decreases have been observed from 103,106 to 89,990 passengers in 2018/19 (12.7% decrease). Eastbrook rail station observed a slight increase (2%) in usage, following a 5% decrease from 2015/16 to 2017/18. Overall, over the five-year period, Dinas Powys observed a 13.9% decrease in patronage and Eastbrook observed a 0.3% increase.
- 3.4.9 It should be noted that there can be anomalies in the patronage data due to the ticketing zones which may distort the number of users of the two stations.

Figure 8 Rail Station Patronage (2014/15 to 2018/19)



- 3.4.10 Surveys have illustrated that standing above train capacity may occur on AM peak trains between Cadoxton and Cardiff. Afternoon standing above capacity appears less severe however between Grangetown and Dinas Powys on the Vale of Glamorgan Line, standing is at levels above standard train capacity.<sup>26</sup>

## Scheme Interface with the Vale of Glamorgan Railway Line

- 3.4.11 A key item retained as part of the original WelTAG Stage Two study was the interface between the Cogan railway tunnel (situated on the Vale of Glamorgan railway line) and the potential Cardiff Road (A4055) 4-arm roundabout located towards the northern end of the proposed bypass routes. The constraint considered was in relation to the roundabout being partially situated over the existing Cogan Tunnel, encompassing the roundabout's ICD, its eastern arm that interconnects with Redlands Road (B4267) and the southern arm interconnecting with the new proposed bypass.
- 3.4.12 The accompanying report (Dinas Powys WelTAG Stage Two Plus; Technical Note; Cogan Tunnel; 10015022-ARC-REP-ECV-000001) is included in [Appendix D](#).

<sup>24</sup> Sewta Rail Strategy 2013 (Jacobs)

<sup>25</sup> Office of Road and Rail – Station usage 2015-16 data

<sup>26</sup> Vale of Glamorgan LDP 2011-2026: Sustainable Transport Assessment

### 3.5 Bus Services and Infrastructure

3.5.1 Bus transport modal share for journeys to work in Dinas Powys is 1% compared to 2% in the Vale of Glamorgan and 3% in South East Wales as a whole.<sup>27</sup> As such, bus travel currently provides for a very low proportion of journeys. There are a number of bus services within Dinas Powys, with varying levels of service frequency. Within the study area, there are various bus services serving the area as illustrated in Table 5. The frequency of service varies with Sunday services being very sparse. There are approximately four buses travelling into Cardiff per hour through Dinas Powys. Two further buses travel into Cardiff per hour from the Cogan junction. These bus routes are described below with regards to the study area.

- Bus service 89 travels from Nat West Bank, The Square Dinas Powys to Cardiff including Cardiff Bay, Grangetown, Butetown and Atlantic Wharf.
- Bus service 92 travels through our study area from the B4267 Redlands Road/ A4055 Cardiff Road junction in a north-easterly direction towards Cogan junction. This route does not travel through Dinas Powys. The bus stop is located approximately 90m north of Cogan junction.
- Bus service 93 travels through Dinas Powys to Cardiff including Grangetown and Riverside.
- Bus service 95 travels through Dinas Powys to Cardiff including Grangetown, Riverside, Cardiff Bus Station o/s Wyndham Arcade and Heath (including Heath Hospital).
- Bus Service 304 travels through Dinas Powys to Cardiff including Cardiff Bay, Grangetown, Butetown and Atlantic Wharf.

Table 5 Local Bus Services (Traveline Cymru)

Bus No.	Route	Bus Stop	Monday – Friday	Saturday	Sunday
89A	Nat West Bank – Cardiff	Nat West Bank, The Square, Dinas Powys	2 hours	2 hours	-
89B (note does not serve Dinas Powys)	The Institute – Cardiff	Llandough Hospital	3 per day	3 per day	-
92 (note does not serve Dinas Powys)	Castle Avenue – Cardiff	Barons Court, Penarth Road, Cogan Pill	20 mins	20 mins	30 mins
93	Morrisons – Cardiff	School, Cardiff Road, Dinas Powys	Hourly	-	-
94 (note does not serve Dinas Powys)	Morrisons – Cardiff	Barons Court, Penarth Road, Cogan Pill	30 mins	30 mins	Hourly
95	Winston Square – Heath Park Way	School, Cardiff Road, Dinas Powys	20 mins	20 mins	Hourly
95A (note does not serve Dinas Powys)	Cardiff - Penarth	Merrie Harrier, Penlan Road, Cogan Pill	Hourly	Hourly	-
304	Cardiff – Llantwit Major via Barry	Dinas Powys Primary School, Cardiff Road, Eastbrook	Hourly	Hourly	2 Hours

<sup>27</sup> 2011 Census



- 3.5.2 **Appendix D** shows the location of bus stops within and near to the study area. Bus stops are equipped with timetables however there is no real-time passenger information available in Dinas Powys. Along the A4055 from Biglis Roundabout to Cogan junction, there are 16 bus stops; eight of which comprise a pole with timetable, seven of which comprise shelters with seating and one with no facilities.
- 3.5.3 The quality of the bus stops is inconsistent with many retaining poor quality facilities with limited facilities. This is noted in Capita's Dinas Powys to Cardiff Corridor study (2015) – *'there are a range of different bus stop provisions along the corridors, which for bus passengers presents a disjointed and inconsistent user experience'*. This inconsistency and poor maintenance and upkeep of bus stops was confirmed following a site visit in March 2017.
- 3.5.4 Signalised crossings comprising tactile paving are located near to the bus stops including at Dinas Powys rail station; north and south of Elm Grove/ Cardiff Road junction; Dinas Powys Primary School; south of Cardiff Road/ Redlands Road junction and Cogan junction. Footways are generally well lit within the area allowing for good lighting at bus stops with the exception of Bryn-y-Don bus stop north of Cardiff Road/ Cross Common Road junction.
- 3.5.5 The Vale of Glamorgan LDP 2011-2026 Sustainable Transport Assessment also notes the following:
- It is a regional and local aspiration to standardise bus stops to ensure well maintained infrastructure in order to deliver a fully accessible bus service. The Regional Transport Authority are considering how to increase quality and standardise the provision of bus stops across the region, as part of the Metro project.
  - Increased pressure on budgets requires an increase in fare revenue to maintain service stability and network coverage. It was reported in the LDP that around 20% of the total local bus service mileage in the Vale of Glamorgan is supported financially by the Council, the remainder of which being operated on a wholly commercial basis.
  - Within the Transport Act 1985, councils in Wales have powers to secure public transport services by entering into service subsidy agreements. They may only do so where there is, in their opinion, a public transport requirement not being satisfied by the free market and which will not be met unless they take action of offering subsidy for the service.
- 3.5.6 There are a number of community transport operations within the Vale of Glamorgan including these running in Dinas Powys:
- Greenlinks
  - Voluntary Emergency Services Transport (VEST)
  - East Vale Community Transport (EVCT)
  - Dinas Powys Voluntary Concern (DPVC)
  - The Intersensory Club
  - Non-Emergency Patient Transport

## 4 SOCIAL CONTEXT

### 4.1 Introduction

- 4.1.1 This chapter summarises the social context of the study. A range of social indicators have been explored to understand the existing social situation including population and age profile. All social WebTAG worksheets are included in [Appendix I](#).

### 4.2 Social Baseline

#### Population

- 4.2.1 The Vale of Glamorgan administrative area positioned west of Cardiff between the M4 and the Severn Estuary is characterised by a pattern of small settlements, approximately 85% of which comprises agricultural areas. However, Dinas Powys encompasses part of the more populous south eastern part of the Vale, including the communities of Dinas Powys, Penarth, Sully and Barry. The Vale of Glamorgan neighbouring local authorities are Bridgend County Borough Council to the west, the City and Cardiff Council to the east and Rhondda Cynon Taf County Borough Council to the north. The border with Cardiff Council is adjacent to the study area along the River Ely to the east of the Baron's Court junction.
- 4.2.2 The Vale of Glamorgan local authority has an overall population of approximately 133,587 based on 2019 mid-year estimates, which represented a 4.4% increase from 2014 (mid-year 2014 population estimate was 128,009). Vale of Glamorgan's population encompasses 4.2% of the total Welsh population (3,152,879 mid-year 2019)<sup>28</sup>. Population statistics for Dinas Powys, Penarth and Barry, based on the 2011 census are presented in Table 6. Dinas Powys has been identified within the LDP (2013) as a primary settlement, providing a choice of housing and facilities to meet local needs. Dinas Powys has a population of 7,799.
- 4.2.3 Barry has been identified as a key settlement in both the RTP (2010) and LDP (2013). It is recognised as an important hub for social and economic activity and a focus for new development and regeneration, including new housing, employment and retail development. Barry's population was approximately 51,502 at the time of the 2011 census. The LDP (2013) identifies Penarth as a Service Centre Settlement as a result of having a significant resident population, good public transport provision, local employment opportunities, established town centre and a wide range of cultural, educational and community services and facilities. Penarth has a population of 22,083.

Table 6 Population Figures within the Study Area<sup>29</sup>

Location	2011 Population
Dinas Powys	7,799
Penarth	22,083
Barry	51,502
Total	81,384

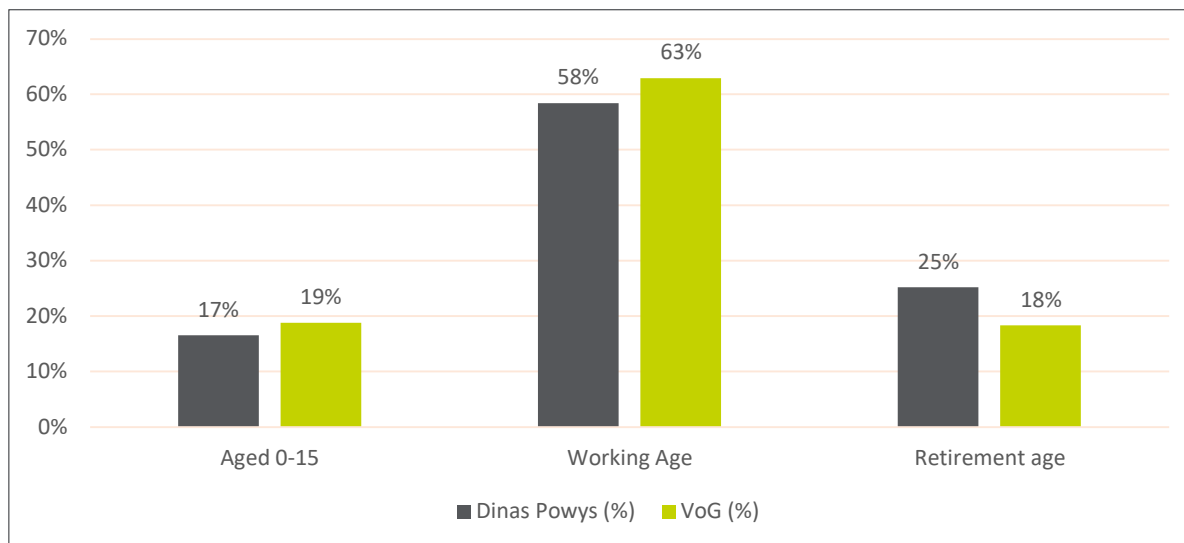
#### Age Profile

- 4.2.4 The age profile of the population of Dinas Powys is shown in Figure 10. The population is made up predominantly of those who are working age and is broadly similar to the Vale of Glamorgan as a whole. Dinas Powys has a population aged 0-15 of 17%, working age 58% and 25% of retirement age. A higher proportion of retirement age people reside in Dinas Powys (25%) than the Vale of Glamorgan as a whole (18%).

<sup>28</sup> StatsWales – Population Estimates by Local Authority and Year

<sup>29</sup> Nomisweb – Local Area Reports

Figure 9 Age Profiles 2011 Census



## Mode Share

- 4.2.5 Dinas Powys retains several modes of sustainable transport providing viable opportunities for access to employment, however travel by car is the dominant mode. Table 7 outlines the Method of Travel to Work for Dinas Powys, The Vale of Glamorgan and South East Wales.
- 4.2.6 The car (or van) is the dominant mode of travel to work across Dinas Powys, as with the Vale of Glamorgan and South East Wales as a whole. 79% of those from Dinas Powys drive to work (including passengers) compared with 76% of South East Wales as a whole. Over three times the percentage of workers in Dinas Powys (10%) travel by train to work compared with the average for South East Wales as a whole (3%)<sup>30</sup>. Only 6% of workers in Dinas Powys travel to work on foot, nearly half the percentage of the Vale of Glamorgan (11%).

Table 7 Method of Journey to Work (2011 Census)

Mode	Dinas Powys	The Vale of Glamorgan	South East Wales
Car or Van Driver	73%	72%	69%
Car or Van Passenger	6%	6%	7%
Taxi	0%	0%	1%
Motorcycle, Scooter or Moped	1%	1%	1%
Bus, Minibus or Coach	2%	3%	6%
Train	10%	6%	3%
Bicycle	2%	2%	2%
On Foot	6%	9%	11%
Other	1%	1%	1%

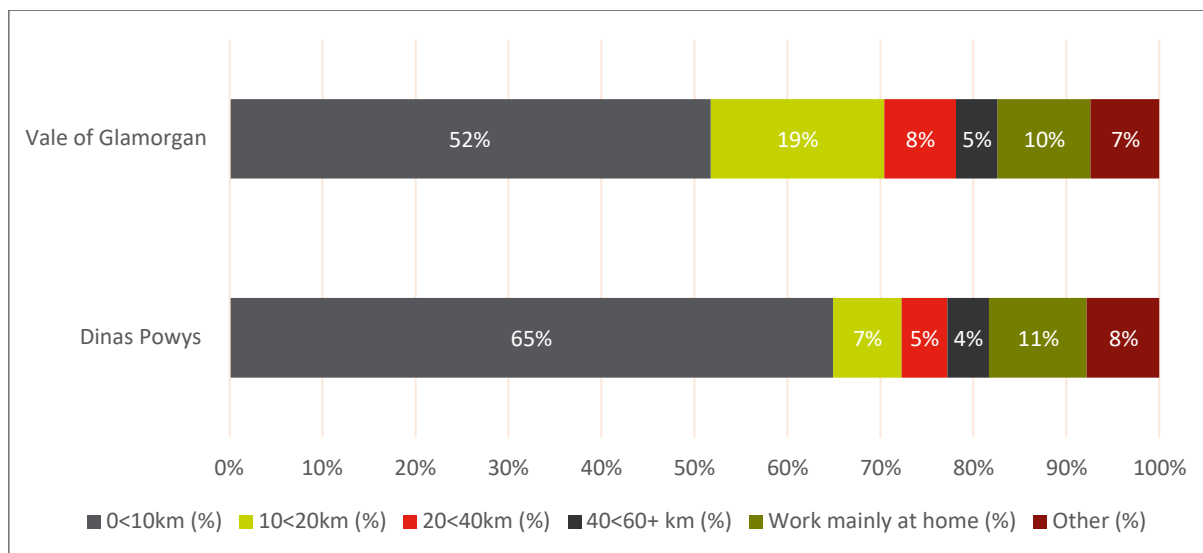
<sup>30</sup> Nomisweb - 2011 Census Method of Journey to Work



## Distance Travelled to Work

4.2.7 Figure 11 identifies the distance travelled to work, highlighting the greatest proportion of journeys to work are under 10km for both Dinas Powys and the Vale of Glamorgan as a whole. This shows that most people from Dinas Powys commute to places of work within the local area and reflects the proximity of the major employment centres of Barry and Cardiff.

Figure 10 Distance Travelled to Work (%) (2011 Census)



## Welsh Index of Multiple Deprivation (WIMD) 2019

4.2.8 The WIMD provides a measure of relative deprivation for small areas of Wales. Deprivation is measured by the following indicators: income, employment, health, education, access to services, community safety, physical environment and housing. The WIMD ranks each Lower Super Output Area (LSOA) in Wales from 1 (most deprived) to 1,909 (least deprived), in corresponding colour change from the darkest blue highlighting most deprived.

4.2.9 The Vale of Glamorgan contains 79 LSOAs, three of which are within the 0% to 10% most deprived in Wales. These are Gibbonsdown 2, Court 3 and Buttrills 2, all located in Barry. Appendix E shows the WIMD for the study area. There are five Dinas Powys LSOAs all of which are among the 50% least deprived, with the exception of Dinas Powys 3, which is among the 30% to 50% most deprived.

## 4.3 Access to Services

4.3.1 There is a mixture of both facilities and services within 2km of Dinas Powys rail station (central point), including: education, healthcare, employment, retail, public transport and recreation.

- There are a significant number of facilities and services in close proximity of Dinas Powys, with potential for access by sustainable modes.
- Llandough University Hospital is located west off Penlan Road/ B4267 opposite Dochdwy Road, approximately 2km north of the centre of Dinas Powys. The hospital benefits from a number of bus stops close by and is also within 1km of Cogan Rail Station.
- There are several schools within the vicinity of the study area encompassing:
  - Dinas Powys Primary School is situated along Cardiff Road/ A4055. The school is located to the northeast of the Cardiff Road/ Millbrook Road/ Murch Road junction where signalised pedestrian crossings comprising tactile paving are present. The crossing serves also as an access route for pedestrians to the nearby bus stop, within approximately 50m of the school site.

- St Andrew's Major Church in Wales Primary School is situated along St Andrew's Road, opposite Westra. A zebra crossing comprising tactile paving is located next to the school.
- St Richard Gwyn Catholic High School is located on Argae Lane, northeast of Barry Docks Link Road/ Coldbrook Road East junction. A footway is provided along one side of the carriageway in a southerly direction towards Barry Docks Link Road, where the footway ends.
- Stanwell High School is located on Salisbury Avenue, southwest Penarth. Footways are provided both sides of the adjacent carriageway as well as traffic calming measures comprising speed humps along the carriageway.
- St. Cyres, Ysgol y Deri and Saint Joseph's RC Nursery and Primary schools are also all situated to the west of Penarth.
- There are limited evening and weekend bus services leading to potential difficulties in accessing essential services and leisure opportunities thus encouraging greater reliance on the private car.

## 4.4 Accidents

- 4.4.1 **Appendix E** shows available accident data by severity within the vicinity of the study area for the years 2015 to 2019, obtained from Crashmap, with an overview of collision locations. The map shows a cluster of accidents at the A4055/ Barry Docks Link Rd/ Sully Moors Rd Roundabout with ten accidents, all slight in severity. Two of the accidents involved cyclist casualties.
- 4.4.2 A cluster of accidents is evident on the A4055 between Elm Grove Road and Perclose with six slight accidents and one serious recorded. The serious accident involved a pedestrian casualty and one of the slight accidents involved a pedestrian. Another cluster can be found at Station Road/ Cardiff Road with four accidents which were of slight severity. Eight accidents have also occurred at the A4055/ A4160/ Penarth Rd Junction (Barons Court), including one serious and one fatal over the survey period. The fatal accident involved a pedestrian casualty. 46 accidents have occurred along Cardiff Road within the study area; 42 slight in severity and four which were serious.

## 4.5 Physical Activity and Health

- 4.5.1 Physical activity significantly contributes to increased well-being and general health levels, leading to the reduction of risk to many chronic health conditions. The benefits of increasing physical activity levels have also shown to deliver cost savings for health and social care services. Low physical activity levels are associated with negative health impacts. Levels of physical activity are influenced by the physical and social environment. An appraisal of physical activity in WelTAG considers changes in participants in active travel.
- 4.5.2 Table 8 outlines data relating to health, identifying that residents of the Vale of Glamorgan have broadly similar levels of health compared to the national average. Overall, 48% of residents report that they have very good health with only 6.4% reporting bad or very bad health, slightly higher than the average for Wales (5.9%).

*Table 8 Health of the Population<sup>31</sup>*

Category	Vale of Glamorgan	Wales
Very good health	48.0%	47.9%
Good health	32.0%	33.0%
Fair health	13.6%	13.2%
Bad health	4.9%	4.5%
Very bad health	1.5%	1.4%

<sup>31</sup> Nomisweb- Local Area Reports

- 4.5.3 Table 9 outlines data relating to physical activity levels identifying that Vale of Glamorgan has a lower proportion of residents who are active for less than 30 minutes each week (30%) in comparison to the national average (33%) and slightly higher than the average for the Health Board area (29%). In addition, the proportion of residents in Vale of Glamorgan who are active for 150 minutes each week is slightly lower (55%) than the average for the Health Board area (57%), but higher than the national average (53%). Table 9 also sets out the levels of overweight and obese residents in Vale of Glamorgan, the Cardiff and Vale Health Board and Wales, which shows that both the Vale of Glamorgan and Wales have 60% of their populations as overweight or obese, however Vale of Glamorgan has a slightly higher proportion of obese people with a BMI greater than 30+ compared to Wales.

Table 9 Adult Lifestyle Data<sup>32</sup>

Category	Vale of Glamorgan	Cardiff & Vale University Health Board	Wales
Active less than 30 minutes in week	30%	29%	33%
Active 150 minutes in week	55%	57%	53%
Overweight or obese (BMI 25+)	60%	56%	60%
Obese (BMI 30+)	26%	20%	24%

## 4.6 Security

- 4.6.1 The DfT WebTAG definition of security (as set out in the social impact assessment) is that transport interventions may affect the level of security for transport users. The assessment of these impacts should reflect both changes in security and the likely numbers of users affected. A potential for overlap with Journey Quality Impacts exists. To avoid this, some indicators which reflect both security and journey quality have been included only in the journey quality impacts assessment.

## 4.7 Crime and Anti-social Behaviour

- 4.7.1 According to the latest reported crime statistics for the year ending June 2020 from the Office of National Statistics (ONS), the South Wales Police Area has lower levels of reported crime (78.6 per 1,000 population) than the Wales average (78.9 per 1,000 population) and the England and Wales average (84.7 per 1,000 population). Note these statistics do not include anti-social behaviour. Reported crime data from the South Wales Police Authority and the total for all police authorities for England and Wales total are shown in Table 10.

Table 10 Average Total Reported Crimes Per 1,000 Population (Year Ending June 2020)<sup>33</sup>

Police Area	Reported Crime July 2019 to June 2020
South Wales	78.6

<sup>32</sup> Statswales-Adult Lifestyles by Local Authority and Health Board

<sup>33</sup> Source: ONS (2018).



Police Area	Reported Crime July 2019 to June 2020
Wales	78.9
Wales and England	84.7

## 4.8 Affordability

- 4.8.1 The WebTAG guidance identifies that there is a substantial body of research to demonstrate that the monetary costs of travel can be a major barrier to mobility for certain groups of people, with particularly acute effects on their ability to access key destinations.
- 4.8.2 Although poorer people spend less money on travel in absolute terms than the rest of the population, this often accounts for a far greater proportion of their income<sup>34</sup>. The low absolute spend reflects low average rates of car ownership, and low car running and high depreciation costs where a car is owned, but where budgets are very constrained, even these costs and public transport costs can account for a high proportion of that budget. Accordingly, changes to the transport network that involve changes in user charges can have a particularly strong impact on people in low-income groups.
- 4.8.3 One indicator of affordability by area is car ownership. Table 11 shows the level of car ownership in Vale of Glamorgan compared to Wales as a whole from the 2011 Census. The data shows that a higher proportion of Vale of Glamorgan households have access to a car or van (80.6%) compared to 77.1% on average across Wales. Moreover, a higher proportion of Vale of Glamorgan households have access to two or more cars compared to the Wales average.

Table 11 Car or Van Availability per Household<sup>35</sup>

Car Ownership	Vale of Glamorgan	Wales
<b>Car or Van Availability per household (%)</b>		
With a car or van	80.6	77.1
Without a car or van	19.4	22.9
<b>Number of Cars or Vans per household (%)</b>		
1 car or van	53.3	55.8
2 cars or vans	35.7	33.5
3 cars or vans	8.3	8
4 + cars or vans	2.7	2.8

## 4.9 Severance

- 4.9.1 The DfT WebTAG guidance defines community severance as the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows. Severance will only be an issue where either vehicle

<sup>34</sup> 'Making the Connections' (Social Exclusion Unit, 2003)

<sup>35</sup> Nomisweb – QS416EW – Car or Van Availability

flows are significant enough to significantly impede pedestrian movement or where infrastructure presents a physical barrier to movement.

- 4.9.2 Severance primarily concerns those using non-motorised modes, particularly pedestrians. To ensure a consistent approach, classification should be based on pedestrians only. The impact of severance on cyclists will differ for two reasons: they travel more quickly and crossing facilities may not be available to them. There are limited connections over the railway line in Dinas Powys, with connections provided along the A4055 in the form of narrow footways alongside the road. There is also an underpass under the railway which has a footway on the southbound side of the carriageway only, causing severance for pedestrians.

## 5 ECONOMIC CONTEXT

### 5.1 Introduction

- 5.1.1 This chapter presents the economic appraisal of the study area including setting out the economic baseline, relevant economic strategies and programmes, future growth, journey time reliability issues, transport costs and wider economic and regeneration issues. As a result of the Covid-19 outbreak in 2020, economic activity has been significantly affected. Information provided within this chapter is based on known data to inform the wider economic context and the longer-term implications are not yet known.
- 5.1.2 The WelTAG Stage Two Plus Economic Appraisal report is included in [Appendix F](#).

### 5.2 Economic Baseline

- 5.2.1 This section sets out the baseline data relating to the economy of the study area. A range of economic indicators have been explored to further understand the existing economic situation for the appraisal area including:

- Income
- Socio Economic Classification and Types of Occupation
- Economic Activity

#### Income

- 5.2.2 Table 12 identifies the gross weekly pay for residents by local authority area in 2019. The gross weekly pay of people in the Vale of Glamorgan is higher than both Wales and Cardiff. The Vale of Glamorgan also observed a large increase in average weekly pay from 2018 to 2019 (18.8%).

Table 12 Weekly Pay (Gross) Ranked (2019)<sup>36</sup>

Local Authority	Weekly Pay (Gross) 2019	% Change (2018 – 2019)
Vale of Glamorgan	£583.70	+18.8%
Cardiff	£568.00	+7.1
Wales	£534.80	+5.1%

#### Socio Economic Classification and Types of Occupation

- 5.2.3 Table 13 shows the National Statistics Socio-economic Classification (NS-SeC) of employment, which provides an indication of socio-economic position based on occupation. It should be noted that the classification data for Vale of Glamorgan and Wales is broadly similar, although there is a higher proportion involved in higher and lower managerial roles in Vale of Glamorgan compared to Wales.

Table 13 National Statistics Socio-Economic Classification (NS-SeC)<sup>37</sup>

National Statistics Socio-economic Classification	Vale of Glamorgan	Wales
Higher managerial, administrative and professional occupations	11%	8%
Lower managerial, administrative and professional occupations	24%	20%

<sup>36</sup> StatsWales – Average (median) gross weekly earnings by Welsh Local Areas and Year

<sup>37</sup> Nomis QS607EW – NS-SeC.



National Statistics Socio-economic Classification	Vale of Glamorgan	Wales
Intermediate occupations	14%	12%
Small employers and own account workers	9%	9%
Lower supervisory and technical occupations	7%	8%
Semi-routine occupations	14%	16%
Routine occupations	9%	13%
Never worked and long-term unemployed	5%	5%
Not classified	7%	9%

### Economic Activity

- 5.2.4 The Vale of Glamorgan exhibits considerable socio-economic diversity containing some of the most affluent and the most deprived communities in Wales in respect of employment, income, education, health and community safety. The Welsh Index of Multiple Deprivation (WIMD) 2014<sup>38</sup>, shows that of the 79 lower super output areas (LSOA) in the Vale of Glamorgan, 5% of which are contained with the most deprived 10% LSOA in Wales. Although Dinas Powys has some of the least deprived LSOAs in the county, the study area is close to, and connects to, Barry which retains some of the most deprived areas.
- 5.2.5 A summary of employment statistics for Dinas Powys has been included as Table 14 against regional and national statistics. Census data (2011) shows that there was a higher percentage of those employed within Dinas Powys and also the Vale of Glamorgan as a whole (figures at 62%) compared with 58% for South East Wales and Wales as a whole. There is a significantly higher population of retired people within Dinas Powys compared to the Vale of Glamorgan, South East Wales and Wales as a whole.

Table 14 Employment Statistics Census 2011

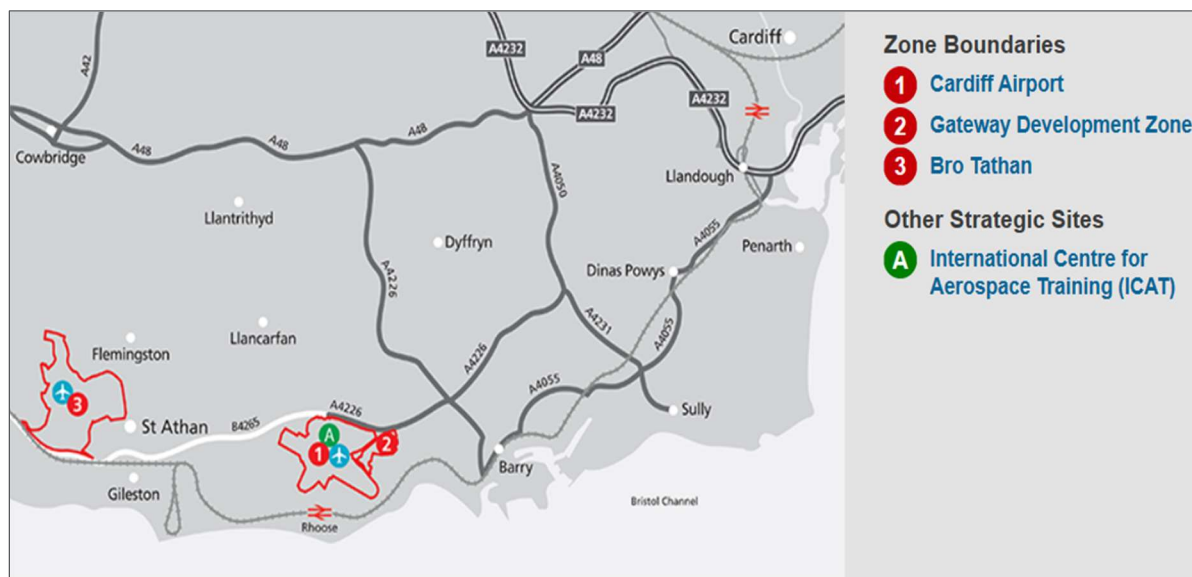
Economic Activity	Dinas Powys	The Vale of Glamorgan	South East Wales	Wales
Employed	62%	62%	58%	58%
Unemployed	3%	4%	5%	4%
Retired	22%	16%	15%	16%
Student	7%	7%	10%	9%
Other	7%	7%	13%	12%

## 5.3 Enterprise Zones

- 5.3.1 There are eight designated Enterprise Zones across Wales where the Welsh Government has created the best possible conditions for business to thrive. The Cardiff Airport and Bro Tathan Enterprise Zone is located south west of Dinas Powys and is a leading UK aerospace location with three sites. Figure 12 shows the areas and sites within the zone.

<sup>38</sup> <http://gov.wales/docs/statistics/2015/150812-wimd-2014-summary-revised-en.pdf>

Figure 11 Cardiff Airport and Bro Tathan Enterprise Zone<sup>39</sup>



5.3.2 The three distinct sites in the Zone offer a range of facilities and accommodation as follows:

- Cardiff Airport serves passengers and freight worldwide and its 2,392m runway can accommodate any aircraft. Together with adjoining development land, the site represents further opportunity for aerospace-related investment, while Cardiff Airport is committed to continuing to grow passenger numbers and expand routes.
- Bro Tathan Business Park is an existing business park home to major occupiers including Aston Martin Lagonda and Bristow Helicopters. Bro Tathan is embarking on the next phase to create a ground-breaking destination for business offering a range of development and occupational opportunities.
- At the Gateway Development Zone, next to the airport, there is development land and early plans to develop an Airport City comprising high quality offices as well as education, training and leisure facilities.

## 5.4 Future Growth

### Location of Development

5.4.1 This section provides an overview of the committed developments within proximity to the study area, all of which are referenced within the Vale of Glamorgan LDP 2013 land allocation for residential use.

#### Land off Caerleon Road

5.4.2 Outline planning consent was granted in January 2016 for the residential development, comprising 70 residential dwelling on land off Caerleon Road (Planning Ref. 2014/00282/OUT). The development proposals include a new shared access from Caerleon Road fronting the site comprising a standard priority junction.

#### Land at Cross Common Road

5.4.3 Outline planning was granted in February 2016 for the residential site allocated for 50 dwellings (Planning Ref. 2015/00392/OUT), located adjacent to Cross Common Road on the southern extent of Dinas Powys.

<sup>39</sup> Welsh Government – Enterprise Zones Wales

- 5.4.4 A new highway link was constructed by the Local Authority as part of the application between Cross Common Road and the A4055. The existing road crossing the river was stopped up, only permitting pedestrian and cyclist movements.

#### **Land Adjoining St Cyres School, Murch Road**

- 5.4.5 Planning was approved in February 2018, for the construction of 215 dwellings and 3-hectare Community/ Recreation User Zone (Planning Ref. 2017/01136/HYB), on land at the former St Cyres Lower School site on Murch Road, Dinas Powys. The main access to the development will be via a new mini roundabout, proposed to replace the existing teardrop island in place onto Murch Road.
- 5.4.6 The proposed access to the site includes a shared footway/ cycleway on the southern side of the carriageway which links to Watery Lane Cycleway to the south, outside of the site. There is also the provision of a footway on the northern side of the carriageway, which links to the existing footways on Murch Road and provides a link to Ash Path. It is anticipated that both pedestrians and cyclists will use the main vehicular access to the site. A connection will also be made to the bridleway to the west of the site between Sunnycroft Lane and Cross Common Road.

## **5.5 Commuting**

- 5.5.1 Table 15 shows the work commuter flows for local authorities in South Wales. Approximately 38% of residents within the Vale of Glamorgan also work there. This is lower than the other adjacent authorities. More people commute out of Vale of Glamorgan compared to those commuting into Vale of Glamorgan; 26,715 people out-commute from the Vale of Glamorgan compared to 13,305 people who in-commute establishing a net flow of -13,410. There is a similar, negative net flow in both Rhondda Cynon Taf and Bridgend, whilst more people commute into Cardiff than out of Cardiff for work.

*Table 15 Comparison Journey to Work Commuter Flows by Local Authority<sup>40</sup>*

Authority	Out Commuting	In Commuting	Net Flow	% Working in Own Area
Bridgend	18,040	17,256	-784	56%
Cardiff	32,845	73,126	40,281	65%
Rhondda Cynon Taf	36,609	19,365	-17,244	48%
<b>Vale of Glamorgan</b>	<b>26, 715</b>	<b>13,305</b>	<b>-13,410</b>	<b>38%</b>

- 5.5.2 Table 16 shows the Usual Residence and Place of work for residents within the Vale of Glamorgan. A total of 17, 773 people reside in the Vale of Glamorgan and work in Cardiff, with 44% of these living in Barry and 8% in Dinas Powys. Approximately 5,576 people live in Cardiff and work in the Vale of Glamorgan.

*Table 16 Location of Usual Residence and Place of Work (2011 Census)*

Currently Residing	Place of Work	Number of People
<b>Vale of Glamorgan</b>	Cardiff	<b>17,773 (Total)</b>
Dinas Powys		1,466 (8%)

<sup>40</sup> Nomisweb - Journey to Work Commuter flows by Local Authority (2011 Census)



Currently Residing	Place of Work	Number of People
Barry		7,886 (44%)
Cardiff	Vale of Glamorgan	<b>5,576 (Total)</b>
	Dinas Powys	197 (4%)
	Barry	1,718 (31%)

*Note: The places have been represented by SOA – Mid Layers*

## 5.6 Wider Economic Impacts

5.6.1 There are numerous studies that provide evidence on the economic benefits of rail investment, for example new stations and existing station improvements. The Rail Delivery Group (the UK Rail industry trade organisation) produced a report in 2017 entitled 'Investment in Rail: The Economic Benefits'<sup>41</sup>. The key findings of the report were as follows:

- The evidence suggests that £50bn of investment to improve Britain's railway into the early 2020s by building new lines, upgrading existing track and manufacturing new trains is predicted to deliver around £82bn–£84bn of additional economic benefits to the UK.
- The £50bn investment is also estimated to generate approximately 11,000 additional jobs in the rail sector and its supply chain.
- Wider economic benefits relating to reduced road congestion, user benefits and spill over effects on the wider economy are estimated to be around £31bn.
- In total the benefits to the UK of investing in rail are estimated to be £113bn to £115bn. This equates to a Benefit Cost Ratio of approximately 2.3 which demonstrates the positive economic benefit of rail investment.

5.6.2 Another recent report was produced for the DfT Rail Group in 2018<sup>42</sup>. This report provided empirical evidence and econometric modelling of the economic effect of rail infrastructure investment by looking at six case studies. The key findings are as follows:

- The report presents evidence that improved rail provision has encouraged people to move to some areas. These factors mainly relate to fact that rail improvements present an opportunity for people to move to an area and then commute to a larger employment centre. This was relevant in the Corby, Falmouth, Bromsgrove and Swindon case studies.
- The report found empirical evidence that rail improvements have boosted the economy in some but not all employment sectors. This is mainly due to agglomeration benefits. The main sectors benefiting from rail improvements are retail, tourism related sectors and transport and storage. Positive evidence was found in Corby, Falmouth, Oxford, Bromsgrove and Swindon case studies.

## 5.7 Journey Times and Reliability

### Road Journey Times and Congestion

5.7.1 The journey times between Biglis roundabout and Barons Court Junction were extracted from the ANPR data. ANPR records the registration number of each vehicle passing a camera and the time

<sup>41</sup> Oxera; Investment in Rail: The Economic Benefits (2017)

<sup>42</sup> SDG/Cambridge Econometrics; Economic Impacts of New or Improved Rail Lines (2018)

that the vehicle passes the camera. The distributions of journey times for vehicles recorded at Biglis roundabout (camera 017 – 022) and at the Barons Court Junction (camera 005 – 010), are shown in [Appendix G](#). The length of this corridor is 5,198 m. The analysis shows that on average, vehicles were driving at less than 11mph during the morning peak period northbound and the evening peak period southbound. The average speed in other time periods was around 20 mph.

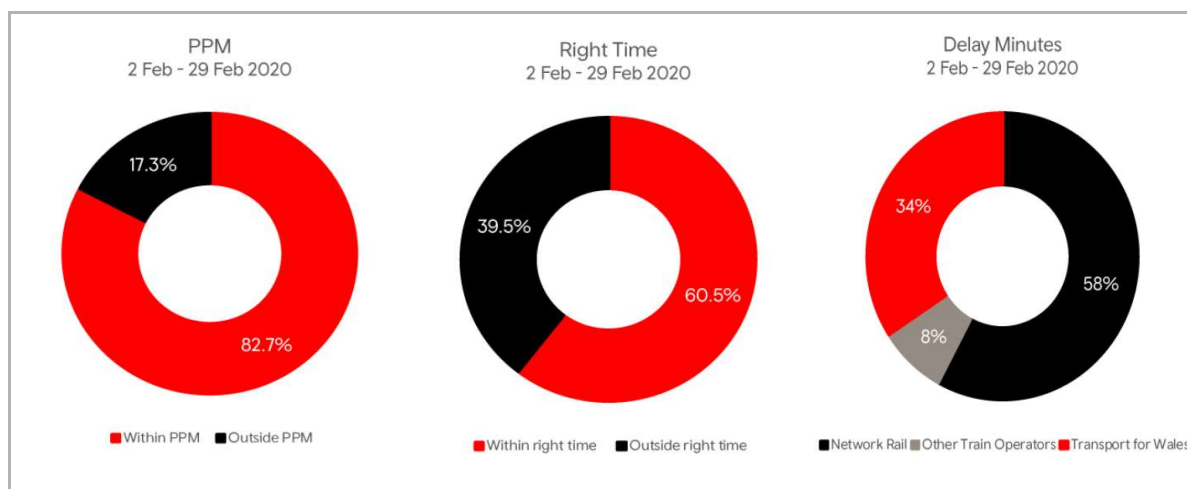
### Train Punctuality

5.7.2 The punctuality and reliability of rail services are considered important indicators in determining passenger satisfaction with the journey. The punctuality for all TfW services and delay responsibility is summarised in Figure 13. It is important to note the data is from February 2020 (pre-Covid-19 conditions) and was assessed to be a more accurate reflection of 'real-time' scenarios than the current data due to reduced and amended services. The data shows that 60.5% of TfW services reached their final destination within 59 seconds of the advertised time. Regarding delay minutes, 34% were attributable to TfW, compared to 58% for Network Rail.

5.7.3 TfW provide up to date information on the punctuality performance figures and where any delay minutes are attributed, which show:

- Public Performance Measure (PPM) – percentage of trains which reached their final destination station within 4 minutes 59 seconds of the advertised time.
- Right Time – percentage of trains which reached their final destination station within 59 seconds of the advertised time.
- Delay (minutes) – percentage of delay minutes attributable to TfW, Network Rail, and other train operators.

Figure 12 TfW Performance<sup>43</sup>



<sup>43</sup> <https://tfwrail.wales/performance>

## 6 ENVIRONMENTAL CONTEXT

### 6.1 Introduction

6.1.1 An appraisal of all relevant data has been undertaken to identify and understand the current environmental baseline within the study area and the area immediately surrounding the outside of the study area. For this assessment, the study area encompasses the existing transport corridors from Biglis Roundabout, Barry through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth. A desk top study has been undertaken to identify environmental features and constraints using mapping linked with the LDP (2017). [Appendix H](#) provides detailed maps of environmental constraints and designations. The desk study has been informed by web-based searches using the following on-line sources:

- Multi-Agency Geographic Information for the Countryside website (MAGIC)
- Historic Wales – Portal for historic environment information in Wales
- Lle Geo-Portal
- Cadw – Historic Landscapes
- Natural Resources Wales' Flood Risk Map Viewer
- AQMA Interactive Map
- The Glamorgan-Gwent Archaeological Trust – Archwilio
- The Wildlife Trust of South & West Wales
- Public Right of Way Maps
- Vale of Glamorgan, Interactive Mapping - Tree Preservation Orders
- Vale of Glamorgan, Interactive Proposals Map
- Noise Priority Areas – Wales

6.1.2 The desk study has also included a review of the following technical reports and strategy documents:

- 2008 Designation of Special Landscape Areas (Vale of Glamorgan County Borough Council ((2008))
- 2013 Agricultural Land Classification of England and Wales 1985 (ALC009)
- 2013 Air Quality Progress Report for Vale of Glamorgan (Vale of Glamorgan, 2013)
- 2016 Air Quality Progress Report for Vale of Glamorgan (Vale of Glamorgan, 2016)
- 2017 Interactive Proposals Map – Sites of Important Nature Conservation (Vale of Glamorgan, 2017)

6.1.3 All environmental WebTAG worksheets are included in [Appendix I](#).

### 6.2 Cultural Heritage

6.2.1 Cultural heritage is defined as follows:

- Buildings (single or in groups) of architectural or historic importance.
- Areas, such as parks, gardens, other designed landscapes or public spaces, remnant historic landscapes, archaeological complexes and heritage coasts.
- Sites (e.g., ancient monuments, places with cultural or historical associations such as battlefields, preserved evidence of human effects on the landscape, for example).
- Individual artefacts that form part of the overall archaeological resource.
- The sense of identity and place which the combination of these features provides.



- 6.2.2 This desk study has included a search for known heritage assets within the appraisal area. The known heritage assets listed below have been identified using Lle Wales/ MAGIC and an archaeological desk-based assessment has been undertaken using the Archwilio and Historic Wales Historical Environmental Records (HER) data portals.

### Scheduled Monuments

- 6.2.3 There are six Scheduled Monuments located within the study area as shown in Table 17.

*Table 17 Scheduled Monuments within the Study Area (Lle Geo-Portal)*

Scheduled Monument	National Grid Reference	Location Description
Romano-British Farmstead, Dinas Powys Common	ST 15103 70939	Romano-British Farmstead, Dinas Powys Common is located between Mount Road and Cardiff Road (A4055), to the south west of Dinas Powys. The monument consists of the remains of a Romano-British settlement dating to the 2nd and 3rd centuries AD. The monument is of national importance for its potential to enhance the knowledge of Roman settlement and agricultural practices. The monument retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits.
Dinas Powys Castle	ST 15275 71637	Dinas Powys Castle is located along Lettons Way, approximately 130m west of Pen-y-Turnpike Road, within the north west of Dinas Powys. The monument comprises the remains of a medieval castle, dating to around 1200AD. It retains significant archaeological potential, with a strong probability of the presence of both structural evidence and intact associated deposits.
Tyn y Coed Earthwork	ST 14896 72016	Tyn y Coed Earthwork is located within Newland Wood, approximately 380m north west of Dinas Powys. The monument comprises the remains of an earthwork dating to the early medieval period and the scheduled area may be expected to contain a wide range of archaeological information.
Cwm George Camp	ST 14804 72232	Cwm George Camp is located within Newland Wood, approximately 600m north west of Dinas Powys. The monument comprises the remains of a defended settlement site dating from the 5 <sup>th</sup> to 7 <sup>th</sup> centuries AD. The monument forms an important element within the wider early medieval context and the scheduled area may be expected to contain a wide range of archaeological information.
Middleton Moated Site	ST 15041 68622	Middleton Moated Site is located approximately 360m north east of Sully Moors Road and approximately 680m south of Cardiff Road (A4055). The monument comprises the remains of a medieval moated homestead. The monument is of national importance for its potential to enhance our knowledge of medieval settlement. It retains significant archaeological potential, with a strong probability of the presence of intact archaeological deposits and structural evidence.
Cogan Deserted Medieval Village	ST 16981 70455	Cogan Deserted Medieval Village is located approximately 150m east of Sully Road and east of Dinas Powys. The monument comprises the remains of earthworks, platforms and building footings, representing a deserted village, of probable medieval date. The monument forms an important element within the wider medieval context and the scheduled area may be expected to contain a wide range of archaeological information, including chronological detail and evidence in regard to construction techniques and agricultural methods.

## Listed Buildings

6.2.4 In total, there are 22 Listed Buildings located within the study area, these are presented in Table 18. The Listed Building, Grade, National Grid Reference (NGR) are provided with a description of the location from key features within the appraisal area.

*Table 18 Listed Buildings within and immediately surrounding the Study Area (Historic Wales)*

Listed Building	Grade	NGR	Location Description
Eight rickstands to north side of Cog Farm	II	ST 16262 68885	Eight rickstands to north side of Cog Farm is located approximately 1.34km southeast from the A4055 (Cardiff Road). Eight rickstands to north side of Cog Farm lies to west of the T-junction in Cog, north of Sully Village.
Planned group of farmyard buildings at Cog Farm	II	ST 16230 68847	Planned group of farmyard buildings at Cog Farm is located approximately 1.34km southeast from the A4055 (Cardiff Road). Cog Farm lies west of the T-junction in Cog, north east of Sully village
Cog House	II	ST 16272 68798	Cog House is located approximately 1.37km southeast from the A4055 (Cardiff Road). Cog House is located west of the T-junction with Swanbridge Road and Sully Road, northeast of Sully village
Downs Farmhouse	II	ST 16544 69662	Downs Farmhouse is located approximately 110m west from Sully Road and south east of Dinas Powys.
St Peter's Church	II*	ST 16875 70568	St Peter's Church is located along an unnamed road, approximately 120m east from Sully Road and east of Old Cogan Hall Farm.
1-6, Little Orchard	II	ST 16318 71007	1-6 Little Orchard are located along Little Orchard Road, to the south east of Murch, east of Dinas Powys.
Barn at Biglis Farm	II	ST 14247 69827	Barn at Biglis Farm is located south west of Dinas Powys, approximately 800m north west of A4055 (Cardiff Road) and 120 north west of the railway line.
Biglis Farmhouse	II	ST 14217 69855	Biglis Farmhouse is located south west of Dinas Powys, approximately 860m north west of A4055 (Cardiff Road) and 170 north west of the railway line.
The Mount	II	ST 15118 71103	The Mount is located along Mount Road within the south west of Dinas Powys.
Old Court	II	ST 15301 71240	Old Court is located along Station Road, approximately 250m north of the A4055 (Cardiff Road). Old Court falls within the western area Dinas Powys.
War Memorial	II	ST 15318 71293	War Memorial is located at the centre junction of Station Road, Mill Road, Highwalls Road, Elm Grove Road and Britway Road within the centre of Dinas Powys.

Listed Building	Grade	NGR	Location Description
Dinas Powys Parish Hall	II	ST 15234 71297	Dinas Powys Parish Hall is located along Britway Road within the centre of Dinas Powys, approximately 280 north of A4055 (Cardiff Road).
Lon Twyn	II	ST 14833 71389	Lon Twyn is located along Beauville Lane within the western area of Dinas Powys.
Remains of Dinas Powys Castle	II	ST 15299 71601	Remains of Dinas Powys Castle is located within the north west Dinas Powys, along Lettons Way.
Church of St Peter	II	ST 15355 71484	Church of St Peter, The Old Rectory, The Bier House in St Andrew's Churchyard and Churchyard cross in St Andrew's Churchyard are located along Ty-gwyn, adjacent to St. Andrews Road, directly west of Dinas Powys. The Listed Buildings, at their closest point, are located approximately 1.5km north west of the A4055 (Cardiff Road).
The Old Rectory	II*	ST 13859 71419	
The Bier House in St Andrew's Churchyard	II	ST 13842 71441	
Churchyard cross in St Andrew's Churchyard	II	ST 13867 71454	

### Conservation Areas

6.2.5 There are two Conservation Areas located within the study area<sup>44</sup>:

- Dinas Powys Conservation Area falls within the centre of Dinas Powys, North west of Cardiff Road (A4055).
- Michaelston-le-Pit Conservation Area covers the Michaelston-le-Pit village, approximately 400m north west of Pen-y-Turnpike Road.

### Historic Parks and Gardens

6.2.6 There is one Historic Park and Garden located within the study area<sup>45</sup>. Cwrty-yr-ala Historic Park and Garden is located approximately 840m north west of Pen-y-Turnpike Road and approximately 250m south of Michaelston-le-Pit village.

### Registered Landscapes of Outstanding Historic Interest

6.2.7 There are no Registered Landscapes of Outstanding Historic Interest located within the appraisal area.

### Archaeology

6.2.8 There are 181 non-designated heritage assets located within the appraisal area. Most of the non-designated heritage assets date to the Post Medieval period, there are 79 Post Medieval assets in total. The majority of these relate to settlement activity, however there are also several heritage constraints that relate to industrial activity. These assets comprise lime kilns and charcoal producing sites which are primarily located to the north and north-west of Dinas Powys. The next most frequently represented time-period is the Medieval period. There are 58 heritage assets of this date.

6.2.9 Many of the Medieval assets relate to settlement activity. However, there are five castles, two of which are Scheduled Monuments. Dinas Powys Castle (GM021) and Dinas Powys Ringwork are both located to the north of Dinas Powys. Dinas Powys Castle is both a Scheduled Monument and

<sup>44</sup> Archwilio

<sup>45</sup> Archwilio - <https://www.archwilio.org.uk/her/chi1/arch.html?county=Vale of Glamorgan&lang=eng>



Listed Building. There are also a number of deserted Medieval villages within the appraisal area, one of which is the Scheduled Monument of Cogan Deserted Medieval village (GM535) which is located to the south-west of Sully Road. The bulk of the Medieval activity is located to the north-north west of Dinas Powys, there is also a dense concentration of activity to the south-east of Sully Road just to the south of Morristown.

- 6.2.10 There are 22 prehistoric heritage assets which are primarily represented by findspots which are densely concentrated to the north-west of Dinas Powys. There is however an Iron Age settlement to the north-west of Dinas Powys at Cwm George. Two round barrows are recorded to the south-west of Dinas Powys. There are 21 assets of Roman date which are mainly represented by findspots.
- 6.2.11 There is however a Scheduled Monument of a Romano-British farmstead at Dinas Powys Common (GM431). A villa is recorded to the south-east of Dinas Powys, further settlement activity is recorded to the north-west of Dinas Powys. There are two heritage assets of Early Medieval date which are both Scheduled Monuments and located to the north of Dinas Powys at Cwm George. These designated heritage assets are Cwm George Camp (GM023) which is a defended settlement and Tyn y Coed Earthwork (GM024). There are also three heritage assets which date to the Modern period.
- 6.2.12 Based upon the known archaeological and built heritage record, the area with the highest archaeological potential within the appraisal area is to the north and north-west of Dinas Powys at Cwm George. There is also the potential for previously unrecorded Medieval archaeological remains to be discovered between the A4055 and B4267 due to the density of known Medieval archaeology within the area and the Scheduled Monuments of Middleton Moated Site at Sully (GM378) and Cogan Deserted Medieval Settlement (GM535).
- 6.2.13 There is the potential to impact the settings of the Listed Buildings and Scheduled Monuments on the outskirts of Sully and just off Sully Road due to the relatively open nature of the landscape surrounding them. Whilst there is limited potential to impact the settings of the Listed Buildings and Conservation Area within Dinas Powys there is the potential to impact the settings of the Scheduled Monuments that are located on the outskirts of it.

### Landscape

- 6.2.14 The Vale of Glamorgan – LDP (2013), the Lle Geo-Portal and Google Maps have been used to detail the Landscape and Land Use within the appraisal area. Within the study area there are two Sites of Special Scientific Interest (SSSI), a Local Nature Reserve (LNR) and 12 Sites of Importance for Nature Conservation (SINC), see section Nature Conservation. The residential area of Dinas Powys is adjoined by a green wedge, which is an LDP policy designation, to the east which is situated between Dinas Powys and Lower Penarth.

### Landscape Designations

- 6.2.15 There are no National Parks, Areas of Outstanding National Beauty (AONBs) or Heritage Coasts located within 5km of the study area (Magic Application, 2017).

### Special Landscape Area

- 6.2.16 A Special Landscape Area (SLA) is a non-statutory conservation designation used by local government to categorise sensitive landscapes which are, either legally or as a matter of policy, protected from development or other man-made influences. Within the study area, the SLA designation only falls under an area to the north west of Dinas Powys<sup>46</sup>.

### Common Land

- 6.2.17 There are 12 pockets of Common Land located within the study area<sup>47</sup>:

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<sup>46</sup> Vale of Glamorgan Council Designation of Special Landscape Areas (2008)

<sup>47</sup> Lle Geo-Portal

- 11.03ha of Common Land is located to the south west of Dinas Powys.
- 0.07ha of Common Land is located adjacent to Pen-y-Turnpike Road, east of Dinas Powys Castle.
- 3.36ha of Common Land is located to the south east of Dinas Powys adjacent to Cross Common Road.

### Agricultural Land Classification

6.2.18 An analysis of the Agricultural Land Classification of England and Wales 1985 (ALC009)<sup>48</sup> details that within the study area, the Agricultural Land Classifications (ALC) that form the majority of the area are Grade 3 and to a lesser extent Grade 2. Grade 2 land is located in the south of the study area.

- Grade 2 - very good quality agricultural land: (Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1).
- Grade 3 - good to moderate quality agricultural land: (Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2).

6.2.19 In terms of impacts, the main concern would be the loss of any Best and Most Versatile (BMV) agricultural land which includes Grades 1, 2 and 3a. The extent of BVM land affected by a scheme would need to be quantified using more recent draft mapping from Welsh Government at a more detailed stage. It should be noted that the maps referred to do not distinguish between Grade 3a and 3b land.

## 6.3 Water Resources and Flooding

### Watercourses

Table 19 Watercourses within the Study Area

Watercourse	Description
Cadoxton	The water course Cadoxton is classified as a 'main river' and flows in a generally south-westerly direction through Dinas Powys, along the route of Cardiff Road (A4055), towards the town of Barry. Available data from the 2016 second cycle regarding water quality, indicates that the River Cadoxton waterbody is currently achieving an overall status of 'Moderate'. The waterbody currently achieves an overall ecological status of 'Moderate' and chemical status of 'Good'. Data for the other watercourses is not available.
East Brook	East Brook is a smaller tributary of the Cadoxton River. The East Brook River joins the Cadoxton south of the A4055 at Dinas Powys. East Brook is classified as a 'main river' and flows through the area of Dinas Powys known as Murch and through Eastbrook.
Coldbrook	Coldbrook starts at St Andrews Major and is classified as a 'main river', Coldbrook and its tributaries, the largest of which is the Nant yr Argae, flows in a general south-easterly direction across the fields of the locality known as Biglis where it joins the Cadoxton, east of Palmerstown.

<sup>48</sup> Natural England – Agricultural Land Classification of England and Wales 1985 (ALC009) (2013)

Watercourse	Description
Cogan Hall Watercourse	Cogan Hall Watercourse is classified as a 'main river' and flows southwards, west of Penarth. Cogan Hall Watercourse flows south of Old Cogan Hall Farm, adjacent to the Cogan Deserted Medieval Village Scheduled Monument, the river joins the Sully Brook before flowing westwards across the Sully Moors.
Sully Brook	The Sully Brook watercourse is classified as a 'main river' and flows in a southwardly direction through the Cosmeston Lakes Country Park (south east of Lower Penarth). The Sully Brook then flows westwards south of Cog Moors and north of Sully Moors, where it meets the Cog Moors Drains ('main river'), the Sully Brook continues westward before joining the Cadoxton near Barry docks <sup>49</sup> .

## Flood Risk

- 6.3.1 The study area and its' surrounding area falls within three separate flood risk zones. The majority falls within Planning Policy Wales TAN 15 Flood Risk Zone A (i.e. area considered to be at little or no risk of fluvial or coastal/tidal flooding). Flood Risk Zone A extends across the majority of the centre of the study area and areas to the east, west and north of the study area surrounding the Cadoxton River<sup>50</sup>.
- 6.3.2 Planning Policy Wales TAN 15 Flood Risk Zone B (i.e., areas known to have flooded in the past) is located in pockets surrounding the area of Flood Risk Zone C2 and are located along the Sully Brook to the east and along the Nant Argae in the west of the study area.
- 6.3.3 Planning Policy Wales TAN 15 Flood Risk Zone C1 (i.e., areas without significant flood defence infrastructure) is located within the centre of Dinas Powys, covering an area surrounding the River Cadoxton and railway line.
- 6.3.4 Within the study area there are areas that fall within Planning Policy Wales TAN 15 Flood Risk Zone C2 (i.e., areas without significant flood defence infrastructure). Flood Risk Zone C2 extents north west of Dinas Powys along Cadoxton River and areas to the south west of the study area along the Cadoxton River, Sully Brook, Cog Moors Drains, East Brook and Coldbrook River.

## 6.4 Nature Conservation

### Statutory Designated Sites

- 6.4.1 The MAGIC website has been used to identify all statutory designated SINC's within and immediately outside of the study area. The search was extended to 10km for identification of statutory sites designated for their bat interest. There are no Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites (a wetland of international importance) within the study area<sup>51</sup>. However, within the surrounding area outside of the appraisal area there are three International designated sites for nature conservation.

