REDSTART

COEDELY: OUTLINE BUSINESS CASE REPORT

(WELTAG STAGE 2)

FINAL IMPACTS ASSESSMENT REPORT

OCTOBER 2018

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Final Impacts Assessment Report

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Contents

Appendices

Section 2 – WelTAG Stage 2: Outline Business Case (OBC)

1. Introduction

The WelTAG Stage 1 Strategic Outline Case includes the Five Cases appraisal (Strategic, Transport, Commercial, Financial, and Delivery) for Coedely. The appraisal was undertaken on the long list of options that emerged from the Stakeholders' Workshop, which were identified to help address the transport problems and issues in the Coedely area. The outcome of the Stage 1 work was a short-list of options, which were packaged together in different combinations.

The WelTAG Stage 2 Outline Business Case has reappraised one of the options (dualling Option 1) against a hybrid of Options 1 and 14 that being an alternative dualling option. This has been referenced Option 1A. The further appraisal, which has included an economics assessment, has determined that Option 1A is the better performing of the two dualling options. Option 1A has replaced the original Option 1 in the option packages in which it appears. Subsequent appraisal has been on the options in the revised short-list.

This Impacts Assessment Report gathers together, in Section 1, all the evidence that has been used to determine and support the short-list of options for Coedely. Section 2 contains all the additional evidence that has become available since the Strategic Outline Case was prepared, which has informed the appraisal of the packaged options in the revised short-list. Sections 1 and 2 will be supplemented with additional information for the Stage 3 Full Business Case when this is prepared.

- Section 1 – WelTAG Stage 1: Strategic Outline Case (SOC)
- Section 2 – WelTAG Stage 2: Outline Business Case (OBC)

The contents of Section 1 and Section 2 are described in subsequent chapters of this report. Throughout the section, references in brackets are the relevant items in the Appendices.

2. WelTAG Stage 1: Strategic Outline Case (SOC)

This section contains all the work that informed the SOC and includes a feasibility report on the dualling of the A4119 at Coedely that was undertaken in 2016 (Appendix 1.1). A summary of the Workshop that marked the commencement of the WelTAG process is included as Appendix 1.2. The Workshop was where problems, opportunities and constraints within the Ely Valley were first identified (Appendix 1.3).

A long list of 28 objectives (Appendix 1.4) that a transport intervention should be appraised against was also identified at this time. These were grouped by theme (Appendix 1.5) to give a total of eight, which were refined to give a short-list of six (Appendix 1.6). These became the Transport Planning Objectives against which all possible options for interventions were appraised.

A long list of 32 possible options (Appendix 1.6) for intervention was produced, which included a Do Minimum scenario. These were grouped by theme to reduce the number to 22 (Appendix 1.8) with a description of each included as Appendix 1.9. Where appropriate, options are shown on a plan (Appendix 1.16).

The 22 options were appraised against the outcomes, goals, and objectives of the following national policy documents:

- Wales Transport Strategy – outcomes (Appendix 1.10);
- The Well-being of Future Generations Act (2015) – goals (Appendix 1.11).

Options were then appraised against the six Transport Planning Objectives (Appendix 1.12) as well as the criteria of Economics, Environment, Social, and Public Accounts, all at a high level in the Appraisal Summary Table (Appendix 1.13).

Options were also appraised against their ability to tackle the identified problems (Appendix 1.14). Finally, options were appraised against Deliverability (Appendix 1.15), the criteria of which were Feasibility, Affordability, Acceptability, Timescale, and Risks.

It should be noted that in some cases where the information from Worksheets has been included in the WelTAG Stage 1: Strategic Outline Case report, they have either had a summary column added or their contents have been summarised in a separate table. This has allowed a clearer understanding of how options perform against the various criteria. However, this information has not been added to the Worksheets in this Impacts Assessment Report.

From all the evidence and other information that was gathered together as part of the WelTAG Stage 1: Strategic Outline Case, a recommended short-list of packaged options was produced for Coedely. This was subsequently reviewed and agreed by a Review Group comprising officers of Rhondda Cynon Taf County Borough Council.

The short-list of packaged options is as follows with the references in brackets being the long list number:

A. Dualling of the A4119 with associated roundabout improvements - Option 1;

B. Dualling of the A4119 with associated roundabout improvements, plus an adjacent Active Travel route (Option 1 and Option 11);

C. Dualling of the A4119 with associated roundabout improvements, plus an adjacent Active Travel route, plus a Park & Ride/Park & Share facility within the SSA 14.1 development site, plus Park & Ride expansion north of the study area (Option 1, Option 2, Option 11, and Option 15);

D. Do Minimum (Option 22).

A change in option references between those contained in the main chapters of the WelTAG Stage 1 Strategic Outline Case and those that have been recommended above, has been necessary. This has been to recognise that two of the packaged options (B and C) are comprised of at least one other from the long list. These packaged options offer more than one individual measure to tackle the identified problems.

3. WelTAG Stage 2: Outline Business Case (OBC)

This section contains all the work that has informed the OBC. The Strategic Case includes a summary of the Strategic Case from the Strategic Outline Case report, additional information received, and an appraisal comparison of dualling Options 1 and 1A, the latter option being the removal of the South Wales Fire & Rescue Service roundabout in combination with the extension of the dualling eastwards. The appraisal comparison is Appendix 2.1, plans of Option 1 are Appendix 2.2 and the plan of Option 1A is Appendix 2.3.The cost estimate for Option 1 is Appendix 2.7 and additional costs to arrive at Option 1A is Appendix 2.8.

In all appraisal work in the Outline Business Case, Option 1 has been replaced by Option 1A, which was the better performing of the two dualling options, in economic terms. The revised packaged options in the short-list are as follows with the references in brackets being the long list number:

A. Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout - Option 1A;

B. Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout, plus an adjacent Active Travel route (Option 1A and Option 11);

C. Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout, plus a Park & Ride/Park & Share facility within the SSA 14.1 development site, plus Park & Ride expansion north of the study area (Option 1A, Option 2, Option 11, and Option 15);

D. Do Minimum (Option 22).

Drawings showing the individual options of each package are shown in the Appendices. As Option 22, Do Minimum only proposes maintenance of the A4119 in the Coedely area, this has not been included as a drawing. The drawings are as follows:

- Option 1A (with part of Option 11) - Appendix 2.3
- Option 11 - Appendix 2.4A and 2.4B
- Option 2 - Appendix 2.5
- Option 15 - Appendix 2.6

The Strategic Case appraisal of the packaged short-list of options has been against the same national policy documents that the 22 options in the long list were appraised against at Stage 1. These are as follows:

- Wales Transport Strategy – Outcomes (Appendix 2.13);
- The Well-being of Future Generations Act (2015) – Goals (Appendix 2.14).

The packaged short-list of options were also appraised against local and regional policy documents although this does not feature in the appendix of this Impacts Assessment Report.

The packaged short-list of options were then appraised against the six Transport Planning Objectives (Appendix 2.15).

In the Transport Case, an economic analysis has been undertaken for each of the packaged options. Supporting information to this is included in Appendix 2.19. This has utilised cost estimates for the individual options that comprise the packaged options. The cost estimate for Do Minimum (Option 22) was used for comparison purposes.

- Option 1A - Appendix 2.7 and 2.8
- Option 11 - Appendix 2.9A and 2.9B
- Option 2 - Appendix 2.10
- Option 15 - Appendix 2.11
- Option 22 - Appendix 2.12

Selected monetised benefits of the packaged options are contained in the Appraisal Summary Table (Appendix 2.16). Qualitative non-monetised benefits are also included. The Appraisal Summary Table is a more comprehensive version of the high level appraisal undertaken in the Strategic Outline Case and has benefitted from further work that has been undertaken since the Stage 1 report was completed. This includes the following:

- Economic Assessment (Appendix 2.19A to 2.19T)
- Ecological Appraisal (Appendix 2.20)
- Environmental Business Case (Appendix 2.21)
- Geotechnical Report (Appendix 2.22A to 2.22D)

Packaged options have also been appraised against topics in the Appraisal Summary Table (Appendix 2.16), their ability to tackle the identified problems (Appendix 2.17), and their likely deliverability (Appendix 2.18).

At the Strategic Outline Case stage, information to support the Financial Case, Commercial Case, and Management Case was minimal. The Outline Business Case contains more information on all three Cases, some of which has been supplied by Rhondda Cynon Taf CBC.

From all the evidence and other information that has been gathered together as part of the WelTAG Stage 2: Outline Business Case, a recommended packaged option has been determined for a transportation intervention within the A4119 corridor at Coedely. The recommended Preferred Option is as follows:

Option B: *Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout, plus an adjacent Active Travel route (Option 1A and Option 11).*

Appendices

Section 1 – WelTAG Stage 1: Strategic Outline Case (SOC)

1.1 A4119 Coed Ely Dualling – Feasibility Report (Sept 2016)

CAPITA

A4119 Coed Ely Dualling

Feasibility Report

September 2016

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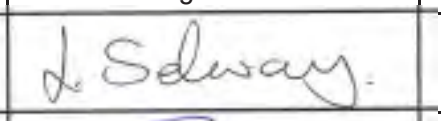
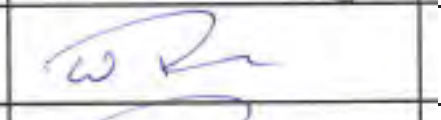
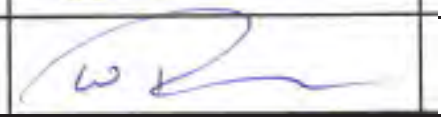
Project No: GC/002498 Doc Ref: GC/002498/003 Rev: Final

Client: Rhondda Cynon Taf County Borough Council
Issue Date: September 2016

A4119 Coed Ely Dualling Feasibility Report

	Name	Signature	Date
Author	Lee Selway		14/09/2016
Checker	Wayne Palmer		14/09/2016
Approver	Wayne Palmer		14/09/2016

Issue Record

Rev	Date	Description/Comments	Author/Prepared by:	Approved for Issue by:
-	18/08/16	Draft – Issued for comment	_	_
-	14/09/16	Final – Updated with comments from the workshop		

Contents

Appendices

1. Introduction

1.1 Scheme Background

1.1.1 Rhondda Cynon Taf County Borough Council (RCT) have commissioned Capita to undertake a feasibility study into the proposed dualling of the A4119 Ely Valley Road. The proposed dualling will take place between the Fire Service roundabout and the Coedely Roundabout, as shown in Figure 1.0 below.
The Works involve the excavation of the existing carriageway and provision of a new 1.3km dualled section. It is likely that widening will take place 'offline' due to the horizontal constraints of the sewage works and retaining walls.

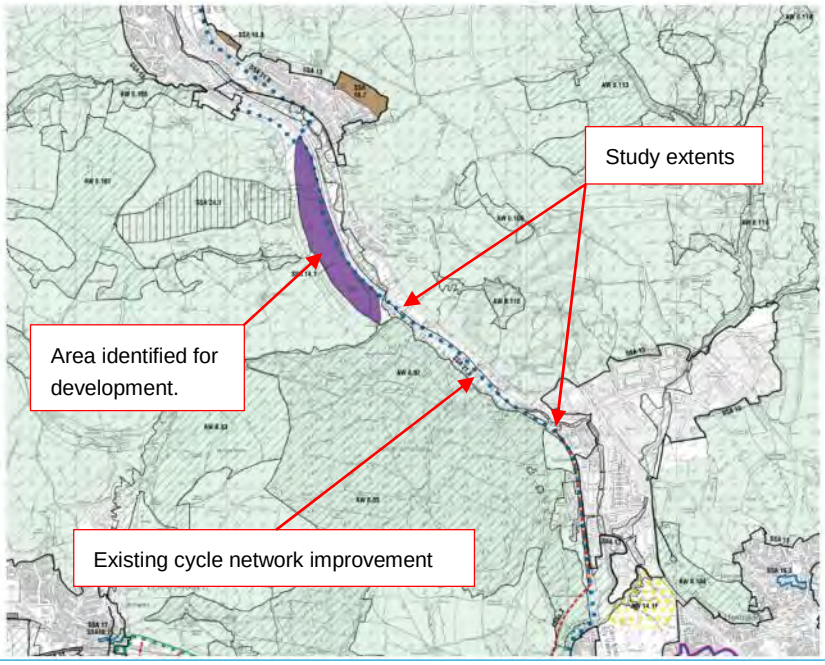


Figure 1.0 – Site location and proposed development land ***(Extract form RCTCBC Local Development Plan)***

1.1.2 The purpose of this report is to determine the feasibility in terms of capital cost, highways alignment, traffic and transportation and ecology. Depending on the findings of this report, the scheme may be progressed to preliminary /detailed design stage.

1.1.3 The dualling has been proposed to open up a 14.32ha Strategic Area for Employment site that has been identified in in RCTs approved Local Development Plan, as shown on Fig 1.0. A strategic road improvement scheme - The Ynysmaerdy to Talbot Green relief road is also proposed to connect into the southern roundabout.

2. Highways Feasibility Design

2.1.1 Topography and Alignment Constraints

In the absence of a topographical survey, LIDAR data was used to create a ground model of the existing topography. The Lidar data has been checked and deemed suitable to undertake the feasibility design. A full topographical survey will be required at the next stage, preliminary design, as several constraints along the route that need to surveyed accurately. The main constraints are:

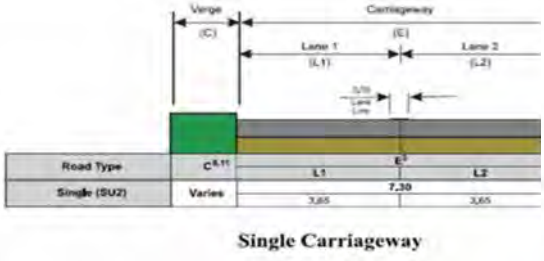
- Existing side roads and field access
- Existing retaining walls
- Extents of the sewage treatment plant
- Vertical alignment

2.1.2 Existing and Proposed Cross Sections

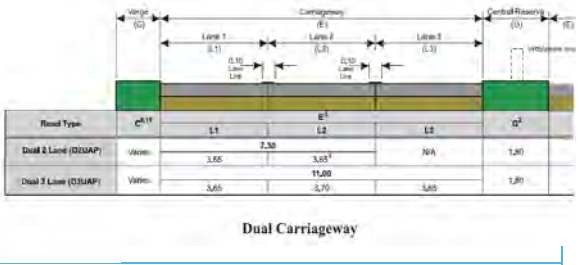
The existing carriageway cross section is based on a single urban carriageway layout SU2 taken from ***TD27/05 Cross Section and Headrooms***. This cross section provides two 3.65m wide running lanes and a footway throughout the majority of its length. The dualled section in advance to the study area seems to be a substandard cross section with a narrow central reserve. The posted speed limit on the existing dualled section is 40mph. The posted, existing speed limit in the study area is 50mph.

Traveling North within study extents

Travelling North on existing dualled section * Non standard



Existing cross section ***(TD27/05 DMRB 6.1.2.4)***



Proposed cross section ***(TD27/05 DMRB 6.1.2.4)***

Figure 2.0 – Existing and proposed cross sections

2.1.3 Design Philosophy

The cross section of the proposed design is fully TD27 compliant and provides two 3.65m wide lanes in both directions. It also has a standard 1.8m central island. The proposed design speed is 85Kph (50mph) although it may be prudent to post a speed limit of 40mph to tie in with the adjacent sections. It is not recommended to post a speed limit ≥50mph in a relatively short section, which is adjacent to 40mph speed limits at either end, the reason for this is;

- Vehicles approaching the roundabouts may fail to slow down sufficiently to negotiate the junctions.
- Inconsistent speed limits as the road user will travel from a section of 40mph through a ≥50mph and back to a 40mph section.
- Bus stops have been proposed along the route – Buses slowing down to use the stops may pose a hazard to road users. Buses exiting the laybys will be travelling at slow speeds when exiting the laybys, especially on the northbound uphill section.
- The extents of Vehicle Restraints Systems would need to be reviewed and potentially increased.
- The risk of an errant vehicle leaving the carriageway would increase.

Following the outcome from the initial scheme workshop a 2m wide footway has been proposed on both sides of the new dualled section. Due to spatial constraints of the sewage works and the retaining walls, the footway widths my need to be narrowed or the footways removed. This would present an opportunity to reduce the overall scheme costs. The narrowing/ removal of the footway can only be determined as part of the next stages of the design once the topographical survey has been completed.

The proposed scheme constraints layout plan can be found in **Appendix A.**

2.1.4 Junctions and Side Roads

There are four commercial, one agricultural and four field accesses located along the existing route. Due to limited available width, it is recommended that all these access operate as 'Left in, Left out' junctions to mitigate the provision of ghost islands and gaps in the central reserve. The 2 commercial access at the southern extents of the scheme (currently operating as a car garage and salvage yard), already have right turns into the premises banned and operate as left in left out.

2.1.5 Statutory Undertakers

We have made C3 enquiries with all the statutory undertakers (SU's) and the anticipated works are summarised in Table 1 below. Unfortunately, BT have not returned a C3 cost and the costs have been estimated. This estimated value is based on engineering judgement for statutory undertaker's diversions on schemes of a similar nature.

Undertaker	Apparatus affected	C3 Costs	Remarks
BT Openreach	✓	£100,000.00 (Est)	Over and Underground apparatus on both sides of existing carriageway
National Grid	✗	-	Unlikely, no apparatus in the locality

Virgin Media	✗	-	No apparatus in the vicinity of the works
Vodafone	✗	-	No apparatus in the vicinity of the works
Welsh Water	✓	£222,058.95	Divert approx. 560m of 6" main
Western Power Distribution	✓	£43,000.00	Minor diversionary/ protection works
Wales and West Utilities	✓	£153,998.82	Diversion and abandon 1200m of gas main
Total Estimated Stats Cost		£520,000.00	Approx

Table 1 – Anticipated works by Statutory undertakers

During the preliminary design phase, it would be prudent to discuss the anticipated supplies for the new development. Where possible any necessary infrastructure could be installed as part of the dualling. There would be a comparatively small capital cost to install ducting and infrastructure and this would provide a dual benefit minimising further installation disruption to the road user and making the development site more desirable. The principle of this has been discussed with the stats and they have agreed to review this at C4 stage, after the prelim design has been developed.

2.1.6 Sustainable Transport (Non-Motorised Users and Public Transport)

There is an existing, substandard width footway on the southern side of the existing route that serves Ynysmaerdy Dyffryn Isaf (NW-bound) bus stop. There is not currently a footway serving Ynysmaerdy Dyffryn Isaf (SE-bound) bus stop and the lack of any pedestrian facilities makes this location and undesirable location to embark/disembark the bus. Both bus stops are shown in Figure 3.0 below.

Ynysmaerdy Dyffryn Isaf (NW-bound) bus stop | Ynysmaerdy Dyffryn Isaf (SE-bound)

Figure 3.0 – Location of existing bus stops

It is unclear from the bus operator's website whether these stops are still operational and there does not seem to be any clear attractor's within the locality. The proposal allows for two standard bus stops/ laybys mid-way through the scheme extents , in the vicinity of the existing stops. The need and provision of these stops can be discussed and agreed as part of the prelim design phase. The removal of the stops would provide both land and construction cost savings. It would also reduce the risk of bus/ vehicle interaction.

As mentioned in section 2.1.3 a 2m wide footway is provided on either side of the carriageway. The footways links into the existing pedestrian routes at Coed Ely roundabout and the Fire service roundabout.

There is an existing cycle network improvement which has been constructed on land directly adjacent to the A4119 in this locality (Figure 4). The works were completed in 2013/2014 and consisted of the provision of a 3m wide cycleway/ footway throughout its entirety shown in Figure 4.

The cycle/footway route forms part of the LDP Policy SSA 21.6 – Pontypridd to Tonyrefail via Llantrisant and this section provides a route to the hospital, local industrial areas and eventually Pencoed train station.

To minimise land take through the proposed dualled section, the use of the cycleway/footway could be promoted rather than providing a footway adjacent to the road. There are very limited attractors on this section of road and if the aforementioned bus stops are abandoned the footway may get very little use. These points would require further discussion with the relevant stakeholders.

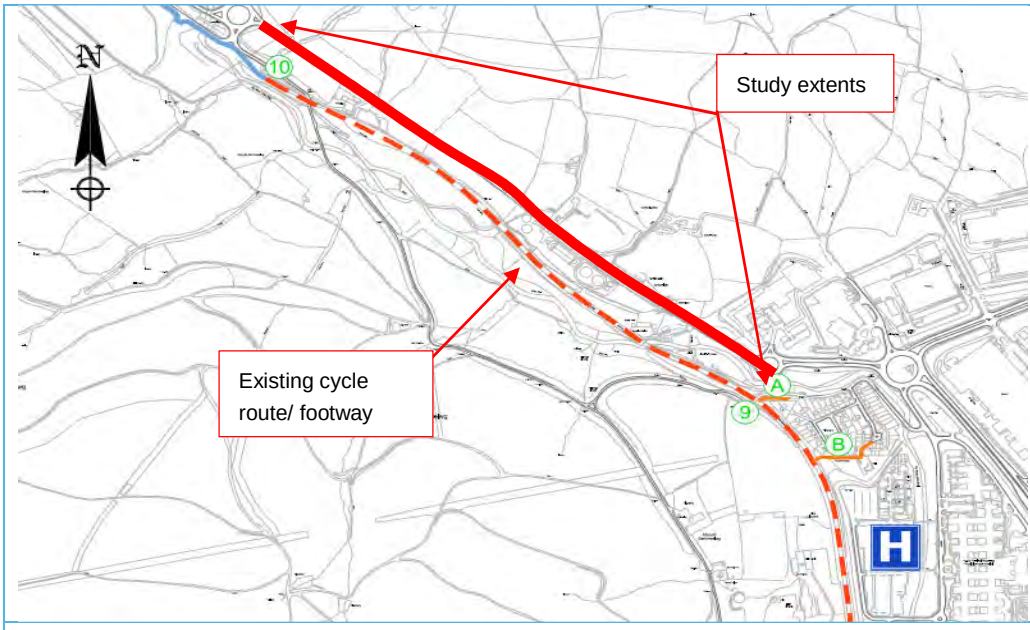


Figure 4.0 – Location of existing cycle/footway route

2.1.7 Land Matters

A land registry search was completed on 04 July 2016 and identified that potentially 18 separate landowners (including RCT) may be affected by the scheme. The land ranges from accesses for commercial premises to agricultural land. Approximately 30,000m2 would need to be purchased as part of the scheme. Using high-level land costs of approximately £26k per hectare, there is potentially £78k worth of land to be purchased. The cost per hectare was derived from the 2016

RICS index, which states '***The highest price for arable land in H2-2015 was £25,946/hectare, which was recorded in the South East region an increase of 5.0% on H1-2015'.*** The highest price of land was used as a worst case scenario rather than the mean land cost for England and Wales.

2.1.8 Risk

A draft Risk Register has been prepared and can be found in **Appendix B**. This will need to be reviewed and amended in conjunction with RCT.

2.1.9 Programme

An indicative programme has been prepared which details the required tasks to take the scheme through preliminary design up to submission of the planning application. The high level programme can be found in **Appendix C.** It can be seen, that the ecology work drives the critical path. A meeting was arranged with the County Ecology on 06 September 2016 and the scope of services and programme was confirmed.

3. Ecological Constraints

3.1 Summary of Ecological Report

3.1.1 The following non-technical appraisal summarises the findings of the initial Preliminary Ecological Assessment and the requirements following a meeting with the county ecologist. A copy of the draft ecological report can be found in **Appendix D.**

3.1.2 Non-Technical Summary

Site Location	**A section of the A4119 between Ynysmaerdy and Coed Ely. Central British National Grid Reference: ST026849.**
Proposed Development	Dualling of the A4119.
Purpose of survey/s	To identify possible ecological constraints to development.
Dates of survey and names of surveyors	• Holly Lewis (ACIEEM) Senior Ecologist: 7th July 2016. • Holly Lewis and Rebecca Howells Graduate Ecologist: 8th August 2016.
Overview of Results	• Two SSSI's exist within 2 km of the proposed site. • The southern end of the scheme runs directly adjacent to the River Ely SINC. Seven additional SINCs exist within 2 km of the site. • Habitats recorded on site included: semi-natural broad-leaved woodland, broad-leaved plantation woodland, mixed plantation woodland, scattered trees, dense scrub, poor semi-improved grassland and improved grassland. • Bat roosting potential was noted in trees on site and in nearby buildings. • Otter potential was identified within the River Ely and other watercourses adjacent to the site. • Woodland, scrub and hedgerows have the potential to support low numbers of dormice. • Breeding bird potential existed in woodland, trees and scrub habitats on site. • Reptile potential was identified within road verges on site. • Japanese knotweed, Himalayan balsam and cotoneaster were noted on site.
Further Surveys / Action Required	• Protection of the River Ely SINC. • Hedgerow retention. • Further bat assessment (buildings, retaining wall, culverts, and trees). • Bat activity surveys. • Dormouse nut search (to inform need for method statement and/or further survey).

	• Otter survey. • Badger survey. • Reptile survey. • Invasive species mapping and method statement. • Maintain habitat connectivity. • Avoid night working (where possible) and lighting of watercourses. • Sensitive vegetation clearance with respect to dormice, reptiles and breeding birds. • Prevent water pollution during and following construction.
Opportunities for enhancement	• Improvement of habitat connectivity. • Enhancement of culverts for otters and bats. • Planting of species to benefit wildlife. • Additional opportunities will be dependent on the results of further surveys.

4. Transportation Considerations

4.1 Summary of High Level Transportation Assessment

A transportation assessment has been undertaken and is provided in **Appendix E.** The following text summarises the report.

Assessment of the existing roundabout layout in opening year (2018) found that the junction is forecast to continue to operate within capacity in the AM peak, and over capacity in the PM peak with a maximum RFC of 0.72 and 0.88 respectively. This increased marginally with the addition of strategic development traffic. With 2033 traffic flows the existing junction is forecast to operate over capacity in the AM peak and the PM peak with a maximum RFC of 0.88 and 1.07 respectively. This increased marginally with the addition of strategic development traffic in the AM, and more significantly during the PM, due to the already high level of RFC.

The addition of a dual carriageway on the A4119 Ely Valley Road (South) arm of the junction was found to increase the capacity of the roundabout and resulted in a reduction in the RFC on the A4119 South arm by up to 15% in the AM peak and 26% in the PM peak with 2018 traffic flows. With 2033 traffic demand the addition of a dual carriageway reduced the RFC of the A4119 by up to 18% in the AM and 30% in the PM. However the A4119 Ely Valley Road (North) is forecast to continue to operate marginally over capacity with an RFC of up to 0.90. In 2033 with the strategic development flows added the unnamed road (potential strategic development site access) is also forecast to operate over capacity with an RFC of 0.96 (+8%) in the PM peak.

An evaluation of the high level traffic modelling approach used has been undertaken. It was found that there are drawbacks associated with the initial junction modelling approach used. These include the fact that lane usage is not specified within the ARCADY junction modelling program and it is therefore likely to overestimate the capacity of the roundabout, and that junction modelling does not take into account issues with capacity elsewhere in the network. In light of this, it is recommended that a more sophisticated and wider area modelling approach be implemented.

Review of typical traffic speeds in the area using Google indicated that there is slow moving traffic on the A4119 between the Fire Service roundabout and Coedely roundabout. It also showed that there is slow moving traffic on the A4119 to the north up to the A4093/A4119 roundabout, and south down to the A41119/B4595 signalised crossroads. In light of this it is recommended that a Vissim microsimulation assessment is undertaken with model extents between the A4093/A4119 roundabout to the north and the A4119/B4595 crossroads to the south. The microsimulation assessment should look at the operation of the corridor currently and provide an evaluation of the forecast impact of a dual carriageway on the A4119 Ely Valley Road between the Fire Service roundabout and Coedely roundabout.

5. Preliminary Cost Estimates

5.1 Construction Costs

A breakdown of the estimated construction costs are provided in **Appendix F.** These costs have been derived using the quantities established as part of the feasibility design and the following key assumptions:

- New works have been measured from outline drawings
- South East Wales Framework rates are used where possible to establish the prices. Where there are no comparable rates or items cannot be easily measured, lump sums have been inserted.
- An allowance has been made for the possible additional cost due to night time working for the resurfacing
- An optimism bias of 44% has been added to the construction costs to give the total of the scheme estimate.

We have identified a number of items that could be value engineered as part of the preliminary design, but these would need to be discussed and agreed with RCT. The potential value engineering opportunities are tabulated below and include:

Series	**Value Engineering Opportunity**	**Potential Saving**
400 – VRS	A safety barrier has been provided along the central reserve. This may not be needed if the cross section is reduced (sec 3.1.2)	£95k
Earthworks	Earthworks could be minimised by removing 1 or both of the footways	£225/£450k
Bus stops	Removal of the bus laybys	£35k
Footways		£68k/£136k
Kerbs	If the footways are removed then over edge drainage may be provided	£55k
	Potential Cost Saving (depending on whether one or both of the footways are removed)	**£546k/£703k**

** The VE savings should be compared against the construction cost only i.e. excluding Optimism Bias.

There are other potential VE designs that could be considered including the relaxation of the TD 27 cross section to match the existing dualled section in advance of the study area. This can be discussed prior to preliminary design stage.

5.2 Design Fee

As stated in the Coed Ely Technical Memo dated 28 May 2016. It would be beneficial to split the design process into five distinct design stages, these being;

- ***Stage Gate 1, Feasibility*** - **£33,492.00**- This report completes this stage of work
- ***Stage Gate 2 Preliminary design to submission of Planning stage*** **- £143,906** - provided in the Draft Brief and Commissioning Documents in **Appendix G**. Once the draft document has been reviewed and agreed with RCT it will be formally reviewed and signed off by Capita.

NOTE: The Stage Gate 2 design fee allows for the 'Do Minimum' in order to gain planning permission. It excludes detailed design and there is a risk that the successful grant of permission may attract additional conditions that will need to be discharged as part of the next phase.

- ***Stage Gate 3 Planning period - Detailed design - £95,000.00*** - Estimated (to be reviewed upon completion of Stage 2)
- ***Stage Gate 4 CPO and Pre Construction - £50,000.00***- Estimated (to be reviewed upon completion of Stage 3)
- ***Stage Gate 5 Construction Phase***- **£160,000.00 -** Estimated (to be reviewed upon completion of Stage 4)

The total estimated design fee from inception to completion is approximately **£483,000.**

5.3 Estimated Scheme Budget (Excluding Client Staff Costs)

A summary of the estimated scheme costs is as follows,

Estimated Construction Costs (See Appendix F)	**£5,942,699.95**
Add optimism bias at 44%	£2,614,787.98
Sub Total (Main works and OB)	£8,557,487.93
Land Costs	£78,000.00
Design Fee - Stage Gate 1 (Feasibility)	£33,492.00
Stage gate 2 - Preliminary Design / Planning (Inc PD Role)	£143,906.00
Stage Gate 3 - Detailed Design	£95,000.00
Stage Gate 4 - CPO/ Precon	£50,000.00
Stage Gate 5 - Construction Supervision	£160,000.00
Estimated 3rd Party Survey costs	£79,000.00
Estimated 3rd Party costs : solicitors, cpo , advertising etc	£40,000.00
Risk - See Scheme Risk Register (Appendix B)	£366,500.00
Total Estimated scheme cost	**£9,603,385.93**

NB* No allowance has been made for RCT staff costs

6. Conclusions and Recommendations

From the feasibility design undertaken to date there appears to be a viable option for the provision of a dualled section between the Coed Ely roundabout to Fire Service roundabout. Depending on funding, budgetary and time constraints, it is recommended that the design be progressed to Stage 2 – Preliminary Design through to Planning. Prior to Stage 2 to commencing, it is recommended that the following aspects are considered;

Aspect	**Comment**
Scheme Objectives	It is advisable to set a clear set of scheme objectives at prelim design stage which will ultimately drive the scheme. These could include - Open up land for development in accordance with the LDP of - Reduce congestion and improve journey times
Road Cross section	Agree whether a standard or 'relaxed' cross section is used to develop the design.
Speed Limit	Agree a design speed and posted speed limit for the scheme
NMU's	Determine the requirements for pedestrians and public transport
Ecology	Discuss the Ecological PEA with the County Ecologist and agree the scope/ requirements for surveys
Diversion routes	It is understood that the route cannot be closed during construction.
Transport	Determine whether a route assessment is required for the A4119 to avoid developments being considered in isolation.

All of the above points can be discussed and agreed prior to the start of the preliminary design period.

Appendix A – Scheme Overview Plan

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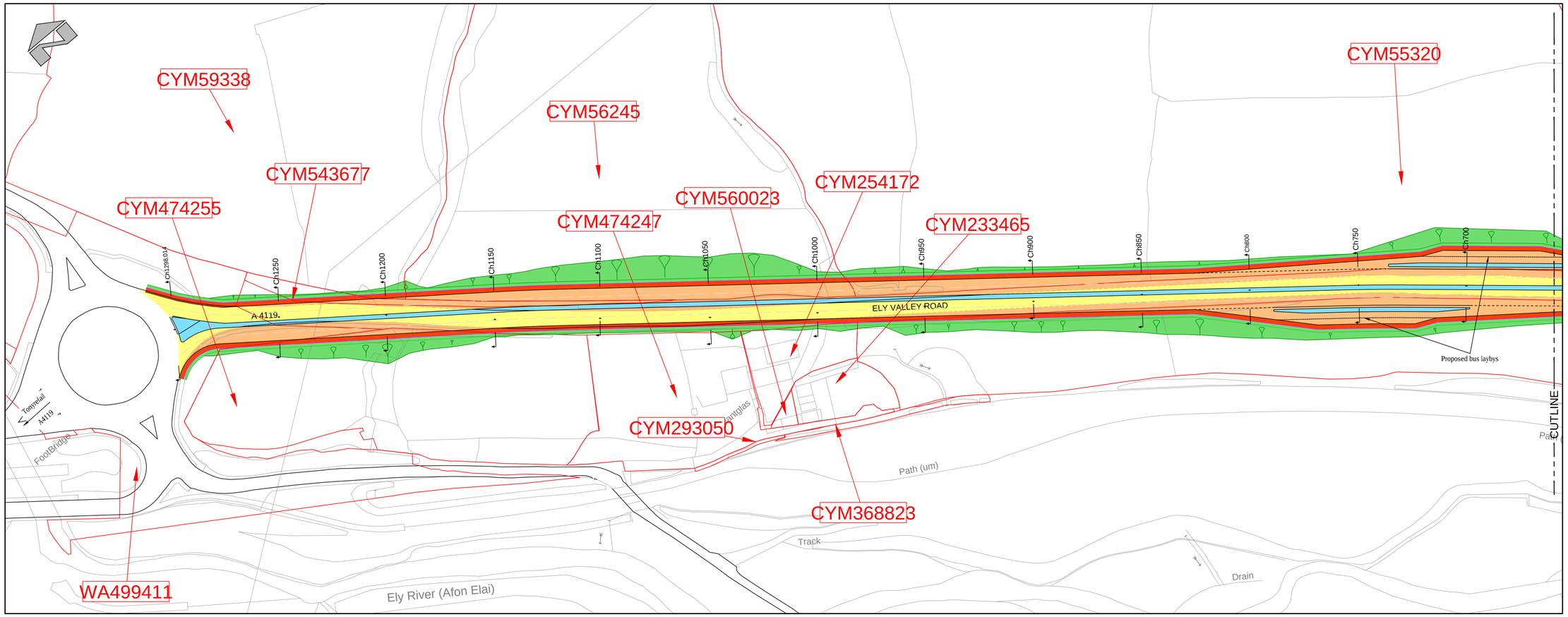

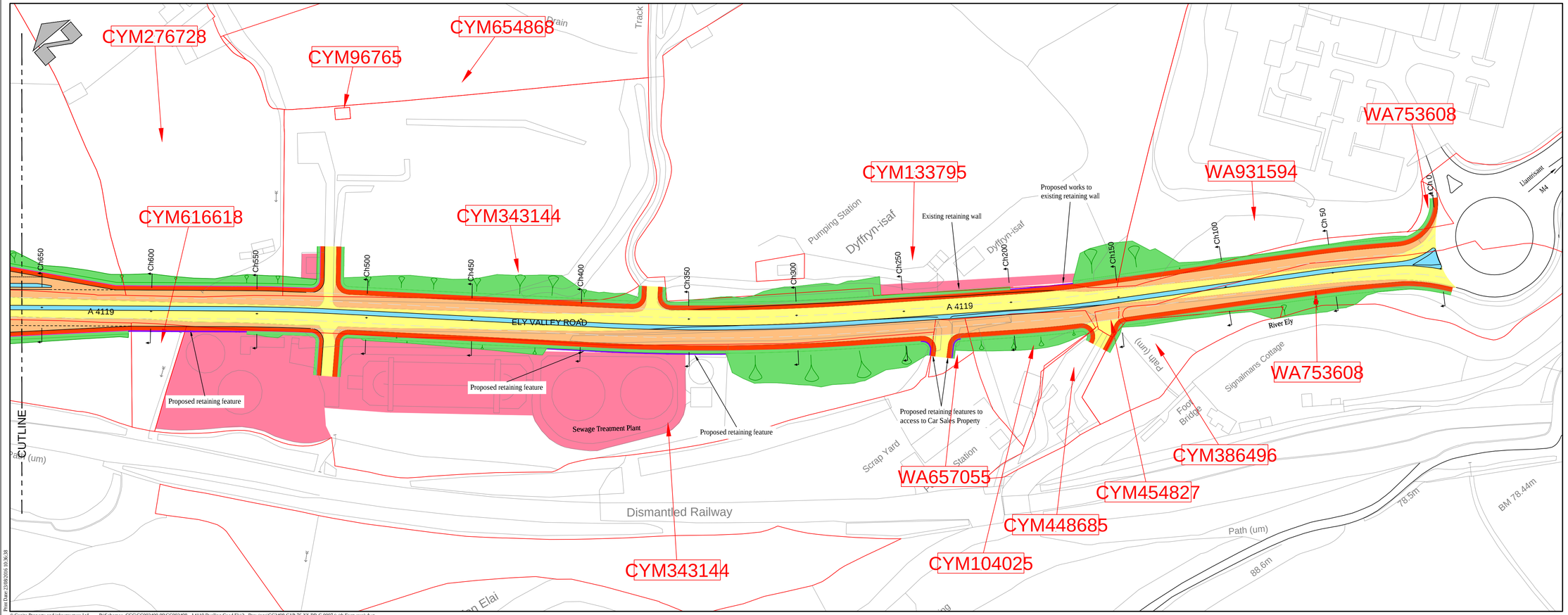

Key

- New road
- Revised/raised road
- New 2m wide footway
- New/revised verge and embankment
- Site Constraints
- Central reservation

Rev	Dwn	Chk'd	Appr'd	Description	Date

Purpose of Issue
S2 - Suitable for Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Preliminary Proposals
with Footways

Scale @ A1	Drawn	Checked	Approved
1:1,000	HT	NM	

Project No.: GC/002498
Date: July 2016

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC2498-CAP-76-XX-DR-C-0007
BS1192 Compliant revision: P01.1

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Capita Property and infrastructure Ltd

DRAFT 23/08/2016

P:\Schemes_CGC\GC002400-99\GC002498 - A4119 Dualling Coed Ely\2 - Drawings\GC2498-CAP-76-XX-DR-C-0007 (with Footways).dwg
Print Date:23/08/2016 10:36:38

Appendix B – Draft Risk Register

Capita Property and Infrastructure Ltd
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A4119 COED ELY DUALLING

COMMERCIAL / POLITICAL RISKS/ STRATEGIC RISKS

Risk Ref.	Threat/Opportunity	Consequence/Impact	Probability	Impact	Risk Factor	Mitigation	Probability	Impact	Risk Factor	Residual Risk	Low Value (£)	Most Likely Value (£)	High Value (£)	Residual Probability (%)	Risk Premium (£)	Risk Owner	Date Identified	Date Last Reviewed	Comments / Status	Closed
CP1	Planning permission not granted or protracted planning negotiations	Scheme unable to be constructed	2	5	10	Organise early meeting with planning department to determine their requirements - Coed Ely development is part of the LDP	1	5	5	LOW if discussed with planning					0	RCT			Unable to quantify	Open
CP2	Capacity along A4119 Route	Severe queuing along the route due to new development- There has been several developments along the route and it is unclear whether the impact of the developments have been considered in isolation or as part of the whole route	2	5	10	Undertake additional transport assessments to ensure route is able to deal with additional traffic generated by the development -	1	5	5	This may involve a strategic network decision. The scheme may need route wide modelling						RCT			Unable to quantify	Open
CP3	Objections from landowners	There may be objections/ claims from the adjacent landowners for loss of profit during the construction	3	3	9	Early consultation required with the landowners to avoid excessive planning objections/ potential for public enquiry - Potential to pre negotiate land?	3	2	5	This will have both time and cost implications if not mitigated early						RCT			Unable to quantify	Open
CP4	Delays during construction	There is no obvious diversion route and it is probable that 1 lane may need to be closed during construction.	4	5	20	There is likely to be complains by the travelling public during construction - Need to consider the buildability and any diversion routes at an early stage	2	5	10							RCT			Unable to quantify	Open
CP5	Delays to emergency services during construction - Hospital	The hospital is located on the roundabout into which we are tying into	5	5	25	Place restriction in the contract to ensure a section of the road will be made available for emergency services	5	4	20							RCT			Unable to quantify	Open
CP6	Inconsistent cross section - Confusion for road users	The cross section of the dual carriageway section O/S the hospital is sub standard. This may confuse the motorist	3	4	12	Consider matching the cross section and design speed of the existing dualled section	2	4	8							RCT			Unable to quantify	Open
CP7	Noise impact on surrounding buildings	Potential for Part 1 Claims	3	4	12	Consider matching the cross section and design speed of the existing dualled section	2	4	8		£1,000.00	£10,000.00	£30,000.00	50	£5,000	RCT			Unable to quantify	Open
CP8	Land Costs	Disproportionately high land costs (using historic RCT schemes)	3	4	12	Negotiate land early and confirm costs	2	4	8	Risk remains until the land is negotiated	£10,000.00	£150,000.00	£200,000.00	50	£75,000	RCT				Open
											£11,000	**£160,000**	**£230,000**		**£80,000.00**					

A4119 COED ELY DUALLING

DESIGN STAGE RISKS

Risk Ref.	Threat/Opportunity	Consequence/Impact	Probability	Impact	Risk Factor	Mitigation	Probability	Impact	Risk Factor	Residual Risk	Low Value (£)	Most Likely Value (£)	High Value (£)	Residual Probability (%)	Risk Premium (£)	Risk Owner	Date risk identified	Date Last Reviewed	Comments / Status	Closed
D1	Inconsistent design parameters, design speed, cross section etc.	May be confusing to road users	3	4	12	Amend the cross section - would require early agreement/departures/relaxations	2	4	8	This should be low with very little cost impact	£5,000.00	£15,000.00	£30,000.00	10	£1,500				This allowance is over and above the estimated stats cost in the cost estimate	
D2	Evasive species	High disposal cost	3	5	15	As above	3	5	15	To be updated after the evasive species mapping is complete										
D3	Additional surveys (Ecology) - Potential for additional surveys after initial scoping	Additional ecology surveys may be required after initial surveys have taken place	2	4	8	Unable to mitigate at this stage	2	4	8	To be updated after the initial ecological surveys	£10,000.00	£20,000.00	£40,000.00	50	£10,000					
D4	EIA required after results of screening	Scoping may determine the need for full EIA	3	5	15	Complete and agree ROND early	3	5	15	To be updated after the initial ecological surveys and EIA scoping	£50,000.00	£200,000.00	£300,000.00	2.5	£5,000					
D5	Supervision of GI by Ecology team	The GI work may need to be supervised by an ecologist	2	3	6	To be updated after ecological surveys	2	3	6	To be updated after the initial ecological surveys	£5,000.00	£10,000.00	£15,000.00	50	£5,000				Costs included above	
D6	Scope Creep - This depends on the resu;ts from the surveys	Additional costs	2	3	6		2	3	6		£5,000.00	£10,000.00	£20,000.00	50	£5,000					
D7	Additional Utility Diversions Required - (Re design work fee only)	Additional Design costs	2	3	6	Early liaision wth stats	2	3	6	To be updated after detailed design	£5,000.00	£20,000.00	£30,000.00	50	£10,000					
															£36,500.00					

A4119 COED ELY DUALLING

CONSTRUCTION RISKS

Risk Ref.	Risk	Consequence	Probability	Impact	Risk Factor	Mitigation	Probability	Impact	Risk Factor	Residual Risk	Low Value (£)	Most Likely Value (£)	High Value (£)	Residual Probability (%)	Risk Premium (£)	Risk Owner	Date risk identified	Date Last Reviewed	Comments / Status	Closed
C1	Contaminated Land	High disposal costs/ possible harm to human health	3	5	15	Undertake ecological surveys/ GI. This risk can be reduced after results from GI - Evasive species mapping	3	5	15	To be updated after the GI results	£50,000.00	£200,000.00	£400,000.00	50	£100,000					
C2	Evasive species	High disposal cost	3	5	15	As above	3	5	15	To be updated after the evasive species mapping is complete										
C3	Stats	Cost of relocating services is higher than assumed within the cost estimate . Difficulty coming to agreement as to proposed solution. Long lead item delays to programme.	3	5	15	The C3 returns have been sent out the we are currently awaiting the budgetary cost and programme estimates. RR to be updated once these have been received	2	5	10	Cost/ Programme -	£350,000.00	£500,000.00	£700,000.00	25	£125,000					
C4	Mine Workings	Possibility of treatment of shallow mine workings	2	3	6	To be picked up in PSSR and GI	1	3	3	There is a slight residual risk at this stage however this will be mitigated prior to construction	200,000	£250,000.00	£70,000.00	10	£25,000					
C5																				
C6																				
C7																				
															£250,000.00					

Probability / Impact

Low	1	
	2	
Medium	3	
	4	
High	5	

Total Suggested Risk Allocation **£366,500**

Appendix C – Draft Programme

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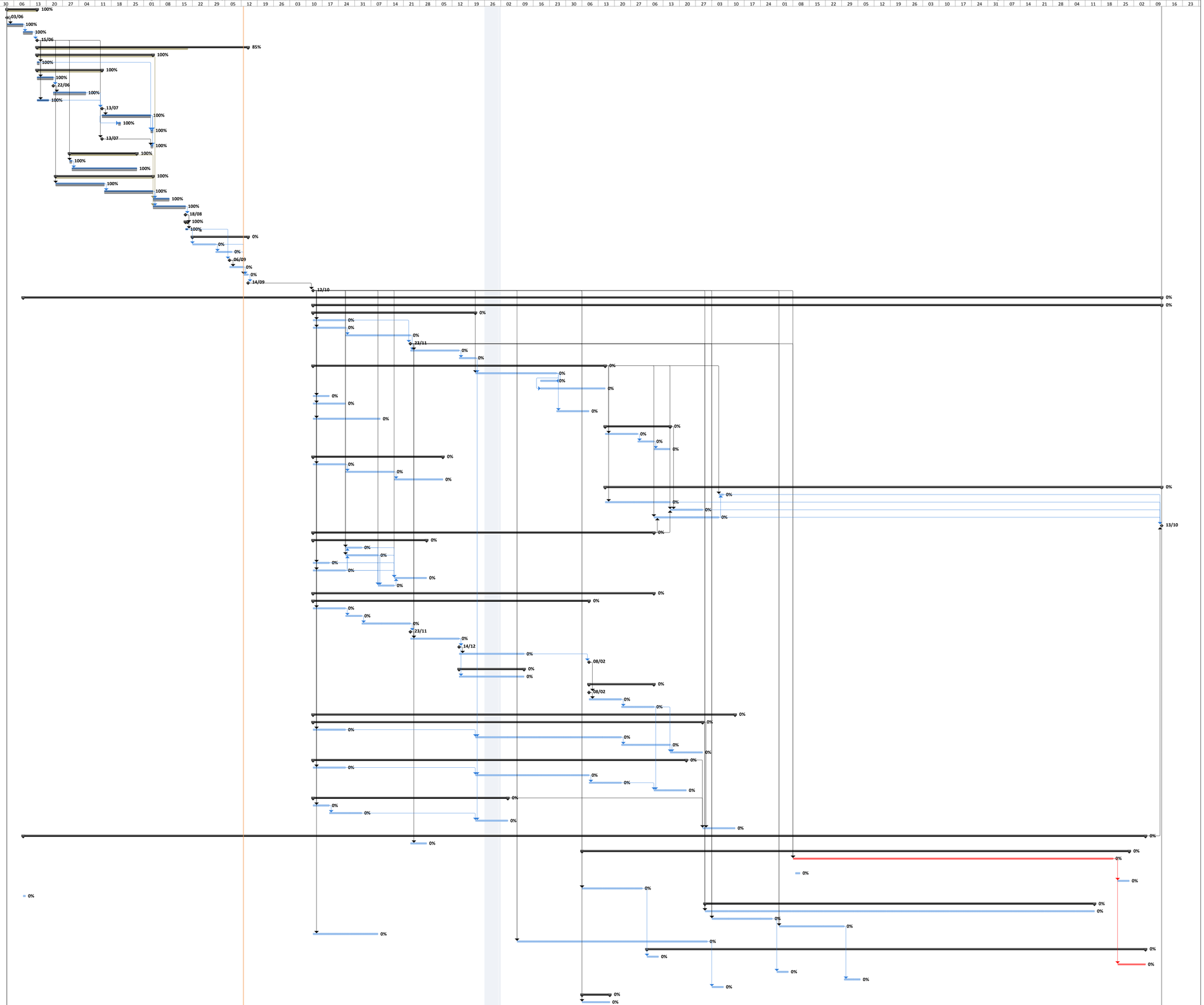
ID	Task Mode	Task Name	Duration	% Complete	Baseline Start	Baseline Finish	Start	Finish
1		**Development of Brief**	**9 days**	**100%**	**Fri 03/06/16**	**Wed 15/06/16**	**Fri 03/06/16**	**Wed 15/06/16**
2		Submission of high level costing review	0 days	100%	Fri 03/06/16	Fri 03/06/16	Fri 03/06/16	Fri 03/06/16
3		RCT Review	5 days	100%	Fri 03/06/16	Thu 09/06/16	Fri 03/06/16	Thu 09/06/16
4		Prepare commissioning document	2 days	100%	Fri 10/06/16	Mon 13/06/16	Fri 10/06/16	Mon 13/06/16
5		RCT sign off	0 days	100%	Wed 15/06/16	Wed 15/06/16	Wed 15/06/16	Wed 15/06/16
6		**Stage 1 - Feasibility Design**	**64 days?**	**85%**	**Thu 16/06/16**	**Thu 04/08/16**	**Thu 16/06/16**	**Wed 14/09/16**
7		**Highways Design (Feasibility)**	**36 days?**	**100%**	**Thu 16/06/16**	**Thu 04/08/16**	**Thu 16/06/16**	**Thu 04/08/16**
8		Undertake C2 Stats requests	1 day	100%	Thu 16/06/16	Thu 16/06/16	Thu 16/06/16	Thu 16/06/16
9		**Procure topographic survey**	**20 days**	**100%**	**Thu 16/06/16**	**Wed 13/07/16**	**Thu 16/06/16**	**Wed 13/07/16**
10		~~Arrange for quotes~~	5 days	100%	Thu 16/06/16	Wed 22/06/16	Thu 16/06/16	Wed 22/06/16
11		~~Appoint contractor~~	0 days	100%	Wed 22/06/16	Wed 22/06/16	Wed 22/06/16	Wed 22/06/16
12		~~Undertake survey~~	10 days	100%	Thu 23/06/16	Wed 06/07/16	Thu 23/06/16	Wed 06/07/16
13		Procure Lidar Data	3 days	100%	NA	NA	Thu 16/06/16	Mon 20/06/16
14		Receive survey data	0 days	100%	Wed 13/07/16	Wed 13/07/16	Wed 13/07/16	Wed 13/07/16
15		Undertake Hz and Vert feasibility design	15 days	100%	Thu 14/07/16	Wed 03/08/16	Thu 14/07/16	Wed 03/08/16
16		Undertake earthworks assessment	1 day?	100%	Thu 21/07/16	Thu 21/07/16	Thu 21/07/16	Thu 21/07/16
17		Undertake C3 Stats request	1 day?	100%	Thu 04/08/16	Thu 04/08/16	Thu 04/08/16	Thu 04/08/16
18		Receive landownership plans from RCT	0 days	100%	Wed 13/07/16	Wed 13/07/16	Wed 13/07/16	Wed 13/07/16
19		Undertake a land take assessment	1 day?	100%	Thu 04/08/16	Thu 04/08/16	Thu 04/08/16	Thu 04/08/16
20		**Ecology**	**21 days?**	**100%**	**Thu 30/06/16**	**Thu 28/07/16**	**Thu 30/06/16**	**Thu 28/07/16**
21		Undertake site visit	1 day?	100%	Thu 30/06/16	Thu 30/06/16	Thu 30/06/16	Thu 30/06/16
22		Prepare ecology desktop study	20 days	100%	Fri 01/07/16	Thu 28/07/16	Fri 01/07/16	Thu 28/07/16
23		**Transportation**	**30 days**	**100%**	**Fri 24/06/16**	**Thu 04/08/16**	**Fri 24/06/16**	**Thu 04/08/16**
24		Traffic Surveys	3 wks	100%	Fri 24/06/16	Thu 14/07/16	Fri 24/06/16	Thu 14/07/16
25		Reporting	3 wks	100%	Fri 15/07/16	Thu 04/08/16	Fri 15/07/16	Thu 04/08/16
26		Prepare documentation for workshop	5 days	100%	Fri 05/08/16	Thu 11/08/16	Fri 05/08/16	Thu 11/08/16
27		Prepare feasibility report	10 days	100%	Fri 05/08/16	Thu 18/08/16	Fri 05/08/16	Thu 18/08/16
28		Submit feasibility report to RCT	0 days	100%	Thu 18/08/16	Thu 18/08/16	Thu 18/08/16	Thu 18/08/16
29		RCT to Review draft report and comment on findings	1 day	100%	NA	NA	Fri 19/08/16	Fri 19/08/16
30		Workshop to discuss findings	1 day	100%	Thu 25/08/16	Thu 25/08/16	Fri 19/08/16	Fri 19/08/16
31		**Capita to amend the report and re -issue**	**17 days**	**0%**	**NA**	**NA**	**Mon 22/08/16**	**Wed 14/09/16**
32		Amend HZ alignmnet	7 days	0%	NA	NA	Mon 22/08/16	Wed 31/08/16
33		Update costs	5 days	0%	NA	NA	Thu 01/09/16	Wed 07/09/16
34		Meeting with County Ecologist	0 days	0%	NA	NA	Tue 06/09/16	Tue 06/09/16
35		Update programme	4 days	0%	NA	NA	Wed 07/09/16	Mon 12/09/16
36		Finalise Report	2 days	0%	NA	NA	Tue 13/09/16	Wed 14/09/16
37		Submit Report	0 days	0%	NA	NA	Wed 14/09/16	Wed 14/09/16
38		RCT to review costs and confirm Stage 2 Start	0 days	0%	NA	NA	Wed 12/10/16	Wed 12/10/16
39		**Stage 2 - Preliminary Design to Planning**	**345 days?**	**0%**	**NA**	**NA**	**Fri 10/06/16**	**Fri 13/10/17**
40		**Highways and Infrastructure**	**257 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Fri 13/10/17**
41		**Land Access and Surveys**	**50 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 21/12/16**
42		Prepare licence plans for entry onto land for surveys	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
43		Preparation of contract document for topo survey	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
44		Let topo tender and tender assessment	4 wks	0%	NA	NA	Thu 27/10/16	Wed 23/11/16
45		Licence in place for Topo, eco surveys and GI	0 days	0%	NA	NA	Wed 23/11/16	Wed 23/11/16
46		Topo Survey	3 wks	0%	NA	NA	Thu 24/11/16	Wed 14/12/16
47		Survey review	1 wk	0%	NA	NA	Thu 15/12/16	Wed 21/12/16
48		**Prelim Highways Design**	**85 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 15/02/17**
49		Geometric design	4 wks	0%	NA	NA	Thu 22/12/16	Wed 25/01/17
50		Fencing and VRS	1 wk	0%	NA	NA	Thu 19/01/17	Wed 25/01/17
51		Drainage	4 wks	0%	NA	NA	Thu 19/01/17	Wed 15/02/17
52		Pavement	1 wk	0%	NA	NA	Thu 13/10/16	Wed 19/10/16
53		signing and lining	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
54		street lighting	2 wks	0%	NA	NA	Thu 26/01/17	Wed 08/02/17
55		Stats liaison	21 days	0%	NA	NA	Thu 13/10/16	Thu 10/11/16
56		**Preliminary Design Drawings**	**20 days**	**0%**	**NA**	**NA**	**Thu 16/02/17**	**Wed 15/03/17**
57		Preparation of drawings	2 wks	0%	NA	NA	Thu 16/02/17	Wed 01/03/17
58		Checking	1 wk	0%	NA	NA	Thu 02/03/17	Wed 08/03/17
59		Approval	1 wk	0%	NA	NA	Thu 09/03/17	Wed 15/03/17
60		**Land Interest and CPO**	**40 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 07/12/16**
61		Prepare Land Interest Plans	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
62		Prepare CPO Plan	3 wks	0%	NA	NA	Thu 27/10/16	Wed 16/11/16
63		Prepare CPO Schedules	3 wks	0%	NA	NA	Thu 17/11/16	Wed 07/12/16
64		**Planning Application**	**172 days**	**0%**	**NA**	**NA**	**Thu 16/02/17**	**Fri 13/10/17**
65		Complete Application Forms	2 days	0%	NA	NA	Thu 06/04/17	Fri 07/04/17
66		Design and Access Statement	4 wks	0%	NA	NA	Thu 16/02/17	Wed 15/03/17
67		Prepare Planning Drawings	2 wks	0%	NA	NA	Thu 16/03/17	Wed 29/03/17
68		Collate Planning Supporting Information	4 wks	0%	NA	NA	Thu 09/03/17	Wed 05/04/17
69		Submit Planning	0 days	0%	NA	NA	Fri 13/10/17	Fri 13/10/17
70		**Geotech**	**100 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 08/03/17**
71		**PSSR**	**35 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 30/11/16**
72		Review Existing Information	1 wk	0%	NA	NA	Thu 27/10/16	Wed 02/11/16
73		Engineering Assessment of earthworks	2 wks	0%	NA	NA	Thu 27/10/16	Wed 09/11/16
74		GRR	1 wk	0%	NA	NA	Thu 13/10/16	Wed 19/10/16
75		3rd Party Reports Envirocheck , mining reports etc	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
76		Prepare report	2 wks	0%	NA	NA	Thu 17/11/16	Wed 30/11/16
77		Outline drawings	1 wk	0%	NA	NA	Thu 10/11/16	Wed 16/11/16
78		**GIR**	**100 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 08/03/17**
79		**Geotechnical Investigation**	**80 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 08/02/17**
80		Prepare Gi Contract Documents	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
81		Tender	1 wk	0%	NA	NA	Thu 27/10/16	Wed 02/11/16
82		Contractor to Price	3 wks	0%	NA	NA	Thu 03/11/16	Wed 23/11/16
83		Award	0 days	0%	NA	NA	Wed 23/11/16	Wed 23/11/16
84		Mobilise	3 wks	0%	NA	NA	Thu 24/11/16	Wed 14/12/16
85		Gi Start	0 days	0%	NA	NA	Wed 14/12/16	Wed 14/12/16
86		Contract period	3 wks	0%	NA	NA	Thu 15/12/16	Wed 11/01/17
87		Receive data for reports (+4 weeks)	0 wks	0%	NA	NA	Wed 08/02/17	Wed 08/02/17
88		**Site supervision**	**15 days**	**0%**	**NA**	**NA**	**Thu 15/12/16**	**Wed 11/01/17**
89		Supervision of GI and contract management	3 wks	0%	NA	NA	Thu 15/12/16	Wed 11/01/17
90		**H022 GIR**	**20 days**	**0%**	**NA**	**NA**	**Wed 08/02/17**	**Wed 08/03/17**
91		Lab Report	0 days	0%	NA	NA	Wed 08/02/17	Wed 08/02/17
92		Ground Modelling	2 wks	0%	NA	NA	Thu 09/02/17	Wed 22/02/17
93		Reporting	2 wks	0%	NA	NA	Thu 23/02/17	Wed 08/03/17
94		**Structures**	**125 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 12/04/17**
95		**SO1 - Retaining Wall Chainage 400**	**115 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 29/03/17**
96		Review information	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
97		Outline design / layout	8 wks	0%	NA	NA	Thu 22/12/16	Wed 22/02/17
98		Preliminary size wall	3 wks	0%	NA	NA	Thu 23/02/17	Wed 15/03/17
99		Production AIP	2 wks	0%	NA	NA	Thu 16/03/17	Wed 29/03/17
100		**SO2 - Retaining Wall Chainage 200**	**110 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 22/03/17**
101		Review information	2 wks	0%	NA	NA	Thu 13/10/16	Wed 26/10/16
102		Outline design / layout	6 wks	0%	NA	NA	Thu 22/12/16	Wed 08/02/17
103		Preliminary size wall	2 wks	0%	NA	NA	Thu 09/02/17	Wed 22/02/17
104		Production AIP	2 wks	0%	NA	NA	Thu 09/03/17	Wed 22/03/17
105		**SO3 - Retaining wall at access to car sales property**	**55 days**	**0%**	**NA**	**NA**	**Thu 13/10/16**	**Wed 04/01/17**
106		Review information	1 wk	0%	NA	NA	Thu 13/10/16	Wed 19/10/16
107		Outline design / layout	2 wks	0%	NA	NA	Thu 20/10/16	Wed 02/11/16
108		Preliminary size wall	1 wk	0%	NA	NA	Thu 22/12/16	Wed 04/01/17
109		GA / Planning drawing SO1 - SO3	2 wks	0%	NA	NA	Thu 30/03/17	Wed 12/04/17
110		**Ecology**	**340 days?**	**0%**	**NA**	**NA**	**Fri 10/06/16**	**Fri 06/10/17**
111		Hazel Tree/Nut Search to determin the risk of door m	5 days	0%	NA	NA	Thu 24/11/16	Wed 30/11/16
112		**Bat Surveys**	**170 days**	**0%**	**NA**	**NA**	**Mon 06/02/17**	**Fri 29/09/17**
113		Actiity surveys - 2 visits per month (5 months, 2 transects - 4 people)	5 mons	0%	NA	NA	Mon 08/05/17	Fri 22/09/17
114		static anabat placement and replacement	2 days	0%	NA	NA	Tue 09/05/17	Wed 10/05/17
115		data analysis	1 wk	0%	NA	NA	Mon 25/09/17	Fri 29/09/17
116		Bat Roost Assessment	1 mon	0%	NA	NA	Mon 06/02/17	Fri 03/03/17
117		**Dormouse surveys (Assumed Not Reqired at this stage)**	1 day?	0%	NA	NA	Fri 10/06/16	Fri 10/06/16
118		**Reptile survey**	**120 days**	**0%**	**NA**	**NA**	**Fri 31/03/17**	**Thu 14/09/17**
119		Survey x 7 and setting out tins	6 mons	0%	NA	NA	Fri 31/03/17	Thu 14/09/17
120		**Otter survey**	1 mon	0%	NA	NA	Mon 03/04/17	Fri 28/04/17
121		**Invasive species mapping**	1 mon	0%	NA	NA	Tue 02/05/17	Mon 29/05/17
122		**Scoping and SINC Consultation with County Ecologist**	1 mon	0%	NA	NA	Thu 13/10/16	Wed 09/11/16
123		**Badger survey**	3 mons	0%	NA	NA	Mon 09/01/17	Fri 31/03/17
124		**Reports**	**155 days**	**0%**	**NA**	**NA**	**Mon 06/03/17**	**Fri 06/10/17**
125		Bat Roost Assessment Report	1 wk	0%	NA	NA	Mon 06/03/17	Fri 10/03/17
126		Bat Activity Survey Report	2 wks	0%	NA	NA	Mon 25/09/17	Fri 06/10/17
127		Otter Report	1 wk	0%	NA	NA	Mon 01/05/17	Fri 05/05/17
128		Invasive Species Report	1 wk	0%	NA	NA	Tue 30/05/17	Mon 05/06/17
129		Badger Report	1 wk	0%	NA	NA	Mon 03/04/17	Fri 07/04/17
130		**EIA Screening**	**10 days**	**0%**	**NA**	**NA**	**Mon 06/02/17**	**Fri 17/02/17**
131		Produce Screening Report for agreement of planning authority	2 wks	0%	NA	NA	Mon 06/02/17	Fri 17/02/17