### International Designated Sites

- 6.4.2 The Severn Estuary SAC, SPA and Ramsar site, a wetland of international importance, are located approximately 2km east of Sully Road. These sites are all of high (international) importance as described in Table 20.

<sup>49</sup> Natural Resources Wales' Flood Risk Map Viewer – Long term flood risk (2017) - <https://www.naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en>

<sup>50</sup> Natural Resources Wales' Flood Risk Map Viewer – Long term flood risk (2017) - <https://www.naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en>

<sup>51</sup> Magic Application (2017) - <http://www.magic.gov.uk/MagicMap.aspx>



Table 20 Nature Conservation – International Designated Sites

Designated Site	Description
Severn Estuary SAC	Designated for its Annex I habitats (including estuaries, Atlantic salt meadows and mudflats and sandflats not covered by seawater at low tide) and Annex II species (including sea lamprey, river lamprey and twaite shad) which form primary reasons for the selection of this site.
Severn Estuary SPA	Designated for its internationally important bird populations (including the Annex I species Bewick's swan over winter as well as ringed plover, dunlin, pintail, redshank and curlew) and for regularly supporting at least 20,000 waterfowl.
Severn Estuary Ramsar Site	Designated for its Annex I habitats (including estuaries, Atlantic salt meadows and mudflats and sandflats not covered by seawater at low tide), its migratory fish populations (including salmon, sea trout and sea lamprey) and for its internationally important assemblage of waterfowl (including gadwall, dunlin and redshank).

## National

6.4.3 There are two SSSIs located within the study area. These are of high (national) importance:

- Cog Moors SSSI, at its closest point, is located approximately 370m east of Cardiff Road (A4055) and approximately 350m west of Sully Road. Cog Moors SSSI is designated for its 'large continuous damp mesotrophic (neutral) semi-natural grassland' which is associated with several stands of tall sedges, and for populations of uncommon plant species.
- Cosmeston Lakes SSSI, at its closest point is located approximately 430m east of Sully Road and approximately 110m west of Lavernock Road (B4267). Cosmeston Lakes SSSI includes two lakes, created from flooded limestone quarries, which are connected by a narrow channel. These are eutrophic water bodies up to 10m deep, which support a range of submerged plants. One of the lakes is of special interest as the only known site in Wales for the presence of starry stonewort (*Nitellopsis obtusa*).

6.4.4 There are no SACs designated for their bat interest within 10km of the study area. There are no National Nature Reserves (NNR) within the study area and no NNR within 2km of the study area. There are no Marine Conservation Zones (MCZ) and no Marine Nature Reserves (MNR) within the study area and no MCZ/MNR within 2km of the study area<sup>52</sup>.

## Sites of Nature Conservation Importance

- There are approximately 12 Sites of Nature Conservation Importance (SINC) located within the study area. Five are located to the south east of Cardiff Road, whilst the remaining seven are located to the north west of Dinas Powys<sup>53</sup>.
- Cog Moors SINC is located immediately adjacent to the eastern boundary of the existing Cog Moors WwTW.
- There is a SINC located fragmentated between Barry Road, Cross Common Road and the area of woodland between Cross Common Road and Sunnycroft Lane.

<sup>52</sup> Lle Geo-Portal (2017) - <http://lle.gov.wales/home>

<sup>53</sup> Vale of Glamorgan LDP Proposals Map 2013 - <http://www.valeofglamorgan.gov.uk/Documents/Living/Planning/Policy/LDP-2013/02-LDP-Proposals-Map-2013.pdf>

- To the north west of Dinas Powys, there are approximately four varied sized and fragmented SINC's which cover areas of Coed Clwyd-gwyn and Case Hill Wood. To the south east of Dinas Powys, there are three varied sized SINC's located between the railway line and Cardiff Road.
- To the east of the study area, there is a SINC covering the area of Cosmeston Lakes Country Park, which extends to the south of Lower Penarth.

### Non-statutory Designated Sites

- 6.4.5 The MAGIC website and the Vale of Glamorgan LDP (2011-2026) has been used to identify all non-statutory designated SINC's within the study area.

### Local Nature Reserve

- 6.4.6 Local Nature Reserve (LNR) is a designation for nature reserves in Great Britain.
- Cosmeston Lakes Country Park LNR is located approximately 200m east of Sully Road.

### Ancient Woodland

- 6.4.7 There are seven varied sized pockets of Ancient Woodland located between Lower Penarth and Dinas Powys, four of these pockets are located north east of Cross Common Road, whilst the remaining three fall south west of Cross Common Road and north of Cog Moors. To the north west of Dinas Powys, there are larger extents of Ancient Woodland covering areas of Coed Twyncyn and Coed Clwyd-gwyn, both of these are adjacent to the Dinas Powys settlement.

### Tree Preservation Orders

- 6.4.8 Within the study area there are numerous pockets and rows of trees with Tree Preservation Orders (TPO):
- Within Dinas Powys, areas with a particularly large concentration of TPOs are centred along Britway Road, to the south of Dinas Powys along the Cardiff Road (A4055), the area of Dinas Powys known as Murch and along Pen-y-turnpike Road to the north west of Dinas Powys.
  - There are multiple connected rows of TPOs adjacent to Cog Moors Wastewater Treatment Works, approximately 950m south east of Dinas Powys.
  - To the west of Lower Penarth there are multiple rows and pockets of TPOs located within close proximity to Cogan Hall Watercourse<sup>54</sup>.

## 6.5 Noise and Vibration

- 6.5.1 Noise annoyance is defined by the as 'a feeling of displeasure evoked by noise'. Noise nuisance from transport sources can adversely affect the quality of living of local communities. Vibration is a similar effect, but instead of being transmitted by air, it is transmitted by the earth. Noise is normally considered as an approximate indicator for both noise and vibration, since its effects are normally felt more strongly.
- 6.5.2 Additionally, WelTAG states that the introduction of transport proposals may generate additional noise, both during construction and system operation. This guidance focuses on the operational noise impacts, since any construction impacts will be temporary and will be unlikely to matter in the overall decision-making process.
- 6.5.3 Noise maps and associated plans are managed by the Welsh Government and local authorities to find where noise levels are high and help create noise action plans to address the issue<sup>55</sup>. There are no Noise Action Priority Areas (NAPPAs) for roads located within the study area. Within the wider study area there is one NAPPA located along the Junction of Coldbrook Road East and the A4231

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<sup>54</sup> Vale of Glamorgan Council Deposit LDP 2011-2026 (2013)

<sup>55</sup> Noise Priority Areas (2017)

(approximate NGR - ST 13442 69888). There are no Noise Action Planning Priority Areas for the railway located within the study area.

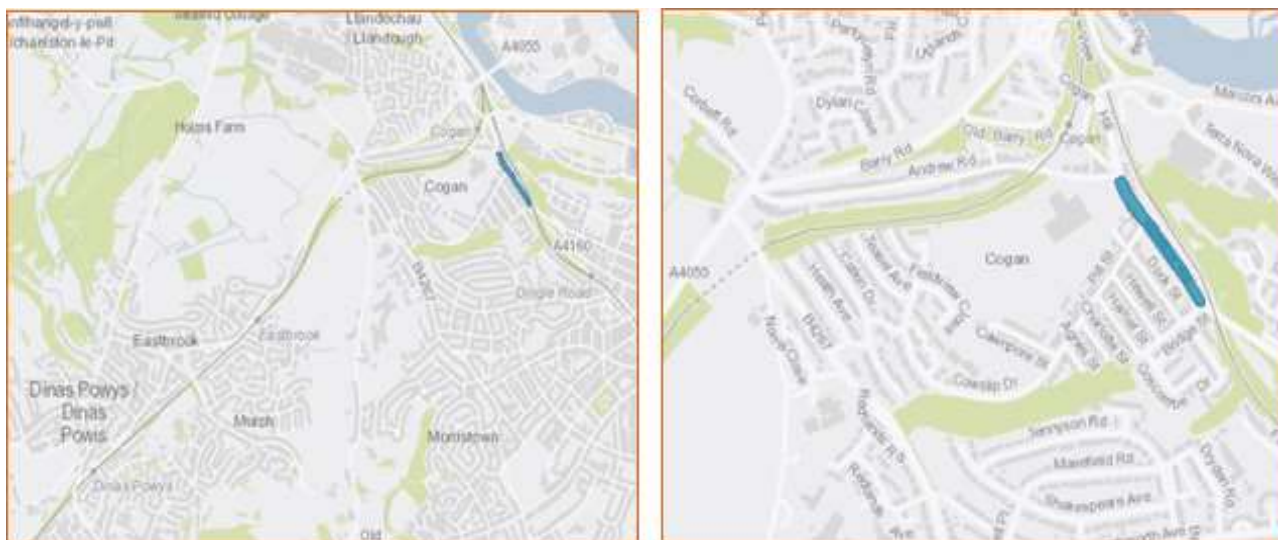
6.5.4 The areas of Dinas Powys and Lower Penarth are potential receptors within the study area for any changes in noise associated with transport proposals. Further a review of aerial photographs, the following roads have multiple potential individual noise and vibration receptors (combination of both residential and agricultural receptors) within the study area:

- A4055 Cardiff Road
- Cross Common Road
- Barry Road
- Argae Lane
- Westra
- St. Andrews Road
- Sully Road

## 6.6 Air Quality

6.6.1 As detailed within the 2016 Air Quality Progress Report for Vale of Glamorgan, the overall air quality across the county complies with regulations to protect human health. Data for 2012 did highlight that at some locations road traffic emissions of nitrogen dioxide (NO<sub>2</sub>) are at, or close to, the relevant annual average concentration of 40ug/m<sup>3</sup>. These were recorded at Windsor Road, Penarth; Cogan Roundabout; Railway Terrace, Cardiff Road, Dinas Powys; Tynnewydd Road, Barry; and Culverhouse Cross. Cogan Roundabout and Railway Terrace lie within the study area, with Windsor Road situated just outside the area (approximately 260m east of Cardiff Road (A4055)). There are no Air Quality Management Areas (AQMA) within the study area. There is an AQMA situated along Windsor Road, Cogan, Penarth (Figure 14)<sup>56</sup>.

Figure 13 Air Quality Management Area - Windsor Road, Cogan<sup>17</sup>



6.6.2 The Vale of Glamorgan Council monitors derived NO<sub>2</sub> at four locations within close proximity to the A4055/ Murch Road junction via use of passive diffusion tubes, including monitoring at Dinas Powys Primary School. There are currently a further six NO<sub>2</sub> monitoring locations, four located along and in close proximity to Railway Terrace on Cardiff Road (A4055) and two of which are situated in

<sup>56</sup> Department for Environment Food & Rural Affairs - <https://uk-air.defra.gov.uk/aqma/maps>



relatively close proximity to the Merrie Harrier signalised junction, situated at the façade of a residential property on Andrew Road and on the A4055 which is directly adjacent to the traffic light system.

- 6.6.3 The datasets from the last five years levels are generally all below the set national objective limits for NO<sub>2</sub>. Moreover, levels have been decreasing over the five-year period. NO<sub>2</sub> levels have been found below the set national annual and one-hour objectives for NO<sub>2</sub> (40µg/m<sup>3</sup> & 200 µg/m<sup>3</sup> not to be exceeded more than 18 times per year). The overarching results are highlighted in [Appendix H](#).

## 7 CULTURAL CONTEXT

### 7.1 Introduction

- 7.1.1 This chapter presents the cultural context of the study area. A range of cultural indicators have been explored to further understand the existing cultural situation for the study area. The terms cultural facilities refer to places relating to recreation, the arts and tourism.

### 7.2 Welsh Language

- 7.2.1 The Future Generations of Wales (2015) Act has a well-being goal of '*A Wales of vibrant culture and thriving Welsh language*'. It is noted that this well-being goal will be achieved through '*a society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.*'

### 7.3 Tourism

#### National Context

- 7.3.1 Tourism is recognised by the Welsh Government as one of the nine key sectors of the economy, in particular with the Partnership for Growth: Strategy for Tourism 2013-2020 (Welsh Government, 2013). An overview of the economic role of tourism is given here, since it relates to the recreation, arts and cultural facilities, whilst recognising that tourism is an essential part of the cultural offer of the region.

#### Regional Context

- 7.3.2 Tourism and leisure establish an important role in the Vale of Glamorgan's economy, particularly in the countryside where it contributes significantly to rural diversification. The Vale of Glamorgan's proximity to Cardiff provides a substantial local catchment area for day visitors, it also attracts longer stay tourists wishing to explore more widely across South Wales. In addition, Cardiff Airport provides further opportunities for wider national and international connectivity for tourism. In 2018, the annual STEAM (Scarborough Tourism Economic Activity Model) survey recorded that tourism in the Vale of Glamorgan attracted approximately 4.26 million visitors, an increase of 2.4% from 2017. Tourism also supported almost 2,981 full time equivalent jobs either directly or indirectly and generated in excess of £250 million of revenue to the authority's annual economy.<sup>57</sup>

### 7.4 Cultural Facilities

- 7.4.1 A cultural facility has been defined in this study as a place for activity associated with the arts; sport and other attractions. Cultural facilities entail a broad spectrum of facilities comprising, although not exclusive to, the following: arts and craft centres; beaches and marinas; country parks; golf courses and ranges; heritage attractions and museums; leisure centres and stadia; outdoor activities; trekking and riding centres; visitor attractions. Cultural facilities have largely been identified as presented in the Vale of Glamorgan Tourism Strategy. The cultural facilities include the following in the vicinity of the study area:
- Cosmeston Lakes Country Park.
  - Dinas Powys Golf Club.
  - St Andrew's Major Golf Club, Barry.
  - Cosmeston Medieval Village.
  - Dinas Powys Castle.
  - Argae House Stables, St Andrews Major.
  - Downside Riding Centre, Penarth.

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<sup>57</sup> STEAM (2018) Vale of Glamorgan Council Summary

## 8 DATA SOURCES

### 8.1 Introduction

8.1.1 In accordance with the WelTAG guidance this chapter summarises the data sources used in and to inform this WelTAG Stage Two: Impacts Assessment Report.

### 8.2 Data Sources

8.2.1 The sources of data used within this Stage One appraisal are as follows:

- AECOM (2014) Mid and North Wales – 2011 Journey to Work Analysis
- Capita Dinas Powys to Cardiff Corridor Bus Priority Measures (2015)
- Cardiff Capital Region Metro Study (2013)
- City Population (2016) – <https://www.citypopulation.de/php.uk-wales.php?adm2id=W06000014>
- Future Generation Commissioner (2020) Future Generations Report 2020 - Transport
- Highways Impact Assessment, Vale of Glamorgan LDP Background Paper (2013)
- National Rail Enquiries - <http://www.nationalrail.co.uk/>
- National Transport Finance Plan (2015) and Evidence Base
- Network Rail - <http://www.networkrail.co.uk/wp-content/uploads/2016/11/South-Wales-investment-map.pdf>
- Office for National Statistics (2011) 2011 Census
- Office of Road and Rail (2020) Estimates of Station usage 2018-19
- Rail Engineer – Cardiff Area Signalling Renewal - <https://www.railengineer.uk/2016/02/28/cardiff-area-signalling-renewal/>
- Railway Technology – Cardiff Area Signalling Renewal (CASR) Project, United Kingdom <http://www.railway-technology.com/projects/cardiff-area-signalling-renewal-casr-project/>
- Rapid Transport for Cardiff: Scoping, Feasibility, Engineering and Economic Study (2013)
- South East Wales Transport Alliance (Sewta) Rail Strategy (2013) (Jacobs)
- South East Wales Transport Alliance (Sewta) Regional Bus and Community Transport Network Strategy (2014)
- South East Wales Transport Alliance (Sewta) RTP (2010)
- STEAM (2018) Vale of Glamorgan Summary: <https://www.visitthevale.com/Documents/Trade-News/STEAM/VOG-Basic-ES-18.pdf>
- Sustainable Transport Assessment, LDP Background Paper (2013)
- Traveline Cymru - <https://www.traveline.cymru/>
- Vale of Glamorgan Council (2013) Deposit LDP 2011-2026
- Vale of Glamorgan Council (2013) Adopted LDP 2011-2026
- Vale of Glamorgan Council (2013) LDP 2011-2026: Sustainable Transport Assessment
- Vale of Glamorgan Council Local Transport Plan 2015-30
- Vale of Glamorgan Council (2013) Vale of Glamorgan Deposit LDP (2011-2026) Proposals Map Deposit Plan - <https://www.valeofglamorgan.gov.uk/Documents/Living/Planning/Policy/LDP-2013/02-LDP-Proposals-Map-2013.pdf>
- Welsh Government (2017) – WelTAG 2017 Welsh Transport Appraisal Guidance



- Welsh Government (2015) – Well-being of Future Generations (Wales) Act 2015
- Welsh Government (2013) – Active Travel (Wales) Act 2013
- Welsh Government (2015) – Active Travel (Wales) Act 2013 Annual Report 2015
- Welsh Government (2016) – Environment Act 2016
- Welsh Government (2018) – Public Transport (Wales) Bill 2018
- Welsh Government (2011) – The Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011
- Welsh Government (2011) – Welsh Language (Wales) Measure 2011
- Welsh Government (2008) – Wales Transport Strategy (One Wales: Connecting the Nation)
- Welsh Government (2013) Partnership for Growth: Strategy for Tourism 2013 to 2020
- Welsh Government (2015) – Natural Resources Policy
- Welsh Government (2017) – Taking Wales Forward 2016-2021
- Welsh Government (2017) – Prosperity for All: The National Strategy
- Welsh Government (2018) – Planning Policy Wales: Edition 10
- Welsh Government (2017) – Prosperity for All: Economic Action Plan
- Welsh Government (2019) – Prosperity for All: A Low Carbon Wales
- Welsh Government (2019) – Climate Emergency
- Welsh Government (2018) – Cymraeg 2050: Welsh Language Strategy
- Welsh Government (2018) – National Transport Finance Plan (Update)
- Welsh Government (2018) – Decarbonising Wales Programme 2018: <https://gov.wales/written-statement-update-decarbonisation-programme>
- Welsh Government (2020) Future Wales: The National Plan 2040 – Working Draft
- Welsh Government - Noise Priority Areas (2020): <http://extrium.co.uk/walesnoiseviewer.html>
- Welsh Government (2018) Tackling roadside nitrogen dioxide concentrations in Wales:  
<https://gov.wales/sites/default/files/publications/2019-04/tackling-roadside-nitrogen-dioxide-concentrations-in-wales.pdf>
- Welsh Government (2020) Stats Wales:  
<https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Greenhouse-Gas/emissionsofgreenhousegases-by-year>
- Welsh Government (2019)- Welsh Index of Multiple Deprivation

**APPENDIX A**

**Taking Wales Forward Relationship with Prosperity for All**

## Well-being Objectives



## Key Themes

### **'Prosperity For All'** - the national strategy

The strategy sets out how we will deliver for Wales during this term  
- and set long-term foundations for the future.

### **'Taking Wales Forward'** - The Programme for Government 2016-2021

The programme sets out what we will deliver for Wales during this Assembly term.



## Well-being of Future Generations Act

The Act sets out the need for a long-term focus, and five 'ways of working' to guide the Welsh public services in delivering for people.



## **APPENDIX B**

### **SEWTM Dinas Powys Bypass (Green Route) Scheme Modelling**

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<b>Project:</b>	Dinas Powys Bypass Scheme Modelling		
<b>Our reference:</b>	402338	<b>Your reference:</b>	-
<b>Prepared by:</b>	Matt Palmer	<b>Date:</b>	01/07/20
<b>Approved by:</b>	Phil Old	<b>Checked by:</b>	George Bate
<b>Subject:</b>	Methodology Note		

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## 1 Introduction

### 1.1 Purpose

Mott MacDonald has been commissioned by Transport for Wales to undertake strategic transport modelling for a bypass around Dinas Powys bypass and associated junction improvements using the South East Wales Transport Model (SEWTM), following a request from Arcadis working on behalf of Vale of Glamorgan Council. Strategic modelling is required to support a WelTAG Stage 2 study for the scheme.

This Technical Note has been prepared to summarise the modelling approach adopted for the study, including validation checks, network coding assumptions, and outputs delivered.

### 1.2 South East Wales Transport Model (SEWTM)

SEWTM is a multi-modal disaggregate demand model of South East Wales, covering the eleven unitary authority areas of Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Neath Port Talbot, Newport, Rhondda Cynon Taf, Torfaen, and Vale of Glamorgan. The model comprises separate highway and public transport assignment models linked together with a demand model. The model was commissioned by Welsh Government in 2015 and has been developed by a team led by Mott MacDonald, and including Arup, RAND Europe, and David Simmonds Consultancy.

The model represents an average weekday for four time periods: an AM average hour between 0700 and 0930, an inter-peak (IP) average hour between 0930 and 1530, an average PM hour between 1530 and 1800 and an off-peak (OP) average hour between 1800 and 0700. The assignment models can also represent peak hours within the AM and PM peak periods. Peak hours are the single hours during which the highest volume of trips are undertaken; between 0745 and 0845, and between 1630 and 1730. The SEWTM base year is 2015, with forecast years of 2026 and 2036 currently available.

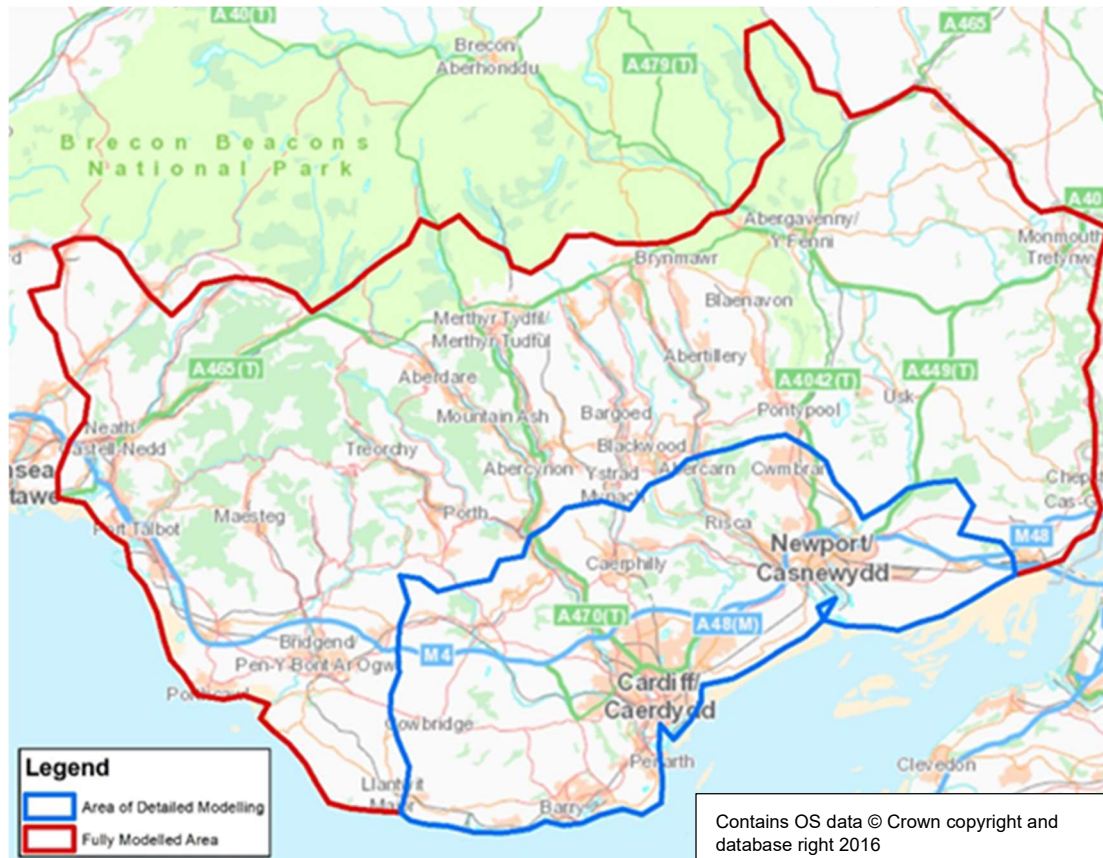
SEWTM geographical coverage is shown in Figure 1. Dinas Powys and the location of the bypass, as well as the wider area in which the greatest transport impacts are likely to be, are well within the Area of Detailed Modelling. This is the area of the transport model within which significant impacts of interventions are more certain. Within this area the model represents all trips (demand), model zones are small and highly disaggregated, the transport network is detailed, and junction modelling is included.

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

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Figure 1: SEWTM modelled area



Source: Mott MacDonald

### 1.3 Approach Overview

An overall approach to the strategic modelling, which is proportionate to the scale of the scheme and current development stage, was agreed with Arcadis in advance:

- Code highway schemes into existing 2026 and 2036 highway networks;
- Run Variable Demand Models (VDMs) to assess the change in travel patterns;
- Run a multi-modal TUBA and check the sensibility of the outputs; and
- Provide Arcadis with the TUBA input files.



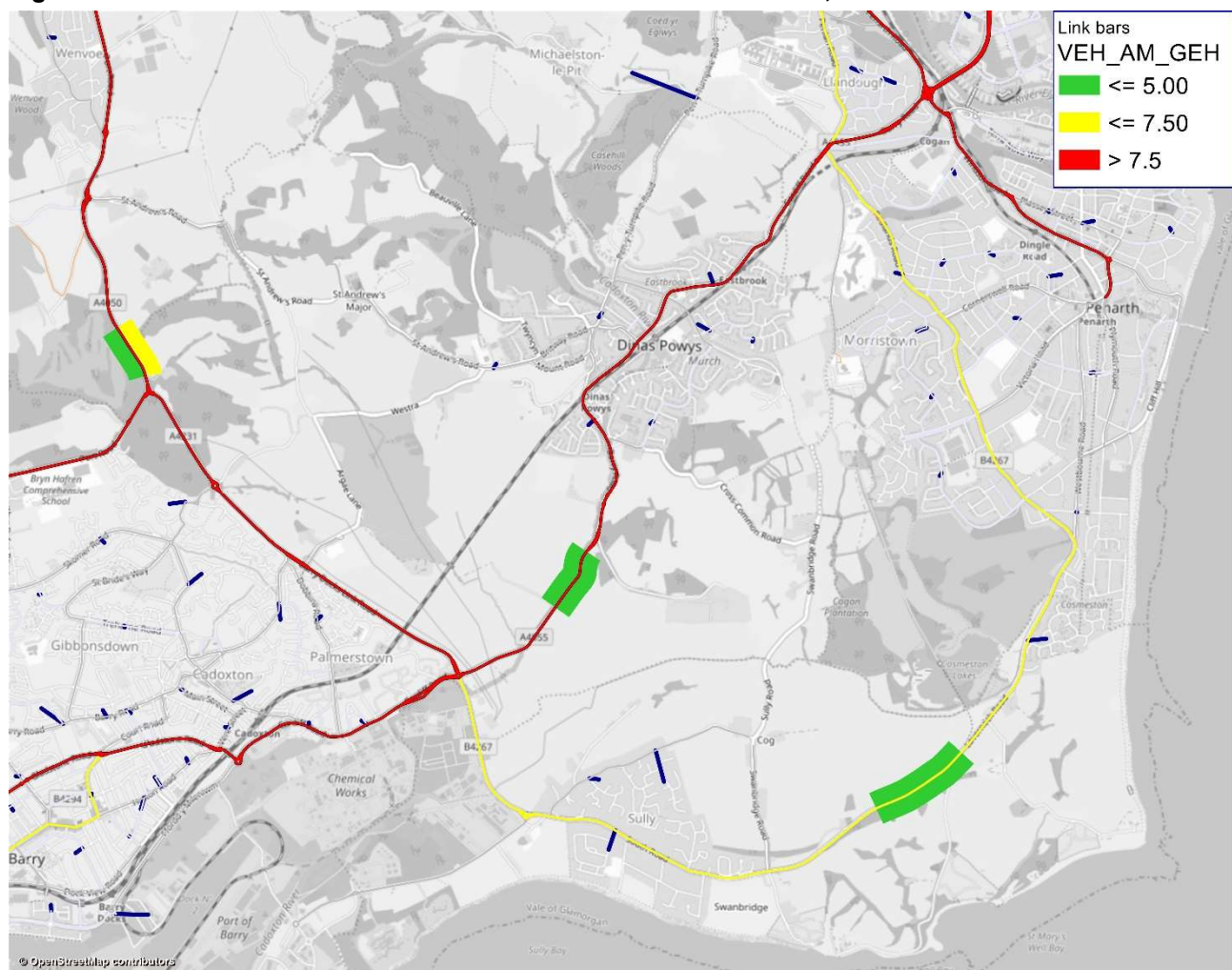


### 3 Highway Validation

A review of 2015 base year highway model performance in the study area has been undertaken. The review indicated that the model presented a good level of validation in terms of screenlines and link flow volumes. This includes the existing road section adjacent to the scheme on the A4055. Link validation results for all time periods, based on the standard GEH statistic, are shown in Figure 3, Figure 4, Figure 5 and Figure 56. The link flow volumes on the B4267 to the east of the scheme did not validate as well in the Inter-Peak period, in which modelled flows are lower than observed flows (note that this is a 1-day count only and hence less reliable). Nevertheless, the model is considered suitable for this assessment.

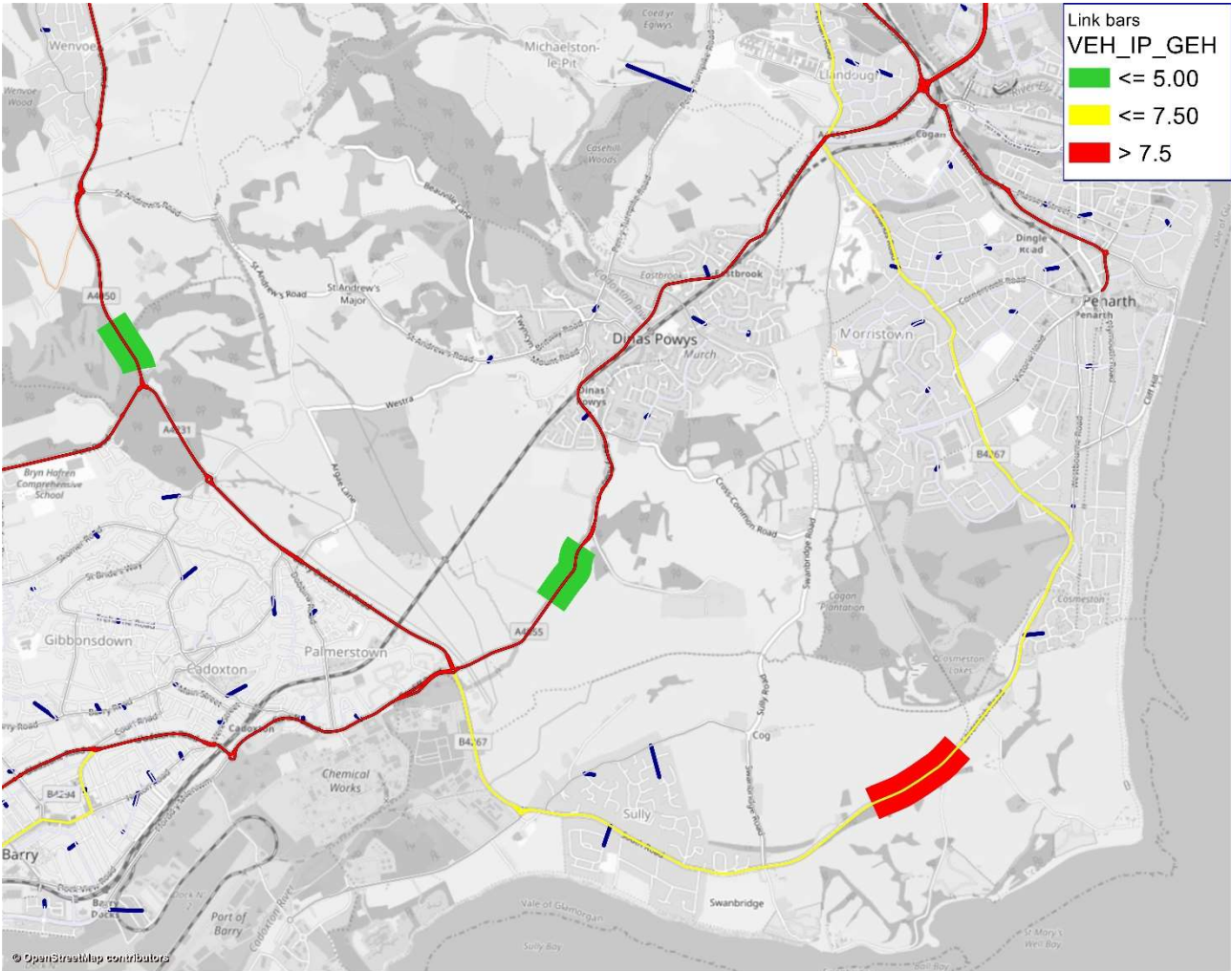
The model journey times were analysed along strategic routes. The route containing the A4055 displays a good level of validation across all time periods.

**Figure 3: Base Year Model Link Calibration/Validation – All Vehicles, AM 2015**



Source: Mott MacDonald

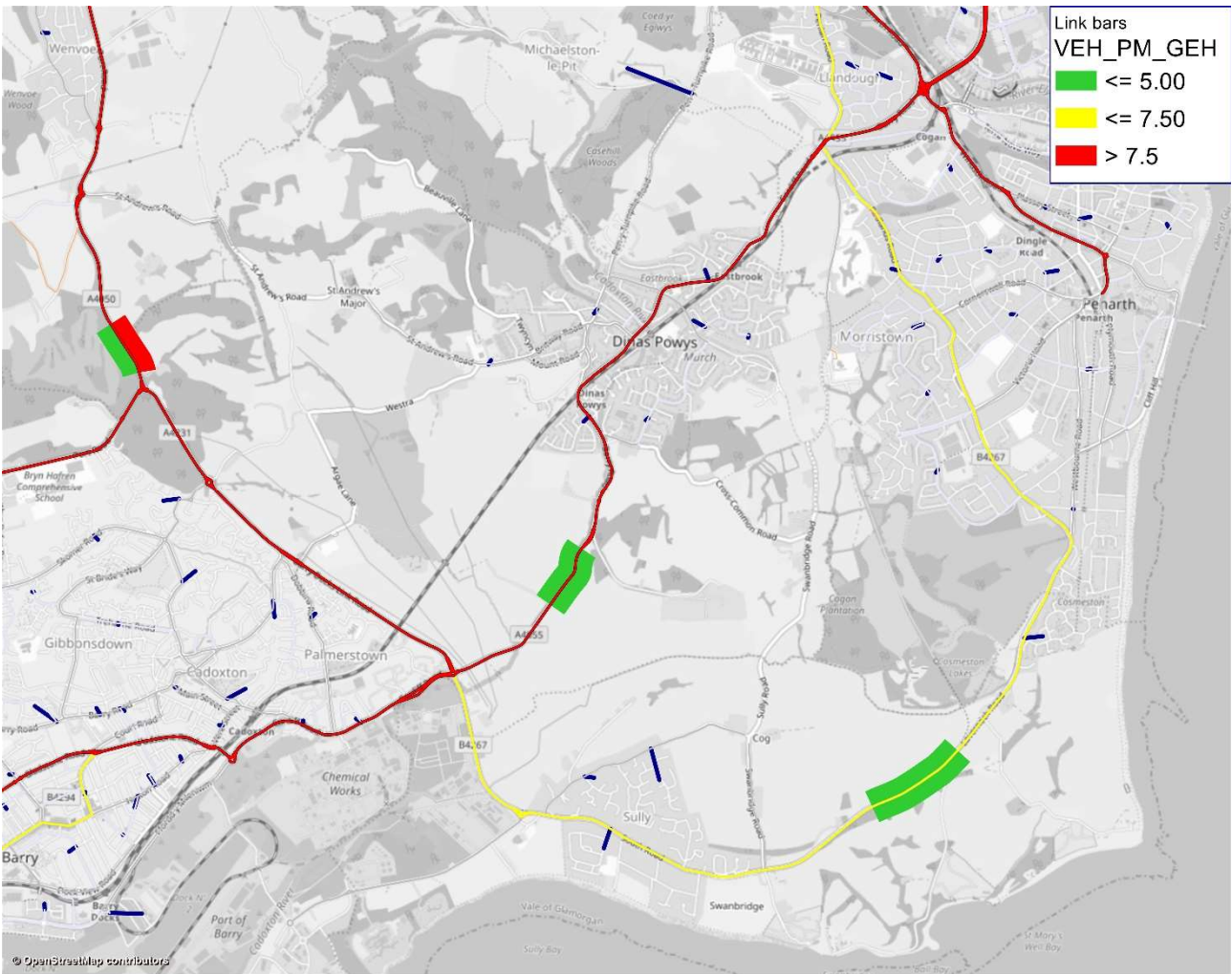
Figure 4: Base Year Model Link Calibration/Validation – All Vehicles, Inter-Peak 2015



Source: Mott MacDonald



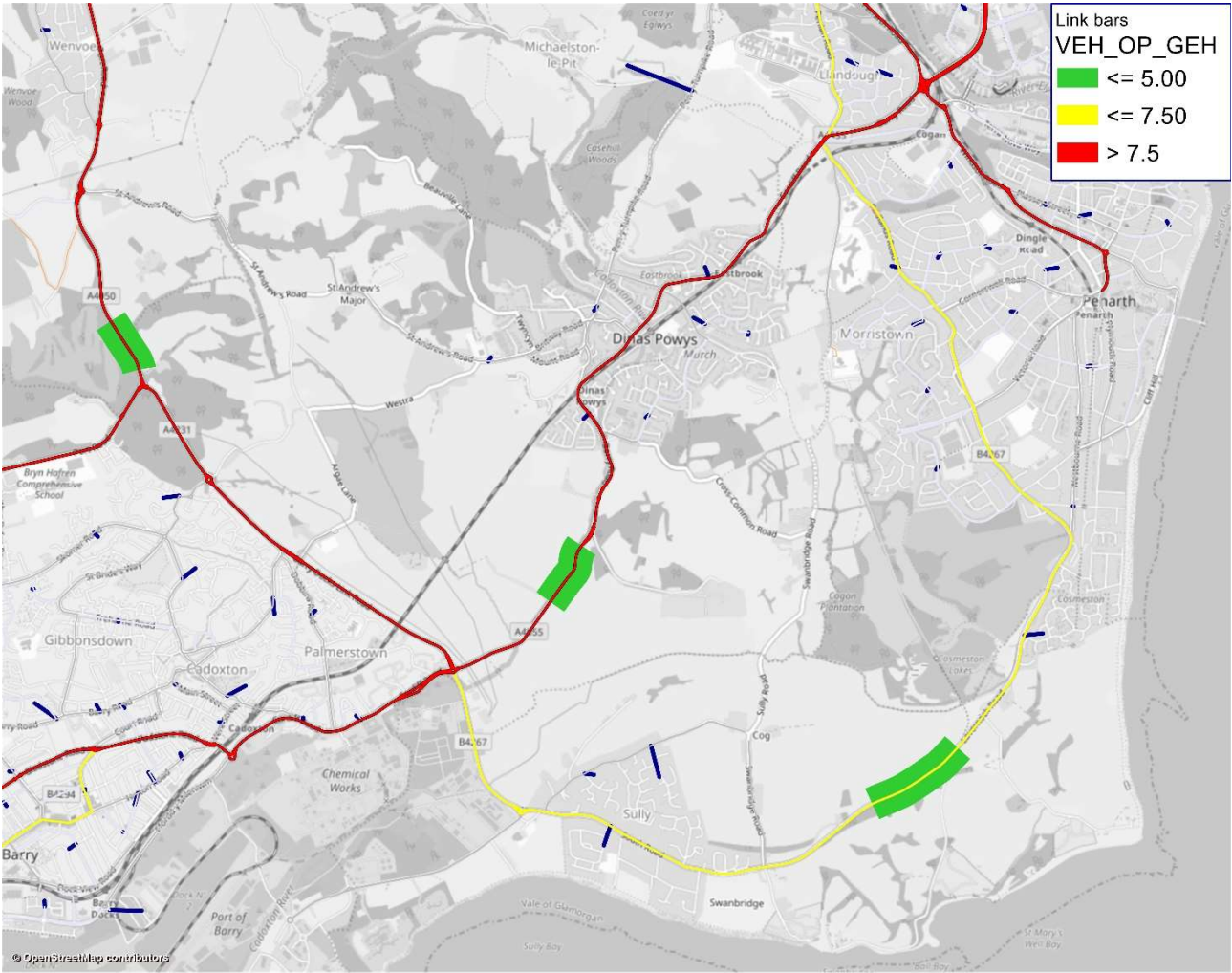
Figure 5: Base Year Model Link Calibration/Validation – All Vehicles, PM 2015



Source: Mott MacDonald



Figure 6: Base Year Model Link Calibration/Validation – All Vehicles, Off-Peak 2015



Source: Mott MacDonald

## 4 Do-Minimum Networks

The SEWTM Do-Minimum highway networks used for this study include the following proposed schemes:

- Five Mile Lane Scheme, involving a range of improvements to the A4226 between Sycamore Cross and Weycock Cross;
- A465 Dualling between Gilwern and Dowlais Top and new section north of Rassau;
- M4 Junction 32 improvements, including a new dedicated left turn lane from the M4 westbound;
- M4 Junction 33 Improvements;
- Cardiff Eastern Bay Link Phase 1;
- Removal of Severn Bridge Tolls;
- A4119 / A473 Roundabout Improvements;
- Reduction of capacity on Castle Street, closure of Westgate Street to through-traffic and associated changes; and
- East Side Scheme (Cardiff City Centre), incorporating two one-way loops around Churchill Way.

The public transport scenario for both forecast years is developed from the Keolis-Amey proposals for Metro Phase 2. This includes:

- A total of 4 trains per hour (tph) from Cardiff to each of Treherbert / Aberdare / Merthyr / Rhymney / Coryton;
- New direct services (2tph) from Treherbert / Aberdare / Merthyr into Cardiff Bay, as part of the 4tph total on each of these lines; and
- Some Aberdare services routed via the City Line so that the City Line is better connected to the wider rail network.

## 5 Do-Something Coding

The 2026 and 2036 Do-Something networks consist of the Do-Minimum network with the additional coding of the bypass and Merrie Harrier Junction improvements. Figure 7 below shows the link coding in the Do-Something networks in the vicinity of the scheme.

**Figure 7: Modelling of the Bypass**



The following assumptions have been made with regards to the scheme coding:

- Single carriageway link classification with a fixed speed of 62km/h (except in the event that queues form) along the full extent of the bypass;
- Two-lane roundabouts at either end of the bypass with two lanes on most approaches, based on the scheme drawings provided;
- Signal coding for the Merrie Harrier junction is based upon the signal specifications provided with the assumption that the pedestrian demand-dependent stages are called every other cycle; and
- Due to the size of zones (and zone loading points) in the proximity of the scheme , no intermediate junctions were coded along the scheme link.

## 6 Population and Jobs Forecasts

There are currently two sets of population and jobs forecasts available for use in SEWTM:

- A core scenario with development sites deemed “near certain” and “more than likely” included, and population and jobs growth controlled to Experian data by Local Authority; and
- An alternate scenario, with population and jobs fixed as per 2015 at existing locations, with the addition of development sites deemed “near certain”, “more than likely” and “reasonably foreseeable”.

This exercise has been undertaken using the alternate scenario assumptions as a basis, as specified by Arcadis. Table 1 below outlines the development sites in the Vale of Glamorgan in this scenario. Dwellings and jobs values are the same in both forecast years, since build out has been assumed as 100% by 2026.

**Table 1: Development Sites Modelled in The Vale of Glamorgan**

Name	Likelihood	Dwellings	Jobs
Phase 2, Barry Waterfront	Near certain	1700	720
Land at Higher End, St. Athan (in part)	More than likely	220	0
Land at Church Farm, St. Athan	Reasonably foreseeable	250	0
Land to the east of Eglwys Brewis, St Athan	Near certain	255	0
Land between new Northern Access Road and Eglwys Brewis Road, Llantwit Major	Reasonably foreseeable	375	0
Land to the north and west of Darren Close, Cowbridge	Near certain	475	0
Land at Upper Cosmeston Farm, Lavernock	Reasonably foreseeable	576	0
Land at and adjoining St. Cyres School, Murch Road	Near certain	300	0
Land north of the Railway Line, Rhoose	Near certain	700	0
Land West of Swanbridge Road, Sully	Near certain	500	0
ITV Wales, Culverhouse Cross	Near certain	224	0
Land to the South of Junction 34 M4 Hensol (Strategic & Local)	Reasonably foreseeable	0	3000
Land adjacent to Cardiff Airport and Port Road, Rhoose (part of St Athan - Cardiff Airport Enterprise Zone)	Reasonably foreseeable	0	4000
Aerospace Business Park, St Athan Rhoose (part of St Athan - Cardiff Airport Enterprise Zone)	Reasonably foreseeable	0	2000
Atlantic Trading Estate	Reasonably foreseeable	0	910
Land at Ffordd y Mileniwm	Near certain	0	890
Hayes Road, Sully	Reasonably foreseeable	0	750
Llandow Trading Estate	Reasonably foreseeable	0	680
Vale Business Park	Reasonably foreseeable	0	1240

## 7 Outputs

Mott MacDonald has undertaken an assessment of the scheme using the DfT's Transport User Benefits Appraisal (TUBA) software for checking purposes, using version 1.9.13 of the software. Results of this TUBA run have not been supplied since scheme costs have not been incorporated. The following input files have been supplied, on the understanding that these will be adapted for use in a full economic appraisal:

- Economics input file based on the standard version supplied with the software, with adaptations to combine the two OGV vehicle classes into a single category;



- Scheme file, including annualisation parameters based on standard SEWTM hour to period factors;
- Highway time and distance skims and demand matrices (vehicle units) in TUBA format for car business, car commute, car other, LGV and HGV trip purposes;
- Public transport time and fare skims and demand matrices in TUBA format for business, commute and other purposes, with standard journey time component factors applied. These are supplied separately for bus and rail passengers, where rail passengers are defined as using a rail service at some point during their journey but may also use bus, and bus passengers are defined as using a bus service at some point during their journey but may not use rail services. Since SEWTM public transport outputs are not usually split by trip purpose, the purpose splits from the demand model's synthetic estimates of trip making have been applied. It is noted that since time and fare skims are the same between DM and DS scenarios, the only PT related benefit in the TUBA is the change in fares due to the service operators;
- Reference distance matrices; and
- Sector files, based upon Local Authority boundaries in the model area.

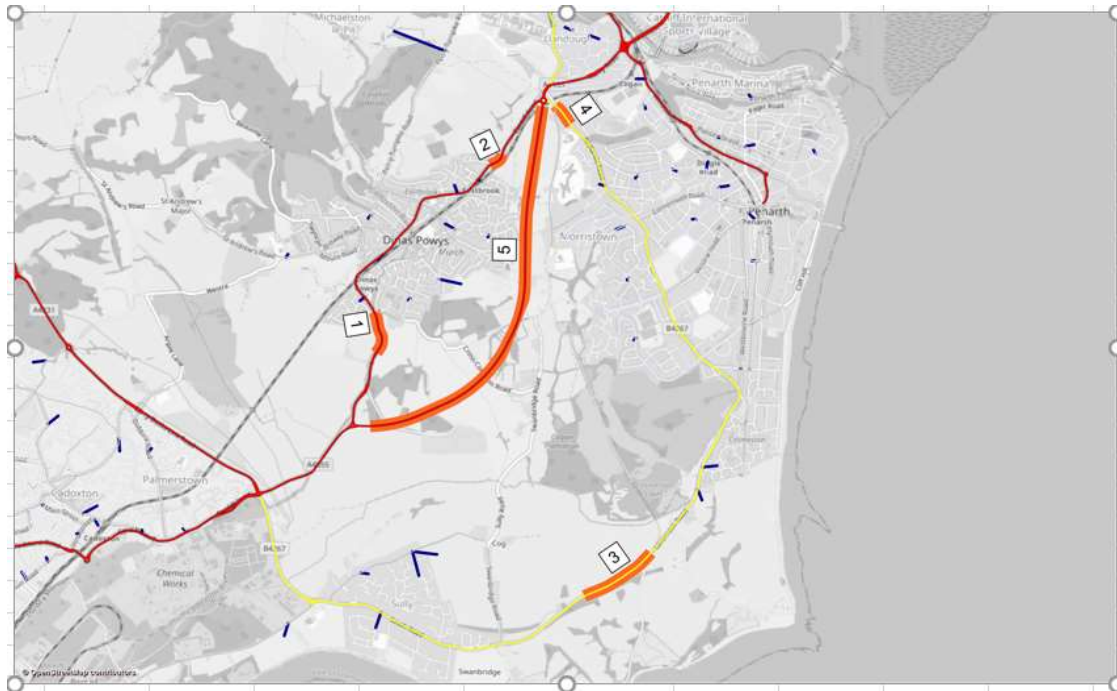
In addition to the TUBA inputs described above, the following outputs have also been provided:

- Network flow difference plots;
- Summary of modelled boardings and alightings for Dinas Powys and other nearby stations; and
- Summary of flows on bypass and competing road links.

Section	Direction	2026 DM	2026 DS	Diff.	2036 DM	2036 DS	Diff.
1	NB	10765	2922	-7843	11398	3132	-8267
	SB	10043	2416	-7627	10780	2546	-8234
2	NB	12234	6055	-6179	12748	6398	-6350
	SB	12100	5859	-6241	12848	6088	-6760
3	NB	5623	3892	-1731	6200	4312	-1888
	SB	5277	3785	-1492	5745	4331	-1414
4	NB	9298	12576	3278	9885	13452	3567
	SB	11333	13710	2377	12138	14633	2496
5	NB	0	11456	11456	0	12248	12248
	SB	0	10624	10624	0	11149	11149
Subtotal	NB	21532	30087	8555	22633	32098	9466
	SB	23433	30193	6760	24985	31870	6884

Subtotal is sum of sections 2, 4 and 5

Time Period	Period	Assignment	Assignment	Hwy Factor	Bus Factor	Rail Factor
AM	07:00-09:30	Peak	07:45-08:45	2.2	2	1.84
IP	09:30-15:30	Average	Average	6	6	6
PM	15:30-18:00	Peak	16:30-17:30	2.38	2.82	2.08
OP	18:00-07:00	Average	Average	13	13	13



**APPENDIX C**

**Highway Network Traffic**

Figure 3.1 Biglis Roundabout

Project Number: **TSP13598**  
 Project Name: **Dinas Powys**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **1**  
 Location: **Biglis Roundabout (A4055/ A4231/ B4267)**

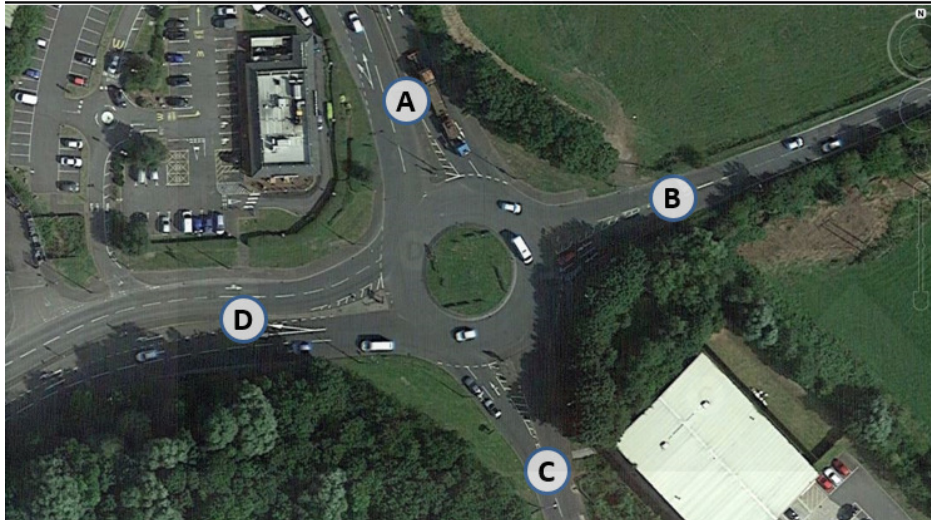


Figure 3.2 A4055/Station Rd

Project Number: **TSP13598**  
 Project Name: **Dinas Powys**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **2**  
 Location: **A4055 / Station Road**

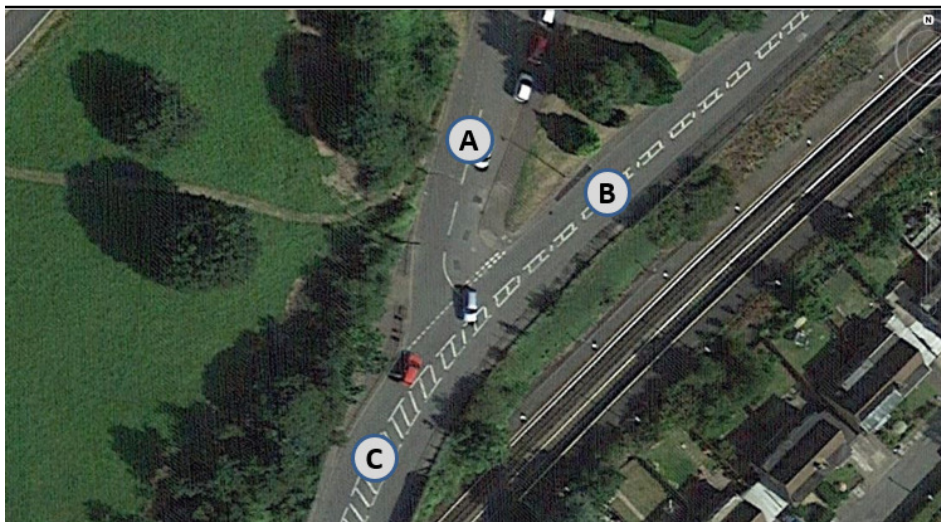




Figure 3.3 Milbrook Rd / A4055 / Murch Rd

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**  
Location: **Milbrook Road / A4055 / Murch Road**

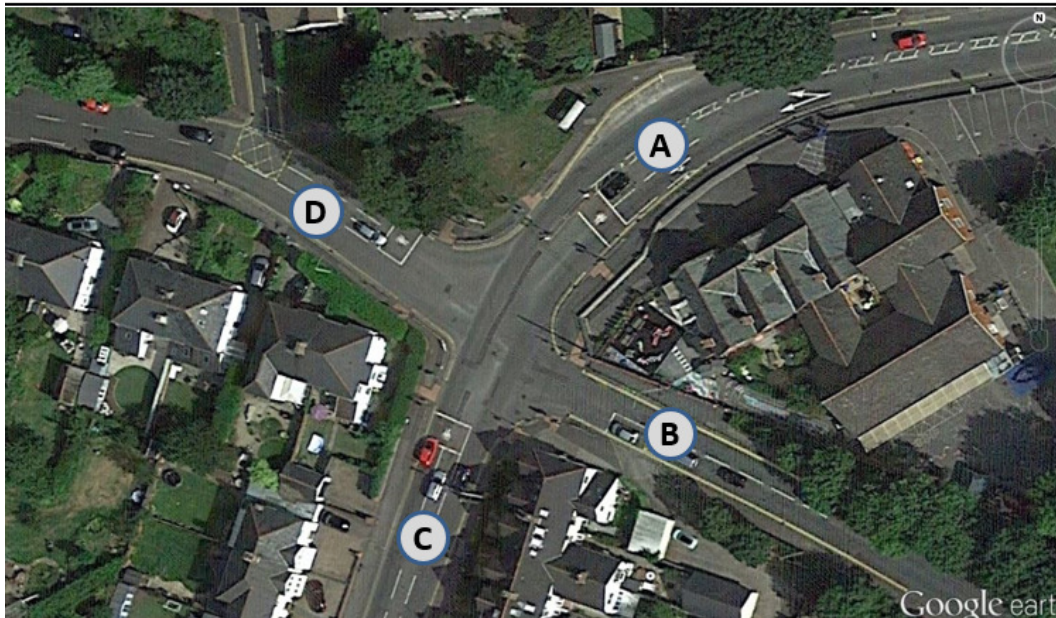


Figure 3.4 Merrie Harrier Junction

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **4**  
Location: **Merrie Harrier Junction (A4055/ B4267/ Andrew Road)**

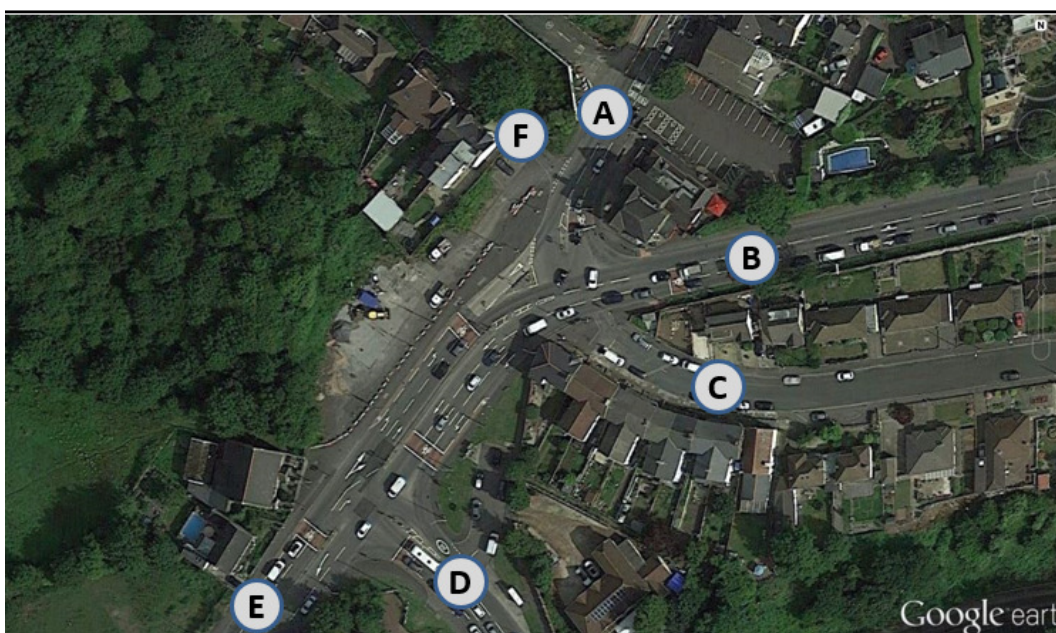




Figure 3.5 Leckwith Rd B4267 / Pen-Y-Turnpike Rd

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **5**  
Location: **Leckwith Road B4267 / Pen-Y-Turnpike Road**