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Appendix D – Ecology Assessment

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CAPITA

A4119 Dualling Preliminary Ecological Assessment

September 2016

Quality Management

Job No	GC/002498		
Project	A4119 Dualling		
Location	Talbot Green		
Title	Preliminary Ecological Assessment		
Document Ref		**Issue / Revision**	
File reference			
Date	September 2016		
Prepared by	Holly Lewis Senior Ecologist BSc (Hons), ACIEEM		Date
Checked by	Geraint Pitman Director, Associate Environment BSc. MA CMLI		Date
Authorised by	Geraint Pitman Director, Associate Environment BSc. MA CMLI		Date

Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised

Contents

Drawings

GC002498-CAP-74-XX-DR-C-0007-P01.1 – Preliminary Proposals with Footways

GC002498-CAP-74-XX-DR-L00002 – Statutory and Non-statutory Sites

GC002498-CAP-74-XX-DR-L00001 - Phase 1 Habitat Survey

Appendices

Non-Technical Summary

Site Location	**A section of the A4119 between Ynysmaerdy and Coed Ely. Central British National Grid Reference: ST026849.**
Proposed Development	Dualling of the A4119.
Purpose of survey/s	To identify possible ecological constraints to development.
Dates of survey and names of surveyors	• Holly Lewis (ACIEEM) Senior Ecologist: 7th July 2016. • Holly Lewis and Rebecca Howells Graduate Ecologist: 8th August 2016.
Overview of Results	• Two SSSI's exist within 2 km of the proposed site. • The southern end of the scheme runs directly adjacent to the River Ely SINC. Seven additional SINCs exist within 2 km of the site. • Habitats recorded on site included: semi-natural broad-leaved woodland, broad-leaved plantation woodland, mixed plantation woodland, scattered trees, dense scrub, poor semi-improved grassland and improved grassland. • Bat roosting potential was noted in trees on site and in nearby buildings. • Otter potential was identified within the River Ely and other watercourses adjacent to the site. • Woodland, scrub and hedgerows have the potential to support low numbers of dormice. • Breeding bird potential existed in woodland, trees and scrub habitats on site. • Reptile potential was identified within road verges on site. • Japanese knotweed, Himalayan balsam and cotoneaster were noted on site.
Further Surveys / Action Required	• Protection of the River Ely SINC. • Hedgerow survey (to inform requirement for Removal Notice). • Hedgerow retention/reinstatement. • Further bat assessment (buildings, retaining wall, culverts, and trees). • Bat activity surveys. • Dormouse nut search (to inform need for method statement and/or further survey). • Otter survey. • Badger survey. • Reptile survey. • Invasive species mapping and method statement. • Maintain habitat connectivity. • Avoid night working (where possible) and lighting of watercourses. • Sensitive vegetation clearance with respect to dormice, reptiles and breeding birds. • Prevent water pollution during and following construction.
Opportunities for enhancement	• Improvement of habitat connectivity. • Enhancement of culverts for otters and bats. • Planting of species to benefit wildlife.

	• Additional opportunities will be dependent on the results of further surveys.

1. Introduction

Capita was commissioned by Rhondda Cynon Taf County Borough Council (RCTCBC) to undertake Preliminary Ecological Assessment (PEA) for a potential dualling scheme along the A4119, Talbot Green (central Grid Reference (BNG) ST026849). The survey was carried out to identify any ecological constraints to the proposed scheme and to identify the scope for further ecological assessment/surveys.

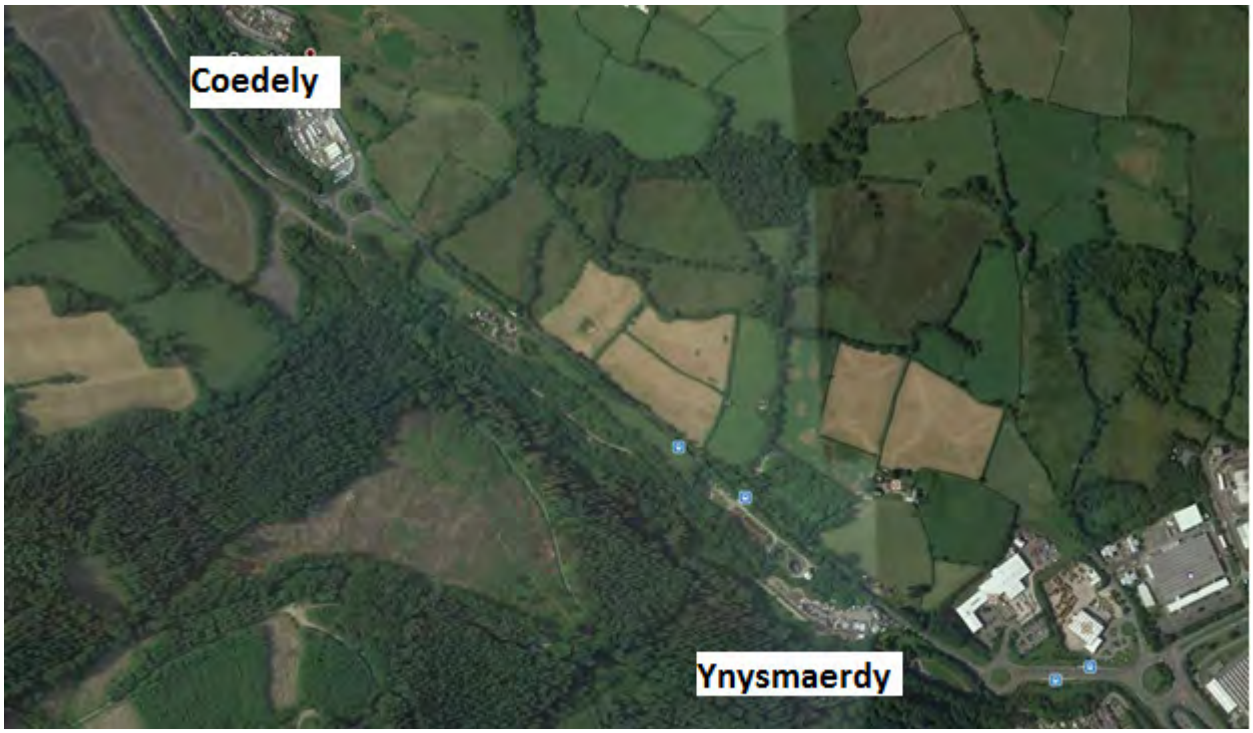
This report includes details of the survey methodologies, results and discussion and contains recommendations for further survey/mitigation where appropriate.

1.1 Site Description

This section of the A4119 Ely Valley Road runs between at Coedely and Ynysmaerdy.

The vast majority of the surrounding area consists of agricultural land, woodlands and hedgerows. The River Ely runs parallel to the west of the site. The South Wales Fire and Rescue Service, industrial units and car dealerships are located to the south of the site and a caravan dealership to the north.

Figure 1: Site Location (Google Earth, 2016).



The potential development site is shown on Drawing GC002498-CAP-74-XX-DR-C-0007-P01.1.

2. Methodology

2.1 Desktop Study

The following organisations/persons were consulted for ecological information about the site and surrounding areas:

- South East Wales Biodiversity Records Centre (SEWBReC, 2016);
- Multi-Agency Geographic Information System (MAGIC, 2016);
- Rhondda Cynon Taf County Ecologist (*Pers Comm*, 2016a).

A request was made for information on any ecologically designated sites and protected/notable species within a 2km radius of the site (5km for bats) and dated within the last ten years.

2.2 Phase 1 Habitat Survey

Experienced Capita surveyors conducted the survey based on Extended Phase 1 habitat survey techniques (JNCC, 2010) on the 7th July and the 8th August 2016. The survey consisted of a thorough walkover of the survey area, mapping the habitat types present and listing floral species within each habitat type. Species nomenclature follows Stace (2010).

2.3 Constraints

Due to health and safety concerns relating to fast traffic and lack of pavement along the eastern side of the A4119 not all of the habitat was fully assessed. The surrounding habitat to the north of the scheme is privately owned and could also therefore not be accessed. Where this occurred the surveyors used binoculars to identify species from the western side of the road. The overall results of the survey are not expected to have been impacted.

3. Desktop Study Results

3.1 Statutory Sites

3.1.1 Sites of Special Scientific Interest

Two SSSI's exist within 2km of the scheme and are detailed below:

Llantrisant Common and Pastures SSSI is 113.2 ha and is located approximately 670 m south-east of the proposed development site. It is designated for its extensive area of predominantly acidic marshy grassland in a lowland setting and for smaller areas of species-rich neutral and acidic grassland and soligenous flush. It is also of special interest for its populations of the nationally rare liverwort (*Scapania paludicola)* and the nationally scarce cornish moneywort (*Sibthorpia europaea)* plant species.

Rhos Tonyrefail SSSI is 224. 7 ha in size and consists of a network of seven groups of fields around Tonyrefail, the nearest of which is located approximately 325 m east of the site. The site is a large lowland site of special interest for its marshy grassland, acid flush, species-rich neutral grassland, acid grassland, wet heath and blanket mire which are associated with areas of woodland. The site is also of special interest for its population of marsh fritillary butterfly (*Euphydryas aurinia*).

3.2 Non-statutory sites

3.2.1 Sites of Importance for Nature Conservation

A total of 8 SINCs were identified within 2 km of the three sites, the nearest and most relevant of which are discussed below:

The River Ely SINC (50.33 ha) lies directly adjacent to the southern end of the site. The River Ely is a prime wildlife corridor and the SINC includes the river, and associated bank side habitats, between Tonyrefail and Talbot Green. The Ely, although previously polluted, has now recovered to generally good water quality. It is a key river for otter (*Lutra lutra*), and it supports kingfisher (*Alcedo atthis*) dipper (*Cinclus cinclus*) and grey wagtail (*Motacilla cinerea*). Brown trout (*Salmo trutta)* and salmon (*Salmo salar*) both breed within its length. The river supports wooded banks, with alder the primary tree and associated areas of wet alder woodland. Monkshood (*Aconitum napellus*), is a speciality of the wooded banks of the River Ely.

Llantrisant Forestry and Craig Melyn SINC (306.928 ha) is located approximately 50 m south of the Ynysmaredy roundabout. Llantrisant Forest is the oldest Forestry Commission conifer forest in Wales. It is an extensive (several hundred hectares) mixed conifer plantation, which includes areas of replanted ancient woodland at Coed Melyn and Coedynysmaerdy. Both woods retain areas of relic semi-natural woodland including oak (*Quercus robor*), alder (*Alnus glutinosa*) and hazel (*Corylus avellana*) woodland with elements of ancient woodland ground floras (bluebell (*Hyacinthoides non-scripta*) and wood anemone (*Anemone nemorosa*)).

Rhiwfelin Fawr SINC (6.912 ha) is located approximately 160 m west of the site. It is a mosaic of marshy grassland and woodland habitat, which lies within the wider complex of the Rhos Tonyrefail SSSI. Although much of the grassland has been modified by agricultural improvement, the site represents an important wet grassland resource. The SINC supports a mosaic of soft rush (*Juncus effusus*) and purple moor-grass (*Molinia caerulea*) dominated

marshy grassland (National Vegetation Classifications M23 and M25) with sharp-flowered rush (*Juncus acutiflorus*), marsh bedstraw (*Galium palustre*), greater bird's-foot trefoil (*Lotus pedunculatus*), tormentil (*Potentilla erecta*), cross-leaved heath (*Erica tetralix*), yellow sedge (*Carex demissa*), and carnation sedge (*Carex panicea*). The SINC supports marsh fritillary (*Eupydryas aurinia*) habitat and devil's-bit scabious (*Succisa pratensis*) is locally common.

Nant Muchudd SINC (28.80 ha) is located approximately 300m to the west of the southern end of the site. The Nant Muchudd is a clean, fast flowing, shallow stream, with gravel shoals, undercut banks, and variously braided channels. The stream supports salmon, brown trout, otter, dipper, and grey wagtail. The steam banks are predominantly wooded. Much of the wooded valley is ancient woodland, including Rhiwfelen-fach Woodland. Typical composition includes alder woodland along the riverbank and valley bottom, and more mixed oak, ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*), wych elm (*Ulmus glabra*) and sycamore (*Acer pseudoplatanus*) on drier valley side. The woodlands have generally good structure, and represent important woodland bird habitat.

Tonyrefail Mountains SINC (198.4 ha) is located approximately 700 m north-east of the northern end of the site. The SINC is an extensive area of un-enclosed upland habitat associated with Mynydd Maendy, Mynydd Hugh and Mynydd Portref, to the south of Tonyrefail. The SINC is a mosaic of wet heath, marshy grassland, acid grassland, acid flush and valley and basin mire. The mosaic of upland wet habitat supports a characteristic upland bird assemblage with meadow pipit (*Anthus pratensis*), skylark (*Alauda arvensis*), stonechat (*Saxicola tortquata*), reed bunting (*Emberiza Schoeniclus*), linnet (*Carduelis cannabina*) and wheatear (*Oeanthe oenanthe*) all recorded. Great crested newt (*Triturus cristatus*) has been recently recorded in ponds on the Coed Ely land reclamation site. Brown hare (*Lepus europaeus*) occur in the mosaics of wetlands and short grassland. Dark green fritillary butterflies (*Argynnis aglaja*) have also been recorded.

The locations of the non-statutory sites are illustrated on GC002498-CAP-74-XX-DR-L00001.

3.3 Tree Preservation Order (TPO)

An individual TPO tree and a mixed woodland TPO area exist immediately north of the Coedely roundabout, alongside the eastern carriageway of the A4119.

3.4 Species

Appendix A lists protected or priority species within a 2km radius of the site (5km for bats) within the last 10 years. A summary of the records is detailed below. Relevant legislation is outlined in Appendix B.

3.4.1 European Protected Species

Bats

The data searched identified 44 records of bats within 2 km and 553 records within 5 km of the site. Records include noctule, serotine (*Eptesicus serotinus*), lesser horseshoe (*Rhinolophus hipposideros*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle, Natterer's (*Myotis nattereri*) and brown long-eared bat (*Plecotus auritus*). The closest record was a whiskered bat found on a wall directly adjacent to site. The record is located towards the north of the site along the western side of carriageway. The nearest confirmed bat roost (species unknown) has been recorded within a property in Stirling Drive located approximately 250 m from the site.

Otters

One otter record was identified in the search area. An otter was recorded swimming within a watercourse located approximately 1.5 km west of the site.

Otters are known to be present within the River Ely (see Section 3.2.1) which runs parallel to the site.

Dormice

Although no records of dormouse exist within the search area several dormouse (*Muscardinus avellanarius*) records exist within Coed Trecastell woodland which is located approximately 2.3 km south of the southern end of the site. There is connectivity, though limited, between this woodland and the woodland mapped along the western carriageway of the site.

3.4.2 UK Protected/Priority Species

Badgers

No records of badgers exist within 2 km of the site.

Reptiles

A total of 32 records of reptiles were identified within 2 km of the site including adder, grass snake (*Natrix natrix*), slow worm and common lizard. The nearest record is of a common lizard located approximately 500m west of the site.

Birds

SEWBReC held 44 records of protected and priority bird species within the 2km radius area of search including Schedule 1 species such as goshawk (*Accipiter gentilis*) hobby (*Falco subbuteo*). The records (Appendix A) are presented as provided by SEWBReC.

Amphibians

Eight records of common frog and one record of palmate newt exist within the search area. The nearest record is for palmate newt which have been recorded within Coedely conservation ponds located approximately 30 m south of Coedely roundabout.

Fish

SEWBReC did not provide any records of protected or priority fish species within 2km in the last 10 years, however the River Ely and Nant Muchadd are known to support protected and priority fish species. Species such as salmon and brown trout are included within the SINC designation descriptions for these habitats (see Section 3.2.1).

Invertebrates

Records of invertebrates identified within the 2km search area include the dingy skipper (*Erynnis tages*) located approximately 500 m west of the northern end of the scheme and white-spotted sable (*Anania funebris*) located approximately 1.1 km south of the site.

Small Mammals

Records of hedgehog (*Erinaceus europaeus*), polecat (*Mustela putorius*), brown hare and weasel (*Mustela nivalis*) exist within the search area. The closest record is of a polecat road traffic causality noted within the site boundary.

Plants and Fungi

There are records of 3 priority and protected plant and fungi species within 2 km of the scheme (bluebell *(Hyacinthoides non-scripta)* violet coral *(Clavaria zollingeri)* and olive earth-tongue *(Microglossum olivaceum*). The nearest record is for bluebells which were recorded approximately 400 m south-west of Ynysmaedy roundabout within Llantrisant Forest.

Invasive Species

A total of nine invasive species have been recorded within 2 km of the three sites including Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*) and montbrecia (*Crocosmia pottsii x aurea = C. x crocosmiiflora*).

4. Phase 1 Habitat Survey Results

4.1 Habitats

The results of the site survey are shown on drawing GC002498-CAP-74-XX-DR-L00001. A botanical species list is provided in Appendix B and additional target notes (TN) are detailed in Appendix C.

4.1.1 Semi-natural broad-leaved woodland

Semi-natural broad-leaved woodland (TN 1) was mapped within the scheme footprint along the southern carriageways of the A4119 which were connected to larger areas of woodland (e.g. woodland mapped along the River Ely). Sycamore and ash were the dominant canopy species and ancient woodland ground flora species such as hart's-tongue fern (*Asplenium scolopendrium*) and herb Robert (*Geranium robertianum*) were recorded. Alder was present within the canopy towards the wetter habitats associated with the river. Himalayan balsam was locally abundant and Japanese knotweed occasional within woodland that falls within the site boundary.

Semi-natural broad-leaved woodland was also mapped in the wider area (TN 3). Species noted included sycamore, ash, alder, hazel and hawthorn (*Crataegus monogyna*). Large extents of Himalayan balsam and Japanese knotweed were also recorded (particularly along the banks of the River Ely).

4.1.2 Broad-leaved plantation woodland

Broad-leaved plantation woodland (TN 2) was mapped along both sides of the A4119. Canopy species included ash, sycamore, hazel, hawthorn and bramble (*Rubus fruticosus agg*) were dominant in the understorey and ground flora species included broad-leaved dock (*Rumex obtusifolius*) and goosegrass (*Galium aparine*). Bracken (*Pteridium aquilinum*) and Himalayan balsam were locally abundant.

Broad-leaved plantation woodland (TN 4) was mapped to the southern end of the scheme (associated with the fire station). Species noted included dogwood (*Cornus sanguinea*), pine (*Pinus* sp.), dog rose (*Rosa canina*), blackthorn (*Prunus spinosa*), silver birch (*Betula pendula*) and bramble.

4.1.3 Mixed plantation woodland

A large area of well-established mixed conifer plantation (TN 8) was mapped in the wider area (to the south of the River Ely) which forms part of the Llantrisant Forestry and Craig Melyn SINC. Further detail is included within Section 3.2.1.
Mixed plantation woodland (TN 18) was mapped on Coedly roundabout. Species included pine, hawthorn and bramble.

A small area of mixed plantation woodland (TN 19) was mapped to the southern end of the scheme along the eastern carriageway. Larch (*Larix* sp) was the abundant species and sycamore was common.

4.1.4 Scattered broad-leaved trees

Thirteen scattered planted broad-leaved trees (TN 5) were mapped on the eastern side of Coedely roundabout. Species included rowan (*Sorbus aucuparia*), lime (*Tilia x europaea*), horse chestnut (*Aesculus hippocastanum*) and cherry (*Prunus avium*).

A large ash tree (*Fraxinus excelsior*) (TN 23) was mapped along the eastern carriageway adjacent to a small road that leads to farmland buildings.

Three immature silver birch trees (TN 7) were mapped within semi-improved grassland adjacent to the Ynysmaerdy roundabout.

4.1.5 Scattered coniferous trees

Pine trees (*Pinus* sp.) (TN 9) were mapped at the back of a plot on the eastern carriageway. The trees were adjacent to a small road that leads to farmland buildings and are likely to have been planted for noise/visual buffering.

4.1.6 Dense scrub

A small area of dense scrub (TN 10) was mapped to the south-west of Coed Ely roundabout (adjacent to the western carriageway). Species included rosebay willowherb (*Chamerion angustifolium*), bramble, Japanese knotweed and Himalayan balsam.

An area of dense scrub (TN 11) lined the southern boundary of an improved grassland field to the east of Coed Ely roundabout. Species recorded included bramble, bracken, meadow vetchling (*Lathyrus pratensis*) and field horsetail (*Equisetum arvense*).

Dense scrub (TN 12) was also mapped approximately central to the scheme along the eastern carriageway. Bramble and bracken were the abundant species with hazel and hawthorn common and false oatgrass (*Arrhenatherum elatis*) frequent.

A small area of dense scrub (TN 13) was mapped adjacent to the entrance of the scrap yard located along the western carriageway. Species included buddleia (*Buddleia davidii*), rosebay willowherb, ash and bramble.

4.1.7 Recently felled mixed woodland

An area of recently felled mixed woodland (TN 21) was mapped within the Llantrisant Forestry and Craig Melyn SINC (detailed in Section 3.2.1).

4.1.8 Semi-improved neutral grassland

A sloped verge of semi-improved neutral grassland (TN 14) was mapped to the south of the Coedely roundabout at the top of the western carriageway. Species included cock's-foot (*Dactylis glomerata*), common knapweed (*Centaurea nigra*), bird's-foot trefoil (*Lotus corniculatus*), tufted vetch (*Vicia cracca*) and mouse ear (*Cerastium fontanum*).

4.1.9 Poor-semi improved grassland

Poor-semi improved grassland (TN 6, 15) was mapped along the verges of the A4119 and the Coed Ely and Ynysmaerdy roundabouts. Species included Yorkshire fog (*Holcus lanatus*), dandelion (*Taraxacum agg*), fescue (*Festuca* sp.), ribwort plantain (*Plantago lanceolata*), yarrow (*Achillea millefolium*) and creeping buttercup (*Ranunculus repens*). These areas appeared to be mown regularly.

4.1.10 Improved grassland

A number of improved grassland fields were mapped adjacent to the A4119. Species noted from the perimeter of the fields included creeping buttercup, ribwort plantain and Yorkshire fog. Rush (*Juncus* sp.) species were often occasional but locally dominant.

4.1.11 Introduced species

A small section of introduced species (TN 16) were mapped along the western carriageway near to Pantglas house. Leyland Cypress (*Cupressus x leylandii*) dominated but bamboo and cotoneaster (*Cotoneaster sp.*) were also recorded.

4.1.12 Hedgerows

Numerous hedgerows were mapped in the wider area bordering agricultural fields adjacent to the A4119. At least some of the hedgerows appeared to be species-rich but could not properly be assessed due to access issues (see Section 2.3).

4.1.13 Wall

A stone retaining wall (approximately 6 m high) (TN 17) was mapped near to the southern end of the scheme along the eastern carriageway. Ivy (*Hedera helix*) and buddleia were recorded growing out of the structure and plantation broad-leaved woodland was mapped in front.

4.1.14 Running water

The River Ely (TN 22) flows parallel to the western carriageway and two tributaries are culverted underneath the A4119 itself.

4.2 Species

4.2.1 European Protected Species

Bats

Trees, culverts, buildings and a retaining wall located alongside the A4119 have the potential to support bat roosts within suitable features such as cracks and crevices and behind dense ivy cover.

Woodland, scrub and tall ruderal habitats mapped alongside the road are considered to be suitable for foraging and commuting routes for bats.

Otters

The River Ely is known to support otters (see Section 3.4.1) which runs parallel to the scheme (closest distance is 5 m from the A4119). Otters are highly likely to be present within this section of the river.

Two tributaries of the River Ely pass underneath the road and are also considered to be suitable for otters.

Great crested newts

Conservation ponds exist approximately 30 m south-west of the Coed Ely roundabout where palmate newts and common frogs have been recorded previously (see Section 3.4.1). The

waterbodies could also have the potential to support great crested newts but are separated from the site by the River Ely which would act as a barrier for dispersal of the species.

Dormice

The Mynydd Garth Maelwg woodland located along the western carriageway of the A4119 is a large woodland likely to be suitable for dormouse although the adjacent long established but primarily conifer forest (Llantrisant Forestry and Craig Melyn SINC (approx. 50 m south of the scheme)) reduces the suitability slightly. No records exist within 2km of the scheme (see Section 3.4.1) but is some connectivity to known dormouse population within Coed Trecastell woods (albeit limited).

4.2.2 UK Protected/Priority Species

Birds

There is potential for breeding birds in woodland, scattered trees, scrub and tall ruderal habitats mapped on site.

Reptiles

There was potential in areas of poor semi-improved grassland for small numbers of reptiles.

Invertebrates

There was no potential for specially protected invertebrate species.

4.2.3 Other

Badgers

Woodland and agricultural fields mapped on site may have the potential to support badgers.

Fish

The River Ely and other watercourses adjacent to the A4119 are likely to support fish species such as salmon, brown trout and European eel.

4.2.4 Invasive Species

Japanese knotweed, Himalayan balsam and cotoneaster were recorded during the survey.

5. Discussion

5.1 SINC

The River Ely SINC runs parallel to the western carriageway A4119 and is directly adjacent to the southern end of the scheme (see drawing GC2498-CAP-74-XX-DR-L-0002). The SINC will require protection during the works to avoid pollution and light spillage and habitat loss will need to be kept to a minimum. Further detail can be found in Sections 7.1, 7.11 and 7.14.

5.2 Bats

Habitat on site appears to be suitable for foraging and commuting routes including tree lines, woodland, hedgerows and watercourses. Trees, buildings and culverts in or directly adjacent to the site may also have bat roost potential and further assessment will be required. European legislation relating to bats is detailed in Appendix C.

5.3 Otters

Otters are likely to be present within the section of the River Ely that runs parallel to site as well as associated tributaries that run underneath the A4119.

It will be necessary to avoid impacting on otters during the works and otter surveys will be required to establish if there are any holts nearby.

5.4 Dormice

Hedgerows and woodland exist within the site which could be suitable for low numbers of dormice due to pre-existing records of the species within the wider area and connectivity to larger, more suitable woodlands (see Section 4.2.1). European legislation relating to dormice is detailed in Appendix C.

5.5 Great crested newts

Conservation ponds within 30 m of the scheme are separated from the site by the River Ely. The river would prevent great crested newts from accessing the site and therefore the species will not be considered any further.

5.6 Breeding birds

Suitable bird nesting habitat was noted throughout the site in habitats such as woodland, scrub and scattered trees. Nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended) (detailed in Appendix C).

5.7 Reptiles

Semi-improved grassland and scrub habitats located alongside the A4119 are suitable to support low numbers of reptiles such as common lizard and slow worm.

Common reptiles receive protection under the Wildlife and Countryside Act (1981), as amended, from killing and injury, and are considered to be priority species for the Conservation of Biodiversity, the local authority has a duty to consider the conservation of these species.

5.8 Fish

A number of protected fish species are likely to be present in watercourses adjacent to site such as the River Ely.

Measures will need to be undertaken to avoid polluting these watercourses during the works and impacting upon fish (see Section 7.12).

5.9 Invasive species

Japanese knotweed and Himalayan balsam mapped on site are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Further survey and mitigation will be required to avoid spreading the invasive species into the local area.

6. Conclusion

The southern end of the scheme lies directly adjacent to the River Ely SINC which has been designated for the watercourse and its wooded banks.

The site has the potential to support numerous protected species such as bats, otters, dormice, breeding birds, badgers and reptiles.

7. Recommendations

7.1 SINC Protection

The River Ely SINC will require protection throughout the duration of the works. Habitat loss will need to be kept to a minimum, lighting of the river channel restricted (see Section 7.12) and measures will need to be in place to prevent pollution (see Section 7.15).

7.2 Hedgerow survey

It will be necessary to identify the quality of the hedgerows that are likely to be directly affected by the scheme. The hedgerows should be surveyed between May and August. Dependent on the results of the survey and the extent of the works Hedgerow Removal Notices may be required from the Local Planning Authority.

7.3 Hedgerow retention/reinstatement

The loss of potentially species-rich hedgerows which adjoin the habitats along the A4119 (see Section 4.1.12) will need to be kept to a minimum. Where possible hedgerows should be retained and used to maintain connectivity during and after the works are complete. In particular any hazel within the footprint of the scheme should be coppiced and replanted to benefit dormice which may be present on site (see Section 5.4).

7.4 Bat assessment survey

Once the extent of the proposed works has been confirmed an ecologist can assess the level of impact to roosting bats. It is likely that due to the loss of suitable habitat on site (buildings, culverts, retaining wall) further survey and/or mitigation will be required.

An initial assessment can be undertaken at any time of year.

7.5 Bat activity surveys

Bat activity surveys are required along transects within high value habitats throughout the site. The surveys will determine if and how the bats are using the site and the species assemblage across the site.

Two bat activity surveys should be completed per transect each month between May-September in accordance with current guidelines (BCT, 2016) and static recorders will also be set up across the site.

7.6 Dormouse Survey (hazel nut search)

A hazel nut search should be carried out on site. This involves collecting samples of gnawed hazel nuts and checking for tooth marks characteristic of dormice to help determine presence/likely absence.

As the loss of woodland on site suitable for the species is fairly minimal if this survey method produces negative results then a method statement is likely be sufficient for the works to be carried out (*Pers, Comm*. 2016b). The need for further survey will be determined following the collation of the results.

The hazel nut search should be carried out on site between mid-August and December.

7.7 Otter survey

An otter survey will be required to check for otter holts within the vicinity of the scheme as well as other signs of otter presence. Following the survey an ecologist will also be able to advise of any additional constraints that may be posed.

7.8 General Otter Mitigation

- The site compound (and all machines and materials) if required should be located away from the watercourse. A suitable location for the compound should be agreed with an ecologist to ensure that this doesn't conflict with other ecological considerations.
- Materials and machinery should be locked away in the site compound when not in use, day, night or weekends.
- Watercourses should be left open as much as possible during the night. Fencing should not occupy or obstruct the watercourses, leaving a safe passage for otters and bats at all times during the works.
- Any excavations should be securely fenced off and covered over at the end of the working period, at weekends or when not in use.
- If otters or any excavations/holts within the river channel are observed at any time all works must stop immediately and an ecologist must be notified.

7.9 Sensitive vegetation clearance

Sensitive vegetation clearance is likely to be required to avoid impacting on dormice, reptiles and breeding birds. This may involve restrictions on the seasonal timings of clearance (e.g. avoid bird breeding season (March-August inclusive)), 2-stage cutting methods and/or ecological supervision. The requirements can be fully determined following targeted species surveys.

7.10 Reptile Survey

It will be necessary to carry out a series of seven reptile surveys (in accordance with best practice guidelines) between March and September. Artificial Cover Objects (ACO's) will be placed within areas of suitable habitat identified along the route and checked in order to establish presence/likely absence of reptiles.

7.11 Invasive species

Invasive species on site will need to be mapped and a site-specific management plan will be required.

The plan will need to address methods of clearance of invasive species, movement/treatment of soil which may contain Japanese knotweed rhizomes and/or Himalayan balsam seeds and longer-term management of invasive species within the site.

7.12 Lighting

The specification and layout of any new lighting that may be included within the design should be agreed with an experienced ecologist at the design stage.

Night-time working should be avoided and no artificial lighting should be used around River Ely SINC and associated watercourses to avoid disturbing species such as bats, otters and fish.

7.13 Maintaining/enhancing connectivity

Maintaining habitat connectivity along the woodland and hedgerows on site is required during and after the works and should be discussed with the ecologist throughout the feasibility and design stages. This is to ensure bat flight lines and wildlife corridors are retained at all times.

Enhancement could be achieved by reducing gaps within the canopy and planting native and diverse species that would benefit a wide range of species.

7.14 Enhancing culverts for otters and bats

It is likely that culverts on site will be extended/replaced which presents opportunities to enhance them for bats and otters.

Bat boxes could be installed to encourage bats to roost within the structure. Further information can be provided following the targeted surveys (see Section 6.3).

There are also opportunities to enhance the site for otters by incorporating an otter ledges into the design of any new culverts. Otter ledges would aim to encourage otters to still use the culverts in times of spate and deter them from crossing the road above.

7.15 Water Pollution Prevention

Pollution prevention measures should be followed to avoid impacting water quality and prevent impacting species such as otters, fish and freshwater invertebrates.

To avoid polluting the watercourse during the works the following recommendations should be adhered to:

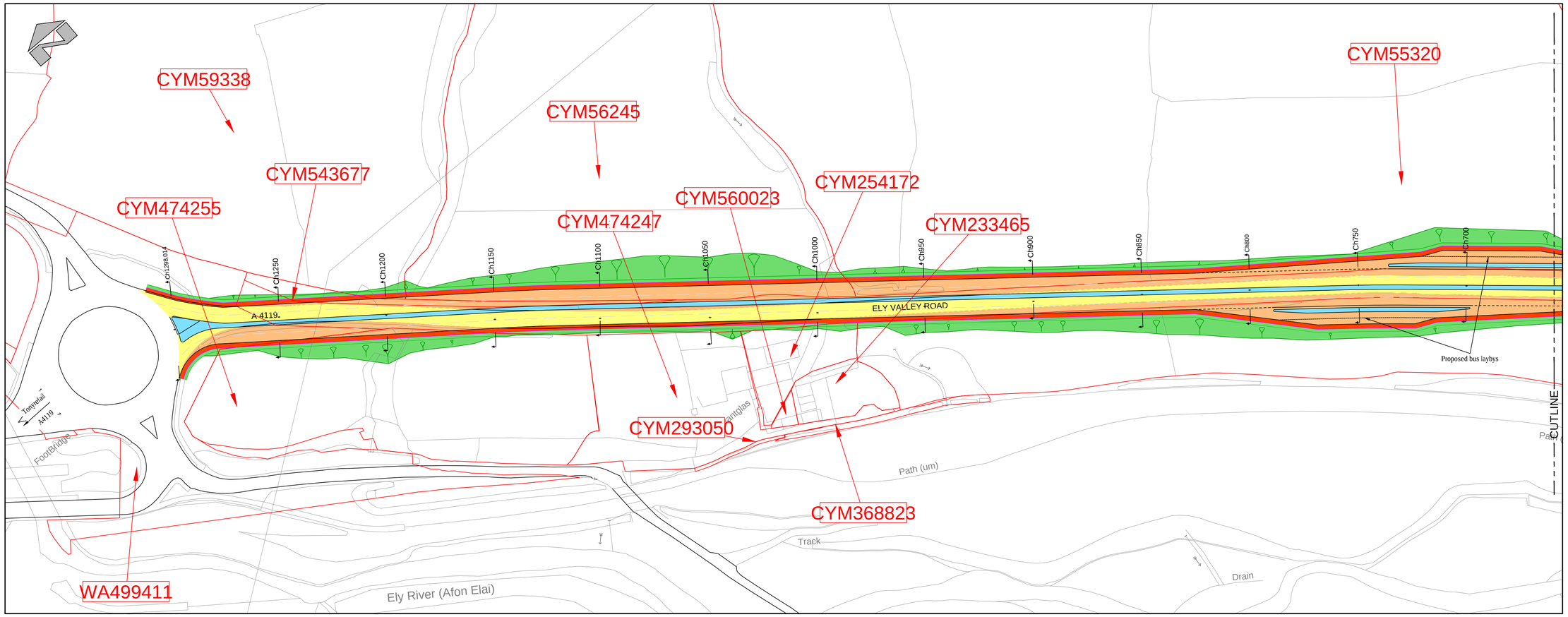
- All materials (especially if hazardous or toxic) should be stored at least 7m away from the watercourse;
- All static machinery should be placed drip-trays or oil absorbent nappies. Trays should be emptied regularly to ensure that they contain any spills.
- Silt fences should be erected where appropriate

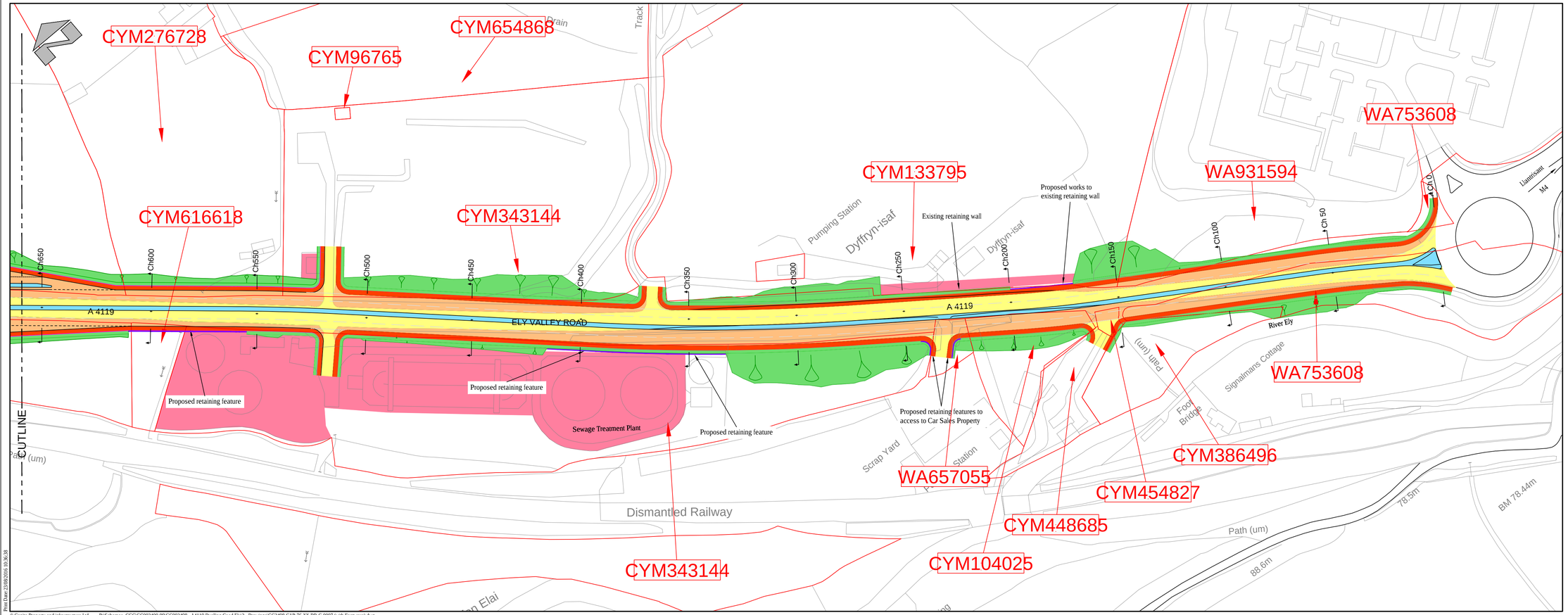
8. References

- Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.
- JNCC. 2010. Handbook for Phase 1 habitat survey. A technique for environmental audit. Joint Nature Conservation Committee
- Personal Communication (*Pers Comm,* 2016a. Email from Richard Wistow received on 22nd July 2016.
- Personal Communication (*Pers Comm,* 2016b. Email confirmation from Richard Wistow received on 7th September 2016.
- Stace, C. A., (2010). (3rd Edition) New Flora of the British Isles, Cambridge University Press
- Wildlife and Countryside Act 1981 (as amended)

Drawings

- GC002498-CAP-74-XX-DR-C-0007-P01.1 – Preliminary Proposals with Footways
- GC2498-CAP-74-XX-DR-L-0002 – Statutory and Non-Statutory Sites
- GC2498-CAP-74-XX-DR-L-0001 – Phase 1 Habitat Survey





Key

- New road
- Revised/raised road
- New 2m wide footway
- New/revised verge and embankment
- Site Constraints
- Central reservation

Rev	Dwn	Chk'd	Appr'd	Description	Date

Purpose of Issue
S2 - Suitable for Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Preliminary Proposals
with Footways

Scale @ A1	Drawn	Checked	Approved
1:1,000	HT	NM	

Project No.: GC/002498
Date: July 2016

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC2498-CAP-76-XX-DR-C-0007
BS1192 Compliant revision: P01.1

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Capita Property and infrastructure Ltd

DRAFT 23/08/2016

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Pant-y-Ddraenen SINC

Garth-Grabban Slopes SINC

Tonyrefail Mountains SINC

Rhiwfelin Fawr SINC

River Ely SINC

Rhos Tonyrefail SSSI

Mynydd Meiros/Upper Ewenny Fach SINC

Llantrisant Common and pastures SINC

Y Graig SINC

Llantrisant Forestry and Craig Melyn SINC

SITE LOCATION

1:2,000

Key

Non-Statutory Sites

Statutory Sites

2km Buffer Zone

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

Reference Plan

Classification

Commercial in Confidence

Client

Rhondda Cynon Taf
County Borough Council

Project

A4119 Ely Valley Road Dualling

Drawing

Ecology
Statutory and Non Statutory Sites

Scale @ A1	Drawn	Checked	Approved
As Shown	SW	JS	AF

Project No.	Date
GC/002498	June 2016

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

GC2498-CAP-74-XX-DR-L-0002

BS1192 Compliant revision

P01

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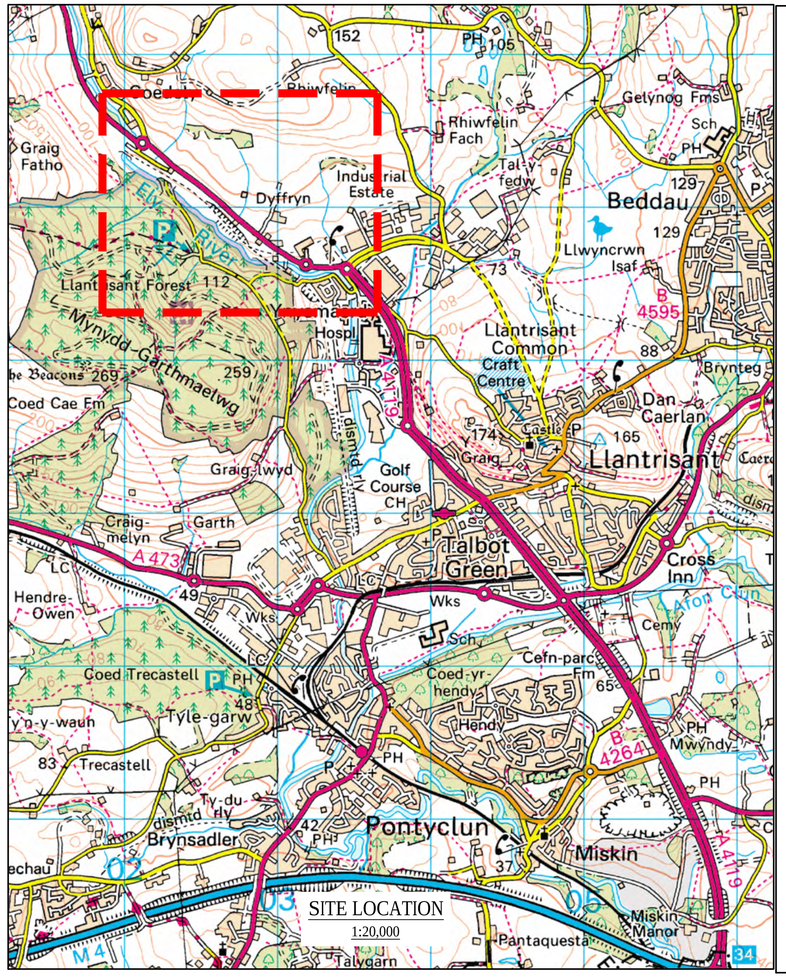

Key

- Semi-natural Broad-leaved Woodland
- Plantation Coniferous Woodland
- Dense / Continuous Scrub
- Tall Ruderal
- Buildings / Hard Standing
- Scattered Trees (coniferous)
- Scattered Trees (broad-leaved)
- Marsh / Marshy Grassland
- Poor Semi Improved Grassland
- Improved Grassland
- Plantation Mixed Woodland
- Wall
- Running Water
- Scattered Scrub
- Plantation Broad-leaved Woodland
- Standing Water
- Introduced Shrub
- Spoil
- Recently-Felled Woodland (mixed)
- Target Note

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
Reference Plan

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Ecology
Phase 1 Habitat Plan

Scale @ A1	Drawn	Checked	Approved
As Shown	GB	JS	AF

Project No.	Date
GC/002498	June 2016

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2498-CAP-74-XX-DR-L-0001

BS1192 Compliant revision
P01

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Appendix A- SEWBReC Data

A.1 Protected and Priority Species within 5 km (bats only)

Common Name	Scientific Name	Legislation / Conservation Status	Number of Records	Most Recent Record
Bats	*Chiroptera*	EPS, WCA5, S42, LBAP (ANG, DEN, FLI, RCT, SNP, TRA, TRF)	50	June 2015
Serotine	*Eptesicus serotinus*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (GWY, POW, TRA, TRF)	4	July 2014
Unidentified Bat	*Myotis*	EPS, HDir, WCA5, Bonn, Bern, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	76	July 2014
Daubenton's Bat	*Myotis daubentonii*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	June 2006
Whiskered Bat	*Myotis mystacinus*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	September 2015
Natterer's Bat	*Myotis nattereri*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	August 2012
Nyctalus Bat species	*Nyctalus*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA)	4	July 2012
Lesser Noctule	*Nyctalus leisleri*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	5	October 2011
Noctule Bat	*Nyctalus noctula*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	54	June 2015
Pipistrelle Bat species	*Pipistrellus*	EPS, WCA5, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	72	May 2016
Nathusius's Pipistrelle	*Pipistrellus nathusii*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	9	October 2011
Common Pipistrelle	*Pipistrellus pipistrellus*	EPS, HDir, WCA5, S42, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	193	September 2015
Pipistrelle	*Pipistrellus pipistrellus* agg.	EPS, HDir, WCA5, S42, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	3	October 2012
Soprano Pipistrelle	*Pipistrellus pygmaeus*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CLY, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	153	July 2015
Brown Long-eared Bat	*Plecotus auritus*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	27	July 2015
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD1 (UK), RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CRM, DEN, FLI, MON, PEM, POW, SNP, TRA, TRF, VOG)	3	October 2011
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CLY, CON, CRM, DEN, FLI, GWY, MON, PEM, POW, SNP, TRA, TRF, VOG, WRE)	12	September 2010
Bats	*Vespertilionidae*	EPS, WCA5, Bonn, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	34	October 2011

A.2 Protected and Priority Species within 2 km (excluding bats)

Common Name	Scientific Name	Legislation/conservation status	Number of records	Most recent record
Adder	*Vipera berus*	WCA5, S42, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	6	May 2016
Bluebell	*Hyacinthoides non-scripta*	WCA8, LBAP (ANG, CLY, CON, FLI, SNP, TRA, TRF)	18	June 2016
Broom Moth	*Ceramica pisi*	S42, UKBAP, LBAP (GWY, VOG)	4	August 2015
Brown Hare	*Lepus europaeus*	S42, UKBAP, Bern, LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG)	1	June 2016
Brown-banded Carder-bee	*Bombus (Thoracobombus) humilis*	S42, UKBAP, LBAP (CER, CON, FLI, GWY, PEM, POW, VOG)	1	May 2016
Buff Ermine	*Spilosoma lutea*	S42, UKBAP, LBAP (GWY, VOG)	1	July 2013
Bullfinch	*Pyrrhula pyrrhula*	S42, UKBAP, WBR(RSPB), LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, TRF, VOG), UKBR(RSPB), UKBAm(RSPB)	1	April 2014
Common Crossbill	*Loxia curvirostra*	WCA1.1, Bern, LBAP (CON, POW), LI(VC43)	2	October 2013
Common Frog	*Rana temporaria*	HDir, WCA5, Bern, LBAP (ANG, CLY, CON, FLI, POW, TRA)	8	February 2016
Common Lizard	*Zootoca vivipara*	WCA5, S42, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	23	June 2016
Common Toad	*Bufo bufo*	WCA5, S42, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, TRA, VOG)	2	May 2011
Dingy Skipper	*Erynnis tages*	S42, UKBAP, RD1 (UK), LBAP (BGW, BRG, CON, FLI, GWY, SWN, VOG), LI(SEWBReC)	2	May 2016
Dunnock	*Prunella modularis*	S42, UKBAP, Bern, RD2 (UK), LBAP (CON, POW, VOG), UKBAm(RSPB)	4	May 2014
Goshawk	*Accipiter gentilis*	WCA1.1, WCA9, Bonn, CITES, LBAP (CLY, CON, POW, VOG)	1	April 2007
Grass Snake	*Natrix natrix*	WCA5, S42, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, VOG)	2	May 2014
Hawfinch	*Coccothraustes coccothraustes*	S42, UKBAP, Bern, LBAP (CON, DEN, FLI, GWY, POW, VOG), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	1	May 2013
Hobby	*Falco subbuteo*	WCA1.1, Bonn, Bern, CITES, LBAP (CON, GWY, POW, VOG), WBAm(RSPB), LI(VC43)	1	June 2014
House Sparrow	*Passer domesticus*	S42, UKBAP, Bern, LBAP (CLY, CON, FLI, GWY, VOG), WBAm(RSPB), UKBR(RSPB)	1	May 2009
Kestrel	*Falco tinnunculus*	S42, Bonn, Bern, CITES, WBR(RSPB), LBAP (ANG, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), LI(VC43), UKBAm(RSPB)	2	July 2015