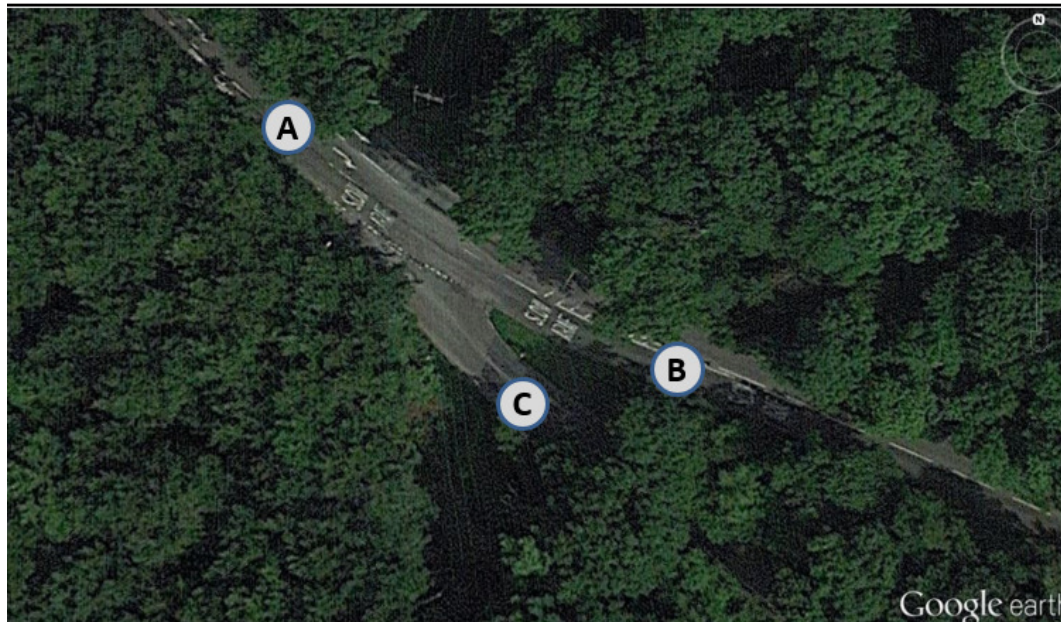


Figure 3.6 Barons Court Junction

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **6**  
Location: **Barons Court Junction (A4160 / A4055)**

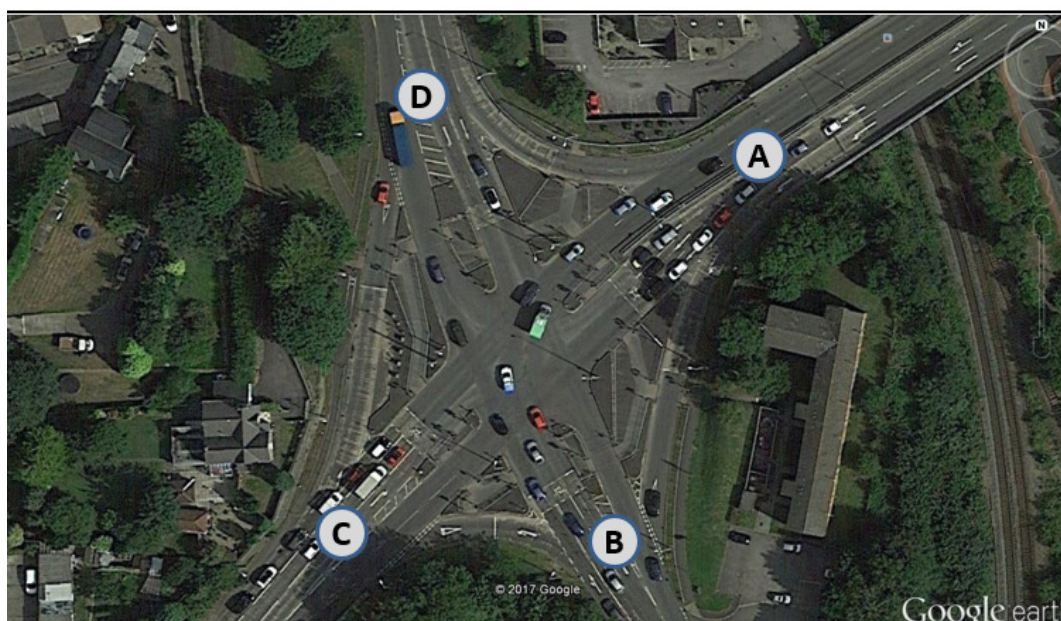




Figure 3.7 Milbrook Rd / Pen-Y-Turnpike Rd

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **7**  
Location: **Millbrook Road / Pen-Y-Turnpike Road**



Figure 3.8 Britway Rd / Mill Rd

Project Number: **TSP13598**  
Project Name: **Dinas Powys**  
Survey Type: **Manual Classified Turning Count**  
Site No: **8**  
Location: **Britway Road / Mill Road**

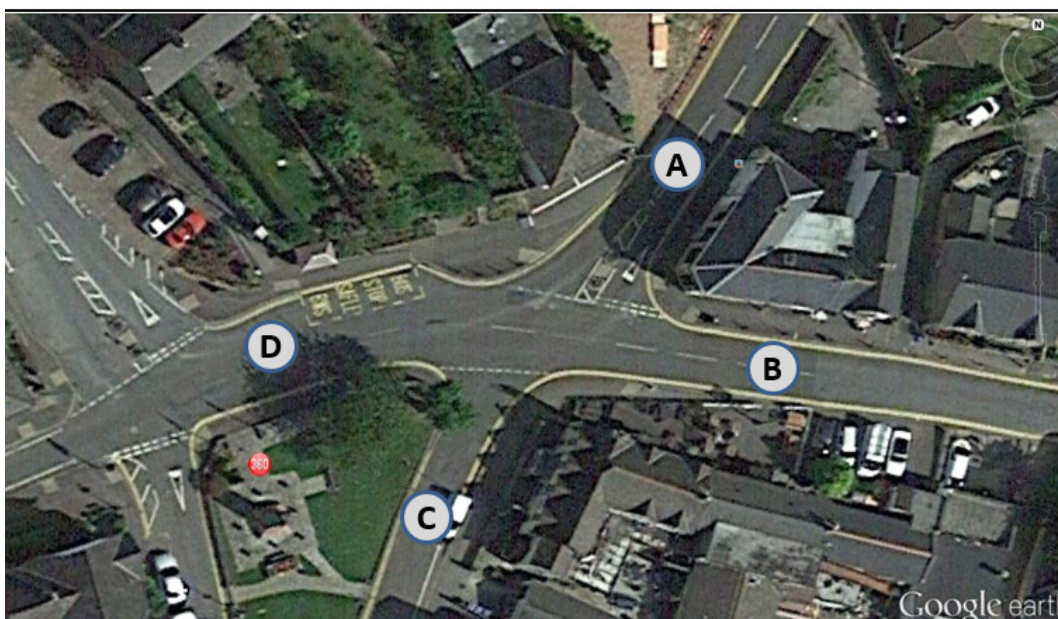


Figure 3.9 Location of ANPR cameras - Barons Court Junction , Merrie Harrier junction, B4267/Llandough Hill Junction, Leckwith Road B4267 / Pen-Y-Turnpike Road Junction

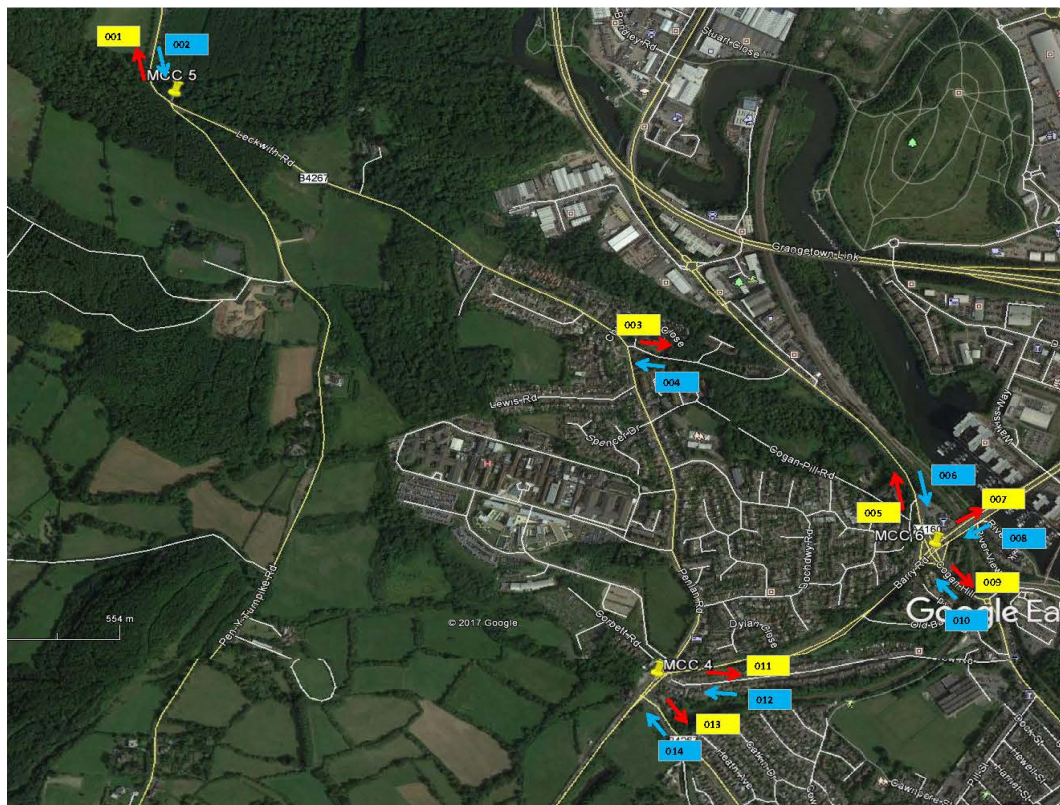




Figure 3.10 Location of ANPR cameras - Britway Road / Mill Road Junction, Millbrook Road/A4055/Murch Road Junction, Millbrook Road / Pen-Y-Turnpike Road Junction and Biglis roundabout

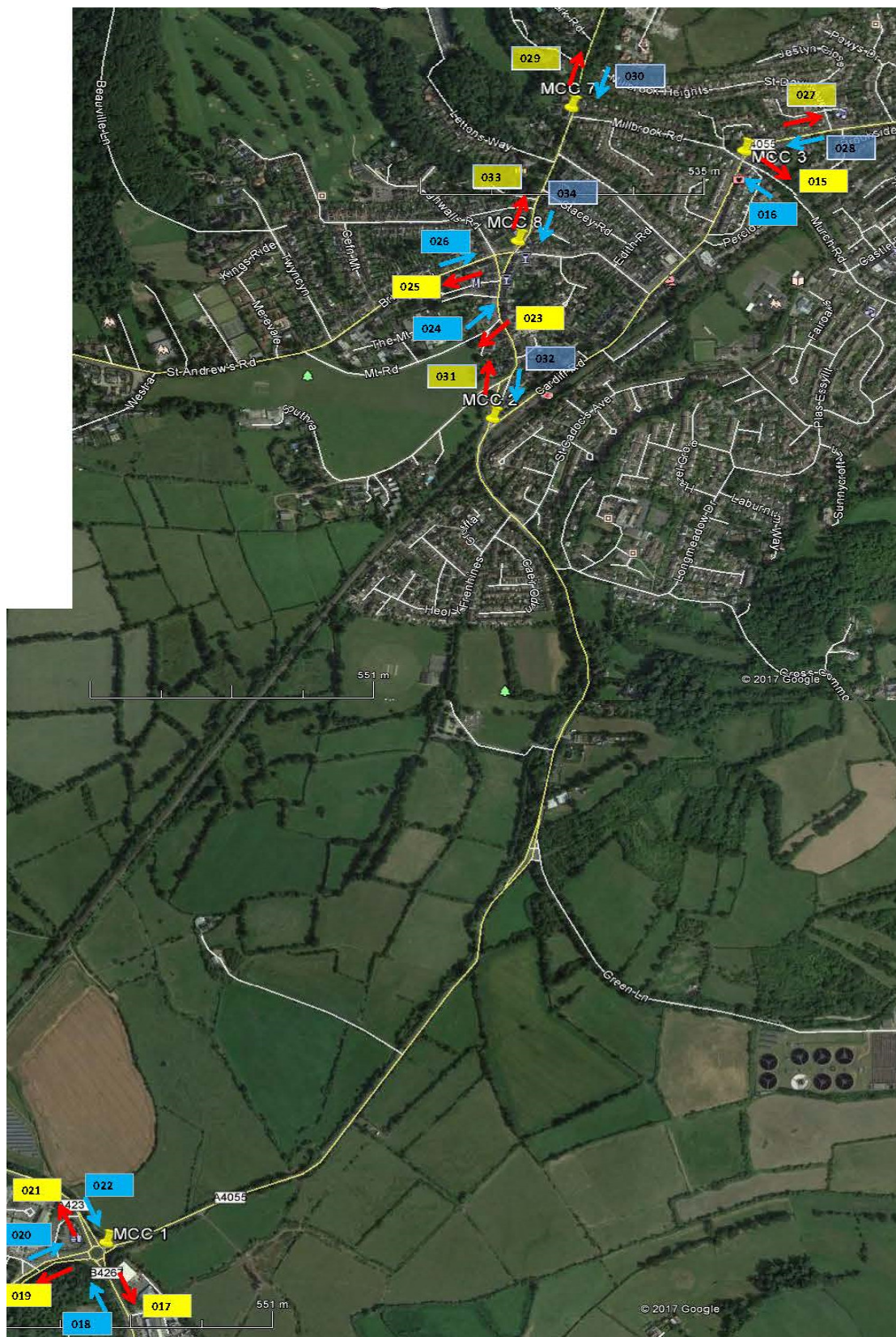


Figure 3.11 Road Segments

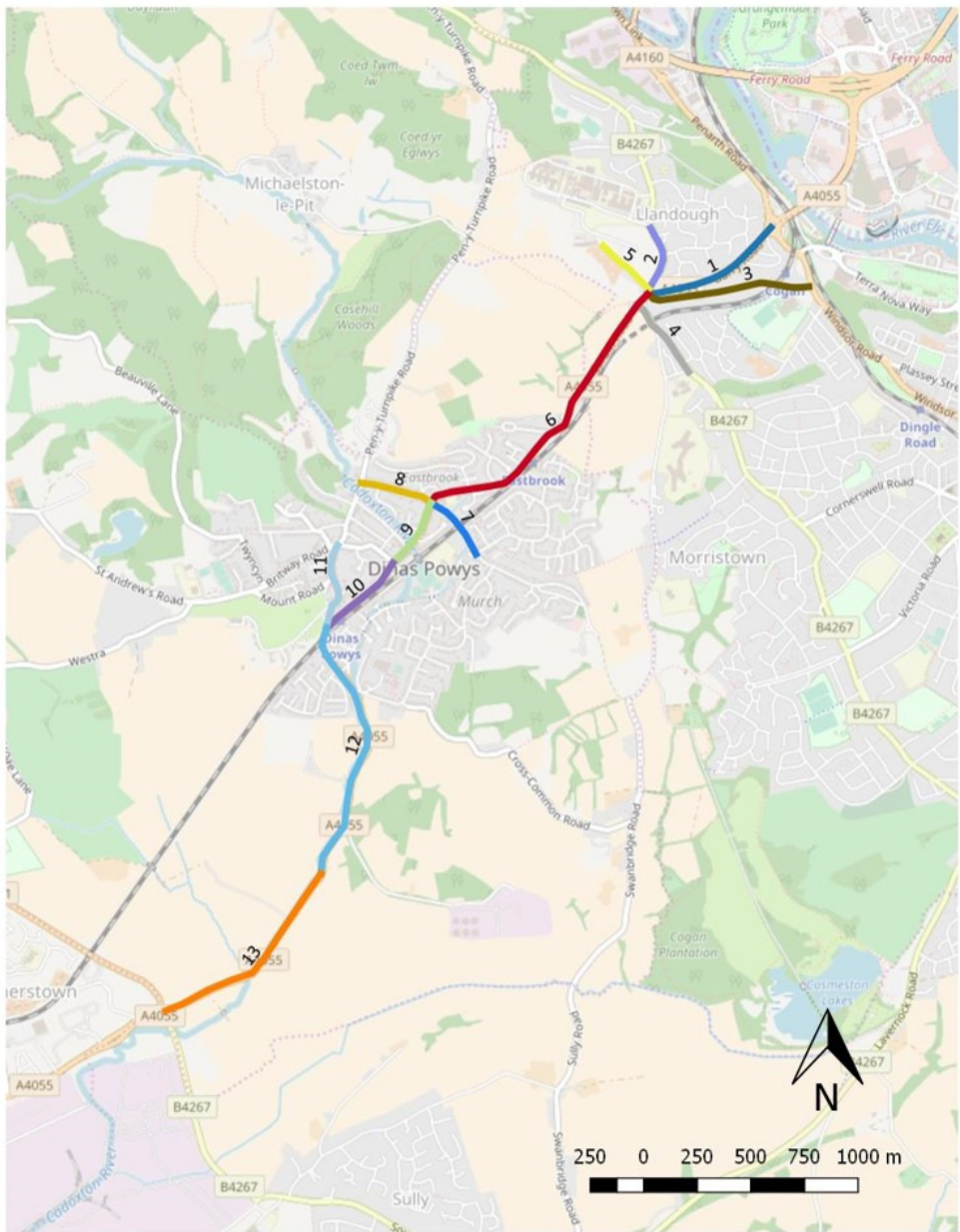




Figure 3.12 Average of Vehicles per hour in the AM peak (Northbound / Southbound)

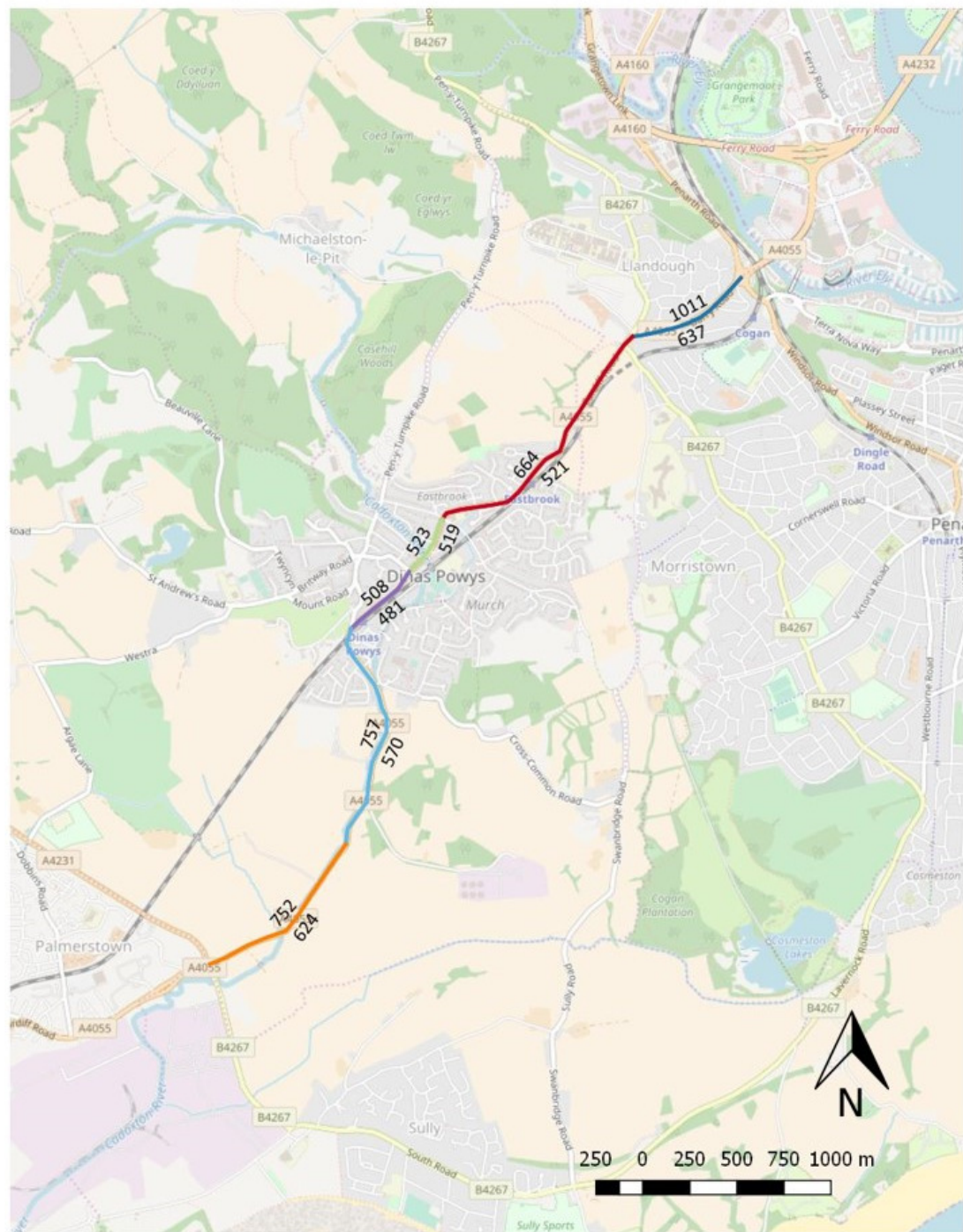


Figure 3.13 Average of Vehicles per hour in the Inter Peak (Northbound / Southbound)

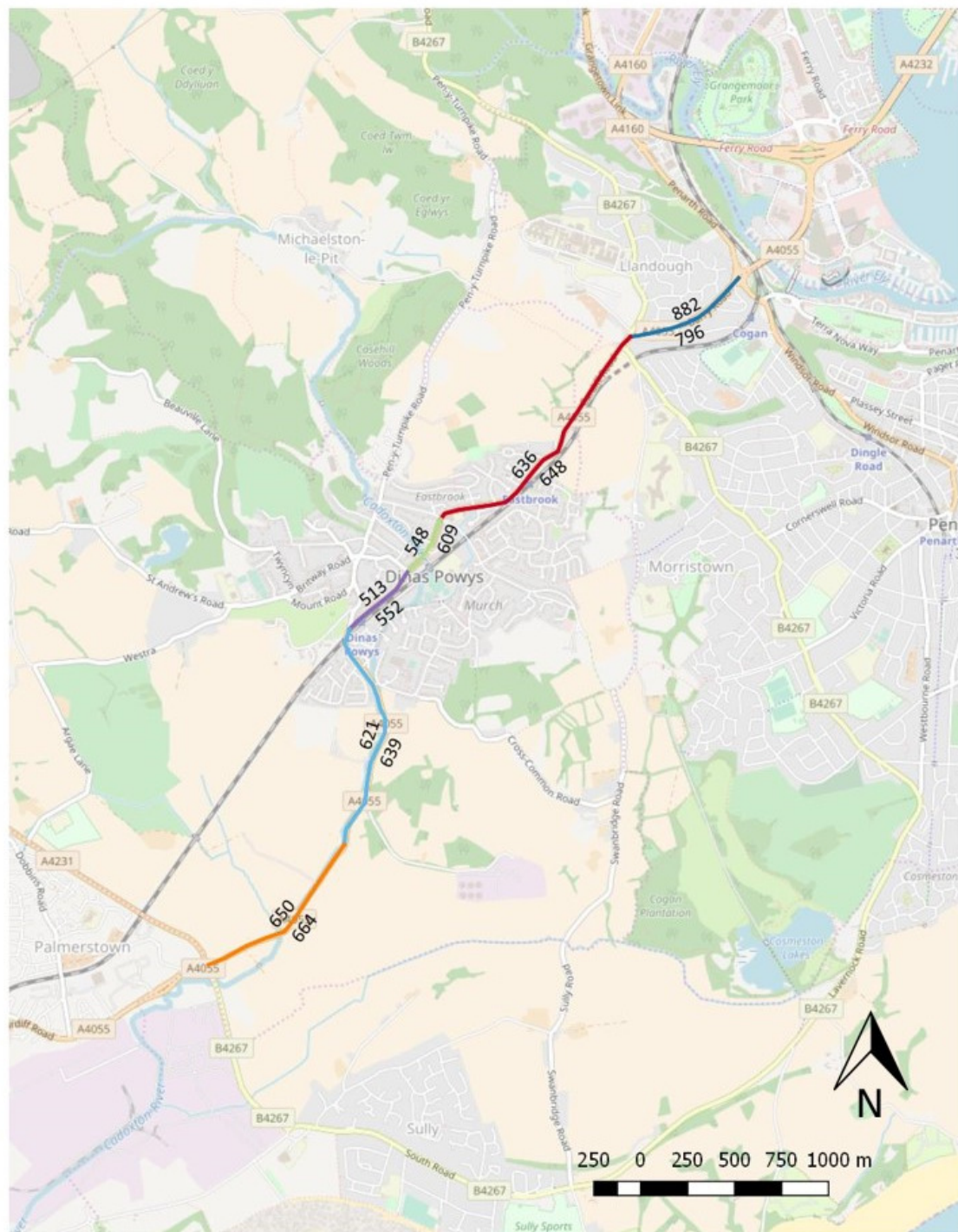




Figure 3.14 Average of Vehicles per hour in the PM peak (Northbound / Southbound)





Client: Arcadis Consulting (UK) Limited

Project Number: TSP13819

Project Name: Dinas Powys - May 2018

Survey Type: ANPR

Survey Date: 15 May 2018, Tuesday

Survey Time: 07:00 - 19:00







Location	Direction	Recs	Match	Unmatch	%	Control Counts	Sample Rate
1	O -1	8083	5305	2778	65.6%	8914	91%
2	I -2	7117	5490	1627	77.1%	7452	96%
3	O -3	7603	4666	2937	61.4%	8471	90%
4	I -4	7678	6024	1654	78.5%	8094	95%
5	O -5	6636	5331	1305	80.3%	6949	95%
6	I -6	6603	4803	1800	72.7%	7097	93%
7	O -7	2812	1877	935	66.7%	3087	91%
8	I -8	2981	2377	604	79.7%	3155	94%
9	O -9	7038	5958	1080	84.7%	7264	97%
10	I -10	7892	5428	2464	68.8%	8296	95%
11	O -11	5873	4983	890	84.8%	6261	94%
12	I -12	5338	3998	1340	74.9%	5461	98%



Client: **Arcadis**

Project Number: **TSP13819**

Project Name: **Dinas Powys - May 2018**

Survey Type: **Manual Classified Turning Count**

Survey Date: **15 May 2018, Tuesday**

Survey Time: **07:00 - 19:00**

Weather: **Dry**

Comments:

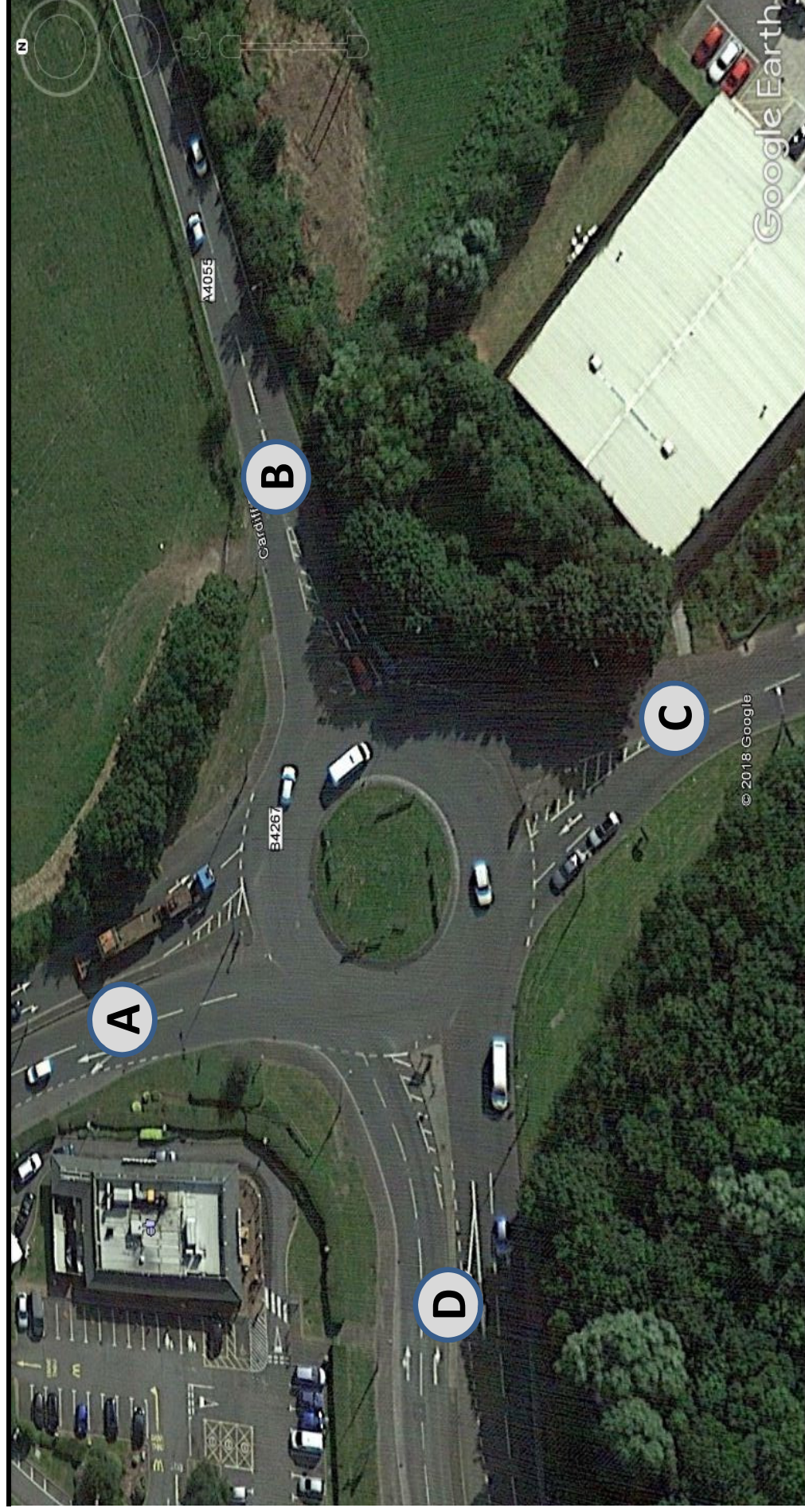
Project Number: TSP13819

Project Name: Dinas Powys - May 2018

Survey Type: Manual Classified Turning Count

Site No: 1

Location: A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road







	1	1	1.5	2.3	2	2	0.4	0.2												
Time	A - A									A - B										
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00									0	0	54	6	1						63	62.1
07:15	5	2							7	7	49	2					1	1	52	53
07:30	4	2							6	6	47	5	1			1			53	53.5
07:45	3								3	3	40	11					1		52	51.4
H/Total	12	4	0	0	0	0	0	0	16	16	190	24	2	0	0	1	2	1	220	220
08:00	8	3							11	11	38	3	1				1		43	42.9
08:15	5	2							7	7	35	3	2			1			41	43
08:30	4	1							5	5	34	3		1		1			39	41
08:45	7	2							9	9	28	5						1	34	33.2
H/Total	24	8	0	0	0	0	0	0	32	32	135	14	3	1	0	2	1	1	157	160.4
09:00	5	1							6	6	30	6							36	36
09:15	5	1							6	6	42	8	1						51	51.5
09:30	5								5	5	26	5	1	1					33	34.8
09:45	7								7	7	34	3		2					39	41.6
H/Total	22	2	0	0	0	0	0	0	24	24	132	22	2	3	0	0	0	0	159	163.9
10:00	4	2							6	6	39	4	4						47	49
10:15	6	1							7	7	28	9					1		38	37.4
10:30	3	1							4	4	31	5							36	36
10:45	2	2							4	4	23	3	1						27	27.5
H/Total	15	6	0	0	0	0	0	0	21	21	121	21	5	0	0	0	1	0	148	149.9
11:00	2								2	2	28	4	4						36	38
11:15	4	1							5	5	23	2	4	2					31	35.6
11:30	5	1							6	6	28	1	1	2					32	35.1
11:45	4	1							5	5	26	4							30	30
H/Total	15	3	0	0	0	0	0	0	18	18	105	11	9	4	0	0	0	0	129	138.7
12:00	2								2	2	29	1	1			1	1		33	33.9
12:15	5								5	5	30	3	2						35	36
12:30	2								2	2	45	6					1		52	51.4
12:45	5								5	5	35	4				2	1		42	43.4
H/Total	14	0	0	0	0	0	0	0	14	14	139	14	3	0	0	3	3	0	162	164.7
13:00	9	1							10	10	40	7							47	47
13:15	8								8	8	40	2					1		43	42.4
13:30	5	1							6	6	22	1	2						25	26
13:45	2	1							3	3	32	1	3			2			38	41.5
H/Total	24	3	0	0	0	0	0	0	27	27	134	11	5	0	0	2	1	0	153	156.9
14:00	10								10	10	34	2		1		2			39	42.3
14:15	5	1							6	6	31	6				1			38	39
14:30	5								5	5	45	4				1	1		51	51.4
14:45	6	1				1			8	9	34	5	1	1		1	1		43	45.2
H/Total	26	2	0	0	0	1	0	0	29	30	144	17	1	2	0	5	2	0	171	177.9
15:00	9								9	9	42	2	1			1	1		47	47.9
15:15	11	1							12	12	28	3	1			1			35.5	34
15:30	7								7	7	34	4	1			1			40	41.5
15:45	7	1							8	8	40					0			40	40
H/Total	34	2	0	0	0	0	0	0	36	36	145	9	3	0	0	3	1	0	161	164.9
16:00	10	2							12	12	38	6	1						45	45.5
16:15	6						2		8	6.8	47	1							48	48
16:30	5								5	5	48	1					1		50	49.4
16:45	10	1							11	11	54	1				1			56	57
H/Total	31	3	0	0	0	0	0	2	36	34.8	187	9	1	0	0	1	1	0	199	199.9
17:00	5								5	5	45	3	1		1				51	51.9
17:15	8								8	8	51	3	1				1		55	55.5
17:30	5								5	5	39	5					1		45	44.4
17:45	4	1							5	5	39	1							40	40
H/Total	22	1	0	0	0	0	0	0	23	23	174	12	2	0	1	0	2	0	191	191.8
18:00	5								5	5	40	2							42	42
18:15	5								5	5	30	2		1			1		34	34.7
18:30	7								7	7	41								41	41
18:45	7								7	7	42	3						1	46	45.2
H/Total	24	0	0	0	0	0	0	0	24	24	153	7	0	1	0	0	1	1	163	162.9
Total	263	34	0	0	0	1	2	0	300	299.8	1759	171	36	11	1	17	15	3	2013	2051.9

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	A - C										A - D									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	23	8	2	1		1	1		36	38.7	40	11	1						52	52.5
07:15	45	13		1					59	60.3	28	12		1					41	42.3
07:30	67	11		2		1	1		82	85	23	7	3	5		1			39	48
07:45	103	8		2		1	1		115	118	34	16	1	3					54	58.4
H/Total	238	40	2	6	0	3	3	0	292	302	125	46	5	9	0	1	0	0	186	201.2
08:00	90	17	1	2		2	1		113	117.5	37	11	3	2					53	57.1
08:15	76	11	2	2		1			92	96.6	36	6	1	2			1		46	48.5
08:30	92	8	1	3		1			105	110.4	43	10	2	1					56	58.3
08:45	91	11	5	1		4			112	119.8	56	10		3					69	72.9
H/Total	349	47	9	8	0	8	1	0	422	444.3	172	37	6	8	0	0	1	0	224	236.8
09:00	48	8		1	1	2			60	64.3	36	9		2	1				48	51.6
09:15	47	10	3	2					62	66.1	37	8	1	10	1		2		59	72.3
09:30	55	6	2	1					64	66.3	51	10	3	1		2			67	71.8
09:45	50	5	5	2					62	67.1	38	12	3	3					56	61.4
H/Total	200	29	10	6	1	2	0	0	248	263.8	162	39	7	16	2	2	2	0	230	257.1
10:00	32	8	2	1		1			44	47.3	36	7	2	4		2			51	59.2
10:15	46	10	6	2					64	69.6	27	13	3	4					47	53.7
10:30	32	2	2						36	37	38	6	3	2					49	53.1
10:45	34	8	1	1				1	45	46	26	8	3						37	38.5
H/Total	144	28	11	4	0	1	0	1	189	199.9	127	34	11	10	0	2	0	0	184	204.5
11:00	49	7	2						58	59	38	7	2	1					48	50.3
11:15	48	8		1					57	58.3	22	9	1	4					36	41.7
11:30	38	3	2	3					46	50.9	36	8	5	4		2			55	64.7
11:45	48	3	1	2					54	57.1	25	9	1	6					41	49.3
H/Total	183	21	5	6	0	0	0	0	215	225.3	121	33	9	15	0	2	0	0	180	206
12:00	39	5	1	1					46	47.8	36	12		4			1		54	59.6
12:15	45	6	2	2					55	58.6	38	9	2	1		1			50	52.3
12:30	48	7	2						57	58	31	4	3	6			1		45	53.7
12:45	45	8	1						54	54.5	36	11	2	3					52	56.9
H/Total	177	26	6	3	0	0	0	0	212	218.9	141	36	7	14	0	1	2	0	201	222.5
13:00	46	8	5	2					61	66.1	38	5	4	2		1	2		52	56.4
13:15	51	7		4			1		63	67.6	38	6	6	2		1			53	59.6
13:30	44	4	5	2		1	1		57	62.5	30	7							37	37
13:45	45	3		3					51	54.9	35	2	2						39	40
H/Total	186	22	10	11	0	1	2	0	232	251.1	141	20	12	4	0	2	2	0	181	193
14:00	34	5		1			1		41	41.7	28	6	1	3			1		39	42.8
14:15	46	4		1					51	52.3	34	8	1	6			1		50	57.7
14:30	45	11	2	2		1			61	65.6	32	6		4					42	47.2
14:45	57	11	1	3					72	76.4	27	8	4	4					43	50.2
H/Total	182	31	3	7	0	1	1	0	225	236	121	28	6	17	0	0	2	0	174	197.9
15:00	59	5	2	1					67	69.3	28	10							38	38
15:15	62	11	2	4		2			81	89.2	37	4	2	3		1			47	52.9
15:30	26	6	1	1		1	1		36	38.2	32	10					2		44	42.8
15:45	63	5	1	2		1			72	76.1	43	8	1						52	52.5
H/Total	210	27	6	8	0	4	1	0	256	272.8	140	32	3	3	0	1	2	0	181	186.2
16:00	57	4	2	2			2		67	69.4	29	9		2			1		41	43
16:15	47	7		1				1	56	56.5	35	10	1	2					49	51.5
16:30	41	5		1		1			48	50.3	42	12	1			1	1		57	57.9
16:45	49	4		2					56	59.6	29	5	1	1					36	37.8
H/Total	194	20	2	6	0	2	2	1	227	235.8	135	36	3	5	0	1	3	0	183	190.2
17:00	47	5	2					1	55	55.2	38	4	1	1					44	45.8
17:15	49	5	1	3					58	62.4	35	3	1	2					41	44.1
17:30	39	3	1				2		45	44.3	33	2		2			1		38	40
17:45	47	6	1			1	3		58	57.7	40	4		1					45	46.3
H/Total	182	19	5	3	0	1	5	1	216	219.6	146	13	2	6	0	0	1	0	168	176.2
18:00	42	5	3	1				1	52	54	37	3	1	2					43	46.1
18:15	48	4	1	3					56	60.4	30	3	1	2					36	39.1
18:30	40	3							43	43	25	3		1			2		31	31.1
18:45	48	5	1				1		55	54.9	26	5							31	31
H/Total	178	17	5	4	0	0	1	1	206	212.3	118	14	2	5	0	0	2	0	141	147.3
Total	2423	327	74	72	1	23	16	4	2940	3081.8	1649	368	73	112	2	12	17	0	2233	2418.9

Project Number: **TSP13819**  
 Project Name: **Dinas Powys - May 2018**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **1**  
 Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
 Date: **15 May 2018, Tuesday**



Time	B - A										B - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	10	2							12	12									0	0
07:15	12	3			1		1		17	17.4				1					1	2.3
07:30	31	6							37	37									0	0
07:45	26	6							32	32									0	0
H/Total	79	17	0	0	1	0	1	0	98	98.4	0	0	0	1	0	0	0	0	1	2.3
08:00	15	2				1			18	19									0	0
08:15	37	4							41	41									0	0
08:30	31	2				2			35	37									0	0
08:45	25	4				1			30	31									0	0
H/Total	108	12	0	0	0	4	0	0	124	128	0	0	0	0	0	0	0	0	0	0
09:00	23	3				6	1		33	38.4									0	0
09:15	25	3	1						29	29.5									0	0
09:30	30	5				1	1		37	37.4				2					2	4.6
09:45	25	4	1	1					31	32.8									0	0
H/Total	103	15	2	1	0	7	2	0	130	138.1	0	0	0	2	0	0	0	0	2	4.6
10:00	31	3	3	2					39	43.1									0	0
10:15	33	8					1		42	41.4				1					1	2.3
10:30	21	5							27	28.3									0	0
10:45	25	3	1	1					29	29.5	1								1	1
H/Total	110	19	4	3	0	0	1	0	137	142.3	1	0	0	1	0	0	0	0	2	3.3
11:00	29	4	1	2			1		37	39.5				1					1	2.3
11:15	19	6							25	25									0	0
11:30	24	5	2						31	32	1								1	1
11:45	36	7		1					44	45.3									0	0
H/Total	108	22	3	3	0	0	1	0	137	141.8	1	0	0	1	0	0	0	0	2	3.3
12:00	29	3	2	1					35	37.3									0	0
12:15	27	3	2						32	33				1					1	2.3
12:30	31	6	1	1					39	40.8									0	0
12:45	32	6							38	38									0	0
H/Total	119	18	5	2	0	0	0	0	144	149.1	0	0	0	1	0	0	0	0	1	2.3
13:00	36	4	1						41	41.5									0	0
13:15	26	6							32	32									0	0
13:30	41	3							44	44									0	0
13:45	34	4					1		39	38.4									0	0
H/Total	137	17	1	0	0	0	1	0	156	155.9	0	0	0	0	0	0	0	0	0	0
14:00	30	8							38	38				1					1	2.3
14:15	41	2	1				1		45	44.9	1								1	1
14:30	46	7		1			2		56	56.1									0	0
14:45	34	2	1			1			38	39.5									0	0
H/Total	151	19	2	1	0	1	3	0	177	178.5	1	0	0	1	0	0	0	0	2	3.3
15:00	30	3	1				1		35	34.9		1							1	1
15:15	45	2				2			49	51									0	0
15:30	48	4					1		53	52.4									0	0
15:45	53	3				1	1		58	58.4									0	0
H/Total	176	12	1	0	0	3	3	0	195	196.7	0	1	0	0	0	0	0	0	1	1
16:00	44	8							52	52									0	0
16:15	44	10					1		55	54.4									0	0
16:30	57	7							64	64									0	0
16:45	43	5					1		49	48.4									0	0
H/Total	188	30	0	0	0	0	2	0	220	218.8	0	0	0	0	0	0	0	0	0	0
17:00	55	8					1		64	63.4									0	0
17:15	67	4	1	1					74	75.2									0	0
17:30	63	2							65	65	1								1	1
17:45	32	2					1		35	34.4									0	0
H/Total	217	16	1	1	0	0	3	0	238	238	1	0	0	0	0	0	0	0	1	1
18:00	61	7							68	68									0	0
18:15	47	5					1	1	54	52.6									0	0
18:30	48	2							50	50									0	0
18:45	32	2					2		36	34.8		1							1	1
H/Total	188	16	0	0	0	0	3	1	208	205.4	0	1	0	0	0	0	0	0	1	1
Total	1684	213	19	11	1	15	20	1	1964	1991	4	2	0	7	0	0	0	0	13	22.1



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	B - C										B - D									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	4	3		1					8	9.3	28	10	1	1	3				43	47.8
07:15	12	3							15	15	36	8	2	1	1				47	49
07:30	14	5	1				1		21	20.9	57	12	1	2	3	2			77	85.1
07:45	17	6							23	23	80	9	2	1	2	2			96	102.3
H/Total	47	17	1	1	0	0	1	0	67	68.2	201	39	6	4	9	4	0	0	263	284.2
08:00	20	4							24	24	50	13	4		1	1	1		70	73.4
08:15	22	6							28	28	97	17	1		1	2			118	121.5
08:30	20	4				2			26	28	76	8	3	1	1		1		90	93.2
08:45	20	7	2			1			30	32	68	19	3	1					91	93.8
H/Total	82	21	2	0	0	3	0	0	108	112	291	57	11	2	3	3	2	0	369	381.9
09:00	19	4	1	1			1		26	27.2	76	11	2	1	3	6			99	110.3
09:15	17	2		1					20	21.3	79	16	3						98	99.5
09:30	13	5	1	1					20	21.8	56	11	6		1	1			75	80
09:45	18	7	1	1		1			28	30.8	62	14	5		1				82	85.5
H/Total	67	18	3	4	0	1	1	0	94	101.1	273	52	16	1	5	7	0	0	354	375.3
10:00	17	1							18	18	64	13	4	1	2	2	1		87	93.7
10:15	18	3	1						22	22.5	70	15	1			2	2		90	91.3
10:30	8	6	2	2					18	21.6	76	13					1		90	89.4
10:45	18								18	18	74	18	2	1	2				97	101.3
H/Total	61	10	3	2	0	0	0	0	76	80.1	284	59	7	2	4	4	4	0	364	375.7
11:00	13	5	2						20	21	90	14	4		2	1	2		113	116.8
11:15	10	2	2			1			15	17	74	13	5		1		1	1	95	97.1
11:30	16	4	2	1		1			24	27.3	78	13	2	1	1	2		1	98	102.5
11:45	14	6				1			21	22	87	12	3	2	1		1		106	110.5
H/Total	53	17	6	1	0	3	0	0	80	87.3	329	52	14	3	5	3	4	2	412	426.9
12:00	9	4	1				1		15	14.9	79	11			1			1	92	92.2
12:15	19	3	1						23	23.5	76	15	1		1			1	94	94.7
12:30	19	4	2					1	26	26.2	78	15	2	1	1	1	1	1	100	102.9
12:45	23	3							26	26	86	8	2	1	2	1			100	105.3
H/Total	70	14	4	0	0	0	1	1	90	90.6	319	49	5	2	5	2	1	3	386	395.1
13:00	18	3	1	1					23	24.8	95	9	2	2					108	111.6
13:15	15	4							19	19	88	11			2	1	1		103	105.4
13:30	11	3		1					15	16.3	80	12	1	1	1	1	1		97	100.2
13:45	20	4							24	24	75	10	2	2	1		1		91	95
H/Total	64	14	1	2	0	0	0	0	81	84.1	338	42	5	5	4	2	3	0	399	412.2
14:00	15	4							19	19	96	15		1	1				113	115.3
14:15	13	3	1			1			18	19.5	99	11	3	1	1	1			116	120.8
14:30	19	3				1			23	24	101	9	2		1	1			114	117
14:45	17	4	1						22	22.5	101	8		1	2		3		115	116.5
H/Total	64	14	2	0	0	2	0	0	82	85	397	43	5	3	5	2	3	0	458	469.6
15:00	18	2	3			1	1	1	26	27.1	78	8	2		2	2	1		91	93.4
15:15	15	3	2					1	21	21.2	109	10	2	1	1	4	1		128	134.7
15:30	18	4	1	1				1	25	26	103	15	2		1	2	3		126	128.2
15:45	21	1							22	22	95	13	5			4	1		118	123.9
H/Total	72	10	6	1	0	1	1	3	94	96.3	385	46	11	1	2	12	6	0	463	480.2
16:00	16	1							17	17	129	22	4	2	2		1	1	161	166.2
16:15	12	1		2		1			16	19.6	121	21	1		1		2		146	146.3
16:30	16	2		1					19	20.3	115	20	4			3			142	147
16:45	10	1		1					12	13.3	142	14				1			157	158
H/Total	54	5	0	4	0	1	0	0	64	70.2	507	77	9	2	3	4	3	1	606	617.5
17:00	17	4							21	21	135	15	1		3			1	155	157.7
17:15	16	1							17	17	150	15					3	1	169	166.4
17:30	29								29	29	154	8	1		1	1	3	3	171	169.3
17:45	27	2	1	1					31	32.8	133	13					1	2	149	146.8
H/Total	89	7	1	1	0	0	0	0	98	99.8	572	51	2	0	4	1	7	7	644	640.2
18:00	15	2		1			1		19	19.7	124	15			1		1		141	141.4
18:15	21	1							22	22	131	13			1		3	1	149	147.4
18:30	12						1		13	12.4	91	8	1		2		1		103	104.9
18:45	8	2							10	10	74	8	2		1	1	1		87	89.4
H/Total	56	5	0	1	0	0	2	0	64	64.1	420	44	3	0	5	1	6	1	480	483.1
Total	779	152	29	17	0	11	6	4	998	1038.8	4316	611	94	25	54	45	39	14	5198	5341.9

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
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Date: **15 May 2018, Tuesday**



Time	C - A										C - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	24	15	5	4		1			49	57.7	8	1							9	9
07:15	31	8		5				2	46	50.9	15					1			16	17
07:30	42	13	1				1		57	56.9	9	2	1	1		2			15	18.8
07:45	52	4	1				1		58	57.9	11	3		1					15	16.3
H/Total	149	40	7	9	0	1	2	2	210	223.4	43	6	1	2	0	3	0	0	55	61.1
08:00	58	9	2	1					70	72.3	17	1				1			18	18
08:15	66	6	3	1					76	78.8	20	2							23	24
08:30	80	5	2	3		2			92	98.9	21	2							23	23
08:45	49	5	4	1					59	62.3	20		1	1					22	23.8
H/Total	253	25	11	6	0	2	0	0	297	312.3	78	5	1	1	0	1	0	0	86	88.8
09:00	68	5	4	3		1			81	87.9	20	1	1						22	22.5
09:15	41	5	2	3					51	55.9	12	2	1						15	15.5
09:30	40	5		3				1	49	52.1	21	3							24	24
09:45	34	8	2	2					46	49.6	12	3		1					16	17.3
H/Total	183	23	8	11	0	1	0	1	227	245.5	65	9	2	1	0	0	0	0	77	79.3
10:00	38	8	3	4					53	59.7	18	1	1	1				1	22	23
10:15	43	7	1	3					54	58.4	21	2							23	23
10:30	52	10		1					63	64.3	16	1	2				1		20	20.4
10:45	41	8	2	1					52	54.3	15	1	1	1					18	19.8
H/Total	174	33	6	9	0	0	0	0	222	236.7	70	5	4	2	0	0	1	1	83	86.2
11:00	45	9	3	3					60	65.4	11	1		1		1			14	16.3
11:15	40	6		2					48	50.6	12	5	1						18	18.5
11:30	36	5	3	1					45	47.8	13	3							16	16
11:45	38	11	3	2					54	58.1	18	6	1				1		26	25.9
H/Total	159	31	9	8	0	0	0	0	207	221.9	54	15	2	1	0	1	1	0	74	76.7
12:00	76	8		2		1			87	90.6	13	2		1				2	18	17.7
12:15	43	5						1	49	48.2	11	3	1						15	15.5
12:30	48	6		3			1		58	61.3	9	3							12	12
12:45	53	12	3						68	69.5	14	3		1					18	19.3
H/Total	220	31	3	5	0	1	1	1	262	269.6	47	11	1	2	0	0	0	2	63	64.5
13:00	68	3	2	3			1		77	81.3	13	6	2						21	22
13:15	51	2	3	2					58	62.1	12	4	1				1		18	17.9
13:30	40	7	1	2		1			51	55.1	14	1		1					16	17.3
13:45	47	9	3	1					60	62.8	13	1							14	14
H/Total	206	21	9	8	0	1	1	0	246	261.3	52	12	3	1	0	0	1	0	69	71.2
14:00	59	8	2			2			71	74	16	4	1	1					22	23.8
14:15	49	12	1	3			1		66	69.8	12	4	1	1					18	19.8
14:30	57	8	2	2					69	72.6	18	2				1			21	22
14:45	59	5		2		1	1		68	71	16	5				1			22	23
H/Total	224	33	5	7	0	3	2	0	274	287.4	62	15	2	2	0	2	0	0	83	88.6
15:00	78	11	1	1			1		92	93.2	19	1							20	20
15:15	59	9	1	2		3	1		75	80.5	16	2							18	18
15:30	92	16	1	1		2			112	115.8	18	3	1	1			2		25	25.6
15:45	70	11	2	3					86	90.9	25	5	1				1		32	31.9
H/Total	299	47	5	7	0	5	2	0	365	380.4	78	11	2	1	0	0	3	0	95	95.5
16:00	76	15	2	1		1			95	98.3	17	1							18	18
16:15	81	10	1	1				1	94	95	26	1	1				1	1	30	29.1
16:30	64	12	1	1			2		81	80.8	19	7							26	26
16:45	77	5	1			2			85	87.5	24	3				2			29	31
H/Total	298	42	5	3	0	3	2	2	355	361.6	86	12	1	0	0	2	1	1	103	104.1
17:00	79	10	1						90	90.5	31			1					32	33.3
17:15	61	7		2					70	72.6	22	1							23	23
17:30	74	7	1	1			2		84	83.3	23		1	1				1	26	27
17:45	76	8	1	1			5	1	92	90	21	2					1		24	23.4
H/Total	290	32	3	3	0	0	7	1	336	336.4	97	3	1	2	0	0	1	1	105	106.7
18:00	61	6					3		70	68.2	23	1							25	24.2
18:15	66	2					1		69	68.4	13	2							15	15
18:30	38	3							41	41	17							2	19	17.4
18:45	45	2						1	48	47.2	21							1	22	21.2
H/Total	210	13	0	0	0	0	4	1	228	224.8	74	3	0	0	0	0	0	4	81	77.8
Total	2665	371	71	76	0	17	21	8	3229	3361.3	806	107	20	15	0	9	8	9	974	1000.5

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
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Date: **15 May 2018, Tuesday**



Time	C - C										C - D									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00									0	0	13	4	1						18	18.5
07:15									0	0	17	5	1	1					24	25.8
07:30									0	0	26	13	1	1	2			2	45	47.2
07:45									0	0	40	6	1					3	50	48.1
H/Total	0	0	0	0	0	0	0	0	0	0	96	28	4	2	2	0	0	5	137	139.6
08:00	1								1	1	60	3	2			2	3		70	71.2
08:15									0	0	65	6			1	2		2	76	77.4
08:30	1								1	1	70	5			2	1			78	81
08:45	1								1	1	56	4	1						61	61.5
H/Total	3	0	0	0	0	0	0	0	3	3	251	18	3	0	3	5	3	2	285	291.1
09:00									0	0	62	8				1	2		73	72.8
09:15									0	0	51	10	2		1		1		65	66.4
09:30									0	0	53	5	3		2		1		64	66.9
09:45									0	0	45	6	1						52	52.5
H/Total	0	0	0	0	0	0	0	0	0	0	211	29	6	0	3	1	4	0	254	258.6
10:00									0	0	46	15					1		62	61.4
10:15									0	0	44	4	1		1	1			51	53.5
10:30									0	0	35	5		1	2				43	46.3
10:45	1								1	1	55	8	1	1			1	1	67	67.4
H/Total	1	0	0	0	0	0	0	0	1	1	180	32	2	2	3	1	2	1	223	228.6
11:00									0	0	50	10	1			1			62	63.5
11:15									0	0	57	9			1		1		68	68.4
11:30		1							1	1	57	12	2		2		2		75	76.8
11:45									0	0	64	8	2						74	75
H/Total	0	1	0	0	0	0	0	0	1	1	228	39	5	0	3	1	3	0	279	283.7
12:00									0	0	75	5	2			1	1		84	85.4
12:15									0	0	64	6	1		1	1			73	75.5
12:30									0	0	56	9	2		2				69	72
12:45									0	0	45	11	1	1					58	59.8
H/Total	0	0	0	0	0	0	0	0	0	0	240	31	6	1	3	2	1	0	284	292.7
13:00									0	0	53	7					1		61	60.4
13:15									0	0	71	9	2		1				83	85
13:30									0	0	53	11	1		2				67	69.5
13:45									0	0	53	9	1						63	63.5
H/Total	0	0	0	0	0	0	0	0	0	0	230	36	4	0	3	0	1	0	274	278.4
14:00	2								2	2	33	4	2			1	2		42	42.8
14:15		1							1	1	69	7	1		1		2		80	80.3
14:30									0	0	51	11			2		1	2	67	66.8
14:45									0	0	47	7	1	2		1	1		59	62.5
H/Total	2	1	0	0	0	0	0	0	3	3	200	29	4	2	3	2	6	2	248	252.4
15:00									0	0	77	5				1			83	84
15:15									0	0	58	18	3	1	2	1	1		84	89.2
15:30									0	0	63	6		1	2	2	1		75	79.7
15:45									0	0	71	10	1						82	82.5
H/Total	0	0	0	0	0	0	0	0	0	0	269	39	4	2	4	4	2	0	324	335.4
16:00									0	0	51	12	1		1				65	66.5
16:15									0	0	64	12			1	1	1		79	80.4
16:30									0	0	62	6		1	2			2	73	74.7
16:45									0	0	55	10	1				2	1	69	67.5
H/Total	0	0	0	0	0	0	0	0	0	0	232	40	2	1	4	1	3	3	286	289.1
17:00									0	0	50	3	1			1			55	56.5
17:15									0	0	60	1		1	1				63	65.3
17:30									0	0	57	5			1	1		2	66	66.4
17:45									0	0	54	3			1		2	1	61	60
H/Total	0	0	0	0	0	0	0	0	0	0	221	12	1	1	3	2	2	3	245	248.2
18:00									0	0	54	3						1	58	57.2
18:15									0	0	57	2			1	1	1		62	63.4
18:30									0	0	58	3			2			1	64	65.2
18:45									0	0	53	1							54	54
H/Total	0	0	0	0	0	0	0	0	0	0	222	9	0	0	3	1	1	2	238	239.8
Total	6	2	0	0	0	0	0	0	8	8	2580	342	41	11	37	20	28	18	3077	3137.3