Common Name	Scientific Name	Legislation/conservation status	Number of records	Most recent record
Lesser Redpoll	*Acanthis cabaret*	S42, UKBAP, WBR(RSPB), LBAP (CON), LBAP (DEN, POW, VOG), UKBR(RSPB), UKBAm(RSPB)	2	October 2013
Linnet	*Linaria cannabina*	S42, Bern, WBR(RSPB), LBAP (ANG, BBNP, CER, CLY, DEN, FLI, PEM, VOG), LBAP (CON, GWY), UKBR(RSPB)	3	May 2015
Marsh Fritillary	*Euphydryas aurinia*	EPS, HDir, WCA5, S42, UKBAP, Bern, RD1 (UK), RD2 (UK), LBAP (ANG, BBNP, CER, CON, CRM, GWY, PEM, POW, SNP, TRA, VOG), LI(SEWBReC)	1	April 2006
Merlin	*Falco columbarius*	BDir1, WCA1.1, Bonn, Bern, CITES, LBAP (CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	1	November 2009
Olive Earthtongue	*Microglossum olivaceum*	S42, UKBAP, LBAP (BBNP, CER, MON, POW)	3	October 2006
Palmate Newt	*Lissotriton helveticus*	WCA5, Bern, LBAP (ANG, CLY, CON, DEN, FLI, POW, TRA), LI(BIS)	1	March 2016
Polecat	*Mustela putorius*	HDir, S42, UKBAP, Bern, RD2 (UK), LBAP (BGW, BRG, CON, FLI, GWY, NEW, POW, SNP, VOG)	1	September 2010
Redwing	*Turdus iliacus*	BDir22, WCA1.1, LBAP (CON, POW), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	4	December 2013
Reed Bunting	*Emberiza schoeniclus*	S42, UKBAP, Bern, LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	2	April 2010
Rustic	*Hoplodrina blanda*	-	1	July 2013
Slow-worm	*Anguis fragilis*	WCA5, S42, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, VOG)	1	Summer 2011
Small Pearl-bordered Fritillary	*Boloria selene*	WCA5, S42, UKBAP, RD1 (UK), RD2 (UK), LBAP (BBNP, CER, CON, DEN, FLI, PEM, POW), LI(SEWBReC), LI(VC43)	5	July 2015
Song Thrush	*Turdus philomelos*	BDir22, S42, UKBAP, Bern, RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG, WRE), WBAm(RSPB), UKBR(RSPB)	9	May 2014
Spotted Flycatcher	*Muscicapa striata*	S42, UKBAP, Bonn, Bern, WBR(RSPB), LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), UKBR(RSPB)	1	May 2014
Starling	*Sturnus vulgaris*	BDir22, S42, UKBAP, Bern, RD2 (UK), WBR(RSPB), LBAP (BBNP, CON, FLI, GWY, VOG), UKBR(RSPB)	4	May 2014
Tree Pipit	*Anthus trivialis*	S42, UKBAP, Bern, LBAP (CON, DEN, FLI, GWY, POW, VOG), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	1	May 2014
Violet Coral	*Clavaria zollingeri*	S42, LBAP (CON, FLI, POW)	1	October 2006
Weasel	*Mustela nivalis*	NRW, Bern, LBAP (ANG, BGW, BRG, CON, FLI, NEW, POW)	1	April 2008
West European Hedgehog	*Erinaceus europaeus*	S42, UKBAP, Bern, LBAP (ANG, BGW, BRG, CON, FLI, GWY, NEW, POW, RCT, VOG)	2	September 2015
White-spotted Sable	*Anania funebris*	S42, UKBAP, RD2 (UK)	5	May 2014

Common Name	Scientific Name	Legislation/conservation status	Number of records	Most recent record
Wood Warbler	*Phylloscopus sibilatrix*	S42, UKBAP, WBR(RSPB), LBAP (CON, GWY, SNP, VOG), UKBR(RSPB), UKBAm(RSPB)	4	May 2014

A.3 Other species of conservation concern

Common Name	Scientific Name	Legislation / Conservation Status	Number of Records	Most Recent Record
Monk's-hood	*Aconitum napellus*	RD2 (UK), LBAP (CDF, RCT, VOG), LI(BIS), LI(SEWBReC), WVP	1	14th August 2015
Long-tailed Tit	*Aegithalos caudatus*	WBAm(RSPB)	6	10th February 2016
Mallard	*Anas platyrhynchos*	BDir21, Bonn, LBAP (CON, GWY), WBAm(RSPB), UKBAm(RSPB)	1	26th February 2016
Meadow Pipit	*Anthus pratensis*	Bern, LBAP (CON), WBAm(RSPB), UKBAm(RSPB)	7	31st March 2016
Little Thorn	*Cepphis advenaria*	RD2 (UK), LBAP (BGW, CLY)	1	16th May 2014
Dipper	*Cinclus cinclus*	Bern, LBAP (BRG, CLY, CON, MTR, POW, RCT, TRA), WBAm(RSPB)	3	31st May 2013
House Martin	*Delichon urbicum*	Bern, LBAP (BRG, CON, POW, RCT, VOG), WBAm(RSPB), UKBAm(RSPB)	3	5th October 2013
Alder Kitten	*Furcula bicuspis*	RD2 (UK), LBAP (NPT), LI(BIS)	1	21st May 2014
Common Snipe	*Gallinago gallinago*	BDir21, Bonn, LBAP (ANG, CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	2	March 2001 - May 2011
Snipe	*Gallinago gallinago*	BDir21, Bonn, LBAP (ANG, CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	3	28th June 2014
Petty Whin	*Genista anglica*	RD1 (UK), LBAP (GWY), LI (VC43)	1	11th January 2014
Sedge Fanner	*Glyphipterix forsterella*	RD2 (UK)	1	4th June 2012
Crane	*Grus grus*	BDir1, WCA9, Bonn, Bern, CITES, RD2 (UK), UKBAm(RSPB)	1	19th April 2015
Swallow	*Hirundo rustica*	Bern, LBAP (ANG, CON, GWY, POW, VOG), WBAm(RSPB), UKBAm(RSPB)	8	26th September 2015
Devon Carpet	*Lampropteryx otregiata*	RD2 (UK), LBAP (BRG, CLY, NPT), LI(BIS)	1	21st May 2014
Lesser Black-backed Gull	*Larus fuscus*	BDir22, Bonn, Bern, LBAP (CON, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	1	30th May 2015
Brown Birch Bolete	*Leccinum scabrum*	RD1 (UK)	1	9th September 2015
Grey Wagtail	*Motacilla cinerea*	Bern, RD2 (UK), LBAP (CLY, CON, POW, TRA), UKBAm(RSPB)	1	27th October 2010
Double-line	*Mythimna turca*	RD2 (UK), LBAP (BBNP, CER, POW)	1	13th July 2013
Overleaf Pellia	*Pellia epiphylla*	RD2 (UK)	7	18th June 2016
Coal Tit	*Periparus ater*	Bern, LBAP (CON, POW), WBAm(RSPB)	15	17TH March 2016
Willow Warbler	*Phylloscopus trochilus*	WBR(RSPB), LBAP (CON), UKBAm(RSPB)	6	4th May 2015
Green Woodpecker	*Picus viridis*	Bern, LBAP (CLY, CON, DEN, FLI, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	5	11th March 2016
Goldcrest	*Regulus regulus*	Bern, LBAP (CON, POW), WBAm(RSPB), UKBAm(RSPB)	7	5th October 2013
Stonechat	*Saxicola rubicola*	Bern, RD2 (UK), LBAP (ANG, DEN, FLI, PEM, POW), LBAP (CON, GWY), UKBAm(RSPB)	3	3rd May 2016
Cornish Moneywort	*Sibthorpia europaea*	RD2 (UK), LBAP (BGW, CDF, CLY, RCT), LI(SEWBReC)	1	11th January 2014
Whitethroat	*Sylvia communis*	LBAP (CON, POW), WBAm(RSPB), UKBAm(RSPB)	2	4th May 2015
Mistle Thrush	*Turdus viscivorus*	BDir22, Bern, RD2 (UK), UKBAm(RSPB)	9	16th May 2014

Common Name	Scientific Name	Legislation / Conservation Status	Number of Records	Most Recent Record
Ivy-leaved Bellflower	*Wahlenbergia hederacea*	RD1 (UK), LBAP (DEN)	1	11th January 2014

A.4 Species of local conservation concern

Common Name	Scientific Name	Legislation / Conservation Status	Number of Records	Most Recent Record
Short-winged Cone-head	*Conocephalus dorsalis*	LBAP (BRG, TRF), LI(SEWBReC)	3	27th August 2015
Golden-ringed Dragonfly	*Cordulegaster boltonii*	LBAP (CLY, SNP), LI(BIS), LI(SEWBReC)	1	8th August 2013
Many-stalked Spike-rush	*Eleocharis multicaulis*	LBAP (BGW), LI(SEWBReC), LI(VC47)	2	9th June 2012 – 11th June 2012
Alder Buckthorn	*Frangula alnus*	LBAP (GWY, NEW), LI(SEWBReC), LI(VC47)	3	21st July 2015
Emerald Damselfly	*Lestes sponsa*	LBAP (CLY, SNP), LI(SEWBReC)	1	16th August 2013
Bee Orchid	*Ophrys apifera*	CITES, LBAP (CLY, GWY, TRA, TRF), LI(SEWBReC), LI(VC47)	1	2nd June 2008
Keeled Skimmer	*Orthetrum coerulescens*	LBAP (BGW, BRG, CLY, SNP), LI(BIS), LI(SEWBReC)	2	10th August 2015
Royal Fern	*Osmunda regalis*	LI (VC43), LI(SEWBReC), LI(VC47), LI(VC52)	1	21st July 2015

Appendix B – Botanical Species List

Common Name	Scientific Name	ACFOR
Plantation woodland (TN 2)		
Ash	*Fraxinus excelsior*	A
Bramble	*Rubus fruticosus* agg	F
Hart tongue fern	*Asplenium scolopendrium*	O
Hawthorn	*Crataegus monogyna*	A
Ivy	*Hedera helix*	C
Sycamore	*Acer pseudoplatanus*	A
Broad-leaved dock	*Rumex obtusifolius*	O
Broad-leaved willowherb	*Epilobium montanum*	R
False oatgrass	*Arrhenatherum elatius*	F
Male fern	*Dryopteris filix-mas*	O
Common knapweed	*Centaurea nigra*	R
Colt's-foot	*Tussilago farfara*	R
Yarrow	*Achillea millefolium*	R
Hogweed	*Heracleum sphondylium*	O
Hazel	*Corylus avellana*	C
Herb Robert	*Geranium robertianum*	O
Holly	*Ilex aquifolium*	O
Cotoneaster	*Cotoneaster* sp.	R
Oak	*Quercus robur*	R
Dog rose	*Rosa canina*	R
Elder	*Sambucus nigra*	R
Nettle	*Urtica dioica*	R
Himalayan balsam	*Impatiens glandulifera*	OLA
Goosegrass	*Galium aparine*	O
Bracken	*Pteridium aquilinum*	R
Field horsetail	*Equisetum arvense*	R
Cow parsley	*Anthriscus sylvestris*	R
Goat willow	*Salix caprea*	R
Male fern	*Dryopteris filix-mas*	R
Blackthorn	*Prunus spinosa*	R
Alder	*Alnus glutinosa*	R
Japanese knotweed	*Fallopia japonica*	R
Broad-leaved woodland (TN 1)		
Ash	*Fraxinus excelsior*	C
Hart tongue fern	*Asplenium scolopendrium*	F
Bramble	*Rubus fruticosus*	O
Cleavers	*Galium aparine*	R
Foxglove	*Digitalis purpurea*	R
Bracken	*Pteridium aquilinum*	C
Hawthorn	*Crataegus monogyna*	O
False oatgrass	*Arrhenatherum elatius*	O

Holly	*Ilex aquifolium*	O
Ivy	*Hedera helix*	F
Broad-leaved willowherb	*Epilobium montanum*	R
Himalayan balsam	*Impatiens glandulifera*	OLA
Sycamore	*Acer pseudoplatanus*	A
Oak	*Quercus robur*	R
Hogweed	*Heracleum sphondylium*	O
Herb Robert	*Geranium robertianum*	O
Laurel	*Lauraceae sp.*	R
Common nipplewort	*Lapsana communis*	O
Poor semi improved grassland roundabout (TN 15)		
Bird's-foot trefoil	*Lotus corniculatus*	-
Red clover	*Trifolium pratense*	-
Creeping buttercup	*Ranunculus repens*	-
Ragwort	*Senecio jacobea*	-
Field horsetail	*Equisetum arvense*	-
Daisy	*Bellis perennis*	-
Dandelion	*Taraxacum agg.*	-
Self-heal	*Prunella vulgaris*	-
Common mouse-ear	*Cerastium fontanum*	-
Spear thistle	*Cirsium vulgare*	-
Red fescue	*Festuca rubra*	-
Ribwort plantain	*Plantago lanceolata*	-
Yorkshire fog	*Holcus lanatus*	-
Sedge	*Carex sp.*	-
Tufted vetch	*Vicia cracca*	-
Annual meadowgrass	*Poa annua*	-
Semi-improved neutral grassland bank (south-west of Coedely roundabout) (TN 14)		
Rosebay willowherb	*Chamelion angustifolium*	-
Cock's-foot	*Dactylis glomerata*	-
Bird's-foot trefoil	*Lotus corniculatus*	-
Creeping buttercup	*Ranunculus repens*	-
Yorkshire fog	*Holcus lanatus*	-
Tufted vetch	*Vicia cracca*	-
Dandelion	*Taraxacum sp.*	-
Mouse ear	*Cerastium fontanum*	-
Common knapweed	*Centaurea nigra*	-
Hedge bedstraw	*Galium album*	-
Broad-leaved dock	*Rumex obtusifolius*	-
False oatgrass	*Arrhenatherum elatis*	-
Self-heal	*Prunella vulgaris*	-
Bramble	*Rubus fruticosus*	-
Silverweed	*Argentina anserina*	-
Common bent	*Agrostis capillaris*	-
Zig-zag clover	*Trifolium medium*	-
Dense scrub (south-west of Coedely roundabout) (TN 10)		

Rosebay willowherb	*Chamerion angustifolium*	A
Bramble	*Rubus fruticosus*	F
Himalayan balsam	*Impatiens glandulifera*	C
Hogweed	*Heracleum mantegazzianum*	O
Nettle	*Urtica dioica*	O
Creeping thistle	*Cirsium arvense*	F
Square-stemmed St. John's-wort	*Hypericum tetrapterum*	R
Ash	*Fraxinus excelsior*	O
Japanese knotweed	*Fallopia japonica*	O
Oak	*Quercus robur*	R
Hazel	*Corylus avellana*	R
Hemp agrimony	*Eupatorium cannabinum*	R
Willowherb sp	*Epilobium sp.*	R
Bracken	*Pteridium aquilinum*	R
Hedge bindweed	*Calystegia sepium*	R
Field horsetail	*Equisetum arvense*	R
Introduced species (TN 16)		
Leyland cypress	*Cupressus x leylandii*	A
Cotoneaster	*Cotoneaster* sp.	C
Bamboo	Bambusoideae sp	O
Broad-leaved scattered trees (adjacent to Coed Ely roundabout) (TN 5)		
Sycamore	*Acer pseudoplatanus*	F
Horse chestnut	*Aesculus hippocastanum*	F
Cherry	*Prunus avium*	R
Rowan	*Sorbus aucuparia*	R
Lime	*Tilia x europaea*	O
Wall (TN 17)		
Buddleia	*Buddleia davidii*	O
Ivy	*Hedera helix*	O
Dense scrub (along eastern carriageway) (TN 12)		
Hazel	*Corylus avellana*	C
Bramble	*Rubus fruticosus*	A
Hawthorn	*Crataegus monogyna*	C
False oatgrass	*Arrhenatherum elatis*	F
Ragwort	*Senecio jacobea*	O
Bracken	*Pteridium aquilinum*	A
Hogweed	*Heracleum mantegazzianum*	O
Ash	*Fraxinus excelsior*	O
Common vetch	*Vicia sativa*	O
Poor semi-improved grassland (along A4119) (TN 6)		
Ribwort plantain	*Plantago lanceolata*	F
Herb Robert	*Geranium robertianum*	R
Dog violet	*Viola rivinana*	R
Ivy	*Hedera helix*	O
Hogweed	*Heracleum mantegazzianum*	O
Red fescue	*Festuca rubra*	C

Semi-natural broad-leaved woodland (along River Ely) (TN 3)		
Ash	*Fraxinus excelsior*	F
Hawthorn	*Crataegus monogyna*	O
Himalayan balsam	*Impatiens glandulifera*	OLA
Alder	*Alnus glutinosa*	F
Oak	*Quercus robur*	O
Hazel	*Corylus avellana*	F
Japanese knotweed	*Fallopia japonica*	OLA
Dense scrub (eastern side of Coedely roundabout) (TN 11)		
Bracken	*Pteridium aquilinum*	C
Bramble	*Rubus fruticosus*	C
Hedge bindweed	*Calystegia sepium*	F
Hogweed	*Heracleum mantegazzianum*	O
Ash	*Fraxinus excelsior*	O
Great willowherb	*Epilobium hirsutum*	O
Bird's-foot trefoil	*Lotus corniculatus*	O
Ragwort	*Senecio jacobea*	O
Nettle	*Urtica dioica*	O
Meadow vetchling	*Lathyrus pratensis*	O
Field horsetail	*Equisetum arvense*	O
Tufted vetch	*Vicia cracca*	O
Creeping thistle	*Cirsium arvense*	O
Plantation woodland (surrounding fire station) (TN 4)		
Dogwood	*Cornus sanguinea*	A
Silver birch	*Betula pendula*	C
Pine	*Pinus* sp.	O
Bramble	*Rubus fruticosa* agg.	F
Ash	*Fraxinus excelsior*	F
Hazel	*Corylus avellana*	O
Blackthorn	*Prunus spinosa*	C
Dog rose	*Rosa canina*	R
Hawthorn	*Crataegus monogyna*	R
Nettle	*Urtica dioica*	O
Creeping thistle	*Cirsium arvense*	R
Bracken	*Pteridium aquilinum*	O
Cherry	*Prunus* sp.	R
Scattered Broad-leaved trees (TN 7)		
Silver birch	*Betula pendula*	O
Mixed plantation woodland (TN 8)		
Conifers	-	A
Sycamore	*Acer pseudoplatanus*	O
Oak	*Quercus robur*	O
Mixed plantation woodland (TN 19)		
Larch	*Larix sp*	A
Sycamore	*Acer pseudoplatanus*	C
Ash	*Fraxinus excelsior*	O
Bramble	*Rubus fruticosa* agg.	O

Coniferous scattered trees (TN 9)		
Pine	*Pinus* sp.	O
Mixed plantation woodland (on Coedely roundabout) (TN 18)		
Pine	*Pinus sp*	C
Hawthorn	*Crataegus monogyna*	F
Cherry	*Prunus* sp.	O
Bramble	*Rubus fruticosa* agg.	O
Blackthorn	*Prunus spinosa*	O

Appendix C – Additional Target Notes

TN 20 – Colliery spoil
TN 21 – Recently felled conifer plantation
TN 22 – River Ely
TN 23 – Large ash tree
TN 24 - Pond

Appendix D Legislation

European Protected Species

European Protected Species are species listed on Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). The list includes many species, including all species of bats, dormouse, great crested newts and otter. The species listed on Schedule 2 are afforded protection against:

- deliberate capture, injury or killing;
- deliberate disturbance;
- deliberate taking or destruction of the eggs;
- damage or destruction of a breeding site or resting place of such an animal.

Where a European protected species is present, a development may only proceed, under a licence issued by Natural Resources Wales. The above species are fully protected under the Wildlife and Countryside Act 1981 (as amended).

UK Protected Species: Birds

All naturally occurring British bird species are protected under the Wildlife and Countryside Act 1981 (as amended). The legislation protects all birds, their nests and eggs and it is an offence to:

- intentionally kill, injure and take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- intentionally take or destroy the egg of any wild bird.

Birds listed on Schedule 1 of the above legislation (e.g. barn owl) are afforded further protection and it is an offence to:

- intentionally or recklessly disturb the bird while nest building or while at (or near) a nest with eggs or young; or
- disturb the dependent young of such a bird.

UK Protected Species: Reptiles

All common reptiles (e.g. common lizard, grass snake, slow worm and adder) receive partial protection under the Wildlife and Countryside Act 1981 (as amended). This legislation protects these species from intentional killing or injury, however does not extend to the protection of habitats used by reptiles.

UK Protected Species: Badger

Badgers and their setts are protected under the Protection of Badgers Act 1992; the Act makes it an offence to:

- Kill, injure, take or attempt to kill, injure or take a badger; or
- Intentionally or recklessly damage, destroy or obstruct access to a badger sett, or disturb a Badger whilst it is occupying a sett.

Any works which directly affect badgers setts can only be carried out under a licence issued by Natural Resources Wales.

Appendix E – Transportation Assessment

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CAPITA

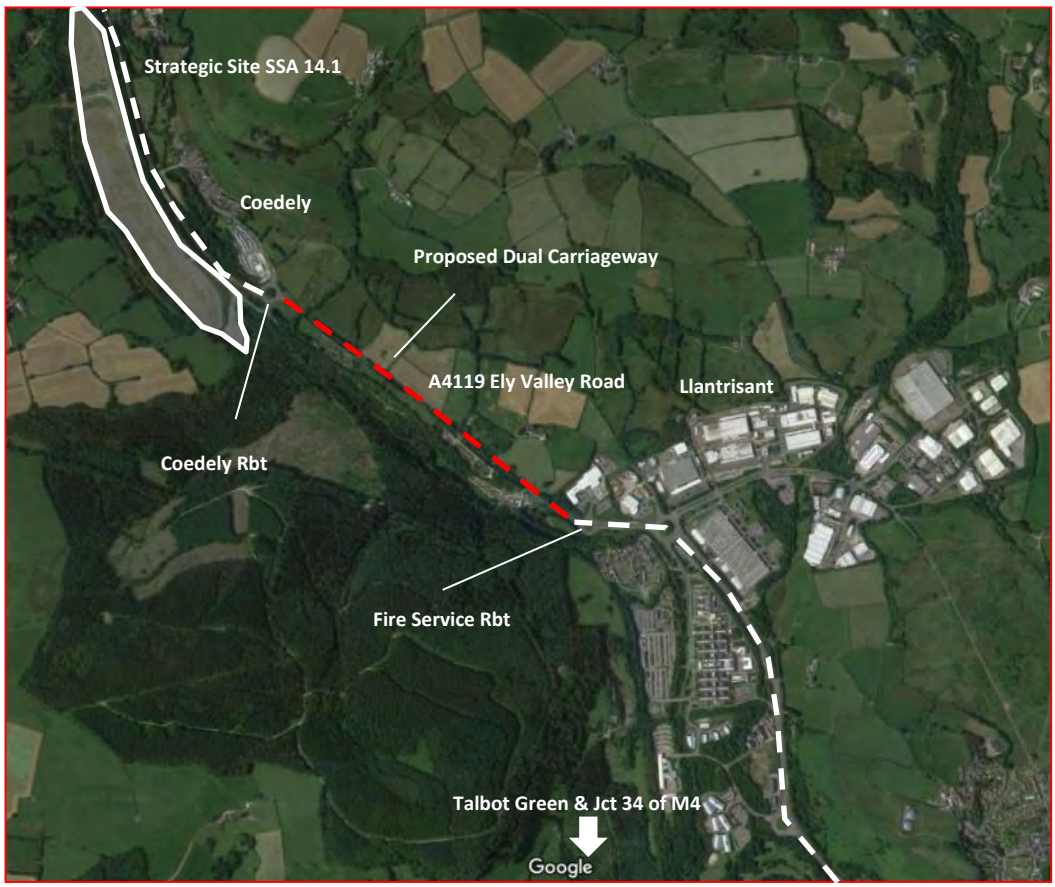
Technical Note A4119 Ely Valley Road Dualling

August 2016

1. INTRODUCTION

This technical note considers proposals to dual the A4119 Ely Valley Road between Llantrisant and Coedely in Tonyrefail as illustrated in figure 1.1.

Figure 1.1 A4119 Ely Valley Road Dual Proposal



The A4119 is a key component of the highway network in Rhondda Cynon Taf and provides connection between the M4 motorway to the south and the Rhondda valleys to the north. The A4119 also accommodates a large amount of traffic movement within the County Borough between towns such as Talbot Green and Porth. The A4119 is currently a dual carriageway between junction 34 of the M4 and the Fire Service roundabout highlighted in figure 1.1. North of this point the A4119 is mainly single carriageway.

Rhondda Cynon Taf County Borough Council (RCTCBC) has advised that this section of single carriageway road along the A4119 currently suffers from congestion. It has also been indicated that this section of the A4119 would accommodate a significant amount of traffic generated by strategic development site SSA 14.1 located adjacent to Coedely roundabout should it be developed.

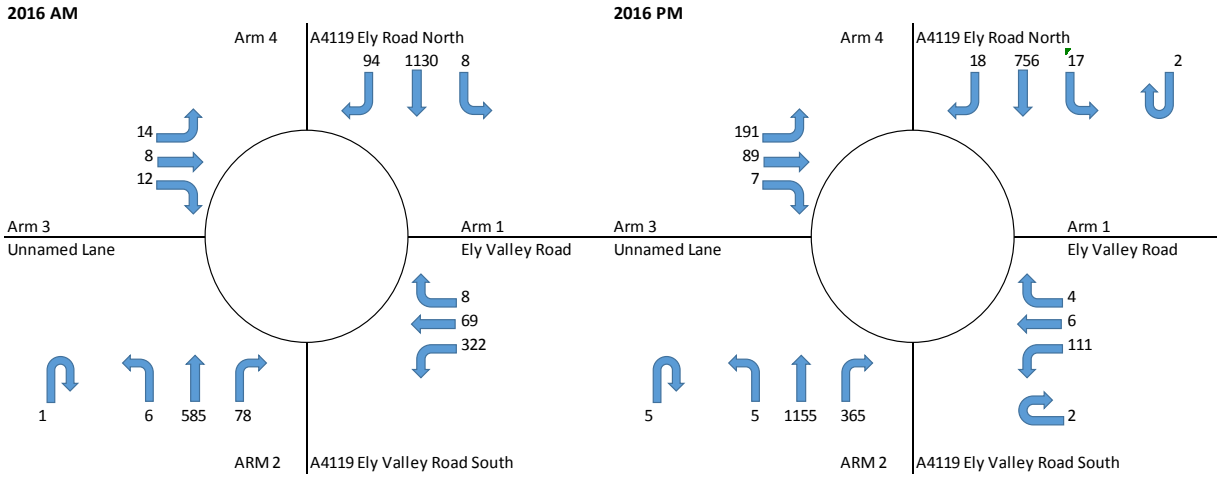
RCTCBC have commissioned Capita to undertake an initial assessment of the A4119 at this location. This includes a capacity assessment of the Coedely roundabout and consideration of any wider area modelling required. An estimate of traffic generation at the strategic site has also been undertaken in order to evaluate how the existing section of the A4119, and any improvements to the highway, will operate in the future. A high level analysis limited to assessment of the Coedely roundabout has been undertaken at this stage as it is likely that a more sophisticated wide area assessment will be required, as discussed further in Section 6.

2. SURVEY ANALYSIS

A junction classified turning count survey was undertaken at the Coedely Roundabout on the 28th June 2016, and an automatic traffic count survey was undertaken on the A4119 Ely Valley Road approximately 200 metres south of the roundabout, between the 22nd June and the 28th June 2016.

The traffic volumes on the 28th June (date of the turning count survey) were compared to the average traffic volumes as identified within the ATC survey. The turning count survey was then adjusted accordingly. Resulting turning movements are illustrated in figure 2.1.

Figure 2.1 Coedely Roundabout Turning Movements (Vehicles)



Queue surveys were also undertaken on the 28th June. The queue survey results for the peak hours are provided in table 2.1.

Table 2.1 Coedely Roundabout Queue Survey Results (Vehicles)

Arm	AM Peak		PM Peak	
	Average	Maximum	Average	Maximum
Ely Valley Road	14	29	2	4
A4119 Ely Valley Road (South)	4	15	8	31
Unnamed Road	1	8	7	16
A4119 Ely Valley Road (North)	17	31	12	22

3. COEDELY ROUNDABOUT CAPACITY ASSESSMENT - EXISTING

A capacity assessment has been undertaken using the Transport Research Laboratory (TRL) software Junctions 8 ARCADY. This is an industry standard software package that is used to assess the operational capacity of a roundabout and provides results in terms of the ratio of flow to capacity (RFC), delay and queues. An RFC of 0.85 and below is generally considered to indicate that a junction is operating within capacity and an RFC above 0.85 is generally considered to indicate the junction is operating above capacity. Delay and queues are expected to increase exponentially above 0.85. Delay is the average delay per arriving vehicle and queues are the maximum queue generated within the time period analysed.

The current operational capacity of the junction is summarised in table 2.1.

Table 3.1 Coedely Roundabout: Summary of Existing Operational Capacity Analysis

Arm	AM Peak			PM Peak		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ely Valley Road	1	6	0.41	0	3	0.10
A4119 Ely Valley Road (South)	1	3	0.40	6	13	0.86
Unnamed Road	0	3	0.03	1	8	0.40
A4119 Ely Valley Road (North)	2	6	0.70	1	4	0.51

The ARCADY model indicates that the roundabout is currently near capacity in the AM peak with a maximum RFC of 0.70 on the A4119 Ely Valley Road (North) arm, and a moderate RFC on the Ely Valley Road and A4119 Ely Valley Road (South) arms.

During the PM peak the ARCADY model indicates that the roundabout is marginally over capacity with an RFC of 0.86 on the A4119 Ely Valley Road (South) arm, and a moderate RFC on the A4119 Ely Valley Road (North) and unnamed road arms.

Comparison of observed and modelled queues shows some disparity between the two. This is due to limitations inherent within the ARCADY programme where total entry width is assumed to accommodate all traffic movements. Whereas in reality, only one of the lanes is used for a large proportion of movements within the junction. It could also be due to queues generated elsewhere on the network causing a reduction in the operational performance of the Coedely roundabout.

Further investigation into the operation of the junction has been undertaken using the 'Entry Lane Simulation' (ELS) feature within ARCADY. ELS allows the turning movements on each arm of a junction to be specified thereby providing the correct capacity at entry to a junction. It should be noted however that ELS is an investigative tool that should be used with judgment to provide an indication of junction capacity.

The ELS capacity assessment results are summarised in table 2.2.

Table 3.2 Coedely Roundabout: Summary of Entry Lane Simulation Analysis

Arm	AM Peak			PM Peak		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ely Valley Road	4	30	N/A	0	3	N/A
A4119 Ely Valley Road (South)	1	4	N/A	67	125	N/A
Unnamed Road	0	0	N/A	0	5	N/A
A4119 Ely Valley Road (North)	55	127	N/A	3	10	N/A

Table 2.2 shows that with the entry lane movements specified larger queues and delays are generated. During the AM peak the A4119 experiences queues of 55 vehicles and delays of 127 seconds, and the Ely Valley Road arm experiences queues four vehicles long and delays of 30 seconds. In the PM peak the A4119 Ely Valley Road (South) arm experiences queues of 67 vehicles and delays of 125 seconds.

The ELS results do not match the observed results, however they do suggest that the roundabout operates at a higher ratio of flow to capacity, resulting in greater queues and delays, than the initial assessment indicated. This should be taken account of when considering future capacity assessment results of the roundabout.

4. Strategic Site SSA 14.1 – Trip Generation, Distribution and Growth

Trip Generation

In order to estimate the traffic generated by strategic development site SSA14.1 a comparative assessment has been undertaken using the TRICS database programme. TRICS is the national standard system of trip generation and analysis in the UK and provides an estimate of potential levels of trip generation for a wide range of land uses and locations.

Strategic development site SSA 14.1 is a development site within the RCTCBC Local Development Plan that is allocated for 14.32 hectares of B1 and B2 land-uses. As such, based on a review of 18 Industrial Estate sites within the TRICS database of B1/B2 use, surveyed on a weekday since 1st January 2008 and ranging in size between 2 and 40 hectares, the following trip rates were calculated:

Table 4.1 Vehicle Trip Rates (per hectare)

Time Period	**All Vehicles**		**OGV + PSV**	
	Arrivals	Departures	Arrivals	Departures
07:30-08:30	11.445	3.962	0.423	0.53
16:30-17:30	4.183	10.643	0.227	0.278

The trip rates shown above were applied to the strategic development site area of 14.32 hectares. The resulting vehicle flows are shown in table 4.2.

Table 4.2 Vehicle Flows

Time Period	**All Vehicles**		**OGV + PSV**	
	Arrivals	Departures	Arrivals	Departures
07:30-08:30	164	57	6	8
16:30-17:30	60	152	3	4

Trip Distribution

Trip distribution has been based on movements to and from Coed Ely Road as movements on the existing un-named road proposed to access the site resulted in significant movements to/from Coed Ely Road which are unlikely to occur as this is against the observed main traffic flow. In the AM peak the movements from Coed Ely Road to the A4119 (North) and the un-named road have been transposed and in the PM peak the same movements have been transposed from the site as flows to and from Coed Ely Road are expected to be minimal. As a worst case, all vehicles to and from the site have been assumed to travel through the roundabout. The resulting vehicle distribution is provided in table 4.3.

Table 4.3 Vehicle Distribution To/From Strategic Development Site SSA 14.1

Movement	AM Peak		PM Peak	
	All Vehicles	OGV+PSV	All Vehicles	OGV+PSV
Site to A4119 (N)	10	1	4	0
Site to Coed Ely Rd	1	0	8	0
Site to A4119 (S)	46	7	140	4
A4119 (N) to Site	15	1	11	1
Coed Ely Rd to Site	15	1	2	0
A4119 (S) to Site	134	4	47	2

Traffic Growth

The roundabout has been assessed in 2018 (estimated opening year for strategic site SSA 14.1) and in 2033 (opening year + 15 years). The Trip End Model Presentation Program (TEMPro) has been used to produce growth rates for the future assessment years analysed. Traffic growth rates for Tonyrefail on urban principal roads were produced.

Table 4.4 Traffic Growth Rates

Year	AM Peak	PM Peak
2016 - 2018	1.029	1.029
2016 - 2033	1.235	1.236

5. COEDELY ROUNDABOUT CAPACITY ASSESSMENT - *FUTURE JUNCTION OPERATION*

Capacity assessments of the roundabout have been undertaken for a 2018 and 2033 future assessment year with and without strategic development traffic. The roundabout has been assessed with its existing configuration and with a dual carriageway approach at the southernmost A4119 arm.

Existing Junction Configuration

Table 5.1 provides the capacity assessment results for the existing junction layout for 2018 with and without development traffic flows. Table 5.2 provides the capacity assessment results for 2033.

Table 5.1 Future Junction Operation – Existing Layout (2018)

Arm	AM Peak			PM Peak		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2018 No Development						
Ely Valley Road	1	6	0.43	0	3	0.10
A4119 Ely Valley Road (South)	1	3	0.42	7	16	0.88
Unnamed Road	0	3	0.03	1	8	0.42
A4119 Ely Valley Road (North)	3	7	0.72	1	5	0.53
2018 + Development Traffic						
Ely Valley Road	1	7	0.47	0	3	0.11

A4119 Ely Valley Road (South)	1	4	0.53	10	21	0.92
Unnamed Road	0	3	0.08	2	13	0.63
A4119 Ely Valley Road (North)	3	7	0.74	1	5	0.57

Table 5.1 shows that with traffic growth applied the roundabout is forecast to continue to operate near capacity in the AM peak with an RFC of 0.72, and marginally over capacity in the PM with an RFC of 0.88. With the addition of traffic associated with the strategic development site the junction is forecast to operate at a marginally higher RFC of 0.74 in the AM peak and 0.94 in the PM peak. Queues and delay are forecast to increase in line with the increase to RFC with a marginal increase forecast in both peak periods.

Table 5.2 Future Junction Operation – Existing Layout (2033)

Arm	**AM Peak**			**PM Peak**		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033						
Ely Valley Road	2	11	0.62	0	3	0.14
A4119 Ely Valley Road (South)	1	4	0.51	79	121	1.07
Unnamed Road	0	3	0.04	2	14	0.60
A4119 Ely Valley Road (North)	7	15	0.88	2	6	0.66
2033 + Development Traffic						
Ely Valley Road	2	13	0.66	0	4	0.15
A4119 Ely Valley Road (South)	2	6	0.62	111	166	1.10
Unnamed Road	0	3	0.09	4	27	0.81
A4119 Ely Valley Road (North)	8	18	0.90	2	8	0.70

Table 5.2 shows that in 2033 the junction is forecast to operate over capacity in both the AM and the PM with a maximum RFC of 0.88 and 1.07 respectively. This results in a maximum queue of seven vehicles and a maximum delay of 15 seconds in the AM peak, and 79 vehicles and 121 seconds in the PM peak. During the PM peak queues and delays are forecast to be significantly increased as the junction is over theoretical capacity where queues and delays increase exponentially.

With the addition of development traffic the junction is forecast to operate at a marginally higher RFC at 0.90 in the AM peak and 1.10 in the PM peak. Queues and delay are forecast to increase marginally during the AM peak, however the increases are exponentially greater in the PM peak.

Existing and Dual Carriageway Configuration Comparison

The capacity assessment results for the Coedely roundabout with a dual carriageway configuration at the A4119 Ely Valley Road (South) arm are compared to the results of the assessment with the existing roundabout configuration. This is done with and without development traffic in 2018 and 2033 in table 5.3 and 5.4 respectively.

Table 5.3 Future Junction Operation Comparison (2018)

Arm	AM Peak			PM Peak		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2018 - Existing Configuration						
Ely Valley Road	1	6	0.43	0	3	0.10
A4119 Ely Valley Road (South)	1	3	0.42	7	16	0.88
Unnamed Road	0	3	0.03	1	8	0.42
A4119 Ely Valley Road (North)	3	7	0.72	1	5	0.53
2018 - Dual Carriageway Layout						
Ely Valley Road	1	6	0.43	0	3	0.10
A4119 Ely Valley Road (South)	0	2	0.30	2	4	0.64
Unnamed Road	0	3	0.03	1	8	0.42
A4119 Ely Valley Road (North)	3	7	0.72	1	5	0.53
2018 + Development - Existing Configuration						
Ely Valley Road	1	7	0.47	0	3	0.11
A4119 Ely Valley Road (South)	1	4	0.53	10	21	0.92
Unnamed Road	0	3	0.08	2	13	0.63
A4119 Ely Valley Road (North)	3	7	0.74	1	5	0.57
2018 + Development - Dual Carriageway Layout						
Ely Valley Road	1	7	0.47	0	3	0.11
A4119 Ely Valley Road (South)	1	2	0.38	2	4	0.66
Unnamed Road	0	3	0.08	2	13	0.63
A4119 Ely Valley Road (North)	3	7	0.74	1	5	0.57

Table 5.3 shows that the implementation of a dual carriageway on the A4119 Ely Valley Road (South) is forecast to reduce the maximum RFC on this arm by 12% in the AM peak and 24% in the PM peak without development traffic in 2018. This results in a relative reduction in queues and delay in the AM peak, however a significant reduction is forecast in the PM peak. This is due to the fact that the junction is forecast to operate over capacity in the PM peak. With development traffic a reduction in RFC of 15% is forecast for the AM peak and 26% in the PM peak. This again results in a relative reduction in queues and delays in the AM peak, but a significant reduction in the PM peak.

Table 5.4 Future Junction Operation Comparison (2033)

Arm	AM Peak			PM Peak		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
2033 - Existing Configuration						
Ely Valley Road	2	11	0.62	0	3	0.14
A4119 Ely Valley Road (South)	1	4	0.51	79	121	1.07
Unnamed Road	0	3	0.04	2	14	0.60
A4119 Ely Valley Road (North)	7	15	0.88	2	6	0.66
2033 - Dual Carriageway Layout						
Ely Valley Road	2	11	0.62	0	3	0.14
A4119 Ely Valley Road (South)	1	2	0.36	3	6	0.77
Unnamed Road	0	3	0.04	2	19	0.68
A4119 Ely Valley Road (North)	7	15	0.88	2	7	0.66
2033 + Development - Existing Configuration						
Ely Valley Road	2	13	0.66	0	4	0.15
A4119 Ely Valley Road (South)	2	6	0.62	111	166	1.10
Unnamed Road	0	3	0.09	4	27	0.81
A4119 Ely Valley Road (North)	8	18	0.90	2	8	0.70
2033 + Development - Dual Carriageway Layout						
Ely Valley Road	2	13	0.66	0	4	0.15
A4119 Ely Valley Road (South)	1	3	0.44	4	7	0.8
Unnamed Road	0	3	0.09	12	78	0.96
A4119 Ely Valley Road (North)	8	18	0.90	2	8	0.71

Table 5.4 shows that the implementation of a dual carriageway on the A4119 Ely Valley Road (South) in 2033 is forecast to reduce the maximum RFC on this arm by 15% in the AM peak and 30% in the PM peak without development traffic. It should be noted however that the A4119 Ely Valley Road (North) is forecast to continue to operate marginally over capacity with a predicted RFC of 0.88, and the unnamed road (potential strategic development site access) is forecast to operate at a higher level of capacity in the PM peak (+8%). The dual carriageway results in relatively minor reductions in queues and delay during the AM peak, however a significant reduction in queues and delay on the A4119 Ely Valley Road (South) are forecast during the PM peak.

With development traffic a reduction in RFC of 18% is forecast for the AM peak and 30% in the PM peak. However it should be noted that the A4119 Ely Valley Road (North) is forecast to continue to operate over capacity in the AM peak with an RFC of 0.90 resulting in moderate queues and delay, and the unnamed road (potential strategic site access) is forecast to operate over capacity with an RFC of 0.96 in the PM peak. This results in a moderate level of queuing but a significant amount delay.

Notwithstanding the analysis described above, it should be noted that although the initial modelling shows that the implementation of a dual carriageway on the A4119 Ely Valley Road provides benefit a more sophisticated assessment is required.

6. FURTHER WIDER AREA ANALYSIS

Capacity assessment of the Coedely roundabout shows that the junction is currently operating near to over capacity, with extended delay and queues generated on the A4119 arms of the roundabout, and the Ely Valley Road arm.

As discussed in Section 3 there are limitations inherent within the ARCADY modelling programme. These include where total entry width to a junction is assumed to accommodate all traffic movements, and where the capacity on an arm within the junction is reduced as a result of a reduction in capacity elsewhere in the network.

Analysis of traffic movements provided in Section 2 shows that there is a significant traffic flow movement through the roundabout, from the A4119 north to south and vice versa. It is likely that ARCADY is overestimating the capacity available to this movement as only one lane is used to make this movement, whereas ARCADY assumes the entire entry width is available.

In light of the above it is recommended that further analysis of the roundabout is undertaken using more sophisticated modelling software and techniques such as VISSIM microsimulation that take into account entry lane usage.

A review of typical traffic speeds in the area using Google has been undertaken as illustrated in figure 6.1.

Figure 6.1 PM Peak Typical Traffic Speeds

Figure 6.1 shows that there is slow moving traffic on the A4119 northbound approach to the A4093/A4119 roundabout. This junction is likely to be the cause of the slow moving traffic and given its close proximity to the development it is recommended that a capacity assessment of this junction is undertaken to establish the impact of development traffic.

The development generates a significant number of trips heading south during the PM peak hour. Figure 6.1 shows that significant congestion occurs at the southbound approach to the A4119/B4595 junction and this additional development traffic could have a significant impact. It is therefore recommended that this junction is included in a capacity assessment.

The A4119 / A473 Talbot Green roundabout has a junction improvement scheme proposed and is therefore not recommended being included in a capacity assessment. Junctions further south on the A4119 tend to experience congestion in the opposite direction to the main development generated traffic and are therefore recommended not to be included in a capacity assessment.

Figure 6.1 also shows that there is slow moving traffic on the A4119 Ely Valley Road between the Fire Service roundabout and the Coedely roundabout in a northbound direction. This does not appear to be caused by a specific junction and could be indicative of a link capacity issue. Traditional junction capacity models would therefore not assist in the assessment of this issue so VISSIM microsimulation is recommended

In light of the wider area issues highlighted it is recommended that a microsimulation model assessment of the A4119 is undertaken with model extents between the A4093/A4119 roundabout to the north and the A4119/B4595 crossroads to the south. Trafficmaster GPS data will be used to inform model journey times. It is also proposed that a more accurate traffic distribution for the strategic development site be acquired using a survey of the A4119/Heol y Sarn roundabout and the Royal Mint employment area. The microsimulation assessment should look at the operation of the corridor currently and provide an evaluation of the forecast impact of a dual carriageway on the A4119 Ely Valley Road between Fire Station roundabout and the Coedely roundabout. The following additional surveys are required to develop the A4119 corridor VISSIM microsimulation model:

- A4093/A4119 Roundabout
- A4119 / Heol Y Sarn Roundabout
- A4119 British Airways Engineering Roundabout
- A4119 / B4595 Traffic Signals

7. SUMMARY

RCTCBC have advised that the A4119 Ely Valley Road between the Fire Service roundabout and the Coedely roundabout currently suffers from congestion and may benefit from road widening from single carriageway to dual carriageway. It has also been indicated that Strategic Development Site SSA 14.1 would generate a significant amount of traffic to this section of the A4119 Ely Valley Road which is likely to exacerbate the existing congestions issue.

This note endeavours to provide a high level feasibility study to assess the current and future operation of the A4119 Ely Valley Road as well as an assessment of further modelling requirements.

Capacity assessment of the Coedely roundabout indicated that the roundabout is near capacity in the AM peak with a maximum RFC of 0.70 which occurs on the A4119 Ely Valley Road (North) arm, and over capacity in the PM peak with a maximum RFC of 0.86 which occurs on the A4119 Ely Valley Road (South) arm.

Assessment of the existing roundabout layout in 2018 found that the junction is forecast to continue to operate within capacity in the AM peak, and over capacity in the PM peak with a maximum RFC of 0.72 and 0.88 respectively. This increased marginally with the addition of strategic development traffic. With 2033 traffic flows the existing junction is forecast to operate over capacity in the AM peak and the PM peak with a maximum RFC of 0.88 and 1.07 respectively. This increased marginally with the addition of strategic development traffic in the AM, and more significantly during the PM, due to the already high level of RFC.

The addition of a dual carriageway on the A4119 Ely Valley Road (South) arm of the junction was found to increase the capacity of the roundabout and resulted in a reduction in the RFC on the A4119 South arm by up to 15% in the AM peak and 26% in the PM peak with 2018 traffic flows. With 2033 traffic demand the addition of a dual carriageway reduced the RFC of the A4119 by up to 18% in the AM and 30% in the PM. However the A4119 Ely Valley Road (North) is forecast to continue to operate marginally over capacity with an RFC of up to 0.90. In 2033 with the strategic development flows added the unnamed road (potential strategic development site access) is also forecast to operate over capacity with an RFC of 0.96 (+8%) in the PM peak.

An evaluation of the high level traffic modelling approach used has been undertaken. It was found that there are drawbacks associated with the initial junction modelling approach used. These include the fact that lane usage is not specified within the ARCADY junction modelling program and it is therefore likely to overestimate the capacity of the roundabout, and that junction modelling does not take into account issues with capacity elsewhere in the network. In light of this, it is recommended that a more sophisticated and wider area modelling approach is implemented.

Review of typical traffic speeds in the area using Google indicated that there is slow moving traffic on the A4119 between the Fire Station roundabout and Coedely roundabout. It also showed that there is slow moving traffic on the A4119 to the north up to the A4093/A4119 roundabout, and south down to the A41119/B4595 signalised crossroads. In light of this it is recommended that a Vissim microsimulation assessment is undertaken with model extents between the A4093/A4119 roundabout to the north and the A4119/B4595 crossroads to the south. The microsimulation assessment should look at the operation of the corridor currently and provide an evaluation of the forecast impact of a dual carriageway on the A4119 Ely Valley Road between the Fire Station roundabout and Coedely roundabout.

Appendix F – Preliminary Scheme Estimate

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	A4119 ELY VALLEY ROAD DUALLING	Amount
	Description	**Amount**
	Page : 1: PRELIMINARIES	see below
	Page : 2: SITE CLEARANCE	£37,832.70
	Page : 3: FENCING	£54,490.00
	Page : 4: ROAD RESTRAINTS	£112,227.50
	Page : 5: DRAINAGE	£290,639.39
	Page : 6: EARTHWORKS	£880,790.90
	Page : 7: PAVEMENTS	£1,198,526.00
	Page : 8: KERBS AND FOOTWAYS	£332,494.00
	Page : 9: TRAFFIC SIGNS AND ROAD MARKINGS	£15,021.29
	Page : 10: ROAD LIGHTING COLUMNS	£57,456.00
	Page : 11: ELECTRICAL WORK FOR ROAD LIGHTING	£50,921.00
	Page : 12: STRUCTURAL CONCRETE	£372,600.00
	Page : 13: LANDSCAPE AND ECOLOGY	£99,790.80
	Sub Total - Measured works (excluding the sections listed below)	**£3,502,789.58**
	Preliminaries (Allowance)	£750,000.00
	Traffic management (Allowance	£876,000.00
	Accommodation works (Allowance)	£175,000.00
	Statutory Undertakers (allowance)	£519,057.77
	Night time working on 10% of pavement	£119,852.60
	Sub Total (excluding contingency and optimism bias)	**£5,942,699.95**
	Add optimism bias at 44%	£2,614,787.98
	Sub Total (Main works and OB)	£8,557,487.93
	Land Costs	£78,000.00
	Design Fee - Stage Gate 1 (Feasibility)	£33,492.00
	Stage gate 2 - Preliminary Design / Planning (Inc PD Role)	£143,906.00
	Stage Gate 3 - Detailed Design	£95,000.00
	Stage Gate 4 - CPO/ Precon	£50,000.00
	Stage Gate 5 - Construction Supervision	£160,000.00
	Estimated 3rd Party Survey costs	£79,000.00
	Estimated 3rd Party costs : solicitors, cpo , advertising etc	£40,000.00
	Risk - See Scheme Risk Register	£366,500.00
	Total scheme cost	**£9,603,385.93**

Ref	Description	Unit	Qty	Rate	Amount
	PRELIMINARIES **PRELIMINARIES** See Summary				
	Page : 1			To Summary	

Ref	Description	Unit	Qty	Rate	Amount
	SITE CLEARANCE				
	General site clearance carriageways	ha	0.94	500.00	£468.00
	General site clearance heavily density wooded	ha	1.30	2500.00	£3,250.00
	General site clearance; open field	ha	2.01	1000.00	£2,014.00
	TAKE UP OR DOWN AND SET ASIDE FOR REUSE OR REMOVE TO STORE OR TIP OFF SITE				
	Take up or down and remove to tip off Site precast concrete kerbs	m	2600.00	4.00	£10,400.00
	Take up or down and remove to tip off site concrete edgings	m	2600.00	4.00	£10,400.00
	Take up or down and remove to tip off Site gully grating and frame	no	17.00	20.00	£340.00
	Take up or down and remove to top off site lighting column, high	no	30.00	200.00	£6,000.00
	Take up or down and remove to tip off Site double sided corrugated beam	m	102.14	5.00	£510.70
	Take up or down and remove to tip off Site mh cover and frame	no	10.00	25.00	£250.00
	take up or down wire fence (allow 500m)	m	500.00	4.00	£2,000.00
	Take up or down feeder pillar	no	1.00	200.00	£200.00
	take up or down signs and post (rogue)	no	14.00	80.00	£1,120.00
	take up or down signs and post (rogue) 5m2	n	3.00	160.00	£480.00
	Take up or down telegraph pole	no	4.00	200.00	£400.00
	Page : 2			To Summary	£37,832.70

Ref	Description	Unit	Qty	Rate	Amount
	FENCING				
	FENCING, GATES AND STILES				
	Temporary fence	m	2600.00	7.75	£20,150.00
	Post and rail fence (allow 1300m)	m	1300.00	23.30	£30,290.00
	Excavation in hard material	m3	30.00	135.00	£4,050.00
	Page : 3			To Summary	£54,490.00

Ref	Description	Unit	Qty	Rate	Amount
	ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN)				
	PEDESTRIAN PARAPETS, GUARDRAILS AND HANDRAILS				
*	Double sided corrugated beam (c/reserve)	m	1,300.00	73.33	£95,322.50
	Terminals	no	5.00	3381.00	£16,905.00
	open box beam	no	0.00	50.00	£0.00
	Page : 4			To Summary	£112,227.50

Ref	Description	Unit	Qty	Rate	Amount
	<u>DRAINAGE AND SERVICE DUCTS</u>				
	<u>DRAINS AND SERVICE DUCTS (EXCLUDING FILTER DRAINS, NARROW FILTER DRAINS AND FIN DRAINS)</u>				
	225 mm internal diameter drain not exceeding 2 metres average depth to invert 1.500 metres	m	2600.00	72.00	£187,200.00
	150 mm internal diameter drain not exceeding 2 metres average depth to invert 0.75 metres	m	264.00	63.00	£16,632.00
	<u>CHAMBERS AND GULLIES</u>				
	Chamber	no	33	1819.57	£59,136.03
	Precast concrete trapped gully with D400 cover and cover and frame	no	132.00	197.08	£26,014.56
	<u>EXCAVATION IN HARD MATERIAL</u>				
	Extra over any item of drainage for excavation in hard material	m3	40.00	41.42	£1,656.80
	culverts (not included)				
				To Summary	£290,639.39

Ref	Description	Unit	Qty	Rate	Amount
	EARTHWORKS				
	EXCAVATION				
	Excavation of acceptable material	m3	37,179.81	£3.00	£111,539.43
	Excavation of unacceptable	m3	2,456.19	£3.00	£7,368.57
	EXCAVATION IN HARD MATERIAL				
	Extra over excavation for excavation in hard material in cutting and other excavation	m3	2,456.19	£8.00	£19,649.52
	DEPOSITION OF FILL				
	Deposition of acceptable material	m3	6,123.00	£3.00	£18,369.00
	Compaction of acceptable material	m3	6,123.00	£0.50	£3,061.50
	DISPOSAL OF MATERIAL				
	Disposal of acceptable material	m3	37,179.81	£18.00	£669,236.58
	Disposal of unacceptable material Class U1B	m3	2,456.19	£20.00	£49,123.80
	COMPLETION OF FORMATION AND SUBFORMATION				
	Completion of formation on acceptable material (6.0315)	m2	24,425.00	£0.10	£2,442.50
					£0.00
	Page : 6			To Summary	£880,790.90

Ref	Description	Unit	Qty	Rate	Amount
	PAVEMENTS				
	SUB-BASE				
	Type 1 sub-base in carriageway hardshoulder and hardstrip	m3	4,262.00	24.00	£102,288.00
	PAVEMENT				
	AC 32 HDM BIN 40/60 REC with 32 mm aggregate base course 170 mm thick in carriageway hardshoulder and hardstrip	m2	21,310.00	29.00	£617,990.00
	AC 20 HDM BIN 40/60 REC with 20 mm aggregate bindercourse 60 mm thick in carriageway hardshoulder and hardstrip	m2	21,310.00	10.80	£230,148.00
	Surface course comprising AC 10 close surf 100/150 des with min PSV55, 40mm thick (BS EN 13108-4: PD 6691 Annex C).	m2	21,310.00	10.00	£213,100.00
	Bus Stops				
	Allowance for Bus Stops	No	2.00	17500.00	£35,000.00
				To Summary	£1,198,526.00

Ref	Description	Unit	Qty	Rate	Amount
	KERBS AND FOOTWAYS				
	kerbs central reserve	m	2984	20.00	£59,680.00
	Kerbs on footway	m	2714	20.00	£54,280.00
	Edgings	m	2714	11.00	£29,854.00
	Paved area in central reserve	m2	3115	17.00	£52,955.00
	Footway	m2	5429	25.00	£135,725.00
	Page : 8			To Summary	£332,494.00

Ref	Description	Unit	Qty	Rate	Amount
	TRAFFIC SIGNS AND ROAD MARKINGS (Cont'd)				
	Lit signs med	no	12.00	380.00	£4,560.00
	lit signs large	no	4.00	1580.00	£6,320.00
	ROAD MARKINGS				
	Intermittent lines	no	1742.00	0.63	£1,097.46
	ROAD STUDS				
	Road studs	no	290	10.50	£3,043.83

To Summary £15,021.29

Ref	Description	Unit	Qty	Rate	Amount
	ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS				
	ROAD LIGHTING COLUMNS AND BRACKETS, WALL MOUNTINGS, CCTV MASTS AND CANTILEVER MASTS				
	Aluminium road lighting column of 12 m nominal height with planted base and with single bracket arm having a projection of 1.0 m	no	42.00	1368.00	£57,456.00
	Page : 10			To Summary	£57,456.00

Ref	Description	Unit	Qty	Rate	Amount
	ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGN				
	TRENCH FOR CABLE OR DUCT				
	Trench for duct not exceeding 300 mm wide depth not exceeding 1.5 metres in cariageways, footways and paved areas	m	2600.00	14.00	£36,400.00
	CABLE AND DUCT				
	6mm2 3 core XLPE/SWA/XLPE cable in duct (14.0125)	m	2706.0	3.50	£9,471.00
	CABLE JOINTS AND TERMINATIONS				
	Single way cut out termination to 6mm2 3 core XLPE/SWA/XLPE cable in lighting columns	no	53.00	50.00	£2,650.00
	Feeder pillar	no	4.00	600.00	£2,400.00
				To Summary	£50,921.00

Ref	Description	Unit	Qty	Rate	Amount
	STRUCTURAL CONCRETE				
	reinforced concrete retaining wall	m2	540.00	690.00	£372,600.00
	Page : 12			To Summary	£372,600.00

Ref	Description	Unit	Qty	Rate	Amount
	LANDSCAPING AND ECOLOGY				
	Hedges	m	2600.00	£4.21	£10,946.00
	tree plants	no	1000.00	£30.00	£30,000.00
	subsoil treatment to surfaces <10	m2	5429.00	£0.40	£2,171.60
	final prep of soils<10	m2	5429.00	£0.25	£1,357.25
	final cult of soils<10	m2	5429.00	£0.25	£1,357.25
	grass seeding<10	m2	5429.00	£0.40	£2,171.60
	subsoil treatment to surfaces >10	m2	9067.00	£0.40	£3,626.80
	final prep of soils<10	m2	9067.00	£0.25	£2,266.75
	final cult of soils>10	m2	9067.00	£0.25	£2,266.75
	grass seeding<10	m2	9067.00	£0.40	£3,626.80
	Ecology Mitigation Measures (allow additional)	Sum			£40,000.00
	Page : 13			To Summary	£99,790.80

Appendix G - Stage 2 Brief and Commissioning Document.

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CAPITA

A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

Briefing and Commissioning Document

DRAFT

Capita Property & Infrastructure

Date: 01 August 2016

We | Listen Create Deliver

Contents

CAPITA
GLAMORGAN CONSULTANCY

Project Charter for Briefs

1. All Client instructions / Service Agreements should have a Brief which covers the essentials.

2. The essentials are to be set out in a standard pro forma template (the must haves).

3. The Brief must be discussed and agreed between both parties (signed).

4. Works cannot be expected to start without an agreed Brief or an Interim Service Agreement

5. The preparation of the Brief is a chargeable project cost

6. The Brief always includes an initial costed risk register

7. The Brief shall be jointly assessed (client & consultant) as a Quality KPI

Bridgend CBC

Merthyr Tydfil CBC

Rhondda Cynon Taf CBC

Capita Glamorgan

Merthyr Tydfil County Borough Council

STRONG HERITAGE | STRONG FUTURE
RHONDDA CYNON TAF
TREFTADAETH GADARN | DYFODOL SICR

CAPITA SYMONDS
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CAPITA

Commissioning Details
Section 1

Provider:	Mr Lee Selway	**Client:**	Lindsay Gauntlett
Address:	Capita Property and infrastructure Capita, St Davids House, Pascal Close, St Mellons, CF3 0LW	**Address**	Rhondda Cynon Taf County Borough Council Sardis House, Sardis Road, Pontypridd, CF37 1DU

Project / Service Details

Scheme Title:	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning	**Scheme Ref:**	GC/002498
Location:	**A4119 between Coed Ely Roundabout and Fire Station Roundabout**	**Date:**	01/08/2016

Terms of Engagement (Contract Type - NEC3, ACE, Other)	**Budget Estimate**	**Fee Proposal**	**DRAFT**	**FINAL**
JV NEC Contract	✓		✓	

Description / Scope (including requirements, objectives and quality criteria for product or service)

This Brief and Commissioning document allows for the anticipated professional services for the **preliminary design and submission of a planning application** of the proposed dualling of the A4119 at Coed Ely. The scope of services has been derived from the initial feasibility design undertaken and includes for;
- Highways and Infrastructure Design - Preliminary highways design to submission of the planning application
- Ecology – Ecology surveys and reporting necessary for planning
- Geotechnical design and supervision of geotechnical site investigation
- Initial structures design and assessment
- Supplementary transportation assessments
- Land matters – preparation of land and CPO plans
- Updating the cost estimates
- Submission of the planning application.

For a detailed breakdown of service, please see attached Cost Time and Resource schedules in section 3.

NOTE: The Stage Gate 2 design fee allows for the 'Do Minimum' in order to gain planning permission. It excludes detailed design and there is a risk that the successful grant of permission may attract additional conditions that will need to be discharged as part of the next phase. This is a time charged fee proposal and the actual hours worked will be charged. The fee may increase or decrease.

Client Supplied Data:
note that unless specifically accounted for in the estimate, this information is assumed to be correct and will not be checked

1	Licenses to enter land for ecological , geotechnical, topographical surveys etc (Mid October)
2	
3	
4	
5	

	Commission Stages / Activities	**Fee Basis**	**Value**
1	Highways and Infrastructure	Time	£41,900
2	Ecology and Enviro	Time	£28,659
3	Geotechnical	Time	£30,739
4	Structures	Time	£11,301
5	Transportation	Time	£14,415
6	CPO and Land	Time	£6,760
7	Planning Application	Time	£8,406
8	Cost Estimate	Time	£1,727
9		Time	
10		Time	
		FEE ESTIMATE	**£143,906**

	External Services Procured Directly By Client		
1	Topographical Survey ** Estimated***		£15,000
2	GI **Estimated**		£50,000
3	CCTV Drainage Survey *** Estimated - Network is currently unknown***		£8,000
4	Traffic Surveys		£6,000
		EXTERNAL SERVICES ESTIMATE	**£79,000**

Risk Allocations (From Initial Risk Register)		**High Risk**	**Risk Estimate**
Refer to Initial risk register on page 3 for details	**RISK ESTIMATE**	**£165,000**	**£38,750**

Client's Suggested Budget Allocation		**Total**
This includes for the estimated consultancy fee, external services procured directly by the client and the design risk premium	**TOTAL ESTIMATE**	**£261,656**

Above details agreed

Provider:	**Capita Property and infrastructure**	**Client:**	**Rhondda Cynon Taf County Borough Council**
Project Manager:	Mr Lee Selway	Main Contact:	Lindsay Gauntlett
Signed:		Signed:	
Date:		Date:	
Project Director:	Mr Andrew Flook	Approving Officer:	Andrew Griffiths
Signed:		Signed:	
Date:		Date:	

NOTES: **Any Changes to the Brief will be communicated through and managed by the Client Main Contact and Capita Glamorgan Project Manager**

CAPITA

Commissioning Details
Section 2

Project / Service Details	
Title:	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning
Stage:	

	Deliverables/Tasks:
1	Preliminary drawings
2	Design and Access Statement
3	EIA Screening
4	Ecology Reports to supplement planning
5	Cost Estimate
6	
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	Constraints / Targets (Cost / Programme):
1	Survey dates - These will be added to the programme. We will need the necessary licences in place prior to any surveys
2	
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	Key Programme Dates:
1	See attached Programe
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	Exclusions / Assumptions:
1	Detailed design excluded
2	It is assumed that RCT willl organise the necessary access to land for surveys
3	Assumed EIA will not be required
4	Assumed all third party work/costs will be instructed by RCT
5	No allowance made for planning queries, a separate comm doc will be provided for - Stage Gate 3 Submission of Planning - Detailed design
6	
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CAPITA

Commissioning Details
Section 3

Client Key Personnel

Name	Organisation	Role	Tel No.
Lindsay Gauntlett	Rhondda Cynon Taf County Borough Council		
Andrew Griffiths	Rhondda Cynon Taf County Borough Council		

Client Personnel Notes:

Key Resources

Name		Role	Tel No.
Mr Andrew Flook	Capita Property and infrastructure	Cost Centre Manager	02920 803650
Mr Lee Selway	Capita Property and infrastructure	Associate	02920 803642
Mr Neil Morris	Capita Property and infrastructure	Principal Engineer	02920 803653
Mr Craig Fletcher	Capita Property and infrastructure	Engineer	
Mrs Julie Stacey	Capita Property and infrastructure	Senior Technician	
Miss Gemma Bilenki	Capita Property and infrastructure	Tech Admin	02920 803633
Mr Stuart Warburton	Capita Property and infrastructure	Apprentice Engineer	
Mr Mark Bray	Capita Property and infrastructure	Business Manager	02920 803607
Miss Holly Lewis	Capita Property and infrastructure	Senior Ecologist	

Resources Notes:

Use of Other Capita Offices / Sub Consultants / Specialist Advisors

Organisation	Role
None	

Risk Register and Allocation (Risks relating to delivery of this service) - THESE ARE NOT PROJECT RISKS SEE RISK REGISETR

Ref	Risk Description	Estimate	Probability	Risk Premium
1	Scope Creep - This depends on the results from the surveys	£10,000.00	50%	£5,000
2	Utility Diversions Required - Additional (Re design work fee only)	£20,000.00	50%	£10,000
3	Additional GI costs Supervision Costs - Main works included within the scheme risk register	£5,000.00	75%	£3,750
4	Additional surveys (Ecology) - Potential for additional surveys after initial scoping	£20,000.00	50%	£10,000
5	EIA required after results of screening	£100,000.00	5%	£5,000
6	Supervision of GI by Ecology team	£10,000.00	50%	£5,000
7				£0
8				£0
9				£0
10				£0
Suggested Client Risk Allowance	**HIGH:**	**£165,000.00**	**RISK EST:**	**£38,750**

CAPITA

Commissioning Details
Section 4

1. CONTRACT DATA

1.1 Part one – Data provided by the *Employer*

1. General

- The conditions of contract are the core clauses and the clauses for main Option **A** dispute resolution Option **W2** and secondary Options **X2, Y(UK)2, Y(UK)3** of the NEC3 Professional Services Contract June 2005 (with amendments June 2006 and September 2011).
- The Employer is :

  Name: Rhondda Cynon Taf County Borough Council

  Address: Sardis House, Sardis Road, Pontypridd, CF37 1DU
- The ***Adjudicator*** is **to be nominated**
- The services are **those set out [within Section 1 & 2] of these Commission Details.**
- The Scope is **set out [within Section 1 & 2] of these Commission Details.**
- The language of this contract is **English**
- The law of the contract is the law of **England and Wales, as it applies in Wales and subject to the jurisdiction of the Courts of England and Wales.**
- The period for reply is **2** weeks.
- The period for retention is **6** years following Completion or earlier termination.
- The Adjudicator nominating body is **The Institution of Civil Engineers.**
- The tribunal is **Litigation.**
- The following matters will be included in the Risk Register:
- **In addition to the risks contained within the Risk Register on Section 3 of the Commission Details); further matters may be discussed, agreed and incorporated.**

2. The Parties' main responsibilities

- The Employer provides access to the following persons, places and things:

  Access To:

  Access Date:

3. Time

- The starting date is Within **[seven days] of agreement of the SSCA.**
- The Consultant submits revised programmes at intervals no longer than a calendar month

4. Quality

- The quality policy statement and quality plan are provided within [2 weeks] of the Contract Date.
- The defects date is 52 weeks after Completion of the whole of the services.

5. Payment

- The assessment interval is **a calendar month**
- The currency of this contract is pounds sterling
- The interest rate is 8% per annum above the base lending rate of the Bank of England.
- The amounts of insurance and the periods for which the Consultant maintains insurance are

6. Indemnity, insurance and liability

Event	**Cover**	**Period following Completion of the whole of the services or earlier termination**
Failure of the Consultant to use the skill and care normally used by professionals providing services similar to the services	**£5,000,000** in respect of each claim and in the aggregate.	**6 Years**
Death of or bodily injury to a person (not an employee of the Consultant) or loss of or damage to property resulting from an action or failure to take action by the Consultant	**£10,000,000** in respect of each claim, without limit to the number of claims	**6 Years**
Death of or bodily injury to employees of the Consultant arising out of and in the course of their employment in connection with this contract	**£10,000,000** in respect of each claim, without limit to the number of claims	**6 Years**

- The Employer provides the following insurances **None**
- The Consultant's total liability to the Employer for all matters arising under or in connection with this contract, other than the excluded matters, is limited to the **lesser** of: a) 10 times the value of the fee (as set out on page 1 of the Commissioning Details) or b) **£10,000,000**.

1.2 Part two - Data provided by the *Consultant*

Statements given in all contracts

The Consultant is:

- Name : Capita Property and infrastructure
- Address: Capita, St Davids House, Pascal Close, St Mellons, CF3 0LW

- The key persons are:

1 Name: Mr Andrew Flook
Job Title: Associate Director
Responsibilities: Project Director as stated in scope
Qualifications: BEng CEng MICE FCIHT

2 Name: Mr Lee Selway
Job Title: Associate
Responsibilities: Project Manager
Qualifications: I.Eng FIHE IMaPS

- The following matters will be included in the Risk Register

In addition to the risks contained within the Risk Register on Page 3 of the Commission Details); further matters may be discussed, agreed and incorporated.

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - PM and Highways

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Andrew Flook	ZCGC	Cost Centre Manager	Infrastructure
2	Mr Lee Selway	ZCGC	Associate	Infrastructure
3	Mr Neil Morris	ZCGC	Principal Engineer	Infrastructure
4	Mr Craig Fletcher	ZCGC	Engineer	Infrastructure
5	Mrs Julie Stacey	ZCGC	Senior Technician	Infrastructure
6	Miss Gemma Bilenki	ZCGC	Tech Admin	Ecology
7	Mr Stuart Warburton	ZCGC	Apprentice Engineer	Infrastructure
8	Mr Mark Bray	ZCGC	Business Manager	Street Lighting
9	Mr Wayne Palmer	ZCGC	Associate Director	Infrastructure
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	3rd Party Costs (Manual)	Total Revenue	Start Month (Manual)	End Month (Manual)	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	**A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning**																**£41,899.56**	**£0.00**	**£41,899.56**	**Jul-16**	**Jul-16**	**1**	
		Mr Andrew Flook	Mr Lee Selway	Mr Neil Morris	Mr Craig Fletcher	Mrs Julie Stacey	Miss Gemma Bilenk	Mr Stuart Warburto	Mr Mark Bray	Mr Wayne Palmer												
1	**Project Management, Governance and Reporting**																**£15,293.82**	**£0.00**	**£15,293.82**	**Jul-16**	**Jul-16**	**1**	
	Brief development and evaluation	4	6		4		2			5							£1,294.36		£1,294.36	Jul-16	Jul-16	1	
	Project Management, forecasting, invoicing, financial reporting	15	60		100		10										£10,252.82		£10,252.82			1	LS -PM allow 0.5day per week over 8mnths CF APM - 1 day per wk
	Meetings		32		32												£3,746.65		£3,746.65			1	Allow 0.5 days per mnth
2	**Land Access and Surveys**																**£3,941.07**	**£0.00**	**£3,941.07**	**Jul-16**	**Jul-16**	**1**	
	Prepare licence plans for entry onto land for surveys				20	2		40									£1,585.45		£1,585.45	Jul-16	Jul-16	1	
	Preparation of contract document for topo survey		5		20												£1,294.35		£1,294.35			1	
	Let tender and tender asessment					16											£653.09		£653.09			1	
	Survey review					10											£408.18		£408.18			1	
3	**Prelim Highways Design**																**£19,270.31**	**£0.00**	**£19,270.31**	**Jul-16**	**Jul-16**	**1**	
	Geometric design		10	40	40	100		40									£9,592.19		£9,592.19	Jul-16	Jul-16	1	
	Fencing and VRS				37												£1,748.72		£1,748.72			1	
	Drainage				50												£2,363.14		£2,363.14			1	
	Pavement				10												£472.63		£472.63			1	
	signing and lining					20		30									£1,235.28		£1,235.28			1	
	Client liaison		4		8												£657.38		£657.38			1	
	streetlighting							20	30								£2,116.08		£2,116.08			1	
	Stats liaison				20			10									£1,084.89		£1,084.89			1	
4	**Preliminary Design Drawings**																**£3,394.36**	**£0.00**	**£3,394.36**	**Jul-16**	**Jul-16**	**1**	
	Preparation of drawings						15	40									£993.63		£993.63	Jul-16	Jul-16	1	Assume 10 layout drawings will be required for planning
	Checking		5						5	20							£2,051.63		£2,051.63			1	
	Approval	5															£349.10		£349.10			1	
																						1	
																						1	
5	**Activity 5**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
6	**Activity 6**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
																				Jul-16	Jul-16	1	
																						1	
7	**Activity 7**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
																				Jul-16	Jul-16	1	
8	**Activity 8**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
																				Jul-16	Jul-16	1	
9	**Activity 9**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
																				Jul-16	Jul-16	1	
10	**Activity 10**																**£0.00**	**£0.00**	**£0.00**	**Jul-16**	**Jul-16**	**1**	
																				Jul-16	Jul-16	1	
	Totals	**24**	**122**	**40**	**341**	**148**	**27**	**180**	**35**	**25**	**0**	**0**	**0**	**0**	**0**	**0**	**£41,899.56**	**£0.00**	**£41,899.56**				
																TOTAL REVENUE	**£41,900**						

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Ecology

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Geraint Pitman	ZCHI	Associate Director	Ecology & Environment
2	Miss Holly Lewis	ZCGC	Senior Ecologist	Ecology
3	Mr Neil Price	ZCGC	Senior Ecologist	Ecology
4	Ms Megan Price	ZCGC	Ecologist (agency zero hours)	Ecology
5	Mrs Rebecca Howells	ZCGC	Ecologist	Ecology
6	Miss Gemma Bilenki	ZCGC	Tech Admin	Ecology
7	Dr Richard Birch	ZBNI	Principal Ecologist	Ecology & Countryside
8				
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	3rd Party Costs (Manual)	Total Revenue	Start Month (Manual)	End Month (Manual)	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning																£27,678.56	£980.00	£28,658.56	Mar-16	Nov-16	9	
		Mr Geraint Pitman	Miss Holly Lewis	Mr Neil Price	Ms Megan Price	Mrs Rebecca Howel	Miss Gemma Bilenk	Dr Richard Birch															
1	Task Management, Governance and Reporting																£986.35	£0.00	£986.35	Jul-16	Jul-16	1	
	Brief development and evaluation		4														£189.05		£189.05	Jul-16	Jul-16	1	
	Task Management, forecasting, invoicing, financial reporting	2	6														£419.19		£419.19			1	
	Meetings		8														£378.10		£378.10			1	
2	Bat Surveys																£12,181.99	£220.00	£12,401.99	Apr-16	Sep-16	6	
	Actiity surveys - 2 visits per month (5 months, 2 transects - 4 people)		60	60	60	60	8										£9,641.62	£200.00	£9,841.62	May-16	Sep-16	5	
	static anabat placement and replacement			10	10												£784.13		£784.13	May-16	Sep-16	5	
	data analysis				37.5												£1,168.14		£1,168.14	May-16	Sep-16	5	
	Bat Roost Assessment			7.5		7.5											£588.10	£20.00	£608.10	Apr-16	Apr-16	1	
																						1	
3	Dormouse surveys																£784.13	£580.00	£1,364.13	Mar-16	Nov-16	9	
	Habitat suitability search (Hazelnut)		10		10												£784.13	£40.00	£824.13	Mar-16	Mar-16	1	
4	Reptile survey																£1,584.91	£120.00	£1,704.91	Apr-16	Sep-16	6	
	Survey x 7 and setting out tins				16	16											£996.81	£60.00	£1,056.81	May-16	Sep-16	5	
	order reptile tins																	£60.00	£60.00	Apr-16	Apr-16	1	
	Otter Surveys		7.5			7.5											£588.10		£588.10			1	
5	Arboricultural Surveys																£3,049.99	£20.00	£3,069.99	Jun-16	Jul-16	2	
	Site Visit		7.5					7.5									£686.75	£20.00	£706.75	Jun-16	Jul-16	2	
	Preparation of plans						10										£290.04		£290.04			1	
	Reporting							40									£1,772.16		£1,772.16			1	
6	Invasive species mapping																£588.10	£20.00	£608.10	Jun-16	Jul-16	2	
			7.5			7.5											£588.10	£20.00	£608.10	Jun-16	Jul-16	2	
7	SINC Consultation & Scoping withCounty Ecologist																£189.05	£0.00	£189.05	Jun-16	Jul-16	2	
			4														£189.05		£189.05	Jun-16	Jul-16	2	
8	Badger survey																£588.10	£20.00	£608.10	Mar-16	Apr-16	2	
				7.5	7.5												£588.10	£20.00	£608.10	Mar-16	Apr-16	2	
9	Reports																£6,747.10	£0.00	£6,747.10	Mar-16	Nov-16	9	
	Bat Roost Assessment Report	1		2	22.5		4										£979.24		£979.24	Mar-16	Nov-16	9	
	Bat Activity Survey Report	1		2	37.5		8										£1,562.51		£1,562.51	Mar-16	Nov-16	9	
	Otter Report	1			16		4										£682.23		£682.23	Mar-16	Nov-16	9	
	Dormouse Report	1	37.5				4										£1,956.18		£1,956.18	Mar-16	Nov-16	9	
	Invasive Species Report	1			16		4										£682.23		£682.23	Mar-16	Nov-16	9	
	Badger Report	1			22.5		4										£884.71		£884.71	Mar-16	Nov-16	9	
10	EIA Screening																£978.83	£0.00	£978.83	Mar-16	Nov-16	9	
	Produce Screening Report for agreement of planning authority	2	16				3										£978.83		£978.83	Mar-16	Nov-16	9	
																						1	
																						1	
Totals		12	171.5	89	255.5	98.5	49	47.5	0	0	0	0	0	0	0	0	£27,678.56	£980.00	£28,658.56				
															TOTAL REVENUE		£28,659						

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CAPITA

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Geotech

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Andrew Hale	ZCEN	Technical Director	Geotechnics
2	Mr Graham Butt	ZCEN	Associate	Geotechnics
3	Mr Levent Dogan	ZCEN	Senior Engineer	Geotechnics
4	Mr Gareth Williams	ZCEN	Assistant Engineer	Geotechnics
5	Mr Kristian Mackerness	ZCEN	Graduate Engineer	Structures
6	Mr Liam Bailey	ZCEN	Technician	Structures
7	Miss Natalie Pyatt	ZCHI	IST	Integrated Services Team
8				
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	Manual 3rd Party Costs	Total Revenue	Manual Start Month	Manual End Month	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning																£29,238.61	£1,500.00	£30,738.61	Jul-16	Jul-16	1	
		Mr Andrew Hale	Mr Graham Butt	Mr Levent Dogan	Mr Gareth Williams	Mr Kristian Mackern	Mr Liam Bailey	Miss Natalie Pyatt															
1	PSSR																£8,882.29	£1,500.00	£10,382.29	Jul-16	Jul-16	1	
	Task Management	2	3		2												£389.70		£389.70	Jul-16	Jul-16	1	
	Review Existing Information	1	2	8	2												£549.97		£549.97			1	
	Engineerining Assessment of earthworks		6	10	30												£1,831.55		£1,831.55			1	
	GRR		6		8												£650.05		£650.05			1	
	3rd Party Reports Envirocheck , mining reports etc					8											£239.49	£1,500.00	£1,739.49			1	
	Prepare report			40	33	20		40									£4,307.46		£4,307.46			1	
	Outline drawings				5	10	30										£914.08		£914.08			1	
2	GIR																£14,402.72	£0.00	£14,402.72	Jul-16	Jul-16	1	
	Procure geotechnical investigation	5		10	30			10									£2,086.96		£2,086.96	Jul-16	Jul-16	1	
	Task management		2	2	15												£748.99		£748.99			1	
	HD22 Gir		20	48	60	60	20	25									£7,870.03		£7,870.03			1	
	Lab schedules		3														£175.78		£175.78			1	
	Ground Modelling		10	40	40												£3,520.96		£3,520.96			1	
3	Site supervision																£5,953.60	£0.00	£5,953.60	Jul-16	Jul-16	1	
	Supervision of GI and contract management	15	10		100	15	10										£5,953.60		£5,953.60	Jul-16	Jul-16	1	
																						1	
4	Activity 4																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
5	Activity 5																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
6	Activity 6																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
7	Activity 7																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
8	Activity 8																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	Activity 9																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
10	Activity 10																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
	Totals	23	62	158	325	113	60	75	0	0	0	0	0	0	0	0	£29,238.61	£1,500.00	£30,738.61				
																TOTAL REVENUE	£30,739						

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Structures

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Neil Mogford	ZCEN	Cost Centre Manager	Structures
2	Mr Kevin Heard	ZCEN	Engineer	Structures
3	Mr Peter Webb	ZCEN	Graduate Engineer	Structures
4	Mr Kristian Mackerness	ZCEN	Graduate Engineer	Structures
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity / Staff Labour - normal hours	Staff Hours 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Staff Revenue	3rd Party Costs (Manual)	Total Revenue	Start Month (Manual)	End Month (Manual)	Duration (Months)	Additional Comments
GC/002498	**A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning**																£11,301.38	£0.00	£11,301.38	Jul-16	Jul-16	1	
		Mr Neil Mogford	Mr Kevin Heard	Mr Peter Webb	Mr Kristian Mackern																		
1	**Project Management, Governance and Reporting**																£1,663.94	£0.00	£1,663.94	Jul-16	Jul-16	1	
	Brief development and evaluation	2															£143.87		£143.87	Jul-16	Jul-16	1	
	Project Management, forecasting, invoicing, financial reporting	2	8														£524.03		£524.03			1	
	Meetings	4	8	8	4												£996.03		£996.03			1	
2	**Retaining Wall Chainage 400**																£3,649.98	£0.00	£3,649.98	Jul-16	Jul-16	1	
	Review information		2	4	4												£318.98		£318.98	Jul-16	Jul-16	1	
	Outline design / layout			4	16												£583.17		£583.17			1	
	Preliminary size wall		4	16													£606.85		£606.85			1	
	Production AIP	2	4	24	36												£2,036.80		£2,036.80			1	
3	**Retaining Wall Chainage 200**																£3,321.86	£0.00	£3,321.86	Jul-16	Jul-16	1	
	Review information		2	4	4												£318.98		£318.98	Jul-16	Jul-16	1	
	Outline design / layout			4	16												£583.17		£583.17			1	
	Preliminary size wall		4	16													£606.85		£606.85			1	
	Production AIP	2	4	20	32												£1,812.86		£1,812.86			1	
4	**Retainin wall at access to car sales property**																£2,665.60	£0.00	£2,665.60	Jul-16	Jul-16	1	
	Review information		2	4	4												£318.98		£318.98	Jul-16	Jul-16	1	
	Outline design / layout			4	16												£583.17		£583.17			1	
	Preliminary size wall		4	12													£502.66		£502.66			1	
	GA / Planning drawing	2	4	8	24												£1,260.80		£1,260.80			1	
																						1	
5	**Activity 5**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
6	**Activity 6**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
7	**Activity 7**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
8	**Activity 8**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	**Activity 9**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
10	**Activity 10**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
	Totals	14	46	132	156	0	0	0	0	0	0	0	0	0	0	0	£11,301.38	£0.00	£11,301.38				
																	TOTAL REVENUE		**£11,301**				

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Transport

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Daniel Davies	ZCEN	Graduate Transport Planner	Transportation
2	Mr Paul Turner	ZCEN	Principal Transport Planner	Transportation
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity / Staff Labour - normal hours	Staff Hours 1 (Mr Daniel Davies)	2 (Mr Paul Turner)	3	4	5	6	7	8	9	10	11	12	13	14	15	Staff Revenue	3rd Party Costs (Manual)	Total Revenue	Start Month (Manual)	End Month (Manual)	Duration (Months)	Additional Comments
GC/002498	**A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning**																£14,364.67	£50.00	£14,414.67	Jul-16	Jul-16	1	
1	**Project Management, Governance and Reporting**																£1,752.77	£50.00	£1,802.77	Jul-16	Jul-16	1	
	Brief and survey specification	6	2														£311.23		£311.23	Jul-16	Jul-16	1	
	Project Management, forecasting, invoicing and reporting	10	8														£755.71		£755.71			1	
	Meetings	8	8														£685.82		£685.82			1	
	Mileage																	£50.00	£50.00			1	
2	**Survey Analysis & Site Visit**																£3,581.95	£0.00	£3,581.95	Jul-16	Jul-16	1	
	Survey analysis + Matrix development	24	8														£1,244.93		£1,244.93	Jul-16	Jul-16	1	
	Site visit	8	8														£685.82		£685.82			1	
	TrafficMaster data analysis	24	16														£1,651.20		£1,651.20			1	
3	**Model Development**																£6,444.10	£0.00	£6,444.10	Jul-16	Jul-16	1	
	Base Model Development	60	16														£2,909.18		£2,909.18	Jul-16	Jul-16	1	
	Model calibration and validation	60	16														£2,909.18		£2,909.18			1	
	Junction Modelling	15	2														£625.73		£625.73			1	
4	**Dual Carriageway Option Testing**																£2,585.86	£0.00	£2,585.86	Jul-16	Jul-16	1	
	Model development	34															£1,188.10		£1,188.10	Jul-16	Jul-16	1	
	Model testing	16															£559.10		£559.10			1	
	Report writing	24															£838.66		£838.66			1	
5	**Activity 5**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
6	**Activity 6**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																						1	
7	**Activity 7**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																						1	
8	**Activity 8**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	**Activity 9**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
10	**Activity 10**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
Totals		**289**	**84**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**£14,364.67**	**£50.00**	**£14,414.67**				
																	TOTAL REVENUE		**£14,415**				

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - CPO and Land

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Neil Morris	ZCGC	Principal Engineer	Infrastructure
2	Mrs Julie Stacey	ZCGC	Senior Technician	Infrastructure
3	Mr Stuart Warburton	ZCGC	Apprentice Engineer	Infrastructure
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	Manual 3rd Party Costs	Total Revenue	Manual Start Month	Manual End Month	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	**A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning**																£6,760.18	£0.00	£6,760.18	Jul-16	Jul-16	1	
		Mr Neil Morris	Mrs Julie Stacey	Mr Stuart Warburto																			
1	**Task Management**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
	Task Management																			Jul-16	Jul-16	1	
2	**Land Interest and CPO**																£6,760.18	£0.00	£6,760.18	Jul-16	Jul-16	1	
	Prepare Land Interest Plans	22.5	20	60													£2,983.46		£2,983.46	Jul-16	Jul-16	1	Based on 18 affected propoerties
	Prepare CPO Plan	8	8	24													£1,134.31		£1,134.31			1	
	Prepare CPO Schedules	24	30														£2,642.42		£2,642.42			1	
																						1	
3	**Activity 3**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
4	**Activity 4**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
5	**Activity 5**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
6	**Activity 6**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
7	**Activity 7**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
8	**Activity 8**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	**Activity 9**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
10	**Activity 10**																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
	Totals	54.5	58	84	0	0	0	0	0	0	0	0	0	0	0	0	£6,760.18	£0.00	£6,760.18				
																TOTAL REVENUE	**£6,760**						

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Planning

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Lee Selway	ZCGC	Associate	Infrastructure
2	Mr Neil Morris	ZCGC	Principal Engineer	Infrastructure
3	Mr Craig Fletcher	ZCGC	Engineer	Infrastructure
4	Mr Stuart Warburton	ZCGC	Apprentice Engineer	Infrastructure
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	Manual 3rd Party Costs	Total Revenue	Manual Start Month	Manual End Month	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning																£8,406.32	£0.00	£8,406.32	Jul-16	Jul-16	1	
		Mr Lee Selway	Mr Neil Morris	Mr Craig Fletcher	Mr Stuart Warburto																		
1	Planning Application																£8,406.32	£0.00	£8,406.32	Jul-16	Jul-16	1	
	Complete Application Forms			8													£378.10		£378.10	Jul-16	Jul-16	1	
	Design and Access Statement	20	50	16													£5,106.52		£5,106.52			1	
	Prepare Planning Drawings			20	40												£1,503.81		£1,503.81			1	
	Collate Planning Supporting Information			30													£1,417.88		£1,417.88			1	
2	Activity 2																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
3	Activity 3																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
4	Activity 4																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
5	Activity 5																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
6	Activity 6																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
7	Activity 7																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
8	Activity 8																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	Activity 9																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
10	Activity 10																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
Totals		20	50	74	40	0	0	0	0	0	0	0	0	0	0	0	£8,406.32	£0.00	£8,406.32				
																TOTAL REVENUE	£8,406						

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A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning

GC/002498

Cost, Time and Resource Schedule - Planning

Date : 01/08/2016
Project Fee Basis : Time

Cardiff PM : Mr Lee Selway
Tel : 02920 803642
Email : lee.selway@capita.co.uk

Client PM : Lindsay Gauntlett
Tel : 01443 494829
Email : lindsay.a.gauntlett@rhondda-cynon-taff.gov.uk

Number	Staff Name	Cost Centre	Job Title	Discipline
1	Mr Michael Asprou	ZCGC	Principal QS	Quantity Surveying
2	Mr Andrew Flook	ZCGC	Cost Centre Manager	Infrastructure
3				
4				
5				
6				
7				
8				
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* • DON'T DELETE ROWS – simply hide the ones that you are not going to use.

WBS	Activity	Staff Hours															Staff Revenue	3rd Party Costs (Manual)	Total Revenue	Start Month (Manual)	End Month (Manual)	Duration (Months)	Additional Comments
	Staff Labour - normal hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15							
GC/002498	A4119 Dualling - Coed Ely - Stage 2 Preliminary Design to Planning																£1,726.70	£0.00	£1,726.70	Jul-16	Jul-16	1	
		Mr Michael Asprou	Mr Andrew Flook																				
1	Update Cost Estimate																£1,726.70	£0.00	£1,726.70	Jul-16	Jul-16	1	
	Update Cost Estimate	22.5	5														£1,726.70		£1,726.70	Jul-16	Jul-16	1	
2	Activity 2																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
3	Activity 3																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
4	Activity 4																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
5	Activity 5																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
6	Activity 6																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
7	Activity 7																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
8	Activity 8																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
9	Activity 9																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
																						1	
10	Activity 10																£0.00	£0.00	£0.00	Jul-16	Jul-16	1	
																				Jul-16	Jul-16	1	
																						1	
Totals		22.5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	£1,726.70	£0.00	£1,726.70				
															TOTAL REVENUE		£1,727						

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1.2 Workshop Report

Appendix 1.2

Coedely: Impacts Assessment Report

Strategic Outline Case

Stakeholders' Workshop Report

The Stakeholders' Workshop for Llanharan was held on the morning of Wednesday 20 September, 2017 at the Rhondda Cynon Taf County Borough Council Offices at Sardis House, Pontypridd. The attendees were as follows:

Name	Organisation/Role
Andrew Griffiths	Rhondda Cynon Taf County Borough Council
Souren Zeinali	Rhondda Cynon Taf County Borough Council
Jessica Lonergan	Rhondda Cynon Taf County Borough Council
Lindsay Gauntlett	Rhondda Cynon Taf County Borough Council
Adrian Morgan	Rhondda Cynon Taf County Borough Council
Rachel Edmunds	Rhondda Cynon Taf County Borough Council
Tim Phillips	Rhondda Cynon Taf County Borough Council
Rebecca Smith	Rhondda Cynon Taf County Borough Council
Charlie Nelson	Rhondda Cynon Taf County Borough Council
Dave Afia	Rhondda Cynon Taf County Borough Council
Rhodri Griffin	Rhondda Cynon Taf County Borough Council
Simon Pritchard	Rhondda Cynon Taf County Borough Council
Anthony Richardson	Rhondda Cynon Taf County Borough Council
DM	Rhondda Cynon Taf County Borough Council
Paul Sullivan	REDSTART, Project Manager
Dave Bennett	REDSTART, Senior Engineer - facilitator
Neil Morris	REDSTART, Senior Engineer - facilitator

Aims of the Workshop

1. To determine what problems or issues there are within the Study Area, opportunities that addressing these could bring, and any constraints that may limit the ability to address the problems or issues.
2. To develop objectives that possible solutions to the problems or issues can be appraised against. These can be wide ranging but they should be specific to the problems or issues that have been identified.
3. To develop a long list of possible solutions that will seek to address the problems or issues that have been identified.
4. Following the workshop, REDSTART will take all the information gathered, and combine it with other relevant information.

WelTAG 2017

WelTAG 2017 was briefly described, including the five stages, Strategic Outline Case (Stage 1), Outline Business Case (Stage 2), Full Business Case (Stage 3), Implementation (Stage 4), and Post-Implementation (Stage 5). It was stated that the Coedely project was to be taken to the end of Stage 1, the identification of a short-list of options, followed by Stage 2 where these would be considered in greater detail.

Workshop Groups

The attendees were split into three groups for the undertaking of three tasks. The composition of the groups was as follows;

Group 1	Group 2	Group 3
Souren Zeinali	Lindsay Gauntlett	Rachel Edmunds
Jessica Lonergan	Adrian Morgan	Tim Phillips
David Afia	Rebecca Smith	Andrew Griffith
Paul Sullivan	Rhodri Griffin	Antony Richardson
Charlie Nelson	Simon Pritchard	DM

Workshop Programme

Task 1: Identification of Problems, Opportunities and Constraints within the Study Area (see below for a plan of the Study Area).

Task 2: Development of Objectives.

Task 3: Development of Solutions/Options.

Each task lasted approximately 15 minutes, which was followed by 15/20 discussion of the output from each group.

Workshop Output

Task 1: Appendix 1.3 (Worksheet 1) in this Impacts Assessment Report lists the output from all three groups from Task 1.

Task 2: Appendix 1.4 (Worksheet 2) in this Impacts Assessment Report lists the output from all three groups from Task 2.

Task 3: Appendix 1.5 (Worksheet 3) in this Impacts Assessment Report lists the output from all three groups from Task 3.

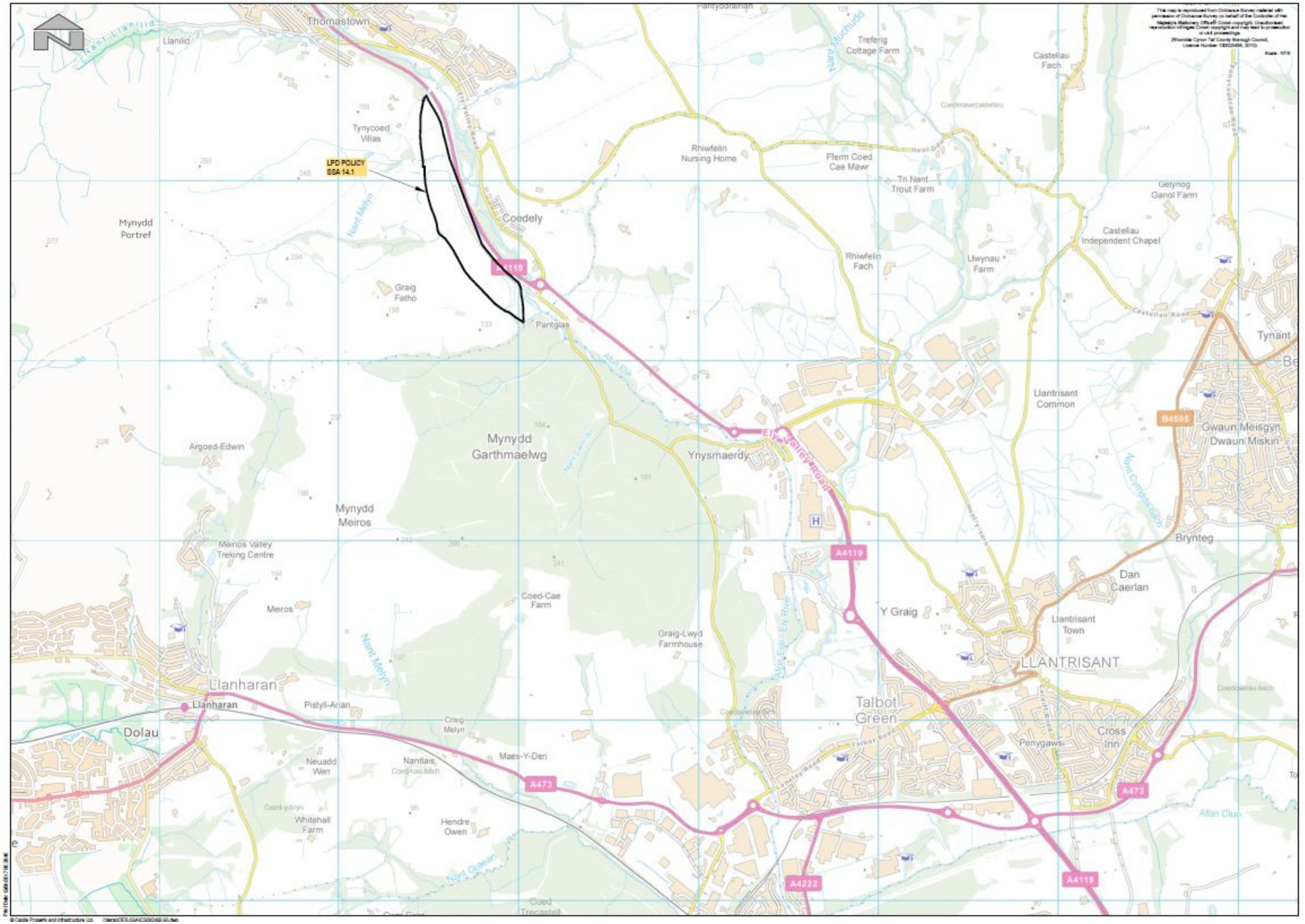
Images from Workshop

Group 1

Group 2

Group 3

Llanharan Study Area



1.3 Worksheet 1: Problems, Opportunities and Constraints

Appendix 1.3 Worksheet 1: Problems, Opportunities and Constraints

Ref	Theme	Description	Source	Problem	Opportunity	Constraint	Existing	Future
1	Traffic flow/Congestion	Traffic congestion tails back to Coedely roundabout	Workshop 20/09/17	✓			✓	✓
2	Safety/Accidents	Accidents - severity	Workshop 20/09/17	✓				
3	Traffic flow/Congestion	Impact of J34 congestion tails back to A473	Workshop 20/09/17	✓			✓	
4	Active Travel	Gap in Active Travel provision between hospital and Talbot Green	Workshop 20/09/17	✓	✓		✓	
5	Future Development	Impact of future committed development on traffic levels	Workshop 20/09/17	✓				✓
6	Public Transport	Delays to public transport services	Workshop 20/09/17	✓			✓	
7	Traffic flow/Congestion	Delays to emergency services	Workshop 20/09/17	✓			✓	
8	Traffic flow/Congestion	Stifles development (poor accessibility)	Workshop 20/09/17	✓				✓
9	Traffic flow/Congestion	Shift traffic problem elsewhere	Workshop 20/09/17	✓				✓
10	Route Efficiency	Diversion route difficulties	Workshop 20/09/17	✓		✓		✓
11	Traffic flow/Congestion	Existing speed limit (40mph)	Workshop 20/09/17	✓	✓		✓	
12	Safety/Accidents	Accident problems	Workshop 20/09/17	✓			✓	
13	Traffic flow/Congestion	Traffic congestion at Talbot Green	Workshop 20/09/17	✓			✓	
14	Traffic flow/Congestion	Traffic signals	Workshop 20/09/17	✓			✓	
15	Future Development	House building	Workshop 20/09/17	✓	✓			✓
16	Traffic flow/Congestion	Congestion (A4119)	Workshop 20/09/17	✓			✓	
17	Standards	Road width	Workshop 20/09/17	✓		✓	✓	
18	Route Efficiency	Number of junctions – too many, roundabouts	Workshop 20/09/17	✓	✓		✓	
19	Traffic flow/Congestion	Poor journey times	Workshop 20/09/17	✓			✓	
20	Future Development	Additional development traffic	Workshop 20/09/17	✓				✓
21	Traffic flow/Congestion	One of two main routes into Rhondda Fawr	Workshop 20/09/17	✓		✓	✓	✓
22	Social	Social economic issues	Workshop 20/09/17	✓	✓		✓	
23	Safety/Accidents	Collisions	Workshop 20/09/17	✓			✓	
24	Public Transport	Bus frequency increasing from 3/hour to 4/hour from November 2017 on Service 122	Workshop 20/09/17		✓			✓
25	Future Development	Unlock development/ employment opportunities	Workshop 20/09/17		✓			✓
26	Funding	Funding targeted at A4119 corridor – LTF, LTNF, MBU	Workshop 20/09/17		✓	✓		✓
27	Access	Improved access to hospital	Workshop 20/09/17	✓	✓			✓
28	Future Development	Development of Strategic Opportunity Area to deliver economic growth	Workshop 20/09/17		✓			✓
29	Route Efficiency	Lose lower roundabout (SWFRS)	Workshop 20/09/17		✓			✓
30	Future Development	Housing expansion	Workshop 20/09/17		✓			✓
31	Public Transport	Metro – north west corridor	Workshop 20/09/17		✓			✓
32	Active Travel	Improve Active Travel	Workshop 20/09/17		✓		✓	✓
33	New Highways	Talbot Green Bypass (Ynysmaerdy to Coedcae Lane)	Workshop 20/09/17		✓			✓

34	Route Efficiency	Additional capacity to A4119 south	Workshop 20/09/17		✓		✓	✓
35	Public Transport	Investigation of bus lane provision	Workshop 20/09/17		✓			✓
36	Funding	City deal	Workshop 20/09/17		✓			✓
37	Funding	WG funding	Workshop 20/09/17		✓			✓
38	Funding	RCT funding	Workshop 20/09/17		✓			✓
39	Funding	CIL	Workshop 20/09/17		✓			✓
40	Future Development	Development	Workshop 20/09/17		✓			✓
41	Land	Land	Workshop 20/09/17			✓		✓
42	Physical/Topography	Topography	Workshop 20/09/17			✓		✓
43	Physical/Topography	Existing uses (farms, sewage works)	Workshop 20/09/17	✓		✓	✓	✓
44	Funding	Funding	Workshop 20/09/17			✓		✓
45	Environment/Ecology	Ecology (bats)	Workshop 20/09/17			✓		✓
46	Traffic flow/Congestion	Construction and keeping traffic flowing	Workshop 20/09/17			✓		✓
47	Utilities	Utilities (especially water and sewage)	Workshop 20/09/17			✓		✓
48	Physical/Topography	Scrap yard	Workshop 20/09/17	✓		✓		✓
49	Physical/Topography	Sewerage plant	Workshop 20/09/17	✓		✓		✓
50	Physical/Topography	Retaining wall	Workshop 20/09/17			✓		✓
51	Land	Land ownership	Workshop 20/09/17			✓		✓
52	Environment/Ecology	Ecology	Workshop 20/09/17			✓		✓
53	Public Transport	Existing bus stops	Workshop 20/09/17	✓		✓		✓
54	Land	Land	Workshop 20/09/17			✓		✓
55	Environment/Ecology	Environmental	Workshop 20/09/17			✓		✓
56	Funding	Funding	Workshop 20/09/17			✓		✓
57	Traffic flow/Congestion	Maintain traffic flow	Workshop 20/09/17			✓		✓
58	Public Transport	No rail access	Workshop 20/09/17	✓		✓	✓	✓
59	Public Transport	Public transport limited	Workshop 20/09/17			✓	✓	

1.4 Worksheet 2: Objective Development - Short-List of Objectives

Appendix 1.4 Worksheet 2: Objective Development - Long List of Objectives

Ref	Theme	Objective	Source
PUT01	Public transport	Improve public transport usage/reliability	Workshop 20/09/17
ECN01	Economy	Improve economic growth/employment opportunities	Workshop 20/09/17
EFF01	Efficiency	Reduce congestion/improve access	Workshop 20/09/17
SAF01	Safety/Health	Improve safety	Workshop 20/09/17
ENV01	Environment	Improve air quality/minimises impact on the environment	Workshop 20/09/17
ACT01	Active travel	Increase Active Travel provison/journeys	Workshop 20/09/17
VFM01	Value for Money	Provide a value for money solution	Workshop 20/09/17
EFF02	Efficiency	Rationlise junctions	Workshop 20/09/17
ENV02	Environment	Improve air quality	Workshop 20/09/17
ACT02	Active travel	Improve Active Travel/public transport	Workshop 20/09/17
ECN02	Economy	Make area developable	Workshop 20/09/17
ECN03	Economy	Employment opportunities	Workshop 20/09/17
EFF03	Efficiency	Network more resilient/road safety	Workshop 20/09/17
ECN04	Economy	Economic regeneration of Ely Valley	Workshop 20/09/17
PUT02	Public transport	Facilitate provision for Park & Ride/Park & Share	Workshop 20/09/17
EFF04	Efficiency	Emergency vehicle response times	Workshop 20/09/17
EFF05	Efficiency	Journey time improvements	Workshop 20/09/17
PUT03	Public transport	Improve public transport provision	Workshop 20/09/17
EFF06	Efficiency	Reduction in queue lengths	Workshop 20/09/17
ENV03	Environment	Pollution reduction air quality and noise	Workshop 20/09/17
SAF02	Safety/Health	Collision reduction	Workshop 20/09/17
ECN05	Economy	Increasing social/economic developments	Workshop 20/09/17
ECN06	Economy	Increasing investment	Workshop 20/09/17
EFF07	Efficiency	Social inclusion (better access to social facilities, jobs and leisure)	Workshop 20/09/17
PUT04	Public transport	Modal shift and increase in public transport	Workshop 20/09/17
ACT03	Active travel	Improve Active Travel - walking and cycling for commuting	Workshop 20/09/17
PUT05	Public Transport	Modal shift and increase in public transport	Workshop 20/09/17
HEA01	Health	Improve the health and well-being of the local community	Capita

1.5 Worksheet 3: Objective Development - Short-List of Objectives (by theme)

Appendix 1.5 Worksheet 3: Objective Development - Short-List of Objectives (by theme)

Ref	Long-list ref	Statement/TPO	Comments and relationship to Problems, Opportunities and Constraints (from Worksheet 1)
TPO1	EFF01 to EFF07	To improve highway journey times on the north/south A4119 corridor and improve access to the M4.	All TPOs relating to the more efficient use of the highway network to improve traffic flow for all users. Congestion, queues, improving access, rationalising junctions, resilience, journey time improvements for all users.
TPO2	ECN01 to ECN07	To improve the economic and employment opportunities in the Ely Valley and provide employment and social benefits.	All TPOs relating to the local economy and employment.
TPO3	ACT01 to ACT03	To improve Active Travel routes along the north/south A4119 corridor.	All TPOs relating to improving Active Travel opportunities.
TPO4	ENV01 to ENV03	To improve environmental conditions, including air quality and noise and to minimise the overall impact on the environment within the north/south A4119 corridor.	All TPOs relating to the environment and its improvement.
TPO5	PUT01 to PUT04	To improve the patronage of public transport and improve public transport reliability within the A4119 corridor.	All TPOs relating to public transport, Park & Ride, Park & Share, and modal shift.
TPO6	SAF01 to SAF02	To improve safety and reduce the number of collisions and KSIs on the A4119 between Talbot Green and Coedely.	All TPOs relating to safety.
TPO7	HEA01	Improve the health and well-being of the local community	All TPOs relating to improving health.

1.6 Worksheet 4: Objective Development - Refined Short-List of Objectives

Appendix 1.6 Worksheet 4: Objective Development - Refined Short-List of Objectives

Ref	Long-list ref	Statement/TPO	Comments and relationship to Problems, Opportunities and Constraints (from Worksheet 1)
TPO1	EFF01 to EFF07	To improve highway journey times on the north/south A4119 corridor and improve access to the M4.	All TPOs relating to the more efficient use of the highway network to improve traffic flow for all users. Congestion, queues, improving access, rationalising junctions, resilience, journey time improvements for all users.
TPO2	ECN01 to ECN07	To improve the economic and employment opportunities in the Ely Valley and provide employment and social benefits.	All TPOs relating to the local economy and employment.
TPO3	ACT01 to ACT03, & HEA01	To improve Active Travel routes along the north/south A4119 corridor with the aim of improving the health and well-being of the local community.	All TPOs relating to improving Active Travel opportunities. Also health.
TPO4	ENV01 to ENV03	To improve environmental conditions, including air quality and noise and to minimise the overall impact on the environment within the north/south A4119 corridor.	All TPOs relating to the environment and its improvement.
TPO5	PUT01 to PUT04	To improve the patronage of public transport and improve public transoport reliability within the north/south A4119 corridor.	All TPOs relating to public transport, Park & Ride, Park & Share, and modal shift.
TPO6	SAF01 to SAF02	To improve safety and reduce the number of collisions and KSIs on the A4119 between Talbot Green and Coedely.	All TPOs relating to safety.