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	D - A										D - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	32	14				1			47	48	146	19	2		1	1	5		175	176.3
07:15	25	11	2	1			1		40	41.7	157	29	2	2		1			189	192.6
07:30	34	6	2	3					45	49.9	145	23	2			1	1		172	173.4
07:45	28	15	3	1					47	49.8	123	15	2	1	2		3		146	148.5
H/Total	119	46	7	5	0	1	1	0	179	189.4	571	86	6	4	3	3	9	0	682	690.8
08:00	18	10	4	3					35	40.9	120	11	5		1	1	2	1	141	143.5
08:15	27	8		5					40	46.5	133	18	1	2	2	3	2	1	162	168.1
08:30	43	20	4	5					72	80.5	108	18	3	2			1		132	135.5
08:45	46	9	3	3		1			62	68.4	97	22	2		2	1	2		126	128.8
H/Total	134	47	11	16	0	1	0	0	209	236.3	458	69	11	4	5	5	7	2	561	575.9
09:00	36	15	3	6					60	69.3	90	18	3				2		113	113.3
09:15	53	10	1	1					65	66.8	77	12	1		2	1	1		94	96.9
09:30	58	14	3	3		1			76	80.9	81	13	4			2			100	104
09:45	60	7	5	2			1		75	79.5	86	12	3		3	1	1		106	110.9
H/Total	207	46	9	12	0	1	1	0	276	296.5	334	55	11	0	5	4	4	0	413	425.1
10:00	58	11	1	3					73	77.4	70	11	1			3		1	86	88.7
10:15	50	18		4			1		73	74.4	83	11	3	1	1				99	102.8
10:30	51	15	1	5		3			75	85	86	17	5		2	2			112	118.5
10:45	40	8	3	5					56	64	87	13	2	3	1		1		107	112.3
H/Total	199	52	9	13	0	3	1	0	277	300.8	326	52	11	4	4	5	1	1	404	422.3
11:00	48	17	3	4		1	1		74	81.1	80	22	2						104	105
11:15	54	10		4			1		69	73.6	88	14	3		2				107	110.5
11:30	55	18	1	2			1	1	78	79.7	83	9	1		1		2		96	96.3
11:45	58	14	2	3		1			78	83.9	81	12	5				1		99	100.9
H/Total	215	59	6	13	0	2	3	1	299	318.3	332	57	11	0	3	0	3	0	406	412.7
12:00	58	9	5	4		1	1		74	76.9	88	19	5		1		1	1	115	117.1
12:15	70	12	2						84	85	113	15	2	3	1		1		135	140.3
12:30	62	8	1	3					74	78.4	94	10	5	2	2				113	120.1
12:45	54	18	3	2			1		78	81.5	92	11	3						106	107.5
H/Total	244	47	11	5	0	1	2	0	310	321.8	387	55	15	5	4	0	2	1	469	485
13:00	54	9	1	3		1	1		69	73.8	91	15	1		1	1	1		109	109.9
13:15	53	18	1	3					75	79.4	86	13		1	2	1	1		104	107.7
13:30	63	7	4	5		1			80	89.5	107	12	1		1		2		123	123.3
13:45	61	14	5	2		1			83	89.1	82	10					1	1	94	92.6
H/Total	231	48	11	13	0	3	1	0	307	331.8	366	50	2	1	4	1	5	1	430	433.5
14:00	50	7	2	3		1	1		64	69.3	76	16	3	2	1	2	1		101	107.5
14:15	77	9	3	1		2			92	96.8	59	9	2	4	2	3			79	90.2
14:30	63	14		4			4		85	87.8	82	16	3	1	2	1	1		106	111.2
14:45	61	8	1	3					74	77.8	85	12	3		2	1	3		106	108.7
H/Total	251	38	6	11	0	3	6	0	315	331.7	302	53	11	7	7	7	5	0	392	417.6
15:00	86	9	1	2		2	2		102	105.9	90	13	4		1	1	1	1	111	113.6
15:15	69	8	1	7		1			86	96.6	97	16	4			1			118	121
15:30	65	14		2	1				82	85.6	97	7			2	1	3		110	111.2
15:45	73	9	3	3			1		89	93.8	101	13	1		2	1			118	121.5
H/Total	293	40	5	14	1	3	3	0	359	381.9	385	49	9	0	5	4	4	1	457	467.3
16:00	62	19					1		82	81.4	100	7	4			3	2	1	117	120
16:15	75	11		2			1		89	91	104	15	2				1		122	122.4
16:30	85	16		2			1		104	106	100	9	2		1				112	114
16:45	64	12	1	2			3	1	83	83.5	92	10	1					1	105	105.7
H/Total	286	58	1	6	0	0	6	1	358	361.9	396	41	9	0	2	3	3	2	456	462.1
17:00	78	7							85	85	117	13	2					1	133	133.2
17:15	70	8	1	1					80	81.8	119	7	2		2	1			131	135
17:30	89	12	1				1		103	102.9	114	12			1				127	128
17:45	70	2		2			1		75	77	101	4			2	1	1	3	112	112
H/Total	307	29	2	3	0	0	2	0	343	346.7	451	36	4	0	5	2	1	4	503	508.2
18:00	70	5							75	75	94	9	1		2				106	108.5
18:15	62	5	1	1			2		71	71.6	96	10	1		1			1	109	109.7
18:30	57	5	1						63	64.3	92	2	1		2	1			98	101.5
18:45	56	3		3					62	65.9	72	4			1			2	79	78.4
H/Total	245	18	1	5	0	0	2	0	271	276.8	354	25	3	0	6	1	0	3	392	398.1
Total	2731	528	79	116	1	18	28	2	3503	3693.9	4662	628	103	25	53	35	44	15	5565	5698.6

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	D - C										D - D									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	35	8							44	45	2	6							8	8
07:15	33	7			1			1	42	42.2	3								3	3
07:30	56	12	2	1		1	1		73	75.7	5	2							7	7
07:45	62	13			1			1	77	77.2	5	6							11	11
H/Total	186	40	2	1	2	2	1	2	236	240.1	15	14	0	0	0	0	0	0	29	29
08:00	53	14	1		2	2	1		73	76.9	7	7							14	14
08:15	40	8	1			2			51	53.5	5	7							12	12
08:30	60	4				2	1		67	68.4	14	4							18	18
08:45	44	10	1						55	55.5	12	8	2						22	23
H/Total	197	36	3	0	2	6	2	0	246	254.3	38	26	2	0	0	0	0	0	66	67
09:00	63	9			2		1		75	76.4	11	8							19	19
09:15	48	14	2	1	1				66	69.3	15	7							22	22
09:30	44	9						1	54	53.2	9	1	1						11	11.5
09:45	49	5	3	1			2		60	61.6	13	2	2						15	16
H/Total	204	37	5	2	3	0	3	1	255	260.5	48	16	3	0	0	0	0	0	67	68.5
10:00	50	12	1		2	1			66	69.5	15	3							18	18
10:15	46	9	2		1			1	59	60.2	15	5	1						21	21.5
10:30	48	9	1				2		60	59.3	8	2							10	10
10:45	51	7							58	58	9	2							11	11
H/Total	195	37	4	0	3	1	2	1	243	247	47	12	1	0	0	0	0	0	60	60.5
11:00	42	5			2				49	51	8	5	1						14	14.5
11:15	48	10			1		1		60	60.4	7	3							10	10
11:30	55	7							62	62	5	1							6	6
11:45	60	15						1	76	75.2	7	6							13	13
H/Total	205	37	0	0	3	0	1	1	247	248.6	27	15	1	0	0	0	0	0	43	43.5
12:00	55	12	4		2		1		74	77.4	23	6	2						31	32
12:15	48	5	1	1	1				56	58.8	19	2							21	21
12:30	62	7							69	69	20	4							24	24
12:45	67	5					2		74	72.8	12	4							16	16
H/Total	232	29	5	1	3	0	3	0	273	278	74	16	2	0	0	0	0	0	92	93
13:00	56	15			2	1	1		75	77.4	23	2					1		26	25.4
13:15	66	10		1	1	1	1	1	81	82.9	21	1							22	22
13:30	56	4	1						61	61.5	18	6					1		25	24.4
13:45	67	11					1		79	78.4	12	4							16	16
H/Total	245	40	1	1	3	2	3	1	296	300.2	74	13	0	0	0	0	2	0	89	87.8
14:00	42	7			2	1			52	55	19	3	1						23	23.5
14:15	40	5	2		1	1	1		50	52.4	15	3							18	18
14:30	44	8				1			53	54	15	2							17	17
14:45	57	11							68	68	18	3	1				1		23	22.9
H/Total	183	31	2	0	3	3	1	0	223	229.4	67	11	2	0	0	0	1	0	81	81.4
15:00	67	4	2		2		1	1	77	78.6	17	4							21	21
15:15	54	5	1		1	1		1	63	64.7	15	5	1						21	21.5
15:30	71	8							79	79	17	5							22	22
15:45	71	6					1		78	77.4	17	4				1			22	23
H/Total	263	23	3	0	3	1	2	2	297	299.7	66	18	1	0	0	1	0	0	86	87.5
16:00	50	5	1		2				58	60.5	13	4							17	17
16:15	61	5		1	1		1		69	70.7	15	5							20	20
16:30	54	9	1	1					65	66.8	27	3	1						31	31.5
16:45	71	5	1				6		83	79.9	21								22	21.4
H/Total	236	24	3	2	3	0	7	0	275	277.9	76	12	1	0	0	0	1	0	90	89.9
17:00	63	5	1		2			2	73	73.9	32	3					1		36	35.4
17:15	80	5	1			1		2	89	88.9	26	1							27	27
17:30	68	8					2		78	76.8	22	2							24	24
17:45	52	3							55	55	17						1		18	17.4
H/Total	263	21	2	0	2	1	2	4	295	294.6	97	6	0	0	0	0	2	0	105	103.8
18:00	55	6	1		1	1		1	65	66.7	14								14	14
18:15	48	1							49	49	13								16	15.4
18:30	56	1			1	1			59	61	7	1					1		8	8
18:45	53	5							58	58	14								14	14
H/Total	212	13	1	0	2	2	0	1	231	234.7	48	3	0	0	0	0	1	0	52	51.4
Total	2621	368	31	7	32	18	27	13	3117	3165	677	162	13	0	0	1	7	0	860	863.3

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	From A									To A										
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	117	25	4	1	0	1	2	0	151	153.3	66	31	5	4	0	2	0	0	108	117.7
07:15	127	29	0	2	0	1	0	0	159	162.6	73	24	2	6	1	0	2	2	110	117
07:30	141	25	4	7	0	2	1	0	180	192.5	111	27	3	3	0	0	1	0	145	149.8
07:45	180	35	1	5	0	1	2	0	224	230.8	109	25	4	1	0	0	1	0	140	142.7
H/Total	565	114	9	15	0	5	5	1	714	739.2	359	107	14	14	1	2	4	2	503	527.2
08:00	173	34	5	4	0	2	2	0	220	228.5	99	24	6	4	0	1	0	0	134	143.2
08:15	152	22	5	4	0	2	1	0	186	195.1	135	20	3	6	0	0	0	0	164	173.3
08:30	173	22	3	5	0	2	0	0	205	215	158	28	6	8	0	4	0	0	204	221.4
08:45	182	28	5	4	0	4	0	1	224	234.9	127	20	7	4	0	2	0	0	160	170.7
H/Total	680	106	18	17	0	10	3	1	835	873.5	519	92	22	22	0	7	0	0	662	708.6
09:00	119	24	0	3	2	2	0	0	150	157.9	132	24	7	9	0	7	1	0	180	201.6
09:15	131	27	5	12	1	0	2	0	178	195.9	124	19	4	4	0	0	0	0	151	158.2
09:30	137	21	6	3	0	2	0	0	169	177.9	133	24	0	6	0	2	1	1	167	175.4
09:45	129	20	8	7	0	0	0	0	164	177.1	126	19	8	5	0	0	1	0	159	168.9
H/Total	516	92	19	25	3	4	2	0	661	708.8	515	86	19	24	0	9	3	1	657	704.1
10:00	111	21	8	5	0	3	0	0	148	161.5	131	24	7	9	0	0	0	0	171	186.2
10:15	107	33	9	6	0	0	1	0	156	167.7	132	34	5	3	0	0	2	0	176	181.2
10:30	104	14	5	2	0	0	0	0	125	130.1	127	31	1	7	0	3	0	0	169	181.6
10:45	85	21	5	1	0	0	0	1	113	116	108	21	6	6	0	0	0	0	141	151.8
H/Total	407	89	27	14	0	3	1	1	542	575.3	498	110	19	25	0	3	2	0	657	700.8
11:00	117	18	8	1	0	0	0	0	144	149.3	124	30	7	9	0	1	2	0	173	188
11:15	97	20	5	7	0	0	0	0	129	140.6	117	23	0	6	0	0	1	0	147	154.2
11:30	107	13	8	9	0	2	0	0	139	156.7	120	29	6	3	0	0	1	1	160	165.5
11:45	103	17	2	8	0	0	0	0	130	141.4	136	33	5	6	0	1	0	0	181	192.3
H/Total	424	68	23	25	0	2	0	0	542	588	497	115	18	24	0	2	4	1	661	700
12:00	106	18	2	5	0	2	2	0	135	143.3	165	20	7	3	0	2	1	0	198	206.8
12:15	118	18	6	3	0	0	0	0	145	151.9	145	20	4	0	0	0	0	1	170	171.2
12:30	126	17	5	6	0	0	2	0	156	165.1	143	20	2	7	0	0	1	0	173	182.5
12:45	121	23	3	3	0	2	1	0	153	159.8	144	36	6	2	0	0	1	0	189	194
H/Total	471	76	16	17	0	4	5	0	589	620.1	597	96	19	12	0	2	3	1	730	754.5
13:00	133	21	9	4	0	1	2	0	170	179.5	167	17	4	6	0	1	2	0	197	206.6
13:15	137	15	6	6	0	1	2	0	167	177.6	138	26	4	5	0	0	0	0	173	181.5
13:30	101	13	7	2	0	1	1	0	125	131.5	149	18	5	7	0	2	0	0	181	194.6
13:45	114	7	5	3	0	2	0	0	131	139.4	144	28	8	3	0	1	1	0	185	193.3
H/Total	485	56	27	15	0	5	5	0	593	628	598	89	21	21	0	4	3	0	736	776
14:00	106	13	1	5	0	2	2	0	129	136.8	149	23	4	3	0	3	1	0	183	191.3
14:15	116	19	1	7	0	1	1	0	145	155	172	24	5	4	0	2	2	0	209	217.5
14:30	127	21	2	6	0	2	1	0	159	169.2	171	29	2	7	0	0	6	0	215	221.5
14:45	124	25	6	8	0	2	1	0	166	180.8	160	16	2	5	0	3	2	0	188	197.3
H/Total	473	78	10	26	0	7	5	0	599	641.8	652	92	13	19	0	8	11	0	795	827.6
15:00	138	17	3	1	0	1	1	0	161	164.2	203	23	3	3	0	2	4	0	238	243
15:15	139	19	5	7	0	4	0	0	174	189.6	184	20	2	9	0	6	1	0	222	240.1
15:30	99	20	2	1	0	2	3	0	127	129.5	212	34	1	3	1	2	1	0	254	260.8
15:45	153	14	2	2	0	1	0	0	172	176.6	203	24	5	6	0	1	2	0	241	251.1
H/Total	529	70	12	11	0	8	4	0	634	659.9	802	101	11	21	1	11	8	0	955	995
16:00	134	21	3	4	0	0	3	0	165	169.9	192	44	2	1	0	1	1	0	241	243.7
16:15	135	18	1	3	0	0	3	1	161	162.8	206	31	1	3	0	0	4	1	246	247.2
16:30	136	18	1	1	0	2	2	0	160	162.6	211	35	1	3	0	0	3	1	254	255.8
16:45	142	11	1	3	0	2	0	0	159	165.4	194	23	2	2	0	2	4	1	228	230.4
H/Total	547	68	6	11	0	4	8	1	645	660.7	803	133	6	9	0	3	12	3	969	977.1
17:00	135	12	4	1	1	0	1	1	155	157.9	217	25	1	0	0	0	1	0	244	243.9
17:15	143	11	3	5	0	0	0	0	162	170	206	19	2	4	0	0	1	0	232	237.6
17:30	116	10	1	2	0	0	4	0	133	133.7	231	21	2	0	0	0	3	0	257	256.2
17:45	130	12	1	1	0	1	3	0	148	149	182	13	1	3	0	0	7	1	207	206.4
H/Total	524	45	9	9	1	1	8	1	598	610.6	836	78	6	7	0	0	12	1	940	944.1
18:00	124	10	4	3	0	0	0	1	142	147.1	197	18	0	0	0	0	3	0	218	216.2
18:15	113	9	2	6	0	0	1	0	131	139.2	180	12	1	1	0	0	4	1	199	197.6
18:30	113	6	0	1	0	0	2	0	122	122.1	150	10	0	1	0	0	0	0	161	162.3
18:45	123	13	1	0	0	0	1	1	139	138.1	140	7	0	3	0	0	2	1	153	154.9
H/Total	473	38	7	10	0	0	4	2	534	546.5	667	47	1	5	0	0	9	2	731	731
Total	6094	900	183	195	4	53	50	7	7486	7852.4	7343	1146	169	203	2	51	71	11	8996	9346



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	From B										To B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	42	15	1	2	3	0	0	0	63	69.1	208	26	3	1	1	1	6	1	247	247.4
07:15	60	14	2	1	2	0	1	0	80	83.7	221	31	0	3	0	3	0	0	258	264.9
07:30	102	23	2	2	3	2	1	0	135	143	201	30	4	1	0	3	1	0	240	245.7
07:45	123	21	2	1	2	2	0	0	151	157.3	174	29	2	2	2	0	4	0	213	216.2
H/Total	327	73	7	6	10	4	2	0	429	453.1	804	116	9	7	3	7	11	1	958	974.2
08:00	85	19	4	0	1	2	1	0	112	116.4	175	15	6	0	1	1	3	1	202	204.4
08:15	156	27	1	0	1	2	0	0	187	190.5	188	23	3	2	2	5	2	1	226	235.1
08:30	127	14	3	1	1	4	1	0	151	158.2	163	23	3	3	0	1	1	0	194	199.8
08:45	113	30	5	1	0	2	0	0	151	156.8	145	27	3	1	2	1	2	1	182	185.8
H/Total	481	90	13	2	3	10	2	0	601	621.9	671	88	15	6	5	8	8	3	804	825.1
09:00	118	18	3	2	3	12	2	0	158	175.9	140	25	4	0	0	0	2	0	171	171.8
09:15	121	21	4	1	0	0	0	0	147	150.3	131	22	3	0	2	1	1	0	160	163.9
09:30	99	21	7	3	1	2	1	0	134	143.8	128	21	5	3	0	2	0	0	159	167.4
09:45	105	25	7	2	1	1	0	0	141	149.1	132	18	3	3	3	1	1	0	161	169.8
H/Total	443	85	21	8	5	15	3	0	580	619.1	531	86	15	6	5	4	4	0	651	672.9
10:00	112	17	7	3	2	2	1	0	144	154.8	127	16	6	1	0	3	0	2	155	160.7
10:15	121	26	2	1	0	2	3	0	155	157.5	132	22	3	2	1	0	1	0	161	165.5
10:30	105	24	2	3	0	0	1	0	135	139.3	133	23	7	0	2	2	1	0	168	174.9
10:45	118	21	3	1	2	0	0	0	145	149.8	126	17	4	4	1	0	1	0	153	160.6
H/Total	456	88	14	8	4	4	5	0	579	601.4	518	78	20	7	4	5	3	2	637	661.7
11:00	132	23	7	3	2	1	3	0	171	179.6	119	27	6	2	0	1	0	0	155	161.6
11:15	103	21	7	0	1	1	1	1	135	139.1	123	21	8	2	2	0	0	0	156	164.6
11:30	119	22	6	2	1	3	0	1	154	162.8	125	13	2	2	1	0	2	0	145	148.4
11:45	137	25	3	3	1	1	1	0	171	177.8	125	22	6	0	0	0	2	0	155	156.8
H/Total	491	91	23	8	5	6	5	2	631	659.3	492	83	22	6	3	1	4	0	611	631.4
12:00	117	18	3	1	1	0	1	1	142	144.4	130	22	6	1	1	1	2	3	166	168.7
12:15	122	21	4	1	1	0	0	1	150	153.5	154	21	5	4	1	0	1	0	186	194.1
12:30	128	25	5	2	1	1	1	2	165	169.9	148	19	5	2	2	0	1	0	177	183.5
12:45	141	17	2	1	2	1	0	0	164	169.3	141	18	3	1	0	2	1	0	166	170.2
H/Total	508	81	14	5	5	2	2	4	621	637.1	573	80	19	8	4	3	5	3	695	716.5
13:00	149	16	4	3	0	0	0	0	172	177.9	144	28	3	0	1	0	1	0	177	178.9
13:15	129	21	0	0	2	1	1	0	154	156.4	138	19	1	1	2	1	3	0	165	168
13:30	132	18	1	2	1	1	1	0	156	160.5	143	14	3	1	1	0	2	0	164	166.6
13:45	129	18	2	2	1	0	2	0	154	157.4	127	12	3	0	0	2	1	1	146	148.1
H/Total	539	73	7	7	4	2	4	0	636	652.2	552	73	10	2	4	3	7	1	652	661.6
14:00	141	27	0	2	1	0	0	0	171	174.6	126	22	4	5	1	4	1	0	163	175.9
14:15	154	16	5	1	1	2	1	0	180	186.2	103	19	3	5	2	4	0	0	136	150
14:30	166	19	2	1	1	2	2	0	193	197.1	145	22	3	1	2	3	2	0	178	184.6
14:45	152	14	2	1	2	1	3	0	175	178.5	135	22	4	1	2	3	4	0	171	176.9
H/Total	613	76	9	5	5	5	6	0	719	736.4	509	85	14	12	7	14	7	0	648	687.4
15:00	126	14	6	0	0	3	3	1	153	156.4	151	17	5	0	1	2	2	1	179	182.5
15:15	169	15	4	1	1	6	1	1	198	206.9	142	21	5	0	0	2	0	0	170	174.5
15:30	169	23	3	1	1	2	4	1	204	206.6	149	14	2	1	2	2	5	0	175	178.3
15:45	169	17	5	0	0	5	2	0	198	204.3	166	18	2	0	2	1	1	0	190	193.4
H/Total	633	69	18	2	2	16	10	3	753	774.2	608	70	14	1	5	7	8	1	714	728.7
16:00	189	31	4	2	2	0	1	1	230	235.2	155	14	5	0	0	3	2	1	180	183.5
16:15	177	32	1	2	1	1	3	0	217	220.3	177	17	3	0	0	0	2	1	200	199.5
16:30	188	29	4	1	0	3	0	0	225	231.3	167	17	2	0	1	0	1	0	188	189.4
16:45	195	20	0	1	0	1	1	0	218	219.7	170	14	1	0	1	3	0	1	190	193.7
H/Total	749	112	9	6	3	5	5	1	890	906.5	669	62	11	0	2	6	5	3	758	766.1
17:00	207	27	1	0	3	0	1	1	240	242.1	193	16	3	1	1	0	1	1	216	218.4
17:15	233	20	1	1	0	0	4	1	260	258.6	192	11	3	0	2	1	0	0	209	213.5
17:30	247	10	1	0	1	1	3	3	266	264.3	177	17	1	1	1	0	1	1	199	200.4
17:45	192	17	1	1	0	0	2	2	215	214	161	7	0	0	2	1	2	3	176	175.4
H/Total	879	74	4	2	4	1	10	7	981	979	723	51	7	2	6	2	4	5	800	807.7
18:00	200	24	0	1	1	0	2	0	228	229.1	157	12	1	0	2	0	0	1	173	174.7
18:15	199	19	0	0	1	0	4	2	225	222	139	14	1	1	1	0	1	1	158	159.4
18:30	151	10	1	0	2	0	2	0	166	167.3	150	2	1	0	2	1	0	2	158	159.9
18:45	114	13	2	0	1	1	3	0	134	135.2	135	8	0	0	1	0	0	4	148	145.8
H/Total	664	66	3	1	5	1	11	2	753	753.6	581	36	3	1	6	1	1	8	637	639.8
Total	6783	978	142	60	55	71	65	19	8173	8393.8	7231	908	159	58	54	61	67	27	8565	8773.1

Project Number: **TSP13819**  
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Date: **15 May 2018, Tuesday**



Time	From C										To C									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	45	20	6	4	0	1	0	0	76	85.2	62	19	2	2	0	2	1	0	88	93
07:15	63	13	1	6	0	1	0	2	86	93.7	90	23	0	1	1	0	0	1	116	117.5
07:30	77	28	3	2	2	2	1	2	117	122.9	137	28	3	3	0	2	3	0	176	181.6
07:45	103	13	2	1	0	0	1	3	123	122.3	182	27	0	2	1	1	1	1	215	218.2
H/Total	288	74	12	13	2	4	2	7	402	424.1	471	97	5	8	2	5	5	2	595	610.3
08:00	136	13	4	1	0	2	3	0	159	162.5	164	35	2	2	2	4	2	0	211	219.4
08:15	151	14	3	1	1	3	0	2	175	180.2	138	25	3	2	0	3	0	0	171	178.1
08:30	172	12	2	3	2	3	0	0	194	203.9	173	16	1	3	0	5	1	0	199	207.8
08:45	126	9	6	2	0	0	0	0	143	148.6	156	28	8	1	0	5	0	0	198	208.3
H/Total	585	48	15	7	3	8	3	2	671	695.2	631	104	14	8	2	17	3	0	779	813.6
09:00	150	14	5	3	0	2	2	0	176	183.2	130	21	1	2	3	2	2	0	161	167.9
09:15	104	17	5	3	1	0	1	0	131	137.8	112	26	5	4	1	0	0	0	148	156.7
09:30	114	13	3	3	2	0	1	1	137	143	112	20	3	2	0	0	0	1	138	141.3
09:45	91	17	3	3	0	0	0	0	114	119.4	117	17	9	4	0	1	2	0	150	159.5
H/Total	459	61	16	12	3	2	4	1	558	583.4	471	84	18	12	4	3	4	1	597	625.4
10:00	102	24	4	5	0	0	1	1	137	144.1	99	21	3	1	2	2	0	0	128	134.8
10:15	108	13	2	3	1	1	0	0	128	134.9	110	22	9	2	1	0	0	1	145	152.3
10:30	103	16	2	2	2	0	1	0	126	131	88	17	5	2	0	0	2	0	114	117.9
10:45	112	17	4	3	0	0	1	1	138	142.5	104	15	1	1	0	0	0	1	122	123
H/Total	425	70	12	13	3	1	3	2	529	552.5	401	75	18	6	3	2	2	2	509	528
11:00	106	20	4	4	0	2	0	0	136	145.2	104	17	4	0	2	0	0	0	127	131
11:15	109	20	1	2	1	0	1	0	134	137.5	106	20	2	1	1	1	1	0	132	135.7
11:30	106	21	5	1	2	0	2	0	137	141.6	109	15	4	4	0	1	0	0	133	141.2
11:45	120	25	6	2	0	0	1	0	154	159	122	24	1	2	0	1	0	1	151	154.3
H/Total	441	86	16	9	3	2	4	0	561	583.3	441	76	11	7	3	3	1	1	543	562.2
12:00	164	15	2	3	0	2	1	2	189	193.7	103	21	6	1	2	0	2	0	135	140.1
12:15	118	14	2	0	1	1	0	1	137	139.2	112	14	4	3	1	0	0	0	134	140.9
12:30	113	18	2	3	2	0	1	0	139	145.3	129	18	4	0	0	0	0	1	152	153.2
12:45	112	26	4	2	0	0	0	0	144	148.6	135	16	1	0	0	0	2	0	154	153.3
H/Total	507	73	10	8	3	3	2	3	609	626.8	479	69	15	4	3	0	4	1	575	587.5
13:00	134	16	4	3	0	0	2	0	159	163.7	120	26	6	3	2	1	1	0	159	168.3
13:15	134	15	6	2	1	0	1	0	159	165	132	21	0	5	1	1	2	1	163	169.5
13:30	107	19	2	3	2	1	0	0	134	141.9	111	11	6	3	0	1	1	0	133	140.3
13:45	113	19	4	1	0	0	0	0	137	140.3	132	18	0	3	0	0	1	0	154	157.3
H/Total	488	69	16	9	3	1	3	0	589	610.9	495	76	12	14	3	3	5	1	609	635.4
14:00	110	16	5	1	0	3	2	0	137	142.6	93	16	0	1	2	1	1	0	114	117.7
14:15	130	24	3	4	1	0	3	0	165	170.9	99	13	3	1	1	2	1	0	120	125.2
14:30	126	21	2	2	2	1	1	2	157	161.4	108	22	2	2	0	3	0	0	137	143.6
14:45	122	17	1	4	0	3	2	0	149	156.5	131	26	2	3	0	0	0	0	162	166.9
H/Total	488	78	11	11	3	7	8	2	608	631.4	431	77	7	7	3	6	2	0	533	553.4
15:00	174	17	1	1	0	1	1	0	195	197.2	144	11	7	1	2	1	2	2	170	175
15:15	133	29	4	3	2	4	2	0	177	187.7	131	19	5	4	1	3	0	2	165	175.1
15:30	173	25	2	3	2	4	3	0	212	221.1	115	18	2	2	0	1	1	1	140	143.2
15:45	166	26	4	3	0	0	1	0	200	205.3	155	12	1	2	0	1	1	0	172	175.5
H/Total	646	97	11	10	4	9	7	0	784	811.3	545	60	15	9	3	6	4	5	647	668.8
16:00	144	28	3	1	1	1	0	0	178	182.8	123	10	3	2	2	0	2	0	142	146.9
16:15	171	23	2	1	1	1	2	2	203	204.5	120	13	0	4	1	1	1	1	141	146.8
16:30	145	25	1	2	2	0	2	3	180	181.5	111	16	1	3	0	1	0	0	132	137.4
16:45	156	18	2	0	0	4	2	1	183	186	130	10	1	3	0	1	6	0	151	152.8
H/Total	616	94	8	4	4	6	6	6	744	754.8	484	49	5	12	3	3	9	1	566	583.9
17:00	160	13	2	1	0	1	0	0	177	180.3	127	14	3	0	2	0	0	3	149	150.1
17:15	143	9	0	3	1	0	0	0	156	160.9	145	11	2	3	0	1	0	2	164	168.3
17:30	154	12	2	1	1	1	2	3	176	176.7	136	11	1	0	0	0	4	0	152	150.1
17:45	151	13	1	1	1	0	8	2	177	173.4	126	11	2	1	0	1	3	0	144	145.5
H/Total	608	47	5	6	3	2	10	5	686	691.3	534	47	8	4	2	2	7	5	609	614
18:00	138	10	0	0	0	0	3	2	153	149.6	112	13	4	2	1	1	1	2	136	140.4
18:15	136	6	0	0	1	1	2	0	146	146.8	117	6	1	3	0	0	0	0	127	131.4
18:30	113	6	0	0	2	0	0	3	124	123.6	108	4	0	0	1	1	1	0	115	116.4
18:45	119	3	0	0	0	0	0	2	124	122.4	109	12	1	0	0	0	1	0	123	122.9
H/Total	506	25	0	0	3	1	5	7	547	542.4	446	35	6	5	2	2	3	2	501	511.1
Total	6057	822	132	102	37	46	57	35	7288	7507.4	5829	849	134	96	33	52	49	21	7063	7293.6

Project Number: **TSP13819**  
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Site No: **1**  
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Date: **15 May 2018, Tuesday**



Time	From D									To D										
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	215	47	2	1	1	3	5	0	274	277.3	83	31	3	1	3	0	0	0	121	126.8
07:15	218	47	2	3	1	1	1	1	274	279.5	84	25	3	2	1	0	0	0	115	120.1
07:30	240	43	6	4	0	2	2	0	297	306	111	34	5	8	5	3	0	2	168	187.3
07:45	218	49	5	2	3	0	3	1	281	286.5	159	37	4	4	2	2	0	3	211	219.8
H/Total	891	186	15	10	5	6	11	2	1126	1149.3	437	127	15	15	11	5	0	5	615	654
08:00	198	42	10	3	3	3	3	1	263	275.3	154	34	9	2	1	3	4	0	207	215.7
08:15	205	41	2	7	2	5	2	1	265	280.1	203	36	2	2	2	4	1	2	252	259.4
08:30	225	46	7	7	0	2	2	0	289	302.4	203	27	5	2	3	1	1	0	242	250.5
08:45	199	49	8	3	2	2	2	0	265	275.7	192	41	6	4	0	0	0	0	243	251.2
H/Total	827	178	27	20	7	12	9	2	1082	1133.5	752	138	22	10	6	8	6	2	944	976.8
09:00	200	50	6	6	2	0	3	0	267	278	185	36	2	3	4	7	2	0	239	253.7
09:15	193	43	4	2	3	1	1	0	247	255	182	41	6	10	2	0	3	0	244	260.2
09:30	192	37	5	3	0	3	0	1	241	249.6	169	27	13	1	3	3	1	0	217	230.2
09:45	208	24	13	3	3	1	4	0	256	268	158	32	11	3	1	0	0	0	205	215.4
H/Total	793	154	28	14	8	5	8	1	1011	1050.6	694	136	32	17	10	10	6	0	905	959.5
10:00	193	37	3	3	2	4	0	1	243	253.6	161	38	6	5	2	4	2	0	218	232.3
10:15	194	43	10	1	2	0	1	1	252	258.9	156	37	6	4	1	3	2	0	209	220
10:30	193	43	7	5	2	5	2	0	257	272.8	157	26	3	3	2	0	1	0	192	198.8
10:45	187	30	5	8	1	0	1	0	232	245.3	164	36	6	2	2	0	1	1	212	218.2
H/Total	767	153	25	17	7	9	4	2	984	1030.6	638	137	21	14	7	7	6	1	831	869.3
11:00	178	49	6	4	2	1	1	0	241	251.6	186	36	8	1	2	2	2	0	237	245.1
11:15	197	37	3	4	3	0	2	0	246	254.5	160	34	6	4	2	0	2	1	209	217.2
11:30	198	35	2	2	1	0	3	1	242	244	176	34	9	5	3	4	2	1	234	250
11:45	206	47	7	3	0	1	1	1	266	273	183	35	6	8	1	0	1	0	234	247.8
H/Total	779	168	18	13	6	2	7	2	995	1023.1	705	139	29	18	8	6	7	2	914	960.1
12:00	224	46	16	0	3	1	3	1	294	303.4	213	34	4	4	1	2	2	1	261	269.2
12:15	250	34	5	4	2	0	1	0	296	305.1	197	32	4	1	2	1	0	1	238	243.5
12:30	238	29	6	5	2	0	0	0	280	291.5	185	32	7	7	3	1	2	1	238	252.6
12:45	225	38	6	2	0	0	3	0	274	277.8	179	34	5	5	2	1	0	0	226	238
H/Total	937	147	33	11	7	1	7	1	1144	1177.8	774	132	20	17	8	5	4	3	963	1003.3
13:00	224	41	2	3	3	2	4	0	279	286.5	209	23	6	4	0	1	4	0	247	253.8
13:15	226	42	1	5	3	2	2	1	282	292	218	27	8	2	3	2	1	0	261	272
13:30	244	29	6	5	1	1	3	0	289	298.7	181	36	2	1	3	1	2	0	226	231.1
13:45	222	39	5	2	0	1	2	1	272	276.1	175	25	5	2	1	0	1	0	209	214.5
H/Total	916	151	14	15	7	6	11	2	1122	1153.3	783	111	21	9	7	4	8	0	943	971.4
14:00	187	33	6	5	3	4	2	0	240	255.3	176	28	4	4	1	1	3	0	217	224.4
14:15	191	26	7	5	3	6	1	0	239	257.4	217	29	5	7	2	1	3	0	264	276.8
14:30	204	40	3	5	2	2	5	0	261	270	199	28	2	4	3	1	1	2	240	248
14:45	221	34	5	3	2	1	5	0	271	277.4	193	26	6	7	2	1	5	0	240	252.1
H/Total	803	133	21	18	10	13	13	0	1011	1060.1	785	111	17	22	8	4	12	2	961	1001.3
15:00	260	30	7	2	3	3	4	2	311	319.1	200	27	2	0	0	3	1	0	233	236.4
15:15	235	34	7	7	1	3	0	1	288	303.8	219	37	8	5	3	6	2	0	280	298.3
15:30	250	34	0	2	3	1	3	0	293	297.8	215	36	2	1	3	4	6	0	267	272.7
15:45	262	32	4	3	2	2	2	0	307	315.7	226	35	7	0	0	5	1	0	274	281.9
H/Total	1007	130	18	14	9	9	9	3	1199	1236.4	860	135	19	6	6	18	10	0	1054	1089.3
16:00	225	35	5	0	2	3	3	1	274	278.9	222	47	5	4	3	0	2	1	284	292.7
16:15	255	36	2	3	1	0	3	0	300	304.1	235	48	2	2	2	1	4	0	294	298.2
16:30	266	37	4	3	1	0	1	0	312	318.3	246	41	6	1	2	4	1	2	303	311.1
16:45	248	27	3	2	1	0	10	2	293	290.5	247	29	2	1	0	1	3	1	284	284.7
H/Total	994	135	14	8	5	3	17	3	1179	1191.8	950	165	15	8	7	6	10	4	1165	1186.7
17:00	290	28	3	0	2	0	1	3	327	327.5	255	25	3	1	3	1	1	1	290	295.4
17:15	295	21	4	1	2	2	0	2	327	332.7	271	20	1	3	1	0	3	1	300	302.8
17:30	293	34	1	0	1	0	3	0	332	331.7	266	17	1	2	2	2	4	5	299	299.7
17:45	240	9	0	2	2	1	3	3	260	261.4	244	20	0	1	1	0	4	3	273	270.5
H/Total	1118	92	8	3	7	3	7	8	1246	1253.3	1036	82	5	7	7	3	12	10	1162	1168.4
18:00	233	20	2	0	3	1	0	1	260	264.2	229	21	1	2	1	0	1	1	256	258.7
18:15	219	18	2	1	1	0	3	1	245	245.7	231	20	1	2	2	1	5	1	263	265.3
18:30	212	9	1	1	3	2	0	0	228	234.8	181	15	1	1	4	0	3	1	206	209.2
18:45	195	12	0	3	1	0	0	2	213	216.3	167	14	2	0	1	1	1	0	186	188.4
H/Total	859	59	5	5	8	3	3	4	946	961	808	70	5	5	8	2	10	3	911	921.6
Total	10691	1686	226	148	86	72	106	30	13045	13421	9222	1483	221	148	93	78	91	32	11368	11762

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **1**  
Location: **A4231 Barry Docks Link Road / A4055 Cardiff Road / B4267 Sully Moors Road**  
Date: **15 May 2018, Tuesday**



Time	Whole Junction								TOTAL	TOTAL (PCU)
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY		
07:00	419	107	13	8	4	5	7	1	564	584.9
07:15	468	103	5	12	3	3	2	3	599	619.5
07:30	560	119	15	15	5	8	5	2	729	764.4
07:45	624	118	10	9	5	3	6	4	779	796.9
H/Total	2071	447	43	44	17	19	20	10	2671	2765.7
08:00	592	108	23	8	4	9	9	1	754	782.7
08:15	664	104	11	12	4	12	3	3	813	845.9
08:30	697	94	15	16	3	11	3	0	839	879.5
08:45	620	116	24	10	2	8	2	1	783	816
H/Total	2573	422	73	46	13	40	17	5	3189	3324.1
09:00	587	106	14	14	7	16	7	0	751	795
09:15	549	108	18	18	5	1	4	0	703	739
09:30	542	92	21	12	3	7	2	2	681	714.3
09:45	533	86	31	15	4	2	4	0	675	713.6
H/Total	2211	392	84	59	19	26	17	2	2810	2961.9
10:00	518	99	22	16	4	9	2	2	672	714
10:15	530	115	23	11	3	3	5	1	691	719
10:30	505	97	16	12	4	5	4	0	643	673.2
10:45	502	89	17	13	3	0	2	2	628	653.6
H/Total	2055	400	78	52	14	17	13	5	2634	2759.8
11:00	533	110	25	12	4	4	4	0	692	725.7
11:15	506	98	16	13	5	1	4	1	644	671.7
11:30	530	91	21	14	4	5	5	2	672	705.1
11:45	566	114	18	16	1	2	3	1	721	751.2
H/Total	2135	413	80	55	14	12	16	4	2729	2853.7
12:00	611	97	23	9	4	5	7	4	760	784.8
12:15	608	87	17	8	4	1	1	2	728	749.7
12:30	605	89	18	16	5	1	4	2	740	771.8
12:45	599	104	15	8	2	3	4	0	735	755.5
H/Total	2423	377	73	41	15	10	16	8	2963	3061.8
13:00	640	94	19	13	3	3	8	0	780	807.6
13:15	626	93	13	13	6	4	6	1	762	791
13:30	584	79	16	12	4	4	5	0	704	732.6
13:45	578	83	16	8	1	3	4	1	694	713.2
H/Total	2428	349	64	46	14	14	23	2	2940	3044.4
14:00	544	89	12	13	4	9	6	0	677	709.3
14:15	591	85	16	17	5	9	6	0	729	769.5
14:30	623	101	9	14	5	7	9	2	770	797.7
14:45	619	90	14	16	4	7	11	0	761	793.2
H/Total	2377	365	51	60	18	32	32	2	2937	3069.7
15:00	698	78	17	4	3	8	9	3	820	836.9
15:15	676	97	20	18	4	17	3	2	837	888
15:30	691	102	7	7	6	9	13	1	836	855
15:45	750	89	15	8	2	8	5	0	877	901.9
H/Total	2815	366	59	37	15	42	30	6	3370	3481.8
16:00	692	115	15	7	5	4	7	2	847	866.8
16:15	738	109	6	9	3	2	11	3	881	891.7
16:30	735	109	10	7	3	5	5	3	877	893.7
16:45	741	76	6	6	1	7	13	3	853	861.6
H/Total	2906	409	37	29	12	18	36	11	3458	3513.8
17:00	792	80	10	2	6	1	3	5	899	907.8
17:15	814	61	8	10	3	2	4	3	905	922.2
17:30	810	66	5	3	3	2	12	6	907	906.4
17:45	713	51	3	5	3	2	16	7	800	797.8
H/Total	3129	258	26	20	15	7	35	21	3511	3534.2
18:00	695	64	6	4	4	1	5	4	783	790
18:15	667	52	4	7	3	1	10	3	747	753.7
18:30	589	31	2	2	7	2	4	3	640	647.8
18:45	551	41	3	3	2	1	4	5	610	612
H/Total	2502	188	15	16	16	5	23	15	2780	2803.5
Total	29625	4386	683	505	182	242	278	91	35992	37174

Peak Hours	Totals
07:00 08:00	2671
07:15 08:15	2861
07:30 08:30	3075
07:45 08:45	3185

08:00 09:00	3189
08:15 09:15	3186
08:30 09:30	3076
08:45 09:45	2918

09:00 10:00	2810
09:15 10:15	2731
09:30 10:30	2719
09:45 10:45	2681

10:00 11:00	2634
10:15 11:15	2654
10:30 11:30	2607
10:45 11:45	2636

11:00 12:00	2729
11:15 12:15	2797
11:30 12:30	2881
11:45 12:45	2949

12:00 13:00	2963
12:15 13:15	2983
12:30 13:30	3017
12:45 13:45	2981

13:00 14:00	2940
13:15 14:15	2837
13:30 14:30	2804
13:45 14:45	2870

14:00 15:00	2937
14:15 15:15	3080
14:30 15:30	3188
14:45 15:45	3254

15:00 16:00	3370
15:15 16:15	3397
15:30 16:30	3441
15:45 16:45	3482

16:00 17:00	3458
16:15 17:15	3510
16:30 17:30	3534
16:45 17:45	3564

17:00 18:00	3511
17:15 18:15	3395
17:30 18:30	3237
17:45 18:45	2970

18:00 19:00	2780
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Client: **Arcadis**

Project Number: **TSP13819**

Project Name: **Dinas Powys - May 2018**

Survey Type: **Manual Classified Turning Count**

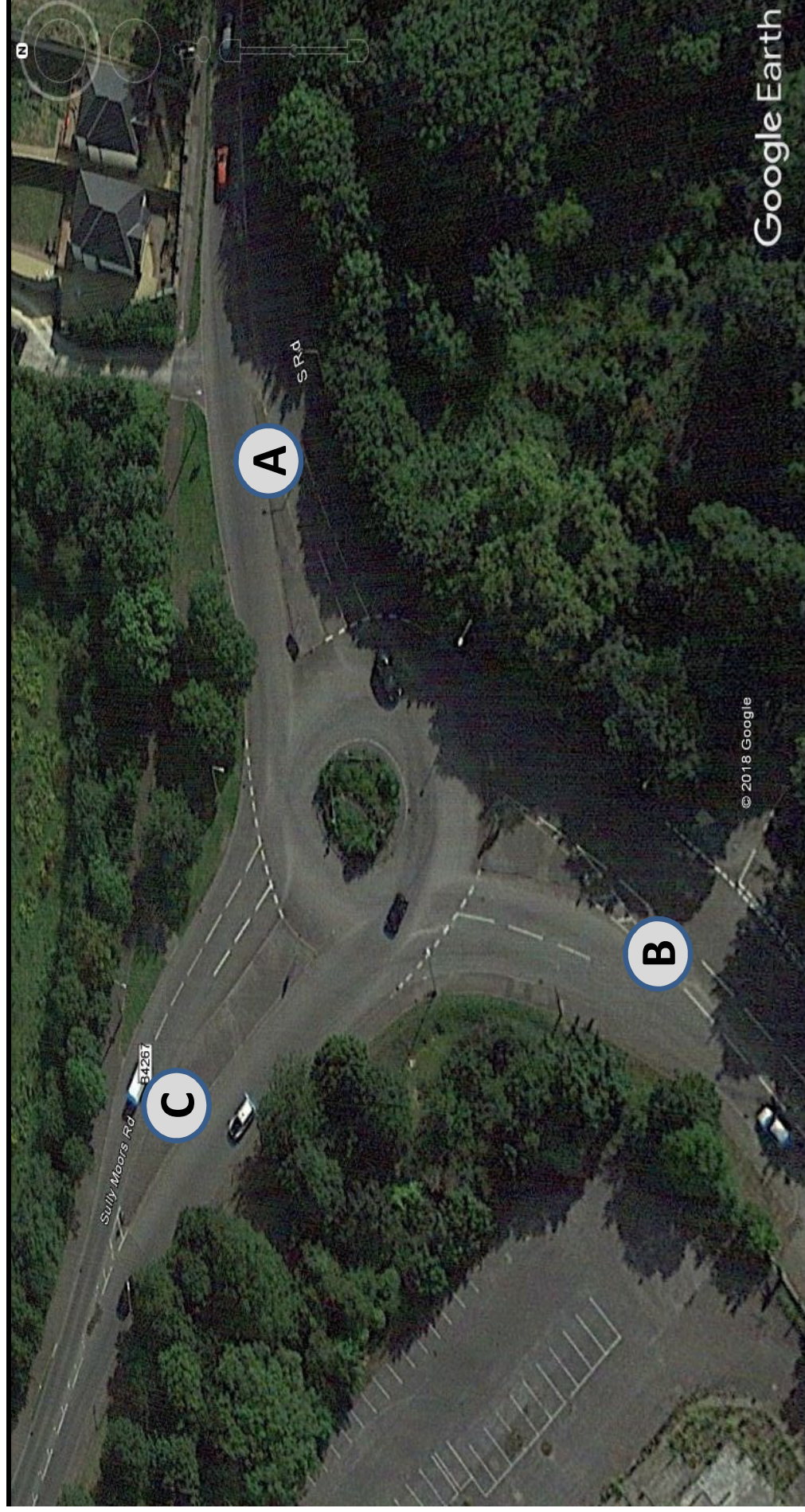
Survey Date: **15 May 2018, Tuesday**

Survey Time: **07:00 - 19:00**

Weather: **Dry**

Comments:

Project Number: TSP13819  
Project Name: Dinas Powys - May 2018  
Survey Type: Manual Classified Turning Count  
Site No: 2  
Location: Sully Moors Road / B4267 South Road / Hayes Road



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



	1	1	1.5	2.3	2	2	0.4	0.2												
Time	A - A										A - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00									0	0	6	1							7	7
07:15									0	0	11	3	1						15	15.5
07:30									0	0	13	5			1				21	20.6
07:45			1						1	1.5	27	2					1	1	29	29
H/Total	0	0	1	0	0	0	0	0	1	1.5	57	11	1	0	1	0	1	1	72	72.1
08:00									0	0	22	1				1			24	25
08:15	1								1	1	28	5				1			34	35
08:30									0	0	30		1		1				32	33.5
08:45									0	0	24	3							27	27
H/Total	1	0	0	0	0	0	0	0	1	1	104	9	1	0	1	2	0	0	117	120.5
09:00		1							1	1	36	1				1			38	39
09:15									0	0	26	1				1			28	29
09:30									0	0	11	2		1	1				15	17.3
09:45									0	0	22	3							25	25
H/Total	0	1	0	0	0	0	0	0	1	1	95	7	0	1	1	2	0	0	106	110.3
10:00									0	0	24	5	2			1			32	34
10:15									0	0	21	4	1						26.5	26.5
10:30		1							1	1	21	7	1		1				30	31.5
10:45	1	1							2	2	30	3							33	33
H/Total	1	2	0	0	0	0	0	0	3	3	96	19	4	0	1	1	0	0	121	125
11:00									0	0	32	2				1			35	36
11:15	1								1	1	31	3	1						35	35.5
11:30									0	0	17	2	2		1				22	24
11:45									0	0	17	3				1			21	22
H/Total	1	0	0	0	0	0	0	0	1	1	97	10	3	0	1	2	0	0	113	117.5
12:00	1								1	1	24	2							26	26
12:15									0	0	21	5	1					1	28	27.7
12:30									0	0	22	1	2		1		1		27	28.4
12:45	1								1	1	27	4	1						32	32.5
H/Total	2	0	0	0	0	0	0	0	2	2	94	12	4	0	1	0	1	1	113	114.6
13:00									0	0	26	4					1		31	30.4
13:15									0	0	21	7				1			29	30
13:30	3								3	3	28	3			1				32	33
13:45									0	0	28	4	1						33	33.5
H/Total	3	0	0	0	0	0	0	0	3	3	103	18	1	0	1	1	1	0	125	126.9
14:00	1								1	1	34	3	1						38	38.5
14:15	1								1	1	24	2						1	27	26.2
14:30	1	1							2	2	29	4			1			1	35	35.2
14:45	1								1	1	27	4	1	1		2			35	38.8
H/Total	4	1	0	0	0	0	0	0	5	5	114	13	2	1	1	2	0	2	135	138.7
15:00									0	0	29	8						1	38	37.2
15:15									0	0	56	4	2	1		3			66	71.3
15:30		1							1	1	47	3	2		1	2			55	59
15:45									0	0	36	5	1			2			44	46.5
H/Total	0	1	0	0	0	0	0	0	1	1	168	20	5	1	1	7	0	1	203	214
16:00	4								4	4	64	6	2			1			73	75
16:15									0	0	62	6	1			1			70	71.5
16:30									0	0	43	10	1		1			1	56	56.7
16:45	1								1	1	63	5	2				1	1	72	71.6
H/Total	5	0	0	0	0	0	0	0	5	5	232	27	6	0	1	2	1	2	271	274.8
17:00									0	0	53	6					1	1	61	59.6
17:15									0	0	59	5	2	1					67	69.3
17:30	1								1	1	52	3				1	1	2	59	57.8
17:45									0	0	42	5						3	50	47.6
H/Total	1	0	0	0	0	0	0	0	1	1	206	19	2	1	0	1	2	6	237	234.3
18:00	1								1	1	33							3	36	33.6
18:15									0	0	24		2					1	28	26.6
18:30	1								1	1	16				1			3	20	18.6
18:45									0	0	25	1						1	27	26.2
H/Total	2	0	0	0	0	0	0	0	2	2	98	3	0	0	1	0	1	8	111	105
Total	20	5	1	0	0	0	0	0	26	26.5	1464	168	29	4	11	20	7	21	1724	1753.7

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	A - C										B - A									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	36	9	2						47	48	18	1	2						23	24.2
07:15	46	13						3	62	59.6	30	5	1					2	38	36.9
07:30	57	12	2		1	1	1	3	77	77	71	4				1	1	2	79	77.8
07:45	84	9	1					4	99	95.7	88	9	5			1	1		104	106.9
H/Total	223	43	5	0	1	1	2	10	285	280.3	207	19	8	0	0	3	2	5	244	245.8
08:00	109	10	1			2	3	1	126	125.9	85	9				3			97	100
08:15	148	15	1		1	4		2	171	174.9	76	17	1					1	98	100.7
08:30	129	9	1		1	2			142	145.5	50	4				3	1		58	60.4
08:45	117	9	2	1			1		130	131.7	36	3	1			1	1		42	42.9
H/Total	503	43	5	1	2	8	4	3	569	578	247	33	2	0	0	10	2	1	295	304
09:00	120	9				2	2		133	133.8	33	4				2			39	41
09:15	100	6	2	2	1		1	1	113	116.2	17	6				1			24	25
09:30	79	6	2		1				89	90.4	34	4						1	39	38.2
09:45	62	8	1	1				1	73	74	23	6	1			2			32	34.5
H/Total	361	29	5	3	2	2	4	2	408	414.4	107	20	1	0	0	5	0	1	134	138.7
10:00	77	21	3				1	1	103	103.1	21	6	1			1			30	30.9
10:15	81	6	1	1	1	1			92	95.2	22	6	1						29	29.5
10:30	72	12	2		1				87	89	23	6		1					30	31.3
10:45	84	15		1			1	1	102	101.9	28	3						1	32	31.2
H/Total	314	54	6	2	2	1	3	2	384	389.2	94	21	2	1	1	0	1	1	121	122.9
11:00	80	12	2		2			1	95	95.2	30	3	2			0	1	1	36	36.2
11:15	87	9			1				97	98	29	1							31	32
11:30	87	14	4		1		2		108	109.8	31	4			1		1	1	37	35.6
11:45	109	13	2				1		125	125.4	23	2					1		26	25.4
H/Total	363	48	8	0	2	0	3	1	425	428.4	113	10	2	0	1	0	2	2	130	129.2
12:00	130	11	1		2	2	1	2	147	147.3	27	2	2			1	1		33	36
12:15	83	8	2		1	1		1	96	98.2	25	4						1	31	29.6
12:30	86	12	1		1				100	101.5	30	3							33	33
12:45	102	15	1				1		119	118.9	20	5	1	1					27	28.8
H/Total	401	46	5	0	2	3	2	3	462	465.9	102	14	3	1	1	1	1	1	124	127.4
13:00	94	8					1		103	102.4	27	3		1		1		1	33	34.5
13:15	96	10	5		1			1	114	116.1	21	3	1	1					28	31.8
13:30	88	12	2	1	2		1	1	105	109.3	19	2			1	2			21	21
13:45	81	12	2						95	96	25	1	1				1		28	27.9
H/Total	359	42	9	1	3	0	2	1	417	423.8	92	9	2	2	0	3	1	1	110	115.2
14:00	88	11	3			1	1		104	105.9	27	1			1				29	30.5
14:15	113	14			1		3	2	133	130.6	22	1							23	23
14:30	90	16	1	1	1		1	1	111	112.4	30	9							39	39
14:45	105	7	1	2		1	1		117	120.5	25	4	1			1			31	32.5
H/Total	396	48	5	3	2	2	6	3	465	469.4	104	14	2	0	1	1	0	0	122	125
15:00	118	11	1			1	1		132	132.9	42	2	1						45	45.5
15:15	107	18	2		2	4	2		135	140.8	33	6	2		1	1	1	1	45	46.6
15:30	137	16	1	1	1	1	2		159	161.6	29	5						1	35	34.2
15:45	145	25	2	1					173	175.3	30	1						1	32	31.2
H/Total	507	70	6	2	3	6	5	0	599	610.6	134	14	3	0	1	1	1	3	157	157.5
16:00	106	10			1	1	1		119	120.4	49	3	1	1	1				55	57.8
16:15	125	19	1		1	1	1	2	150	150.3	31	1							33	32.4
16:30	101	11	1		1		2	2	118	116.7	34	4	1				1		40	39.9
16:45	100	12	1			3	2		118	120.3	33	3							36	36
H/Total	432	52	3	0	3	5	6	4	505	507.7	147	11	2	1	1	0	2	0	164	166.1
17:00	96	11	1			1		1	110	110.7	55	5			1		2		63	62.8
17:15	123	8		1	1			1	135	137.5	27	1						4	32	28.8
17:30	108	8	2		1		1	3	123	122	41	2							43	43
17:45	113	8					4	1	126	122.8	26								26	26
H/Total	440	35	3	1	2	2	5	6	494	493	149	8	0	0	1	0	2	4	164	160.6
18:00	109	9					1	2	121	118.8	24				1				25	26
18:15	113	5					2		123	123	13	4						1	18	17.2
18:30	90	5			1	1			98	97.4	14	1							15	15
18:45	102	3						3	108	105.6	12						1	2	15	12.8
H/Total	414	22	0	0	2	1	3	8	450	444.8	63	5	0	0	1	0	1	3	73	71
Total	4713	532	60	13	26	31	45	43	5463	5505.9	1559	178	27	5	8	24	15	22	1838	1863.4



Project Number: **TSP13819**  
 Project Name: **Dinas Powys - May 2018**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **2**  
 Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
 Date: **15 May 2018, Tuesday**



Time	B - B										B - C									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00									0	0	10	7	3						26	35
07:15									0	0	15	2		4		1		1	23	28.4
07:30									0	0	19	11	1	1	1	2			36	40
07:45									0	0	15	4	1	1				1	21	22.8
H/Total	0	0	0	0	0	0	0	0	0	0	59	24	5	11	1	4	0	2	106	126.2
08:00									0	0	27	4	2	2					35	38.6
08:15									0	0	19	1	1	2					23	26.1
08:30									0	0	19	2	1	1	1				24	26.8
08:45									0	0	17		3	2					22	26.1
H/Total	0	0	0	0	0	0	0	0	0	0	82	7	7	7	1	0	0	0	104	117.6
09:00									0	0	16	6	6	3					31	37.9
09:15									0	0	9	8	2	3				1	23	27.1
09:30									0	0	22	4	1	2	1			1	31	34.3
09:45									0	0	17	7		3					27	30.9
H/Total	0	0	0	0	0	0	0	0	0	0	64	25	9	11	1	0	0	2	112	130.2
10:00									0	0	20	5	1	4					30	35.7
10:15									0	0	20	3		1					24	25.3
10:30									0	0	24	6		1		1			32	34.3
10:45									0	0	21	2	1	4					28	33.7
H/Total	0	0	0	0	0	0	0	0	0	0	85	16	2	10	1	0	0	0	114	129
11:00									0	0	25	8	2	2					37	40.6
11:15			1						1	1.5	24	7	1	2			1		35	37.5
11:30									0	0	14	4	3		1				22	24.5
11:45									0	0	18	6	2	1					27	29.3
H/Total	0	0	1	0	0	0	0	0	1	1.5	81	25	8	5	1	0	1	0	121	131.9
12:00									0	0	18	5		2					25	27.6
12:15									0	0	20	4	1						25	25.5
12:30									0	0	25	5		2	1				33	36.6
12:45									0	0	27	6	3	2					38	42.1
H/Total	0	0	0	0	0	0	0	0	0	0	90	20	4	6	1	0	0	0	121	131.8
13:00									0	0	14	7	2	1					24	26.3
13:15									0	0	24	6	3	2					35	39.1
13:30	1								1	1	16	5		2		1			24	27.6
13:45									0	0	21	5	2	1					29	31.3
H/Total	1	0	0	0	0	0	0	0	1	1	75	23	7	6	0	1	0	0	112	124.3
14:00									0	0	21	5	2	2		2			32	37.6
14:15									0	0	20	3	2	4					29	35.2
14:30									0	0	20	8	2		1	1			32	35
14:45									0	0	14	5		1		3	1		24	27.7
H/Total	0	0	0	0	0	0	0	0	0	0	75	21	6	7	1	6	1	0	117	135.5
15:00	1								1	1	36	3	1			1			41	42.5
15:15									0	0	26	7	2	3					38	42.9
15:30									0	0	19	3	1	2	1	1			27	32.1
15:45									0	0	26	6	2	1		1			36	39.3
H/Total	1	0	0	0	0	0	0	0	1	1	107	19	6	6	1	3	0	0	142	156.8
16:00	1								1	1	35	9	4	1				1	50	52.5
16:15	1								1	1	22	2		1					25	26.3
16:30									0	0	24	10			1				35	36
16:45									0	0	22	2							24	24
H/Total	2	0	0	0	0	0	0	0	2	2	103	23	4	2	1	0	0	1	134	138.8
17:00									0	0	43	3		1					47	48.3
17:15									0	0	20	1							21	21
17:30	1								1	1	29	2	2	1	1			1	36	38.5
17:45									0	0	14	1		1			2		18	18.1
H/Total	1	0	0	0	0	0	0	0	1	1	106	7	2	3	1	0	2	1	122	125.9
18:00									0	0	18						3		21	19.2
18:15									0	0	10								10	10
18:30	1								1	1	14				1				15	16
18:45									0	0	8	1						1	10	9.2
H/Total	1	0	0	0	0	0	0	0	1	1	50	1	0	0	1	0	3	1	56	54.4
Total	6	0	1	0	0	0	0	0	7	7.5	977	211	60	74	11	14	7	7	1361	1502.4