1.7 Worksheet 5: Option Development - Long List of Options (themes)

Appendix 1.7 Worksheet 5: Option Development - Long List of Options (themes)

Ref. No.	Option	Source	Theme
1	Dual Stink Pot Hill	Workshop 20/09/17	(DCW01)
2	Park & Ride/Share - parking within development site	Workshop 20/09/17	(PRS01)
3	Park & Ride/Share - parking within golf course	Workshop 20/09/17	(PRS02)
4	Talbot Green Bypass (LDP scheme)	Workshop 20/09/17	(BPS01)
5	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	Workshop 20/09/17	(MBU01)
6	Smart solution for Stink Pot Hill - third lane tidal	Workshop 20/09/17	(WSC01)
7	Light rail to Tonyrefail/Rhondda	Workshop 20/09/17	(PTR01)
8	Bus rapid transit to Tonyrefail/Rhondda	Workshop 20/09/17	(PTR02)
9	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	Workshop 20/09/17	(EWC01)
10	New link - Coedely to Beddau/Gwaun Miskin	Workshop 20/09/17	(ECW02)
11	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	Workshop 20/09/17	(BPS02)
12	New link from A4119 Ynysmaerdy to Llanharan	Workshop 20/09/17	(ECW03)
13	Talbot Green Bypass (Ynysmaerdy to Talbot Green Relief Road)	Workshop 20/09/17	(BPS03)
14	Removal of at-grade junctions (A4119)	Workshop 20/09/17	(MBU02)
15	Flyover (on A4119)	Workshop 20/09/17	(MBU03)
16	Community route adjacent to A4119	Workshop 20/09/17	(ATR01)
17	Metro link, bus/light rail	Workshop 20/09/17	(PTR03)
18	Platooning traffic	Workshop 20/09/17	(TRA01)
19	Park & Ride expansion and Pontyclun Park & Ride	Workshop 20/09/17	(PRS03)
20	Boris Bike Parks with electric bike provision	Workshop 20/09/17	(CYC01)
21	Dualling (A4119)	Workshop 20/09/17	(DCW02)
22	Light rail/tram link	Workshop 20/09/17	(PTR04)
23	Heavy rail	Workshop 20/09/17	(PRS04)
24	Rapid Bus Transit - guided bus system	Workshop 20/09/17	(PTR05)
25	Priority bus routes/bus lanes	Workshop 20/09/17	(BPL01)
26	Reduction in public transport fares	Workshop 20/09/17	(BPL01)
27	Grade separated route along A4119	Workshop 20/09/17	(MBU04)
28	Road bypass (assumed as to the west of Yntsmaerdy/Talbot Green)	Workshop 20/09/17	(BPS04)
29	Improve Park & Ride system	Workshop 20/09/17	(PRS05)
30	Rationalise number of junctions (on A4119)	Workshop 20/09/17	(MBU05)
31	Car share lanes	Workshop 20/09/17	(CSL01)
32	Do Minimum	Workshop 20/09/17	(MBU06)

1.8 Worksheet 6: Option Development - Long List of Options (grouped by theme)

Appendix 1.8 Worksheet 6: Option Development - Long List of Options (grouped by theme)

Option No.	Option	Source	Theme
1	Dual single carriageway A4119 (Stink Pot Hill)	Workshop 20/09/17	DCW01 & DCW02
2	Park & Ride/Park & Share facility within SSA 14.1 development site	Workshop 20/09/17	PRS01 & PRS05
3	Park & Ride/Park & Share facility within Llantrisant Golf Course	Workshop 20/09/17	PRS02 & PRS05
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	Workshop 20/09/17	BPS01 & BPS03
5	Third lane tidal (A4119 to south of Coedely Roundabout)	Workshop 20/09/17	WSC01
6	New link from A4119 Ynysmaerdy to Llanharan	Workshop 20/09/17	ECW03
7	New link - Coedely to Beddau/Gwaun Miskin	Workshop 20/09/17	ECW02
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	Workshop 20/09/17	BPS02
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	Workshop 20/09/17	MBU01
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	Workshop 20/09/17	EWC01
11	Active Travel route adjacent to A4119	Workshop 20/09/17	ATR01
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	Workshop 20/09/17	BPS04
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	Workshop 20/09/17	PTR01, PTR02, PTR03, PTR0 & PTR05
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	Workshop 20/09/17	MBU02 & MBU05
15	Park & Ride expansion north of the study area	Workshop 20/09/17	PRS03
16	Flyover/grade separation on A4119	Workshop 20/09/17	MBU03 & MBU04
17	Platooning traffic	Workshop 20/09/17	TRA01
18	Boris Bike Parks with electric bike provision	Workshop 20/09/17	CYC01
19	Improve public transport infrastructure and provide priority bus routes/bus lanes	Workshop 20/09/17	BPL01
20	Reduction in public transport fares	Workshop 20/09/17	BPL01
21	Car share lanes	Workshop 20/09/17	CSL01
22	Do Minimum	Workshop 20/09/17	MBU06

It should be noted that the option numbers on Worksheet 6 above are not the same as reference numbers on Worksheet 5

1.9 Worksheet 7: Option Descriptions

Appendix 1.9 Worksheet 7: Option Descriptions

Option No.	Option	Description
1	Dual single carriageway A4119 (Stink Pot Hill)	This will be the dualling of the 1.3 kilometre section of A4119 between Coedely roundabout and the South Wales Fire and Rescue Headquarters roundabout. Also included will be alterations at the two roundabouts to improve traffic capacity.
2	Park & Ride/Park & Share facility within SSA 14.1 development site	Although the site is identified for B1 and B2 use, it could also support a Park & Ride site for either the extensive Talbot Green retail development area or further afield. Ideally this would be at the southern end close to the Coedely roundabout; however, this would also be where development will want to be initially located, for ease of access onto the highway network.
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	The identified area is at the northern end of the golf course adjacent to the roundabout on the A4119 that gives access to the Royal Glamorgan Hospital from the south. It was one of the sites considered for a Park & Ride facility when various options were being considered close to the A4119 in 2016.
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	This is is referenced in the RCT LDP as Proposal CS 8(a) (2), the Ynysmaerdy to Talbot Green Relief Road. The following description is taken from the LDP. *The proposed relief road is to provide an alternative route from the Upper Ely Valley, to the west of Talbot Green. The scheme is largely dependant on the scale of new development in the area, and as such will require developers to assst with cost. The alignment shown on the Proposals Map is supported by the Council and is the only route to benefit from a feasibiity study. The Council acknowledges that it may be possible to deliver the proposed new road via an alternative alignment. This is particularly the case at the northern end of the scheme where it may be possible to distance the route from the settlement of Ynysmaerdy. Without prejeudice to any future planning application, should redevelopment proposals at the former Fire Service Headquarters at Lanelay Hall be supported, alternative routes may be viable at the southern end, including the possibility of agreeing a variation of the route in conjunction with any redevelopment scheme. As such, the Council, whilst continuing to seek to protect the feasible route as indicated on the Proposals Map, fully intends to investage alterrnative alignments before it finally adopts a route to take forward to detailed design.*
5	Third lane tidal (A4119 to south of Coedely Roundabout)	This will require less widening of the A4119 between Coedely roundabout and the South Wales Fire and Rescue Headquarters roundabout than would be the case with a dual carriageway, Option 1. However, the carriageway width will have to be increased to 10 metres to accommodate a third lane. It is anticipated that the central lane will be used by southbound traffic during the AM peak period and by northbound traffic during the PM peak period. It will have to be determined as to the arrangements for usage of the central lane at other times of the day (if at all) to ensure that this length of the A4119 operated safely.
6	New link from A4119 Ynysmaerdy to Llanharan	This would be a considerably shorter option for A4119/A473 (west) traffic as it would cut out a number of junctions on the A4119 north and east of Talbot Green. It would commence at the South Wales Fire and Rescue Service headquarters roundabout and would pass to the est and south of Llantrisant Forest before meeting the A473 approximately 1.5 kilometres east of Llanharan. As there are no existing roads between these two locations, no upgrading will be possible and all roads will be new.
7	New link - Coedely to Beddau/Gwaun Miskin	This option will improve east/west journeys between Beddau and the Coedely area, including the SSA 14.1 development site. It would cut out a number of junctions on the A4119. It will require the upgrading of minor roads between these two locations. The roads are generally very narrow and the road linking to Coedely roundabout will be steep.
8	Alternative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	This would commence at the eastern end of the dual carriageway that passes through llantrisant Business Park. The route would go north following a minor road to the east of the Royal Mint. Between here and Coedely, the road will requiring considerable upgrading as it follows a sinuous alignment. There is a steep approach to Coedely.
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	This is a large traffic signal controlled junction with segregated left turn lanes on three of the four arms. No specific improvements have been suggested but they are likely to involve changes to the signal timings as a means to increase capacity.
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	This will achieve a similar east/west benefit to Option 7 although requiring less upgrading of existing roads and linking to the A4119 further south. It will pass through the eastern part of Llantrisant Business Park.
11	Active Travel route adjacent to A4119	There is already a cycle route that can also be used by pedestrians that follows the alignment of part of the former Llantrisant and Taff Vale Junction railway line. Although not adjacent to the A4119, it broadly follows the same corridor but in a more remote location. There are long term plans to extend this through the SSA 14.1 site although a route already exists and is used. There are also plans to extend the route from the Royal Glamorgan Hospital to the roundabout that serves the hospital from the south. South of here and adjacent to the west side of the A4119, short term plans exist to provide a shared use facility to compliment the cycle route that follows Ely Valley Road to the centre of Talbot Green. A route adjacent to the A4119 will add to this network.
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	This will be the upgrading of the minor road that starts on Lanely Road in the western part of Talbot Green. The road continues north, passing through the eastern side of Llantrisant Forest west of Ynysmaerdy to meet Coedely roundabout. This road is generally very narrow with a sinuous alignment throughout. At its northern end, it passes beneath the former railway that is now used as a cycle route (not NCN).
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	Although more details of the option do not exist, it is likely that this would follow part of the alignment of the former Llantrisant and Taff Vale Junction railway line. It would commence close to Lanelay Road in western Talbot Green and would pass thriugh the eastern side of the SSA 14.1 development site before continuing to Tonyrefail/Rhondda. In places at the southern end, the route has been developed and further north it is a cycle route (not NCN). To be fully integrated with Cardiff Metro, this would have to be provided all the way to Talbot Green from Cardiff.
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	Some of the roundabouts on the A4119 north of Talbot Green are considered unnecessary, in particular the one that serves the South Wales Fire and Rescue Service headquarters. Removal would improve the flow of north/south traffic on the A4119 although safe means of access will still be required for developments that are currently served from roundabouts. Horizontal alignment standards will have to be maintained.
15	Park & Ride expansion north of the study area.	This is a non-specific proposal having the potential to be attractive to users in the Rhondda Valleys.
16	Flyover/grade separation on A4119	This is a non-specific option but it is assumed that it would involve the grade separation of at least one junction on the A4119. The existing traffic signal junction in Talbot Green would be the most likely candidate. This would improve flow on the A4119 although the impact further north is not known.
17	Platooning traffic	This is a non-specific option. It involves a group of vehicles that travels in close proximity to each other, nose-to-tail, at normal highway speeds. This could be achieved through traffic signals.
18	Boris Bike Parks with electric bike provision	This is a non-specific option. It involves the setting up of a cycle hub to allow hire bikes to be used within a defined area. The only area in which this might be successful is the large retail development in Talbot Green.
19	Improve public transport infrastructure and provide priority bus routes/bus lanes	This is a non-specific option. The A4119 is the main north/south road between the M4 and the Rhondda Valleys and as such is used by buses. It is therefore already a priority route. The addition of bus lanes will benefit public transport and could ease congestion in the Coedely area although they will require carriageway widening. Such a proposal is planned for the A4119 in the Mwyndy area in relation to a proposed Park & Ride site. RCT also has short-term proposals to upgrade bus stops between Tonypandy and Talbot Green (Cardiff Bus Priority Scheme).
20	Reduction in public transport fares	This could have the effect of transferring car trips to public transport. However, consultation with the bus companies that use the A4119 corridor would be required.
21	Car share lanes	As with bus lanes, car share lanes will require carrigeway widened wherever they would be proposed. This would have to be in conjunction with a campaign to promote the benefits of car sharing.
22	Do Minimum	Non specific low cost improvements.

Where necessary, the above descriptions are interpretations of the solutions tht were put forward during the Stakeholders' Workshop.

1.10 Worksheet 8: Appraisal of Options against the Wales Transport Strategy Outcomes

Appendix 1.10 Worksheet 8: Appraisal of Options against the Wales Transport Strategy Outcomes

Option No.	Option	Wales Transport Strategy Outcomes																
		Social					Economy					Environment						
		Improve access to healthcare	Improve access to education, training and lifelong learning	Improve access to shopping and leisure facilities	Encourage healthy lifestyles	Improve the actual and perceived safety of travel	Improve access to employment opportunities	Improve connectivity within Wales and internationally	Improve the efficient, reliable and sustainable movement of people	Improve the efficient, reliable and sustainable movement of freight	Improve access to visitor attractions	Increase the use of more sustainable materials	Reduce the contribution of transport to greenhouse gas emissions	Adapt to the impacts of climate change	Reduce the contribution of transport to air pollution and other harmful emissions	Improve the impact of transport on the local Environment	Improve the impact of transport on our heritage	Improve the impact of transport on biodiversity
1	Dual single carriageway A4119 (Stink Pot Hill)	+	+	+	0	0	++	+	+	+	+	+	+	+	0	-	0	-
2	Park & Ride/Park & Share facility within SSA 14.1 development site	0	0	0	+	+	0	0	0	0	0	0	+	+	+	0	0	0
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	0	0	0	+	+	0	0	0	0	0	0	+	+	+	-	0	-
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	+	+	+	0	0	++	+	++	++	+	+	0	0	-	- -	-	- -
5	Third lane tidal (A4119 to south of Coedely Roundabout)	0	0	0	0	-	+	+	0	0	0	+	-	-	0	-	-	-
6	New link from A4119 Ynysmaerdy to Llanharan	+	+	+	0	-	+	+	++	+	+	+	-	-	-	- -	-	- -
7	New link - Coedely to Beddau/Gwaun Miskin	+	+	+	0	-	+	+	+	+	+	+	-	-	-	- -	-	- -
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	0	0	0	0	-	+	+	+	+	0	+	-	-	-	- -	0	- -
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	+	+	+	0	+	+	0	+	+	+	0	0	0	0	0	0	0
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	0	0	0	0	-	+	+	+	+	0	+	-	-	-	- -	0	- -
11	Active Travel route adjacent to A4119	0	0	0	+++	+	+	+	0	+	0	0	+	+	+	+	0	0
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	0	0	0	0	-	++	+	0	+	0	+	-	-	-	- -	-	- -
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	+	+	+	+	+	++	+	+	0	+	0	+	+	+	-	-	- -
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	+	+	+	0	+	+	0	+	+	+	0	+	+	0	0	0	0
15	Park & Ride expansion north of the study area	0	0	0	+	+	+	0	0	0	0	0	+	+	+	0	0	0
16	Flyover/grade separation on A4119	+	+	+	0	+	+	+	+	+	+	+	+	+	0	0	0	0
17	Platooning traffic	0	0	0	0	- -	0	0	0	0	0	0	0	0	0	0	0	0
18	Boris Bike Parks with electric bike provision	0	0	0	++	0	0	0	0	0	0	0	+	+	+	+	0	0
19	Improve public transport infrastructure and provide priority bus routes/bus lanes	+	+	+	+	+	+	0	0	0	+	0	+	+	+	0	0	0
20	Reduction in public transport fares	+	+	+	+	0	+	0	0	0	+	0	0	0	+	0	0	0
21	Car share lanes	0	0	0	+	+	+	0	+	0	0	0	+	+	+	0	0	0
22	Do Minimum	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

1.11 Worksheet 9: Appraisal of Options against the Well-being of Future Generations (Wales) Act 2015 Goals

Appendix 1.11 Worksheet 9: Appraisal of Options against the Well-being of Future Generations (Wales) Act 2015 Goals

Option No.	Option	A globally responsible Wales	A Wales of vibrant culture and thriving Welsh language	A Wales of cohesive communities	A more equal Wales	A healthier Wales	A resilient Wales	A prosperous Wales
1	Dual single carriageway A4119 (Stink Pot Hill)	+ +	+	+	+	0	+	+ +
2	Park & Ride/Park & Share facility within SSA 14.1 development site	+	0	0	+	+	+	0
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	+	0	0	+	+	+	0
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	0	0	+	0	0	+	+
5	Third lane tidal (A4119 to south of Coedely Roundabout)	+	+	+	0	0	+	+
6	New link from A4119 Ynysmaerdy to Llanharan	-	0	-	0	0	+	+
7	New link - Coedely to Beddau/Gwaun Miskin	-	0	-	0	0	+	0
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	-	0	-	0	0	+	0
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	+	0	0	0	0	+	+
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	-	0	-	0	0	0	0
11	Active Travel route adjacent to A4119	+ +	+	+	+ +	+ +	+	+
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	- -	0	-	0	0	+	+
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	+ +	+	+	+	+	+	+
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	-	0	0	0	0	0	0
15	Park & Ride expansion north of the study area	+	0	0	+	+	+	+
16	Flyover/grade separation on A4119	+	0	0	0	0	+	0
17	Platooning traffic	0	0	0	0	0	0	0
18	Boris Bike Parks with electric bike provision	+	0	0	+	+ +	+	+
19	Improve public transport infrastructure and provide priority bus routes/bus lanes	+	0	+	+	0	+	+
20	Reduction in public transport fares	0	+	+	+	0	+	0
21	Car share lanes	+	0	+	+	0	+	+
22	Do Minimum	0	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

1.12 Worksheet 10: Appraisal of Options against the Transport Planning Objectives (TPOs)

Appendix 1.12 Worksheet 10: Appraisal of Scheme Options against Transport Planning Objectives (TPOs)

Option No.	Option	Transport Planning Objectives (TPOs)					
		TPO1: To improve highway journey times on the north/south A4119 corridor and improve access to the M4.	**TPO2:** To improve the economic and employment opportunities in the Ely Valley and provide employment and social benefits.	**TPO3:** To improve Active Travel routes with the aim of improving the health and well-being of the local community.	**TPO4:** To improve enviromental conditions, including air quality and noise and to minimise the overall impact on the environment.	**TPO5:** To increase the patronage of public transport and improve public transport reliability.	**TPO6:** To improve safety and reduce the number of collisions and KSIs on the A4119 between Talbot Green and Thomastown.
1	Dual single carriageway A4119 (Stink Pot Hill)	+ + +	+ + +	0	+	+	+
2	Park & Ride/Park & Share facility within SSA 14.1 development site	0	0	0	+	+	0
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	0	0	0	+	+	0
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	+ +	+ +	0	-	+	+
5	Third lane tidal (A4119 to south of Coedely Roundabout)	+	+	+	+	0	0
6	New link from A4119 Ynysmaerdy to Llanharan	+ +	+	0	+ +	+	+
7	New link - Coedely to Beddau/Gwaun Miskin	+	+	0	+	0	+
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	+	+	0	+	0	+
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	+	+	0	+	+	+
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	+	+	0	+	0	+
11	Active Travel route adjacent to A4119	0	0	+ +	+	0	0
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	+	+	+	- -	+	+
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	0	0	0	+	+	0
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	+	+	0	+	+	+
15	Park & Ride expansion north of the study area	0	0	0	+	+	0
16	Flyover/grade separation on A4119	+	+	0	+	+	+
17	Platooning traffic	0	0	0	+	0	0
18	Boris Bike Parks with electric bike provision	0	0	+ +	+	0	0
19	Improve public transport infrastructure and provide priority bus routes/b	0	0	0	+	+	0
20	Reduction in public transport fares	0	0	+	0	+	0
21	Car share lanes	0	0	0	+	0	0
22	Do Minimum	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

1.13 Worksheet 11: High Level Appraisal of Options (Appraisal Summary Table)

Appendix 1.13 Worksheet 11: High Level Appraisal of Options (Appraisal Summary Table)

Criteria	Qualitative Assessment																					
	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11	Option 12	Option 13	Option 14	Option 15	Option 16	Option 17	Option 18	Option 19	Option 20	Option 21	Option 22
Economic																						
Business Users & Reliability Impact	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA
Regeneration	+ +	0	0	+	+	0	+	+	0	+	0	+	+	0	0	0	0	0	0	0	0	0
Wider Impacts	+ +	0	-	+	+	0	+	+	+	+	0	+	+	0	0	0	0	0	0	0	+	0
Environment																						
Noise	0	0	0	+	0	+	+	+	0	+	0	+	-	0	0	0	0	0	0	0	0	0
Air Quality	0	0	0	+	0	+	+	+	0	+	0	+	-	0	0	0	0	0	0	0	0	0
Greenhouse Gases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Landscape	0	0	-	-	0	- - -	- - -	- - -	0	- - -	0	- - -	-	0	0	0	0	0	0	0	0	0
Townscape	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Historic Landscape	0	0	0	0	0	- - -	- -	- -	0	- -	0	- - -	0	0	0	0	0	0	0	0	0	0
Biodiversity	-	0	-	-	-	- - -	- -	- -	0	- -	0	- - -	-	0	0	0	0	0	0	0	0	0
Water Environment	0	0	-	0	0	-	-	-	0	-	0	-	0	0	0	0	0	0	0	0	0	0
Social																						
Commuting and Other Users	+ +	+	+	+	+	+ +	+	+	+	+	+	+	+	0	+	+	+	+	+	+ +	+	0
Reliability Impact on Commuting and Other Users	+ +	+	+	-	+	+ +	+	+	+	+	+	+	-	0	+	+	+	0	+	0	+	0
Physical Activity	0	0	0	0	0	0	0	0	0	0	+ + +	0	0	0	0	0	0	+ + +	0	+	0	0
Journey Quality	+ +	+	+	+ +	+	+ +	+ +	+ +	0	+ +	+	+ +	+ +	+	+	0	-	0	+	0	+	0
Accidents	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA
Security	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA
Access to Services	+	0	0	+ +	+	+ +	+	+	+	+	0	+	+ +	0	0	0	0	+	0	+	0	0
Affordability	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA
Severance	0	0	0	-	0	- -	- -	- -	0	- -	0	- -	-	0	0	0	0	0	0	+	0	0
Option Values	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	0	0	+	0	0	0	0
Public Accounts																						
Cost to Broad Transport Budget	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA
Indirect Tax Revenues	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA	NYA

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

1.14 Worksheet 12: How the Options will Tackle the Identified Problems, and Other Issues

Appendix 1.14 Worksheet 12: How the Options will Tackle the Identified Problems, and Other Relevant Issues

Opt. No.	Option	How the Option will Tackle the Identified Problems	Other Commernts
1	Dual single carriageway A4119 (Stink Pot Hill)	This option will widen the existing A4119 to a dual carriageway standard, which will require alterations to the two terminal roundabouts. The dualling will increase link capacity and the roundabout improvements will increase the capacity through the terminal junctions. The improvements will reduce queuing and congestion on this part of the A4119 and will also accommodation additional traffic from the SSA 14.1 development.	It is considered that the lack of a dual carriageway all the way north to Coedely roundabout is reducing the attractiveness of the SSA 14.1 to developers.
2	Park & Ride/Park & Share facility within SSA 14.1 development site	A Park & Ride would have the potential to reduce the number of vehicles on the A4119 to the south of Coedely and in turn reduce queuing and congestion. It could be used for sustainable access to the Talbot Green retail area.	Other than B1 and B2 use, there are no definite plans for the SSA 14.1 site.
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	This option could fulfil the same purpose as Option 2. However, as it lies to the south of the single carriageway A4119, there will be no reduction in traffic flows and queuing and congestion will not change.	This site was one of those identified as a potential Park & Ride in the A4119 corridor improvement study, 2016.
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	The intention of this option has always been to bypass Talbot Green. It will reduce the distance for A4119 to A473 (west) traffic and vice versa. And will reduce traffic flows on Talbot Road. Although it will not directly benefit the single carriageway A4119 to the north of Ynysmaerdy, a reduction in traffic flow further south may give some relief. It will require a considerable detour at its southern end. This option will require alterations to the South Wales Fire and Rescue Centre headquarters roundabout.	This option has been in the RCT LDP for some time.
5	Third lane tidal (A4119 to south of Coedely Roundabout)	The introduction of a third lane will increase capacity of the single carriageway A4119. It will effectively provide a two-lane approach to both terminal roundabouts over a distance required to reduce queuing to an acceptable level. Improvements to the roundabout approaches will also be required. It is likely that this option will have a positive effect on queuing and congestion.	The distance between the roundabouts (1.3 kilometres) will also allow 650 metres of overtaking as well.
6	New link from A4119 Ynysmaerdy to Llanharan	This will be not dissimilar to Option 4 but over a greater distance. As a result, it will not benefit the single carriageway A4119 to the north of Ynysmaerdy.	Likely considerable environmental impacts.
7	New link - Coedely to Beddau/Gwaun Miskin	This option will benefit access to the SSA 14.1 site from the east, which in turn will benefit access from the south through less traffic on the A4119. This may reduce queuing and congestion on this road and at the terminal roundabouts.	Considerable upgrading of minor roads required.
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	Although this will allow north and southbound traffic to avoid the A4119 to the immediate south of Coedely, it will be a longer, more tortuous route requiring a diversion to reach it. It will still require improvements to Coedely roundabout.	Considerable upgrading of minor roads required.
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	Although it may be possible to improve capacity for some movements, this is likely to disbenefit others. The benefits on the A4119 are unlikely to extend to Coedely.	All movements will have to pass through the junction at grade.
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	This option will improve east/west movements only and avoid traffic having to go south through Llantrisant. Although this may benefit the A4119 between the main roundabout at Ynysmaerdy and Talbot Road junction, it will have no effect further north at Coedely.	East/west traffic will have to pass through an industrial area. Considerable upgrading of minor roads required.
11	Active Travel route adjacent to A4119	Although this option is unlikely to address the identified problems on the A4119 and Coedely roundabout, it will give greater sustainable travel choice in this part of the Ely Valley, particularly when linked to the completion of the Llantrisant to Tonyrefail Community Route.	There is already an Active Travel Route that follows a former railway to the immediate west of the A4119.
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	This option is likely to achieve similar benefits to Option 4 but additionally, it will extend further north to Coedely roundabout thus benefiting the SSA 14.1 development. This will give greater relief to the A4119. It will be a longer, more tortuous route requiring a considerable detour at the southern end to reach it.	Passes through Llantrisant Forest as well as through or close to the Lanelay Hall residential development site.
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	Although a public transport system direct from Talbot Green to the Rhondda will also benefit the SSA 14.1 site, without the Cardiff Metro extending from the Capital to Talbot Green, the benefits will be considerably less.	Largely relies on Cardiff Metro extending to Talbot Green. The status of this is not known.
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	It is considered that some junctions on the A4119 are not required as they only give access to organisations such as the South Wales Fire and Rescue Service headquarters. Alterations to particular junctions giving greater priority to A4119 movements could improve traffic flow.	Roundabouts provide convenient changes in direction, which may make north/south priority difficult to achieve within current design standards.
15	Park & Ride expansion north of the study area	This option is well outside the study area. Even though it may be beneficial in the Pontyclun area, there will be no benefit to the Coedely area.	Cannot really be considered an option to address the identified problems.
16	Flyover/grade separation on A4119	With all the junctions on the A4119 being at-grade, there is direct interaction between north/south and east/west traffic. Grade separation of these movements will benefit all users particularly between Talbot Green and the M4. However, with no east/west routes in the Coedely area, benefits will not be realised.	The A4119 is to be the subject of a corridor study to consider all the junctions south of Tonyrefail.
17	Platooning traffic	It is difficult to see how this option would work and even if it could, it is unlikely that it would tackle the identified problems. It may create additional, unforeseen problems.	Would likely require additional input to be able to function.
18	Boris Bike Parks with electric bike provision	This is not really an option that could address the identified problems.	This option is more about very localised transport issues.
19	Improve public transport infrastructure and provide pri	Bus lanes would have to be associated with physically providing an additional lane or fitting additional provision within sections of existing highway. The latter would impact upon vehicle capacity and the benefits are likely to be very small.	The A4119 is already a major north/south bus route through Rhondda Cynon Taf.
20	Reduction in public transport fares	It is difficult to see how such an option would address the identified problems on the A4119 at Coedely.	Requires outside involvement (bus operators) and agreement, which is unlikely to happen.
21	Car share lanes	Car share lanes have the ability to reduce the number of cars on the road but this relies on a number of factors such as car share campaigns, which are unlikely to result in a large take up of car sharing.	Additional traffic lanes required or a reduction in capacity on existing roads (dual carriageways).
22	Do Minimum	Other than ensuring that the A4119 continues to be fit for purpose in maintenance terms, this option will not change the way that the A4119 operates. With no improvements, the situation will	Regular maintenance only.

1.15 Worksheet 13: Appraisal of Options against Deliverability

Appendix 1.15 Worksheet 13: Appraisal of Scheme Options against Deliverability

Option No.	Option	Feasibility	Affordability	Acceptability	Timescale	Risks
1	Dual single carriageway A4119 (Stink Pot Hill)	+ +	+ +	+ +	+	+
2	Park & Ride/Park & Share facility within SSA 14.1 development site	+ +	+ +	+ +	-	0
3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.	-	+	-	-	- -
4	Ynysmaerdy to Talbot Green Relief Road (LDP scheme)	-	- -	0	- -	- -
5	Third lane tidal (A4119 to south of Coedely Roundabout)	+ +	+ + +	+	+ +	-
6	New link from A4119 Ynysmaerdy to Llanharan	- - -	- - -	- -	- - -	- - -
7	New link - Coedely to Beddau/Gwaun Miskin	- - -	-	- - -	- -	- -
8	Alterrnative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin	- -	-	- -	- -	- -
9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity	+	+ + +	+	+	+ +
10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin	- -	+	- -	-	- -
11	Active Travel route adjacent to A4119	+ +	+ + +	+	+ +	+ +
12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)	- - -	-	- -	- -	- -
13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda	- - -	- - -	- - -	- - -	- - -
14	Removal of at-grade roundabout on the A4119 at the South Wales Fire and Rescue Centre headquarters	- -	0	0	0	0
15	Park & Ride expansion north of the study area	-	+	+ +	0	0
16	Flyover/grade separation on A4119	- - -	- - -	- -	- - -	- - -
17	Platooning traffic	0	0	-	+	0
18	Boris Bike Parks with electric bike provision	- -	+	- -	0	-
19	Improve public transport infrastructure and provide priority bus routes/l	-	0	0	0	- - -
20	Reduction in public transport fares	0	0	+	-	0
21	Car share lanes	-	0	-	-	- - -
22	Do Minimum	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

1.16 Options Plan

Scale : NTS

Coed Ely Options

Option 1	Dual single carriageway A4119 (Stink Pot Hill)
Option 2	Park & Ride/Park & Share facility within SSA 14.1 development site
Option 3	Park & Ride/Park & Share facility within the existing Llantrisant and Pontyclun Golf Course.
Option 4	Ynysmaerdy to Talbot Green relief road (LDP scheme)
Option 5	Third lane tidal (A4119 to South of Coedely roundabout)
Option 6	New link from A4119 Ynysmaerdy to Llanharan
Option 7	New link - Coedely to Beddau/Gwaun Miskin
Option 8	Alternative alignment to Stink Pot Hill via Royal Mint and Rhiwfelin
Option 9	Improve Talbot Road junction - better access to/from bus station, better throughput, more left turn/right turn capacity
Option 10	Improve east/west corridors - new link Royal Mint to Beddau/Gwaun Miskin
Option 11	Active travel route adjacent to A4119
Option 12	Road bypass (assumed as to the west of Ynysmaerdy/Talbot Green)
Option 13	Light rail/bus rapid transit/tram/guided bus/heavy rail/Metro link to Tonyrefail/Rhondda
Option 14	Removal of At grade roundabout on the A4119 at the South Wales Fire and Rescue Centre Headquarters

APPENDIX 1.16

Appendices
Section 2 – WelTAG Stage 2: Outline Business Case (OBC)

2.0 A4119 Corridor Assessment: Traffic Forecasts & Capacity Assessment Report (May 2018)

REDSTART

A4119 CORRIDOR ASSESSMENT, TRAFFIC FORECAST & CAPACITY ASSESSMENT

MAY 2018

A

Project No: CS/93813 Doc Ref: CS/93813 Rev: A

CLIENT: Rhondda Cynon Taf County Borough Council
ISSUE DATE: May 2018

A4119 Corridor Assessment, Traffic Forecast & Capacity Assessment

	NAME	SIGNATURE	DATE
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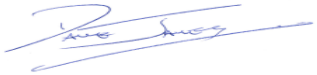
APPROVER	Dave James		11/05/2018

ISSUE RECORD

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REDSTART

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Contents

Appendices

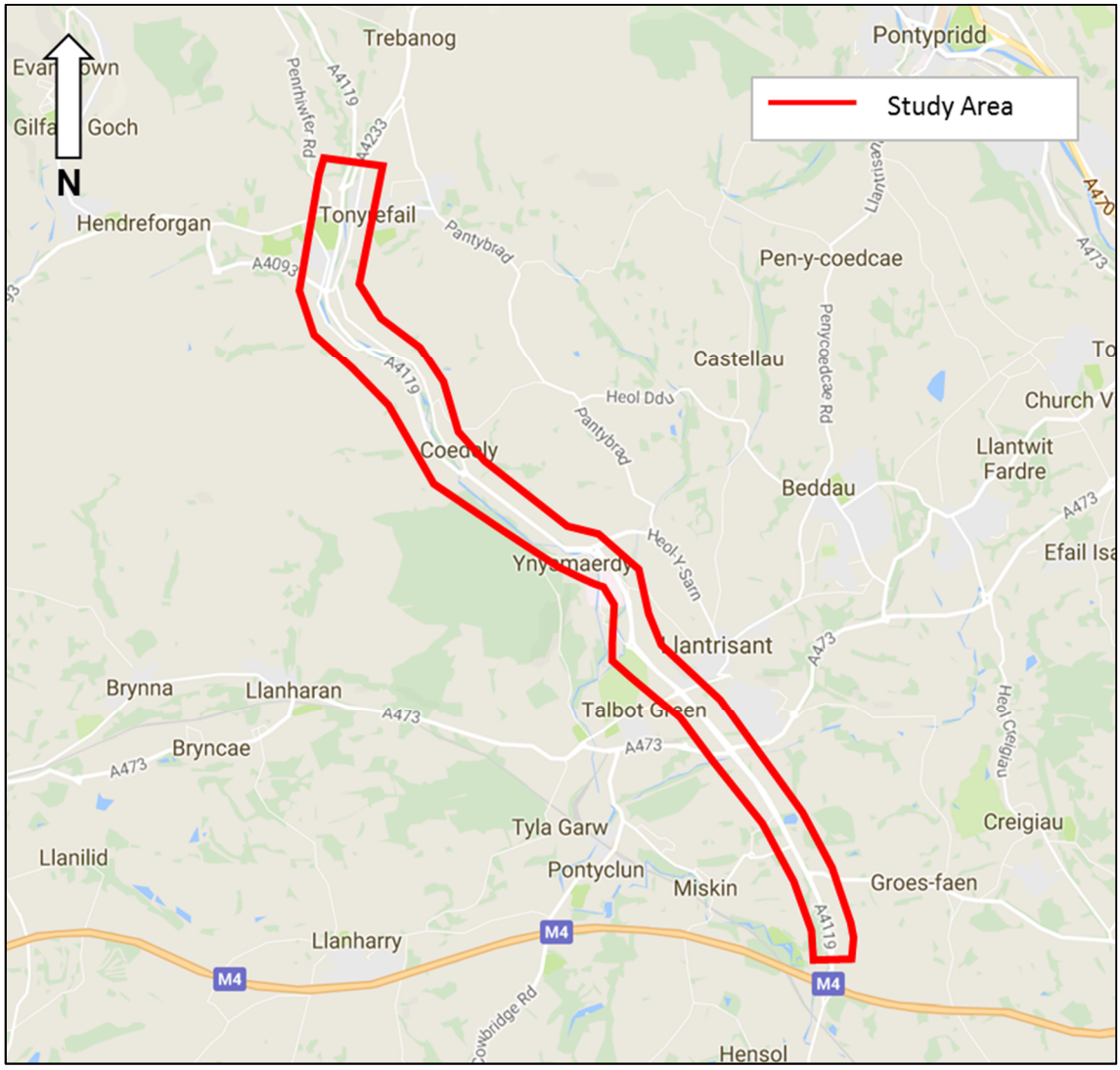
1. Introduction

1.1 The Commission

REDSTART was commissioned by Rhondda Cynon Taf County Borough Council (RCTCBC) to undertake an assessment of the A4119 corridor and its ability to accommodate traffic generated from existing and proposed developments in the area.

The RCTCBC Local Development Plan (LDP) for the Southern Strategy area includes a number of housing allocations for Tonyrefail and Coedely, as well as large mixed-use sites in Talbot Green and an employment site to the west of Coedely. Due to the numerous potential development sites in this area that could add traffic to the A4119 a corridor assessment has been undertaken which assesses the A4119 between Tonyrefail and junction 34 of the M4, as illustrated in Figure 1.1.

Figure 1.1 A4119 Corridor Assessment Area



1.2 Purpose of the report

The purpose of this report is to provide the methodology used to assess the current operational capacity and forecast capacity of the A4119 corridor, and present the results of the capacity assessments undertaken. The structure of the report is provided in section 1.3.

1.3 Report Structure

The remainder of the report has been set out in the following chapters:

- Chapter 2: Background;
- Chapter 3: Survey Analysis;
- Chapter 4: Junction model development and validation;
- Chapter 5: Microsimulation model development and validation;
- Chapter 6: Existing A4119 corridor operation;
- Chapter 7: Forecast traffic demand spreadsheet model;
- Chapter 8: Forecast A4119 corridor operation;
- Chapter 9: Summary.

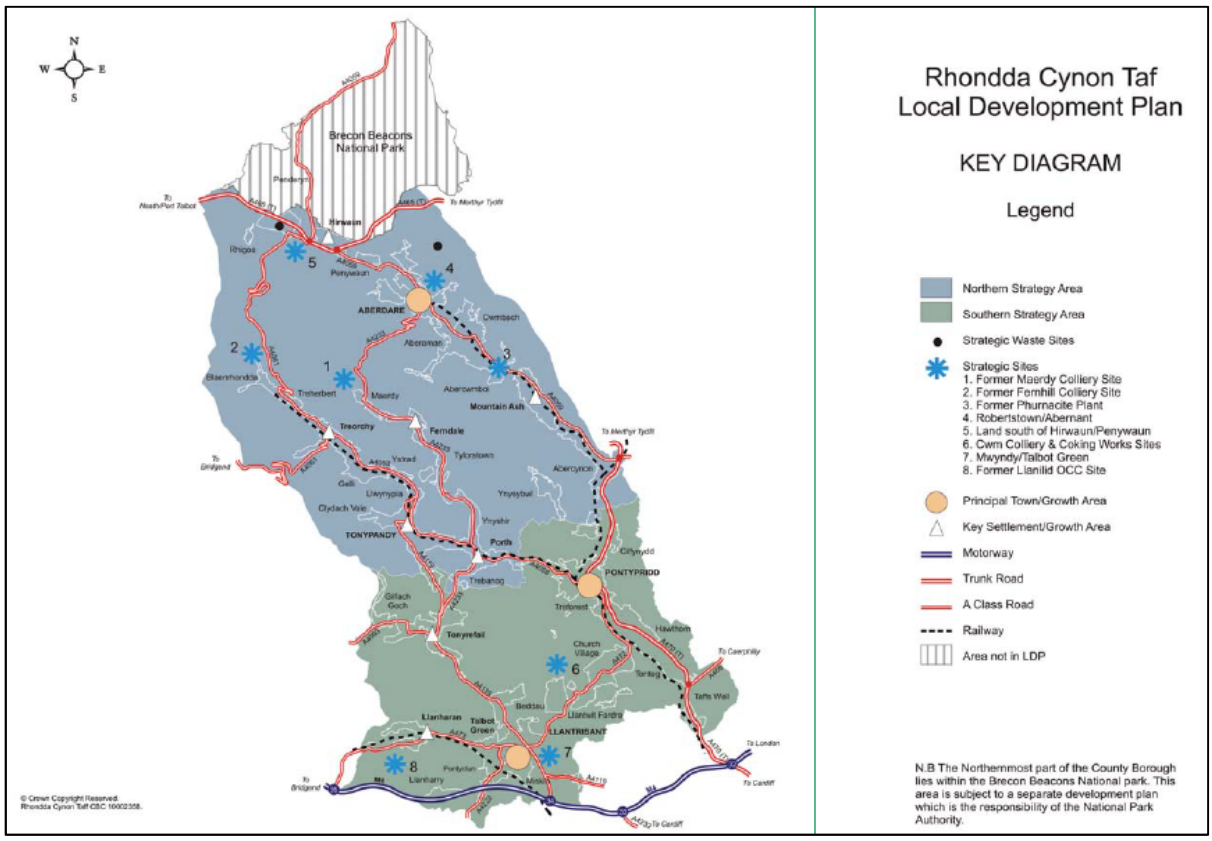
2. Background

The RCTCBC LDP specifies the development strategy and policy framework for RCT over a fifteen-year period to 2021. It is used by the Council to guide and control development and to provide a basis on which to base decisions related to development within the County Borough.

The LDP provides a framework for the development of 14,385 new dwellings in Rhondda Cynon Taf over the 15 year LDP period. This is based on the Welsh Government's National and Sub National Projections for Wales (2006) and equates to an annual increase of 959 dwellings per annum. In addition to the identification of residential development the LDP also recognises the importance of smaller settlements and other land uses in providing a range of services to meet local needs.

The core strategy for RCT advocates a different approach for development in the north and south of the County Borough in-line with social, economic and environmental trends. The A4119 corridor is within the Southern Strategy Area (SSA) which includes Pontypridd, Llantrisant (including Talbot Green), Tonyrefail and Llanharan. The SSA is illustrated in Figure 2.1.

Figure 2.1 RCT LDP Strategy Areas



RCTCBC LDP

This study analyses the impact of traffic generated by LDP related development in the SSA upon the operation of the A4119 corridor.

3. Survey Specification and Analysis

In order to analyse the current operation of the A4119 corridor and assess the impact of future development related traffic a series of traffic surveys have been undertaken. These include manual classified count (MCC) surveys, queue surveys and an Automatic Number Plate Recognition (ANPR) survey. The specification and analysis of each survey type is described further below.

3.1 Survey Specification

Manual Classified Count (MCC) Survey

MCC surveys have been undertaken at thirteen junctions within the A4119 corridor as illustrated in Figure 3.1. MCCs were undertaken on Thursday 16th November 2017 between the hours of 07:00 and 10:00 during the AM peak period, and between the hours of 16:00 and 19:00 during the PM peak period. The MCC surveys have been used to produce a junction model of each of the 13 junctions identified below, and to contribute to the matrix estimation process as part of the microsimulation model development.

Queue Surveys

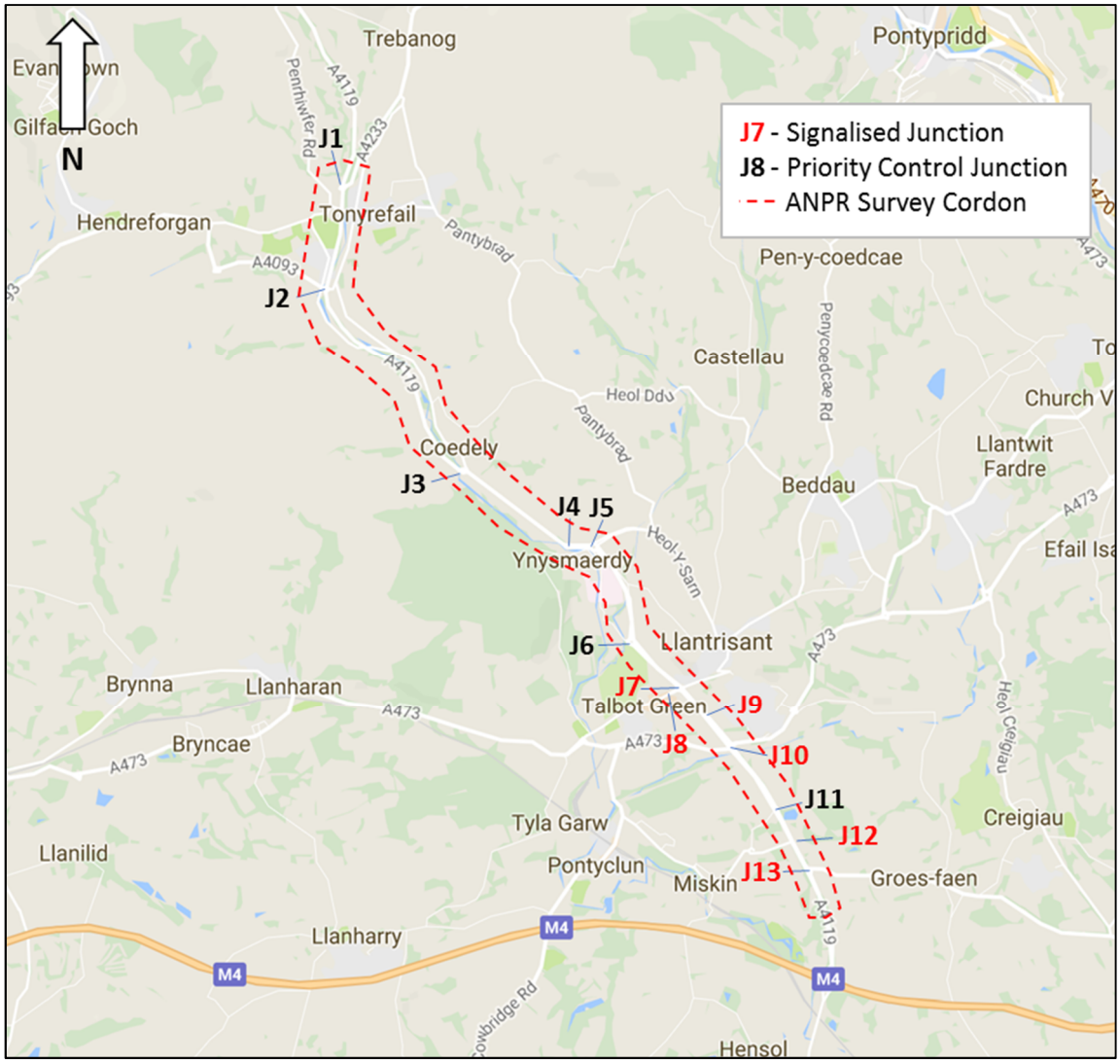
Queue surveys were also undertaken at the thirteen junctions within the A4119 corridor, illustrated in Figure 3.1, on Thursday 16th November 2017. The maximum queue length at each approach to the thirteen junctions was surveyed every 5 minutes between the hours of 07:00 and 10:00 during the AM peak period, and between the hours of 16:00 and 19:00 during the PM peak. The queue surveys have been used to validate the junction models and the microsimulation model.

Automatic Number Plate Recognition (ANPR) Survey

An ANPR survey has been undertaken on the A4119 corridor between the A4119/A4233 roundabout north of Tonyrefail and junction 34 of the M4 near Miskin, as illustrated in Figure 3.1. The ANPR was undertaken on the 9th of January 2018 between 07:00 and 10:00 hours. The ANPR provided Origin – Destination (O-D) trip routing information and journey time information split into 15-minute time segments.

The ANPR survey has been used to produce a traffic demand matrix for the microsimulation model, and the associated journey time results used to validate the microsimulation model.

Figure 3.1 Survey Locations



Google

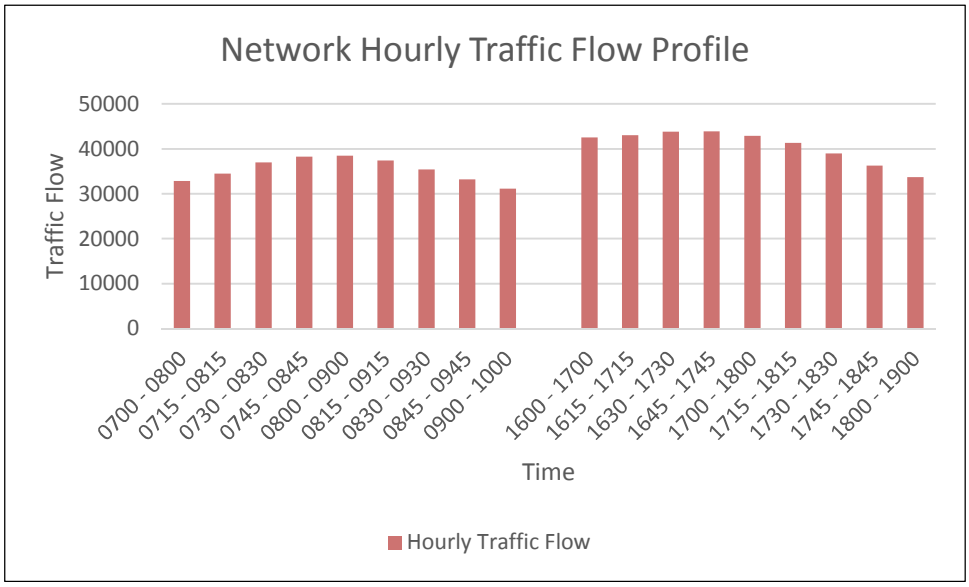
3.2 Survey Analysis

Manual Classified Counts (MCC)

Analysis of the MCC surveys has been undertaken to identify the peak hour within the AM and PM periods for each individual junction and the overall network. The peak hour for each junction is specified within the analysis for each junction in Chapter 4 and the overall network peak hours are identified as 08:00 - 09:00 and 16:45 - 17:45.

The AM and PM period hourly traffic flow profile for the overall network is illustrated in Figure 3.2.

Figure 3.2 Hourly Traffic Flow



ANPR

The overall sample rates for each time period is presented in table 3.1. It is shown that both AM and PM sample rates are at or above 90% which is a comprehensive level of accuracy. The ANPR sample rate for inbound and outbound movements for each site in both time periods is provided in Appendix A.

Table 3.1 ANPR Sample Rates

Time Period	Count (vehicles)	ANPR (vehicles)	Sample Rate (%)
AM (0700 – 1000)	55748	50538	91%
PM (1600 – 1900)	62355	56211	90%

4. Junction Model Development and Validation

4.1 Introduction

The existing operation of the A4119 corridor has been assessed using a combination of junction modelling software as well as microsimulation software. This chapter presents the methodology and results associated with the junction model assessments.

The junctions identified in Chapter 3 and listed below have been assessed in the network peak hour (08:00 – 09:00 & 16:45 – 17:45) in order to provide a comparison with the area wide microsimulation model.

4.2 Methodology

Industry standard software Junctions 8 has been used to assess the capacity of the priority controlled junctions, these include:

- Junction 1: A4119/A4233 roundabout;
- Junction 2: A4119/Mill Street/A4093 roundabout;
- Junction 3: A4119/Ely Valley Road/Site Access roundabout;
- Junction 4: A4119/Fire & Rescue Centre Access roundabout;
- Junction 5: A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout;
- Junction 6: A4119/Magden Park Access roundabout; and
- Junction 11: A4119/Cardiff Road/ALJ Store Access staggered crossroads.

The ARCADY module within Junctions 8 has been used to assess roundabouts, and the PICADY module has been used to assess the staggered crossroads. The geometry and layout associated with the priority controlled junctions has been measured using Google Earth.

The ratio of flow to capacity (RFC) is a measure commonly used at priority controlled junctions to represent operational capacity and has been used to evaluate the junctions listed above. An RFC value of 0.85 is considered to be the upper limit of junction capacity. This is consistent with Transport for London (TfL) Traffic Modelling Guidelines which advises that un-signalised junctions with an RFC value of 0.85 and below may be considered to be operating within capacity. The queue measurement provided by Junctions 8 is the average maximum queue generated within the assessment period, and the delay measurement is the maximum value of average delay per arriving vehicle.

Industry standard software LINSIG has been used to assess the capacity of the signal controlled junctions, these include:

- Junction 7: A4119 Ely Valley Road/B4595 Talbot Road signalised crossroads;
- Junction 8: B4595 Talbot Road/Danygraig Drive/New Park Retail Estate Access North signalised junction;
- Junction 9: A4119/New Park Retail Estate Access South signalised junction;
- Junction 10: A4119/A473 signalised roundabout;
- Junction 12: A4119/School Road signalised junction; and
- Junction 13: A4119/A4119 Llantrisant Road signalised junction.

Traffic signal model junction layout and dimensions have been attained using Google earth. Traffic signal stage arrangement and timings have been acquired from RCTCBC and input into the traffic signal models.

At signal controlled junctions the degree of saturation (DOS) is the measure used to represent the operational capacity and has been used to evaluate the junctions listed above. A DOS of 90% is considered to represent the upper limit of practical capacity. Practical reserve capacity (PRC) is the measure of available spare capacity and is related to DOS. The queue length measurements provided are mean max queue (MMQ) which is the mean number of PCUs which have queued up before the queue clears the stop-line. The delay measurements provided represent an estimate of the average delay experienced per PCU in seconds.

It should be noted that a junction may operate at an RFC above 0.85, or 90% DOS; however, queues and delay increase exponentially when a junction operates above these thresholds.

4.3 Capacity Assessment Results

This chapter provides the junction model validation and capacity assessment summary results. The full capacity assessment results are provided in Appendix B.

4.3.1 Junction 1: A4119/A4233 roundabout

The results of the A4119/A4233 ARCADY assessment are provided below.

Table 4.3-1 A4119/A4233 Capacity Assessment – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	1	6	0.58	7	6
A4233	1	4	0.37	8	7
A4119 S	1	5	0.57	6	5

Table 4.3-2 A4119/A4233 Capacity Assessment – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	1	4	0.45	8	7
A4233	0	3	0.28	7	7
A4119 S	5	13	0.83	7	2

The junction model results provided in Tables 4.3-1 and 4.3-2 show that the junction is currently operating well within capacity during the AM peak and near capacity during the PM peaks with a maximum RFC of 0.58 and 0.83 respectively. It is also shown that the junction model results compare well with observed queues with a difference in queue ranging between 1 and 7 PCUs.

4.3.2 Junction 2: A4119/Mill Street/A4093 roundabout

The results of the A4119/Mill Street/A4093 roundabout assessment are provided below.

Table 4.3-3 A4119/Mill Street/A4093 Roundabout Capacity Assessment – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	13	40	0.95	16	3
Mill Street	0	4	0.23	4	4
A4119 S	1	4	0.48	4	3
A4093	2	11	0.71	9	7

Table 4.3-4 A4119/Mill Street/A4093 Roundabout Capacity Assessment – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	2	7	0.65	5	3
Mill Street	0	3	0.22	6	6
A4119 S	7	20	0.88	14	7
A4093	1	10	0.58	9	8

The summary results provided in Tables 4.3-3 and 4.3-4 show that the junction is currently operating over capacity in both the AM and PM peaks with a maximum RFC of 0.95 in the AM and 0.88 in the PM. Comparison between observed and modelled queues shows that the junction validates well with a difference in queue ranging between 3 and 8 PCUs.

4.3.3 *Junction 3: A4119/Ely Valley Road/Site Access roundabout*

The results of the A4119/Ely Valley Road/Site Access roundabout assessment are provided below.

Table 4.3-5 A4119/Ely Valley Road/Site Access roundabout – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	3	7	0.72	0	3
Ely Valley Rd	0	5	0.32	5	5
A4119 S	1	3	0.42	0	1
Site Access	0	3	0.02	0	0

Table 4.3-6 A4119/Ely Valley Road/Site Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	1	5	0.54	5	4
Ely Valley Rd	0	3	0.11	6	6
A4119 S	8	16	0.89	3	5
Site Access	0	7	0.24	3	3

The junction results presented in Tables 4.3-5 and 4.3-6 show that the junction is currently operating within capacity during the AM peak and over capacity during the PM peak with a maximum RFC of 0.72 and 0.89 respectively. Comparison between observed and modelled queues shows that the junction validates well with a difference in queue ranging between 0 and 6 PCUs.

4.3.4 *Junction 4: A4119/Fire & Rescue Centre Access roundabout*

The results of the A4119/Fire & Rescue Centre Access roundabout assessment are provided below.

Table 4.3-7 A4119/Fire & Rescue Centre Access roundabout – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
Fire Service Access	0	5	0.02	1	1
A4119 E	1	3	0.38	3	2
A4119 W	9	22	0.91	4	5

Table 4.3-8 A4119/Fire & Rescue Centre Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
Fire Service Access	0	4	0.06	1	1
A4119 E	3	7	0.77	30	27
A4119 W	1	4	0.52	0	1

The summary results presented in Tables 4.3-7 shows that the junction is currently operating over capacity during the AM peak with a maximum RFC of 0.91. It also shows that the junction model queue results compare well with observed queue results with a difference in queue ranging between 1 and 5 PCUs. Table 4.3-8 indicates that the junction is operating well within capacity with a maximum RFC of 0.77. However, the queue results do not compare well on the A4119 East arm with a difference of 27 PCUs.

In light of the above, further analysis of the roundabout operation has been undertaken using the entry lane analysis facility within ARCADY. A review of the roundabout layout indicates that the exit on the western A4119 arm merges down from two lanes to one. As such a secondary lane usage of 40% has been applied to lane two of the A4119 Eastern arm of the roundabout to replicate the lower utility of this lane. The resulting capacity assessment results are provided in table 4.3-9.

Table 4.3-9 A4119/Fire & Rescue Centre Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
Fire Service Access	0	1	0.06	1	1
A4119 E	33	59	0.98	30	3
A4119 W	0	2	0.52	1	1

The results provided in Tables 4.3-9 indicates that the second lane on the A4119 Eastern arm of the junction is not fully utilised which results in the junction being over capacity and a larger queue than would be expected if both lanes were to be fully used.

4.3.5 Junction 5: A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout

The results of the A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout assessment are provided below.

Table 4.3-10 A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
Sterling Drive	0	5	0.02	1	1
Heol-Y-Sarn	0	3	0.25	10	10
A4119 S	2	7	0.69	3	1
Site Access	0	5	0.13	2	2
A4119 W	5	12	0.84	13	8

Table 4.3-11 A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue	Delay	RFC	Observed Queue	Difference
Sterling Drive	0	4	0.05	2	2
Heol-Y-Sarn	0	2	0.25	12	12
A4119 S	18	38	0.97	30	12
Site Access	1	13	0.5	21	20
A4119 W	1	4	0.52	22	21

The junction model results provided in Tables 4.3-10 shows that the junction is currently operating at capacity during the AM with a maximum RFC of 0.84. It also shows that the junction model queue results compare well with observed queue results with a difference in queue ranging between 1 and 10 PCUs. Table 4.3-11 indicates that the junction is operating over capacity with a maximum RFC of 0.97. However, the queue results do not compare well with a difference in queue ranging between 2 and 21 PCUs.

In light of the above, further analysis of the roundabout operation has been undertaken using the entry lane analysis facility within ARCADY. A review of the roundabout turning movements indicates that unequal usage is present due to a heavy movement travelling between the A4119 East and West arms, and a large proportion turning left or going ahead on the Heal Y Sarn approach. Due to the merging of the of two lanes into one at the western side of the roundabout and the general layout of the roundabout this could result in a higher usage of the inside lane. As such a secondary lane usage of has been applied to lane two of the A4119 eastern and western arms of the roundabout and the turning movements within each lane has been specified to replicate the actual behaviour of drivers at the roundabout. The resulting capacity assessment results are provided in table 4.3-12.