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	C - A										C - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	47	8	1			2	1		59	60.9	9	3	1						14	15.5
07:15	42	8			1			1	52	52.2	22	8	1			1			31	31.5
07:30	82	13	4			1	2		102	103.8	22	4	2	1					29	31.3
07:45	117	19			1	2	1	1	141	142.6	27	6		1					35	35.7
H/Total	288	48	5	0	2	5	4	2	354	359.5	80	21	4	2	0	1	1	0	109	114
08:00	139	18	1	1	1	4	1		165	171.2	23	7	1		1				32	33.5
08:15	96	15	2			3			116	120	13	1	1	2				1	18	20.3
08:30	110	9				3	1		123	125.4	30	4	1	2		2			39	44.1
08:45	102	21	6		1	1			131	136	31	5	2			3			41	45
H/Total	447	63	9	1	2	11	2	0	535	552.6	97	17	5	4	1	5	0	1	130	142.9
09:00	92	12	1			1	1		107	107.9	35	5			3	1			45	50.3
09:15	80	15	2	1	1		1		100	102.7	29	7		5				1	42	47.7
09:30	86	11	1					1	99	98.7	18	3	3	2					26	30.1
09:45	81	16	4	2		1	2		106	110.4	32	3	2	1					38	40.3
H/Total	339	54	8	3	1	2	4	1	412	419.7	114	18	5	9	3	1	0	1	151	168.4
10:00	71	10	4		1	2			88	93	24	7			1	1			33	35.3
10:15	83	6	6		1			1	97	100.2	29	10			3				42	45.9
10:30	74	13	2					1	91	90.6	21	2	1	2			1		27	29.5
10:45	88	11						1	100	99.2	17	5	1	1					24	25.8
H/Total	316	40	12	0	2	2	1	3	376	383	91	24	2	7	1	0	1	0	126	136.5
11:00	77	16	1		1				95	96.5	22	2	2		1				27	29
11:15	87	12	1		1	1	1		103	104.9	15	5							21	22.3
11:30	81	9	1			1			92	93.5	22	5	2	4					33	39.2
11:45	93	10							103	103	25	6		2		1			34	37.6
H/Total	338	47	3	0	2	2	1	0	393	397.9	84	18	4	7	1	1	0	0	115	128.1
12:00	86	12	2		1		1	1	103	103.6	15	6	1	2	1		1		26	29.5
12:15	89	9	1		1				100	101.5	19	2	3						24	25.5
12:30	95	14	2					1	112	112.2	23	4	2						29	30
12:45	106	7							114	113.4	25	3	1	1					30	31.8
H/Total	376	42	5	0	2	0	2	2	429	430.7	82	15	7	3	1	0	1	0	109	116.8
13:00	103	13	2	1	1		1		121	123.7	13	8	2	2	1				26	30.6
13:15	93	14			1		1		109	109.4	28	6	1	3					38	42.4
13:30	87	9	2			1	1		100	101.4	19	4	3	3			1		30	34.8
13:45	94	9					1		104	103.4	28	6		2		1			37	40.6
H/Total	377	45	4	1	2	1	4	0	434	437.9	88	24	6	10	1	1	1	0	131	148.4
14:00	72	10			1	1	1		85	86.4	25	4	2		1				32	34
14:15	72	8			1				81	82	18	3		2		1			24	27.6
14:30	82	11				2			95	97	24	9	1	1		1			36	38.8
14:45	111	14			1				126	127	22	6		3					31	34.9
H/Total	337	43	0	0	2	4	1	0	387	392.4	89	22	3	6	1	2	0	0	123	135.3
15:00	114	6	3		1	1	1	2	128	129.3	24	5	5	3	1				38	45.4
15:15	106	11		1	1	2	1	2	124	126.1	23	9	4	1					37	40.3
15:30	105	10	2			1	2		120	120.8	17	6	1	1					25	26.8
15:45	124	8				1	1		134	134.4	25		1	1					27	28.8
H/Total	449	35	5	1	2	5	5	4	506	510.6	89	20	11	6	1	0	0	0	127	141.3
16:00	107	9			1		2		119	118.8	20	2	2	1	1		1		27	29.7
16:15	105	7			1			1	114	114.2	23	5		4		1			33	39.2
16:30	87	14	1			1			103	104.5	18	1		3					22	25.9
16:45	117	8					2		127	125.8	16	2		2		1	3		24	25.8
H/Total	416	38	1	0	2	1	4	1	463	463.3	77	10	2	10	1	2	4	0	106	120.6
17:00	92	10			1		1	2	106	104.8	20	4	2			1			27	29
17:15	115	5				1			121	122	17	4	2	3					26	30.9
17:30	103	9					4	1	117	113.8	31	4	1						36	36.5
17:45	112	10					1		123	122.4	21	1	1	1					24	25.8
H/Total	422	34	0	0	1	1	6	3	467	463	89	13	6	4	0	1	0	0	113	122.2
18:00	89	14			1		2		106	105.8	14	4	3	2	1				24	29.1
18:15	103	5						1	109	108.2	15	1	2	2					20	23.6
18:30	80	5			1	1			88	89.2	12	2					1		15	14.4
18:45	102	6					1		109	108.4	18	4	1						23	23.5
H/Total	374	30	0	0	2	1	3	2	412	411.6	59	11	6	4	1	0	1	0	82	90.6
Total	4479	519	52	6	22	35	37	18	5168	5222.2	1039	213	61	72	12	14	9	2	1422	1565.1



Time	C - C									TOTAL	TOTAL (ECU)
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY			
07:00									0	0	
07:15									0	0	
07:30				1					1	2.3	
07:45									0	0	
H/Total	0	0	0	1	0	0	0	0	1	2.3	
08:00									0	0	
08:15									0	0	
08:30									0	0	
08:45									0	0	
H/Total	0	0	0	0	0	0	0	0	0	0	
09:00		1							1	1	
09:15	1								1	1	
09:30	2								2	2	
09:45	2								2	2	
H/Total	5	1	0	0	0	0	0	0	6	6	
10:00									0	0	
10:15	2								2	2	
10:30	1								1	1	
10:45	1								1	1	
H/Total	4	0	0	0	0	0	0	0	4	4	
11:00									0	0	
11:15									0	0	
11:30									0	0	
11:45									0	0	
H/Total	0	0	0	0	0	0	0	0	0	0	
12:00									0	0	
12:15	1								1	1	
12:30									0	0	
12:45									0	0	
H/Total	1	0	0	0	0	0	0	0	1	1	
13:00									0	0	
13:15									0	0	
13:30									0	0	
13:45	2								2	2	
H/Total	2	0	0	0	0	0	0	0	2	2	
14:00	1								1	1	
14:15	1	2							3	3	
14:30									0	0	
14:45									0	0	
H/Total	2	2	0	0	0	0	0	0	4	4	
15:00									0	0	
15:15	1								1	1	
15:30									0	0	
15:45									0	0	
H/Total	1	0	0	0	0	0	0	0	1	1	
16:00	1								1	1	
16:15									0	0	
16:30									0	0	
16:45	1								1	1	
H/Total	2	0	0	0	0	0	0	0	2	2	
17:00									0	0	
17:15									0	0	
17:30									0	0	
17:45		1							1	1	
H/Total	0	1	0	0	0	0	0	0	1	1	
18:00									0	0	
18:15									0	0	
18:30									0	0	
18:45									0	0	
H/Total	0	0	0	0	0	0	0	0	0	0	
Total	17	4	0	1	0	0	0	0	22	23.3	

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	From A										To A									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	42	10	2	0	0	0	0	0	54	55	65	9	3	0	0	3	1	1	82	85.1
07:15	57	16	1	0	0	0	0	3	77	75.1	72	13	1	0	1	0	0	3	90	89.1
07:30	70	17	2	0	2	1	2	4	98	97.6	153	17	4	0	0	2	3	2	181	181.6
07:45	111	11	2	0	0	0	1	4	129	126.2	205	28	6	0	1	3	2	1	246	251
H/Total	280	54	7	0	2	1	3	11	358	353.9	495	67	14	0	2	8	6	7	599	606.8
08:00	131	11	1	0	0	3	3	1	150	150.9	224	27	1	1	1	7	1	0	262	271.2
08:15	177	20	1	0	1	5	0	2	206	210.9	173	32	3	0	0	6	0	1	215	221.7
08:30	159	9	2	0	2	2	0	0	174	179	160	13	0	0	0	6	2	0	181	185.8
08:45	141	12	2	1	0	0	1	0	157	158.7	138	24	7	0	1	2	1	0	173	178.9
H/Total	608	52	6	1	3	10	4	3	687	699.5	695	96	11	1	2	21	4	1	831	857.6
09:00	156	11	0	0	0	3	2	0	172	173.8	125	17	1	0	0	3	1	0	147	149.9
09:15	126	7	2	2	1	1	1	1	141	145.2	97	21	2	1	1	1	1	0	124	127.7
09:30	90	8	2	1	2	0	1	0	104	107.7	120	15	1	0	0	0	0	2	138	136.9
09:45	84	11	1	1	0	0	0	1	98	99	104	22	5	2	0	3	2	0	138	144.9
H/Total	456	37	5	4	3	4	4	2	515	525.7	446	75	9	3	1	7	4	2	547	559.4
10:00	101	26	5	0	0	1	1	1	135	137.1	92	16	5	0	2	2	1	0	118	123.9
10:15	102	10	2	1	1	1	1	0	118	121.7	105	12	7	0	1	0	0	1	126	129.7
10:30	93	20	3	0	2	0	0	0	118	121.5	97	20	2	1	0	0	0	1	122	122.9
10:45	115	19	0	1	0	0	1	1	137	136.9	117	15	0	0	0	0	0	2	134	132.4
H/Total	411	75	10	2	3	2	3	2	508	517.2	411	63	14	1	3	2	2	4	500	508.9
11:00	112	14	2	0	0	1	0	1	130	131.2	107	19	3	0	1	0	0	1	131	132.7
11:15	119	12	1	0	1	0	0	0	133	134.5	117	13	1	0	2	1	1	0	135	137.9
11:30	104	16	6	0	2	0	2	0	130	133.8	112	13	1	0	0	1	1	1	129	129.1
11:45	126	16	2	0	0	1	1	0	146	147.4	116	12	0	0	0	0	1	0	129	128.4
H/Total	461	58	11	0	3	2	3	1	539	546.9	452	57	5	0	3	2	3	2	524	528.1
12:00	155	13	1	0	0	2	1	2	174	174.3	114	14	4	0	2	1	1	1	137	140.6
12:15	104	13	3	0	1	1	0	2	124	125.9	114	13	1	0	1	0	1	1	131	131.1
12:30	108	13	3	0	2	0	1	0	127	129.9	125	17	2	0	0	0	0	1	145	145.2
12:45	130	19	2	0	0	0	1	0	152	152.4	127	12	1	1	0	0	1	0	142	143.2
H/Total	497	58	9	0	3	3	3	4	577	582.5	480	56	8	1	3	1	3	3	555	560.1
13:00	120	12	0	0	0	0	2	0	134	132.8	130	16	2	2	1	1	1	1	154	158.2
13:15	117	17	5	0	1	1	1	1	143	146.1	114	17	1	1	1	2	1	0	137	141.2
13:30	119	15	2	1	3	0	0	0	140	145.3	109	11	2	0	0	1	1	0	124	125.4
13:45	109	16	3	0	0	0	0	0	128	129.5	119	10	1	0	0	0	2	0	132	131.3
H/Total	465	60	10	1	4	1	3	1	545	553.7	472	54	6	3	2	4	5	1	547	556.1
14:00	123	14	4	0	0	1	1	0	143	145.4	100	10	1	0	2	1	1	0	115	117.9
14:15	138	16	0	0	1	0	3	3	161	157.8	95	9	0	0	1	0	0	0	105	106
14:30	120	21	1	1	2	0	1	2	148	149.6	113	21	0	0	0	2	0	0	136	138
14:45	133	11	2	3	0	3	1	0	153	160.3	137	18	1	0	0	2	0	0	158	160.5
H/Total	514	62	7	4	3	4	6	5	605	613.1	445	58	2	0	3	5	1	0	514	522.4
15:00	147	19	1	0	0	1	1	1	170	170.1	156	8	4	0	1	1	1	2	173	174.8
15:15	163	22	4	1	2	7	2	0	201	212.1	139	17	2	1	2	3	2	3	169	172.7
15:30	184	20	3	1	2	3	2	0	215	221.6	134	16	2	0	0	1	2	1	156	156
15:45	181	30	3	1	0	2	0	0	217	221.8	154	9	0	0	0	1	1	1	166	165.6
H/Total	675	91	11	3	4	13	5	1	803	825.6	583	50	8	1	3	6	6	7	664	669.1
16:00	174	16	2	0	1	2	1	0	196	199.4	160	12	1	1	2	0	2	0	178	180.6
16:15	187	25	2	0	1	2	1	2	220	221.8	136	8	0	0	1	0	1	1	147	146.6
16:30	144	21	2	0	2	0	2	3	174	173.4	121	18	2	0	0	1	1	0	143	144.4
16:45	164	17	3	0	0	3	3	1	191	192.9	151	11	0	0	0	0	2	0	164	162.8
H/Total	669	79	9	0	4	7	7	6	781	787.5	568	49	3	1	3	1	6	1	632	634.4
17:00	149	17	1	0	0	1	1	2	171	170.3	147	15	0	0	2	0	3	2	169	167.6
17:15	182	13	2	2	1	1	0	1	202	206.8	142	6	0	0	0	1	0	4	153	150.8
17:30	161	11	2	0	1	1	2	5	183	180.8	145	11	0	0	0	0	4	1	161	157.8
17:45	155	13	0	0	0	0	4	4	176	170.4	138	10	0	0	0	0	1	0	149	148.4
H/Total	647	54	5	2	2	3	7	12	732	728.3	572	42	0	0	2	1	8	7	632	624.6
18:00	143	9	0	0	0	0	1	5	158	153.4	114	14	0	0	2	0	2	0	132	132.8
18:15	137	7	0	0	1	1	3	2	151	149.6	116	9	0	0	0	0	0	2	127	125.4
18:30	107	5	0	0	2	0	0	5	119	117	95	6	0	0	1	1	0	1	104	105.2
18:45	127	4	0	0	0	0	0	4	135	131.8	114	6	0	0	0	0	2	2	124	121.2
H/Total	514	25	0	0	3	1	4	16	563	551.8	439	35	0	0	3	1	4	5	487	484.6
Total	6197	705	90	17	37	51	52	64	7213	7285.7	6058	702	80	11	30	59	52	40	7032	7112.1



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	From B										To B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	28	8	5	5	0	2	0	1	49	59.2	15	4	1	0	0	1	0	0	21	22.5
07:15	45	7	1	4	0	1	0	3	61	65.3	33	11	2	0	0	0	0	0	46	47
07:30	90	15	1	1	1	3	1	3	115	117.8	35	9	2	1	1	0	1	1	50	51.9
07:45	103	13	6	1	0	1	1	0	125	129.7	54	8	0	1	0	0	1	0	64	64.7
H/Total	266	43	13	11	1	7	2	7	350	372	137	32	5	2	1	1	2	1	181	186.1
08:00	112	13	2	2	0	3	0	0	132	138.6	45	8	1	0	1	1	0	0	56	58.5
08:15	95	18	2	2	0	3	0	1	121	126.8	41	6	1	2	0	1	0	1	52	55.3
08:30	69	6	1	1	1	3	1	0	82	87.2	60	4	2	2	1	2	0	0	71	77.6
08:45	53	3	4	2	0	1	1	0	64	69	55	8	2	0	0	3	0	0	68	72
H/Total	329	40	9	7	1	10	2	1	399	421.6	201	26	6	4	2	7	0	1	247	263.4
09:00	49	10	6	3	0	2	0	0	70	78.9	71	6	0	1	3	2	0	0	83	89.3
09:15	26	14	2	3	0	1	0	1	47	52.1	55	8	0	5	0	1	0	1	70	76.7
09:30	56	8	1	2	1	0	0	2	70	72.5	29	5	3	3	1	0	0	0	41	47.4
09:45	40	13	1	3	0	2	0	0	59	65.4	54	6	2	1	0	0	0	0	63	65.3
H/Total	171	45	10	11	1	5	0	3	246	268.9	209	25	5	10	4	3	0	1	257	278.7
10:00	41	11	2	4	1	0	1	0	60	66.6	48	12	2	1	1	1	0	0	65	69.3
10:15	42	9	1	1	0	0	0	0	53	54.8	50	14	1	3	0	0	0	0	68	72.4
10:30	47	12	0	2	1	0	0	0	62	65.6	42	9	2	2	1	0	1	0	57	61
10:45	49	5	1	4	0	0	0	1	60	64.9	47	8	1	1	0	0	0	0	57	58.8
H/Total	179	37	4	11	2	0	0	1	235	251.9	187	43	6	7	2	1	1	0	247	261.5
11:00	55	11	4	2	0	0	0	1	73	76.8	54	4	2	0	1	1	0	0	62	65
11:15	53	8	2	2	1	0	1	0	67	71	46	8	2	1	0	0	0	0	57	59.3
11:30	45	8	3	0	1	0	1	1	59	60.1	39	7	4	4	1	0	0	0	55	63.2
11:45	41	8	2	1	0	0	1	0	53	54.7	42	9	0	2	0	2	0	0	55	59.6
H/Total	194	35	11	5	2	0	3	2	252	262.6	181	28	8	7	2	3	0	0	229	247.1
12:00	45	7	2	2	1	1	0	0	58	63.6	39	8	1	2	1	0	1	0	52	55.5
12:15	45	8	1	0	0	0	1	1	56	55.1	40	7	4	0	0	0	0	1	52	53.2
12:30	55	8	0	2	1	0	0	0	66	69.6	45	5	4	0	1	0	1	0	56	58.4
12:45	47	11	4	3	0	0	0	0	65	70.9	52	7	2	1	0	0	0	0	62	64.3
H/Total	192	34	7	7	2	1	1	1	245	259.2	176	27	11	3	2	0	2	1	222	231.4
13:00	41	10	2	2	0	1	0	1	57	60.8	39	12	2	2	1	0	1	0	57	61
13:15	45	9	4	3	0	2	0	0	63	70.9	49	13	1	3	0	1	0	0	67	72.4
13:30	36	7	0	2	0	1	0	0	46	49.6	48	7	3	3	1	0	1	0	63	68.8
13:45	46	6	3	1	0	0	1	0	57	59.2	56	10	1	2	0	1	0	0	70	74.1
H/Total	168	32	9	8	0	4	1	1	223	240.5	192	42	7	10	2	2	2	0	257	276.3
14:00	48	5	3	2	1	2	0	0	61	68.1	59	7	3	0	1	0	0	0	70	72.5
14:15	42	4	2	4	0	0	0	0	52	58.2	42	5	0	2	0	1	0	1	51	53.8
14:30	50	17	2	0	1	1	0	0	71	74	53	13	1	1	1	1	0	1	71	74
14:45	39	9	1	1	0	4	1	0	55	60.2	49	10	1	4	0	2	0	0	66	73.7
H/Total	179	35	8	7	2	7	1	0	239	260.5	203	35	5	7	2	4	0	2	258	274
15:00	79	5	2	0	0	1	0	0	87	89	54	13	5	3	1	0	0	1	77	83.6
15:15	59	13	4	3	1	1	1	1	83	89.5	79	13	6	2	0	3	0	0	103	111.6
15:30	48	8	1	2	1	1	0	1	62	66.3	64	9	3	1	1	2	0	0	80	85.8
15:45	56	7	2	1	0	1	0	1	68	70.5	61	5	2	1	0	2	0	0	71	75.3
H/Total	242	33	9	6	2	4	1	3	300	315.3	258	40	16	7	2	7	0	1	331	356.3
16:00	85	12	5	2	1	0	0	1	106	111.3	85	8	4	1	1	1	1	0	101	105.7
16:15	54	3	0	1	0	0	1	0	59	59.7	86	11	1	4	0	2	0	0	104	111.7
16:30	58	14	1	0	1	0	1	0	75	75.9	61	11	1	3	1	0	0	1	78	82.6
16:45	55	5	0	0	0	0	0	0	60	60	79	7	2	2	0	1	4	1	96	97.4
H/Total	252	34	6	3	2	0	2	1	300	306.9	311	37	8	10	2	4	5	2	379	397.4
17:00	98	8	0	1	1	0	2	0	110	111.1	73	10	2	0	0	1	1	1	88	88.6
17:15	47	2	0	0	1	0	0	4	53	49.8	76	9	4	4	0	0	0	0	93	100.2
17:30	71	4	2	1	1	0	0	1	80	82.5	84	7	1	0	0	1	1	2	96	95.3
17:45	40	1	0	1	0	0	2	0	44	44.1	63	6	1	1	0	0	0	3	74	73.4
H/Total	256	15	2	3	2	0	4	5	287	287.5	296	32	8	5	0	2	2	6	351	357.5
18:00	42	0	0	0	1	0	3	0	46	45.2	47	4	3	2	1	0	0	3	60	62.7
18:15	23	4	0	0	0	0	0	1	28	27.2	39	3	2	2	0	0	1	1	48	50.2
18:30	29	1	0	0	1	0	0	0	31	32	29	2	0	0	1	0	1	3	36	34
18:45	20	1	0	0	0	0	1	3	25	22	43	5	1	0	0	0	0	1	50	49.7
H/Total	114	6	0	0	2	0	4	4	130	126.4	158	14	6	4	2	0	2	8	194	196.6
Total	2542	389	88	79	19	38	22	29	3206	3373.3	2509	381	91	76	23	34	16	23	3153	3326.3

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	From C										To C									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	56	11	2	0	0	3	1	0	73	76.4	46	16	5	5	0	1	0	0	73	83
07:15	64	16	1	0	1	0	0	1	83	83.7	61	15	0	4	0	1	0	4	85	88
07:30	104	17	6	2	0	1	2	0	132	137.4	76	23	3	2	2	3	1	4	114	119.3
07:45	144	25	0	1	1	2	2	1	176	178.3	99	13	2	1	0	0	1	4	120	118.5
H/Total	368	69	9	3	2	6	5	2	464	475.8	282	67	10	12	2	5	2	12	392	408.8
08:00	162	25	2	1	2	4	1	0	197	204.7	136	14	3	2	0	2	3	1	161	164.5
08:15	109	16	3	2	0	3	0	1	134	140.3	167	16	2	2	1	4	0	2	194	201
08:30	140	13	1	2	0	5	1	0	162	169.5	148	11	2	1	2	2	0	0	166	172.3
08:45	133	26	8	0	1	4	0	0	172	181	134	9	5	3	0	0	1	0	152	157.8
H/Total	544	80	14	5	3	16	2	1	665	695.5	585	50	12	8	3	8	4	3	673	695.6
09:00	127	18	1	1	3	2	1	0	153	159.2	136	16	6	3	0	2	2	0	165	172.7
09:15	110	22	2	6	1	0	1	1	143	151.4	110	14	4	5	1	0	1	2	137	144.3
09:30	106	14	4	2	0	0	0	1	127	130.8	103	10	3	2	2	0	1	1	122	126.7
09:45	115	19	6	3	0	1	2	0	146	152.7	81	15	1	4	0	0	0	1	102	106.9
H/Total	458	73	13	12	4	3	4	2	569	594.1	430	55	14	14	3	2	4	4	526	550.6
10:00	95	17	4	1	2	2	0	0	121	128.3	97	26	4	4	0	0	1	1	133	138.8
10:15	114	16	6	3	1	0	0	1	141	148.1	103	9	1	2	1	1	1	0	118	122.5
10:30	96	15	3	2	0	0	2	1	119	121.1	97	18	2	1	2	0	0	0	120	124.3
10:45	106	16	1	1	0	0	0	1	125	126	106	17	1	5	0	0	1	1	131	136.6
H/Total	411	64	14	7	3	2	2	3	506	523.5	403	70	8	12	3	1	3	2	502	522.2
11:00	99	18	3	0	2	0	0	0	122	125.5	105	20	4	2	0	0	0	1	132	135.8
11:15	102	17	1	1	1	1	0	1	124	127.2	111	16	1	2	1	0	1	0	132	135.5
11:30	103	14	3	4	0	1	0	0	125	132.7	101	18	7	0	2	0	2	0	130	134.3
11:45	118	16	0	2	0	1	0	0	137	140.6	127	19	4	1	0	0	1	0	152	154.7
H/Total	422	65	7	7	3	3	1	0	508	526	444	73	16	5	3	0	4	1	546	560.3
12:00	101	18	3	2	2	0	2	1	129	133.1	148	16	1	2	0	2	1	2	172	174.9
12:15	109	11	4	0	1	0	0	0	125	128	104	12	3	0	1	1	0	1	122	124.7
12:30	118	18	4	0	0	0	0	1	141	142.2	111	17	1	2	2	0	0	0	133	138.1
12:45	131	10	1	1	0	0	1	0	144	145.2	129	21	4	2	0	0	1	0	157	161
H/Total	459	57	12	3	3	0	3	2	539	548.5	492	66	9	6	3	3	2	3	584	598.7
13:00	116	21	4	3	2	0	1	0	147	154.3	108	15	2	1	0	0	1	0	127	128.7
13:15	121	20	1	3	1	0	1	0	147	151.8	120	16	8	2	1	0	1	1	149	155.2
13:30	106	13	5	3	0	1	2	0	130	136.2	104	17	2	3	2	1	0	0	129	136.9
13:45	124	15	0	2	0	1	1	0	143	146	104	17	4	1	0	0	0	0	126	129.3
H/Total	467	69	10	11	3	2	5	0	567	588.3	436	65	16	7	3	1	2	1	531	550.1
14:00	98	14	2	0	2	1	1	0	118	121.4	110	16	5	2	0	3	1	0	137	144.5
14:15	91	13	0	2	1	1	0	0	108	112.6	134	19	2	4	1	0	3	2	165	168.8
14:30	106	20	1	1	0	3	0	0	131	135.8	110	24	3	1	2	1	1	1	143	147.4
14:45	133	20	0	3	0	1	0	0	157	161.9	119	12	1	3	0	4	2	0	141	148.2
H/Total	428	67	3	6	3	6	1	0	514	531.7	473	71	11	10	3	8	7	3	586	608.9
15:00	138	11	8	3	2	1	1	2	166	174.7	154	14	2	0	0	2	1	0	173	175.4
15:15	130	20	4	2	1	2	1	2	162	167.4	134	25	4	3	2	4	2	0	174	184.7
15:30	122	16	3	1	0	1	2	0	145	147.6	156	19	2	3	2	2	2	0	186	193.7
15:45	149	8	1	1	0	1	1	0	161	163.2	171	31	4	2	0	1	0	0	209	214.6
H/Total	539	55	16	7	3	5	5	4	634	652.9	615	89	12	8	4	9	5	0	742	768.4
16:00	128	11	2	1	2	0	3	0	147	149.5	142	19	4	1	1	1	1	1	170	173.9
16:15	128	12	0	4	1	1	0	1	147	153.4	147	21	1	1	1	1	2	1	175	176.6
16:30	105	15	1	3	0	1	0	0	125	130.4	125	21	1	0	2	0	2	2	153	152.7
16:45	134	10	0	2	0	1	5	0	152	152.6	123	14	1	0	0	3	2	0	143	145.3
H/Total	495	48	3	10	3	3	8	1	571	585.9	537	75	7	2	4	5	6	5	641	648.5
17:00	112	14	2	0	1	1	1	2	133	133.8	139	14	1	1	0	1	0	1	157	159
17:15	132	9	2	3	0	1	0	0	147	152.9	143	9	0	1	1	1	0	1	156	158.5
17:30	134	13	1	0	0	0	4	1	153	150.3	137	10	4	1	2	0	1	4	159	160.5
17:45	133	12	1	1	0	0	1	0	148	149.2	127	10	0	1	0	0	6	1	145	141.9
H/Total	511	48	6	4	1	2	6	3	581	586.2	546	43	5	4	3	2	7	7	617	619.9
18:00	103	18	3	2	2	0	2	0	130	134.9	127	9	0	0	0	0	4	2	142	138
18:15	118	6	2	2	0	0	0	1	129	131.8	123	5	0	0	1	1	2	1	133	133
18:30	92	7	0	0	1	1	1	0	103	103.6	104	5	0	0	2	0	0	2	113	113.4
18:45	120	10	1	0	0	0	1	0	132	131.9	110	4	0	0	0	0	0	4	118	114.8
H/Total	433	41	6	4	3	1	4	2	494	502.2	464	23	0	0	3	1	6	9	506	499.2
Total	5535	736	113	79	34	49	46	20	6612	6810.6	5707	747	120	88	37	45	52	50	6846	7031.2

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **2**  
Location: **Sully Moors Road / B4267 South Road / Hayes Road**  
Date: **15 May 2018, Tuesday**



Time	Whole Junction								TOTAL	TOTAL (PCU)
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY		
07:00	126	29	9	5	0	5	1	1	176	190.6
07:15	166	39	3	4	1	1	0	7	221	224.1
07:30	264	49	9	3	3	5	5	7	345	352.8
07:45	358	49	8	2	1	3	4	5	430	434.2
H/Total	914	166	29	14	5	14	10	20	1172	1201.7
08:00	405	49	5	3	2	10	4	1	479	494.2
08:15	381	54	6	4	1	11	0	4	461	478
08:30	368	28	4	3	3	10	2	0	418	435.7
08:45	327	41	14	3	1	5	2	0	393	408.7
H/Total	1481	172	29	13	7	36	8	5	1751	1816.6
09:00	332	39	7	4	3	7	3	0	395	411.9
09:15	262	43	6	11	2	2	2	3	331	348.7
09:30	252	30	7	5	3	0	1	3	301	311
09:45	239	43	8	7	0	3	2	1	303	317.1
H/Total	1085	155	28	27	8	12	8	7	1330	1388.7
10:00	237	54	11	5	3	3	2	1	316	332
10:15	258	35	9	5	2	1	1	1	312	324.6
10:30	236	47	6	4	3	0	2	1	299	308.2
10:45	270	40	2	6	0	0	1	3	322	327.8
H/Total	1001	176	28	20	8	4	6	6	1249	1292.6
11:00	266	43	9	2	2	1	0	2	325	333.5
11:15	274	37	4	3	3	1	2	0	324	332.7
11:30	252	38	12	4	3	1	3	1	314	326.6
11:45	285	40	4	3	0	2	2	0	336	342.7
H/Total	1077	158	29	12	8	5	7	3	1299	1335.5
12:00	301	38	6	4	3	3	3	3	361	371
12:15	258	32	8	0	2	1	1	3	305	309
12:30	281	39	7	2	3	0	1	1	334	341.7
12:45	308	40	7	4	0	0	2	0	361	368.5
H/Total	1148	149	28	10	8	4	7	7	1361	1390.2
13:00	277	43	6	5	2	1	3	1	338	347.9
13:15	283	46	10	6	2	3	2	1	353	368.8
13:30	261	35	7	6	3	2	2	0	316	331.1
13:45	279	37	6	3	0	1	2	0	328	334.7
H/Total	1100	161	29	20	7	7	9	2	1335	1382.5
14:00	269	33	9	2	3	4	2	0	322	334.9
14:15	271	33	2	6	2	1	3	3	321	328.6
14:30	276	58	4	2	3	4	1	2	350	359.4
14:45	305	40	3	7	0	8	2	0	365	382.4
H/Total	1121	164	18	17	8	17	8	5	1358	1405.3
15:00	364	35	11	3	2	3	2	3	423	433.8
15:15	352	55	12	6	4	10	4	3	446	469
15:30	354	44	7	4	3	5	4	1	422	435.5
15:45	386	45	6	3	0	4	1	1	446	455.5
H/Total	1456	179	36	16	9	22	11	8	1737	1793.8
16:00	387	39	9	3	4	2	4	1	449	460.2
16:15	369	40	2	5	2	3	2	3	426	434.9
16:30	307	50	4	3	3	1	3	3	374	379.7
16:45	353	32	3	2	0	4	8	1	403	405.5
H/Total	1416	161	18	13	9	10	17	8	1652	1680.3
17:00	359	39	3	1	2	2	4	4	414	415.2
17:15	361	24	4	5	1	2	0	5	402	409.5
17:30	366	28	5	1	2	1	6	7	416	413.6
17:45	328	26	1	2	0	0	7	4	368	363.7
H/Total	1414	117	13	9	5	5	17	20	1600	1602
18:00	288	27	3	2	3	0	6	5	334	333.5
18:15	278	17	2	2	1	1	3	4	308	308.6
18:30	228	13	0	0	4	1	1	6	253	252.6
18:45	267	15	1	0	0	0	2	7	292	285.7
H/Total	1061	72	6	4	8	2	12	22	1187	1180.4
Total	14274	1830	291	175	90	138	120	113	17031	17470

Peak Hours	Totals
07:00 08:00	1172
07:15 08:15	1475
07:30 08:30	1715
07:45 08:45	1788

08:00 09:00	1751
08:15 09:15	1667
08:30 09:30	1537
08:45 09:45	1420

09:00 10:00	1330
09:15 10:15	1251
09:30 10:30	1232
09:45 10:45	1230

10:00 11:00	1249
10:15 11:15	1258
10:30 11:30	1270
10:45 11:45	1285

11:00 12:00	1299
11:15 12:15	1335
11:30 12:30	1316
11:45 12:45	1336

12:00 13:00	1361
12:15 13:15	1338
12:30 13:30	1386
12:45 13:45	1368

13:00 14:00	1335
13:15 14:15	1319
13:30 14:30	1287
13:45 14:45	1321

14:00 15:00	1358
14:15 15:15	1459
14:30 15:30	1584
14:45 15:45	1656

15:00 16:00	1737
15:15 16:15	1763
15:30 16:30	1743
15:45 16:45	1695

16:00 17:00	1652
16:15 17:15	1617
16:30 17:30	1593
16:45 17:45	1635

17:00 18:00	1600
17:15 18:15	1520
17:30 18:30	1426
17:45 18:45	1263

18:00 19:00	1187
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Client: **Arcadis**

Project Number: **TSP13819**

Project Name: **Dinas Powys - May 2018**

Survey Type: **Manual Classified Turning Count**

Survey Date: **15 May 2018, Tuesday**

Survey Time: **07:00 - 19:00**

Weather: **Dry**

Comments:



Project Number: TSP13819

Project Name: Dinas Powys - May 2018

Survey Type: Manual Classified Turning Count

Site No: 3

Location: Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line



Project Number: **TSP13819**  
 Project Name: **Dinas Powys - May 2018**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
 Date: **15 May 2018, Tuesday**



Time	A - A										A - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
	1	1	1.5	2.3	2	2	0.4	0.2												
07:00									0	0									0	0
07:15									0	0									0	0
07:30									0	0									0	0
07:45									0	0									0	0
H/Total	0	0	0	0	0	0	0	0	0	0	184	64	9	8	0	4	0	3	272	288.5
08:00									0	0									0	0
08:15	1	1							2	2									4	4
08:30	2	1							3	3									6	6
08:45	1								1	1									2	2
H/Total	4	2	0	0	0	0	0	0	6	6	342	63	14	8	0	1	2	1	431	447.4
09:00	4	1	1						6	6.5	102	20	1	3		3	1		130	136.8
09:15	2								2	2	73	18		7					98	107.1
09:30									0	0	94	15	7	2		2	2		122	128.9
09:45	2								2	2	78	16	8	2		3		1	108	116.8
H/Total	8	1	1	0	0	0	0	0	10	10.5	347	69	16	14	0	8	3	1	458	489.6
10:00	3								3	3	86	15	4	4		3	1		113	122.6
10:15									2	2	99	11	4	5					119	127.5
10:30	2								2	2	73	17	1	5					96	103
10:45	2	1							3	3	107	14	5	1			1	1	129	131.4
H/Total	9	1	0	0	0	0	0	0	10	10	365	57	14	15	0	3	2	1	457	484.5
11:00	3	1							4	4	88	18	4	1		2			114	118.7
11:15	2								2	2	99	13	4	3					122	125.9
11:30	1			1					2	3.3	102	14	3	4		2		2	127	134.1
11:45	3	1							4	4	92	14	2	7		1			116	127.1
H/Total	9	2	0	1	0	0	0	0	12	13.3	381	59	13	15	0	5	3	3	479	505.8
12:00	1	1	1						3	3.5	121	16	5	4		1	2		149	156.5
12:15	1								1	1	108	17	2	2		1			129	132.6
12:30	3								3	3	106	15	5	5			1	1	133	140.6
12:45	4								4	4	109	14	2	3		2			130	136.9
H/Total	9	1	1	0	0	0	0	0	11	11.5	444	62	14	14	0	3	3	1	541	566.6
13:00	3	2							5	5	102	11	6	7		1	2		129	140.9
13:15	1								1	1	124	15	1					1	143	144.7
13:30			1	1					2	3.8	115	7	2	5		2	1		130	136.9
13:45	1								1	1	103	14	3	3				1	124	128.6
H/Total	5	2	1	1	0	0	0	0	9	10.8	444	47	12	15	0	3	3	2	526	551.1
14:00		1					1		2	1.4	94	11		4					109	114.2
14:15	2								2	2	108	9	4	9		1	2		133	146.5
14:30	3								3	3	121	15	2	5				2	145	150.9
14:45	3								3	3	84	20	3	5					114	120.8
H/Total	8	1	0	0	0	0	1	0	10	9.4	407	55	9	23	0	1	4	2	501	532.4
15:00	3	1							4	4	109	12	3	1					125	127.8
15:15	7								7	7	119	13	3	5		2	1		143	152.4
15:30	3								3	3	106	12	2	1			4		127	128.9
15:45	3	1							4	4	108	18	2			5			133	139
H/Total	16	2	0	0	0	0	0	0	18	18	442	55	10	7	0	9	5	0	528	548.1
16:00	2								2	2	124	17	3	3		1	1	1	150	155
16:15	2								2	2	114	19	3				2		138	138.3
16:30	2								2	2	135	15	3	1		2			156	160.8
16:45	0								0	0	132	17	2	1					152	154.3
H/Total	6	0	0	0	0	0	0	0	6	6	505	68	11	5	0	3	3	1	596	608.4
17:00									0	0	128	10	2				2	1	143	142
17:15	4						1		5	4.4	125	16	1	3				2	147	149.8
17:30	4								4	4	124	7		2		1	1		135	138
17:45	2								2	2	130	10		1				5	146	143.3
H/Total	10	0	0	0	0	0	1	0	11	10.4	507	43	3	6	0	1	3	8	571	573.1
18:00									0	0	160	9		1				1	171	171.5
18:15	2	1							3	3	118	11	2	3				1	135	139.1
18:30	1								1	1	111	8							121	119.8
18:45	1								1	1	91	9		1			1	1	103	102.9
H/Total	4	1	0	0	0	0	0	0	5	5	480	37	2	5	0	0	3	3	530	533.3
Total	88	13	3	2	0	0	2	0	108	110.9	4848	679	127	135	0	41	34	26	5890	6128.8

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	A - C										B - A									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	15	3	1		1				20	21.5	89	15							104	104
07:15	19	4	1						24	24.5	99	12							111	111
07:30	24	9	4		2				39	43	105	22	3	2		3		1	136	142.3
07:45	58	10	1					2	73	73.9	94	20	3	3					123	126.4
H/Total	116	26	7	0	3	2	0	2	156	162.9	387	69	6	5	0	3	2	2	474	483.7
08:00	44	9	1		1	1			56	58.5	96	13	4	5				1	119	126.7
08:15	75	15				2		1	93	94.2	71	11	2	1					85	87.3
08:30	82	13	2		1	2			100	104	103	17	5	6		1	1		133	143.7
08:45	83	10	1	1					95	96.8	111	9	5	2		1	1		129	134.5
H/Total	284	47	4	1	2	5	0	1	344	353.5	381	50	16	14	0	2	2	1	466	492.2
09:00	75	7	1		2	3	1		89	93.9	128	18	4	4			2		156	162
09:15	95	14	2			2	2		115	116.8	78	14	3	3		1	1		100	105.8
09:30	72	6	1	1	1				81	83.8	116	17	2	2		1	1		139	143
09:45	72	14	1				1		88	87.9	110	16	7	2		4			139	149.1
H/Total	314	41	5	1	3	5	4	0	373	382.4	432	65	16	11	0	6	4	0	534	559.9
10:00	66	17	2						85	86	101	10	1	4		1	1	1	118	123.9
10:15	60	15	2	1		1			79	82.3	104	11	4	2		1	1	1	124	128.2
10:30	61	6				1	1		69	69.4	114	15	5	5					139	148
10:45	50	11			1	1			63	65	103	21	3	6		1	1		135	144.7
H/Total	237	49	4	1	1	3	1	0	296	302.7	422	57	13	17	0	3	2	2	516	544.8
11:00	65	10		1			1		77	77.7	101	20	1	3		1			126	131.4
11:15	71	14	1		1				87	88.5	107	20	4	3			1	1	136	140.5
11:30	63	13	3		1	1	1	1	83	85.1	109	14	2	2			3		128	127.2
11:45	77	15	1				1		94	93.9	126	19	4	2		1	1	1	154	158.2
H/Total	276	52	5	1	2	1	3	1	341	345.2	443	73	11	8	0	2	5	2	544	557.3
12:00	92	8	1						101	101.5	110	17	4	2					133	137.6
12:15	83	19				1	2		105	104.8	111	22	4	2					139	143.6
12:30	74	11	1	2	1	1		1	91	95.3	119	10	3	4		2	1		139	147.1
12:45	77	10				1			88	89	127	13	2	4					146	150.2
H/Total	326	48	2	2	1	3	2	1	385	390.6	467	62	13	12	0	2	1	0	557	582.5
13:00	71	10		1					82	83.3	121	16	2	2		1	2		142	142.8
13:15	81	8	1						90	90.5	127	13	2	4		1	1	1	149	154.8
13:30	66	15	4		2				87	91	110	8	2	5		1	2		128	135.3
13:45	70	9	1				1		81	80.9	126	22	8	2		1			159	166.6
H/Total	288	42	6	1	2	0	1	0	340	345.7	484	59	14	11	0	4	5	1	578	599.5
14:00	65	11	1				3		80	78.7	103	23	4	5		2			137	147.5
14:15	98	8	1			1			108	109.5	89	10	1	3	1	4	1		109	117.8
14:30	79	8							87	87	132	7	4	4		2	3		152	159.4
14:45	99	7	1	1	1				109	111.8	130	22	3	3		1	4	1	164	167.2
H/Total	341	34	3	1	1	1	3	0	384	387	454	62	12	15	1	9	8	1	562	591.9
15:00	85	13	1			4	1		104	107.9	134	17	4	4		1	2	1	163	169.2
15:15	88	10	1		1	2		1	103	105.7	98	11	1	4	1	2			117	125.7
15:30	96	14			1	1	1		113	114.4	139	22		1					162	163.3
15:45	92	10	3			3			108	112.5	104	18	4	2					128	132.6
H/Total	361	47	5	0	2	10	2	1	428	440.5	475	68	9	11	1	3	2	1	570	590.8
16:00	103	29	1					1	134	133.7	139	21	2	1		3	2		168	172.1
16:15	103	17				1	2		123	122.8	115	22	1	4					142	147.7
16:30	117	18				2	2		139	139.8	124	15	3	2			2		146	148.9
16:45	119	15			1	2	3		140	141.2	128	14	2	1			2	2	149	148.5
H/Total	442	79	1	0	1	5	7	1	536	537.5	506	72	8	8	0	3	6	2	605	617.2
17:00	115	16		1		2	1	1	136	137.9	126	5	1	1		2		1	136	139
17:15	106	7	2						117	116.8	138	14	2						154	155
17:30	110	7			1		1	2	121	119.8	129	12	1						142	142.5
17:45	100	3	2			1	5		111	110	92	6			1	1		1	101	102.2
H/Total	431	33	4	1	1	3	9	3	485	484.5	485	37	4	1	1	3	0	2	533	538.7
18:00	96						1		97	96.4	96	11	1		1			1	110	110.7
18:15	114						1	1	116	114.6	93	4	1	1	1		1	1	102	103.4
18:30	86				1				88	88.4	104	9	1	1	1	1			117	120.8
18:45	73	1				1			75	76	81	7		3		1	2	2	94	97.3
H/Total	369	1	0	0	1	1	3	1	376	375.4	374	31	3	5	3	2	1	4	423	432.2
Total	3785	499	46	9	20	39	35	11	4444	4507.9	5310	705	125	118	6	42	38	18	6362	6588.7

Project Number: **TSP13819**  
 Project Name: **Dinas Powys - May 2018**  
 Survey Type: **Manual Classified Turning Count**  
 Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
 Date: **15 May 2018, Tuesday**



Time	B - B										B - C									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00									0	0									11	11.5
07:15									0	0									9	9
07:30									0	0									14	15.5
07:45	1								2	2						1			19	21
H/Total	1	1	0	0	0	0	0	0	2	2	35	12	4	0	0	2	0	0	53	57
08:00	1								1	1	21	4				1			26	27
08:15	1	1							2	2	18	7							25	25
08:30	2								2	2	19	3							22	22
08:45	1								1	1	19	6	1						26	26.5
H/Total	5	1	0	0	0	0	0	0	6	6	77	20	1	0	0	1	0	0	99	100.5
09:00	1								1	1	27	6							33	33
09:15	1								1	1	30	4	1						35	35.5
09:30									0	0	31	4	1				1		37	36.9
09:45	1								1	1	32	7	2						42	42.4
H/Total	3	0	0	0	0	0	0	0	3	3	120	21	4	0	0	0	2	0	147	147.8
10:00									0	0	27	4	1			1			33	34.5
10:15									0	0	25	4							30	31
10:30	1								1	1	30	5					1		36	35.4
10:45									0	0	28	5	1					2	36	34.9
H/Total	1	0	0	0	0	0	0	0	1	1	110	18	2	0	0	2	1	2	135	135.8
11:00									0	0	23	7							31	31.5
11:15									0	0	38	5	2			2			47	50
11:30									0	0	37	5	2						44	45
11:45	1								1	1	30	7				1			38	39
H/Total	1	0	0	0	0	0	0	0	1	1	128	24	5	0	0	3	0	0	160	165.5
12:00	3								3	3	28	6					1		35	34.4
12:15	1								1	1	30	3							33	33
12:30	1								1	1	31	6				1	2		40	39.8
12:45	2								2	2	46	5					2		53	51.8
H/Total	7	0	0	0	0	0	0	0	7	7	135	20	0	0	0	1	5	0	161	159
13:00									0	0	35	7	1				1		44	43.9
13:15									0	0	22	2	1						25	25.5
13:30									0	0	40	6				1			47	48
13:45									0	0	27	5				1			33	34
H/Total	0	0	0	0	0	0	0	0	0	0	124	20	2	0	0	2	1	0	149	151.4
14:00	1								1	1	32	4							36	36
14:15	1								2	1.4	26	4				3	1		34	36.4
14:30									0	0	27	5	1			1			34	35.5
14:45	1								1	1	32	7	3				1		43	43.9
H/Total	3	0	0	0	0	0	1	0	4	3.4	117	20	4	0	0	4	2	0	147	151.8
15:00									0	0	47	8					1		56	55.4
15:15									0	0	45	5	1				2		53	52.3
15:30									0	0	59	8	1						68	68.5
15:45									0	0	48	10	1				1		60	59.9
H/Total	0	0	0	0	0	0	0	0	0	0	199	31	3	0	0	0	4	0	237	236.1
16:00									0	0	49	2				1	1		53	53.4
16:15	1								1	1	57	11					1		69	68.4
16:30									0	0	51	9				1	1		62	62.4
16:45									0	0	55	2							57	57
H/Total	1	0	0	0	0	0	0	0	1	1	212	24	0	0	0	2	3	0	241	241.2
17:00									0	0	74	5							79	79
17:15									0	0	51	7	2						62	61.8
17:30									0	0	44	4							48	48
17:45	1								1	1	35	5	1				1	1	43	42.1
H/Total	1	0	0	0	0	0	0	0	1	1	204	21	3	0	0	0	3	1	232	230.9
18:00									0	0	22	4							27	26.2
18:15									0	0	33	8					1		42	41.4
18:30		1							1	1	34	5							39	39
18:45									0	0	33	2	1						36	36.5
H/Total	0	1	0	0	0	0	0	0	1	1	122	19	1	0	0	0	1	1	144	143.1
Total	23	3	0	0	0	0	1	0	27	26.4	1583	250	29	0	0	17	22	4	1905	1920.1



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	C - A										C - B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	77	4							81	81	20	4							24	24
07:15	75	8	1			1			85	86.5	22	5	1						28	28.5
07:30	73	10	2		1	1	2	2	91	91.2	23	7	1			1	1		33	33.9
07:45	68	11			1	1			81	83	25	9	1			1	1		37	37.9
H/Total	293	33	3	0	2	3	2	2	338	341.7	90	25	3	0	0	2	2	0	122	124.3
08:00	63	8	1			2	1		75	76.9	35	2							37	37
08:15	58	9	1	1	1	1	1	1	73	75.4	38	6	1			1			46	47.5
08:30	76	10	2		1				89	91	19	2	1						22	22.5
08:45	58	10					1	1	70	68.6	33	4					1		38	37.4
H/Total	255	37	4	1	2	3	3	2	307	311.9	125	14	2	0	0	1	1	0	143	144.4
09:00	91	13					1		106	105.9	32	8	1			1			42	43.5
09:15	72	8			1	2			83	86	22	3							25	25
09:30	63	6	5	1	1	1			77	82.8	20	3	1						24	24.5
09:45	71	9					1		81	80.4	27	4						1	32	31.4
H/Total	297	36	6	1	2	3	2	0	347	355.1	101	18	2	0	0	1	1	0	123	124.4
10:00	88	14				3			105	108	16	2							18	18
10:15	57	14							72	73	24	3							27	27
10:30	70	8			1	3	2		84	86.8	30	3	1			1	1		36	36.9
10:45	63	11	3	1					78	80.8	34	3	3			1	1		42	43.9
H/Total	278	47	3	1	1	7	2	0	339	348.6	104	11	4	0	0	2	2	0	123	125.8
11:00	74	11				1			86	87	26	4	1			1			32	33.5
11:15	65	11					1	1	80	80.9	30	4	3						38	38.9
11:30	68	10	2		1				80	81	30	5	1				1		37	36.7
11:45	78	12					1		91	90.4	20	3				1			24	25
H/Total	285	44	2	1	1	1	2	1	337	339.3	106	16	5	0	0	2	1	1	131	134.1
12:00	58	11	1			4			74	72.1	22	6							28	28
12:15	90	8	2		1		1	1	103	103.6	12	1							13	13
12:30	93	7	1	1			1		103	104.2	30	4							34	34
12:45	70	11	2				1		84	84.4	25	4				1			30	31
H/Total	311	37	6	1	1	0	7	1	364	364.3	89	15	0	0	0	1	0	0	105	106
13:00	80	8				1	1		90	90.4	32	5					1		38	37.4
13:15	75	8	1	1	1				87	89.2	26	4	1						31	31.5
13:30	66	4	1	1			1		73	74.2	18	5	2			1			26	28
13:45	72	11	1			1	1	1	87	87.1	31	1							32	32
H/Total	293	31	3	2	1	2	4	1	337	340.9	107	15	3	0	0	1	1	0	127	128.9
14:00	52	5		1		3	2		63	66.1	32	3							35	35
14:15	51	9	1			1	1		63	63.9	20	6				2			28	30
14:30	67	12			2	1	1		83	85.4	24	6	1			1			32	33.5
14:45	74	8	1			1			84	85.5	26	3							29	29
H/Total	244	34	2	1	2	6	4	0	293	300.9	102	18	1	0	0	3	0	0	124	127.5
15:00	70	14	2			1	1		88	89.4	30	5	1						36	36.5
15:15	83	7	1		1				93	95.5	28	5							33	33
15:30	106	5					1		112	111.4	25	6							31	31
15:45	78	9				1			88	89	29	4	1			1			35	36.5
H/Total	337	35	3	0	1	3	2	0	381	385.3	112	20	2	0	0	1	0	0	135	137
16:00	86	10	4					1	101	102.2	21	3	1			3			28	31.5
16:15	79	5	1		1		1		87	87.9	25	4				3			32	35
16:30	99	9							108	108	17	3				1			21	22
16:45	79	6				1			86	87	32	2							34	34
H/Total	343	30	5	0	1	1	1	1	382	385.1	95	12	1	0	0	7	0	0	115	122.5
17:00	95	10	2				1		108	108.4	22								22	22
17:15	92	9	1		1			1	104	104.7	23								23	23
17:30	76	8					3		87	85.2	24	3							27	27
17:45	64	5		2			1	1	73	74.2	22	1					2		25	23.8
H/Total	327	32	3	2	1	0	5	2	372	372.5	91	4	0	0	0	0	2	0	97	95.8
18:00	75	6	1					1	84	83.1	13	2							15	15
18:15	59	7	1			1			68	69.5	22	2				1	2		27	26.8
18:30	66	4			1	1			72	74	17								17	17
18:45	50	3	2						55	56	15	1							16	16
H/Total	250	20	4	0	1	2	1	1	279	282.6	67	5	0	0	0	1	2	0	75	74.8
<b>Total</b>	<b>3513</b>	<b>416</b>	<b>44</b>	<b>10</b>	<b>16</b>	<b>31</b>	<b>35</b>	<b>11</b>	<b>4076</b>	<b>4128.2</b>	<b>1189</b>	<b>173</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>12</b>	<b>1</b>	<b>1420</b>	<b>1445.5</b>

[illegible]

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	From A										To A									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	52	15	3	1	1	0	0	0	72	75.8	166	19	0	0	0	0	0	0	185	185
07:15	58	18	2	2	0	1	0	0	81	85.6	174	20	1	0	0	1	0	0	196	197.5
07:30	67	25	6	4	2	1	0	1	106	116.4	178	32	5	2	1	4	2	3	227	233.5
07:45	123	32	5	1	0	4	0	4	169	173.6	162	31	3	3	1	1	2	1	204	209.4
H/Total	300	90	16	8	3	6	0	5	428	451.4	680	102	9	5	2	6	4	4	812	825.4
08:00	124	25	5	3	1	2	1	0	161	169.8	159	21	5	5	0	2	1	1	194	203.6
08:15	151	35	2	1	0	2	0	2	193	195.7	130	21	3	2	1	1	1	1	160	164.7
08:30	175	30	4	1	1	2	0	0	213	219.3	181	28	7	6	1	1	1	0	225	237.7
08:45	180	22	7	4	0	0	1	0	214	222.1	170	19	5	2	0	1	2	1	200	204.1
H/Total	630	112	18	9	2	6	2	2	781	806.9	640	89	20	15	2	5	5	3	779	810.1
09:00	181	28	3	3	2	6	2	0	225	237.2	223	32	6	4	0	0	3	0	268	274.4
09:15	170	32	2	7	0	2	2	0	215	225.9	152	22	3	3	1	3	1	0	185	193.8
09:30	166	21	8	3	1	2	2	0	203	212.7	179	23	7	3	1	2	1	0	216	225.8
09:45	152	30	9	2	0	3	1	1	198	206.7	183	25	7	2	0	4	1	0	222	231.5
H/Total	669	111	22	15	3	13	7	1	841	882.5	737	102	23	12	2	9	6	0	891	925.5
10:00	155	32	6	4	0	3	1	0	201	211.6	192	24	1	4	0	4	0	1	226	234.9
10:15	161	26	6	6	0	1	0	0	200	211.8	163	25	4	2	0	2	1	1	198	203.2
10:30	136	23	1	5	0	1	1	0	167	174.4	186	23	5	5	1	3	2	0	225	236.8
10:45	159	26	5	1	1	1	1	1	195	199.4	168	33	6	7	0	1	1	0	216	228.5
H/Total	611	107	18	16	1	6	3	1	763	797.2	709	105	16	18	1	10	4	2	865	903.4
11:00	156	29	4	2	0	2	2	0	195	200.4	178	32	1	3	0	2	0	0	216	222.4
11:15	172	27	5	3	1	0	2	1	211	216.4	174	31	4	4	1	0	2	2	218	223.4
11:30	166	27	6	5	1	3	1	3	212	222.5	178	24	4	1	0	0	3	0	210	211.5
11:45	172	30	3	7	0	1	1	0	214	225	207	32	4	2	0	1	2	1	249	252.6
H/Total	666	113	18	17	2	6	6	4	832	864.3	737	119	13	10	1	3	7	3	893	909.9
12:00	214	25	7	4	0	1	2	0	253	261.5	169	29	6	2	0	0	4	0	210	213.2
12:15	192	36	2	2	0	1	2	0	235	238.4	202	30	6	2	1	0	1	1	243	248.2
12:30	183	26	6	7	1	1	1	2	227	238.9	215	17	4	5	0	2	2	0	245	254.3
12:45	190	24	2	3	0	3	0	0	222	229.9	201	24	4	4	0	0	1	0	234	240.6
H/Total	779	111	17	16	1	6	5	2	937	968.7	787	100	20	13	1	2	8	1	932	956.3
13:00	176	23	6	8	0	1	2	0	216	229.2	204	26	2	0	0	2	3	0	237	238.2
13:15	206	23	2	0	0	2	0	1	234	236.2	203	21	3	5	1	1	2	1	237	245
13:30	181	22	7	6	2	0	1	0	219	231.7	176	12	4	7	0	1	3	0	203	213.3
13:45	174	23	4	3	0	0	1	1	206	210.5	199	33	9	2	0	2	1	1	247	254.7
H/Total	737	91	19	17	2	3	4	2	875	907.6	782	92	18	14	1	6	9	2	924	951.2
14:00	159	23	1	4	0	0	4	0	191	194.3	155	29	4	6	0	5	3	0	202	215
14:15	208	17	5	9	0	2	2	0	243	258	142	19	2	3	1	5	2	0	174	183.7
14:30	203	23	2	5	0	0	0	2	235	240.9	202	19	4	4	2	3	4	0	238	247.8
14:45	186	27	4	6	1	0	2	0	226	235.6	207	30	4	3	0	2	4	1	251	255.7
H/Total	756	90	12	24	1	2	8	2	895	928.8	706	97	14	16	3	15	13	1	865	902.2
15:00	197	26	4	1	0	4	1	0	233	239.7	207	32	6	4	0	2	3	1	255	262.6
15:15	214	23	4	5	1	4	1	1	253	265.1	188	18	2	4	2	3	0	0	217	228.2
15:30	205	26	2	1	1	3	5	0	243	246.3	248	27	0	1	0	0	1	0	277	277.7
15:45	203	29	5	0	0	8	0	0	245	255.5	185	28	4	2	0	1	0	0	220	225.6
H/Total	819	104	15	7	2	19	7	1	974	1006.6	828	105	12	11	2	6	4	1	969	994.1
16:00	229	46	4	3	0	1	1	2	286	290.7	227	31	6	1	0	3	2	1	271	276.3
16:15	219	36	3	0	0	1	4	0	263	263.1	196	27	2	4	1	0	1	0	231	237.6
16:30	254	33	3	1	0	4	2	0	297	302.6	225	24	3	2	0	0	2	0	256	258.9
16:45	251	32	2	1	1	2	3	0	292	295.5	207	20	2	1	0	1	2	2	235	235.5
H/Total	953	147	12	5	1	8	10	2	1138	1151.9	855	102	13	8	1	4	7	3	993	1008.3
17:00	243	26	2	1	0	2	3	2	279	279.9	221	15	3	1	0	2	1	1	244	247.4
17:15	235	23	3	3	0	0	3	2	269	271	234	23	3	0	1	0	1	1	263	264.1
17:30	238	14	0	2	1	1	2	2	260	261.8	209	20	1	0	0	0	3	0	233	231.7
17:45	232	13	2	1	0	1	5	5	259	255.3	158	11	0	2	1	1	1	2	176	178.4
H/Total	948	76	7	7	1	4	13	11	1067	1068	822	69	7	3	2	3	6	4	916	921.6
18:00	256	9	0	1	0	0	1	1	268	267.9	171	17	2	0	1	0	1	2	194	193.8
18:15	234	12	2	3	0	0	1	2	254	256.7	154	12	2	1	1	1	1	1	173	175.9
18:30	198	8	0	0	1	0	3	0	210	209.2	171	13	1	1	2	2	0	0	190	195.8
18:45	165	10	0	1	0	1	1	1	179	179.9	132	10	2	3	0	1	0	2	150	154.3
H/Total	853	39	2	5	1	1	6	4	911	913.7	628	52	7	5	4	4	2	5	707	719.8
Total	8721	1191	176	146	20	80	71	37	10442	10748	8911	1134	172	130	22	73	75	29	10546	10828

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	From B										To B									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	97	17	1	0	0	0	0	0	115	115.5	57	16	2	1	0	0	0	0	76	78.3
07:15	106	14	0	0	0	0	0	0	120	120	61	19	2	2	0	1	0	0	85	89.6
07:30	113	26	4	2	0	4	0	1	150	157.8	66	23	3	4	0	2	1	1	100	107.3
07:45	107	25	5	3	0	1	2	1	144	149.4	91	32	5	1	0	3	1	2	135	139.6
H/Total	423	82	10	5	0	5	2	2	529	542.7	275	90	12	8	0	6	2	3	396	414.8
08:00	118	17	4	5	0	1	0	1	146	154.7	116	18	4	3	0	1	1	0	143	149.3
08:15	90	19	2	1	0	0	0	0	112	114.3	114	26	3	1	0	1	0	1	146	149
08:30	124	20	5	6	0	1	1	0	157	167.7	112	18	3	1	0	0	0	0	134	136.8
08:45	131	15	6	2	0	1	1	0	156	162	130	16	6	3	0	0	2	0	157	162.7
H/Total	463	71	17	14	0	3	2	1	571	598.7	472	78	16	8	0	2	3	1	580	597.8
09:00	156	24	4	4	0	0	2	0	190	196	135	28	2	3	0	4	1	0	173	181.3
09:15	109	18	4	3	0	1	1	0	136	142.3	96	21	0	7	0	0	0	0	124	133.1
09:30	147	21	3	2	0	1	2	0	176	179.9	114	18	8	2	0	2	2	0	146	153.4
09:45	143	23	9	2	0	4	1	0	182	192.5	106	20	8	2	0	3	1	1	141	149.2
H/Total	555	86	20	11	0	6	6	0	684	710.7	451	87	18	14	0	9	4	1	584	617
10:00	128	14	2	4	0	2	0	1	151	158.4	102	17	4	4	0	3	1	0	131	140.6
10:15	129	15	4	2	0	2	1	1	154	159.2	123	14	4	5	0	0	0	0	146	154.5
10:30	145	20	5	5	0	0	1	0	176	184.4	104	20	2	5	0	1	1	0	133	140.9
10:45	131	26	4	6	0	1	1	2	171	179.6	141	17	8	1	0	1	2	1	171	175.3
H/Total	533	75	15	17	0	5	3	4	652	681.6	470	68	18	15	0	5	4	1	581	611.3
11:00	124	27	2	3	0	1	0	0	157	162.9	114	22	5	1	0	3	1	0	146	152.2
11:15	145	25	6	3	0	2	1	1	183	190.5	129	17	7	3	0	0	3	1	160	164.8
11:30	146	19	4	0	0	0	3	0	172	172.2	132	19	4	4	0	2	0	3	164	170.8
11:45	157	26	4	2	0	2	1	1	193	198.2	113	17	2	7	0	2	0	0	141	153.1
H/Total	572	97	16	8	0	5	5	2	705	723.8	488	75	18	15	0	7	4	4	611	640.9
12:00	141	23	4	2	0	0	1	0	171	175	146	22	5	4	0	1	2	0	180	187.5
12:15	142	25	4	2	0	0	0	0	173	177.6	121	18	2	2	0	0	0	0	143	146.6
12:30	151	16	3	4	0	3	3	0	180	187.9	137	19	5	5	0	0	1	1	168	175.6
12:45	175	18	2	4	0	0	2	0	201	206	136	18	2	3	0	3	0	0	162	169.9
H/Total	609	82	13	12	0	3	6	0	725	746.5	540	77	14	14	0	4	3	1	653	679.6
13:00	156	23	3	0	0	1	3	0	186	186.7	134	16	6	7	0	1	3	0	167	178.3
13:15	149	15	3	4	0	1	1	1	174	180.3	150	19	2	0	0	2	0	1	174	176.2
13:30	150	14	2	5	0	2	2	0	175	183.3	133	12	4	5	0	1	1	0	156	164.9
13:45	153	27	8	2	0	2	0	0	192	200.6	134	15	3	3	0	0	0	1	156	160.6
H/Total	608	79	16	11	0	6	6	1	727	750.9	551	62	15	15	0	4	4	2	653	680
14:00	136	27	4	5	0	2	0	0	174	184.5	127	14	0	4	0	0	0	0	145	150.2
14:15	116	14	1	3	1	7	3	0	145	155.6	129	15	4	9	0	3	3	0	163	177.9
14:30	159	12	5	4	0	3	3	0	186	194.9	145	21	3	5	0	1	0	2	177	184.4
14:45	163	29	6	3	0	1	5	1	208	212.1	111	23	3	5	0	0	2	0	144	150.8
H/Total	574	82	16	15	1	13	11	1	713	747.1	512	73	10	23	0	4	5	2	629	663.3
15:00	181	25	4	4	0	1	3	1	219	224.6	139	17	4	1	0	0	0	0	161	164.3
15:15	143	16	2	4	1	2	2	0	170	178	147	18	3	5	0	2	1	0	176	185.4
15:30	198	30	1	1	0	0	0	0	230	231.8	131	18	2	1	0	2	4	0	158	159.9
15:45	152	28	5	2	0	0	1	0	188	192.5	137	22	3	0	0	6	0	0	168	175.5
H/Total	674	99	12	11	1	3	6	1	807	826.9	554	75	12	7	0	10	5	0	663	685.1
16:00	188	23	2	1	0	4	3	0	221	225.5	145	20	4	3	0	4	1	1	178	186.5
16:15	173	33	1	4	0	0	1	0	212	217.1	140	23	3	0	0	3	2	0	171	174.3
16:30	175	24	3	2	0	1	3	0	208	211.3	152	18	3	1	0	3	0	0	177	182.8
16:45	183	16	2	1	0	0	2	2	206	205.5	164	19	2	1	0	0	0	0	186	188.3
H/Total	719	96	8	8	0	5	9	2	847	859.4	601	80	12	5	0	10	3	1	712	731.9
17:00	200	10	1	1	0	2	0	1	215	218	150	10	2	0	0	0	2	1	165	164
17:15	189	21	4	0	0	0	2	0	216	216.8	148	16	1	3	0	0	0	2	170	172.8
17:30	173	16	1	0	0	0	0	0	190	190.5	148	10	0	2	0	1	1	0	162	165
17:45	128	11	1	0	1	1	1	2	145	145.3	153	11	0	1	0	0	2	5	172	168.1
H/Total	690	58	7	1	1	3	3	3	766	770.6	599	47	3	6	0	1	5	8	669	669.9
18:00	118	15	1	0	1	0	0	2	137	136.9	173	11	0	1	0	0	0	1	186	186.5
18:15	126	12	1	1	1	0	2	1	144	144.8	140	13	2	3	0	1	2	1	162	165.9
18:30	138	15	1	1	1	1	0	0	157	160.8	128	9	0	0	0	0	2	0	139	137.8
18:45	114	9	1	3	0	1	0	2	130	133.8	106	10	0	1	0	0	1	1	119	118.9
H/Total	496	51	4	5	3	2	2	5	568	576.3	547	43	2	5	0	1	5	3	606	609.1
Total	6916	958	154	118	6	59	61	22	8294	8535.2	6060	855	150	135	0	63	47	27	7337	7600.7



Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**

Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	From C										To C									
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	TOTAL (PCU)
07:00	97	8	0	0	0	0	0	0	105	105	23	5	2	0	1	0	0	0	31	33
07:15	96	13	2	0	0	1	0	0	113	115	26	6	1	0	0	0	0	0	33	33.5
07:30	96	17	3	0	1	2	3	2	124	125.1	32	13	5	0	2	1	0	0	53	58.5
07:45	93	20	1	0	1	2	1	0	118	120.9	70	14	3	0	0	3	0	2	92	94.9
H/Total	383	58	6	0	2	5	4	2	460	466	151	38	11	0	3	4	0	2	209	219.9
08:00	98	10	1	0	0	2	1	0	112	113.9	65	13	1	0	1	2	0	0	82	85.5
08:15	96	15	2	1	1	2	1	1	119	122.9	93	22	0	0	0	2	0	1	118	119.2
08:30	95	12	3	0	1	0	0	0	111	113.5	101	16	2	0	1	2	0	0	122	126
08:45	91	14	0	0	0	0	2	1	108	106	102	16	2	1	0	0	0	0	121	123.3
H/Total	380	51	6	1	2	4	4	2	450	456.3	361	67	5	1	2	6	0	1	443	454
09:00	123	21	2	0	0	1	1	0	148	149.4	102	13	1	0	2	3	1	0	122	126.9
09:15	94	11	0	0	1	2	0	0	108	111	125	18	3	0	0	2	2	0	150	152.3
09:30	83	9	6	1	1	1	0	0	101	107.3	103	10	2	1	1	0	1	0	118	120.7
09:45	98	13	0	0	0	0	2	0	113	111.8	104	21	3	0	0	0	2	0	130	130.3
H/Total	398	54	8	1	2	4	3	0	470	479.5	434	62	9	1	3	5	6	0	520	530.2
10:00	104	16	0	0	0	3	0	0	123	126	93	21	3	0	0	1	0	0	118	120.5
10:15	81	17	0	0	0	1	0	0	99	100	85	19	2	1	0	2	0	0	109	113.3
10:30	100	11	1	0	1	4	3	0	120	123.7	91	11	0	0	0	1	2	0	105	104.8
10:45	97	14	6	1	0	1	1	0	120	124.7	78	16	1	0	1	1	0	2	99	99.9
H/Total	382	58	7	1	1	9	4	0	462	474.4	347	67	6	1	1	5	2	2	431	438.5
11:00	100	15	1	0	0	2	0	0	118	120.5	88	17	1	1	0	0	1	0	108	109.2
11:15	95	15	3	1	1	0	2	1	118	119.8	109	19	3	0	1	2	0	0	134	138.5
11:30	98	15	3	0	0	0	0	1	117	117.7	100	18	5	0	1	1	1	1	127	130.1
11:45	98	15	0	0	0	1	1	0	115	115.4	107	22	1	0	0	1	1	0	132	132.9
H/Total	391	60	7	1	1	3	2	2	468	473.4	404	76	10	1	2	4	3	1	501	510.7
12:00	80	17	1	0	0	0	4	0	102	100.1	120	14	1	0	0	0	1	0	136	135.9
12:15	102	9	2	0	1	0	1	1	116	116.6	113	22	0	0	0	1	2	0	138	137.8
12:30	123	11	1	1	0	0	1	0	137	138.2	105	17	1	2	1	2	2	1	131	135.1
12:45	95	15	2	0	0	1	1	0	114	115.4	123	15	0	0	0	1	2	0	141	140.8
H/Total	400	52	6	1	1	1	7	1	469	470.3	461	68	2	2	1	4	7	1	546	549.6
13:00	112	13	0	0	0	1	2	0	128	127.8	106	17	1	1	0	0	1	0	126	127.2
13:15	101	12	2	1	1	0	1	0	118	120.7	103	10	2	0	0	0	0	0	115	116
13:30	85	9	3	1	0	1	1	0	100	103.2	107	21	4	0	2	1	0	0	135	140
13:45	103	12	1	0	0	1	1	1	119	119.1	97	14	1	0	0	1	1	0	114	114.9
H/Total	401	46	6	2	1	3	5	1	465	470.8	413	62	8	1	2	2	2	0	490	498.1
14:00	84	8	0	1	0	3	2	0	98	101.1	97	15	1	0	0	0	3	0	116	114.7
14:15	71	15	1	0	0	3	1	0	91	93.9	124	12	1	0	0	4	1	0	142	145.9
14:30	91	18	1	0	2	2	1	0	115	118.9	106	13	1	0	0	1	0	0	121	122.5
14:45	100	11	1	0	0	1	0	0	113	114.5	131	14	4	1	1	0	1	0	152	155.7
H/Total	346	52	3	1	2	9	4	0	417	428.4	458	54	7	1	1	5	5	0	531	538.8
15:00	100	19	3	0	0	1	1	0	124	125.9	132	21	1	0	0	4	2	0	160	163.3
15:15	111	12	1	0	1	1	0	0	126	128.5	133	15	2	0	1	2	2	1	156	158
15:30	131	11	0	0	0	0	1	0	143	142.4	155	22	1	0	1	1	1	0	181	182.9
15:45	107	13	1	0	0	2	0	0	123	125.5	140	20	4	0	0	3	1	0	168	172.4
H/Total	449	55	5	0	1	4	2	0	516	522.3	560	78	8	0	2	10	6	1	665	676.6
16:00	107	13	5	0	0	3	0	1	129	133.7	152	31	1	0	0	1	1	1	187	187.1
16:15	104	9	1	0	1	3	1	0	119	122.9	160	28	0	0	0	1	3	0	192	191.2
16:30	116	12	0	0	0	1	0	0	129	130	168	27	0	0	0	3	3	0	201	202.2
16:45	111	8	0	0	0	1	0	0	120	121	174	17	0	0	1	2	3	0	197	198.2
H/Total	438	42	6	0	1	8	1	1	497	507.6	654	103	1	0	1	7	10	1	777	778.7
17:00	117	10	2	0	0	0	1	0	130	130.4	189	21	0	1	0	2	1	1	215	216.9
17:15	115	9	1	0	1	0	0	1	127	127.7	157	14	4	0	0	0	4	0	179	178.6
17:30	101	11	0	0	0	0	3	0	115	113.2	155	11	0	0	1	0	1	2	170	168.8
17:45	86	6	0	2	0	0	3	1	98	98	135	8	3	0	0	1	6	1	154	152.1
H/Total	419	36	3	2	1	0	7	2	470	469.3	636	54	7	1	1	3	12	4	718	716.4
18:00	88	8	1	0	0	0	1	1	99	98.1	118	4	0	0	0	0	1	1	124	122.6
18:15	81	9	1	0	0	2	2	0	95	96.3	147	8	0	0	0	0	2	1	158	156
18:30	83	4	0	0	1	1	0	0	89	91	120	5	0	0	1	0	1	0	127	127.4
18:45	66	4	2	0	0	0	0	0	72	73	107	3	1	0	0	1	0	0	112	113.5
H/Total	318	25	4	0	1	3	3	1	355	358.4	492	20	1	0	1	1	4	2	521	519.5
Total	4705	589	67	10	16	53	47	12	5499	5576.7	5371	749	75	9	20	56	57	15	6352	6431

Project Number: **TSP13819**  
Project Name: **Dinas Powys - May 2018**  
Survey Type: **Manual Classified Turning Count**  
Site No: **3**  
Location: **Ffordd Y Mileniwm / A4055 Roundabout / western arm routes under the rail line**  
Date: **15 May 2018, Tuesday**



Time	Whole Junction									TOTAL (PCU)
	CAR	LGV	OGV 1	OGV 2	BUS	COACH	MCY	PCY	TOTAL	
07:00	246	40	4	1	1	0	0	0	292	296.3
07:15	261	45	4	2	0	2	0	0	314	320.6
07:30	276	68	13	6	3	7	3	4	380	399.3
07:45	323	77	11	4	1	7	3	5	431	443.9
H/Total	1106	230	32	13	5	16	6	9	1417	1460.1
08:00	340	52	10	8	1	5	2	1	419	438.4
08:15	337	69	6	3	1	4	1	3	424	432.9
08:30	394	62	12	7	2	3	1	0	481	500.5
08:45	402	51	13	6	0	1	4	1	478	490.1
H/Total	1473	234	41	24	4	13	8	5	1802	1861.9
09:00	460	73	9	7	2	7	5	0	563	582.6
09:15	373	61	6	10	1	5	3	0	459	479.2
09:30	396	51	17	6	2	4	4	0	480	499.9
09:45	393	66	18	4	0	7	4	1	493	511
H/Total	1622	251	50	27	5	23	16	1	1995	2072.7
10:00	387	62	8	8	0	8	1	1	475	496
10:15	371	58	10	8	0	4	1	1	453	471
10:30	381	54	7	10	1	5	5	0	463	482.5
10:45	387	66	15	8	1	3	3	3	486	503.7
H/Total	1526	240	40	34	2	20	10	5	1877	1953.2
11:00	380	71	7	5	0	5	2	0	470	483.8
11:15	412	67	14	7	2	2	5	3	512	526.7
11:30	410	61	13	5	1	3	4	4	501	512.4
11:45	427	71	7	9	0	4	3	1	522	538.6
H/Total	1629	270	41	26	3	14	14	8	2005	2061.5
12:00	435	65	12	6	0	1	7	0	526	536.6
12:15	436	70	8	4	1	1	3	1	524	532.6
12:30	457	53	10	12	1	4	5	2	544	565
12:45	460	57	6	7	0	4	3	0	537	551.3
H/Total	1788	245	36	29	2	10	18	3	2131	2185.5
13:00	444	59	9	8	0	3	7	0	530	543.7
13:15	456	50	7	5	1	3	2	2	526	537.2
13:30	416	45	12	12	2	3	4	0	494	518.2
13:45	430	62	13	5	0	3	2	2	517	530.2
H/Total	1746	216	41	30	3	12	15	4	2067	2129.3
14:00	379	58	5	10	0	5	6	0	463	479.9
14:15	395	46	7	12	1	12	6	0	479	507.5
14:30	453	53	8	9	2	5	4	2	536	554.7
14:45	449	67	11	9	1	2	7	1	547	562.2
H/Total	1676	224	31	40	4	24	23	3	2025	2104.3
15:00	478	70	11	5	0	6	5	1	576	590.2
15:15	468	51	7	9	3	7	3	1	549	571.6
15:30	534	67	3	2	1	3	6	0	616	620.5
15:45	462	70	11	2	0	10	1	0	556	573.5
H/Total	1942	258	32	18	4	26	15	2	2297	2355.8
16:00	524	82	11	4	0	8	4	3	636	649.9
16:15	496	78	5	4	1	4	6	0	594	603.1
16:30	545	69	6	3	0	6	5	0	634	643.9
16:45	545	56	4	2	1	3	5	2	618	622
H/Total	2110	285	26	13	2	21	20	5	2482	2518.9
17:00	560	46	5	2	0	4	4	3	624	628.3
17:15	539	53	8	3	1	0	5	3	612	615.5
17:30	512	41	1	2	1	1	5	2	565	565.5
17:45	446	30	3	3	1	2	9	8	502	498.6
H/Total	2057	170	17	10	3	7	23	16	2303	2307.9
18:00	462	32	2	1	1	0	2	4	504	502.9
18:15	441	33	4	4	1	2	5	3	493	497.8
18:30	419	27	1	1	3	2	3	0	456	461
18:45	345	23	3	4	0	2	1	3	381	386.7
H/Total	1667	115	10	10	5	6	11	10	1834	1848.4
Total	20342	2738	397	274	42	192	179	71	24235	24860

Peak Hours	Totals
07:00 08:00	1417
07:15 08:15	1544
07:30 08:30	1654
07:45 08:45	1755

08:00 09:00	1802
08:15 09:15	1946
08:30 09:30	1981
08:45 09:45	1980

09:00 10:00	1995
09:15 10:15	1907
09:30 10:30	1901
09:45 10:45	1884

10:00 11:00	1877
10:15 11:15	1872
10:30 11:30	1931
10:45 11:45	1969

11:00 12:00	2005
11:15 12:15	2061
11:30 12:30	2073
11:45 12:45	2116

12:00 13:00	2131
12:15 13:15	2135
12:30 13:30	2137
12:45 13:45	2087

13:00 14:00	2067
13:15 14:15	2000
13:30 14:30	1953
13:45 14:45	1995

14:00 15:00	2025
14:15 15:15	2138
14:30 15:30	2208
14:45 15:45	2288

15:00 16:00	2297
15:15 16:15	2357
15:30 16:30	2402
15:45 16:45	2420

16:00 17:00	2482
16:15 17:15	2470
16:30 17:30	2488
16:45 17:45	2419

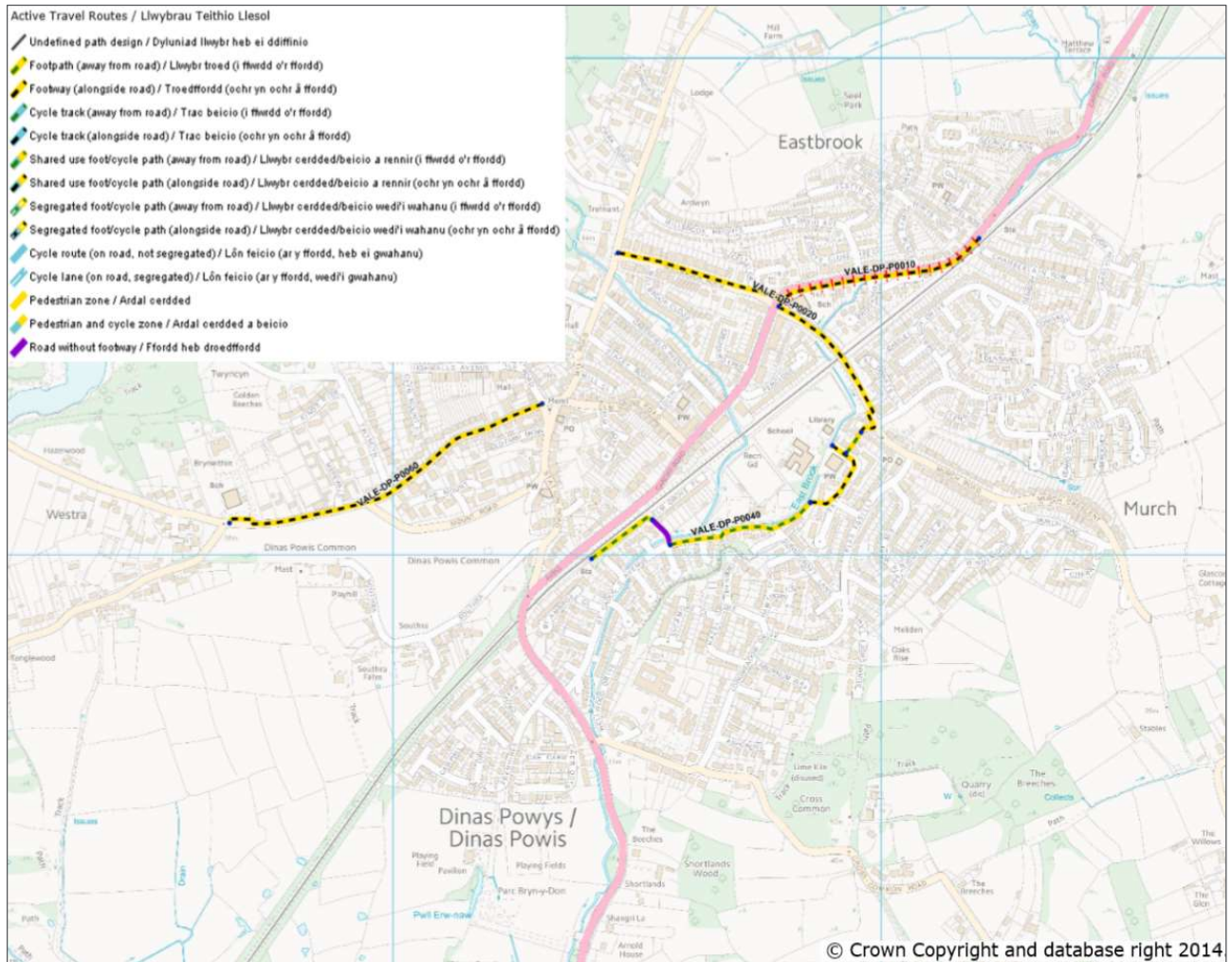
17:00 18:00	2303
17:15 18:15	2183
17:30 18:30	2064
17:45 18:45	1955

18:00 19:00	1834
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**APPENDIX D**

**Transport Baseline Conditions**

## Dinas Powys Existing Route Map





[illegible]

Integrated Network Walking

Integrated Network Shared Use

Dinas Powys / Dinas Powis

Eastbrook

Murch

Morristown

A4231

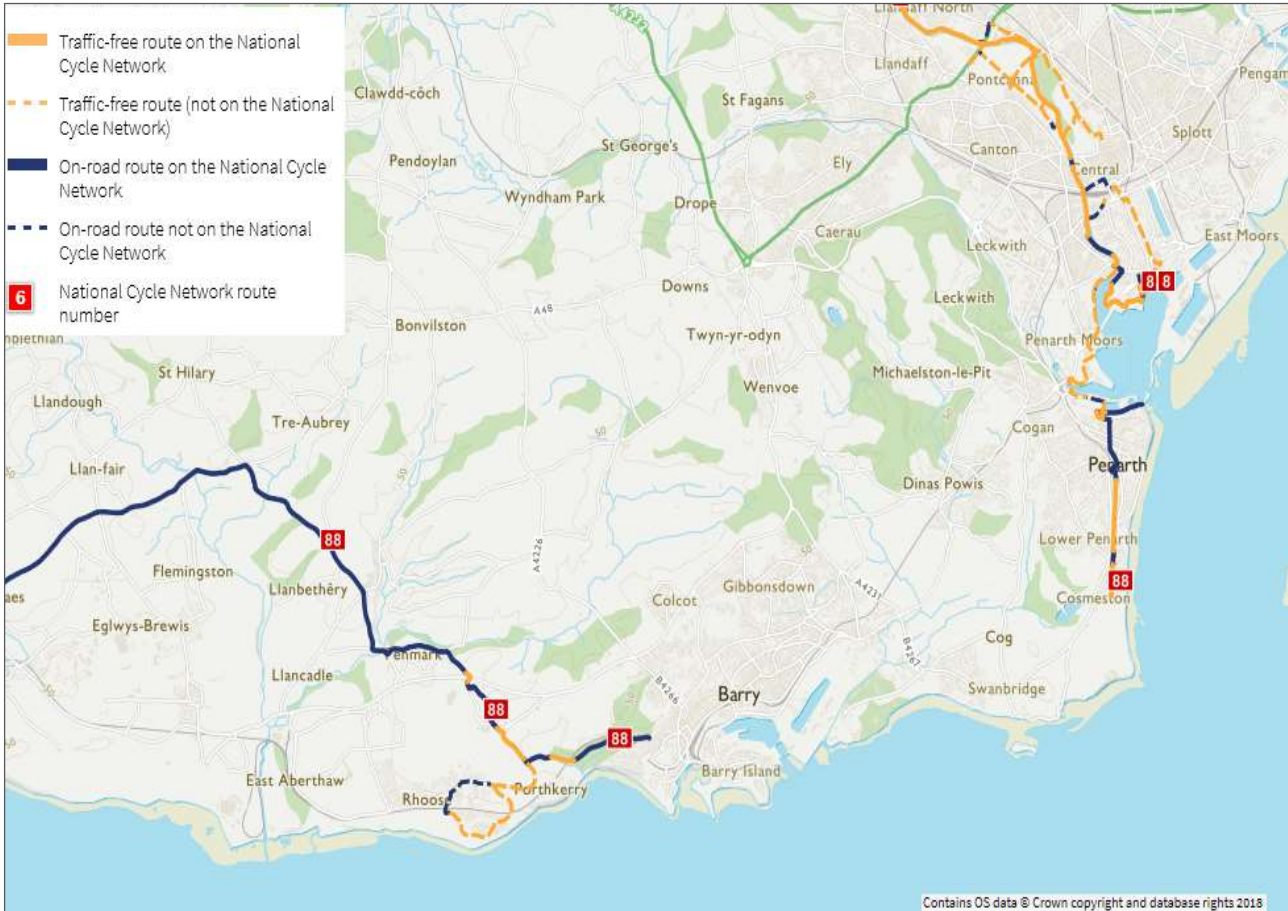
A4235

A4236

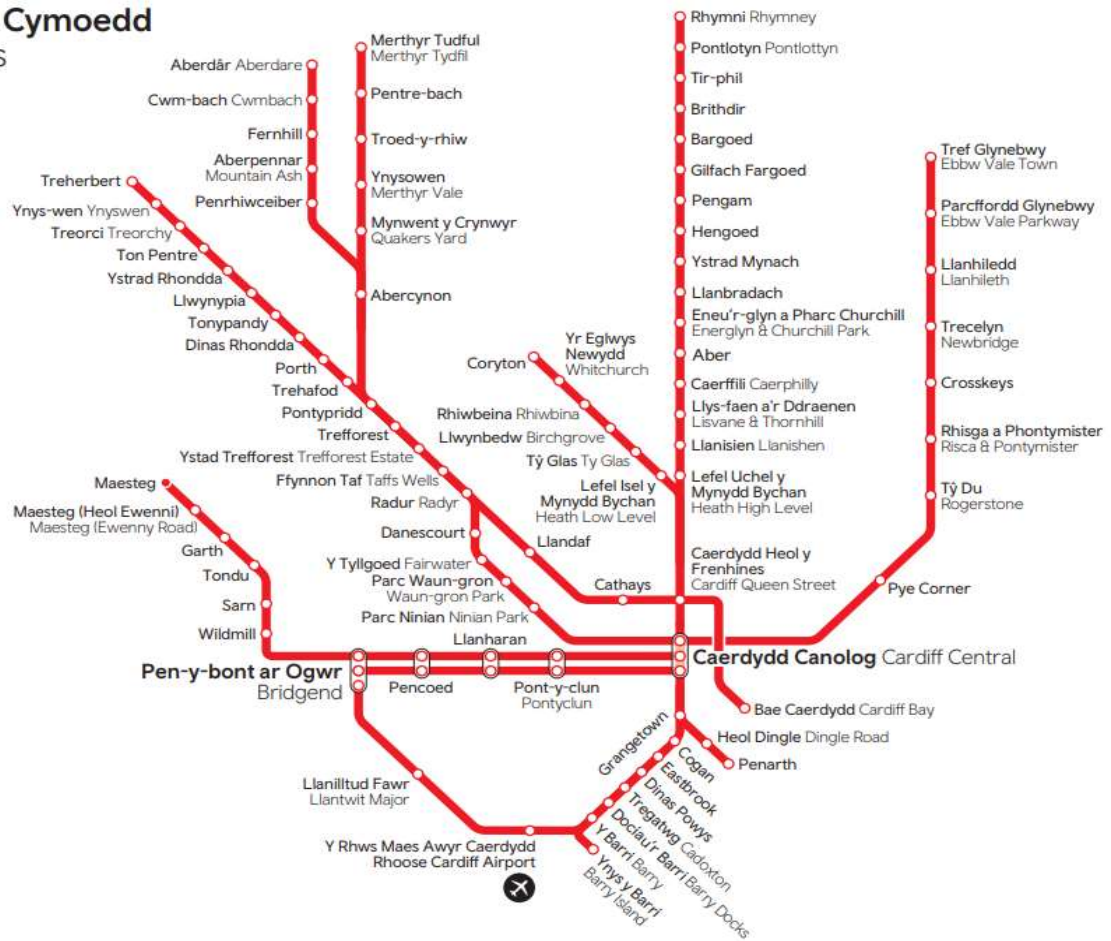
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Sustrans Map of Cycle Routes in Local Area

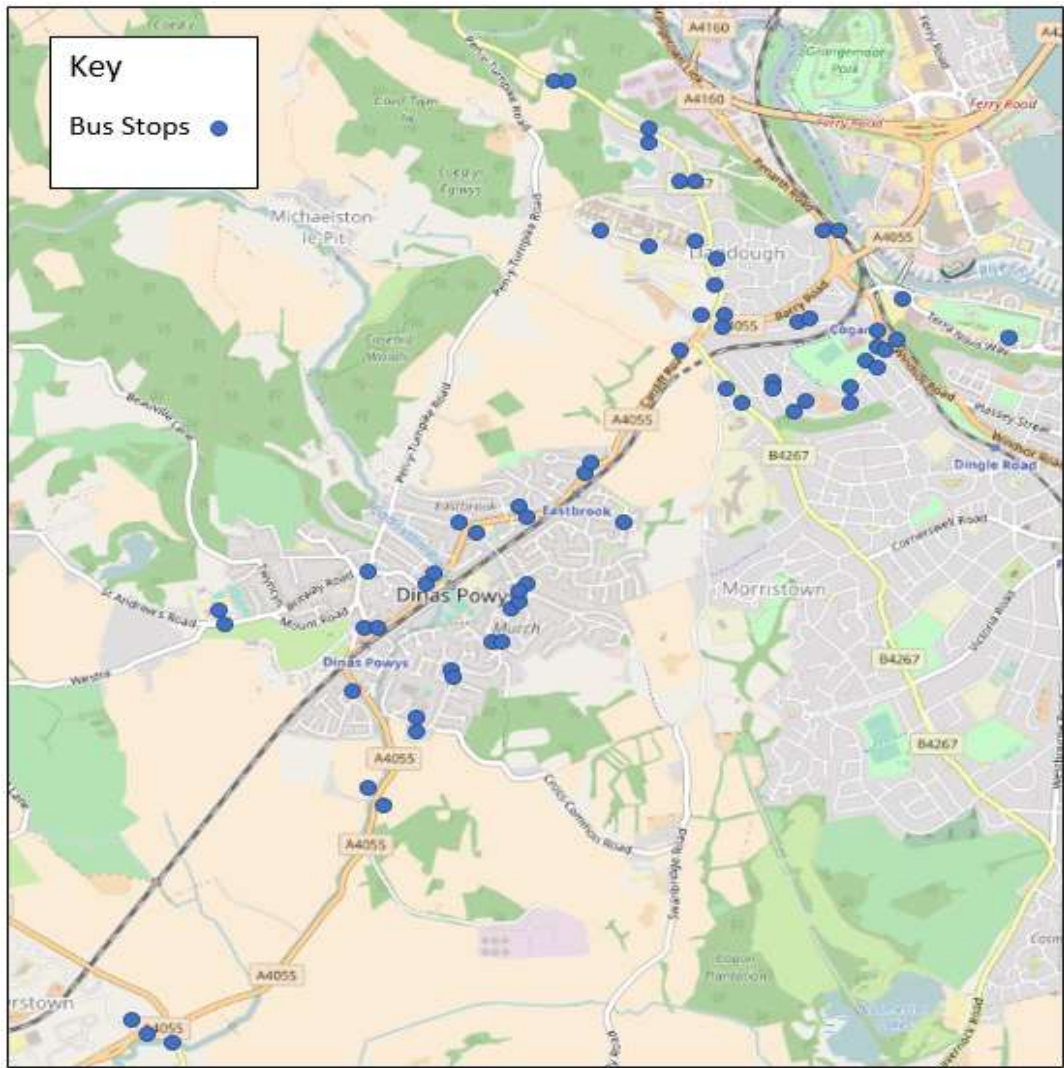


**Llinellau'r Cymoedd**  
Valley Lines





Dinas Powys Local Bus Stops



# VALE OF GLAMORGAN COUNCIL

## Dinas Powys WelTAG Stage Two Plus

### TECHNICAL NOTE

#### Cogan Tunnel



Issue Date: 24<sup>th</sup> December 2019

Report No: 10015022-ARC-REP-ECV-000001

ELR: BRY

Mileage: 2m 75ch

OS Ref: ST 167 722

Revision: A01

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# VALE OF GLAMORGAN COUNCIL

## Dinas Powys WelTAG Stage Two Plus

### Technical Note

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#### Cogan Tunnel

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**Reviewer** Jeff Lynn



**Approver** Jeff Lynn



**Document No** 10015022-ARC-REP-ECV-000001

**Issue Date** 24<sup>th</sup> December 2019

**Revision** A01

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## 1.1 Introduction

Arcadis Consulting (UK) Limited has been commissioned by Vale of Glamorgan Council to develop and appraise potential options for improving the transport network encompassing corridors from Biglis roundabout (Barry) through Dinas Powys, to Cardiff via Leckwith, Cogan and Penarth as part of the Welsh Transport Appraisal Guidance (WeITAG) Stage Two scheme.

As part of this scheme, it is proposed that an at grade, 4-arm roundabout is constructed at the intersection of the proposed highway, Cardiff Road (A4055) and Redlands Road (B4267), to the south west of the Merrie Harrier pub. The constraints associated with the existing highway network and the proposed bypass are such that the proposed roundabout is partially situated over the existing Cogan Railway Tunnel, with the arm of the proposed bypass crossing it.

This report sets out the loading implications of the proposal on the railway tunnel that underlies the site and the likely implications of this. The report also considers the requirements for a tunnel assessment prior to construction of the proposed works.

A Basic Asset Protection Agreement (BAPA) has been set up between the Vale of Glamorgan Council and Network Rail concerning the tunnel to assist in developing and reviewing proposals.

## 1.2 Site Description

The site for the proposed roundabout is in a semi-rural greenfield area bounded by Cardiff Road (A4055) to the northwest and Redlands Road (B4267) to the northeast. The site of the proposed roundabout falls within a field of approx. area 2.25 ha with a general fall of approximately 1 in 12 from east to west. The field is currently used as farmland with dense vegetation around perimeter, refer to Figure 1 below.

The field overlies the existing Cogan railway tunnel, which carries the Barry Railway Line (Engineers Line Reference: BRY) under the proposed site at a mileage of between 2m 75ch and 3m 5ch.

No overhead services were identified during a site visit on 14/11/2019, although this it to be confirmed during an overhead/buried services search at the next project stage. Ordnance survey mapping indicates a telecommunications mast in the vicinity of the proposed works, however, this was not identified during the site visit.

The layout of the proposed site is shown in Figure 1. The layout of the proposed roundabout is shown in Figure 2.



Figure 1. Site layout.

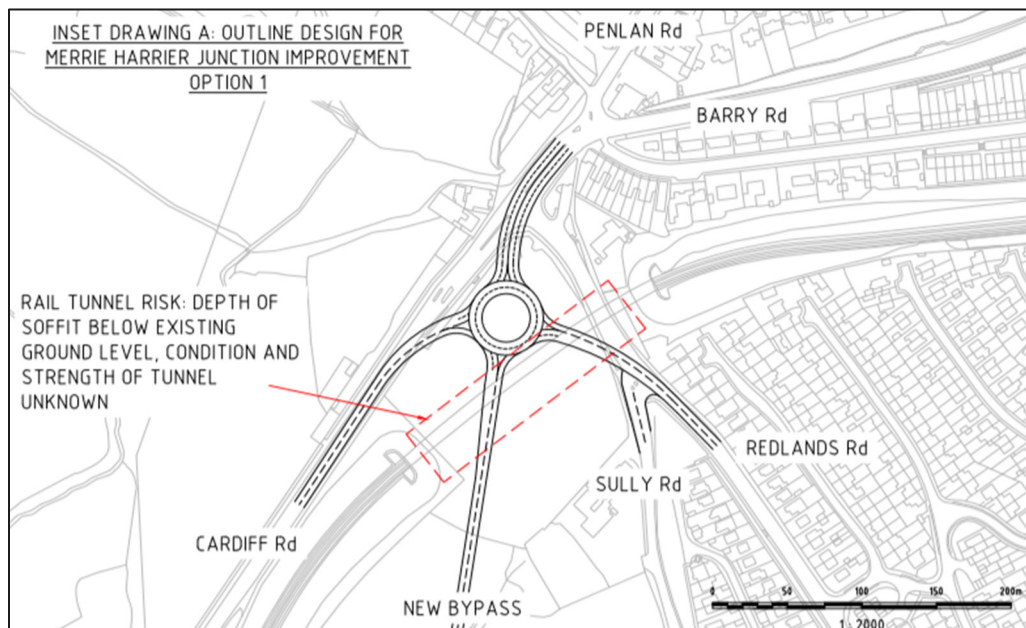


Figure 2. Proposed Roundabout above Railway Tunnel

It has been proposed as part of the WelTAG Stage Two Plus scheme that a new bypass is constructed that will include the provision of a roundabout within the farm field that overlies Cogan Tunnel.

### 1.3 Cogan Tunnel

Cogan Tunnel is understood to have been constructed in 1888 and has a total length of 201m. The tunnel portals are constructed entirely of masonry stonework, with the arch lining and sidewalls constructed using blue engineering bricks. The tunnel is understood to have been bored through mudstone bedrock (Mercia Mudstone Group). This assumption is largely based on the nature of the mudstone and depth of cover which is understood to vary from approximately 11m at the high mileage end to approximately 14m at the low mileage end. A small watercourse also crosses over the tunnel approx. 20m away from the high mileage portal. There are no rail services situated above the tunnel.

There are understood to be no open shafts above the tunnel, however it is understood that there may be an infilled shaft at a mileage of 3m 0.25ch, approximately 110m from high mileage (West) portal. The exact location of the suspected closed shaft is unknown, but it is thought to be signified by a 1m deep depression of 3m width and concealed by overgrown vegetation in the surrounding area (see Appendix A - Photo 1). If the presence of the shaft is confirmed, this will require a clearance zone of 22m radius (see Appendix B) during construction of the proposed roundabout.

Additional correspondence received from Network Rail regarding the tunnel shaft states that intrusive investigations have been undertaken recently directly above the tunnel centreline to try and confirm the presence of the suspected construction shaft. The results from the investigations are consistent with undisturbed ground, meaning it is considered unlikely that a shaft exists at the suspected location. However, there is also a possibility that the shaft is offset from the tunnel. Whilst the probability of this is low, it cannot be ruled out completely.

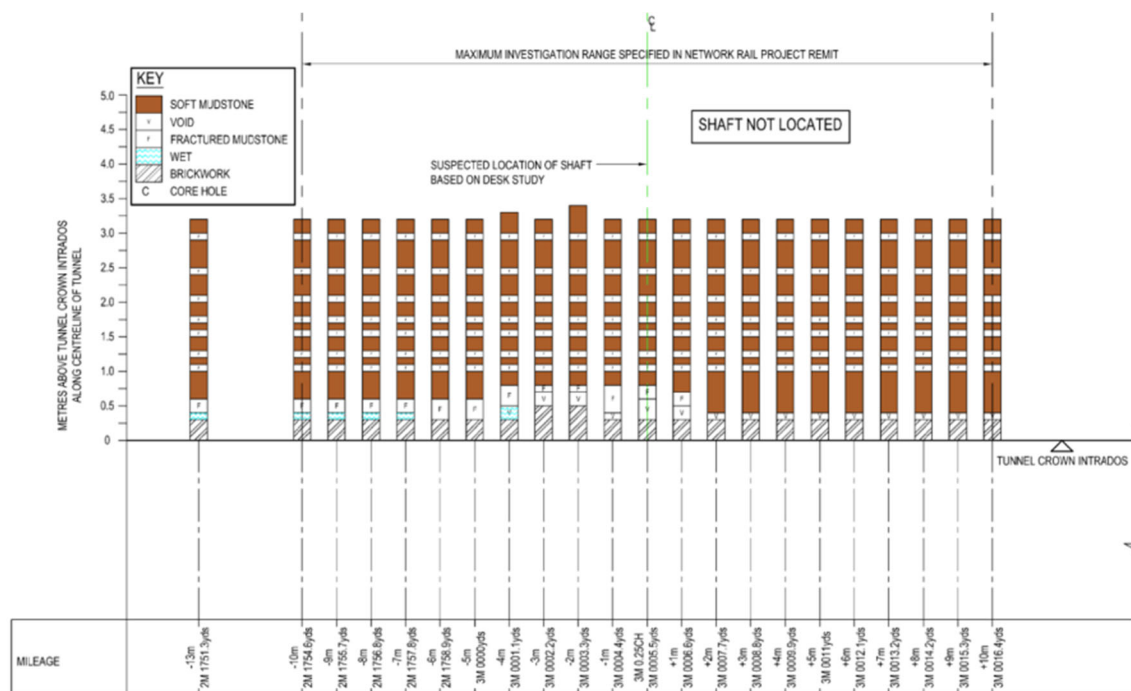


Figure 3. Cogan Tunnel Shaft Investigation Works

As a result, any proposal that would include development within the suspected zone of influence of the shaft would need further discussion and extensive ground investigations (offset probe drilling) to conclude that the development was not being constructed over the hidden shaft.

According to a Detailed Examination undertaken on behalf of Network Rail in December 2018, the condition of the tunnel is generally fair with no significant defects mentioned. Key tunnel dimensions are shown in Figure 4.

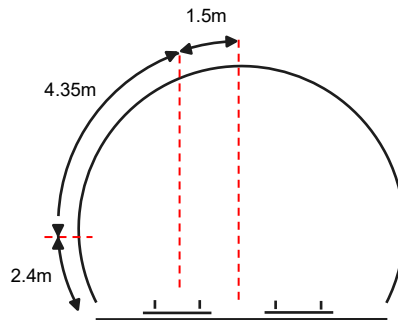


Figure 4. Cogan Tunnel key dimensions from Dec. 2018 Detailed Examination.

## 1.4 Loading Implications

Redlands Road (B4267) bounds the proposed site to the northeast and currently crosses over Cogan Tunnel at approximately 2m 77ch, with a depth of cover of approximately 13m. Redlands Road is unrestricted to highway loading and the tunnel shows no signs of distress.

The loading from the proposed roundabout will provide a similar loading arrangement to Redlands Road with a depth of cover of approx. 11m. As the roundabout will be at grade, any change in dead loadings on the tunnel lining will be negligible. Included within Figure 5 is the typical pressure distribution that may be expected due to wheel loads from the highway. As can be seen, the increase in pressure is negligible at a depth greater than 4B. Typical traffic axles could be expected up to 1.8m in width and therefore beyond 8m depth live load effects will be negligible. The proposed arrangements will maintain a depth of cover of circa 11m, which equates to a depth greater than 6B.

It can be seen therefore, that the loading on the tunnel lining will be unchanged by the proposed works.

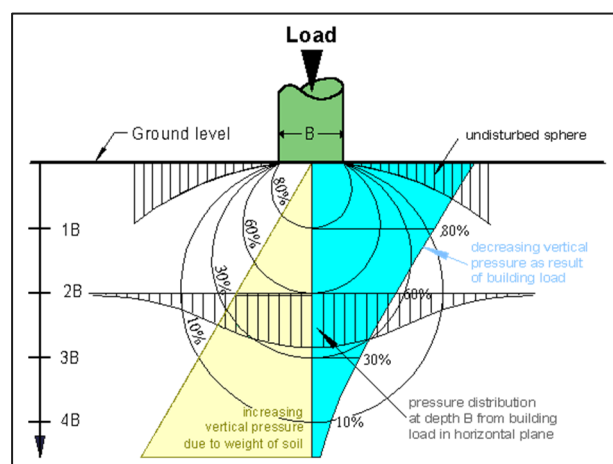


Figure 5. Pressure distribution in soil



Correspondence received from Network Rail confirms the assumptions above that the due to the depth of the tunnel (see Figure 6), there would be no requirement for a structural assessment to be undertaken.

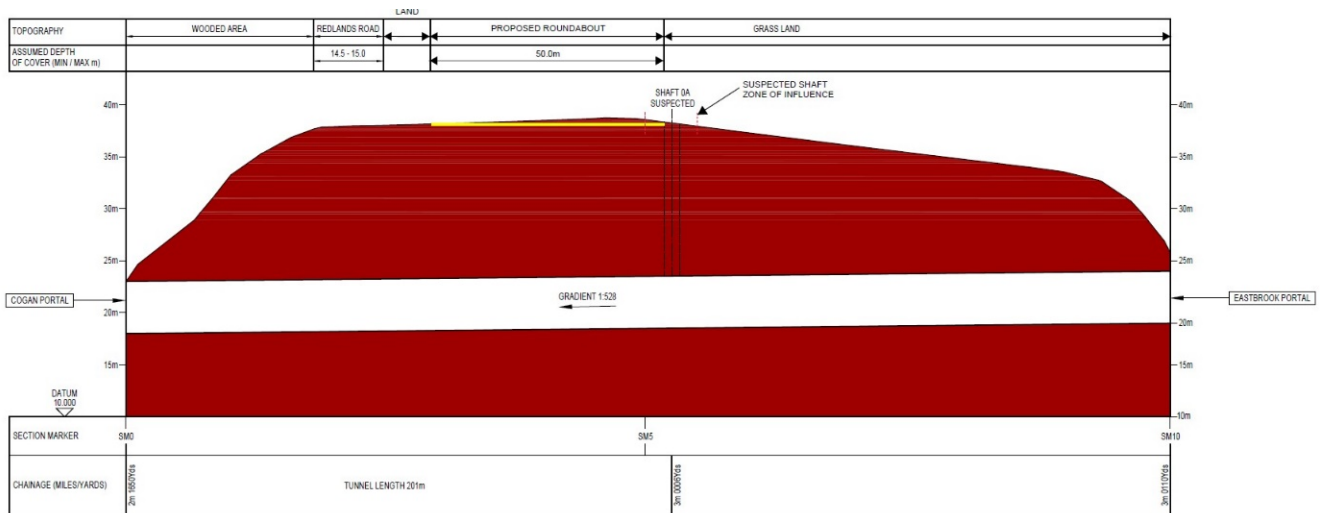


Figure 6. Geological sectional elevation of Cogan Tunnel

## 1.5 Conclusion

Due to the depth of cover overlying Cogan Tunnel, any increase in loading from the proposal can be considered negligible. It can therefore be concluded that a structural assessment of the tunnel will not be required.

It can also be concluded that construction of the proposed roundabout on the land overlying Cogan Tunnel is feasible, provided that the further ground investigations are undertaken to confirm the presence and location of the suspected construction shaft. If the shaft is located then a 22m exclusion zone would be required to surround it, which may influence which option to progress at the next stage.

## 1.6 Recommendations

It is recommended that the following information is obtained at the next stage of the scheme:

- Formally identify where the suspected tunnel shaft is located by undertaking further ground investigations including offset probe drilling;
- Undertake an overhead/buried services search of the proposed site;
- Infrequent tunnel walkthroughs will be required during the works to ensure that the tunnel is not sustaining any obvious damage during/as a result of the works. If the advice given in this technical note is adhered to then no ongoing Network Rail monitoring will be required.

## 1.7 COMMENTS

**Comments:**

(comments or notes from Network Rail to be held here)

**Name:**

**Signature:**

**Date:**

**Job title:**

## APPENDIX A

### Photos



Photo 1. Elevation of Cogan Tunnel (Low Mileage portal) – Extract from Detailed Exam Report Dec 2018



Photo 2. Suspected location of existing tunnel shaft (immediately west of Redlands Road) – Extract from Detailed Exam Report Dec 2018





Photo 3. Redlands Road (looking south-east) - 14/11/2019



Photo 4. Redlands Road (looking north-west) - 14/11/2019



Photo 5. Site of proposed development (looking north-east) - 14/11/2019



Photo 6. Entrance to site of proposed development - 14/11/2019



Photo 7. Site of proposed development (looking south) - 14/11/2019



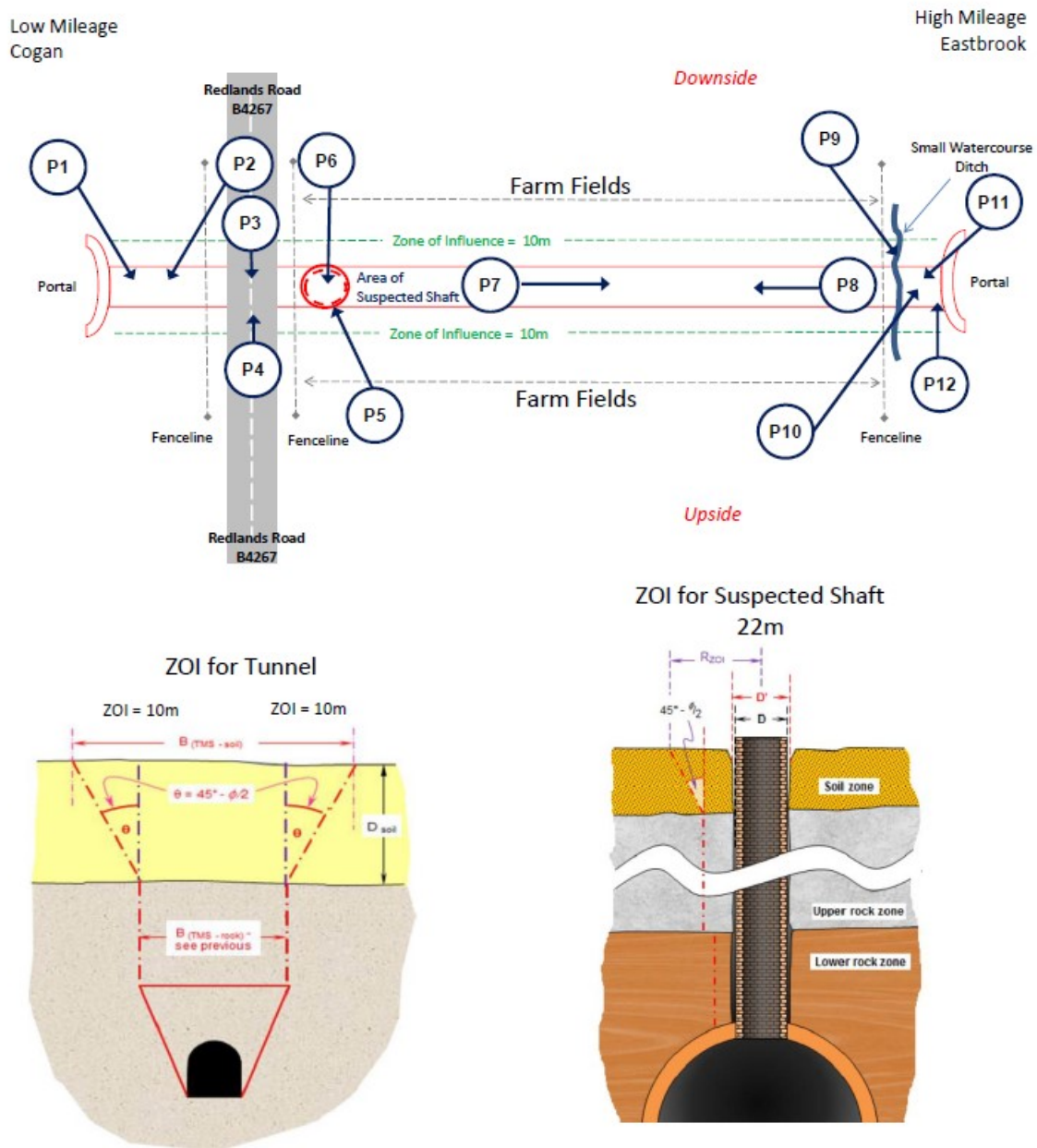
Photo 8. Site of proposed development (looking north) - 14/11/2019

## APPENDIX B

### **Network Rail Document Extracts**

## Appendix B

Tunnel and suspected shaft zones of influence from December 2018 Detailed Exam (document reference: Wales BRY 2 1650 09122018 Detailed CARRS ID 1160251).