Table 4.3-12 A4119/Sterling Drive/Heol y Sarn/Hospital Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
Sterling Drive	0	1	0.05	2	2
Heol-Y-Sarn	1	9	0.77	12	11
A4119 S	26	45	0.97	30	4
Site Access	1	11	0.49	21	20
A4119 W	7	24	0.91	22	15

The junction model results provided in Table 4.3-12 shows that the model compares better with observed queue results with lane movements specified and a secondary lane usage weighting applied to lane two of the A4119 west. It is indicated that the junction operates over capacity with a maximum RFC of 0.97.

4.3.6 Junction 6: A4119/Magden Park Access roundabout

The results of the A4119/Magden Park Access roundabout assessment are provided below.

Table 4.3-13 A4119/Fire & Rescue Centre Access roundabout – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	2	6	0.69	2	0
A4119 S	6	10	0.85	7	1
Magden Park	0	4	0.12	5	5

Table 4.3-14 A4119/Fire & Rescue Centre Access roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	2	7	0.7	10	8
A4119 S	3	6	0.76	4	1
Magden Park	3	19	0.78	13	10

The summary results in Tables 4.3-13 and 4.3-14 show that the junction is currently operating at capacity in the AM peak and within capacity during the PM peak with maximum RFC values of 0.85 and 0.78 respectively. Comparison between observed and modelled queues shows that the junction validates well with a difference in queue ranging between 0 and 10 PCUs.

4.3.7 *Junction 7: A4119/B4595 Talbot Road signalised crossroads*

The results of the A4119/B4595 Talbot Road signalised crossroads are provided below.

Table 4.3-15 A4119/B4595 Talbot Road signalised crossroads – 2017 AM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 Northbound Left	5.4%	18	1	-	-
A4119 Northbound Ahead	84.7%	55	21	16	5
A4119 Northbound Ahead	85.5%	55	23	16	7
A4119 Northbound Right	11.5%	42	1	6	5
Talbot Rd Eastbound Left Ahead	64.1 : 64.1%	39	14	6	8
Talbot Rd Eastbound Ahead	43.4%	59	5	3	2
Talbot Rd Eastbound Right	26.1%	58	2	3	1
A4119 Southbound Left Ahead	86.9%	58	22	13	9
A4119 Southbound Ahead Right	87.2 : 87.2%	54	17	12	5
Talbot Rd Westbound Left Ahead	84.1 : 84.1%	78	11	4	7
Talbot Rd Westbound Ahead	81.3%	84	10	3	7
Talbot Rd Westbound Right	85.2%	99	9	5	4
PRC (%)	3.2				
Total Delay (pcuHr)	63.03				
Cycle Time (s)	125				

Table 4.3-12 A4119/B4595 Talbot Road signalised crossroads – 2017 PM Base

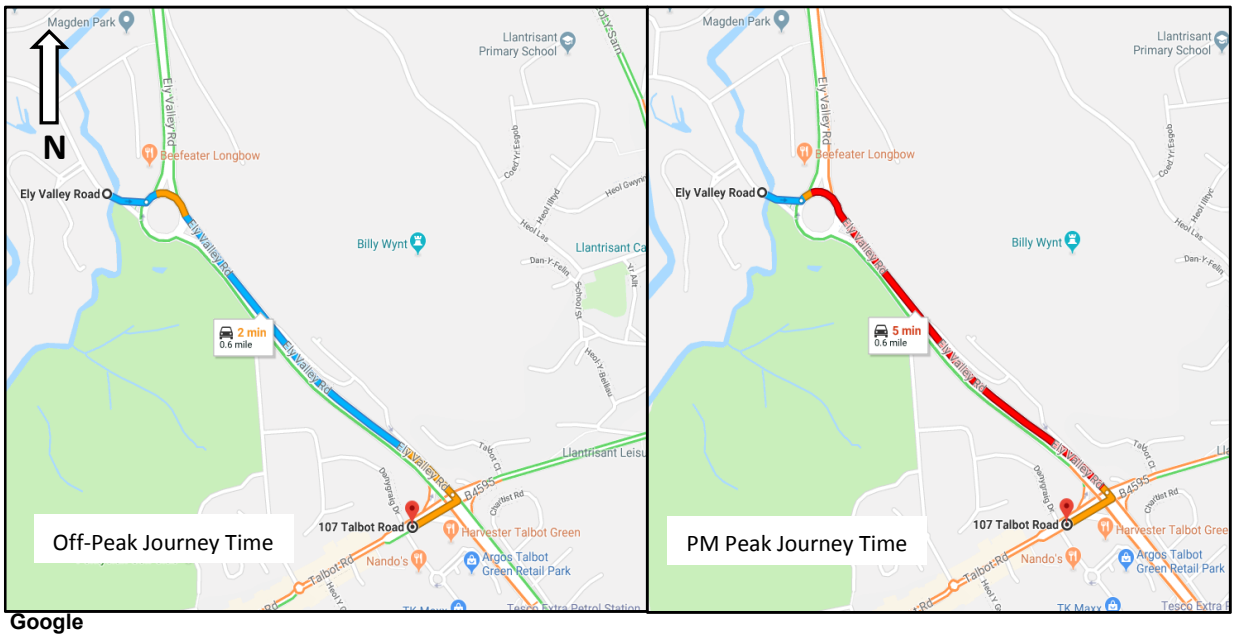
Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 Northbound Left	4.7%	16	1	-	-
A4119 Northbound Ahead	68.5%	35	17	9	8
A4119 Northbound Ahead	69.7%	35	19	11	8
A4119 Northbound Right	47.9%	46	7	8	1
Talbot Rd Eastbound Left Ahead	66.3 : 66.3%	45	13	6	7
Talbot Rd Eastbound Ahead	103.8%	230	16	5	11
Talbot Rd Eastbound Right	55.4%	86	3	5	2
A4119 Southbound Left Ahead	103.9%	146	57	6	51
A4119 Southbound Ahead Right	105.6 : 105.6%	175	47	20	27
Talbot Rd Westbound Left Ahead	88.2 : 88.2%	96	10	4	6
Talbot Rd Westbound Ahead	83.5%	113	7	3	4
Talbot Rd Westbound Right	72.8%	110	4	4	0
PRC (%)	-17.3				
Total Delay (pcuHr)	117.40				
Cycle Time (s)	125				

The junction model results provided in Tables 4.3-15 and 4.3-16 indicate that the junction is currently operating at capacity in the AM peak hour and over capacity in the PM peak hour. It is also shown that the junction model results compare well with observed queues with the exception of the A4119 southbound approach to the junction. There is a difference in modelled and observed queue at the A4119 southbound approach ranging between 27 and 51 PCUs.

A review of Google traffic data and ANPR journey time data has been undertaken to gain an understanding of the queue discrepancy described above. The Google traffic data indicates that the typical journey time between the Magden Park access (Zone 8) and Talbot Road West (Zone 9) is two minutes at off-peak and five minutes during the PM peak as illustrated in Figure 4.1. The ANPR also indicates that the journey time between Zone 8 and Zone 9 is 3:49.

In light of this, it is likely that there is a queue present on the A4119 north arm of the junction during the PM peak and that an error has occurred in the queue survey.

Figure 4.1 A4119 North Journey Time (A4119/B4595 Talbot Road signalised crossroads)



Google

4.3.8 *Junction 8: B4595 Talbot Road/Danygraig Drive/New Park Retail Estate Access (North) signalised junction*

The results of the B4595 Talbot Road/Danygraig Drive/New Park Retail Estate Access (North) signalised junction are provided below.

Table 4.3-17 B4595 Talbot Road/Danygraig Drive/New Park Retail Estate Access (North) signalised junction – 2017 AM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
Talbot Rd E Left Ahead	47.8%	26	6	9	3
Talbot Rd E Right Ahead	49.0%	26	6	8	2
NewPark Access Left	16.1%	21	2	3	1
NewPark Access Ahead Right	27.2%	47	1	2	1
Talbot Road West Left Ahead Right	50.0 : 50.0%	9	5	13	8
PRC (%)	80.1				
Total Delay (pcuHr)	7.6				
Cycle Time (s)	80				

Table 4.3-18 B4595 Talbot Road/Danygraig Drive/New Park Retail Estate Access (North) signalised junction – 2017 PM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
Talbot Rd E Left Ahead	65.60%	37	7	8	1
Talbot Rd E Right Ahead	67.60%	37	8	6	2
NewPark Access Left	32.40%	23	3	6	3
NewPark Access Ahead Right	64.60%	45	5	4	1
Talbot Road West Left Ahead Right	69.2 : 69.2%	15	6	17	11
PRC (%)	30.1				
Total Delay (pcuHr)	14.00				
Cycle Time (s)	80				

The junction model results provided in Tables 4.3-17 and 4.3-18 indicate that the junction is currently operating well within capacity with an RFC of 80.1% in the AM peak hour and 30.1% in the PM peak hour. It is also shows that the junction model results compare well with observed queues with a difference in queue ranging from one to 11 PCUs.

It should be noted that a review of the survey video was undertaken to understand how often the pedestrian crossing was called. It was found that the pedestrian crossing was called twice in the AM peak hour and five times in the PM peak hour. This is a very small proportion of the total number of cycles within the hour and as such the pedestrian stage has been omitted from the junction model stage sequence.

4.3.9 Junction 9: A4119/New Park Retail Estate Access (South) signalised junction

The results of the A4119/New Park Retail Estate Access (South) signalised junction are provided below.

Table 4.3-19 A4119/New Park Retail Estate Access (South) signalised junction – 2017 AM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 N Ahead	40.10%	16	8	5	3
A4119 N Ahead Right	43.7 : 61.4%	24	8	8	0
A4119 S Ahead Left	64.4 : 64.4%	15	12	12	0
A4119 S Ahead	52.20%	17	12	8	4
New Park Access Left Right	61.9 : 61.9%	50	4	5	1
New Park Access Right	38.40%	59	3	2	1
PRC (%)	39.8%				
Total Delay (pcuHr)	17.78 seconds				
Cycle Time (s)	114				

Table 4.3-20 A4119/New Park Retail Estate Access (South) signalised junction – 2017 PM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 N Ahead	54.30%	24	12	9	3
A4119 N Ahead Right	57.4 : 76.0%	31	12	14	2
A4119 S Ahead Left	78.5 : 78.5%	20	16	14	2
A4119 S Ahead	65.40%	27	16	11	5
New Park Access Left Right	79.4 : 79.4%	48	11	12	1
New Park Access Right	66.40%	54	9	6	3
PRC (%)	13.4%				
Total Delay (pcuHr)	31.15				
Cycle Time (s)	114				

The summary results in Table 4.3-19 shows that the A4119/NewPark Retail Access junction operates well within capacity during the AM peak with a PRC of 39.8%, a maximum DOS of 64.4%, a maximum delay of 59 seconds and a maximum MMQ of 12 PCUs. Table 4.3-20 shows that during the PM peak the junction operates within capacity but with a lower level of PRC at 13.4%, a maximum DOS of 79.4%, maximum delay of 54 seconds and a maximum MMQ of 16 PCUs. It is also possible to see that the model validates well with difference in queue between modelled results and observed ranging between 0 and 5 PCUs.

4.3.10 Junction 10: A4119/A473 signalised roundabout

The results of the A4119/A473 signalised roundabout are provided below.

Table 4.3-21 A4119/A473 signalised roundabout – 2017 AM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 Southbound Left Ahead	89.8 : 89.8%	53	11	14	3
A4119 Southbound Ahead	88.3 : 88.3%	50	11	13	2
A473 Westbound Ahead Ahead 2	87.3 : 77.4%	31	10	26	16
A473 Westbound Ahead	71.50%	41	7	9	2
A4119 Northbound Left Ahead	84.6 : 84.6%	35	13	18	5
A4119 Northbound Ahead	86.4 : 86.4%	35	14	15	1
A473 Eastbound Left Ahead	83.5 : 39.6%	33	6	14	8
A473 Eastbound Ahead	57.7 : 45.9%	34	4	4	0
PRC (%)	0.2				
Total Delay (pcuHr)	54.27				
Cycle Time (s)	75				

Table 4.3-22 A4119/A473 signalised roundabout – 2017 PM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
A4119 Southbound Left Ahead	96.5 : 96.5%	66	19	21	2
A4119 Southbound Ahead	95.7 : 95.7%	63	18	20	2
A473 Westbound Ahead Ahead 2	99.0 : 96.3%	72	16	22	6
A473 Westbound Ahead	93.5%	88	11	10	1
A4119 Northbound Left Ahead	95.8 : 95.8%	57	21	20	1
A4119 Northbound Ahead	98.2 : 98.8%	63	27	20	7
A473 Eastbound Left Ahead	91.4 : 51.9%	33	7	12	5
A473 Eastbound Ahead	73.0 : 57.6%	38	5	4	1
PRC (%)	-10.0				
Total Delay (pcuHr)	101.56				
Cycle Time (s)	75				

The junction model results provided in Tables 4.3-21 and 4.3-22 indicate that the junction is currently operating at capacity with an RFC of 0.2% in the AM peak hour and -10% in the PM peak hour. It can also be seen that the junction model queue results compare well with the observed queues with the exception of the A473 westbound approach in the AM peak hour. Observed queues on this approach at the junction are 16 PCUs higher than that modelled. The survey video has been reviewed and it has been found that this is likely to be due to the exit blocking on the A4119 southbound exit arm of the junction as illustrated in Image 4.1.

Image 4.1 A4119 Exit Blocking AM Peak (A4119/A473 signalised roundabout)

4.3.11 *Junction 11: A4119/Cardiff Road/ALJ Store Access staggered crossroads*

The A4119/Cardiff Road/ALJ Store Access junction has been assessed using the staggered crossroads module within PICADY. The results of the PICADY assessments are provided below.

Table 4.3-23 A4119/Cardiff Road/ALJ Store Access Staggered Junction – 2017 AM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	0	9	0.24	4	4
ALJ Store Access	0	0	0.00	1	1
A4119 S	0	6	0.01	1	1
Cardiff Road	1	17	0.42	6	5

Table 4.3-24 A4119/Cardiff Road/ALJ Store Access Staggered Junction – 2017 PM Base

Capacity Assessment				Validation	
Arm	Queue (PCU)	Delay (Seconds)	RFC	Observed Queue (PCU)	Difference (PCU)
A4119 N	1	16.25	0.49	7	6
ALJ Store Access	26	inf	inf	3	23
A4119 S	0	8	0.01	1	1
Cardiff Road	72	inf	inf	4	69

Table 4.3.23 shows that the junction is currently operating well within capacity during the AM peak hour with a maximum RFC of 0.42. It is also possible to see that the junction validates well with a difference in queue ranging between 1 and 5 PCUs.

Table 4.3.24 indicates that the junction is currently operating well above capacity with the significant queues and infinite delay and RFCs on the minor arms. This is not consistent with the observed queues and as such it is likely that the model is not accurately reflecting the traffic behaviour that is occurring on the ground. The queue surveys indicate that there are significant queues along the A4119 and as such it is likely that there is unconventional traffic behaviour occurring such as courtesy let out manoeuvres which is not captured by the PICADY model.

4.3.12 *Junctions 11, 12 & 13: A4119/Cardiff Road Priority Junction & A4119/School Road & A4119/Llantrisant Road Signalised Junctions*

The A4119/Cardiff Road, A4119/School Road & A4119/Llantrisant Road junctions have been modelled as a signal junction network model. The results are provided below.

Table 4.3-25 A4119/Cardiff Road, A4119/School Road, A4119/Llantrisant Road LinSig model results - 2017 AM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
J11: A4119 / Cardiff Road					
A4119 North Ahead Right	28.0 : 28.0%	1	1	2	1
Right Left	38.70%	8	2	2	0
J12: A4119 / School Road Jct					
A4119 North Ahead	67.70%	26	17	17	0
A4119 North Ahead Right	53.7 : 53.7%	23	12	17	5
A4119 South Left Ahead	76.4 : 76.4%	26	18	14	4
A4119 South Ahead	66.80%	26	18	12	6
School Road Right Left	79.2 : 79.2%	51	14	14	0
J13: A4119 / Llantrisant Road					
A4119 N Left Ahead	65.2 : 65.2%	20	21	19	2
A4119 N Ahead	63.60%	27	18	17	1
A4119 Groesfaen Road Left Right	80.0 : 80.0%	43	14	17	3
A4119 S Ahead	42.40%	11	9	8	1
A4119 S Right Ahead	58.3 : 58.3%	12	12	15	3
PRC (%)	12.6				
Total Delay (pcuHr)	49.12				
Cycle Time (s)	116 / 124				

Table 4.3-26 A4119/Cardiff Road, A4119/School Road, A4119/Llantrisant Road LinSig model results - 2017 PM Base

Capacity Assessment				Validation	
Arm	Degree of saturation (%)	Delay (s/pcu)	MMQ (pcu)	Observed Queue (PCU)	Difference (PCU)
J11: A4119 / Cardiff Road					
A4119 North Ahead Right	27.4 : 47.0%	2	3	3	1
Right Left	33.60%	10	2	2	0
J12: A4119 / School Road Jct					
A4119 North Ahead	57.00%	9	12	10	2
A4119 North Ahead Right	36.5 : 36.5%	10	6	8	2
A4119 South Left Ahead	92.2 : 92.2%	25	27	23	5
A4119 South Ahead	82.40%	22	28	20	8
School Road Right Left	78.4 : 78.4%	72	7	7	0
J13: A4119 / Llantrisant Road					
A4119 N Left Ahead	66.5 : 66.5%	23	22	21	1
A4119 N Ahead	63.30%	32	18	15	3
A4119 Groesfaen Road Left Right	89.1 : 89.1%	62	20	22	2
A4119 S Ahead	76.30%	18	27	24	3
A4119 S Right Ahead	90.1 : 90.1%	24	39	35	4
PRC (%)	-2.4				
Total Delay (pcuHr)	61.86				
Cycle Time (s)	112 / 132				

Table 4.3.25 and 4.3.26 show that the junction is currently operating near capacity during the AM peak and over capacity during the PM peak with maximum DOSs of 80.0% and 92.2% respectively. It is also possible to see that the junction validates well with a difference in queue ranging between 0 and 8 PCUs.

It should be noted that an Underutilised Green Time (UGT) adjustment has been applied to the A4119 southbound movement at both A4119/School Road and A4119/Llantrisant Road junctions in the AM peak in order to capture the exit blocking occurring at this time. The UGT observed at these junctions is illustrated in images 4.2 and 4.3.

Image 4.2 A4119 Exit Blocking AM Peak (A4119/School Rd Junction)

Image 4.3 A4119 Exit Blocking AM Peak (A4119/Llantrisant Rd Junction)

5. Microsimulation Model Development and Validation

This chapter presents the methodology used to develop the A4119 corridor microsimulation model and the results of the model calibration and validation. The microsimulation model consists of 27 zones, each representing a point into and/or out of the network. The model extents and zones are illustrated in figures 5.1 and 5.2.

Figure 5.1 Model Extents – Zones (North)

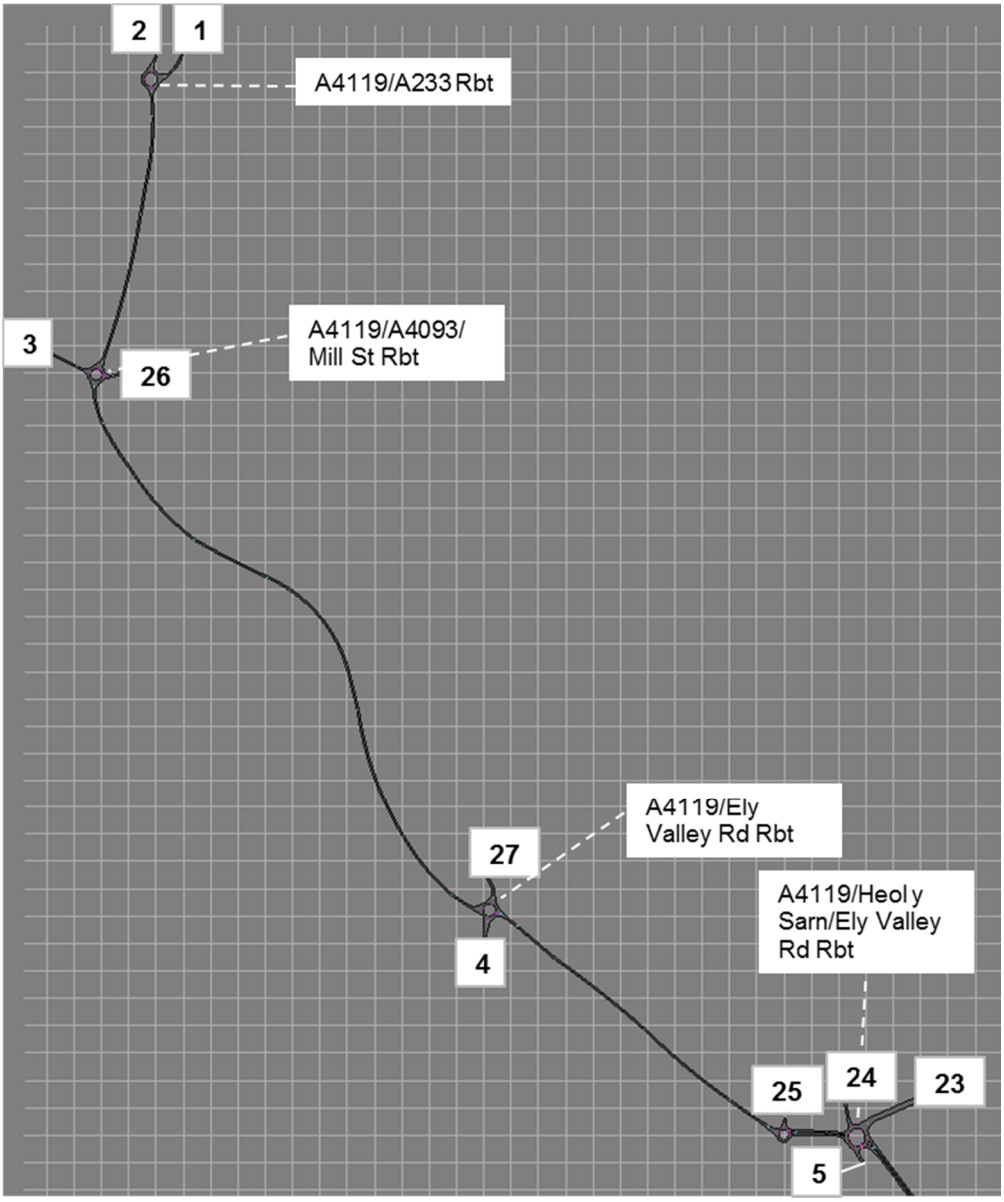
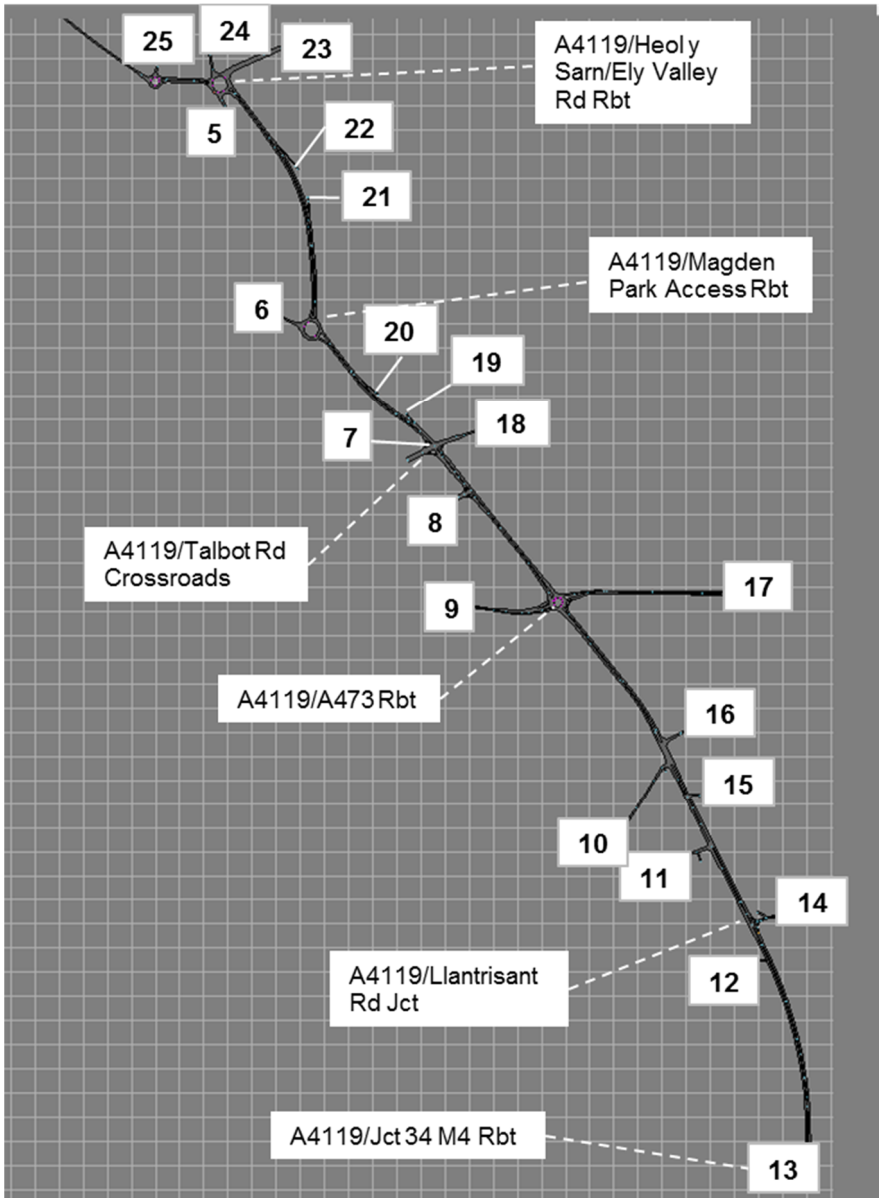


Figure 5.2 Model Extents – Zones (South)



5.1 Matrix Development and Matrix Estimation (ME)

The matrix estimation (ME) facility within Paramics was used to estimate a demand matrix for each vehicle class including cars, LGVs and heavy vehicles for the AM and PM 3-hour peak time periods.

The following information was used to estimate the matrix:

- O-D element of the ANPR survey was used to inform the routing of trips within the demand matrix and formed the prior matrix element of the ME process;
- The MCC traffic survey data was used to control the traffic flow values at all junctions within the network, and formed the survey file within the ME process;

- Origin and destination totals from the MCC traffic survey data were used as constraints within the ME process to ensure the correct number of vehicles enter and exit the network;

- A PIJA (Proportion of vehicles going from points I to J that are Assigned to each link) file was run during a model simulation to ascertain any routing information from the model.

All junction turning movements were included in the ME process which amounts to 109 turning movements. The results of the ME process are summarised in table 5.1 and provided in full in Appendix C. The Geoffrey E Havers (GEH) statistic has been used to compare observed and estimated or modelled traffic flows. The GEH formula compares observed and modelled traffic flows in terms of relative and absolute difference and is similar to Chi-square statistical analysis. A GEH value less than 5 is generally considered to be a good match between observed and modelled/estimated traffic flows.

Table 5.1 Matrix Estimation Result Summary

AM				
Matrix Vehicle Class	Average Difference (GEH)	Movements above 5 (GEH)	Max Difference (GEH)	Max Difference (Veh)
Cars	0.91	0	4.02	+72
LGVs	0.70	0	4.38	-41
HVs	0.83	1	5.75	-32
PM				
Matrix Vehicle Class	Average Difference (GEH)	Movements above 5 (GEH)	Max Difference (GEH)	Max Difference (Veh)
Cars	0.74	0	3.97	+81
LGVs	0.74	1	5.91	-41
HVs	0.69	0	3.47	-7

Table 5.1 shows that the estimated matrices match observed traffic flows well with only one estimated movement in each time period with a GEH difference greater than 5. The reason for the difference between observed and estimated turning movements was investigated. It was found that the difference occurred due to discrepancies in observed turning movements between junctions. The matrix estimation process would therefore average the conflicting turning movement counts.

A traffic demand release profile was produced for each zone to zone movement within the matrix. This was based on the traffic demand profile provided in the MCC survey data and is provided for each 15 minute time segment within the AM and PM three hour time periods.

5.2 Model Network Development

In order to code the A4119 corridor network in Paramics an Ordinance Survey (OS) CAD layer was used to trace the carriageway extents. Signal controlled junctions were coded using staging arrangement and signal timings information attained from RCTCBC.

In order to replicate the blocking back that occurs at the M4 eastbound on-slip at Junction 34 a capacity restraint has been coded into the network in the form of a signalised node. This has been calibrated so that the resulting queue and journey times are produced on the A4119.

Site visits were undertaken during the peak hour in order to ensure queues and delays were occurring in the correct place on the network.

5.3 Model Calibration and Validation

Turning Count Calibration

The performance of the model was assessed and calibrated by comparing modelled turning count flows with the turn counts recorded by the MCC surveys. The Transport Appraisal Guidance (WebTAG) calibration requirements are presented in table 5.2.

Table 5.2 WebTAG Calibration Requirements

Criteria	Description of criteria	Acceptability Guideline
1	Individual flows within 100veh/h of counts for flows less than 700 veh/h	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2700 veh/h	
	Individual flows within 400 veh/h of counts for flows more than 2700 veh/h	
2	GEH < 5 for individual flows	

The summary results of the model calibration are presented in tables 5.3. The full calibration results for all movements is provided in Appendix D.

Table 5.3 Summary Calibration Results

Criteria	Movements that meet the requirement	
	AM	PM
Individual flows within 100veh/h of counts for flows less than 700 veh/h	100%	100%
Individual flows within 15% of counts for flows from 700 to 2700 veh/h	100%	100%
Individual flows within 400 veh/h of counts for flows more than 2700 veh/h	100%	100%
GEH < 5 for individual flows	100%	100%

Table 5.3 shows tha the model calibrates well compared with observed flows with all movements meeting WebTAG requirements.

Journey Time Validation

The model was validated by comparing modelled journey times with recorded journey times attained from the ANPR. The model was also validated by comparing queue results with observed queues. The WebTAG validation guidance is provided in table 5.4.

Table 5.4 WebTAG Validation Criteria

Criteria	Acceptability Guideline
Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%)	> 85% of cases

The model journey time validation results are presented in tables 5.5 to 5.8. Journey time survey results with a sample size lower than 10 have been excluded. The difference in journey time is presented for each zone to zone movement with differences greater than 60 seconds highlighted in red (modelled greater than observed), and differences less than -60 seconds highlighted in blue (modelled less than observed). The percentage difference in journey time is also presented.

Table 5.5 AM Model Validation Results (Seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1		10	21	-23	-22	10	-23	-57															53			-23	
2	7		23	-32	-37	0	-24	-63										28					-11			16	
3	-21	10		21	0		-19	0															-24			22	
4																											
5		-2																					5				
6							-23																				
7	-9	0	22		-17	19												5					17		11	-4	4
8						21												-19					44				
9													-39				-10										
10																	-43										
11													-19	-44			-75										
12																											
13									-18		-74	-2		-29			7										
14									1		-52		67				-32										
15																											
16																											
17									31	-34			-49	-112													
18		-49			-33	-36	-21	0																			
19																		-75									
20																											
21																											
22																											
23		22	9		8	3	-24	-35																	10	12	
24																											
25																											
26	58	101	21				-44																				
27				48	-11		-35	18															1				

Table 5.6 AM Model Validation Results (%)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1		34%	13%	-6%	-4%	2%	-3%	-8%															11%			-15%	
2	46%		14%	-8%	-7%	0%	-3%	-8%										4%					-2%			11%	
3	-18%	13%		10%	0%		-3%	0%															-6%			109%	
4																											
5		-1%																					13%				
6							-18%																				
7	-2%	0%	6%		-9%	21%												8%					10%		6%	-1%	2%
8						14%												-19%					21%				
9													-9%				-8%										
10																	-21%										
11													-6%	-34%			-30%										
12																											
13									-7%		-39%	-3%		-15%			3%										
14									0%		-23%		31%				-9%										
15																											
16																											
17									23%	-18%			-11%	-36%													
18		-9%			-15%	-21%	-23%	0%																			
19																		-56%									
20																											
21																											
22																											
23		6%	3%		24%	4%	-13%	-15%																	16%	4%	
24																											
25																											
26	55%	99%	68%				-8%																				
27				154%	-5%		-10%	5%																			

During the AM peak hour 93% of selected zone to zone movements met the journey time validation criteria. As such the model is considered to validate well. A small number of zone to zone journey times had moderate differences. These were investigated and found to be less significant movements that may be improved further should these specific movements require further validation.

Table 5.7 PM Model Validation Results (Seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1		9	0		-34		11																-8			-7	
2	4		1		-28		-22	-59															-23			-5	
3	-5	0					74	-22															17			12	
4	-73	-52																									-23
5	43	-40	-46																				47				1
6							57	41										-48					71				
7	24	19	42		25	66												27					54			66	31
8	-42	1	-44															27					72				-10
9													-4	-26			-27										
10																	-38										
11													-66	2													
12																											
13									26		-23	-40		18			-57										
14									45		30		71				-59										
15																	-96										
16																											
17									23	-72			5	-22													
18			21			35	-19	-2																			-10
19																		3									
20																											
21																											
22																											
23	-16	-48	-45		4		-7	-53																			2
24																							0				
25																							32				
26	-9	-9	4																				5				
27							35																2				

Table 5.8 PM Model Validation Results (%)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1		40%	0%		-9%		2%																-2%			-8%	
2	27%		1%		-7%		-3%	-9%										0%					-6%			-6%	
3	-5%	0%					14%	-4%															6%			40%	
4	-15%	-11%																									-51%
5	7%	-6%	-7%																				61%				1%
6							25%	17%										-18%					69%				
7	3%	2%	6%		13%	88%												38%					32%			10%	9%
8	-5%	0%	-6%															30%					35%				-3%
9													-1%	-11%			-18%										
10																	-14%										
11													-28%	2%													
12																											
13									8%		-11%	-34%		10%			-14%										
14									14%		21%		79%				-15%										
15																	-36%										
16																											
17									19%	-35%			2%	-10%													
18			3%			27%	-19%	-2%																			-3%
19																		5%									
20																											
21																											
22																											
23	-3%	-7%	-8%		13%		-3%	-16%										0%									1%
24																							2%				
25																							65%				
26	-9%	-8%	17%																				2%				
27							9%																2%				

During the PM peak hour 92% of selected zone to zone movements met the journey time validation criteria. As such the model is considered to validate well. A small number of zone to zone journey times had moderate differences. These were investigated and found to be less significant movements that may be improved further should these specific movements require further validation.

In addition to zone to zone journey time validation the journey time for trips from the north to the middle of the network (A4119/A4233 roundabout to A4119/A473 Talbot Green roundabout) and vice versa as well as from the middle of the network to the south (A4119/A473 Talbot Green roundabout to Junction 34 of M4) and vice versa have been compared. The results are presented in table 5.9.

Table 5.9 A4119 major route journey time validation

Journey	AM				PM			
	Obs	Mod	Diff (s)	Diff (%)	Obs	Mod	Diff (s)	Diff (%)
North (Jct1) to Middle (Jct 10)	713	767	-55	-8%	744	691	53	7%
Middle (Jct 10) to North (Jct 1)	529	551	-22	-4%	886	830	56	6%
Middle (Jct 10) to South (Jct 13)	465	420	45	10%	323	276	47	15%
South (Jct 13) to Middle (Jct 10)	256	264	-8	-3%	353	363	-10	-3%

Table 5.9 shows that all the major journeys along the A4119 corridor meet WebTAG criteria and validate well.

Queue Validation

The model was also validated using queue information gained through peak hour site visits and queue survey information. The most notable queues which have been incorporated into the model during the AM period include:

- Large queues on the A4119 southbound approach to the A4119/A4093/Mill Street Roundabout (Junction 2);
- Large queues on the A4119 southbound approach to the A4119/Ely Valley Road Roundabout (junction 3);
- Moderate queues at the A4119/Talbot Road crossroads;
- Large queues generated along the A4119 in a southbound direction between the A473/A4119 roundabout and Junction 34 of the M4 between 07:00 and 08:00 which reduce to small to moderate queues between 08:00 and 09:00.

The most notable queues which have been incorporated into the model during the PM period include:

- Large queues on the A4119 northbound approach to the A4119/A4093/Mill Street Roundabout (Junction 2);
- Large queues on the A4119 northbound approach to the A4119/Ely Valley Road Roundabout (junction 3);
- Moderate to large queues on the A4119 northbound approach to the A4119/Fire Station access roundabout (Junction 4) and the A4119/Heol-y-Sarn/Hospital Access roundabout (Junction 5).
- Moderate queues at the A4119/Talbot Road crossroads;
- Moderate queues generated along the A4119 in a northbound direction between the A473/A4119 roundabout and Junction 34 of the M4 between.

6. Existing A4119 Corridor Operation

The junction and micro-simulation models have been used to understand the existing operation of the A4119 corridor and identify operational issues at junctions and carriageway links.

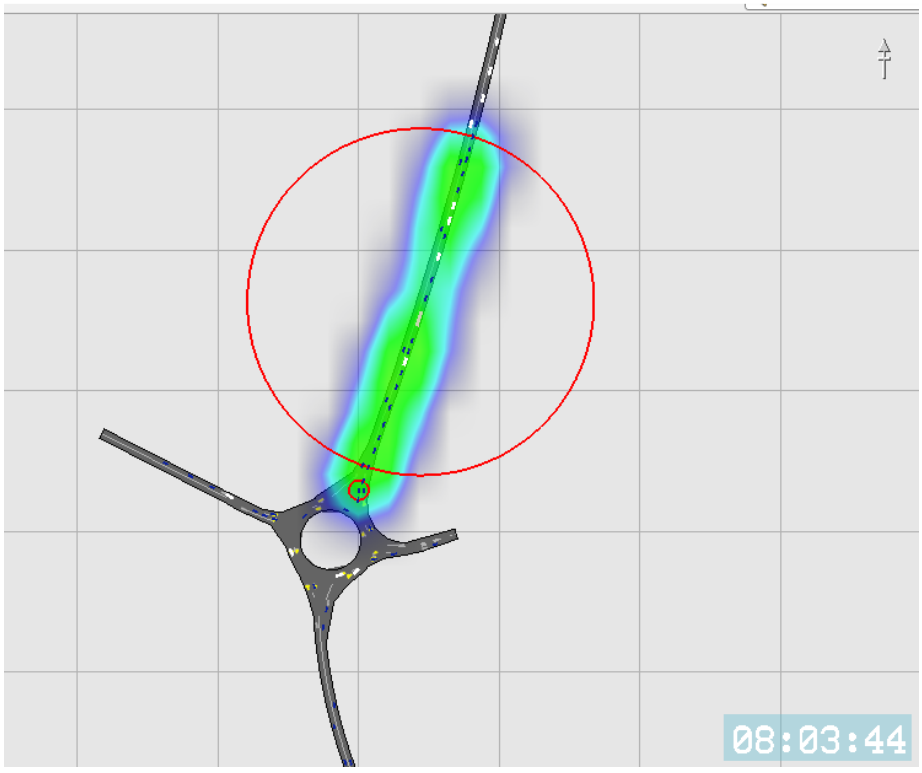
6.1 AM Peak (08:00 – 09:00)

During the AM period the most notable capacity issues were found at the following locations:

6.1.1 A4119/A4093/Mill Street Roundabout (Junction 2)

During the AM peak period significant queues are generated at the A4119/A4193/Mill Street roundabout, particularly in a southbound direction on the A4119. This is identified by the extended queues highlighted in the Paramics model, figure 6.1, and the junction model results for the A4119 north (Section 4.3.2) which indicated an RFC of 0.95, a queue of 13 vehicles and a delay of 40 seconds.

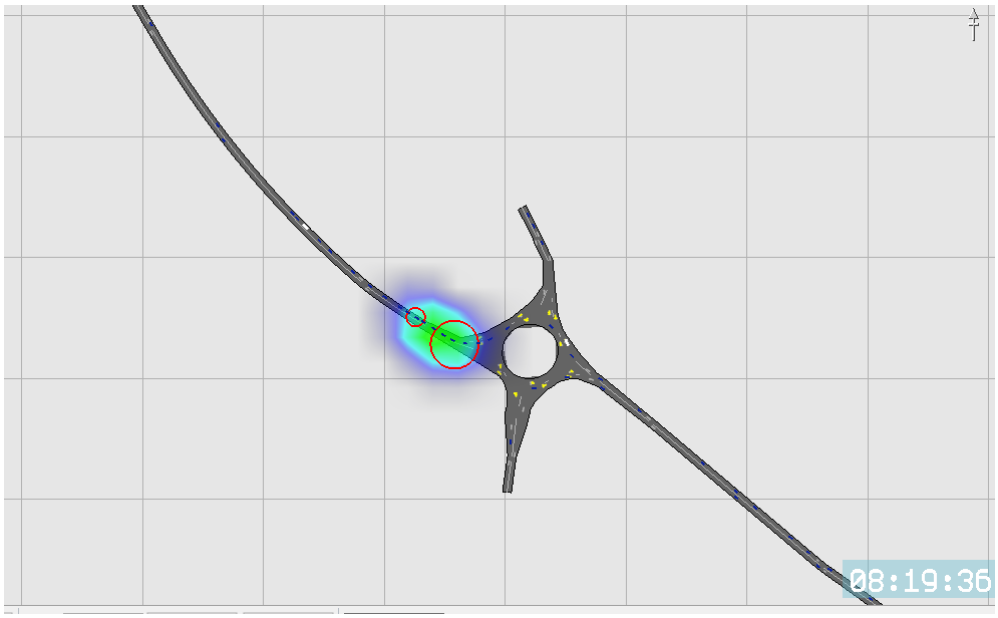
Figure 6.1 A4119/A4093/Mill Street Roundabout (Junction 2) capacity issues - AM



6.1.2 A4119/Ely Valley Road Roundabout (junction 3)

Significant queues are also identified on the A4119 southbound approach to the A4119/Ely Valley Road Roundabout (junction 3). This is identified by the Paramics model as illustrated in figure 6.2, and supported to some degree by the junction model (Section 4.3.3) which indicated that the A4119 southbound approach operates at an RFC of 0.72. It should be noted that the junction models is likely to overestimate the performance of the roundabout as there are more than one lane on approach to the roundabout with unequal lane usage likely.

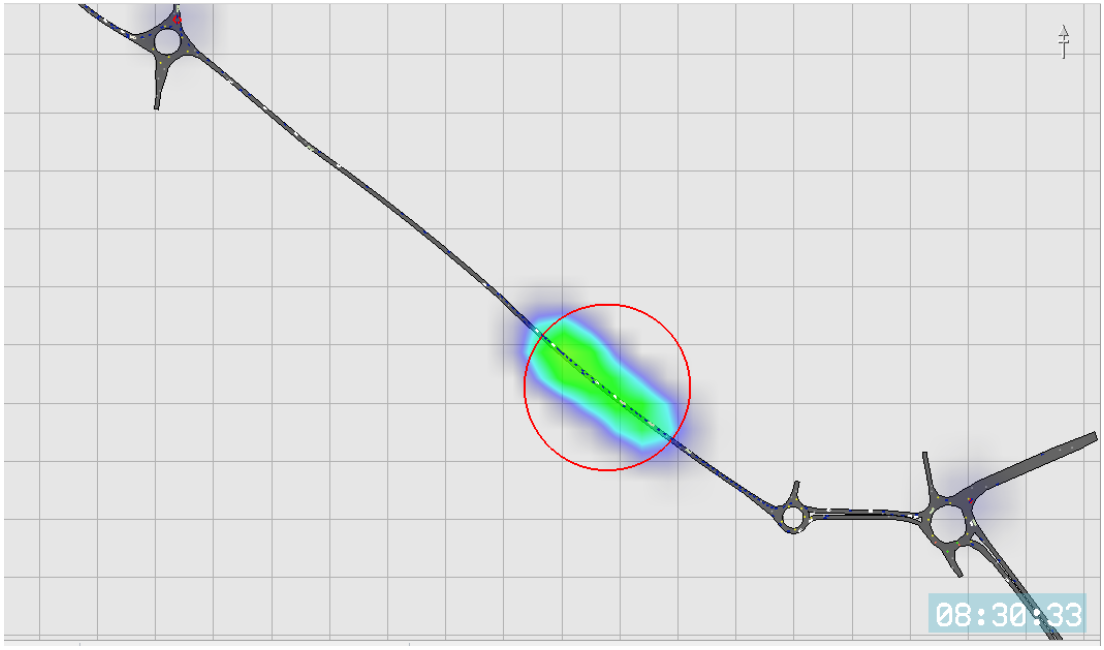
Figure 6.2 A4119/Ely Valley Road Roundabout (Junction 3) capacity issues - AM



6.1.3 A4119 Ely Valley Road between Coedely (Junction 3) and Royal Glamorgan Hospital Roundabout (Junction 5)

Reduced vehicle speeds and extended queues are identified along the A4119 between Coedely (Junction 3) and the Royal Glamorgan Hospital roundabout (Junction 5). This is illustrated in the Paramics model visualisation in figure 6.3, and identified in the junction model results in Section 4.3.4.

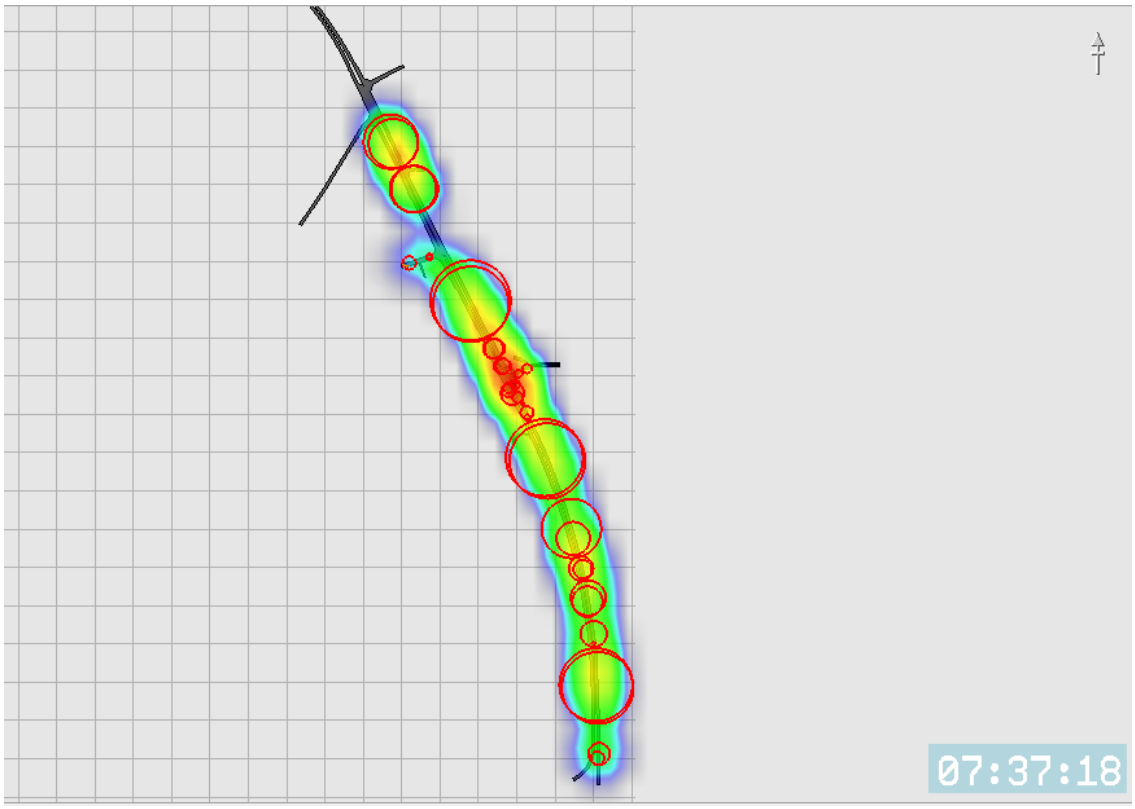
Figure 6.3 A4119 Ely Valley Road between Coedely (Junction 3) and Royal Glamorgan Hospital Roundabout (Junction 5) capacity issues - AM



6.1.4 *Junction 34 of the M4*

Significant queuing and junction exit blocking is identified at the M4 eastbound on-slip. This is identified in the Paramics visualisation (figure 6.3) and in the junction model results in section 4.3.10 & 4.3.12. Although this occurs before the network peak between 07:00 and 08:00 the resulting queues affect the operation of the peak between 08:00 and 09:00.

Figure 6.4 M4 Junction 34 Eastbound on-slip capacity issues - AM



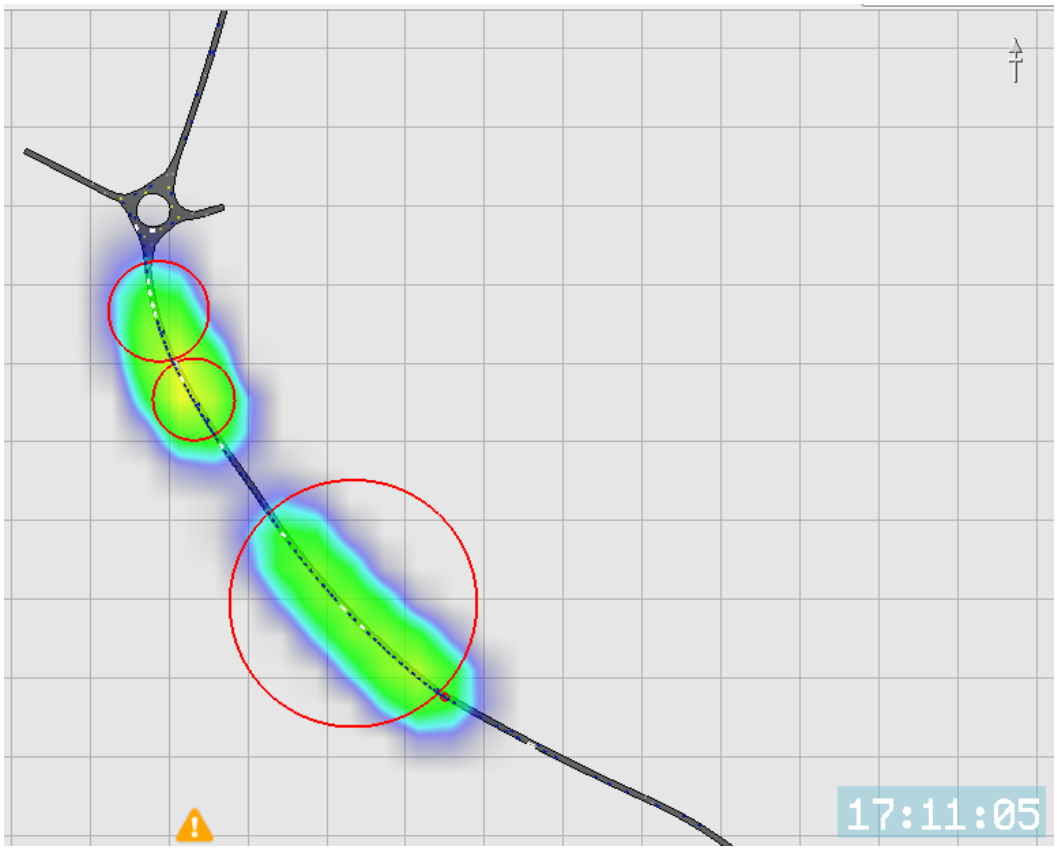
6.2 PM Period (16:00 – 19:00)

During the PM period the most notable capacity issues were found at the following locations:

6.2.1 *A4119/A4093/Mill Street Roundabout (Junction 2)*

Significant queues and reduced vehicle speeds are identified on the A4119 northbound approach to the A4119/A4093/Mill Street roundabout (Junction 3). This is illustrated by the Paramics visualisation (Figure 6.5) and supported by the junction model (Section 4.3.2) which indicated that the junction operates at an RFC of 0.88.

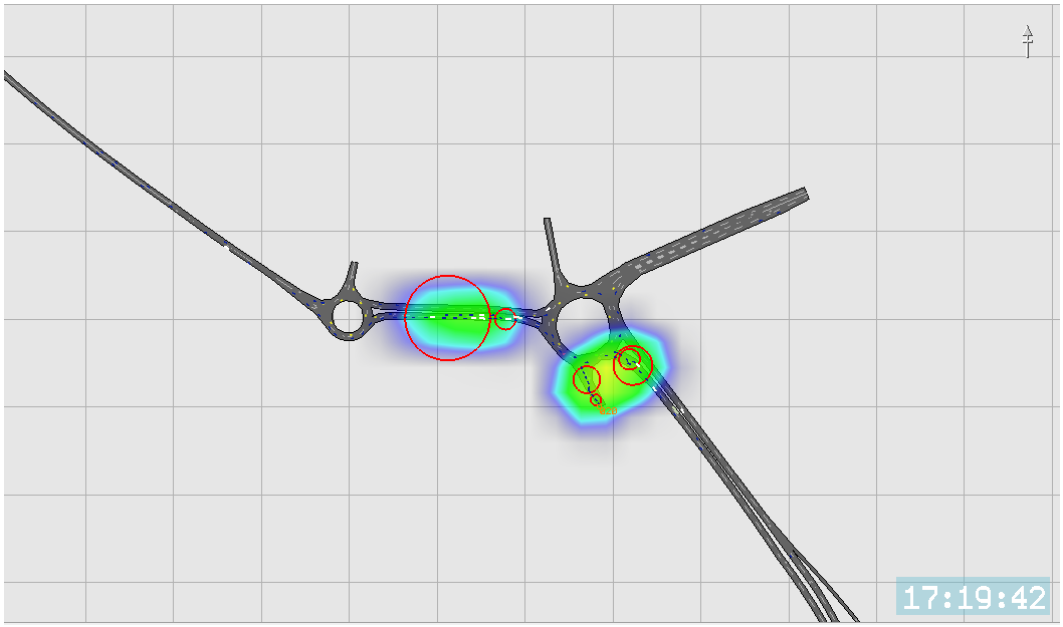
Figure 6.5 A4119/A4093/Mill Street Roundabout (Junction 2) capacity issues - PM



6.2.2 *A4119 Ely Valley Road between Coedely (Junction 3) and the Royal Glamorgan Hospital Roundabout (Junction 5)*

Significant congestion was identified on the A4119 in a northbound direction between Coedely (Junction 3) and the Royal Glamorgan Hospital Roundabout (Junction 5). This is illustrated in the Paramcis visualisation (Figure 6.6) and supported by the junction model results in Section 4.3.4 which indicated that the junction operates with an RFC of 0.98.

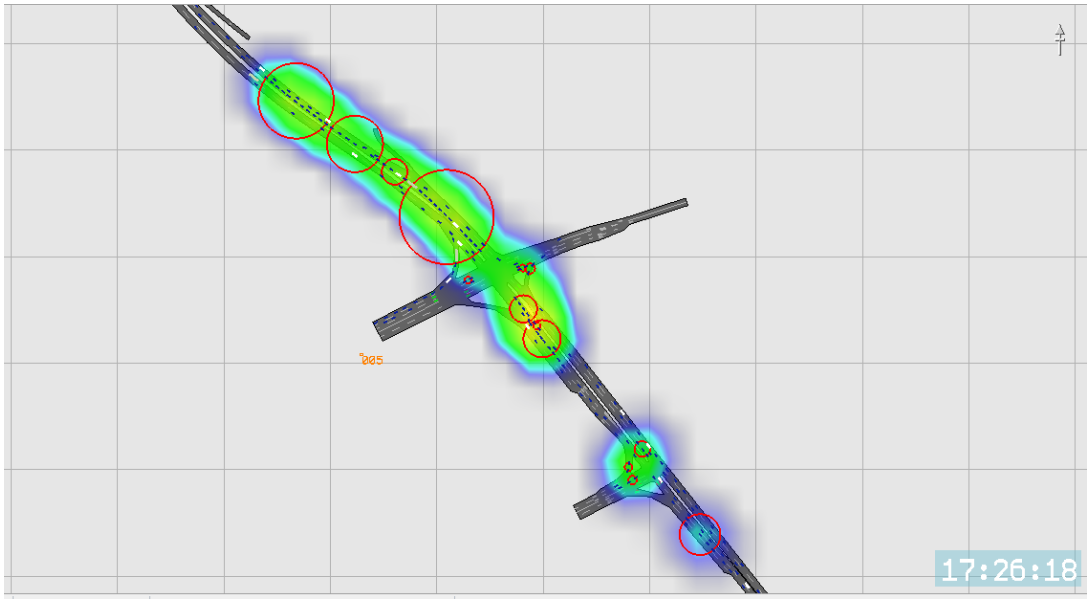
Figure 6.6 A4119 Ely Valley Road between Coedely (Junction 3) and the Royal Glamorgan Hospital roundabout (Junction 4) capacity issues - PM



6.2.3 *A4119/Talbot Road Signalised Crossroads*

Extended queues and delay are identified at the A4119/Talbot Road signalised crossroads, particularly on the A4119 southbound approach. This is illustrated in Figure 6.6 and supported by the junction model capacity assessment results (Section 4.3.7) which indicated that the junction is over capacity with a DOS of 103%-105% on the A4119 southbound approach.