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**APPENDIX E**

**Social Context**

Most deprived

Least deprived

Dinas Powys 5

Dinas Powys 2

Dinas Powys 3

Dinas Powys 4

Dinas Powys 1

Caerau

Llanfihangel-y-pwll / Michaelston-le-Pit

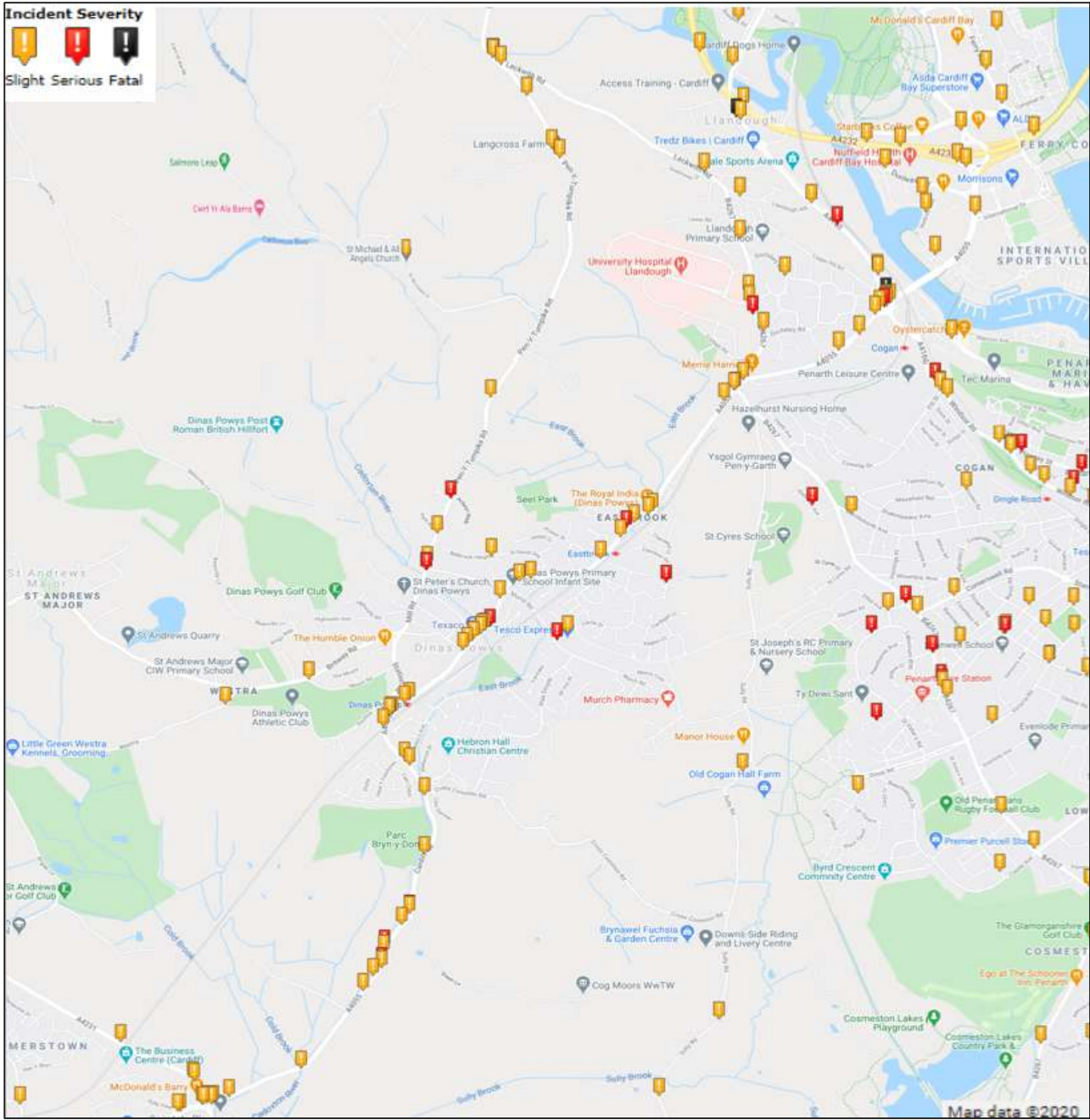
Saint Andras / St Andrews

Penarth Flats

Sully Bay

Crown Copyright and database right 2019. Ordnance Survey 100017916

Accidents by Severity within Study Area (2015 – 2019)





**APPENDIX F**

**WeITAG Stage Two Plus | Economic Appraisal**

# Economic Appraisal

Project	<b>Dinas Powys Transport Network</b>	Date	<b>12 October 2020</b>
	<b>WelTAG Study: Stage Two Plus</b>		
Subject	<b>Transport User Benefits and Indicative BCR</b>	Ref	<b>Version 1</b>

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## Version Control

Prepared by	Maya Thompson	Date	12/10/2020
Checked by	Adam Robinson	Date	12/10/2020
Approved by	Claire Bond	Date	12/10/2020

Revision Status	Amendments	Date
01		

# 1 Introduction

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## 1.1 Purpose of the Technical Note

- 1.1.1 The purpose of this report is to provide a detailed overview of the methodology used to provide an assessment of the economic case for providing a bypass around Dinas Powys. This work is at WelTAG Stage Two Plus and the objective is to present a refined result of the preferred option presented in the Stage 2 report.
- 1.1.2 In a WelTAG study the proposed interventions are assessed on the basis of their contribution towards meeting the objectives set and an assessment of their social and cultural, environmental and economic impacts. This technical note reports on the direct economic impacts of a bypass as measured by the impact on the journey times and costs of people using the bypass. It also considers the likely changes in accidents through the provision of the bypass. The Outline Business Case report considers all the other impacts.
- 1.1.3 Cost estimates have been used to derive an initial benefit cost ratio (BCR) for the scheme. In a WelTAG Stage Three study these costs would be further refined. Further work would also consider the wider economic impacts of providing a bypass to Dinas Powys and the impact on the scheme of proposed new housing and employment in the area.

### Study Area

- 1.1.4 The study area covers the A4055 Cardiff Road from the Biglis roundabout to Barons Court Junction as set out in the Outline Business Case report. The length of the corridor is 5.198 km. The following junctions are also included in the study area:
- Milbrook Road/A4055/Murch Road Junction
  - Merrie Harrier Junction
  - A4055/Station Road
  - B4267/ Llandough Hill Junction
  - Leckwith Road B4267 / Pen-Y-Turnpike Road Junction
  - Britway Road/ Mill Road Junction



## 2 Green Alignment for Assessment

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### Introduction

- 2.1.1 The primary alignment assessed in this study is the Green alignment. This alignment is shown in figures and described fully in the Outline Business Case report. It is based on the following:
- Alignment complies with the Design Manual for Roads and Bridges and contains no departures for 60mph speed limit (100kph design speed) single carriageway - Carriageway width of 3.65m per lane + 1m hardstrips (total carriageway width of 9.3m) plus verge width of 2.5m either side of the carriageway.
  - A 3.5m wide cycleway is included to one side of the bypass.
  - Total cross section width of 17.8m + earthworks slopes where required.
  - The alignment has been developed to fit into the landscape and where possible avoid constraints as provided by the Vale of Glamorgan Council.
  - The vertical alignment is based on 5m OS Contours which have the accuracy to +/- 2m.
  - Earthworks are assumed to be 1 in 3 embankment and cutting slopes – to be confirmed at a later stage subject to ground investigation and the materials present.
  - Outfall points for drainage are not known at this stage - costs have been estimated.
  - It is assumed that access along Cross Common Road will be terminated, and no direct through route will be allowed. A junction of the proposed bypass with Green Lane will be incorporated into the design.
- 2.1.2 It should be noted that further surveys, investigations and design will be required in WeITAG Stage Three in order to confirm its accuracy.

### Green Alignment

- 2.1.3 The Green alignment provides a new road to the east of Dinas Powys. This alignment does not change the layout of the Merrie Harrier Junction but rather there is a new 4-arm roundabout provided to the south west of the existing Merrie Harrier Junction. This roundabout has connections to Cardiff Road, Redlands Road and the new bypass.
- 2.1.4 This alignment allows for access to remain at all existing arms at the Merrie Harrier Junction, including the one-way system through Andrew Road. This provides minimal disruption to the existing Merrie Harrier Junction itself while allowing traffic to reach the new bypass. There would also be a new 3-arm roundabout at the southern end of the new bypass which is used to connect Cardiff Road with the new bypass.

### 3 South East Wales Transport Model (SEWTM)

- 3.1.1 At WeITAG Stage Two, a spreadsheet model was used to derive the inputs for the economic appraisal. At WeITAG Stage Two plus, the South East Wales Transport Model has been used to perform strategic transport modelling for the scheme and provide the inputs for the economic appraisal.
- 3.1.2 SEWTM is a multi-modal disaggregate demand model of South East Wales, covering the eleven unitary authority areas of Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Neath Port Talbot, Newport, Rhondda Cynon Taf, Torfaen, and Vale of Glamorgan. The model comprises separate highway and public transport assignment models linked together with a demand model.
- 3.1.3 The geographical coverage of SEWTM is shown in Figure 3-1. **Error! Reference source not found..** Dinas Powys and the location of the bypass are well within the Area of Detailed Modelling. Within this area, the model represents all trips (demand), model zones are small and highly disaggregated, the transport network is detailed, and junction modelling is included.

Figure 3-1: SEWTM modelled area



Source: Mott MacDonald

## 4 Economic Appraisal Assumptions

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### 4.1 Introduction

- 4.1.1 There are three levels of economic analysis applied to the assessment of transport schemes:
- Level 1: this includes impacts which assume a fixed land use and excludes wider economic impacts.
  - Level 2: this includes wider economic impacts but assumes fixed land use.
  - Level 3: this includes analysis in which either land use changes are explicitly quantified, or supplementary economic modelling is conducted. Wider economic impacts are included.
- 4.1.2 In this report, we have carried out an analysis of Level 1 benefits plus accident impacts, which is considered appropriate to inform a WeITAG Stage Two assessment and determine whether the do-something warrants further detailed consideration.
- 4.1.3 The tools used to derive the Level 1 benefits were:
- The DfT's Transport User Benefits Appraisal Tool TUBA, version 1.9.14. This software was used to estimate the direct user and provider benefits in terms of travel time savings and vehicle operating costs.
  - DfT's computer program COBALT (COst and Benefit to Accidents-Light Touch,) version 2013.2, was used to calculate the accident benefits
- 4.1.4 This TUBA analysis has been carried out using trip forecasts for 2026 and 2036.

### 4.2 Economic Parameters

- 4.2.1 TUBA provides a complete set of default economic parameters in its standard Economics File. This contains values of time, vehicle operating cost data, tax rates, economic growth rates and a range of other economic parameter values. For the TUBA 1.9.14 release used, two economic parameter files version have been released. One is consistent with the values provided in the July 2020 WeITAG Databook v1.13.1 and the second Economics File is consistent with the forthcoming change TAG Databook v1.14.
- 4.2.2 TUBA version 1.9.14 reports the economics values in 2010 prices and discounted to the present value of 2010.

### 4.3 Scheme Parameters

- 4.3.1 The scheme parameters used in the appraisal are as follows:
- Base year – 2015
  - Current Year – 2020
  - Scheme Opening – 2025
  - Design Year – 2036
  - Horizon Year – 2084
- 4.3.2 The 'Horizon Year' has been set at the end of 2084, with the appraisal period taken as 60 years from the scheme opening.

### Time Slices

- 4.3.3 TUBA works based on five standard definition time periods as follows:
- AM Peak (weekday 07:00 to 10:00)
  - PM Peak (weekday 16:00 to 19:00)
  - Inter Peak (weekday 16:00 to 19:00)

- Off-peak (weekday 19:00 to 07:00)
- Weekend

4.3.4 TUBA analysis for the Scheme's transport model comprises of four weekday time periods:

- AM average hour (07:00 to 09:30)
- Inter-peak average hour (09:30 to 15:30)
- PM average hour (15:30 to 18:00)
- Off-peak average hour (18:00 to 07:00)

## Annualisation Factors

4.3.5 The modelled time period benefits calculated by TUBA are converted into an estimate of annual benefits using annualisation factors. Annualisation factors are used to convert the travel time benefits per time slice to the annual user benefits. The benefits in each time slice are multiplied by an annualisation factor and then summed up over all time slices to give annual benefits.

4.3.6 The annualisation factor is therefore a representation of the number of time slices in a calendar year and is calculated as follows:

$$h \times d$$

where h = the number of time slices in the time period

d = the number of days in a year containing the time periods

4.3.7 The modes have different hour to period factors since some modes are more peaked than others during the time slice. The annualisation factors are shown in Table 4-1.

- For the AM periods, expanding the flows in the peak hour to the corresponding time period using the assignment factor. i.e. AM: 0745 – 0845 to 0700 – 1000.
- For IP period, multiply the average hourly flow by 6 hours (0930 – 1530).
- For the PM peak periods, expand the flows in the peak hour to corresponding time period. Using the assignment factor PM: 1630 – 1730 to 1600 – 1900.
- Multiply by 253 to get the number of working days in the year.

Table 4-1 Annualisation Factors

Time Period	Period	Assignment Type	Mode	Assignment Hour	Assignment Factor	Annualisation Factor
AM	07:00 to 09:30	Peak	Highway	07:45 to 08:45	2.2	556
IP	09:30 to 15:30	Average	All modes	Average	6	1518
PM	15:30 to 18:00	Peak	Highway	16:30 to 17:30	2.38	601
OP	18:00-7:00	Average	All modes	Average	13	3289
AM	07:00 to 09:30	Peak	Bus	07:45 to 08:45	2	507
PM	15:30 to 18:00	Peak	Bus	16:30 to 17:30	2.82	715
AM	07:00 to 09:30	Peak	Rail	07:45 to 08:45	1.84	466
PM	15:30 to 18:00	Peak	Rail	16:30 to 17:30	2.08	527



## User Classes

- 4.3.8 The SEWTM transport model has seven assignment classes. These were split into eleven user classes within TUBA to take account of the varying values of time for different purposes and vehicles operating costs by vehicle type corresponding to the standard TUBA vehicle types / sub-modes. The highway TUBA inputs were provided at the same level of disaggregation as the transport model. These are:
- Car – Business
  - Car – Commute
  - Car – Other
  - LGV
  - HGV
- 4.3.9 The LGV user class was input into TUBA as business only as the region has a low percentage of LGV personal use. The HGV user class encompasses both OGV1 and OGV2 user classes and has been amalgamated in the TUBA economics file by applying a weighted average to the parameters.
- 4.3.10 SEWTM public transport outputs are not usually split by trip purpose. In this case, the demand model's synthetic estimates of trip making have been applied to the rail and bus modes to produce the TUBA inputs at the same level as the TUBA economics file.
- 4.3.11 Table 4-2 presents the user classes within TUBA.

*Table 4-2: User Classes and Trip Purpose Proportion Splits*

User Class	Model User class	TUBA User Class	Proportion Split
1	Car Business	Car Business	1
2	Car Commute	Car Commute	1
3	Car Other	Car Other	1
4	LGV	LGV Business	1
5	HGV	OGV1/OGV2 Business	1
6	Bus	Bus Business	1
7	Bus	Bus Commute	1
8	Bus	Bus Other	1
9	Rail	Rail Business	1
10	Rail	Rail Commute	1
11	Rail	Rail Other	1

## Scenarios

- 4.3.12 Within the TUBA program, each modelled option is termed as a scenario and these were classified as either Without Scheme or With Scheme.
- 4.3.13 The Without Scheme scenario comprised of the following proposed schemes:
- Five Mile Lane Scheme, involving a range of improvements to the A4226 between Sycamore Cross and Weycock Cross;
  - A465 Dualling between Gilwern and Dowlais Top and new section north of Rassau;
  - M4 Junction 32 improvements, including a new dedicated left turn lane from the M4 westbound;

- M4 Junction 33 Improvements;
- Cardiff Eastern Bay Link Phase 1;
- Removal of Severn Bridge Tolls;
- A4119 / A473 Roundabout Improvements;
- Reduction of capacity on Castle Street, closure of Westgate Street to through-traffic and associated changes; and
- East Side Scheme (Cardiff City Centre), incorporating two one-way loops around Churchill Way.

4.3.14 The public transport scenario for both forecast years is developed from the Keolis-Amey proposals for Metro Phase 2. This includes:

- A total of 4 trains per hour (tph) from Cardiff to each of Treherbert / Aberdare / Merthyr / Rhymney/ Coryton;
- New direct services (2tph) from Treherbert / Aberdare / Merthyr into Cardiff Bay, as part of the 4tph total on each of these lines; and
- Some Aberdare services routed via the City Line so that the City Line is better connected to the wider rail network.

4.3.15 The With Scheme scenario comprised of the Do-Minimum network with the additional coding of the bypass and Merrie Harrier Junction improvements.

4.3.16 The following assumptions have been made with regards to the scheme coding:

- Single carriageway link classification with a fixed speed of 62km/h (except in the event that queues form) along the full extent of the bypass;
- Two-lane roundabouts at either end of the bypass with two lanes on most approaches, based on the scheme drawings provided;
- Signal coding for the Merrie Harrier junction is based upon the signal specifications provided with the assumption that the pedestrian demand-dependent stages are called every other cycle; and
- Due to the size of zones (and zone loading points) in the proximity of the scheme , no intermediate junctions were coded along the scheme link.

## **4.4 Trip Matrices, Distance, Time and Reference Distance**

4.4.1 Data input into TUBA comprises of the trip matrices, travel times, travel distances and reference distance matrices (base year demand weighted distance matrices).

4.4.2 These matrices were prepared for all four time periods (AM, IP, PM, OP), eleven user classes, two forecast years (2026 and 2036) and two scenarios (Without Scheme and With Scheme) and provided by Mott Macdonald.

4.4.3 TAG Unit A1.1 and TAG Data Book (and therefore TUBA) uses hours as units of time. Therefore, a factor of 0.0167 was used in the TUBA input file to convert time from minutes to hours.

## **4.5 Vehicle Operating Costs**

4.5.1 Vehicle operating costs (fuel and non-fuel) were produced as part of the assessment of Transport Economic Efficiency benefits and costs using TUBA.

4.5.2 Fuel costs vary by vehicle type; hence fuel costs are calculated based on variables including fuel consumption, average speed and fuel type.

4.5.3 Fuel costs also vary over time caused by improvements in vehicle efficiency and changes in the costs for fuel and for cars and the proportion of traffic using petrol or diesel engines.

4.5.4 Non-fuel vehicle operating costs elements include oil, tyres, maintenance, depreciation and

vehicles capital saving and depends upon vehicle type and fuel type for business and consumer trips.

- 4.5.5 Vehicle operating costs and fuel costs are contained in the standard TUBA economics input file.

## Alternative Growth Scenario

- 4.5.6 The SEWTM model currently has two sets of population and job forecasts available for use:
- A core scenario with development sites deemed “near certain” and “more than likely” included, and population and jobs growth controlled to Experian data by Local Authority; and
  - An alternate scenario, with population and jobs fixed as per 2015 at existing locations, with the addition of development sites deemed “near certain”, “more than likely” and “reasonably foreseeable”.
- 4.5.7 The alternative scenario assumptions have been used for this economic appraisal.

## Estimation of Costs

- 4.5.8 The costs estimate for the Green Alignment have been produced following WebTAG guidelines. The cost estimates include risk and optimism bias. A risk item of 14% has been used to build up the cost for the alignment. An Optimism Bias level of 30%, which is averaged between the stage 1 (44%) and stage 2 (15%) from recommendations in TAG Unit 1.2 has also been used. Optimism bias is used in order to account for underestimation of costs in major projects. It is considered that the 30% is still valid due to the unknowns within the projects such as ground data, additional junctions and possible improvements required to existing junctions.
- 4.5.9 The cost estimate in 2018 factored costs is £46.32m. For the appraisal process, these costs are converted to 2010 calendar year values using the GDP deflators from the May 2019 WebTAG Databook. The following process was undertaken to achieve this:
- The costs are factored back to rebase them to 2010 calendar year values using the GDP deflators from the May 2019 WebTAG Databook.
  - The costs estimates are then discounted using a discount rate of 3.5% for first 30 years then 3.0% thereafter.
- 4.5.10 As a cost profile has yet to be produced, it has been assumed that the costs are evenly spread over the period from the current year (2020) to the opening year (2025). The costs in 2010 market prices, discounted to 2010, are as follows:

Table 4-3 Final Cost Estimates (£m)

	Undiscounted Costs in 2018 factor costs	2010 market prices discounted to 2010
2020	7.72	5.69
2021	7.72	5.50
2022	7.72	5.31
2023	7.72	5.13
2024	7.72	4.96
2025	7.72	4.79
<b>Total</b>	<b>46.32</b>	<b>31.37</b>

- 4.5.11 The final cost of the schemes’ Green Alignment in 2010 market prices, discounted to 2010, is £31.37m.

## Accident Cost Savings

- 4.5.12 The DfT's program COBALT (COst and Benefit to Accidents-Light Touch) has been used to undertake the analysis of the impacts on accidents as part of the economic appraisal of the road scheme. The accident impact assessment has been performed using the method set out in the COBALT Manual<sup>1</sup>, although Annual Average Weekday Traffic (AAWT) has been used instead of Annual Average Daily Traffic (AADT) as SEWTM does not model weekend flows. COBALT is used to forecast changes in the number of accidents and casualties and estimate the monetary value of these impacts.
- 4.5.13 The latest COBALT scheme parameter file used for the assessment is 2020.1 which was used in conjunction with the COBALT software version 2013.2.
- 4.5.14 The COBALT model calculates the number of accidents by looking at each link in the network in turn and multiplying the forecasts number of vehicle kilometres travelled along that link by the standard accident rates per vehicle kilometres for the roads of the same type as that link. The standard accident rates for each road type are contained within the COBALT software and come from analysis of historic data from throughout the UK. When summed over all the links in the network this gives the total predicted number of accidents in the network, first for the do-minimum situation and then for the do-something.
- 4.5.15 Local accident rates can also be applied to some of the links. These are calculated using local accident data obtained from the appropriate local authority to determine the number of Personal Injury Accidents per million vehicle kilometres (PIA/mvkm), where 'vehicle kilometres' are the number of vehicles using a section of the road multiplied by the length of the road.
- 4.5.16 Standard valuations for fatal, serious and slight accidents are applied within the program to calculate the cost of these accidents in both the 'without' and 'with' scheme scenarios. The software then calculates the difference in the value and number of accidents between the do-minimum and do-something scenarios. The change in the value of accidents between the two scenarios are then annualised, interpolated and extrapolated over the 60-year appraisal period, and finally discounted to produce a 2010 present value of accident benefits in 2010 prices. This value can then be added to the values of the economic impacts assessed using the TUBA software.

## Assumptions for COBALT

- 4.5.17 Annual Average Weekday Traffic (AAWT) has been used instead of Annual Average Daily Traffic (AADT), which may overestimate the accident disbenefits calculated by COBALT. This is therefore a conservative assumption.
- 4.5.18 The accident rates used for this assessment are a combination of the default accident rates (national average) provided in the Tag Databook<sup>2</sup>, which has a base year 2009 and pre-calculated local accident rates based on the years 2014 – 2018.

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<sup>1</sup> <https://www.gov.uk/government/publications/cobalt-software-and-user-manuals>

<sup>2</sup> <https://www.gov.uk/government/publications/tag-data-book>



## 5 Economic Appraisal Results

### 5.1 User and Provider Benefits

- 5.1.1 The Transport User Benefits Appraisal (TUBA) tool which calculates transport user benefits and indirect taxation has been used to estimate the direct economic benefits for the scheme. For the results below, the Economics File relating to corresponding to TAG Databook v1.13.1 has been used.
- 5.1.2 The user and provider benefits for the scheme are reported in the TEE tables given below. **Error! Reference source not found.** presents these benefits and distinguishes between benefits to business users and consumers.

Table 5-1: User and Provider Benefits (£m PVB 2010 prices discounted to 2010)

Present Value of Benefits 2010 prices (£m)		Scheme Benefits
Commuting	Travel Time	22.3
	Vehicle Operating Costs	1.89
Other consumers	Travel Time	24.04
	Vehicle Operating Costs	1.29
Business	Travel Time	16.77
	Vehicle Operating Costs	3.47
Private Sector Provider Impacts	Revenue	-1.24
Total		68.53
Business benefits as % of total		30%

- 5.1.3 The scheme user and provider benefits are estimated at have a total discounted value in 2010 prices and values, appraised over 60 years, of £69 million.
- 5.1.4 **Error! Reference source not found.** shows the effects of the scheme on public finances, taking into account the impact on the broad transport budget after allowing for changes in revenues. It also includes changes in the broader indirect tax revenues which accrue to the government.

Table 5-2: Public Accounts (Present Value Costs £m 2010 prices discounted to 2010)

Scheme Costs	Green Alignment
Investment Costs	31.37
Operator Costs	-
Revenue	-
Indirect Tax Revenue	1.03
Net impact	32.40

- 5.1.5 The net impact on the transport budget is estimated at £32m.
- 5.1.6 The indirect tax revenue values show a decrease in revenue to the wider public finances and, in accordance with WebTAG guidance, are included in the calculation of the Present Value of Benefits (PVB). The sign of the value in the PA table is reversed in the AMCB table because the PA table presents costs to the public accounts as positive values.
- 5.1.7 The AMCB tables combine the results from the TEE tables and the PA tables supplemented by information on accidents and environmental effects. The results from the appraisal of the

impact on accidents is set out below.

## 5.2 Accident Cost Savings

5.2.1 Table 5.3 presents the accident cost savings for the impacted links, which are based on the COBALT outputs. A combination of default accident rates (national averages) and local accident rates were used. The costs are for the 60-year assessment period (2025-2084) and are discounted to 2010 prices.

Table 5-3 Accident Benefits Summary (Cost in £m discounted to 2010)

		Without Scheme	With Scheme	Total Savings (diff. of with and without scheme)
<b>Accident cost</b>	Total (£m)	27.54	31.87	-4.33
<b>Accident Summary</b>	Total	640	647	-7
<b>Casualty Summary</b>	Total	868	925	-57
	Fatal	6	11	-5
	Serious	84	100	-16
	Slight	778	814	-36

5.2.2 The results show negative scheme benefits with an increase in total accident cost of -£4.33m, over the 60-year period in 2010 prices. The table shows that the scheme results in more accidents overall and forecasts additional casualties over the next 60 years. However, the increase in accidents and casualties is very small and this is likely to be due to having a higher speed road.

## Analysis of Monetised Costs and Benefits Table

5.2.3 The Analysis of Monetised Costs and Benefits (AMCB) table combines the results from the TEE table and the PA table and supplements it with the information on accidents. A summary of the results for the scheme appraisal is set out in **Error! Reference source not found..**

Table 5-4: AMCB Summary Table (prices in £m, discounted to 2010)

	Scheme Costs	Green Alignment
<b>A</b>	<b>Accidents</b>	-4.33
<b>B</b>	<b>Economic efficiency: Commuting</b>	24.19
<b>C</b>	<b>Economic efficiency: Other</b>	25.34
<b>D</b>	<b>Economic efficiency: Business</b>	19.00
<b>E</b>	<b>Wider Public Finances (ITR)</b>	-1.03
<b>F</b>	<b>PVB (A+B+C+D+E)</b>	63.17
<b>G</b>	<b>PVC</b>	31.37
<b>H</b>	<b>Net Present Value (F-G)</b>	31.8
<b>I</b>	<b>Benefit Cost Ratio (F/G)</b>	2.01

## 6 Sensitivity Test

### 6.1 Introduction

- 6.1.1 A second Economics file has been included with TUBA version 1.9.14, which is consistent with the forthcoming change to TAG Databook v1.14 and the July 2020 Office for Budget Responsibility forecasts, which takes into account COVID-19 impacts. Government guidance states the requirement for scheme promoters to conduct sensitivity tests using TAG Databook v1.14.
- 6.1.2 The changes in TAG Databook v1.14 consist of:
- reduced growth in forecast GDP per capita, and corresponding changes to forecast values of time and other appraisal values;
  - a slight reduction in the share of diesel cars in the fleet mix with a corresponding increase in petrol cars;
  - increased petrol and diesel fuel efficiency for cars and vans in the long run, with a slower rate of improvement in the short-term;
  - stronger electric car efficiency improvement projections, but weaker electric van efficiency improvements;
  - the inclusion of fuel efficiency improvement projections for HGVs (efficiency was previously assumed to be constant over time).
- 6.1.3 The TUBA tool which calculates transport user benefits and indirect taxation has been used to estimate the direct economic benefits for the scheme using the Economics File corresponding to TAG Databook v1.14.

### 6.2 User and Provider Benefits

- 6.2.1 The TUBA tool which calculates transport user benefits and indirect taxation has been used to estimate the direct economic benefits for the scheme sensitivity test.
- 6.2.2 The user and provider benefits for the sensitivity test are reported in the TEE tables given below. Table 6-1 presents these benefits and distinguishes between benefits to business users and consumers.

Table 6-1: User and Provider Benefits (£m PVB 2010 prices discounted to 2010)

Present Value of Benefits 2010 prices (£m)		Scheme Benefits
<b>Commuting</b>	Travel Time	19.02
	Vehicle Operating Costs	1.82
<b>Other consumers</b>	Travel Time	20.42
	Vehicle Operating Costs	1.19
<b>Business</b>	Travel Time	14.24
	Vehicle Operating Costs	3.34
<b>Private Sector Provider Impacts</b>	<b>Revenue</b>	<b>-1.24</b>
<b>Total</b>		<b>58.79</b>
<b>Business benefits as % of total</b>		<b>30%</b>

- 6.2.3 The scheme user and provider benefits are estimated to have a total discounted value in 2010 prices and values, appraised over 60 years, of £59 million.

- 6.2.4 Table 6-2 **Error! Reference source not found.** shows the effects of the sensitivity test on public finances, taking into account the impact on the broad transport budget after allowing for changes in revenues. It also includes changes in the broader indirect tax revenues which accrue to the government.

Table 6-2: Public Accounts (Present Value Costs £m 2010 prices discounted to 2010)

Scheme Costs	Green Alignment
Investment Costs	31.37
Operator Costs	-
Revenue	-
Indirect Tax Revenue	0.91
<b>Net impact</b>	<b>32.28</b>

- 6.2.5 The net impact on the transport budget is estimated at £32m.
- 6.2.6 The indirect tax revenue values show a decrease in revenue to the wider public finances and, in accordance with WebTAG guidance, are included in the calculation of the Present Value of Benefits (PVB). The sign of the value in the PA table is reversed in the AMCB table because the PA table presents costs to the public accounts as positive values.
- 6.2.7 The AMCB tables combine the results from the TEE tables and the PA tables supplemented by information on accidents and environmental effects. The results from the appraisal of the impact on accidents is set out below.

### Analysis of Monetised Costs and Benefits Table

- 6.2.8 The Analysis of Monetised Costs and Benefits (AMCB) table combines the results from the TEE table and the PA table and supplements it with the information on accidents. A summary of the results for the scheme appraisal is set out in Table 6-3.

Table 6-3: AMCB Summary Table (prices in £m, discounted to 2010)

	Scheme Costs	Green Alignment
<b>A</b>	<b>Accidents</b>	-4.33
<b>B</b>	<b>Economic efficiency: Commuting</b>	20.84
<b>C</b>	<b>Economic efficiency: Other</b>	21.61
<b>D</b>	<b>Economic efficiency: Business</b>	16.34
<b>E</b>	<b>Wider Public Finances (ITR)</b>	-0.91
<b>F</b>	<b>PVB (A+B+C+D+E)</b>	53.55
<b>G</b>	<b>PVC</b>	31.37
<b>H</b>	<b>Net Present Value (F-G)</b>	22.18
<b>I</b>	<b>Benefit Cost Ratio (F/G)</b>	1.71



## 7 Summary and Conclusions

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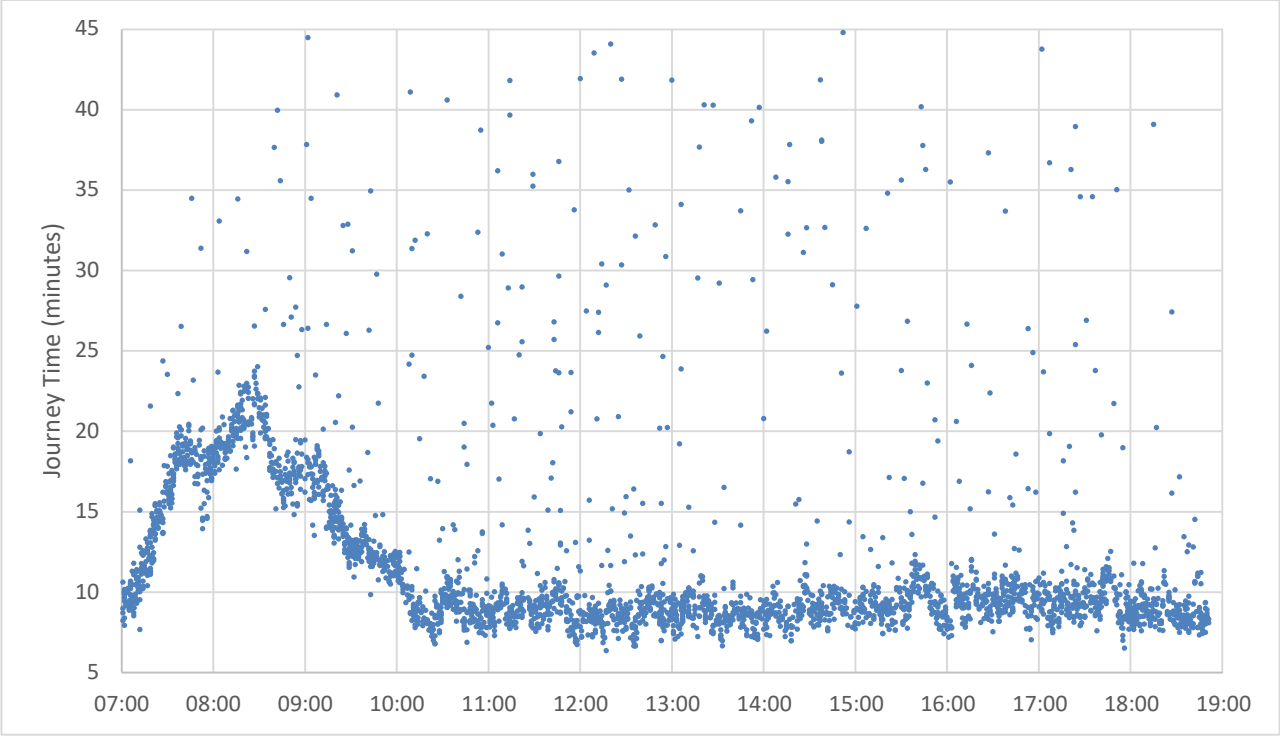
### Summary of Economic Appraisal

- 7.1.1 The Green alignment produces a total PVB of £63m and a cost of £31m under the Core TUBA scenario. This results in a Net Present Value of £32m and an initial Benefit Cost Ratio of 2. This suggests that the scheme would represent high value for money.
- 7.1.2 The Sensitivity test results show that the Green alignment produces a total PVB of £53m and a cost of £31m. This results in a Net Present Value of £22m and an initial Benefit Cost Ratio of 1.7. This suggests that the scheme would represent medium value for money.
- 7.1.3 These results do not reflect the qualitative and quantitative information such as reliability and wider economic impacts, which contribute to the calculation of the Adjusted Benefit Cost Ratio and may increase the Value for Money of the scheme further.
- 7.1.4 A full business case would be needed to further consider the economic impact of the scheme.

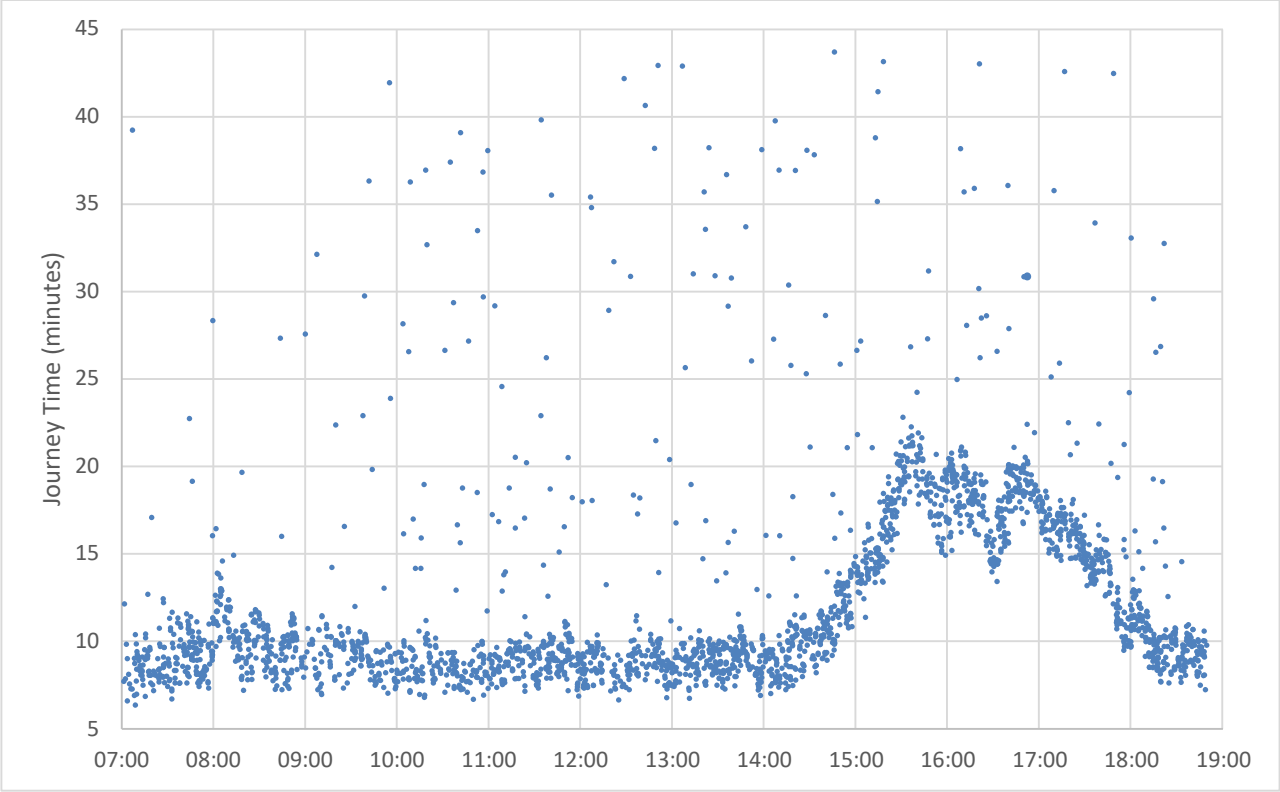
**APPENDIX G**

**Economic Context**

Northbound Journey Time (minutes)



Southbound Journey Time (minutes)





**APPENDIX H**

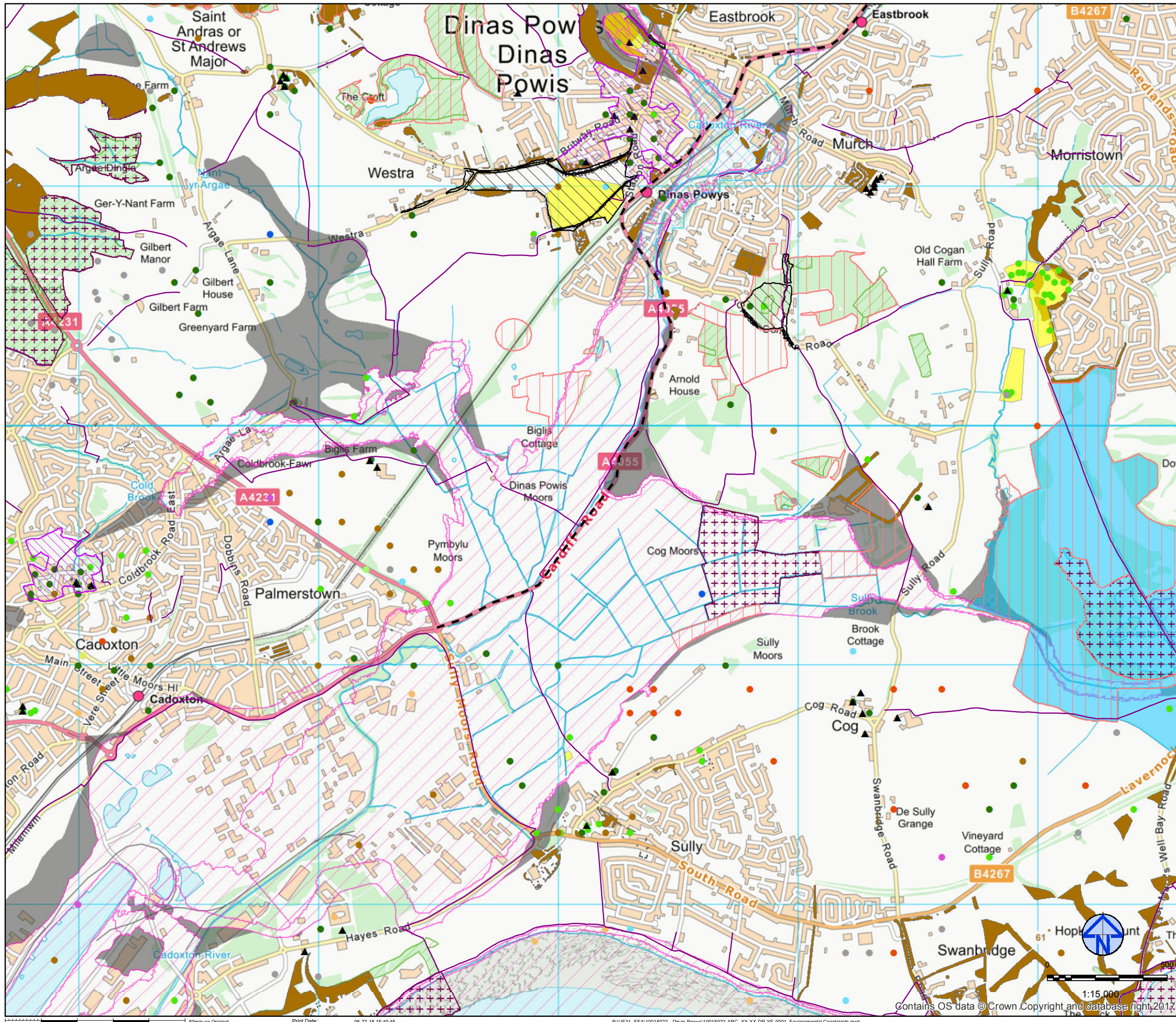
**Environmental Context**

# NO2 Levels in Dinas Powys<sup>58</sup>

Site ID	Grid Reference	Annual Mean Concentration (µg/m³)				
		2012	2013	2014	2015	2016
Site ID 7 (Cardiff Road/ Millbrook Junction)	315773 171514	29.4	28.5	26.3	24.6	25
Site ID 46 (46 Cardiff Road)	315747 171369	23.7	22	19.7	18.6	18
Site ID 47 (Dinas Powys Health Centre)	315710 171385	19.2	17.5	15.6	14.4	13
Site ID 72 (Dinas Powys Primary School)	315841 171527	29.1	24.1	27.8	23.8	22
Site ID 61 (Railway Terrace) Cardiff Road	316433 171932	39.7	34.6	31	30.1	31
Site ID 67 (2 Matthew Terrace) Cardiff Road	316488 172004	28.8	30	26	24.2	27
Site ID 89 (9 Wayside Cottage)	316447 171963	N/A	34	31.2	30.8	31
Site ID 90 (16 Railway Terrace)	316453 171945	N/A	27	24.6	21.4	21
Site ID 56 (Andrew Road)	317595 172435	40.3	38.5	33.9	29.4	17
Site ID 70 (Ty-Isaf)	316731 172391	23	19	21.9	23.2	24

<sup>58</sup> Vale of Glamorgan Council 2016 Air Quality Progress Report - <http://www.srs.wales/Documents/Pollution/Air-Quality-Reports/16.09.21-Air-Quality-Progress-Report-2016May-2016-Revised-LTP-and-LDP.pdf>





NOTES:

Legend:

- Public Rights of Way
- Registered Common Land
- Site of Importance for Nature Conservation (SINC)
- Conservation Area
- Designated Heritage Assets
  - Listed Building
- Archaeological Features
  - Prehistoric
  - Mesolithic
  - Neolithic
  - Bronze Age
  - Iron Age
  - Roman
  - Early Medieval
  - Medieval
  - Post-Medieval
- Modern
- Unknown
- Scheduled Monument
- Tree Preservation Order
- Environmental Designations
  - Site of Special Scientific Interest
  - Local Nature Reserve
  - Ancient Woodland
  - Zone C1
  - Zone C2
- Flood Zones
  - Zone B

Rev	Date	Description	Drawn	Check	Approv
01	27/06/18	DESCRIPTION	RM	SP	MF

Client

VALE of GLAMORGAN COUNCIL

PROJECT: WELTAG STAGE 2 APPRAISAL

Site

Dinas Powys

ARCADIS

Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London N1 9AB

Coordinating office: Arcadis Cymru House, Fortran Road, St Mellons, Cardiff CF3 0EY

www.arcadis.com

TITLE:

Figure 1:  
Dinas Powys (Extended Study Area) -  
Environmental Constraints

Drawn	R.MILLMAN	Date	27JUN18	Signed
Checked	S.PRICE	Date	27JUN18	Signed
Approved	M.FRY	Date	27JUN18	Signed
Scale:	1:15,000	Datum:	AOD	
Original Size:	A3	Grid:	OS	
Suitability Code:	S2	Project Number:	10015022	

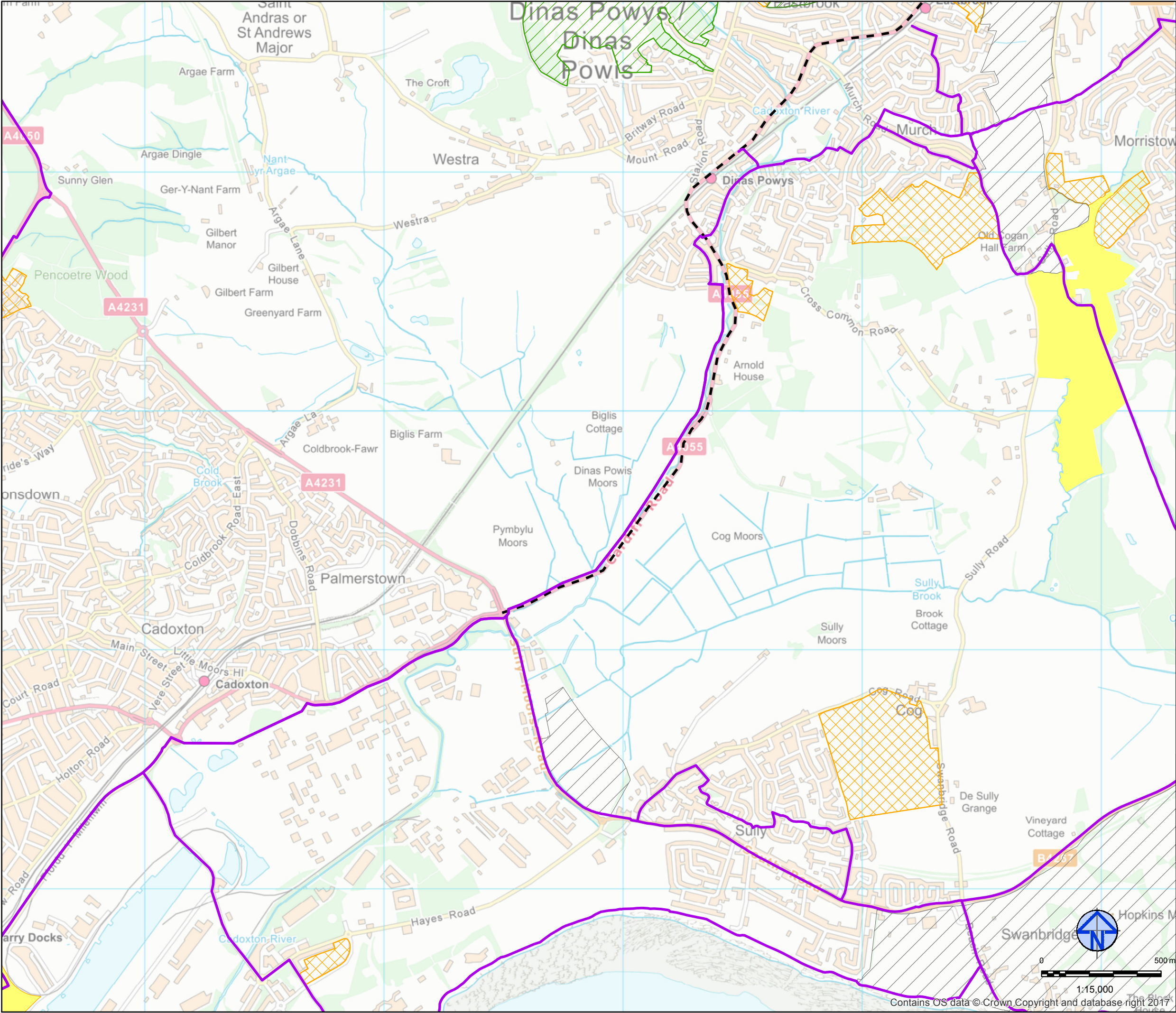
Suitability Description: Issued for information

Drawing Number: 10015022-ARC -XX-XX-DR-YE-0001

Revision: 01

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NOTES:

Legend:

- LDP Transport Cycling
- A4055
- LDP Green Wedge
- LDP SLA
- LDP Public Open Space
- LDP Housing

01	30/05/18	DESCRIPTION	RM	SP	MF
Rev	Date	Description	Drawn	Check	Approv

Client

VALE of GLAMORGAN COUNCIL

PROJECT: WELTAG STAGE 2 APPRAISAL

Site

Dinas Powys

ARCADIS

Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London N1 9AB

Coordinating office: Arcadis Cymru House, Fortran Road, St Mellons, Cardiff CF3 0EY

www.arcadis.com

TITLE:

Figure 2: Planning Policies

Drawn	R.MILLMAN	Date	30MAY18	Signed	
Checked	S.PRICE	Date	30MAY18	Signed	
Approved	M.FRY	Date	30MAY18	Signed	
Scale:	1:15,000	Datum:	AOD		
Original Size:	A3	Grid:	OS		
Suitability Code:	S2	Project Number:	10015022		
Suitability Description: Issued for information					

Drawing Number: 10015022-ARC -XX-XX-DR-YE-0002

Revision: 01

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**APPENDIX I**

**WebTAG Assessment Sheet**

## TAG Journey Quality Impacts Worksheet

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness			
	Facilities			
	Information			
	Environment			
Travellers' Views	-			
Traveller Stress	Frustration			
	Fear of potential accidents			
	Route uncertainty			

### Reference Source

10015022-ARC-XX-XX-DR-HE-0004, 0005, 0006 and 0007 - Green Alignment  
 10015022-ARC-XX-XX-DR-HE-0008, 0009, 0010 and 0011 - Pink Alignment  
 WebTAG TAG unit A4-1 Social Impact Appraisal  
 Dinas Powys Bypass Scheme Modelling (01/07/2020)

### Summary Assessment Score

High beneficial (more than 10,000 users per day affected).

### Qualitative Comments

Reference the Stage Two Outline Business Case report.

## TAG Journey Quality Impacts Worksheet

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness			
	Facilities			
	Information			
	Environment			
Travellers' Views	-			
Traveller Stress	Frustration			
	Fear of potential accidents			
	Route uncertainty			

### Reference Source

WebTAG TAG unit A4-1 Social Impact Appraisal  
 10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
 10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes

### Summary Assessment Score

Moderate beneficial (between 500 - 10,000 users per day affected).

### Qualitative Comments

Reference the Stage Two Outline Business Case report.

## TAG Journey Quality Impacts Worksheet

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness			
	Facilities			
	Information			
	Environment			
Travellers' Views	-			
Traveller Stress	Frustration			
	Fear of potential accidents			
	Route uncertainty			

### Reference Source

10015022-ARC-XX-XX-DR-HE-0004, 0005, 0006 and 0007 - Green Alignment  
 WebTAG TAG unit A4-1 Social Impact Appraisal  
 10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
 10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes  
 Dinas Powys Bypass Scheme Modelling (01/07/2020)

### Summary Assessment Score

High beneficial (more than 10,000 users per day affected).

### Qualitative Comments

Reference the Stage Two Outline Business Case report.



## Bypass

### TAG Security Impacts Worksheet

Security Indicator	Relative importance	Without scheme	With scheme
	(High/Medium/Low)	(Poor/Moderate/High)	(Poor/Moderate/High)
Site perimeters	Medium	Moderate	High
Entrances and exits	Medium	Moderate	Moderate
Formal surveillance	Medium	Poor	Moderate
Informal surveillance	Medium	Moderate	Moderate
Landscaping	Medium	Poor	High
Lighting and visibility	Medium	Poor	Moderate
Emergency call	Medium	Poor	Moderate

#### Approximate Number of Users Affected

High (more than 10,000 users per day affected).

#### Reference Source

10015022-ARC-XX-XX-DR-HE-0004, 0005, 0006 and 0007 - Green Alignment  
10015022-ARC-XX-XX-DR-HE-0008, 0009, 0010 and 0011 - Pink Alignment  
WebTAG TAG unit A4-1 Social Impact Appraisal  
Dinas Powys Bypass Scheme Modelling (01/07/2020)

#### Summary Assessment Score

Whilst the total number of travellers affected is in excess of 10,000 users per day (see SEWTM output), a moderate score has been applied when considering the changes in the level of the security indicators and the relative importance of the indicators.

#### Qualitative Comments

Reference Outline Business Case report.

## TAG Security Impacts Worksheet

Security Indicator	Relative importance	Without scheme	With scheme
	(High/Medium/Low)	(Poor/Moderate/High)	(Poor/Moderate/High)
Site perimeters	Low	Moderate	High
Entrances and exits	n/a	Moderate	High
Formal surveillance	High	Moderate	High
Informal surveillance	High	Moderate	Moderate
Landscaping	Medium	Poor	High
Lighting and visibility	Medium	Moderate	High
Emergency call	Medium	Poor	High

### Approximate Number of Users Affected

Moderate (between 500 - 10,000 users per day affected).

### Reference Source

WebTAG TAG unit A4-1 Social Impact Appraisal  
 10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
 10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
 10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes

### Summary Assessment Score

Moderate beneficial (between 500 - 10,000 users per day affected).

### Qualitative Comments

See Outline Business Case report.

## Bypass (Green route) and Multi-modal

### TAG Security Impacts Worksheet

Security Indicator	Relative importance	Without scheme	With scheme
	(High/Medium/Low)	(Poor/Moderate/High)	(Poor/Moderate/High)
Site perimeters	Medium	Moderate	High
Entrances and exits	Medium	Moderate	High
Formal surveillance	High	Moderate	High
Informal surveillance	High	Moderate	Moderate
Landscaping	Medium	Poor	High
Lighting and visibility	Medium	Moderate	High
Emergency call	Medium	Poor	High

### Approximate Number of Users Affected

High (more than 10,000 users per day affected).

### Reference Source

10015022-ARC-XX-XX-DR-HE-0004, 0005, 0006 and 0007 - Green Alignment  
WebTAG TAG unit A4-1 Social Impact Appraisal  
10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes  
Dinas Powys Bypass Scheme Modelling (01/07/2020)

### Summary Assessment Score

Moderate beneficial

### Qualitative Comments

Reference Outline Business Case report.

## Bypass

### TAG Severance Impacts Worksheet

Change in Severance	Population Affected			
	Dinas Powys			Total Affected
Large negative				-
Moderate negative				-
Slight negative				-
Neutral				-
Slight positive				-
Moderate positive	200 - 1000			<b>200 - 1000</b>
Large positive				-

#### Reference Source

GoogleMaps Data ©2020  
10015022-ARC-XX-XX-DR-HE-0004, 0005, 0006 and 0007 - Green Alignment  
10015022-ARC-XX-XX-DR-HE-0008, 0009, 0010 and 0011 - Pink Alignment  
WebTAG TAG unit A4-1 social impact appraisal, December 2017  
SAPE19DT3-mid-2016-msoa-syoa-estimates\_formatted (<https://www.ons.gov.uk/>)  
SAPE19DT11-mid-2016-Isa-population-density (<https://www.ons.gov.uk/>)  
Dinas Powys Bypass Scheme Modelling (01/07/2020)

#### Summary Assessment Score

Moderate positive

#### Qualitative Comments

See Outline Business Case report.  
2016 Dinas Powys population estimate <https://www.ons.gov.uk/>  
<https://gov.wales/docs/statistics/Isaamaps/Isa.htm#Vale of Glamorgan>  
Significant reduction in traffic flow within built up area of Dinas Powys establishing a large impact.  
Estimated that between 200 - 1000 people will be affected within Dinas Powys.



## Multi-modal

### TAG Severance Impacts Worksheet

Change in Severance	Population Affected			
	Dinas Powys			Total Affected
Large negative	0			0
Moderate negative	0			0
Slight negative	0			0
Neutral	0			0
Slight positive	200 to 1000			200 to 1000
Moderate positive	0			0
Large positive	0			0

#### Reference Source

GoogleMaps Data ©2020  
10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes  
SAPE19DT3-mid-2016-msoa-syoa-estimates\_formatted (<https://www.ons.gov.uk/>)  
SAPE19DT11-mid-2016-lsoa-population-density (<https://www.ons.gov.uk/>)

#### Summary Assessment Score

Slight positive

#### Qualitative Comments

Reference Outline Business Case report.

## Bypass (Green route) and Multi-modal

### TAG Severance Impacts Worksheet

Change in Severance	Population Affected			
	Dinas Powys			Total Affected
Large negative				-
Moderate negative				-
Slight negative				-
Neutral				-
Slight positive				-
Moderate positive	Up to 1000			Up to 1000
Large positive				

#### Reference Source

GoogleMaps Data ©2020  
10015022-ARC-XX-XX-DR-HE-0004 - Green Alignment  
10015022-ARC-XX-XX-DR-HE-0002 Proposed Park & Ride Area  
10015022-ARC-XX-XX-DR-HE-0012 Existing Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0013 Proposed Public Transport Routes  
10015022-ARC-XX-XX-DR-HE-0014 Proposed Walking & Cycling Routes  
SAPE19DT3-mid-2016-msoa-syoa-estimates\_formatted (<https://www.ons.gov.uk/>)  
SAPE19DT11-mid-2016-lsoa-population-density (<https://www.ons.gov.uk/>)  
Dinas Powys Bypass Scheme Modelling (01/07/2020)

#### Summary Assessment Score

Large beneficial

#### Qualitative Comments

See Outline Business Case report.  
2016 Dinas Powys population estimate <https://www.ons.gov.uk/>  
<https://gov.wales/docs/statistics/lsoamaps/lsoa.htm#Vale of Glamorgan>  
Up to 74% reduction in traffic flow within built up area of Dinas Powys establishing a large impact.  
Estimated that >1000 people will be affected within Dinas Powys and Barry.

## TAG Biodiversity Impacts Worksheet

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Severn Estuary Ramsar	Annex I habitats (including estuaries, Atlantic salt meadows and mudflats and sandflats not covered by seawater at low tide), its migratory fish populations (including salmon, sea trout and sea lamprey) and for its internationally important assemblage of waterfowl (including gadwall, dunlin and redshank). Located approximately 2km east of the scheme.	International	Qualifying feature of a internationally designated site so very high importance	Water quality improving. Quality of saltmarsh threatened. Water fowl population status varies but overall assemblage has declined from approx. 81,000 to 66,000 between 1992/93 and 2006/7	Very high	Neutral	Neutral
Severn Estuary Special Protection Area (SPA)	Internationally important bird populations (including the Annex I species Bewick's swan over winter as well as ringed plover, dunlin, pintail, redshank and curlew) and for regularly supporting at least 20,000 waterfowl. Located approx. 2km east of the scheme.	International	Qualifying feature of a internationally designated site so very high importance	Water fowl population status varies but overall assemblage has declined from approx. 81,000 to 66,000 between 1992/93 and 2006/7	Very high	Neutral	Neutral
Severn Estuary SAC	Annex I habitats (including estuaries, Atlantic salt meadows and mudflats and sandflats not covered by seawater at low tide) and Annex II species (including sea lamprey, river lamprey and twaite shad). Located approx. 2km east of the scheme	International	Qualifying feature of a internationally designated site so very high importance	Water quality improving. Quality of saltmarsh threatened.	Very high	Neutral	Neutral
Cog Moors SSSI	Large continuous damp mesotrophic (neutral) semi-natural grassland associated with stands of tall sedges and populations of uncommon plants (bulbous foxtail and pepper saxifrage). Located approx. 0.1km south of the scheme.	National	Qualifying feature of a nationally designated site so high importance	Habitats static with active management but pillwort lost from site.	High	Neutral	Neutral
Cosmeston Lakes SSSI	Cosmeston Lakes SSSI includes two lakes, created from flooded limestone quarries, which are connected by a narrow channel. These are eutrophic water bodies up to 10m deep, which support a range of submerged plants. One of the lakes is of special interest as the only known site in Wales for the presence of starry stonewort. Located approx. 1km south-east of the scheme.	National	Qualifying feature of a nationally designated site so high importance	Static with minimal management	High	Neutral	Neutral
Cosmeston Lakes Country Park local Nature Reserve	As above, a water vole population was released here in 2017.	County	Qualifying feature of a nationally designated site so high importance	Static with active management	High	Neutral	Neutral

Sites of Interest for Nature Conservations (SINCs)	Various SINCs within 2km of the scheme. Both routes pass in proximity to North of Cog Moors and Pop Hill SINCs. Embankment works may encroach on Pop Hill SINC boundary.	County	Designated at Local Authority Level	Unknown, dependent on further information on SINC designations	Medium	Intermediate negative	Moderate adverse
Ancient Woodland	Both route options pass in proximity to two areas of ancient woodland, one semi-natural, one restored. Embankments works likely to encroach on woodland edge and/or root protection zones.	Regional	Habitat of principal importance	In decline	Medium	Intermediate negative	Moderate adverse
Tree Preservation Orders (TPO)	Notable individual and groups of trees within the search area but none identified along either route.	County	Designated at Local Authority Level	Static	Low	Minor negative	Slight adverse
Priority Habitats	Running and standing open water, hedgerows, woodland, marshy grassland are crossed or are adjacent to both route options.	County	Potential habitat of principal importance under Environment (Wales) Act 2016	In decline	Up to Medium	Uncertainty remains pending further survey work	Dependent on further survey, minor adverse if present
Other natural habitats	Scrub, tall ruderals, improved grassland, arable fields are present along or adjacent to both route options	Local	Common habitats of some local biodiversity interest	Static	Low	Minor negative	Slight adverse
Hard structures	Roads and buildings are present along or adjacent to both route options.	Local	Common habitats with no nature conservation value (unless bat roost present - see bats)	N/A	Negligible	Minor negative	Neutral
Amphibians	Records of great crested newts. A range of suitable terrestrial foraging habitat available and at least 15 ponds within 500m offering potential breeding habitat. Both route options likely to lead to the loss of 3 ponds.	At least local, dependent on further survey work	Species of principal importance (great crested newt are European and UK Protected Species)	Declining	Up to medium (if great crested newt present)	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Badgers	No records. Potential for setts in woodland and hedgerows and foraging habitat available	At least local, dependent on further survey work	Protected under Protection of Badgers Act 1992	Static / maybe increasing	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Bats	Records for <i>Myotis</i> sp., <i>Pipistrellus</i> sp. and unidentified bat species. Foraging and commuting habitat identified and potential for roosts in mature trees and buildings.	At least local, dependent on further survey work	European and UK protected species	Varies with species	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Birds	Records for a variety of species and suitable breeding habitat for both tree and ground nesting species. A variety of suitable foraging habitats.	At least local, dependent on further survey work	Protected during breeding season	Varies with species. Wintering birds are doing well but farmland birds are decreasing.	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Dormouse	Records and suitable habitat within hedgerows and woodland for breeding, foraging and hibernating individuals.	At least local, dependent on further survey work	European and UK protected species	In decline but decline may be levelling off	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present



Fish	Eel, bullhead and brown trout have been recorded and may be present in watercourses depending on their characteristics	At least local, dependent on further survey work	Species of principal importance	Varies with species	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Hedgehog	Records and suitable habitat within hedgerows, woodland and field margins	At least local, dependent on further survey work	Species of principal importance	Uncertain but considered to be in decline	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Invertebrates	Records and a variety of habitats will suit both aquatic and terrestrial species.	At least local, dependent on further survey work	Species of principal importance	Varies with species, but 21% species listed as Welsh priorities were declining, 25% were improving and 54% showed little change	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Otter	No records. Otter may use the smaller watercourses/drainage ditches for commuting and/or dispersing.	At least local, dependent on further survey work	European and UK Protected species	Increasing nationally	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Reptile	Suitable habitat for grass snake, slow-worm and common lizard within hedgerows and field margins. No potential for adder identified at this stage.	At least local, dependent on further survey work	UK protected species	Declining	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Water vole	Water vole released at Cosmeston lakes, smaller watercourses may also be suitable depending on conditions.	At least local, dependent on further survey work	UK protected species	Declining	Up to medium	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Plants	Habitats may support some EWA Section 7 species and WCA Schedule 9 species.	At least local, dependent on findings of Phase 1 survey	Species of principal importance	Varies with species, but 53% flowering plants that are features of European designated sites are in decline in Wales whilst 43% are increasing.	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present
Other	Field habitats may support brown hare.	At least local, dependent on detailed Phase 1 habitat survey	Brown hare are species of principal importance	Declining (brown hare)	Low	Uncertainty remains pending further survey work	Dependent on further survey, slight adverse if present

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## Summary Assessment Score

Up to moderate adverse impacts anticipated this stage.

## Qualitative Comments

At this stage there is little to differentiate the routes except that the pink route may lead to greater habitat loss than the green route as proposals include three rather than one roundabout. Impacts on Pop Hill SINC will depend on the extent and type of works adjacent to its boundary but are likely to lead to the loss of some mature trees. It is likely that as a minimum compensatory tree planting would be required to off-set this loss. Aerial imagery and a ground truthing exercise identified the potential for both woodland, important hedgerows and priority habitats including rhos pasture but this would need to be verified through a Phase 1 habitat survey. Although impacts on ancient woodland are considered moderate it should be noted that this habitat cannot be recreated and therefore impacts should be considered as permanent. Further data including protected species surveys are required and potential mitigation activities should be recommended in an Ecological Impact Assessment.

## TAG Landscape Impacts Worksheet - Dinas Bypass

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The landscape is characterised by a relative small scale pattern of fields within an undulating lowland landscape. The landscape pattern is predominantly made up of pastoral fields bounded by hedgerows containing trees. Farms are scattered across the area which forms a green buffer between Dinas Powys and Penarth.	locally (tbc in next stage)	locally (tbc in next stage)	locally (tbc in next stage)	Road will provide new feature and interrupt the existing hedgerow field patterns. This will be difficult to replicate in short term due to time necessary to establish vegetation cover. Increased traffic in area and long distance views will also be interrupted.	<b>Moderate adverse:</b> Field patterns and open spaces disrupted, with loss of hedges. Road will replace existing narrow lanes. Mitigations difficult without diminishing local landscape character. <b>Additional mitigation:</b> Landscape design along route, retain or planting of new hedges to integrate with the landscape pattern, design of road sympathetic to local landscape character.
Tranquillity	Generally open landscape with minor hedgerowed lanes that are tranquil and sheltered. Urban edge of Dinas Powys is intrusive in parts, however the green fringe on the north-eastern edge of Dinas Powys provides a subtle integration of urban edge and farmland. PRoWs links across the landscape with some open long distance views across the landscape particularly from elevated land along the western edge of Penarth.	locally (tbc in next stage)	locally (tbc in next stage)	locally (tbc in next stage)	Difficult due to road dividing the landscape and severing the green fringe. Increased traffic in area, long distance views interrupted.	<b>Moderate adverse:</b> Traffic and road through the landscape will reduce tranquillity, although its proximity to the urban edge of Dinas Powys will be a consideration. <b>Additional mitigation:</b> Good landscape (screening) and lighting design to integrate into the landscape and minimise night time landscape impact.

Cultural	<p>Agricultural landscape with mature woodlands and hedgerows are features in the landscape. Largely intact survival of historical fieldscape of elongated strip fields on Pop Hill. However, the urban sprawl of Dinas Powys and Penarth has largely obscured earlier fieldscapes and patterns of settlement throughout the rest of the area.</p>	locally (tbc in next stage)	locally (tbc in next stage)	locally (tbc in next stage)	Difficult due to loss of historic field patterns and landscape features.	<p><b>Moderate adverse:</b> setting of historic rural landscape patterns will deteriorate, loss of hedges and some woodland.</p> <p><b>Additional mitigation:</b> Landscape design along route, retain and / or plant new hedges.</p>
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Landcover	Agricultural landscape and floodplain with hedgerows with trees and some mature woodlands.	locally (tbc in next stage)	locally (tbc in next stage)	locally (tbc in next stage)	Difficult due to severance of field patterns and hedgerows as well as loss of some woodland. Road will create new feature in landscape.	<b>Moderate adverse:</b> loss of fields, fields will be divided and made smaller, loss of hedges. <b>Additional mitigation:</b> Landscape design along route, retain or plant new hedges.
Summary of character	Agricultural and urban fringe landscape set within a predominantly green buffer between Dinas Powys and Penarth. Undulating and open with mostly uninterrupted views. Wooded areas and hedgerow lined field patterns set the landscape character with scattered farms and views to the urban fringes of Dinas Powys and Penarth.	locally (tbc in next stage)	locally (tbc in next stage)	locally (tbc in next stage)	Difficult in short term due to time necessary to establish vegetation cover, increased traffic and new feature in the low lying and undulating landscape.	<b>Moderate adverse:</b> Road will reduce tranquillity in floodplain landscape, particularly where the road is on raised embankment. Traffic will increase, farmland will be lost, previously unlit green wedge will be lit, long distance views will be interrupted. <b>Additional mitigation:</b> Landscape design along route, retain or planting of new hedges, design of road sympathetic to local landscape character. Good landscape design (screening) and lighting design to minimise night time landscape impact.

#### Reference Sources

Site visit January 2018
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#### Step 5 - Summary Assessment Score

Moderate adverse
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#### Qualitative Comments

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TAG Historic Environment Impacts Worksheet

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	<p>The historic resource of the study area is characterised predominately by agricultural land comprising both arable and pasture to the east, south east of Dinas Powys and west of Penarth. Surrounding this agricultural land are the built up urban settlements of Dinas Powys and Lower Penarth.</p> <p>There is an one area of Registered Common Land, eight Listed Buildings (seven Grade II and one Grade II*), there is one Scheduled Monument (Cogan Deserted Medieval Village) seperated in to three pockets within 500m of the proposed Green and Pink Alignment.</p> <p>There are no Registered Parks and Gardens, Conservation Areas, World Heritage Sites, Historical Landscapes or Registered Battlefields located within 500m of the proposed Green and Pink alignments. The designated heritage assets are mainly associated with domestic buildings.</p> <p>There are mutiple 'known' archaeological sites (Roman, Medieval and Post-Medival features) located within 500m of the proposed Green and Pink alignments. There is potential for as yet unidentified buried archaeolgical assets to be present within the proposed Green and Pink alignment footprint.</p>	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance.	The Grade II* Listed Building is of National Significance. The Grade II Listed Buildings and the Scheduled Monuments are of Regional Significance. There is potential for unidentified buried archaeological features of unknown significance.	NYA	<p>The proposed alignments have the potential to have a 'slight adverse' impact on 'unknown' non-designated heritate assets.The proposed alignments have the potential to directly impact on buried archeological remains which could result in the permanent and irreversible loss of assets.</p> <p><b>Slight adverse.</b></p>
Survival	NYA	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance. The survival of heritage assets is a contributing factor to its significance.	The Grade II* Listed Building is of National Significance. The Grade II Listed Buildings and the Scheduled Monuments are of Regional Significance. There is potential for unidentified buried archaeological features of unknown significance.	NYA	<p>The proposed alignments would not have an effect on the survival of the designated assets. The proposed alignments may have a 'slight adverse' effect on the survival of unidentified buried archaeological remains within the route of the scheme, however, this is not quantifiable at this stage.</p> <p><b>Slight adverse.</b></p>
Condition	NYA	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner of appropriate to their significance. The condition of heritage assets contributes to their significance and sensitivity to impacts.	The condition of designated and non-designated assets is important as, if in good condition, they can inform our understanding of the history of the region and contribute to the economic wellbeing of the local area.	NYA	NYA
Complexity	Eight of the Listed Buildings within 500m of the proposed Alignments are located within the Green Wedge between Dinas Powys and Lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of Lower Penarth. The Dinas Powys Conservation Area is located approximately 1km west of the proposed alignments.	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance. The complexity of assets, including individually complex assets or groups of assets contributes to their significance.	NYA	NYA	NYA
Context	Eight of the Listed Buildings within 500m of the proposed Alignments are located within the Green Wedge between Dinas Powys and Lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of Lower Penarth. The Dinas Powys Conservation Area is located approximately 1km west of the proposed alignments.	The context and setting of most cultural heritage assets is a material consideration at the local and national policy level.	The context of Listed Buildings (excluding the Grade II* Listed Building) and the Scheduled Monument are regionally significant. The context of the archaeological features both 'known' and 'unknown' has not been assessed and the significance is therefore unknown.	NYA	<p>The effect on the context of the Scheduled Monument and Listed Buildings are likely to be neutral. The effect on the context of the Dinas Powys Conservation Area has the potential to be slight beneficial due to diverting traffic from travelling through the centre of Dinas Powys on to the by-pass (Green and Pink Alignment). Due to the lack of assessment on the archaeological features the effect of the alignments on the non-designated archaeological features 'known' and 'unknown' is still to be determined.</p> <p><b>Slight Adverse</b></p>
Period	St Peter's Church (Grade II*) is of a Medieval date. The Listed Buildings are of a Post Medieval date. Cogan Deserted Medieval Village is of Medieval date. Non-designated archaeological features within 500m of the routes are ranged primarily of Medieval to the Post-Medieval period.	Period does not necessarily determine the importance of the historic resource although, it can affect it. Policies within the Local and Regional Plans make reference to the safeguarding and enhancement of cultural heritage assets. The protection of designated assets and areas regardless of their period is of national concern as set out in the Planning Policy Wales.	The range of periods of the designated heritage assets are primarily of a Early Medieval / Medieval date. The non-designated buried archaeological features within the area are important in understanding the development of the surrounding area on a local and regional level.	NYA	<p>The proposed alignments would not have an affect on the periods of heritage assets and areas.</p> <p><b>Neutral</b></p>

Reference Sources

Historic Wales, Archwilio , Vale of Glamorgan Interactive Constraints Map, Vale of Glamorgan Website, British Listed Buildings Website
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Step 5 - Summary Assessment Score

Slight adverse
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Qualitative Comments

At this stage there is little to differentiate the Green and Pink Alignments impact on the Historic Environment due to both routes having near identical alignment profiles. Slight adverse impact on the buried archaeological features located along either Alignment. Neutral impacts on the settings of the Listed Buildings and Scheduled Monument. Slight beneficial impact on the Conservation Area as a result of the Green and Pink Alignment, as it is anticipated this would divert traffic from the centre of Dinas Powys.
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TAG Townscape Impacts Worksheet

	Step 2	Step 3					Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in Without-scheme case	Impact
Layout	The area of townscape is characterised around the large village of Dinas Powys which is situated along the A4055 (Cardiff Road) between Cardiff and Barry. The residential area of Dinas Powys is laid out around cul de sac roads making them free of through traffic. There are isolated individual properties located within the surrounding agricultural landscape to the south and east of Dinas Powys.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	As the proposed Pink and Green alignments are both linear and by-pass Dinas Powys, the Pink and Green alignment would not result in a significant change in the layout of the townscape.  <b>Neutral effect</b>
Density and mix	Buildings in the townscape are low density residential buildings. Residential buildings are predominately located in the village of Dinas Powys. There are isolated residential buildings within the surrounding landscape, with the surrounding landscape being predominantly composed of agricultural land, which reduce the density of development.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	As the proposed Pink and Green alignments are both linear and by-pass the village of Dinas Powys, the Pink and Green alignment would not result in a significant change in the density and mix of the townscape.  <b>Neutral effect</b>
Scale	The built up area is predominatly composed of residential housing which is considered of small scale with development mostly two storeys in height. Within the surrounding area there are isolated properties with large grounds, open agricultural land and recreational areas.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	As the proposed Pink and Green alignments are both linear and by-pass the village of Dinas Powys, the Pink and Green alignment would not result in a significant change in the scale of the townscape.  <b>Neutral effect</b>
Appearance	<p>The Dinas Powys Conservation Area is notable for its architecture from three phases of developing which reflects the expansion of the village (pre-1880s, 1880s to 1930s, late 20th Century. Roadside stone walls, including the stone retaining wall running along the west side of the main road and surrounding the churchyard. Trees, hedges and other greenery soften the townscape and add to the area's rural appearance.</p> <p>Development is mostly two storeys in height, most houses are detached or semi-detached. Key purpose built commerical, religious or community buildings stand out of virtue of their bulk and size (e.g. the two non-conformist chapels, the parish hall and the bank at no.1 Elm Grove Road). St.Peter's Chuch and The Mount House stand out in the townscape.</p>	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	As the proposed Pink and Green alignment are both linear and by-pass the village of Dinas Powys. The Pink and Green alignment would not result in a significant change in the appearance of the townscape.  <b>Neutral effect</b>
Human interaction	Dinas Powys is a mainly residential area bisected by the A4055 (Cardiff Road) which runs through the centre of the village. Amenities es are located around the village centre and include a post office, a range of small independent shops, public houses, restaurants and community facilities. In addition there are shops, a pharmacy, garages and small supermarkets.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase. Open space will be lost or become less safe to use because of heavier traffic associated with the Green and Pink alignments. Increased noise and disturbance in housing and open space. Foot and cycle path routes may improve cycle and pedestrian access.	The proposed Pink and Green alignment are both linear and by-pass the village of Dinas Powys. The Pink and Green alignment would not result in a significant change in the human interaction of the townscape, however the access and quantity of open space between Dinas Powys (Murch) and Lower Penarth would likely be negatively impacted by the development of a by-pass.  <b>Slight Adverse effect</b>

Cultural	The historical buildings within Dinas Powys contribute to the heritage feel of the Dinas Powys Conservation Area. The surrounding area has isolated Scheduled Monuments, Listed Buildings and a Registered Park and Garden within the surrounding agricultural landscape, contributing to the historical heritage feel of the area.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The proposed Pink and Green alignment are both linear and by-pass the village of Dinas Powys. The Pink and Green alignment would not result in a significant change in the cultural aspect of the townscape. However, with the alignment by-passing Dinas Powys, this would divert traffic away from the village which would enhance its overall heritage feel.  <b>Slight beneficial effect</b>
Land use	Land use within the area is divided between areas of residential settlement (Dinas Powys, Lower Penarth and small groups/individual propoerties) and areas of agricultural land, comprising both arable and pasture. Additionally, the Cog Moors Wastewater Treatement Works is located to the south east of Dinas Powys. The village of Dinas Powys is located along the A4055 (Cardiff Road). There are areas for recreation including a golf course, vineyard and hotel.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	As the proposed Pink and Green alignment are both linear and by-pass the village of Dinas Powys. The Pink and Green alignment would not result in a significant change in the land use of the townscape.  <b>Neutral effect</b>
Summary of character	The primary features of the townscape are roads and the residential area of Dinas Powys and Lower Penarth. There are built designated heritage assets within Dinas Powys including notable architecture from three phases of development reflecting the expansion of the village: pre-1880s, 1880s to 1930s, late 20th century. Prevalence of local limestone in the construction of pre-1880 buildings and use of red and buff brick in the post-railway 1880-1930 development. Furthmore a series of medieval field systems operate within the area between Dinas Powys, Lower Penarth and Cog Moors.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The proposed Pink and Green alignment are both linear and by-pass the village of Dinas Powys. The Pink and Green alignment would not result in a significant change in the townscape character of Dinas Powys and Lower Penarth. However, with the alignment by-passing Dinas Powys, this would divert traffic away from the village which would enhance its overall heritage feel. Loss of the field systems surrounding Dinas Powys may have an impact in the character setting of the townscape.  <b>Neutral effect</b>

Reference Sources

Google Earth Aerial Photography; OS maps; Vale of Glamorgan Local Development Plan Interactive Map (2017), Vale of Glamorgan - Dinas Powys Conservation Area Appraisal and Management Plan (2009)
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Step 5 - Summary Assessment Score

Neutral to Slight Adverse effect
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Qualitative Comments

Area assessed; Dinas Powys village using the Vale of Glamorgan Dinas Powys Conservation Area Appraisal and Management Plan (2009). Both the Pink and Green alignment will cross the through the area of green space and field systems (Green Wedge) between Dinas Powys and Lower Penarth, which may have a potential slight adverse impact on the setting of the Dinas Powys rural townscape feel. Both routes by-pass Dinas Powys and are unlikely to have any direct and indirect impacts on the townscape of the village.
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# TAG Water Environment Impacts Worksheet

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
<b>Surface Water</b>									
Study area: Surface Water	Rivers  River Cadoxton WFD Ref: GB110058026420  WFD - Moderate Overall Status  - Moderate Ecol. Condition - Good Chemical Condition	Biodiversity Aesthetics Cultural Heritage Value to economy	River Cadoxton  WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Medium	NYA	Medium	Slight Adverse	Low Significance
Pollution to River Cadoxton from construction		Water Quality	River Cadoxton  WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Slight Adverse	Low Significance
Pollution to River Cadoxton from routine runoff		Water Quality	River Cadoxton  WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Negligible	Insignificant
Pollution to River Cadoxton from accidental spillage		Water Quality	River Cadoxton  WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Slight Adverse	Low Significance
Impact to the Cadoxton Flood Plain	Flood Plain	Conveyance of flood flows  Flood flow routes Surface water flooding	Presence of Flood Zones C2 (e.g. areas without significant flood defence infrastructure) and Flood Zone B (e.g. areas known to have flooded in the past).	Local	Low	NYA	NYA	Slight Adverse / Negligible	Low Significance / Insignificant
<b>Ground Water</b>									
Pollution to Groundwater from construction	Groundwater  Thaw & Cadoxton Jurassic Lias  WFD Ref: GB41002G201400  WFD - Good Overall Status - Good Quantitative Condition - Good Chemical Condition	Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Slight Adverse	Low Significance
Pollution to Groundwater from routine runoff		Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Negligible	Insignificant
Pollution to Groundwater from accidental spillage		Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Slight Adverse	Low Significance

## Reference Sources

Natural Resources Wales, Cycle 2 Rivers and Waterbodies WFD Data (2018)  
Natural Resources Wales, Flood Risk Map (2018)  
MAGIC, Defra (2018)  
Department for Transport (DfT) Transport Appraisal Guidance (TAG) Unit A3 - Environmental Impact Appraisal (2017)

## Summary Assessment Score

Green and Pink Alignment - Slight Adverse

**Qualitative Comments**

The potential impacts to the 'main rivers' and ordinary water courses concerns a possible accidental spillage, construction activities and routine run-off. This potential impact requires further investigation as the River Cadovton has achieved a 'moderate' WFD score.

Following further investigations, mitigation measures may be required as part of the design. A construction environmental management plan should be put in place during the construction of the Alignment which will minimise the risk of pollution to watercourses during construction. Three ordinary watercourses are crossed as part of both the Green and Pink alignment. Sections of the route cross the floodplain to the south west of the proposed alignments in a Flood Zone C2/B. The floodplain is associated with the Cadovton River, NRW flood maps shows that flood risk is high to moderate in the areas where the alignment interacts with the floodplain. Potential effects include for the loss of floodplain storage volume and impediment of floodplain flow paths. To mitigate, there may be a need to provide compensation storage, culverts through embankments to maintain continuity of flow conveyance. Any new crossings of smaller watercourses also has the potential to impact flood risk, careful design of crossings should avoid impacts/mitigate risks.

TAG Historic Environment Impacts Worksheet - Multi-modal

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	<p>The historic resource of the study area is characterised predominately by agricultural land comprising both arable and pasture to the east, south east of Dinas Powys and west of Penarth. Surrounding this agricultural land are the built up urban settlements of Dinas Powys and Lower Penarth.</p> <p>There is an one area of Registered Common Land, eight Listed Buildings (seven Grade II and one Grade II*), there is one Scheduled Monument (Cogan Deserted Medieval Village) seperated in to three pockets within 500m of the Multi-modal option.</p> <p>There are no Registered Parks and Gardens, Conservation Areas, World Heritage Sites, Historical Landscapes or Registered Battlefields located within 500m of the Multi-modal option. The designated heritage assets are mainly associated with domestic buildings.</p> <p>There are multiple 'known' archaeological sites (Roman, Medieval and Post-Medieval features) located within 500m of the Multi-modal option.</p>	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance.	The Grade II* Listed Building is of National Significance. The Grade II Listed Buildings and the Scheduled Monuments are of Regional Significance. There is potential for unidentified buried archaeological features of unknown significance.	NYA	<p>The proposed Multi-modal option is unlikely to have any impact on 'known' and 'unknown' designated heritage assets and non-designated heritate assets.The proposed Multi-modal option is unlikely to have any potential direct impact on buried archeological remains.</p> <p><b>Neutral.</b></p>
Survival	NYA	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance. The survival of heritage assets is a contributing factor to its significance.	The Grade II* Listed Building is of National Significance. The Grade II Listed Buildings and the Scheduled Monuments are of Regional Significance. There is potential for unidentified buried archaeological features of unknown significance.	NYA	<p>The Multi-modal option would not have an effect on the survival of the designated assets. The proposed Multi-modal option is unlikely to have any potential direct impact on buried archeological remains.</p> <p><b>Neutral.</b></p>
Condition	NYA	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance. The condition of heritage assets contributes to their signifcance and sensitivity to impacts.	The condition of designated and non-designated assets is important as, if in good condition, they can inform our understanding of the history of the region and contribute to the economic wellbeing of the local area.	NYA	NYA
Complexity	Eight of the Listed Buildings within 500m of the Multi-modal option are located within the Green Wedge between Dinas Powys and Lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of Lower Penarth. The Dinas Powys Conservation Area is located in close proximity to the multi-modal option.	The protection and enhancement of heritage assets is of national concern as set out in the Planning Policy Wales, which sets out to conserve heritage assets in a manner appropriate to their significance. The complexity of assets, including individually complex assets or groups of assets contributes to their significance.	NYA	NYA	NYA
Context	Eight of the Listed Buildings within 500m of the Multi-modal option are located within the Green Wedge between Dinas Powys and Lower Penarth. The remaining designated assets are not overly complex and represent medieval ruins to the west of Lower Penarth. The Dinas Powys Conservation Area is located in close proximity to the multi-modal option.	The context and setting of most cultural heritage assets is a material consideration at the local and national policy level.	The context of Listed Buildings (excluding the Grade II* Listed Building) and the Scheduled Monument are regionally significant. The context of the archaeological features both 'known' and 'unknown' has not been assessed and the significance is therefore unknown.	NYA	<p>The effect on the context of the Scheduled Monument and Listed Buildings are likely to be neutral. The effect on the context of the Dinas Powys Conservation Area has the potential to be slight beneficial due to the Multi-modal option potentially reducing traffic through Dinas Powy due to the ultisation of the upgraded public transport routes. The proposed Multi-modal option is unlikely to have any potential direct impact on buried archeological remains.</p> <p><b>Neutral.</b></p>
Period	St Peter's Church (Grade II*) is of a Medieval date. The Listed Buildings are of a Post Medieval date. Cogan Deserted Medieval Village is of Medieval date. Non-designated archaeological features within 500m of the Multi-modal options are ranged primarily of Medieval to the Post-Medieval period.	Period does not necessarily determine the importance of the historic resource although, it can affect it. Policies within the Local and Regional Plans make reference to the safeguarding and enhancement of cultural heritage assets. The protection of designated assets and areas regardless of their period is of national concern as set out in the Planning Policy Wales.	The range of periods of the designated heritage assets are primarily of a Early Medieval / Medieval date. The non-designated buried archaeological features within the area are important in understanding the development of the surrounding area on a local and regional level.	NYA	<p>The Multi-modal option would not have an affect on the periods of heritage assets and areas.</p> <p><b>Neutral.</b></p>

Reference Sources
Historic Wales, Archwilio , Vale of Glamorgan Interactive Constraints Map, Vale of Glamorgan Website, British Listed Buildings Website

Step 5 - Summary Assessment Score
Neutral

Qualitative Comments
Neutral impact on the buried archaeological features. Neutral impacts on the settings of the Listed Buildings and Scheduled Monument. Slight beneficial impact on the Conservation Area, as it is anticipated that the Multi-modal option would reduce traffic through the centre of Dinas Powys as individuals may opt to use the enhanced public transport routes.

### TAG Townscape Impacts Worksheet - Multi-modal

	Step 2	Step 3					Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in Without-scheme case	Impact
Layout	The area of townscape is characterised around the large village of Dinas Powys which is situated along the A4055 (Cardiff Road) between Cardiff and Barry. The residential area of Dinas Powys is laid out around cul de sac roads making them free of through traffic. There are isolated individual properties located within the surrounding agricultural landscape to the south and east of Dinas Powys.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the layout of the townscape.  <b>Neutral effect</b>
Density and mix	Buildings in the townscape are low density residential buildings. Residential buildings are predominately located in the village of Dinas Powys. There are isolated residential buildings within the surrounding landscape, with the surrounding landscape being predominantly composed of agricultural land, which reduce the density of development.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the density and mix of the townscape.  <b>Neutral effect</b>
Scale	The built up area is predominatly composed of residential housing which is considered of small scale with development mostly two storeys in height. Within the surrounding area there are isolated properties with large grounds, open agricultural land and recreational areas.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the scale of the townscape.  <b>Neutral effect</b>
Appearance	<p>The Dinas Powys Conservation Area is notable for its architecture from three phases of developing which reflects the expansion of the village (pre-1880s, 1880s to 1930s, late 20th Century. Roadside stone walls, including the stone retaining wall running along the west side of the main road and surrounding the churchyard. Trees, hedges and other greenery soften the townscape and add to the area's rural appearance.</p> <p>Development is mostly two storeys in height, most houses are detached or semi-detached. Key purpose built commerical, religious or community buildings stand out of virtue of their bulk and size (e.g. the two non-conformist chapels, the parish hall and the bank at no.1 Elm Grove Road). St.Peter's Church and The Mount House stand out in the townscape.</p>	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the appearance of the townscape.  <b>Neutral effect</b>
Human interaction	Dinas Powys is a mainly residential area bisected by the A4055 (Cardiff Road) which runs through the centre of the village. Amenities are located around the village centre and include a post office, a range of small independent shops, public houses, restaurants and community facilities. In addition there are shops, a pharmacy, garages and small supermarkets.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase. Foot and cycle path routes may improve cycle and pedestrian access.	The Multi-modal option would potentially result in a slight change in the cultural aspect of the human interaction. The Multi-modal option would potentially result in an increase of individuals utilising the upgraded public transport systems. This would potentially reduce traffic through the village with the enhanced public transport and potentially increase public use of the proposed walking and cycling routes.  <b>Slight beneficial</b>



Cultural	The historical buildings within Dinas Powys contribute to the heritage feel of the Dinas Powys Conservation Area. The surrounding area has isolated Scheduled Monuments, Listed Buildings and a Registered Park and Garden within the surrounding agricultural landscape, contributing to the historical heritage feel of the area.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the cultural aspect of the townscape. The Multi-modal option would potentially result in an increase of individuals utilising the upgraded public transport systems. This would potentially reduce traffic through the village which would enhance its overall cultural feel.  <b>Neutral effect</b>
Land use	Land use within the area is divided between areas of residential settlement (Dinas Powys, Lower Penarth and small groups/individual propoerties) and areas of agricultural land, comprising both arable and pasture. Additionally, the Cog Moors Wastewater Treatement Works is located to the south east of Dinas Powys. The village of Dinas Powys is located along the A4055 (Cardiff Road). There are areas for recreation including a golf course, vineyard and hotel.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The Multi-modal option would not result in a significant change in the land use of the townscape.  <b>Neutral effect</b>
Summary of character	The primary features of the townscape are roads and the residential area of Dinas Powys and Lower Penarth. There are built designated heritage assets within Dinas Powys including notable architecture from three phases of development reflecting the expansion of the village: pre-1880s, 1880s to 1930s, late 20th century. Prevalence of local limestone in the construction of pre-1880 buildings and use of red and buff brick in the post-railway 1880-1930 development. Furthmore a series of medieval field systems operate within the area between Dinas Powys, Lower Penarth and Cog Moors.	Local scale.	NYA	Locally Important. Dinas Powys Conservation Area to be considered as Regionally Important.	Heritage buildings could not be substituted.	Further adverse effects forecast as the traffic volumes along A4055 (Cardiff Road) would continue to increase.	The proposed Multi-modal option utilises the existing railway and bus route transport infrastructure within and surrounding Dinas Powys. Additionally, the proposed walking and cycle routes would use the existing road and pathway network within and surrounding Dinas Powys. The Multi-modal option would not result in a significant change in the townscape character of Dinas Powys and Lower Penarth. The Multi-modal option would potentially result in an increase of individuals utilising the upgraded public transport systems. This would potentially reduce traffic through the village which would enhance its overall heritage feel.  <b>Neutral effect</b>

Reference Sources

Google Earth Aerial Photography; OS maps; Vale of Glamorgan Local Development Plan Interactive Map (2017), Vale of Glamorgan - Dinas Powys Conservation Area Appraisal and Management Plan (2009)
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Step 5 - Summary Assessment Score

Neutral effect - Slight beneficial
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Qualitative Comments

Area assessed; Dinas Powys village using the Vale of Glamorgan Dinas Powys Conservation Area Appraisal and Management Plan (2009). The Multi-Modal option will have a neutral impact on the area within and surrounding Dinas Powys. The Multi-modal option will have the potential to increase human interaction through the proposed improvement of public transport (Bus and Railway) and the proposed walking and cycle routes. The Multi-modal option is unlikely to have any direct and indirect impacts on the townscape of the village.
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**TAG Water Environment Impacts Worksheet - Multi-modal**

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
<b>Surface Water</b>									
Study area: Surface Water	Rivers  River Cadoxton WFD Ref: GB110058026420 WFD - Moderate Overall Status - Moderate Ecol. Condition - Good Chemical Condition	Biodiversity Aesthetics Cultural Heritage Value to economy	River Cadoxton WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Medium	NYA	Medium	Slight Adverse	Low Significance
Pollution to River Cadoxton from construction		Water Quality	River Cadoxton WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Slight Adverse	Low Significance
Pollution to River Cadoxton from routine runoff		Water Quality	River Cadoxton WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Negligible	Insignificant
Pollution to River Cadoxton from accidental spillage		Water Quality	River Cadoxton WFD - Moderate Overall Status  Other small watercourses within the area - Unknown Quality	Regional	Low	NYA	Medium	Slight Adverse	Low Significance
Impact to the Cadoxton Flood Plain	Flood Plain	Conveyance of flood flows  Flood flow routes Surface water	Presence of Flood Zones C2 (e.g. areas without significant flood defence infrastructure) and Flood Zone B (e.g. areas known to have flooded in the past).	Local	Low	NYA	NYA	Slight Adverse / Negligible	Low Significance / Insignificant
<b>Ground Water</b>									
Pollution to Groundwater from construction	Groundwater  Thaw & Cadoxton Jurassic Lias  WFD Ref: GB41002G201400  WFD - Good Overall Status - Good Quantitative Condition - Good Chemical Condition	Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Slight Adverse	Low Significance
Pollution to Groundwater from routine runoff		Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Negligible	Insignificant
Pollution to Groundwater from accidental spillage		Water Quality	WFD - Good status in terms of both Quantity - Good Chemical - Good	Regional	High	NYA	High	Slight Adverse	Low Significance

**Reference Sources**

Natural Resources Wales, Cycle 2 Rivers and Waterbodies WFD Data (2018)  
Natural Resources Wales, Flood Risk Map (2018)  
MAGIC, Defra (2018)  
Department for Transport (DfT) Transport Appraisal Guidance (TAG) Unit A3 - Environmental Impact Appraisal (2017)

Summary Assessment Score

Multi-modal option - Slight Adverse
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Qualitative Comments

<p>The potential impacts to the 'main rivers' and ordinary water courses concerns a possible accidental spillage, construction activities and routine run-off. This potential impact requires further investigation as the River Cadoxton has achieved a 'moderate' WFD score. Following further investigations, mitigation measures may be required as part of the design. A construction environmental management plan should be put in place during the construction of the Multi-modal option which will minimise the risk of pollution to watercourses during construction. Three ordinary watercourses are crossed as part of both the Multi-modal options (however, these upgrades would utilise the existing infrastructure present). Sections of the Multi-modal option are located in floodplain to the south of Dinas Powys in Flood Zones C2/B. The floodplain is associated with the Cadoxton River. Potential effects include for the loss of floodplain storage volume and impediment of floodplain flow paths if significant works are to take place on the existing transport links. Any new crossings of smaller watercourses also has the potential to impact flood risk, careful design of crossings should avoid impacts/mitigate risks.</p>
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**Dinas Powys WelTAG Stage 2 – Review Group Meeting**

**14th January 2021**

**Attendees**

Emma Reed VOG  
Councillor Peter King VOG  
Kyle Phillips – VOG  
Lisa Elliott VOG  
Councillor Vince Bailey – Barry TC  
Councillor Robert Crowley - observer  
Councillor Vince Driscoll - observer  
Corinne Mabbs – TfW  
Cllr Elliott Penn – Llandough Community Council  
Emma Boylan – Penarth TC  
Matthew Fry – Arcadis  
Janice Hughes – Arcadis  
Gareth Stevens – Cardiff Bus  
Matthew Gilbert – TfW  
Ryland Jones – Sustrans Cymru  
Simon LeGood – TfW  
Tom Cotton – RHA

Apologies – James Hooker / Natalie Grohman

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All should have received Terms of Reference and 2 large emails

Reminded documents are confidential and contain commercially sensitive information.

MF presented the presentation (attached to the minutes)

Councillor V Bailey – you've mentioned the likelihood of funding is a key uncertainty and whether the VOGC will make this its top priority for infrastructure as opposed to the A48 – would that make the likelihood of securing funding more likely?

Emma Reed – we are looking to submit a funding bid to WG this year for continuation of this work. So, for the continuation of this work including the consultation and the next steps. In terms of ranking, in my experience you can put whatever ranking you like on schemes, it tends to be what WG think is best fit with their strategy. So, this scheme will go forward this year for a request for funding and it continuing is dependent on that request. We need to remember this scheme is not just about a by-pass, it is about a whole range of multi-modal options, such as train services, bus services and active travel routes because of the village's close proximity to

employment areas and also to the capital city. If we were to receive money from WG, that would give us a bit more certainty for taking it forward to the next stage

Councillor V Bailey – would like to know if there has been any analysis that could compare the net benefit to residents in terms of improved connectivity. You've got the data there that shows reduced journey times to people trying to access Barry and Cardiff either way. I'd be intrigued to know whether, within that, you are analysing how much of a net benefit these schemes would be to Vale residents as opposed to people by passing with the A48 being a good example, people coming from out of the Vale to the airport, might be seen to improve their journey times, but in this, which is quite a Vale centric scheme, I'm interested to know if you are, within these models, looking at the benefits the residents of the Vale would get?

Janice Hughes (Arcadis) – The modelling looks at overall benefits on the network, so it doesn't really differentiate between different groups within that. I think it's fair to say that overall the M4 corridor has a higher cost benefit ratio because it does provide a more strategic link. The Dinas Powys link is addressing more local issues, so as Matt referred to you still end up with the pinch point at Barons Court so it does address the corridor along Cardiff Road and therefore you can qualitatively say there are local benefits within Dinas Powys and strategic benefits on the other one but its not that simplistic you do have to look at what the appraisal is telling you, where traffic is changing in particular. You can see on the plans where those changes are on the network and that can help understanding but it doesn't separate them in quite that way.

Councillor V Bailey – I appreciate what you are saying about the multi-modal with the by-pass, I remember when I was Chair of Committee, we paired the two together for consideration because it made a lot more sense than just comparing them on a standalone basis, because it gives the inclusion of a bypass a better chance when you are adding other net benefits to the environment by having that multi-modal approach as well.

Councillor V Bailey – On the strategic benefits, it is worth noting, from a WG perspective you see the airport link has been a nationally strategic project, Barry is the largest town in Wales and Cardiff is its capital and it's currently an absolute disaster trying to travel through pre covid notwithstanding, not many people are travelling on that route at the moment to go to offices, but that is obviously a strategic benefit to improve the links between the largest town in Wales with the capital.

Emma Reed – that is a point well made, I think the difference between the two schemes is that the south eastern corridor has excellent public transport, which we are looking through this scheme to make exemplary public transport, whereas for the M4 scheme the public transport is a lot less available... So that's why they are two different schemes and it is difficult to make a comparison between the two because they both have very different offers.

Gareth Stevens – for us the issues we have are Barons Court and Ty Vernon roundabout and really travelling through Dinas itself, the traffic lights at the school, there's no real bus priority, and at times, less so now because of obvious reasons, pre coronavirus traffic issues in both directions it wasn't just peak am into Cardiff, both

directions were issues for us and what really should be a nice straight route through the village, bus service every 15 minutes we are at the moment, it does get blighted by the congestion so from our perspective it's trying to reduce the impacts from that and trying to make sure we've got some consistent journey times through Dinas Powys that would help us is really what we are looking for. Then when you look at the journey times from a customer perspective, look at the bus stops the shelters the whole weight of the environment as well which I think we would really look to try and put forward certainly any areas to be considered highly in any improvements you're looking to do in the area.

Emma Reed – Anything to put forward from TfW on the train service?

Corinne Mabbs (TfW) – Nothing specific. The report details the frequency of the services along that line of route and the status of the complexities along that line but as you said its strange times at the moment but if you look pre-covid, I think what you have analysed within the report is probably quite accurate in terms of how integral the stations are within the environment as well.

Emma Reed – Do you have any queries from your perspective (RHA)?

Tom Cotton (RHA) – HGV's have moved on like bus technology has with their suspension – 72% of the HGV fleet is now Euro 6 so the cleanest emissions vehicles on the planet and if you take out one HGV you are going to create 21 vans, because that's the capacity of vans to a truck so if you take out a nice clean, relatively new vehicle you are going to replace it with 12 transit vans which are going to amplify the congestion, also the pollution because at the moment there is little regulation in relation to vans. We to are looking for consistent journey times and road freight, heavy goods vehicles are the most efficient way of doing it and as you're currently seeing at the moment, huge problems in Kent and the cold chain confederation are at a critical point as far as food goes, all food, essential items are delivered by heavy goods vehicles, there is no alternative at the moment unless you are going to put in infrastructure which takes decades as we've seen with HS2. So essentially, we welcome any road scheme which is going to reduce having to travel through villages and towns where heavy goods vehicles aren't particularly welcomed by residents, but they are totally necessary to the entire economy. I'm not totally familiar with the area, clearly there's an airport there and I have been looking on mapping as we've been talking at the location. I don't know what the industry is but all businesses rely on delivery and collection of raw materials, the collection of finished goods and again, HGV's are the most efficient way to move it and we totally support any scheme which is going to improve life for our members. We have a lot of members in South Wales, we have 7,200 members nationally and we are now moving into van and coach industries to support them so without road freight you get nothing and again if we can get those consistent journey times, that reduces the congestion, reduces the emissions and just makes everyone's life much better. Lorry parking is a huge issue at the moment. If there is the ability to put lorry parking in this, doesn't have to be massive – lay-bys, rest areas for truck drivers because sometimes they get delayed and have to wait for the next delivery slot, or they arrive early to take a break, anything within that side of things would be appreciated for our members.

Emma Reed – thanked TC for the information provided with regards to HGV's.

## Active Travel

Ryland Jones – There doesn't seem to be a lot of detail on strategic active travel network under the multi modal option. You mention a range of measures along the existing alignments, but any strategic alignment seems to be completely tied in to the route along the by-pass. I would have concerns with that because fundamentally the whole direction of travel is against new road build. We've got declared climate emergencies, we've got an emerging transport strategy that will reduce considerably the argument for new road build and we would like to see the multi modal option as a stand-alone really underpinning the strategic active travel network in as much as it does the local one. I think the changes to capacity at junctions is fair enough, that's going to enable facilitating movements through active travel as well, so some things proposed for Merrier Harrier might well assist with that but there's an argument to say if you're providing strategic route from Barry through, you could actually have a dedicated green way along the alignment which wouldn't necessarily have to be tied into a by-pass option – I'd certainly like that to be considered because if the only consideration is a new road then part of that is a very difficult choice for an organisation like Sustrans to support giving our view would be that we would not want to see a new road built.

Emma Reed – I think that point is a well-made. We do have a lot of active travel strategic plans in this area as well.

Lisa Elliott – Ryland is aware of the Biglis roundabout to Dinas Powys scheme that we are trying to get funding for, we've got further works to do on that in order to apply for funding this year. Then looking from the link to Dinas Powys to the Merrier Harrier, Merrier Harrier to Barons Court – Cardiff are looking at a cross county corridor from the Vale to Cardiff to Newport – they are going to apply for funding for this year. We are actively looking at our active travel links in this area.

Ryland Jones – I know there is work going on at Cogan at the interchange so clearly there will be a tie in with that. Anything that we can do to look at a joined up strategic network for the NCN independent of necessarily a by-pass option for Dinas would be good.

Emma Reed – what we need to do is get across what that strategic ambition is for active travel and I think we have work to do on that and what are the essential links to make that strategic network work for active travel because when it does come in its really well used. It is essential we put across that ambition that they are really well used and I will take that on board and consider some additional detail within the document.

Ryland Jones – with regards to electric bikes, I think that's a game changer in terms of distance.

Emma Reed – We obviously have got the first electric bike scheme in Wales in Penarth, and we are looking to do similar in Dinas and again its about translating that better into those measures which are complimentary to anything we are looking to do to improve the environment within Dinas Powys by way of a by-pass.



Councillor P King – Good point about the lorry rest spaces. I am keen that this goes forward and is submitted but I do want everyone to recognise that it is a lot bigger than just a by-pass. The by-pass is clearly the bulk of the funding, but the overall project has a lot more components to it. I think the greatest advantage of the Dinas Powys by-pass maybe that standing traffic is not going to be in the village. It's hard to imagine what it could be like if all the traffic trying to get through Dinas Powys now by passes it, what the impact of that is because I think that may help the bus operators, it may help the active travellers, it may help the cyclists because I would like to think there would be less traffic trying to squeeze through Dinas Powys and make it a lot more pleasant.

Councillor P King – In the option that includes the roundabout that would connect to the Murch. The by-pass will help everything but it will not help anything at the Merrier Harrier and Barons Court pinch point, if anything it will get traffic to queue at those points quicker. It did occur to me that the outgoing would be easier because the traffic that's going to Dinas Powys and wants to go to Dinas Powys will separate out at the Merrier Harrier in the evening and the traffic that's going to Barry will go in a different route, so it might make it a little bit easier. Coming back to Dinas Powys and the roundabout half way along, that would require slowing down the traffic. I don't think the speed of the traffic on the Dinas Powys by-pass is a concern, I think that it's designed at 60 mph is almost immaterial. My question to everybody is might that ease some of the traffic within Dinas Powys because the people who live in that vicinity will be able to make their journey a little bit easier and they won't all be trying to squeeze out by the school or vice versa.

Matthew Fry (Arcadis) – (Shared screen to show traffic flows back from the South East Wales traffic model in terms of the reduction through Dinas Powys showing the output received from Transport for Wales (TfW)).

MF continued by explaining the table shown on screen and pointed out the routes – points 1 and 2 being north and south of Dinas Powys itself and section 5 being the by-pass and again is consideration of the green route which TfW considered as part of their South East Wales transport model analysis. So under the do minimum scenario which it seems no by-pass is implemented, you can see there's traffic flows northbound and southbound of circa 10-11k on points 1 to the south of Dinas Powys and for point 2 circa over 12k again northbound and southbound. If you see implementation of that green route by pass under the do something option, section 5 you can see there is displacement of traffic flows circa 11k northbound and southbound onto the route and quite significant reductions in traffic flow through the centre of Dinas Powys itself so the actual flows would be circa 3k in the northbound for example and 2.5k at points 1 and similarly almost a half reduction in traffic flows at section 2 for the north of Dinas Powys so quite significant reductions in traffic flow and as Cllr King mentioned that would be to the benefit very much of the local residents of Dinas Powys in terms of air quality and noise especially in terms of the environmental impacts. In terms of the strategic analysis of the Murch Road roundabout, the benefits would need further analysis at the next stage in terms of what the impacts would be and how traffic would route through that new roundabout on the bypass itself. There certainly could be benefits in terms of potential strategic development within this area and providing development either local to that junction or within the vicinity of Dinas Powys itself, so that does need further exploration but can certainly have benefits for

people living in Dinas Powys to get onto the strategic network, other than to the points north and south of Dinas Powys itself. That has shown a snap shot of the traffic flow impact the bypass could have and again with regard to those reductions, conditions for walkers and cyclists as well through the existing A4055 transport corridor as well.

Gareth Stevens (Cardiff Bus) – comparison of his services, the 93 that goes via the Murch is quicker than the 95 that goes on the main road. Time difference of only seconds but the direct route is longer showing the weight of traffic going through Dinas Powys at peak times.

Community Councillor Elliot Penn – with Barons Court and Merrier Harrier with the data already at capacity and also going forward a dedicated bus scheme running between the two, how much traffic will avoid going to Barons Court and actually funnel through Llandough and will that increase the traffic going through Llandough as they'll avoid Barons Court because they can cut the corner and go down Llandough hill or down Leckwith Road?

Matthew Fry (Arcadis) – I don't have the strategic output for that route at present, but I can look into that for you and get back to you on that question. It is certainly worth noting that the option that we assess with the green by pass completely assume that radical transformation of Merrier Harrier so that is included within circa £7m was the estimated cost for the Merrier Harrier transformation and that cost and that assessment is included as part of the economic appraisal as well so its quite a big assumption as at the moment it is a very constrained pinch point with not much space there. With that resolve obviously has a benefit for that benefit cost ratio in terms of that economic enhancement on how that traffic will distribute through the area and like you say, the Barons Court will remain that pinch point as well as a key direction for travel between Barons and Dinas and from Dinas.

Community Councillor Elliott Penn – I'm not sure how the people of Llandough will be about the Merrier Harrier pub disappearing – you might get quite a lot of opposition to that as it's the only public house in Llandough. There are quite a few public houses in Dinas Powys.

Emma Reed – this is why this document is so confidential because of the potential implications on the Merrier Harrier and the commercial sensitivity. There are others along the main route but that is the key one. I think it's a good point and one Cllr King has raised and the facilities within Llandough itself are limited. All of the options do include an issue with the pub and if that was to progress we would need to look at how alternative provision is made within the village.

Councillor V Bailey – if we could have as much advance notice as possible to process the data which puts us in a better position to represent our constituents and having as much notice as we can to properly scrutinise is important.

Councillor R Crowley – on the assumption that most of the traffic between Barry and Cardiff will use the by-pass, there's the temptation for people to assume that the route through Dinas Powys is going to be the quieter route and will be very tempted to use it. Are there any thoughts on anyway to mitigate this?

Janice Hughes (Arcadis) – there is a time benefit to the bypass which would mean for most people they would use it as you would choose the best route, however, it does mean when you put in a bypass you do need to consider what measures you might make in the village itself to make it more friendly for walkers and cyclists and buses as well which may mean making it less attractive as a traffic route at the same time so you have to make sure you have a balance of attractiveness right to put people onto the right route rather than continue to drive through Dinas Powys. The modelling picks up some of that by defining how fast the route might be etc but it assumes a certain level of traffic will remain based on where people are going from and to so where people start or finish in the village will still be on the network there. It is an important point – you can't out in a by-pass without then considering what the existing network looks like in the future.

Councillor R Crowley – the demolishing of the pub is one thing, are there any other buildings that need to be removed for the scheme?

Matthew Fry (Arcadis) – The pub is the key building. I don't believe there is anything else at that junction. There will be some impact north of the A4055 between the Merrier Harrier and the Barons Court as you widen the lanes and you require retaining walls to the north of that section. So, whilst there will be an impact on land boundaries, the pub is the key infrastructure that will be affected at the location. We fully recognise that will be a significant impact at that location from the community perspective and fully expect comments as such, but from our perspective we would task at looking what would be the solution for that junction hence removing that pub to get the sufficient space required to get the capacity needed for that junction.

Janice Hughes (Arcadis) – on the bypass alignment itself, we have done our best through design to avoid direct impacts on people's homes and businesses, however there would be land and property impacts on people immunity as well by being in proximity to it, particularly on the lane that goes through that the alignment seeks to avoid homes on there but that would have an impact on those residents.

Matthew Gilbert – raised the issue of 8½ k extra vehicle movements would be generated by the by pass in 2026

Matthew Fry (Arcadis) – in terms of those flows, they are not new trips generated because of the bypass, it's the redistribution of trips existing throughout the strategic network, so it's the assumption that if you had this enhanced quality link between Barry and Cardiff, there would be an assumption that people would see that as a significant benefit to their journeys in the region and to that recognise the redistribution of traffic as opposed to them being new generated trips is the redistribution of trips that the model recognises. It shows around 8k northbound and 6k southbound which will be by passing Dinas Powys so between the areas of Barry and Cardiff itself.

Emma Reed - 20mph default limit – there is a project at the moment to roll out pilots for 20mph and in turn legislate for 20 to become the new 30 with exceptions where they're applied for. Llandough has an existing out of date 20mph zone and I think Cllr King's point is that could that be extended through the village.

Ryland Jones – I was making the point that legislation is already in place for default 20mph so any street where there is 30 is likely to become 20. The key thing is you would have to look at key changes to the network through the existing network through the village as quickly as possible after any other infrastructure was provided, because we know over time the roads will just fill up again so you need to make those changes and lock them in early on, particularly in allocation for road space and reduction in speed and so on, so depending on the lead in times, it's likely that the 20mph default will come in probably but certainly needs to be considered in the planning.

Emma Reed – I think it's something that the report needs to be updated with as that's relatively new information that's come through from Welsh Government.

Emma Reed – Train capacity – Cllr King commented, any increase in train capacity this could apply to bus as well, would mitigate any additional road use and Matthew Gilbert commented the issue for climate emergency and how new road space fits into that and what you use the road space for, in terms of the road space distribution and then consideration of how then that fits in with the climate emergency because building new roads is not necessarily a bad thing, it's about how they are used and what type of vehicles use them and the comments about the HGV's earlier and the move to electric buses, the move to electric cars – all of those things need to be taken into account.

Matthew Fry (Arcadis) – the climate emergency is a really interesting and emerging point from the last couple of years especially and that's the one thing the WelTAG process does is allow you to look at the full remit impact from an environmental as well as a socio-economic and cultural benefits as well. For the decision makers, it's looking at the balance of how these impacts affect local communities, how they affect regional communities and so on, so I agree it's a really important aspect in terms of the emerging Welsh transport strategy and the climate emergency declarations. The benefits for local communities in Dinas Powys will be quite evident in terms of reductions and changes in traffic flows and how that impacts on communities and their wellbeing and their welfare and so forth so hopefully our report has taken a step back and tried to do a holistic analysis of all these different impacts and certainly at WelTAG Stage 3, should it get to stage 3, that impact on climate change analysis and greenhouse gas emissions will form a key part of that analysis to consider what the impact will be and how it will align with the Welsh Transport Strategy and once it's been adopted, so yes it's an emerging theme at the moment and it will be a challenge for all projects throughout Wales about how they address socio-economic needs against environmental considerations as well.

Councillor P King – the train route from Cogan station to the centre of Cardiff is brilliant, it's about 6-7 minutes. But I won't go in the mornings because it won't stop because it's full so unless we can make the trains more attractive, we are not going to get that modal shift. This project is bigger than the bypass, it includes things like improving the access to Eastbrook and Dinas Powys stations, which is a modest village within the Vale but already has two stations. If we could improve the access to them that would help, but the biggest single issue is put more capacity on the line.

Councillor V Driscoll – regarding the roundabout that would link to Murch Road. At the moment Murch Road is really unsuitable for any more extra traffic, they've got the



health centre, the house development, there is parking on both sides which is single lane traffic most of the time. I think even though there are benefits to having a roundabout there they are outweighed by the disadvantages of extra traffic down Murch Road – apart from that I am quite happy with everything that has been said and done thank you.

Matthew Fry (Arcadis) – Should that option be taken forward a key consideration would require further analysis to look at the disadvantages as well as the potential benefits of that roundabout, so to re-assure you, it would require further analysis but we thought it was important to retain it as a potential option for that combined bypass and active travel option essentially as this stage of the analysis.

Emma Reed – moving forward the proposal would be subject to funding and everything else being available to consult on both of those options to see what the general public view is on it rather go down to one particular option.

All we requested to provide any comments by Friday 22<sup>nd</sup> January 2021.

All comments raised today will try to include within the draft document for Cabinet. If no objections will be looking to take forward to the Council's Cabinet with a potential recommendation for consultation, subject to the funding being made available from Welsh Government, to take this to the next step so that will be for the multi modal modes as well as for the bypass. No comments or objections were received on this.

Further written comments from Penarth Town Council following the meeting:

As is noted the last meeting of the Review Group was in Oct 2018. Since that time there have been two significant changes to the context in which policy is set-

1. The realisation of the Climate Emergency and;
2. Covid 19

Both mentioned in the Report (para 1.6-1.7.) These topics need further consideration reflecting the growing realisation of the need to control global warming and the behaviour change hastened by Covid 19.

These are conveniently summarised in the Draft Wales Transport Plan, which has fully reflected these new imperatives as follows:-

Our first priority is to reduce greenhouse gas emissions by planning ahead for better physical and digital connectivity, more local services, more home and remote working and more active travel, so that fewer people need to use their cars on a daily basis. (page 26).

Given the elapse of time and new evidence, on both climate change and Covid driven behaviour change, it is suggested that any decisions as to next steps should be postponed until emerging evidence has been better assessed.

More particularly in terms of the evidence, this project needs to incorporate changes in transport use and growth forecasts. These should reflect present flexibility and ways of working, which to some degree, in the return to work areas, will be sustained and which are evident in current plans of employers and changes in the property market. This is likely to mean some reduction in growth forecasts and the flattening out of peak flows as people respond to flexible 'opportunities'.

The report in para 7.2.4.(Outline Business Case) refers to recently released forecasts as the result of Covid 19 and the possibility that forecasts in the main forecast might be overestimated. It would be unwise to embark on any substantial element of the preferred option until lockdown measures are relaxed and people adjust to this and return to the workplace and the impact is then assessed.

With a parochial perspective, major problems exist at the Merrie Harrier junction but particularly Barons Court junction persist, indicating how network improvements can merely displace problems to other parts of the network in dense urban situations; thus limiting the strategic value of the bypass.

We note also that a connection to Dinas Road was suggested by the Dinas Powys Community Council but dismissed.

ENDS