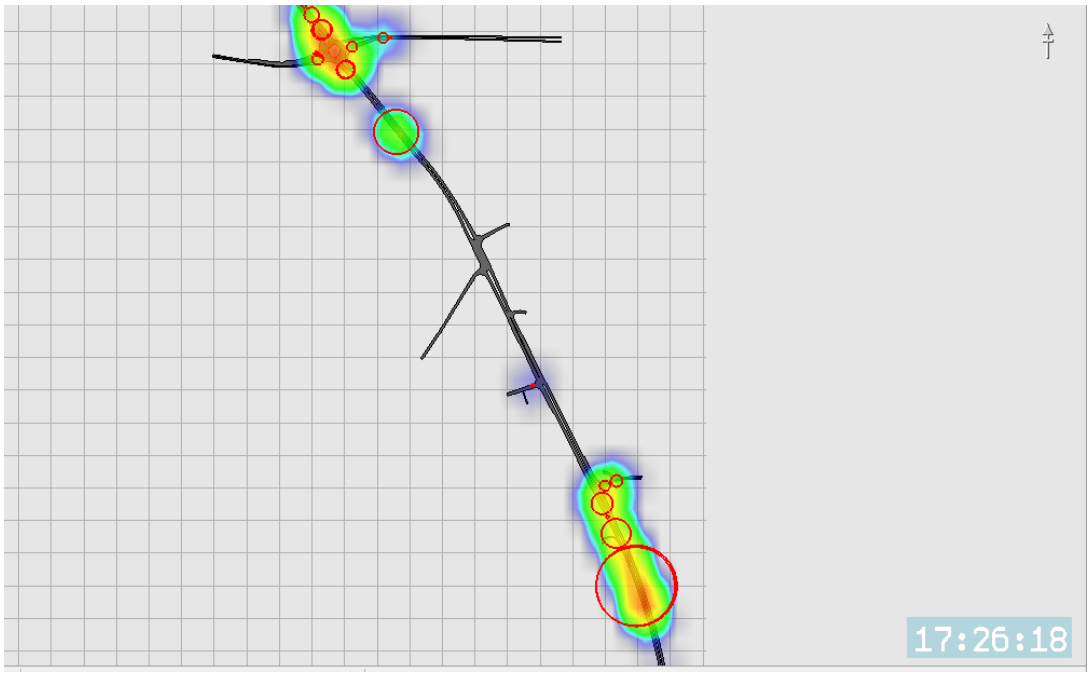
Figure 6.7 A4119/Talbot Road Signalised Crossroads capacity issues - PM



6.2.4 *A4119 between Junction 34 of the M4 and the A4119/A473 roundabout*

Moderate to large queues and delay are identified along the A4119 in a northbound direction. This is illustrated in the Paramics visualisation in figure 6.8 and supported by the junction model assessment results in Section 4.3.10 and 4.3.12 which indicate that the A4119/A473 and the A4119/A4119 Llantrisant Road junctions are operating at capacity with DOSs of 95% and 90% respectively.

Figure 6.8 A4119 between Junction 34 of the M4 and the A4119/A473 roundabout capacity issues - PM



7. Forecast Traffic Demand Spreadsheet Model

7.1 Introduction

TAG Unit M4 Forecasting and Uncertainty gives practical guidance for producing traffic demand forecasts including developing a core scenario and producing an uncertainty log. TAG Unit M4 guidance has been followed in the development of the forecast matrix in order to provide a traffic forecast that is consistent with general practise that will also allow the appraisal of a transport intervention in accordance with Central Government requirements.

7.2 Scenarios

7.2.1 Core Scenario

TAG requires a Core Scenario which is based on the most unbiased and realistic set of assumptions that form the central case that is presented in appraisal. It should represent the best basis for decision-making given current evidence. The Core Scenario is based on:

- NTEM growth in demand
- Developments that are more than likely to occur
- Appropriate modelling assumptions.

A core scenario is presented for 2022, which is 5 years after the base model year and 2037 which is 20 years after the base model year. The Core Scenario contains the developments identified within the LDP with planning permissions and is constrained to NTEM growth.

7.3 Uncertainty and the Uncertainty Log

There are two potential sources of forecast error. These are uncertainty in inputs such as size of new housing and errors in model parameters and specification. This section summarises all known assumptions and uncertainties in the modelling and forecasting approach in an uncertainty log and includes an assessment of the likelihood for future change. The purpose of the uncertainty log is to record the central forecasting assumptions that underpin the Core Scenario and record the degree of uncertainty around these central assumptions.

The uncertainty log includes an assessment of the uncertainty of each individual input by placing it into one of four categories as shown in Table 7.1.

Table 7.1 Classification of Uncertainty Log Inputs

Probability of the input	Status
Near certain: The outcome will happen, or there is a high probability it will happen	Intent announced by proponent to regulatory agencies Approved development proposals Project under construction
More than likely: The outcome is likely to happen, but there is some uncertainty	Submission of planning or consent application imminent Development application within the consent process
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	Identified within a development plan Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented Development conditional upon the transport strategy/scheme proceeding A committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty
Hypothetical: There is considerable uncertainty whether the outcome will ever happen	Conjecture based upon currently available information Discussed on a conceptual basis One of a number of possible inputs in an initial consultation process A policy aspiration

All relevant developments have been collated and presented in this uncertainty log. The log is broken down into demand and supply, where 'supply' is transport schemes which alter network capacity, and 'demand' relates to new developments which have the potential to generate new trips on the transport network.

The key role of the uncertainty log is to detail the forecasting assumptions that form the core scenario, which is the most unbiased and realistic set of assumptions that will form the central case of the scheme appraisal. Only assumptions that are considered to be near certain or more than likely are included in the core scenario.

7.3.1 Transport Schemes Log

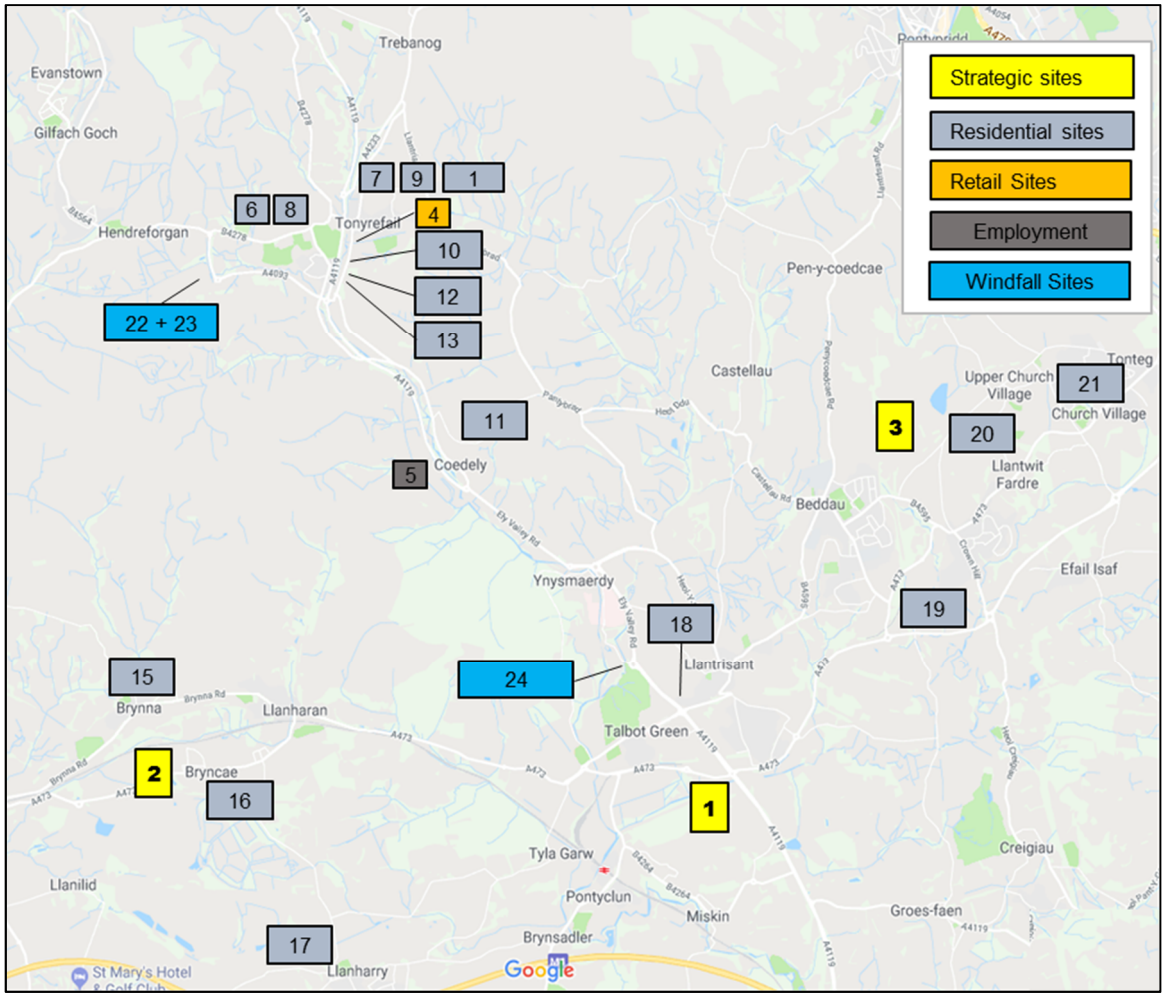
Table 7.2 Transport Schemes Log

Ref	Scheme	Year	Assumption	Uncertainty
T1	A4119/Unnamed Road/Arthur Llywelyn Jenkins Staggered Junction	Pre 2022	Included in Opening Year Model	Granted planning permission

7.3.2 Development Sites Log

The RCT LDP includes a proposals map which presents the areas of land which have been specifically allocated for development. The proposals map has been analysed in order to identify the developments that are likely to generate traffic that will impact upon the A4119 corridor. The developments identified are illustrated in Figure 7.1.

Figure 7.1 Proposals Map Development Sites



Google

Figure 7.1 shows that there is a total of 21 development sites that are likely to generate traffic that will impact upon the A4119 corridor. The sites consist of strategic, residential, retail and employment sites at various locations within the SSA. Discussions were held with RCTCBC Development Control department in order to classify sites in accordance with Table 3.1 above. Sites already constructed were also identified and removed from the study. The resulting site classification is presented in table 7.3.

Table 7.3 Development Site Details

Site No	Name	Location	Scale	Planning Status
Strategic Sites				
1	Mwyndu SSA 8	Talbot Green	500 dwellings, 15 hectares employment, 23,400m² retail floor space, 10,000m² leisure floor space, primary school, library/community space	Approved
2	Former OCC Site Llanhilid	Llanharan	1950 - 2100 dwellings, 2500m² retail floor space, medical centre, library/community centre, primary school	Approved
3	Cwm Colliery and Coking Works Site	Beddau	800 - 950 dwellings, 1.9 hectares of employment land, primary school	Approved
Retail Sites				
As (2) above	Former OCC Site Llanhilid	Llanharan	As specified above - 2500m²	Approved
4	Land east of Mill Street	Tonyrefail	2000m²	Approved
Employment Sites				
5	Coedely Employment Site	Tonyrefail	14.32 hectares	Approved
General Housing Allocations				
6	Trane Farm SSA 10.2	Tonyrefail	700 dwellings	Approved
7	Collenna Farm SSA 10.3	Tonyrefail	25 dwellings	Allocation only
8	Bryngolau SSA 10.4	Tonyrefail	50 dwellings	Approved
9	Hillside Club SSA 10.5	Tonyrefail	40 dwellings	Allocation only
10	Mill Street SSA 10.6	Tonyrefail	100 dwellings	Allocation only
11	Gwern Heulog Coedely SSA 10.7	Coedely	150 dwellings	Approved
12	Tylcha Wen Tce SSA 10.8	Tonyrefail	30 dwellings	Allocation only
13	Tylcha Ganol Farm SSA 10.9	Tonyrefail	85 dwellings	Allocation only
14	Hafod Wen SSA 10.10	Tonyrefail	100 dwellings	Allocation only
15	Brynna Road SSA 10.11	Brynna	200 dwellings	Allocation only
16	Dolau County SSA 10.12	Brynna	130 dwellings	Allocation only
17	Llechau SSA 10.13	Llanharry	90 dwellings	Allocation only
18	Penygawsi SSA 10.14	Llantrisant	40 dwellings	Allocation only
19	Brynteg Court SSA 10.15	Beddau	150 dwellings	Allocation only
20	Link Site SSA 10.16	Church village	160 dwellings	Approved
21	The Riddings SSA 10.18	Church Village	500 dwellings	Allocation only
Windfall Sites				
22	Parc Eirin	Tonyrefail	200 dwellings	Approved
23	Parc Eirin	Tonyrefail	3500m² employment	Approved
24	Magden Park	Talbot Green	2500m² retail	Approved

7.4 Forecast Matrix Development

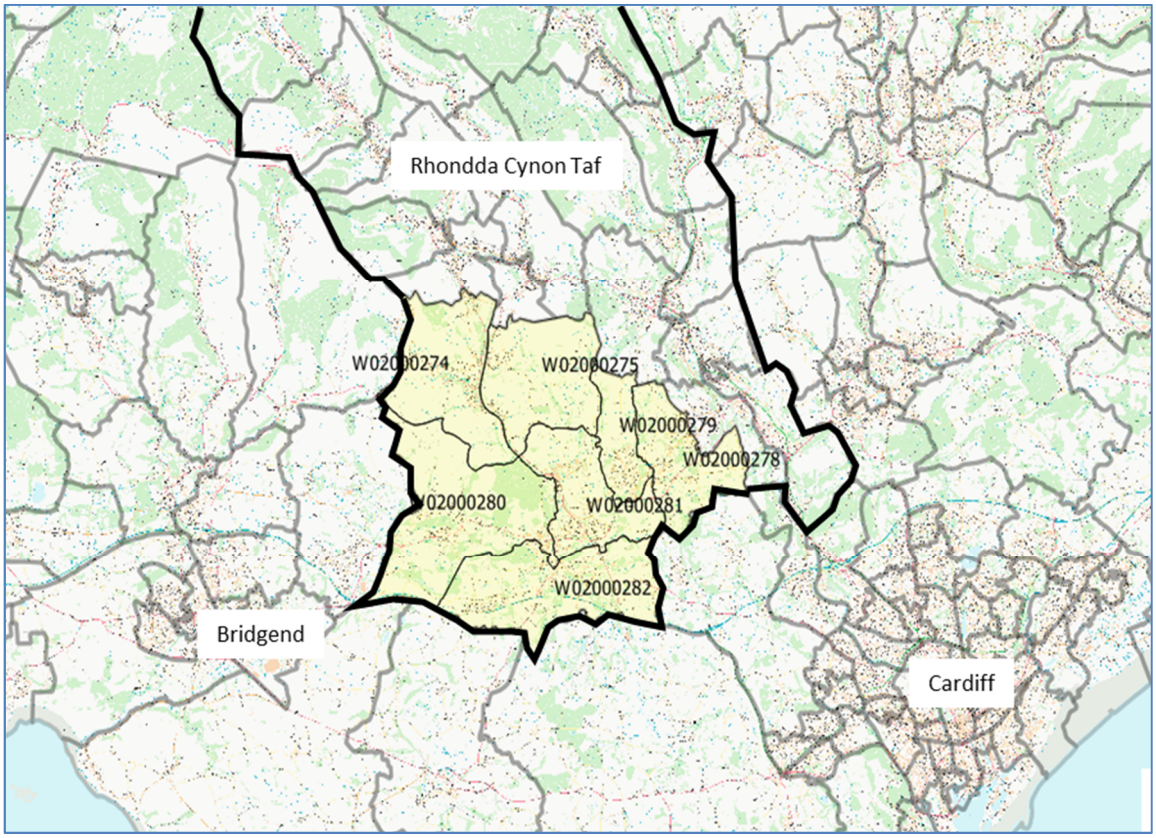
7.4.1 Core Scenario

Planning Assumptions

TAG Unit M4 requires that growth in travel demand is constrained to growth in the National Trip End Model (NTEM) for the core scenario. NTEM forecasts growth in origin-destinations for use in transport modelling and considers national projections of population, employment, housing, car ownership, and trip rates. The NTEM dataset represents the DfT standard assumptions about growth in demand. NTEM guidance states that information about planned dwellings is derived from local authority plans and monitoring reports and based on targets/plans for the whole control area.
In order to constrain growth to NTEM and the area with development sites that will influence traffic demand on the A4119 the following NTEM zones have been used.

- W0200274
- W0200275
- W0200278
- W0200279
- W0200280
- W0200281
- W0200282

Figure 7.2 A4119 Area of Influence NTEM Zones



For the period from the base model year (2018) to the future assessment years 2022 and 2037 NTEM contains the following demographic projections for the zones identified above.

Table 7.4 NTEM Planning Projections

Year	Population	Households	Jobs	Workers
2018	59366	25234	27576	28289
2022	60126	25808	28014	28355
2037	59568	26607	29215	28097
Change 2018 - 2022	+760	+574	+438	+66.6
Change 2018 - 2037	+201	+1373	+1639	-192

A review of the LDP allocated development sites within the study area indicated that there are 5280 dwellings, 31 hectares of employment land and 27900m² of retail land to be developed. However, discussions with RCTCBC Development Control Department and a review of recent development completions in the area indicated that this is unlikely to be achieved within the assessed time period.

In order to estimate the likely number of future households an annual household build rate of 150 dwellings has been used. This is based on discussion with RCTCBC Development Control department as well as forecast household increase in NTEM for this area which is 72 households per year. This calculates to a forecast household increase of 2850 dwellings by 2037 which is closer to NTEM and recent completion levels. In addition, only the large employment development site (Site No 5 – Coedely Development Site) was included in the assessment, and the smaller employment sites and retail sites have been excluded. It has been assumed that Site 5 will be 50% constructed by 2022 and fully constructed by 2037.

7.4.2 Adjusting NTEM to incorporate land use developments

NTEM makes no assumptions about individual land use developments although adjustments can be made that remove them from NTEM trip end growth rates so that they can be included specifically within the transport model. As such the study area NTEM zones have had the relevant household and employment increase removed to provide an adjusted background growth. The resulting background growth rates are provided in table 7.5.

Table 7.5 NTEM and Adjusted Growth

	AM		PM	
Year	NTEM	Adjusted	NTEM	Adjusted
2018 – 2022	3.986%	2.767%	3.788%	2.423%
2018 – 2037	16.110%	12.853%	15.392%	11.800%

7.4.3 Development Trip Rates & Distribution

Where available, the traffic generated by the development sites identified above has been taken from the associated Transport Assessment. Alternatively, traffic generation has been estimated using industry standard software TRICS. A trip rate for each land use based on a suburban location outside London parameter has been produced using TRICS and is presented in Table 7.6. The full TRICS output is provided in Appendix E.

Table 7.6 TRICS Trip Generation

Land Use	Residential Trip Rates			Employment (Industrial Estate) Trip Rates		
	Arrivals	Departures	Total	Arrivals	Departures	Total
AM						
07:00-08:00	0.06	0.25	0.31	11.12	3.05	14.17
08:00-09:00	0.12	0.35	0.48	12.16	6.89	19.05
09:00-10:00	0.14	0.15	0.29	7.97	6.46	14.43
3 Hr Total	0.33	0.76	1.08	31.24	16.40	47.65
PM						
16:00-17:00	0.25	0.16	0.40	5.95	11.01	16.96
17:00-18:00	0.29	0.17	0.46	2.45	9.54	11.99
18:00-19:00	0.25	0.17	0.42	1.76	3.57	5.33
3 Hr Total	0.79	0.49	1.28	10.17	24.11	34.28

The trips estimated from development have been assigned onto the A4119 road network utilising first principles and the ANPR survey data. An estimate of the proportion of trips distributed to the A4119 corridor for each of the developments has been developed based on the proximity of the development to the A4119 corridor. For example, only 30% of trips generated at Site 2 (Former OCC Site – Llanharan) have been distributed to the A4119 as the site is over four miles from the A4119 corridor and the A473/Junction 35 of the M4 provides a feasible alternative access to the surrounding local and strategic road network.

The resulting trips are presented for 2022 and 2037 in tables 7.7 and 7.8 respectively.

Table 7.7 LDP Development Site Trips - 2022

Site No	Name	Location	Scale	Scale (adjusted to build rate)	% Travelling to A4119	Resulting Trips			
						AM		PM	
Strategic Sites						In	Out	In	Out
1	Mwyndu SSA 8	Talbot Green	500 dwellings	83	80	22	50	53	33
2	Former OCC Site Llanhilid	Llanharan	1950 dwellings	324	30	32	74	205	48
3	Cwm Colliery and Coking Works Site	Beddau	800 dwellings	133	30	13	182	32	20
Employment Sites									
5	Coedely Employment Site	Tonyrefail	14.32 hectares	7.16	100	224	235	73	173
General Housing Allocations									
6	Trane Farm SSA 10.2	Tonyrefail	700 dwellings	116	80	30	70	74	46
8	Bryngolau SSA 10.4	Tonyrefail	50 dwellings	8	80	2	5	5	3
11	Gwern Heulog Coedely SSA 10.7	Coedely	150 dwellings	25	80	6	15	16	10
20	Link Site SSA 10.16	Church village	160 dwellings	27	30	3	6	6	4
Windfall Sites									
22	Parc Eirin	Tonyrefail	200 dwellings	33	80	9	20	21	13
Total				750+(7.16 h)		340	657	484	348

Table 7.8 LDP Development Site Trips - 2037

Site No	Name	Location	Scale	Scale (adjusted to build rate)	% Travelling to A4119	Resulting Trips			
						AM		PM	
Strategic Sites						In	Out	In	Out
1	Mwyndu SSA 8	Talbot Green	500 dwellings	333	80	86	201	210	131
2	Former OCC Site Llanhilid	Llanharan	1950 dwellings	1297	30	126	295	820	191
3	Cwm Colliery and Coking Works Site	Beddau	800 dwellings	532	30	52	182	126	78
Employment Sites									
5	Coedely Employment Site	Tonyrefail	14.32 hectares	14.32	100	447	235	146	345
General Housing Allocations									
6	Trane Farm SSA 10.2	Tonyrefail	700 dwellings	466	80	121	282	294	183
8	Bryngolau SSA 10.4	Tonyrefail	50 dwellings	33	80	9	20	21	13
11	Gwern Heulog Coedely SSA 10.7	Coedely	150 dwellings	100	80	26	60	63	39
20	Link Site SSA 10.16	Church village	160 dwellings	106	30	10	24	25	16
Windfall Sites									
22	Parc Eirin	Tonyrefail	200 dwellings	133	80	35	81	84	52
Total				3000+ (14.32 h)		913	1380	1789	1048

The trips calculated above have been distributed to the A4119 corridor in accordance with the origin and destination patterns identified within the ANPR survey data.

7.4.4 Total Growth

Following the addition of background growth and development trips to the demand matrix a comparison has been made between the final growth rate produced and the NTEM forecast growth. The differences are presented in tables 7.9 and 7.10.

Table 7.9 Manual and NTEM growth comparison (2018 – 2022)

	Manual Growth	NTEM Growth	Difference
AM	8.0%	3.9%	4.1%
PM	6.0%	3.8	2.2%

Table 7.10 Manual and NTEM growth comparison (2018 – 2037)

	Manual Growth	NTEM Growth	Difference
AM	26.1%	16.1%	10.0%
PM	25.3%	15.4%	9.9%

Table 7.9 and 7.10 show that the growth in traffic demand produced using the manual addition methodology results in a higher growth rate. As such the manual growth rate has been factored down so that it is constrained to NTEM growth in accordance with WebTAG guidance. It should be noted that these growth rates assume that there is no significant change in the generalised cost of travel that could be caused by significant congestion for example.

8. Forecast A4119 Corridor Operation

The forecast demand matrices have been assigned to the microsimulation model and the operation of the model has been reviewed in order to understand how the A4119 corridor will operate in 2022 (base + 5 years' time) and 2037 (base + 20 years' time).

8.1 2022 Future Assessment Year

8.1.1 AM Peak Hour (08:00 – 09:00)

Journey Times

The zone to zone journey times within the model have been analysed in order to identify journeys that have increased in duration. The journey time comparison is presented in table 8.1. A conditional format has been applied to the table based on a red colour scale so that the largest numbers are highlighted in dark red (not including the row and column Zone numbers).

Table 8.1 Zone to zone journey time comparison – AM 2018-2022 (difference in seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	-1	54	23	74	0	36	61	28	76	3	0	274	119	0	0	10	-18	0	-34	0	13	3	78	55	17	-77
2	-1	0	26	22	73	-7	45	52	82	180	0	0	217	154	0	-22	23	44	0	62	0	39	22	40	18	52	21
3	-2	1	0	0	-11	24	27	26	66	96	79	0	230	108	0	0	35	25	0	0	0	1	51	0	33	1	-23
4	2	0	0	0	0	24	0	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	0	-5	0
5	13	0	5	-7	0	17	17	12	20	0	94	0	136	55	0	0	4	18	0	0	0	11	-2	0	-3	6	9
6	-10	18	-10	0	-1	0	21	18	-6	70	25	0	140	27	0	0	4	15	0	-1	0	0	-10	0	0	0	1
7	-3	-4	4	37	4	14	0	46	5	49	34	0	134	66	0	0	-19	7	0	-3	0	0	4	5	-5	19	9
8	32	33	23	0	-13	43	20	0	-11	69	0	0	146	16	0	-5	-31	22	0	-15	0	-5	1	20	35	-11	42
9	67	28	47	0	28	56	73	16	0	61	15	0	112	35	0	24	3	-7	0	25	0	0	40	64	43	68	101
10	44	91	64	0	61	46	49	45	28	0	0	0	99	54	0	72	40	38	0	0	0	0	74	0	9	80	94
11	0	0	0	0	47	162	0	21	33	0	0	0	111	3	-19	0	19	40	0	0	0	0	96	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	115	96	125	0	113	112	142	97	53	44	17	2	0	75	24	88	31	98	0	16	0	80	114	116	123	139	117
14	64	126	79	0	76	87	119	106	46	29	10	0	59	0	11	0	38	49	0	0	0	0	133	127	60	70	64
15	136	122	93	0	0	98	0	58	17	0	0	0	136	0	0	0	37	0	0	0	0	0	0	0	0	100	0
16	0	0	0	0	0	0	163	56	42	133	0	0	147	0	0	0	83	0	0	0	0	0	0	0	0	0	0
17	144	141	137	0	108	152	108	86	56	107	79	0	203	94	0	89	0	106	0	110	0	0	139	116	126	98	100
18	-11	-17	22	0	0	-9	8	0	9	84	77	0	145	13	0	2	-3	0	0	-21	0	0	17	-5	-11	6	11
19	0	-16	0	0	52	48	3	-26	-3	100	0	0	200	54	0	0	-13	14	0	0	0	0	0	109	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	10	0	15	0	-3	-5	-39	25	0	0	0	147	0	0	0	1	0	0	0	0	0	12	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	2	-9	5	-8	3	2	9	17	-7	104	24	0	153	30	0	0	2	-123	0	-18	0	-13	0	0	-6	-6	12
24	0	0	0	0	-35	0	-82	-6	-9	0	0	0	230	0	0	0	68	-8	0	0	0	0	-2	0	96	0	-42
25	8	-47	-8	0	58	0	-2	0	11	0	0	0	0	0	0	0	-3	0	0	0	0	0	-3	0	0	0	0
26	50	18	0	-5	-35	7	2	18	36	70	0	0	144	44	0	53	13	22	0	0	0	44	32	0	34	0	22
27	-24	10	9	-11	25	23	36	19	30	87	19	0	188	50	0	0	57	39	0	0	0	-30	22	10	26	-19	0

The following journey time patterns are identified in Table 8.1:

- Journeys to and from Zone 13 are forecast to experience the largest increase in journey time with all journeys experiencing an increase. This is primarily due to the signalised junction that is proposed at the Cardiff Road/Arthur Llywelyn Jenkins access staggered junction. However, increased queues and delay that are generated as a result of the increased number of vehicles travelling to zone 13 will also contribute to this.

- Journeys from Zone 17 (A473 East) are forecast to experience a moderate to large increase in journey time. This is due to the proposed development and associated traffic demand that is forecast to originate at this location.

- Journeys from zones 1, 2 and 3 to 8, 9 and 10 are forecast to experience a moderate increase in journey time. This is due to the additional demand from zones near Tonyrefail and the congestion that is generated near Junction 2 (Tonyrefail) and Junction 3 (Coedely).

- There are a small number of journeys which benefit from a marginally reduced journey time. This is due to improved access to the network in cases such as Zone 10, where the junction has become signalised, and at zone 5, where vehicles benefit from the upstream or downstream junction blocking back and vehicles allowing courtesy let-out manoeuvres into the network.

A comparison of major route journey time has been undertaken and is presented in table 8.2.

Table 8.2 Major Route Journey Time Comparison – AM 2022

Route	2018 Journey Time	2022 Journey Time	Difference (s)	Difference (%)
North (Jct 1) To Middle (Jct 10)	767	814	47	6%
Middle (Jct 10) to North (Jct 1)	551	579	28	5%
Middle (Jct 10) to South (M4)	420	709	289	69%
South (M4) to Middle (Jct 10)	264	293	29	11%

Table 8.2 shows that the largest increase is forecast to occur to journeys from the middle of the network (Junction 10) to the south (Jct 34 of M4) with an increase of 289 seconds (69%).

Queues

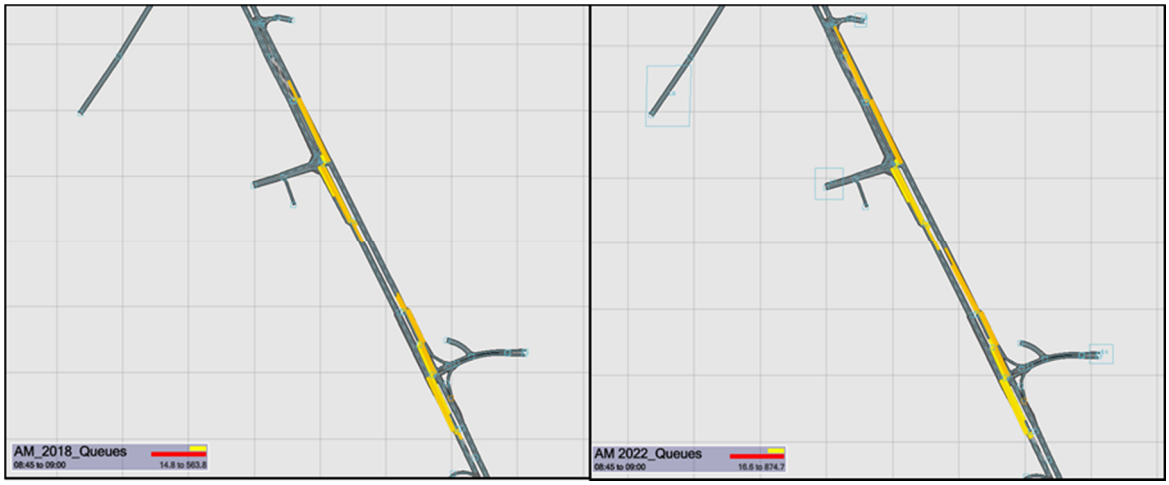
A review of the change in queue length was undertaken. It was found that the average maximum queue at the following locations are forecast to increase the most by 2022.

- A4119 Southbound approach to Junction 2 is forecast to increase by 4 vehicles.

Figure 8.1 A4119 Southbound approach to Junction 2 - AM Average Maximum Queue

- A4119 Southbound approach to Junctions 12 and 13 is forecast to increase by 7 and 5 vehicles respectively.

Figure 8.2 A4119 Southbound approach to Junctions 12 and 13 - AM Average Maximum Queue



8.1.2 *PM Period (16:45 – 17:45)*

Journey Times

The journey time comparison for the PM period is presented in table 8.3.

Table 8.3 Zone to zone journey time comparison – PM 2018-2022 (difference in seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	2	1	12	13	0	-11	39	58	199	0	0	97	201	0	0	-30	71	0	38	0	74	10	0	-1	-2	-5
2	0	0	2	12	14	22	65	62	72	157	46	0	148	141	0	0	64	56	0	28	0	-4	20	14	0	-1	-3
3	2	-1	0	5	4	17	170	37	74	159	46	0	165	177	0	0	-18	88	0	50	0	0	4	0	0	3	20
4	91	88	91	0	0	0	0	-39	0	0	0	0	147	0	0	0	0	0	0	0	0	1	0	0	0	114	0
5	43	66	96	0	0	-39	-50	67	-13	-6	-11	0	-15	65	0	0	21	-46	0	0	0	-164	-43	0	0	-65	-20
6	233	252	310	0	0	0	183	171	159	348	185	0	129	207	0	0	236	168	0	141	0	0	136	0	0	0	206
7	188	166	122	102	46	69	0	48	41	204	110	0	72	154	0	55	-16	19	0	123	0	73	72	57	-68	146	70
8	73	137	127	0	7	9	2	0	-1	122	69	0	105	94	0	0	-1	23	0	57	0	0	-8	0	0	106	22
9	141	100	59	0	25	13	6	2	0	113	58	0	74	63	0	45	5	16	0	25	0	-27	3	0	0	105	46
10	110	68	93	31	33	1	72	55	9	0	0	0	11	42	0	-2	26	2	0	0	0	0	-47	-165	0	133	62
11	54	200	0	0	74	0	67	116	100	0	0	0	20	13	23	88	75	23	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	249	222	239	101	121	158	54	100	94	83	31	33	0	43	0	135	90	82	0	99	0	88	149	200	73	224	140
14	193	246	105	0	81	40	83	81	71	104	36	0	-5	0	0	0	87	82	0	84	0	0	40	0	0	177	128
15	180	166	169	0	0	0	80	72	54	20	0	0	0	0	0	0	40	0	0	0	0	0	83	0	0	255	32
16	0	236	263	0	0	0	0	94	33	167	0	0	93	76	0	0	62	100	0	0	0	0	0	0	0	0	97
17	135	76	126	0	19	32	32	25	25	138	80	0	83	86	0	52	0	25	0	77	0	54	50	0	0	243	30
18	90	104	151	0	45	21	13	18	8	136	65	0	87	80	0	0	13	0	0	154	0	251	-28	0	93	65	36
19	119	0	0	0	0	0	-31	20	13	128	0	0	80	85	0	0	-1	0	0	0	0	0	9	0	0	78	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	139	0	-4	0	-2	110	5	-38	0	0	0	116	65	0	0	12	-25	0	37	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	84	105	158	-52	4	4	40	8	32	156	0	0	109	108	0	0	42	24	0	5	0	2	0	-1	7	109	3
24	114	98	114	0	-8	0	11	0	46	0	0	0	100	145	0	0	48	78	0	44	0	0	0	0	0	0	5
25	114	130	111	0	17	0	18	118	-6	55	0	0	138	107	0	0	21	108	0	0	0	0	2	11	0	183	37
26	1	0	-2	7	0	0	45	21	48	165	0	0	104	62	0	0	-64	-60	0	7	0	40	10	0	12	0	36
27	41	95	143	0	2	5	27	117	107	158	0	0	101	120	0	0	73	80	0	32	0	-1	1	0	0	65	0

The following journey time patterns are identified in Table 8.3:

- Journeys to Zones 1, 2 and 3 are forecast to experience the largest increase in journey time with the vast majority of journeys experiencing a large increase. This is due to the congestion and delay that occurs at the A4119 northbound approach to Junction 2 at Tonyrefail and Junction 5 (Royal Glamorgan Hospital);

- Journeys from Zone 6 (Magden Park) are forecast to experience a significant increase in journey time. This is due to the increased traffic demand that is passing the entrance to the Magden Park business park reducing the opportunity for vehicles to exit;

- Journeys times to and from zones 10, 13 and 14 are forecast to increase at a moderate level. This is due to the signalised junction that is proposed at the Cardiff Road/Arthur Llywelyn Jenkins access staggered junction, and the increased queues and delay that are generated as a result of increased traffic travelling on the A4119 at this location; and

- There are a small number of journeys which benefit from a marginally reduced journey time. This is due to improved access to the network in cases such as Zone 10, where the junction has become signalised, and at zone 5, where vehicles benefit from the upstream or downstream junction blocking back and allowing courtesy let-out manoeuvres into the network.

A comparison of major route journey time for the PM peak hour is presented in table 8.4.

Table 8.4 Major Route Journey Time Comparison – PM 2022

Route	2018 Journey Time	2022 Journey Time	Difference (s)	Difference (%)
North (Jct 1) To Middle (Jct 10)	691	766	22	3%
Middle (Jct 10) to North (Jct 1)	830	949	63	7%
Middle (Jct 10) to South (M4)	276	359	36	11%
South (M4) to Middle (Jct 10)	363	460	107	30%

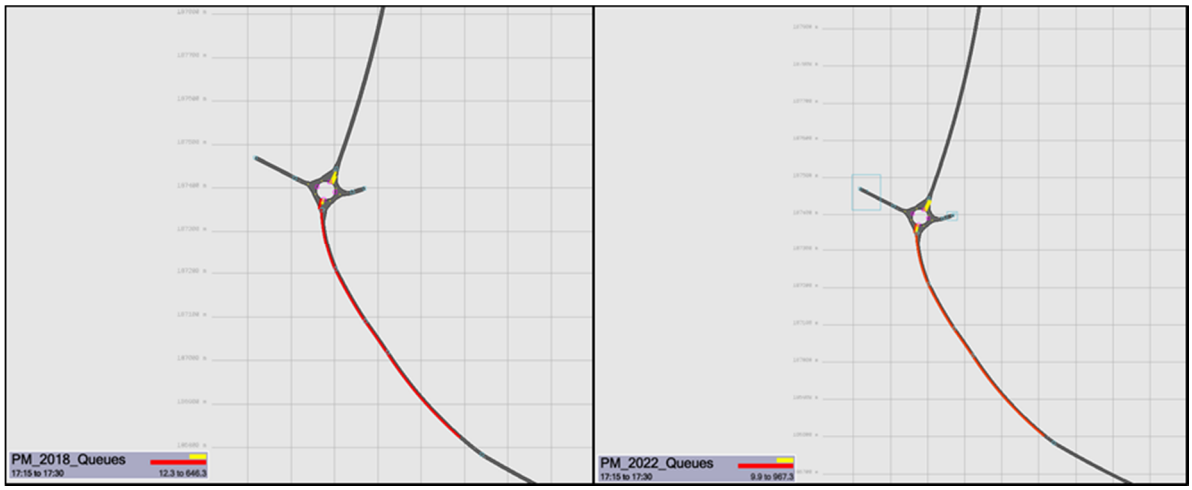
Table 8.4 shows that the largest increase is forecast to occur to journeys from the south of the network (M4) to the middle (Junction 10) with an increase of 107 seconds (30%).

Queues

A review of the change in queue length was undertaken. It was found that the queue at the following locations are forecast to increase the most by 2022.

- The average queue at the A4119 northbound approach to Junction 2 is forecast to increase by 13 vehicles.

Figure 8.3 A4119 Northbound approach to Junction 2 - PM Average Maximum Queue

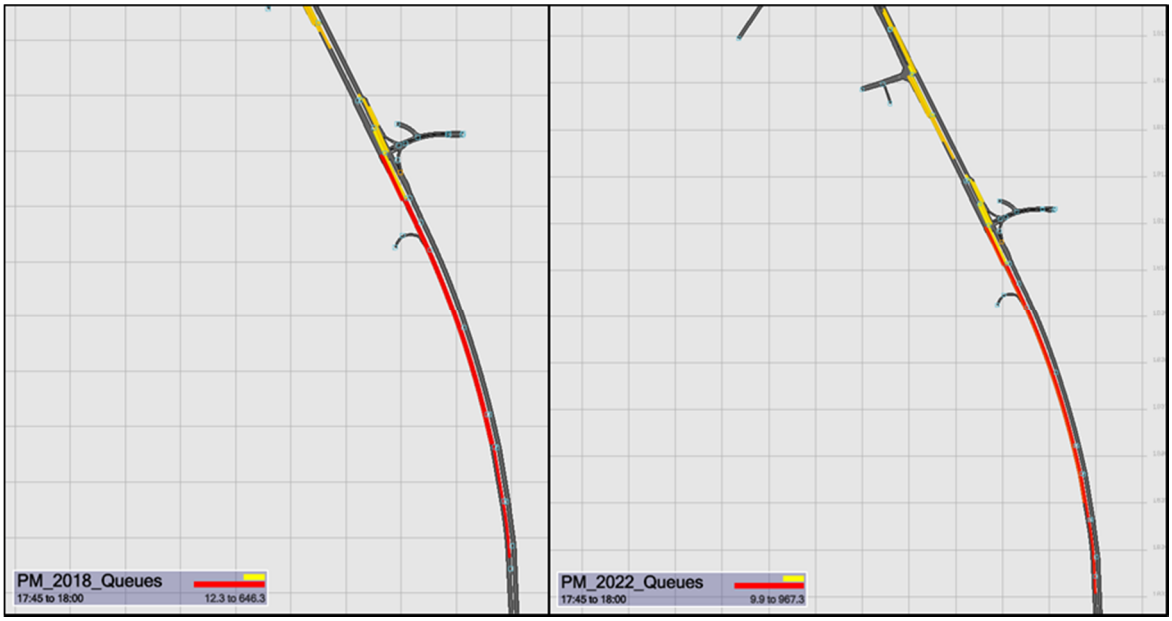


- The average queue at the A4119 southbound approach to Junctions 7 is forecast to increase by 15 vehicles

Figure 8.4 A4119 Southbound approach to Junction 7 - PM Average Maximum Queue

- The average queue at the A4119 northbound approach to Junctions 13 is forecast to increase by 13 vehicles.

Figure 8.5 A4119 northbound approach to Junction 13 - PM Average Maximum Queue



8.2 2037 Future Assessment Year

8.2.1 AM Peak Hour (08:00 – 09:00)

Journey Times

The journey time comparison for the 2037 AM peak hour is presented in table 8.5.

Table 8.5 Zone to zone journey time comparison – AM 2018-2037 (difference in seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	355	339	503	704	0	687	767	924	1160	1751	0	1487	1393	0	0	743	748	0	998	0	704	619	581	614	415	339
2	70	0	317	432	593	510	586	829	842	1246	0	0	1716	1193	0	757	635	416	0	601	0	555	522	485	530	299	385
3	71	72	0	142	256	299	291	252	381	686	857	0	909	708	0	0	352	284	0	0	0	158	321	0	268	54	181
4	6	4	3	0	0	112	0	0	126	0	0	0	0	0	0	0	0	0	0	0	0	0	121	0	0	-2	0
5	86	18	44	75	0	9	16	11	22	0	612	0	740	498	0	0	70	-22	0	0	0	-9	1	0	1	34	183
6	138	151	91	0	1	0	23	-5	32	280	522	0	697	499	0	0	76	43	0	1	0	0	-10	0	0	0	29
7	100	97	70	65	54	68	0	61	74	242	429	0	743	499	0	0	67	38	0	67	0	0	53	59	62	103	85
8	112	101	109	0	62	50	23	0	49	243	0	0	796	506	0	236	25	47	0	158	0	183	57	46	62	134	165
9	197	146	204	0	196	174	189	139	0	185	234	0	608	353	0	150	24	108	0	119	0	0	129	134	129	135	323
10	273	258	161	0	228	183	122	94	61	0	0	0	442	197	0	113	62	163	0	0	0	0	114	0	97	114	143
11	0	0	0	0	160	316	0	120	87	0	0	0	383	169	123	0	167	363	0	0	0	0	427	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	789	663	726	0	680	686	711	639	520	415	416	294	0	794	457	476	484	667	0	574	0	657	759	700	815	767	757
14	447	380	481	0	466	445	353	399	296	175	151	0	355	0	105	0	258	353	0	0	0	0	509	355	393	428	406
15	221	178	260	0	0	241	0	158	42	0	0	0	424	0	0	0	47	0	0	0	0	0	0	0	0	191	0
16	0	0	0	0	0	0	698	632	365	296	0	0	1257	0	0	0	675	0	0	0	0	0	0	0	0	0	0
17	581	673	691	0	607	587	593	546	424	692	794	0	1185	883	0	837	0	588	0	612	0	0	605	648	638	610	567
18	39	69	103	0	54	1	3	7	43	244	403	0	697	508	0	217	78	0	0	13	0	0	38	20	9	124	69
19	0	274	0	0	227	120	-9	-9	36	188	0	0	628	545	0	0	55	4	0	0	0	0	0	33	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	192	0	46	0	-5	-29	10	30	0	0	0	797	0	0	0	83	0	0	0	0	0	31	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	47	10	62	84	-1	12	14	24	45	329	398	0	834	531	0	0	76	-95	0	33	0	-13	0	0	1	58	50
24	0	-40	0	0	-46	0	-93	-15	36	0	0	0	751	0	0	0	62	-28	0	0	0	0	25	0	34	0	9
25	65	23	66	0	128	0	77	0	26	0	0	0	1802	0	0	0	6	0	0	0	0	0	-19	0	0	0	0
26	26	-6	8	90	158	185	175	212	307	515	0	0	1036	720	0	610	296	202	0	0	0	270	194	0	176	0	90
27	55	31	44	47	148	157	160	131	177	482	400	0	863	611	0	0	189	196	0	0	0	108	137	98	118	134	0

The following journey time patterns are identified in Table 8.5:

- Journeys to and from Zone 13 are forecast to experience the largest increase in journey time with all journeys experiencing an increase. This is primarily due to the large increase in traffic that is forecast to travel towards Zone 13 (Junction 34 of M4) and the fact that a number of the junctions along this route are forecast to operate over capacity. It is also in-part due to the signalised junction that is proposed at the Cardiff Road/Arthur Llywelyn Jenkins access staggered junction, and the associated increased queues and delay.

- Journeys from zones 1, 2 and 3 are forecast to experience a significant increase in journey time. This is due to the additional demand from zones near Tonyrefail and the congestion that is generated near Junction 2 (Tonyrefail) and Junction 3 (Coedely).

- Journeys from Zone 17 (A473 East) are forecast to experience a moderate to large increase in journey time. This is due to the proposed development and associated traffic demand that is forecast to originate at this location and the operation of the A4119/A473 roundabout.

- There are a small number of journeys which benefit from a marginally reduced journey time. This is due to improved access to the network in cases such as Zone 10, where the junction has become signalised, and at zone 5, where vehicles benefit from the upstream or downstream junction blocking back and allowing courtesy let-out manoeuvres into the network.

A comparison of major route journey time for the AM peak in 2037 has been undertaken and is presented in table 8.6.

Table 8.6 Major Route Journey Time Comparison – AM 2037

Route	2018 Journey Time	2037 Journey Time	Difference (s)	Difference (%)
North (Jct 1) To Middle (Jct 10)	767	1441	674	88%
Middle (Jct 10) to North (Jct 1)	551	690	139	25%
Middle (Jct 10) to South (M4)	420	1115	695	165%
South (M4) to Middle (Jct 10)	264	711	447	169%

Table 8.6 shows that the largest increase in journey time is forecast to occur to journeys from the middle of the network (Junction 10) to the south (M4) and vice versa with an increase of 695 seconds (165%) and 447 (169%) respectively.

Queues

A review of the change in queue length was undertaken. It was found that during the AM peak hour the average maximum queue at the following locations are forecast to increase the most by 2037.

- A4119 southbound approach to Junction 2 and Junction 3 is forecast to increase by 32 vehicles and 14 vehicles respectively.

Figure 8.6 A4119 southbound approach to Junction 2 - AM Average Maximum Queue

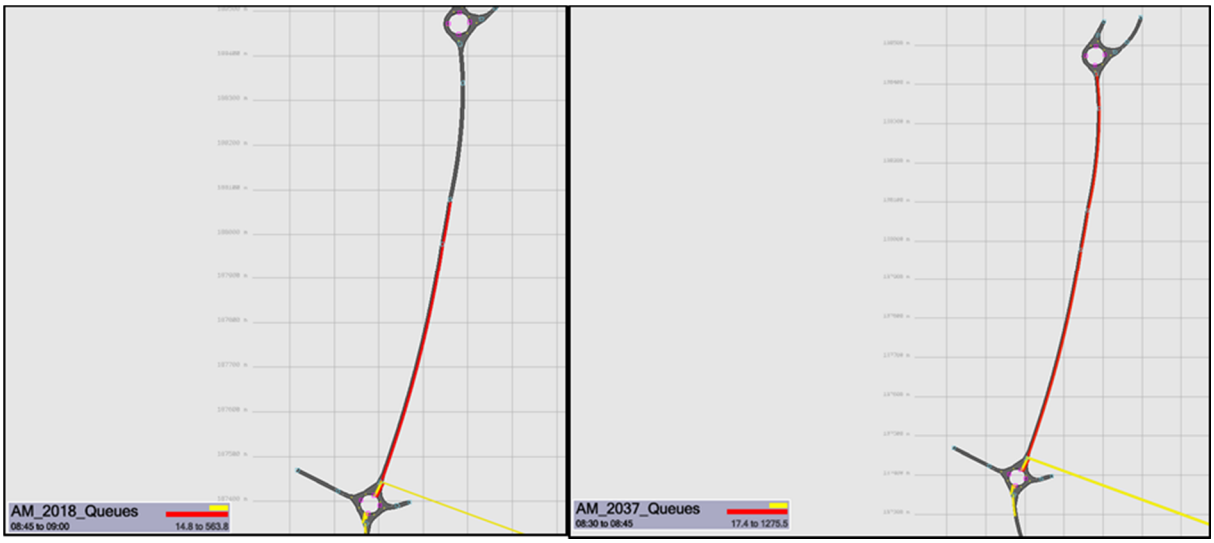
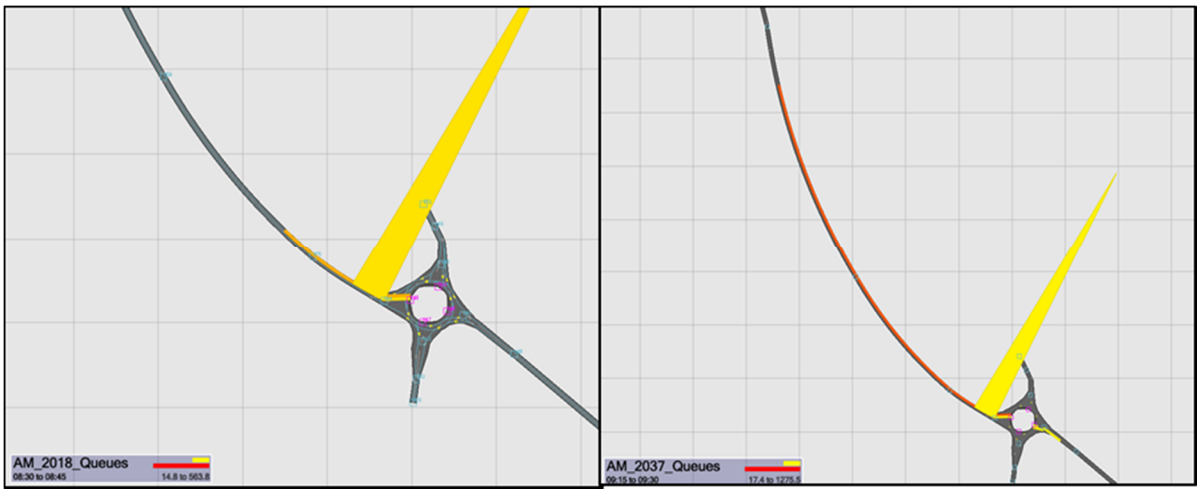
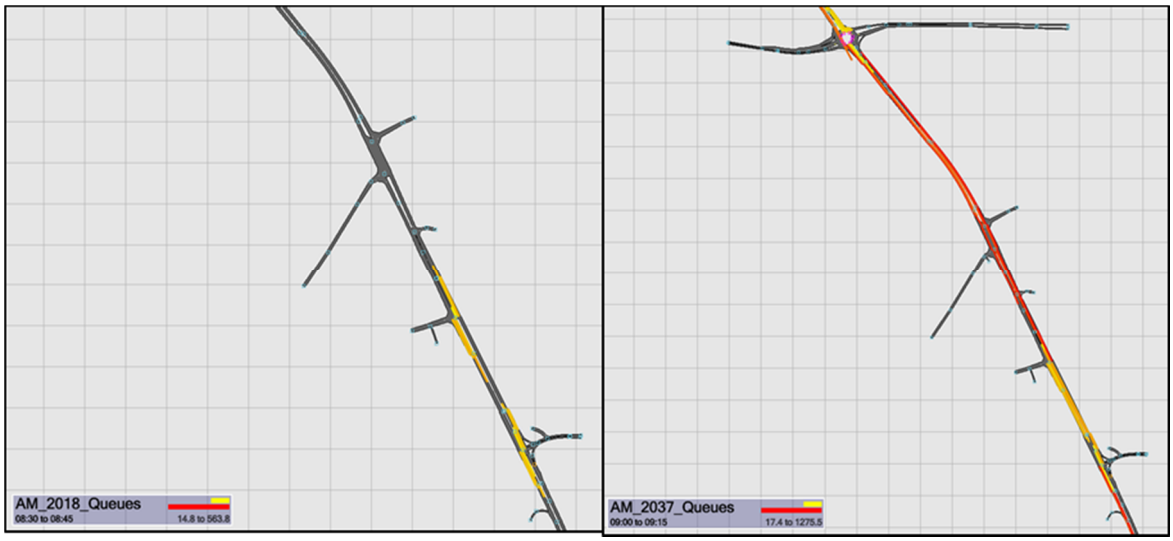


Figure 8.7 A4119 southbound approach to Junction 3 - AM Average Maximum Queue



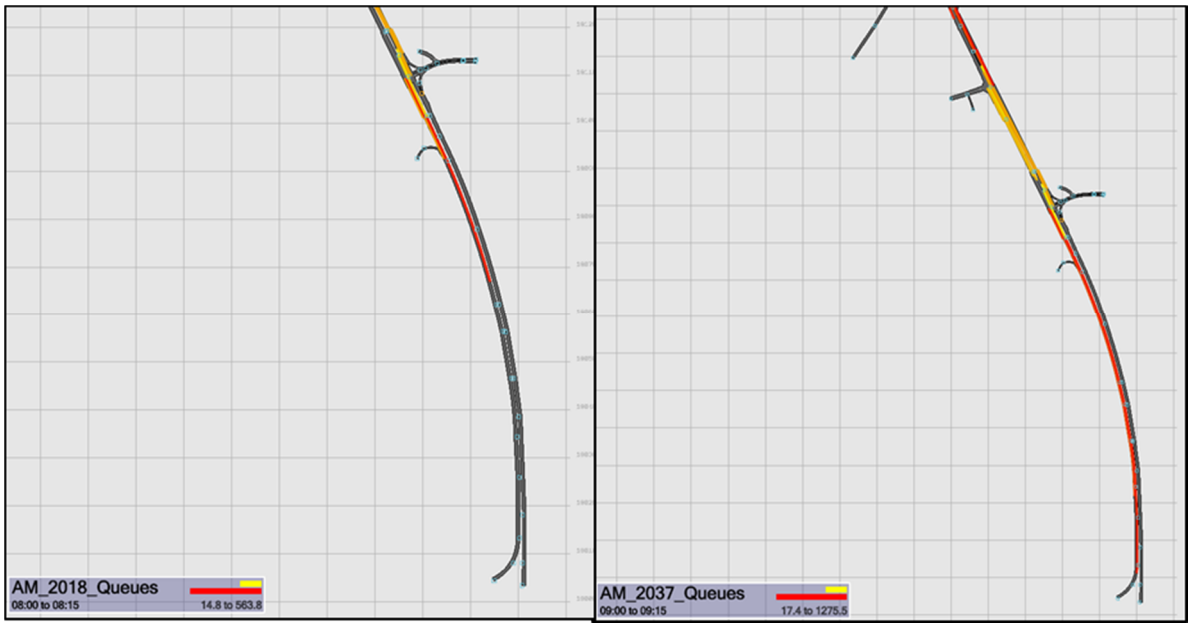
- The average queue at the A4119 Southbound approach to Junctions 12 and 13 is forecast to increase by 43 and 46 vehicles respectively.

Figure 8.8 A4119 southbound approach to Junctions 12 and 13 - AM Average Maximum Queue



- The number of vehicles queuing on the A4119 northbound approach to Junction 13 is forecast to increase by 16 vehicles.

Figure 8.9 A4119 northbound approach to Junction 13 - AM Average Maximum Queue



8.2.2 PM Peak Hour (16:45 – 17:45)

Journey Times

The journey time comparison for the PM period is presented in table 8.7.

Table 8.7 Zone to zone journey time comparison – PM 2018-2037 (difference in seconds)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	4	4	44	29	0	345	359	407	531	0	0	469	409	0	0	484	276	0	125	0	27	24	0	30	-1	27
2	0	0	6	39	40	194	274	360	422	542	455	0	552	581	0	0	411	307	0	204	0	4	38	46	0	1	38
3	0	1	0	41	32	221	383	327	382	525	597	0	531	655	0	0	286	235	0	186	0	0	36	0	0	11	44
4	371	369	374	0	0	0	0	235	0	0	0	0	489	0	0	0	0	0	0	0	0	21	0	0	0	403	1
5	531	720	629	0	0	352	353	290	512	567	625	0	531	569	0	0	625	270	0	0	0	125	166	0	0	629	318
6	912	931	944	0	0	0	522	507	572	779	733	0	668	763	0	0	646	495	0	421	0	0	527	0	0	0	484
7	747	609	573	225	223	200	0	145	248	338	245	0	350	395	0	375	264	104	0	142	0	269	251	233	43	681	225
8	1256	1045	1049	0	453	535	470	0	497	666	636	0	685	686	0	0	610	491	0	517	0	0	485	0	0	925	648
9	533	612	439	0	62	-10	-2	2	0	186	173	0	164	159	0	123	8	13	0	52	0	53	30	0	0	506	157
10	550	567	610	350	67	30	78	53	27	0	0	0	61	15	0	-12	27	46	0	0	0	0	80	-45	0	696	335
11	523	725	0	0	196	0	202	178	153	0	0	0	60	31	55	141	127	174	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1155	1324	1100	779	661	592	519	582	539	636	471	484	0	458	0	567	585	643	0	565	0	814	741	635	796	1218	742
14	1087	1039	880	0	439	365	419	449	469	422	347	0	340	0	0	0	425	451	0	433	0	0	521	0	0	814	673
15	605	632	674	0	0	0	131	128	89	26	0	0	0	0	0	0	78	0	0	0	0	0	144	0	0	709	208
16	0	636	572	0	0	0	0	129	120	175	0	0	132	121	0	0	88	40	0	0	0	0	0	0	0	0	202
17	911	798	892	0	423	321	282	332	357	392	380	0	395	419	0	321	0	324	0	438	0	441	398	0	0	1037	624
18	566	575	505	0	82	39	17	15	133	291	206	0	254	225	0	0	170	0	0	107	0	-62	40	0	73	503	169
19	658	0	0	0	0	0	-55	9	83	269	0	0	198	185	0	0	97	3	0	0	0	0	112	0	0	592	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	501	0	141	0	40	151	183	618	0	0	0	441	337	0	0	231	67	0	408	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	476	460	513	62	6	54	192	201	299	422	0	0	417	428	0	0	356	112	0	169	0	14	0	2	25	448	110
24	467	454	471	0	-14	0	199	0	273	0	0	0	427	447	0	0	483	183	0	167	0	0	2	0	0	0	59
25	431	501	472	0	59	0	307	322	252	457	0	0	461	375	0	0	307	213	0	0	0	0	25	56	0	541	80
26	3	4	3	42	23	0	286	114	395	455	0	0	520	518	0	0	227	221	0	220	0	42	24	0	39	0	24
27	341	330	461	2	4	130	267	364	323	465	0	0	429	479	0	0	419	158	0	238	0	8	3	0	0	365	0

The following journey time patterns are identified in Table 8.7:

- Journeys to Zones 1, 2 and 3 are forecast to experience the largest increase in journey time with the vast majority of journeys experiencing a large increase. This is due to the congestion and delay that occurs at the A4119 northbound approach to Junction 2 at Tonyrefail and Junction 5 (Royal Glamorgan Hospital);

- Journeys from Zone 6 (Magden Park) are forecast to experience a significant increase in journey time. This is due to the increased traffic demand that is passing the entrance to the Magden Park business park reducing the opportunity for vehicles to exit.

- Journey times to and from zones 10, 13 and 14 are forecast to increase significantly. This is due to the increased traffic demand travelling to and from these locations and the fact that the junctions along the A4119 operate over capacity at this location. The signalised junction that is proposed at the Cardiff Road/Arthur Llywelyn Jenkins access staggered junction and the associated increase in queues and delay will also contribute to this.

- Journey times to zones 7, 8, 9 and 17 are forecast to experience a moderate increase. This is due to the increased congestion and delay that is forecast on the A4119 between the A4119/A473 roundabout (Junction 10) and the A4119/Talbot Road signalised crossroads (Junction 7).

- There are a small number of journeys which benefit from a marginally reduced journey time. This is due to improved access to the network in cases such as Zone 10, where the junction has become signalised, and at zone 5, where vehicles benefit from the upstream or downstream junction blocking back and allowing courtesy let-out manoeuvres into the network.

A comparison of major route journey time for the PM peak hour in 2037 is presented in table 8.8.

Table 8.8 Major Route Journey Time Comparison – PM 2037

Route	2018 Journey Time	2037 Journey Time	Difference (s)	Difference (%)
North (Jct 1) To Middle (Jct 10)	691	1143	399	54%
Middle (Jct 10) to North (Jct 1)	830	1364	478	54%
Middle (Jct 10) to South (M4)	276	477	154	48%
South (M4) to Middle (Jct 10)	363	626	273	77%

Table 8.8 shows that the largest increase is forecast to occur to journeys from the south of the network (M4) to the middle (Junction 10) with an increase of 273 seconds (77%).

Queues

A review of the change in queue length was undertaken. It was found that the queue at the following locations are forecast to increase the most by 2022.

- The average queue at the A4119 northbound approach to Junction 2 and Junction 3 is forecast to increase by 24 vehicles and 10 vehicles respectively.

Figure 8.10 A4119 northbound approach to Junction 2 - PM Average Maximum Queue

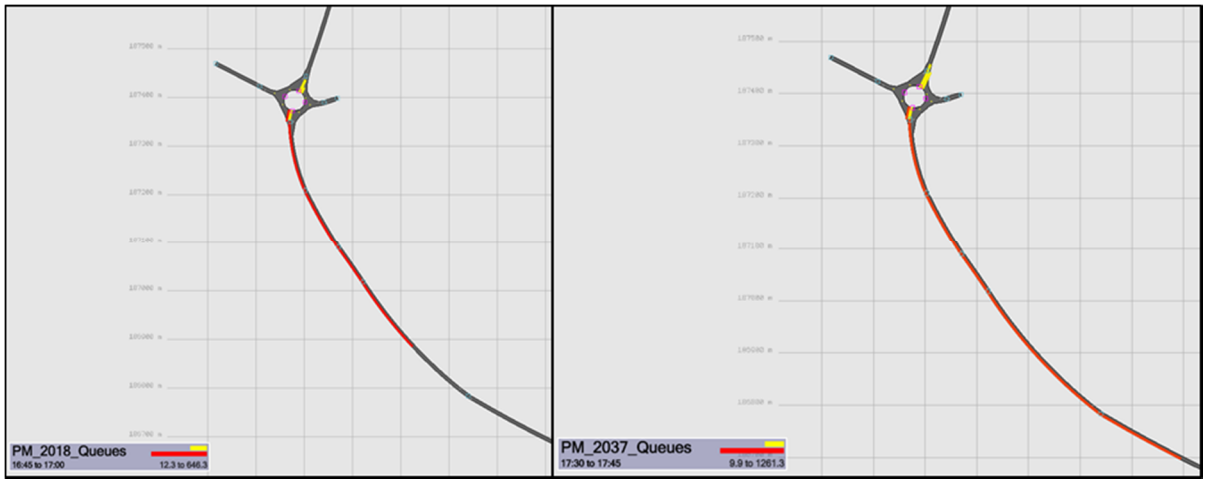
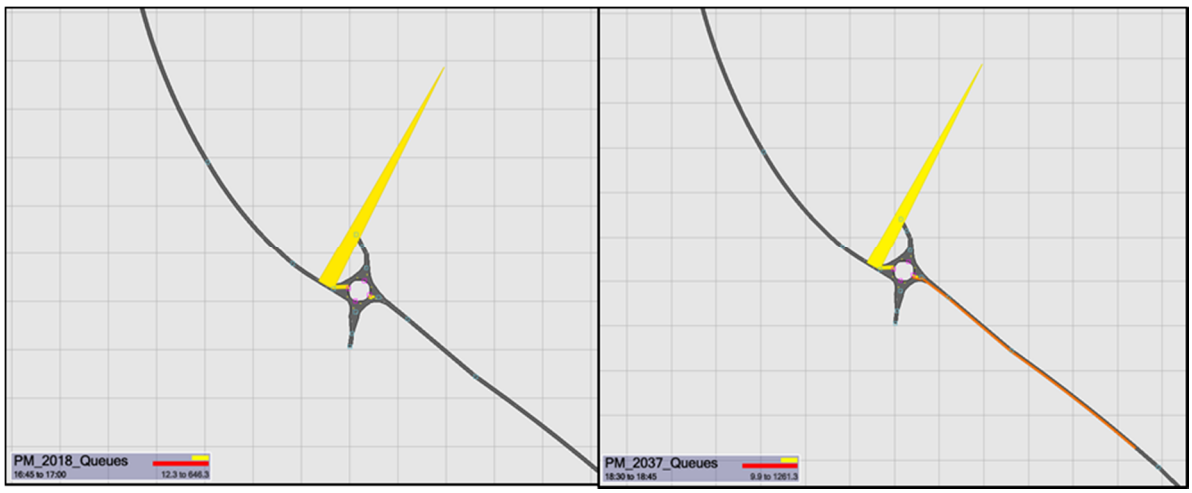
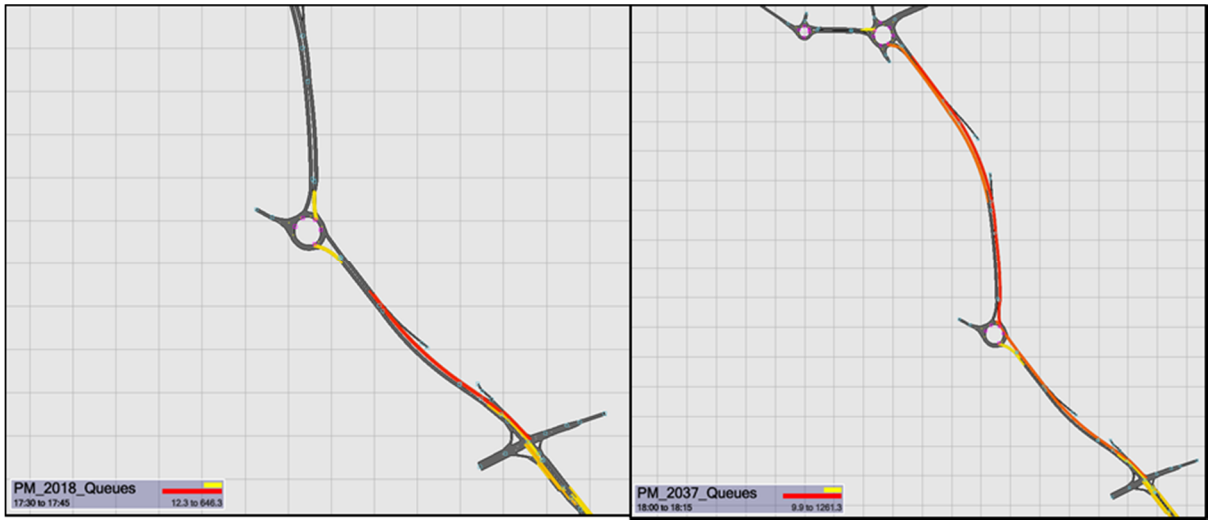


Figure 8.11 A4119 northbound approach to Junction 3 - PM Average Maximum Queue



- The average queue at the A4119 southbound approach to Junction 7 is forecast to increase by 25 vehicles.

Figure 8.12 A4119 southbound approach to Junction 7 - PM Average Maximum Queue



- The average queue at the A4119 northbound approach to Junction 12 and Junction 13 is forecast to increase by 10 vehicles and 28 vehicles respectively.

9. Summary

A series of junction models and a micro-simulation model of the A4119 corridor and associated junctions has been developed in order to gain an understanding of how the corridor is currently operating, and to forecast how it will operate in the future.

Each of the junctions along the corridor have been modelled in junction modelling packages and validated using queue data. The microsimulation model has been developed using OS CAD data and signal time information acquired from RCTCBC. The model has been calibrated and validated using surveyed turning movements and journey times in accordance with WebTAG.

During the AM peak hour the greatest delay and queues were identified at the following locations:

- A4119/A4093/Mill Street Roundabout (Junction 2);
- A4119/Ely Valley Road Roundabout (junction 3);
- A4119 Ely Valley Road between Coedely (Junction 3) and Royal Glamorgan Hospital Roundabout (Junction 5); and
- Junction 34 of the M4.

During the PM peak hour the greatest delay and queues were identified at the following locations:

- A4119/A4093/Mill Street Roundabout (Junction 2);
- A4119 Ely Valley Road between Coedely (Junction 3) and the Royal Glamorgan Hospital Roundabout (Junction 5);
- A4119/Talbot Road Signalised Crossroads;
- A4119 between Junction 34 of the M4 and the A4119/A473 roundabout.

Forecast traffic demand for the A4119 corridor has been developed for 2020 (base year + 5 years) and 2037 (base year + 20 years). The forecast traffic demand is based on allocated developments within RCTCBC LDP and NTEM growth in accordance with WebTAG Unit M4 'Forecasting and Uncertainty'.

The forecast model indicates that during the AM peak hour in 2022 the following journeys are likely to experience the greatest level of delay and congestion:

- Journeys to and from Zone 13 (Junction 34 of M4);
- Journeys from Zone 17 (A473 East); and
- Journeys from Zones 1,2 and 3 (A4119/A4233 and A4119/A4093 roundabouts in Tonyrefail) to Zones 8, 9 and 10 (Talbot Green);

The forecast model indicates that during the PM peak hour in 2022 the following journeys are likely to experience the greatest level of delay and congestion:

- Journeys to Zones 1, 2 and 3 (A4119/A4233 and A4119/A4093 roundabouts in Tonyrefail);
- Journeys from Zone 6 (Magden Park); and
- Journeys to and from Zones 10, 13 and 14

By 2037 the forecast model indicates that during the AM peak hour the following journeys are likely to experience and even greater level of delay and congestion:

- Journeys to and from Zone 13 (Junction 34 of M4);
- Journeys from Zone 17 (A473 East); and
- Journeys from Zones 1,2 and 3 (A4119/A4233 and A4119/A4093 roundabouts in Tonyrefail) to Zones 8, 9 and 10 (Talbot Green);

By 2037 the forecast model indicates that during the PM peak hour the following journeys are likely to experience and even greater level of delay and congestion:

- Journeys to Zones 1, 2 and 3 (A4119/A4233 and A4119/A4093 roundabouts in Tonyrefail);
- Journeys from Zone 6 (Magden Park);
- Journey to and from Zones 10, 13 and 14 (Cardiff Road, Junction 34 of M4 and Llantrisant Road);
- Journey to zones 7, 8, 9 and 17 (Talbot Green and the A473 East).

The model and forecast work undertaken now provides an opportunity to model and assess the benefit that may be gained by various infrastructure interventions on the A4119 corridor, and may provide the basis for cost benefit analysis to support future funding applications.

Appendix A – ANPR Data

Intelligent Data Collection Limited

Client: Capita
Project Number: ID03637
Date of Survey: 09.01.2018
Project Name: Llantrisant Repeat

Capture / Matching Overview AM

	Overall Sample Rates			Inbound Sample Rates			Outbound Sample Rates			Inbound Match Rates		
Site	MCC	Captured Plates	Sample Rate	MCC	Captured Plates	Sample Rate	MCC	Captured Plates	Sample Rate	MCC	Matched Plates	Match Rate
01	1975	1860	94%	1176	1137	97%	799	723	90%	1176	1066	91%
02	3144	2713	86%	1751	1640	94%	1393	1073	77%	1751	1556	89%
03	2542	2339	92%	1594	1443	91%	948	896	95%	1594	1337	84%
05	296	253	85%	38	28	74%	258	225	87%	38	23	61%
06	1477	1375	93%	384	320	83%	1093	1055	97%	384	294	77%
08	1798	1540	86%	342	283	83%	1456	1257	86%	342	263	77%
09	3140	2696	86%	1431	1303	91%	1709	1393	82%	1431	1209	84%
10	2058	1978	96%	834	797	96%	1224	1181	96%	834	769	92%
11	4293	3328	78%	2024	1181	58%	2269	2147	95%	2024	1074	53%
12	843	775	92%	462	431	93%	381	344	90%	462	399	86%
13	1908	1820	95%	1341	1272	95%	567	548	97%	1341	1098	82%
14	28	25	89%	-	-	-	28	25	89%	-	-	-
15	8801	8253	94%	3931	3814	97%	4870	4439	91%	3931	3539	90%
16	2995	2553	85%	1422	1292	91%	1573	1261	80%	1422	1232	87%
17	315	39	12%	217	21	10%	98	18	18%	217	19	9%
18	72	52	72%	27	22	81%	45	30	67%	27	14	52%
19	5503	5128	93%	3047	2900	95%	2456	2228	91%	3047	2737	90%
20	2272	2152	95%	1558	1458	94%	714	694	97%	1558	1351	87%
21	57	55	96%	57	55	96%	-	-	-	57	54	95%
22	20	17	85%	-	-	-	20	17	85%	-	-	-
23	35	31	89%	35	31	89%	-	-	-	35	27	77%
24	28	22	79%	-	-	-	28	22	79%	-	-	-
25	2470	2308	93%	1093	1019	93%	1377	1289	94%	1093	938	86%
26	154	130	84%	34	28	82%	120	102	85%	34	27	79%
27	274	260	95%	29	25	86%	245	235	96%	29	24	83%
29	1070	1002	94%	572	553	97%	498	449	90%	572	507	89%
30	1146	1062	93%	918	859	94%	228	203	89%	918	809	88%
31	7034	6772	96%	3530	3408	97%	3504	3364	96%	-	-	-
Total	**55748**	**50538**	**91%**	**27847**	**25320**	**91%**	**27901**	**25218**	**90%**	**24317**	**20366**	**84%**

External Site
Internal Site

*Inbound match rates are only shown for the external sites that have traffic inbound to the study area
*For internal sites, the MCC and capture data will relate to EB and WB or NB and SB as opposed to Inbound and Outbound

Intelligent Data Collection Limited

Client: Capita
Project Number: ID03637
Date of Survey: 09.01.2018
Project Name: Llantrisant Repeat

Capture / Matching Overview PM

	Overall Sample Rates			Inbound Sample Rates			Outbound Sample Rates			Inbound Match Rates		
Site	MCC	Captured Plates	Sample Rate	MCC	Captured Plates	Sample Rate	MCC	Captured Plates	Sample Rate	MCC	Matched Plates	Match Rate
01	2258	2089	93%	875	844	96%	1383	1245	90%	875	781	89%
02	3542	2815	79%	1972	1395	71%	1570	1420	90%	1972	1316	67%
03	2720	2488	91%	1138	1007	88%	1582	1481	94%	1138	911	80%
05	408	329	81%	306	237	77%	102	92	90%	306	181	59%
06	1347	1238	92%	818	734	90%	529	504	95%	818	667	82%
08	1713	1131	66%	1338	879	66%	375	252	67%	1338	847	63%
09	3548	3254	92%	1905	1762	92%	1643	1492	91%	1905	1597	84%
10	3563	3443	97%	1720	1679	98%	1843	1764	96%	1720	1595	93%
11	4810	3656	76%	2339	1309	56%	2471	2347	95%	2339	1240	53%
12	851	756	89%	366	324	89%	485	432	89%	366	309	84%
13	2059	1931	94%	618	535	87%	1441	1396	97%	618	477	77%
14	35	31	89%	-	-	-	35	31	89%	-	-	-
15	9386	8918	95%	5862	5554	95%	3524	3364	95%	5862	5304	90%
16	2935	2659	91%	1459	1369	94%	1476	1290	87%	1459	1326	91%
17	218	66	30%	184	64	35%	34	2	6%	184	62	34%
18	79	65	82%	61	54	89%	18	11	61%	61	47	77%
19	6194	5687	92%	2592	2388	92%	3602	3299	92%	2592	2304	89%
20	2864	2666	93%	1197	1095	91%	1667	1571	94%	1197	1017	85%
21	81	79	98%	81	79	98%	-	-	-	81	76	94%
22	124	110	89%	-	-	-	124	110	89%	-	-	-
23	31	25	81%	31	25	81%	-	-	-	31	25	81%
24	31	23	74%	-	-	-	31	23	74%	-	-	-
25	2392	2257	94%	1258	1187	94%	1134	1070	94%	1258	1104	88%
26	137	107	78%	110	95	86%	27	12	44%	110	89	81%
27	220	196	89%	211	188	89%	9	8	89%	211	178	84%
29	1198	1093	91%	638	604	95%	560	489	87%	638	551	86%
30	1519	1364	90%	358	311	87%	1161	1053	91%	358	294	82%
31	8092	7735	96%	4201	4028	96%	3891	3707	95%	-	-	-
Total	**62355**	**56211**	**90%**	**31638**	**27746**	**88%**	**30717**	**28465**	**93%**	**27437**	**22298**	**81%**

External Site
Internal Site

*Inbound match rates are only shown for the external sites that have traffic inbound to the study area
*For internal sites, the MCC and capture data will relate to EB and WB or NB and SB as opposed to Inbound and Outbound

Appendix B – Capacity Assessment Results

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Arcady_Model_DRD_Exact geo.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct1\Network Peak
Report generation date: 01/05/2018 10:57:46

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Base							
A4119 N	1.37	5.66	0.58	A	0.83	4.32	0.45	A
A4233	0.58	4.20	0.37	A	0.40	3.41	0.28	A
A4119 S	1.31	5.24	0.57	A	4.84	13.43	0.83	B

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Base, AM " model duration: 07:45 - 09:15
"D2 - Base, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 10:57:45

File summary

Title	A4119 Corridor Asessment
Location	Llantrisant
Site Number	Junction 1
Date	19/12/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	Daniel.Davies
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	DemandSets	D1 - Base, AM	Time results are shown for central hour only. (Model is run for a 90 minute period.)

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Base, AM	Base	AM		ONE HOUR	07:45	09:15	90	15	✓			✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A4119/A4233 Rbt	Roundabout	1,2,3				5.17	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A4119 N	1	A4119 N	
A4233	2	A4233	
A4119 S	3	A4119 S	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A4119 N	0.00	99999.00		0.00
A4233	0.00	99999.00		0.00
A4119 S	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A4119 N	3.70	7.20	10.00	23.00	70.00	22.00	
A4233	3.70	8.00	14.00	82.00	70.00	38.00	
A4119 S	3.30	9.00	12.00	35.00	70.00	44.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A4119 N		(calculated)	(calculated)	0.510	1676.685
A4233		(calculated)	(calculated)	0.523	1794.565
A4119 S		(calculated)	(calculated)	0.489	1638.706

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
A4119 N	ONE HOUR	✓	798.90	100.000
A4233	ONE HOUR	✓	454.90	100.000
A4119 S	ONE HOUR	✓	824.80	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - A4119/ A4233 Rbt (for whole period)

		To		
		A4119 N	A4233	A4119 S
From	A4119 N	0.000	38.500	760.400
	A4233	80.500	0.000	374.400
	A4119 S	537.300	287.500	0.000

Turning Proportions (PCU) - A4119/ A4233 Rbt (for whole period)

		To		
		A4119 N	A4233	A4119 S
From	A4119 N	0.00	0.05	0.95
	A4233	0.18	0.00	0.82
	A4119 S	0.65	0.35	0.00

Vehicle Mix

Average PCU Per Vehicle - A4119/ A4233 Rbt (for whole period)

		To		
		A4119 N	A4233	A4119 S
From	A4119 N	1.000	1.000	1.000
	A4233	1.000	1.000	1.000
	A4119 S	1.000	1.000	1.000

Heavy Vehicle Percentages - A4119/ A4233 Rbt (for whole period)

		To		
		A4119 N	A4233	A4119 S
From	A4119 N	0.0	0.0	0.0
	A4233	0.0	0.0	0.0
	A4119 S	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
A4119 N	0.58	5.66	1.37	A	798.90	798.90	66.43	4.99	0.74	85.09	4.64
A4233	0.37	4.20	0.58	A	454.90	454.90	29.20	3.85	0.32	38.09	3.65
A4119 S	0.57	5.24	1.31	A	824.80	824.80	64.46	4.69	0.72	83.27	4.40

Main Results for each time segment

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	718.19	179.55	717.23	554.72	258.14	0.00	1545.03	1402.24	0.465	0.62	0.86	4.343	A
A4233	408.95	102.24	408.55	292.70	682.66	0.00	1437.78	1097.02	0.284	0.30	0.40	3.495	A
A4119 S	741.48	185.37	740.56	1018.91	72.30	0.00	1603.33	1543.71	0.462	0.62	0.85	4.168	A

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	879.61	219.90	877.60	678.90	315.91	0.00	1515.56	1402.24	0.580	0.86	1.36	5.624	A
A4233	500.85	125.21	500.12	358.21	835.30	0.00	1358.00	1097.02	0.369	0.40	0.58	4.193	A
A4119 S	908.12	227.03	906.32	1246.92	88.50	0.00	1595.40	1543.71	0.569	0.85	1.30	5.210	A

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	879.61	219.90	879.56	680.19	316.53	0.00	1515.24	1402.24	0.581	1.36	1.37	5.663	A
A4233	500.85	125.21	500.84	358.92	837.18	0.00	1357.02	1097.02	0.369	0.58	0.58	4.204	A
A4119 S	908.12	227.03	908.09	1249.39	88.63	0.00	1595.33	1543.71	0.569	1.30	1.31	5.238	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	718.19	179.55	720.18	556.68	259.08	0.00	1544.55	1402.24	0.465	1.37	0.88	4.377	A
A4233	408.95	102.24	409.68	293.78	685.47	0.00	1436.31	1097.02	0.285	0.58	0.40	3.510	A
A4119 S	741.48	185.37	743.26	1022.65	72.50	0.00	1603.23	1543.71	0.462	1.31	0.87	4.194	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	12.62	0.84	4.343	A	A
A4233	5.84	0.39	3.495	A	A
A4119 S	12.52	0.83	4.168	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	19.74	1.32	5.624	A	A
A4233	8.52	0.57	4.193	A	A
A4119 S	18.94	1.26	5.210	A	A

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	20.54	1.37	5.663	A	A
A4233	8.73	0.58	4.204	A	A
A4119 S	19.64	1.31	5.238	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	13.52	0.90	4.377	A	A
A4233	6.11	0.41	3.510	A	A
A4119 S	13.36	0.89	4.194	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Filename: Jct_2_Rbt_ARCADY_standard geo.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct2\Network Peak
Report generation date: 01/05/2018 10:59:08

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Base Analysis - Base							
A4119 N	13.17	39.50	0.95	E	1.87	7.09	0.65	A
Mill St	0.30	4.21	0.23	A	0.29	3.33	0.22	A
A4119 S	0.94	4.40	0.48	A	7.04	19.88	0.88	C
A4093	2.37	11.05	0.71	B	1.36	9.78	0.58	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Base, AM " model duration: 07:45 - 09:15
"D2 - Base, PM" model duration: 16:15 - 17:45

Run using Junctions 8.0.6.541 at 01/05/2018 10:59:08

File summary

Title	A4119 Corridor Assessment
Location	Talbot Green
Site Number	Jct 2
Date	29/12/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	Daniel.Davies
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Base Analysis - Base, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Base Analysis	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Base, AM	Base	AM		ONE HOUR	07:45	09:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A4119/Mill St/A4093	Roundabout	1,2,3,4				20.58	C

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A4119 N	1	A4119 N	
Mill St	2	Mill St	
A4119 S	3	A4119 S	
A4093	4	A4093	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A4119 N	0.00	99999.00		0.00
Mill St	0.00	99999.00		0.00
A4119 S	0.00	99999.00		0.00
A4093	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A4119 N	3.70	8.00	14.00	32.00	66.00	62.00	
Mill St	4.30	8.70	12.50	84.00	66.00	32.00	
A4119 S	3.80	8.30	12.00	110.00	66.00	40.00	
A4093	3.40	6.90	6.00	114.00	66.00	36.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A4119 N		(calculated)	(calculated)	0.488	1613.340
Mill St		(calculated)	(calculated)	0.579	1988.383
A4119 S		(calculated)	(calculated)	0.539	1780.576
A4093		(calculated)	(calculated)	0.485	1427.446

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
A4119 N	ONE HOUR	✓	1161.00	100.000
Mill St	ONE HOUR	✓	231.00	100.000
A4119 S	ONE HOUR	✓	704.00	100.000
A4093	ONE HOUR	✓	713.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - A4119/ Mill St/ A4093 (for whole period)

		To			
		A4119 N	Mill St	A4119 S	A4093
From	A4119 N	0.000	64.000	913.000	184.000
	Mill St	59.000	0.000	110.000	62.000
	A4119 S	467.000	65.000	0.000	172.000
	A4093	284.000	140.000	289.000	0.000

Turning Proportions (PCU) - A4119/ Mill St/ A4093 (for whole period)

		To			
		A4119 N	Mill St	A4119 S	A4093
From	A4119 N	0.00	0.06	0.79	0.16
	Mill St	0.26	0.00	0.48	0.27
	A4119 S	0.66	0.09	0.00	0.24
	A4093	0.40	0.20	0.41	0.00

Vehicle Mix

Average PCU Per Vehicle - A4119/ Mill St/ A4093 (for whole period)

		To			
		A4119 N	Mill St	A4119 S	A4093
From	A4119 N	1.000	1.000	1.010	1.020
	Mill St	1.000	1.000	1.000	1.000
	A4119 S	1.010	1.000	1.000	1.010
	A4093	1.010	1.010	1.000	1.000

Heavy Vehicle Percentages - A4119/ Mill St/ A4093 (for whole period)

		To			
		A4119 N	Mill St	A4119 S	A4093
From	A4119 N	0.0	0.0	1.0	2.0
	Mill St	0.0	0.0	0.0	0.0
	A4119 S	1.0	0.0	0.0	1.0
	A4093	1.0	1.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
A4119 N	0.95	39.50	13.17	E	1065.35	1598.03	458.73	17.22	5.10	458.78	17.23
Mill St	0.23	4.21	0.30	A	211.97	317.95	18.96	3.58	0.21	18.96	3.58
A4119 S	0.48	4.40	0.94	A	646.00	969.00	61.25	3.79	0.68	61.25	3.79
A4093	0.71	11.05	2.37	B	654.26	981.39	128.41	7.85	1.43	128.42	7.85

Main Results for each time segment

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	874.06	218.52	867.85	607.15	369.83	0.00	1433.03	1319.02	0.610	0.00	1.55	6.373	A
Mill St	173.91	43.48	173.34	201.38	1036.30	0.00	1388.21	1080.15	0.125	0.00	0.14	2.961	A
A4119 S	530.01	132.50	528.12	981.31	228.34	0.00	1657.49	1362.89	0.320	0.00	0.47	3.211	A
A4093	536.78	134.20	533.62	313.09	443.36	0.00	1212.44	794.20	0.443	0.00	0.79	5.311	A

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1043.72	260.93	1038.48	727.04	443.05	0.00	1397.33	1319.02	0.747	1.55	2.86	9.994	A
Mill St	207.66	51.92	207.46	241.16	1240.37	0.00	1270.02	1080.15	0.164	0.14	0.19	3.387	A
A4119 S	632.88	158.22	632.23	1174.58	273.25	0.00	1633.28	1362.89	0.387	0.47	0.63	3.627	A
A4093	640.97	160.24	639.34	374.73	530.75	0.00	1170.06	794.20	0.548	0.79	1.20	6.803	A

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1278.28	319.57	1245.71	889.14	541.09	0.00	1349.54	1319.02	0.947	2.86	11.01	28.765	D
Mill St	254.34	63.58	253.95	293.39	1493.42	0.00	1123.47	1080.15	0.226	0.19	0.29	4.138	A
A4119 S	775.12	193.78	773.91	1416.92	330.45	0.00	1602.44	1362.89	0.484	0.63	0.94	4.378	A
A4093	785.03	196.26	780.54	454.67	649.69	0.00	1112.38	794.20	0.706	1.20	2.32	10.768	B

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1278.28	319.57	1269.63	891.73	543.79	0.00	1348.22	1319.02	0.948	11.01	13.17	39.497	E
Mill St	254.34	63.58	254.32	295.66	1517.76	0.00	1109.37	1080.15	0.229	0.29	0.30	4.210	A
A4119 S	775.12	193.78	775.09	1437.64	334.43	0.00	1600.30	1362.89	0.484	0.94	0.94	4.401	A
A4093	785.03	196.26	784.84	458.84	650.68	0.00	1111.90	794.20	0.706	2.32	2.37	11.054	B

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1043.72	260.93	1083.83	730.85	446.92	0.00	1395.45	1319.02	0.748	13.17	3.14	13.055	B
Mill St	207.66	51.92	208.04	245.03	1285.71	0.00	1243.76	1080.15	0.167	0.30	0.20	3.476	A
A4119 S	632.88	158.22	634.07	1213.01	280.74	0.00	1629.24	1362.89	0.388	0.94	0.65	3.653	A
A4093	640.97	160.24	645.48	382.52	532.29	0.00	1169.31	794.20	0.548	2.37	1.24	6.970	A

Main results: (09:00-09:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	874.06	218.52	880.17	611.00	373.01	0.00	1431.48	1319.02	0.611	3.14	1.61	6.674	A
Mill St	173.91	43.48	174.14	203.26	1049.93	0.00	1380.32	1080.15	0.126	0.20	0.14	2.986	A
A4119 S	530.01	132.50	530.68	993.36	230.71	0.00	1656.21	1362.89	0.320	0.65	0.48	3.228	A
A4093	536.78	134.20	538.51	315.89	445.50	0.00	1211.40	794.20	0.443	1.24	0.81	5.394	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	22.08	1.47	6.373	A	A
Mill St	2.10	0.14	2.961	A	A
A4119 S	6.92	0.46	3.211	A	A
A4093	11.43	0.76	5.311	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	39.95	2.66	9.994	A	A
Mill St	2.88	0.19	3.387	A	A
A4119 S	9.34	0.62	3.627	A	A
A4093	17.34	1.16	6.803	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	126.17	8.41	28.765	D	C
Mill St	4.28	0.29	4.138	A	A
A4119 S	13.70	0.91	4.378	A	A
A4093	32.42	2.16	10.768	B	B

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	183.39	12.23	39.497	E	D
Mill St	4.42	0.29	4.210	A	A
A4119 S	14.11	0.94	4.401	A	A
A4093	35.23	2.35	11.054	B	B

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	61.73	4.12	13.055	B	B
Mill St	3.07	0.20	3.476	A	A
A4119 S	9.88	0.66	3.653	A	A
A4093	19.48	1.30	6.970	A	A

Queueing Delay results: (09:00-09:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	25.42	1.69	6.674	A	A
Mill St	2.20	0.15	2.986	A	A
A4119 S	7.28	0.49	3.228	A	A
A4093	12.51	0.83	5.394	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Filename: Base Junction 3 Arcady_v2.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct3\Network Peak
Report generation date: 01/05/2018 11:00:04

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Base Scenario 1							
A4119 N	2.59	6.70	0.72	A	1.16	5.03	0.54	A
Ely Valley Rd	0.49	5.35	0.32	A	0.13	2.85	0.11	A
A4119 S	0.73	3.22	0.42	A	7.56	16.01	0.89	C
Site Access	0.02	2.81	0.02	A	0.31	7.32	0.24	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Base Scenario 1, AM " model duration: 07:30 - 09:00
"D2 - Base Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:00:04

File summary

Title	(untitled)
Location	Tonyrefail
Site Number	Junction 3
Date	04/01/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Base Scenario 1, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Base Scenario 1, AM	Base Scenario 1	AM		ONE HOUR	07:30	09:00	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				5.38	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A4119 N	1	A4119 N	
Ely Valley Rd	2	Ely Valley Rd	
A4119 S	3	A4119 S	
Site Access	4	Site Access	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A4119 N	0.00	99999.00		0.00
Ely Valley Rd	0.00	99999.00		0.00
A4119 S	0.00	99999.00		0.00
Site Access	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A4119 N	4.05	8.60	14.90	29.00	35.40	19.00	
Ely Valley Rd	4.60	8.90	13.10	45.00	33.20	34.00	
A4119 S	4.60	8.90	12.60	29.00	30.00	32.00	
Site Access	4.20	8.40	12.01	30.00	33.00	32.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A4119 N		(calculated)	(calculated)	0.734	2027.091
Ely Valley Rd		(calculated)	(calculated)	0.731	2056.205
A4119 S		(calculated)	(calculated)	0.729	2033.191
Site Access		(calculated)	(calculated)	0.696	1890.680

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
A4119 N	ONE HOUR	✓	1280.60	100.000
Ely Valley Rd	ONE HOUR	✓	301.40	100.000
A4119 S	ONE HOUR	✓	741.00	100.000
Site Access	ONE HOUR	✓	28.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - (untitled) (for whole period)

		To			
		A4119 N	Ely Valley Rd	A4119 S	Site Access
From	A4119 N	0.000	4.000	1192.700	83.900
	Ely Valley Rd	15.000	0.000	277.400	9.000
	A4119 S	652.500	86.000	0.000	2.500
	Site Access	21.000	0.000	7.000	0.000

Turning Proportions (PCU) - (untitled) (for whole period)

		To			
		A4119 N	Ely Valley Rd	A4119 S	Site Access
From	A4119 N	0.00	0.00	0.93	0.07
	Ely Valley Rd	0.05	0.00	0.92	0.03
	A4119 S	0.88	0.12	0.00	0.00
	Site Access	0.75	0.00	0.25	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To			
		A4119 N	Ely Valley Rd	A4119 S	Site Access
From	A4119 N	1.000	1.000	1.010	1.000
	Ely Valley Rd	1.000	1.000	1.030	1.000
	A4119 S	1.010	1.020	1.000	1.000
	Site Access	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To			
		A4119 N	Ely Valley Rd	A4119 S	Site Access
From	A4119 N	0.0	0.0	1.0	0.0
	Ely Valley Rd	0.0	0.0	3.0	0.0
	A4119 S	1.0	2.0	0.0	0.0
	Site Access	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
A4119 N	0.72	6.70	2.59	A	1175.10	1762.65	146.85	5.00	1.63	146.86	5.00
Ely Valley Rd	0.32	5.35	0.49	A	276.57	414.85	29.56	4.27	0.33	29.56	4.28
A4119 S	0.42	3.22	0.73	A	679.95	1019.93	49.11	2.89	0.55	49.11	2.89
Site Access	0.02	2.81	0.02	A	25.69	38.54	1.69	2.62	0.02	1.69	2.62

Main Results for each time segment

Main results: (07:30-07:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	964.10	241.03	960.29	516.86	69.82	0.00	1975.88	1765.04	0.488	0.00	0.95	3.565	A
Ely Valley Rd	226.91	56.73	226.09	67.56	962.54	0.00	1352.84	671.37	0.168	0.00	0.21	3.282	A
A4119 S	557.86	139.47	556.28	1107.71	80.92	0.00	1974.23	1909.98	0.283	0.00	0.40	2.565	A
Site Access	21.08	5.27	21.02	71.54	565.65	0.00	1496.91	542.31	0.014	0.00	0.01	2.438	A

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1151.23	287.81	1149.41	618.49	83.55	0.00	1965.81	1765.04	0.586	0.95	1.41	4.441	A
Ely Valley Rd	270.95	67.74	270.60	80.85	1152.11	0.00	1214.31	671.37	0.223	0.21	0.29	3.919	A
A4119 S	666.14	166.54	665.66	1325.86	96.85	0.00	1962.62	1909.98	0.339	0.40	0.52	2.807	A
Site Access	25.17	6.29	25.16	85.63	676.88	0.00	1419.48	542.31	0.018	0.01	0.02	2.581	A

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1409.97	352.49	1405.37	757.26	102.29	0.00	1952.06	1765.04	0.722	1.41	2.56	6.591	A
Ely Valley Rd	331.85	82.96	331.08	98.98	1408.68	0.00	1026.82	671.37	0.323	0.29	0.49	5.311	A
A4119 S	815.86	203.96	815.02	1621.32	118.44	0.00	1946.89	1909.98	0.419	0.52	0.72	3.215	A
Site Access	30.83	7.71	30.80	104.71	828.75	0.00	1313.76	542.31	0.023	0.02	0.02	2.805	A

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1409.97	352.49	1409.84	758.04	102.39	0.00	1951.98	1765.04	0.722	2.56	2.59	6.697	A
Ely Valley Rd	331.85	82.96	331.83	99.09	1413.14	0.00	1023.57	671.37	0.324	0.49	0.49	5.347	A
A4119 S	815.86	203.96	815.85	1626.18	118.79	0.00	1946.64	1909.98	0.419	0.72	0.73	3.218	A
Site Access	30.83	7.71	30.83	105.03	829.61	0.00	1313.16	542.31	0.023	0.02	0.02	2.806	A

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1151.23	287.81	1155.83	619.73	83.71	0.00	1965.69	1765.04	0.586	2.59	1.44	4.513	A
Ely Valley Rd	270.95	67.74	271.72	81.02	1158.51	0.00	1209.63	671.37	0.224	0.49	0.30	3.948	A
A4119 S	666.14	166.54	666.96	1332.87	97.36	0.00	1962.25	1909.98	0.339	0.73	0.52	2.813	A
Site Access	25.17	6.29	25.20	86.09	678.24	0.00	1418.54	542.31	0.018	0.02	0.02	2.585	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	964.10	241.03	966.00	518.80	70.08	0.00	1975.69	1765.04	0.488	1.44	0.97	3.607	A
Ely Valley Rd	226.91	56.73	227.27	67.82	968.26	0.00	1348.66	671.37	0.168	0.30	0.21	3.298	A
A4119 S	557.86	139.47	558.35	1114.14	81.39	0.00	1973.89	1909.98	0.283	0.52	0.40	2.573	A
Site Access	21.08	5.27	21.09	71.96	567.78	0.00	1495.43	542.31	0.014	0.02	0.01	2.443	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	13.91	0.93	3.565	A	A
Ely Valley Rd	3.03	0.20	3.282	A	A
A4119 S	5.85	0.39	2.565	A	A
Site Access	0.21	0.01	2.438	A	A

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	20.55	1.37	4.441	A	A
Ely Valley Rd	4.33	0.29	3.919	A	A
A4119 S	7.65	0.51	2.807	A	A
Site Access	0.27	0.02	2.581	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	36.38	2.43	6.591	A	A
Ely Valley Rd	7.11	0.47	5.311	A	A
A4119 S	10.68	0.71	3.215	A	A
Site Access	0.36	0.02	2.805	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	38.68	2.58	6.697	A	A
Ely Valley Rd	7.33	0.49	5.347	A	A
A4119 S	10.90	0.73	3.218	A	A
Site Access	0.36	0.02	2.806	A	A

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	22.44	1.50	4.513	A	A
Ely Valley Rd	4.57	0.30	3.948	A	A
A4119 S	7.96	0.53	2.813	A	A
Site Access	0.27	0.02	2.585	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	14.89	0.99	3.607	A	A
Ely Valley Rd	3.18	0.21	3.298	A	A
A4119 S	6.08	0.41	2.573	A	A
Site Access	0.22	0.01	2.443	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
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Filename: Base Junction 4 Arcady.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct4\Network Peak
Report generation date: 01/05/2018 11:01:46

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Scenario 1							
Site Access	0.02	5.12	0.02	A	0.07	3.63	0.06	A
A4119 E	0.60	2.51	0.38	A	3.29	6.80	0.77	A
A4119 W	9.23	21.93	0.91	C	1.09	4.21	0.52	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Scenario 1, AM " model duration: 07:30 - 09:00
"D2 - Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:01:45

File summary

Title	J4 3-arm roundabout
Location	Junction 4 - Ynysmaerdy
Site Number	
Date	08/01/2018
Version	Non Validated
Status	(new file)
Identifier	093813
Client	RCT
Jobnumber	
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Scenario 1, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Scenario 1, AM	Scenario 1	AM		ONE HOUR	07:30	09:00	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	Site Access	Roundabout	1,2,3				15.07	C

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
Site Access	1	Site Access	
A4119 E	2	A4119 E	
A4119 W	3	A4119 W	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
Site Access	0.00	99999.00		0.00
A4119 E	0.00	99999.00		0.00
A4119 W	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Site Access	3.95	6.10	9.80	43.42	60.00	44.00	
A4119 E	7.60	7.60	0.00	42.42	60.00	36.00	
A4119 W	4.45	7.00	20.00	21.00	60.00	45.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Site Access		(calculated)	(calculated)	0.524	1544.523
A4119 E		(calculated)	(calculated)	0.665	2314.371
A4119 W		(calculated)	(calculated)	0.562	1802.780

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
Site Access	ONE HOUR	✓	11.00	100.000
A4119 E	ONE HOUR	✓	788.00	100.000
A4119 W	ONE HOUR	✓	1459.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.000	10.000	1.000
	A4119 E	66.000	0.000	722.000
	A4119 W	20.000	1439.000	0.000

Turning Proportions (PCU) - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.00	0.91	0.09
	A4119 E	0.08	0.00	0.92
	A4119 W	0.01	0.99	0.00

Vehicle Mix

Average PCU Per Vehicle - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	1.000	1.000	1.000
	A4119 E	1.000	1.000	1.010
	A4119 W	1.000	1.010	1.000

Heavy Vehicle Percentages - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.0	0.0	0.0
	A4119 E	0.0	0.0	1.0
	A4119 W	0.0	1.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
Site Access	0.02	5.12	0.02	A	10.09	15.14	1.11	4.40	0.01	1.11	4.40
A4119 E	0.38	2.51	0.60	A	723.08	1084.62	41.76	2.31	0.46	41.76	2.31
A4119 W	0.91	21.93	9.23	C	1338.80	2008.21	378.45	11.31	4.21	378.50	11.31

Main Results for each time segment

Main results: (07:30-07:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	8.28	2.07	8.25	64.54	1076.98	0.00	979.87	667.63	0.008	0.00	0.01	3.704	A
A4119 E	593.25	148.31	591.86	1084.48	0.75	0.00	2313.87	2274.02	0.256	0.00	0.35	2.107	A
A4119 W	1098.41	274.60	1091.95	543.04	49.57	0.00	1774.93	1695.78	0.619	0.00	1.61	5.274	A

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	9.89	2.47	9.88	77.21	1288.95	0.00	868.74	667.63	0.011	0.01	0.01	4.191	A
A4119 E	708.40	177.10	708.01	1297.92	0.90	0.00	2313.77	2274.02	0.306	0.35	0.44	2.262	A
A4119 W	1311.61	327.90	1306.86	649.61	59.30	0.00	1769.46	1695.78	0.741	1.61	2.80	7.777	A

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	12.11	3.03	12.09	94.33	1562.11	0.00	725.53	667.63	0.017	0.01	0.02	5.045	A
A4119 E	867.60	216.90	866.97	1573.10	1.10	0.00	2313.64	2274.02	0.375	0.44	0.60	2.509	A
A4119 W	1606.39	401.60	1583.82	795.45	72.61	0.00	1761.98	1695.78	0.912	2.80	8.44	18.431	C

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	12.11	3.03	12.11	94.64	1581.26	0.00	715.48	667.63	0.017	0.02	0.02	5.117	A
A4119 E	867.60	216.90	867.60	1592.27	1.10	0.00	2313.64	2274.02	0.375	0.60	0.60	2.511	A
A4119 W	1606.39	401.60	1603.24	796.03	72.67	0.00	1761.96	1695.78	0.912	8.44	9.23	21.928	C

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	9.89	2.47	9.91	77.71	1318.26	0.00	853.37	667.63	0.012	0.02	0.01	4.269	A
A4119 E	708.40	177.10	709.02	1327.27	0.90	0.00	2313.77	2274.02	0.306	0.60	0.45	2.264	A
A4119 W	1311.61	327.90	1336.58	650.54	59.39	0.00	1769.42	1695.78	0.741	9.23	2.99	8.853	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	8.28	2.07	8.29	64.85	1088.59	0.00	973.79	667.63	0.009	0.01	0.01	3.730	A
A4119 E	593.25	148.31	593.64	1096.13	0.75	0.00	2313.87	2274.02	0.256	0.45	0.35	2.112	A
A4119 W	1098.41	274.60	1103.72	544.67	49.72	0.00	1774.85	1695.78	0.619	2.99	1.66	5.458	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.12	0.01	3.704	A	A
A4119 E	5.13	0.34	2.107	A	A
A4119 W	23.10	1.54	5.274	A	A

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.17	0.01	4.191	A	A
A4119 E	6.58	0.44	2.262	A	A
A4119 W	39.59	2.64	7.777	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.25	0.02	5.045	A	A
A4119 E	8.92	0.59	2.509	A	A
A4119 W	104.88	6.99	18.431	C	B

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.26	0.02	5.117	A	A
A4119 E	9.05	0.60	2.511	A	A
A4119 W	133.59	8.91	21.928	C	C

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.18	0.01	4.269	A	A
A4119 E	6.79	0.45	2.264	A	A
A4119 W	51.23	3.42	8.853	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.13	0.01	3.730	A	A
A4119 E	5.29	0.35	2.112	A	A
A4119 W	26.05	1.74	5.458	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Base Junction 4 Arcady_v2 val.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct4\Network Peak
Report generation date: 01/05/2018 11:02:39

Summary of junction performance

	AM			
	Queue (PCU)	Delay (s)	RFC	LOS
	A1 [Entry Lane Simulation] - Scenario 1			
Site Access	0.01	2.07	N/A	A
A4119 E	0.55	2.17	N/A	A
A4119 W	9.05	19.83	N/A	C

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Scenario 1, AM " model duration: 07:30 - 09:00
"D2 - Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:02:39

File summary

Title	J4 3-arm roundabout
Location	Junction 4 - Ynysmaerdy
Site Number	
Date	08/01/2018
Version	Validated
Status	(new file)
Identifier	093813
Client	RCT
Jobnumber	
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	117360401	2560

(Default Analysis Set) - Scenario 1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	Entry Lane Simulation		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Scenario 1, AM	Scenario 1	AM		ONE HOUR	07:30	09:00	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	Site Access	Roundabout	1,2,3			13.59	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
Site Access	1	Site Access	
A4119 E	2	A4119 E	
A4119 W	3	A4119 W	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
Site Access	0.00	99999.00
A4119 E	0.00	99999.00
A4119 W	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Site Access	3.95	6.10	9.80	43.42	60.00	44.00	
A4119 E	7.60	7.60	0.00	42.42	60.00	36.00	
A4119 W	4.45	7.00	20.00	21.00	60.00	45.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Site Access		(calculated)	(calculated)	0.524	1544.523
A4119 E		(calculated)	(calculated)	0.665	2314.371
A4119 W		(calculated)	(calculated)	0.562	1802.780

The slope and intercept shown above include any corrections and adjustments.

Entry Lane Analysis: Arm options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Site Access	Evenly split	10.00
A4119 E	Evenly split	40.00
A4119 W	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCU)	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
Site Access	**1**	1		Infinity	0.00	99999.00
A4119 E	**1**	1	✓	3.00	0.00	99999.00
A4119 E	**1**	2	✓	3.00	0.00	99999.00
A4119 E	**2**	1		Infinity		
A4119 W	**1**	1		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Site Access	(calculated)	(calculated)	0.524	1544.523
A4119 E	(calculated)	(calculated)	0.332	1157.186
A4119 E	(calculated)	(calculated)	0.332	1157.186
A4119 W	(calculated)	(calculated)	0.562	1802.780

Lane Movements

Junction	Arm	Lane Level	Lane	Arm		
				Site Access	A4119 E	A4119 W
Site Access	Site Access	1	1	✓	✓	✓
Site Access	A4119 E	1	1			✓
Site Access	A4119 E	1	2	✓	✓	
Site Access	A4119 E	2	1	✓	✓	✓
Site Access	A4119 W	1	1	✓	✓	✓

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
Site Access	ONE HOUR	✓	11.00	100.000
A4119 E	ONE HOUR	✓	788.00	100.000
A4119 W	ONE HOUR	✓	1459.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.000	10.000	1.000
	A4119 E	66.000	0.000	722.000
	A4119 W	20.000	1439.000	0.000

Turning Proportions (PCU) - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.00	0.91	0.09
	A4119 E	0.08	0.00	0.92
	A4119 W	0.01	0.99	0.00

Vehicle Mix

Average PCU Per Vehicle - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	1.000	1.000	1.000
	A4119 E	1.000	1.000	1.010
	A4119 W	1.000	1.010	1.000

Heavy Vehicle Percentages - Site Access (for whole period)

		To		
		Site Access	A4119 E	A4119 W
From	Site Access	0.0	0.0	0.0
	A4119 E	0.0	0.0	1.0
	A4119 W	0.0	1.0	0.0

Results

Results Summary for whole modelled period

Name	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)
Site Access	2.07	0.01	A	10.41	15.61	0.35	1.36	0.00
A4119 E	2.17	0.55	A	721.34	1082.02	32.30	1.79	0.36
A4119 W	19.83	9.05	C	1338.94	2008.41	332.79	9.94	3.70

Main Results for each time segment

Main results: (07:30-07:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	8.11	2.03	8.14	65.65	1087.69	0.00	0.00	0.740	A
A4119 E	584.62	146.15	584.55	1095.01	0.82	0.00	0.22	1.347	A
A4119 W	1094.87	273.72	1102.86	534.77	50.48	0.00	0.79	2.763	A

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	10.29	2.57	10.34	77.87	1284.41	0.00	0.00	1.216	A
A4119 E	706.52	176.63	706.59	1293.90	0.84	0.00	0.32	1.620	A
A4119 W	1309.78	327.44	1302.49	647.22	59.79	0.00	1.92	5.153	A

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	12.52	3.13	12.52	94.72	1573.39	0.00	0.00	1.853	A
A4119 E	869.99	217.50	870.48	1584.95	0.96	0.32	0.55	2.174	A
A4119 W	1602.79	400.70	1596.01	798.64	72.10	1.92	8.42	15.860	C

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	12.40	3.10	12.22	92.68	1592.03	0.00	0.01	2.072	A
A4119 E	868.25	217.06	868.23	1603.38	0.87	0.55	0.54	2.170	A
A4119 W	1613.11	403.28	1613.51	797.54	71.21	8.42	9.05	19.831	C

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	9.75	2.44	9.85	77.47	1286.71	0.01	0.00	1.262	A
A4119 E	706.68	176.67	706.42	1295.71	0.84	0.54	0.34	1.637	A
A4119 W	1311.70	327.92	1305.60	648.00	58.57	9.05	1.95	7.156	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	9.36	2.34	9.36	65.39	1082.39	0.00	0.00	0.843	A
A4119 E	592.00	148.00	591.96	1090.88	0.87	0.34	0.22	1.324	A
A4119 W	1101.38	275.35	1098.57	544.48	49.21	1.95	0.89	2.940	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.03	0.00	0.740	A	A
A4119 E	3.37	0.22	1.347	A	A
A4119 W	12.65	0.84	2.763	A	A

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.05	0.00	1.216	A	A
A4119 E	4.83	0.32	1.620	A	A
A4119 W	28.17	1.88	5.153	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.09	0.01	1.853	A	A
A4119 E	7.92	0.53	2.174	A	A
A4119 W	104.16	6.94	15.860	C	B

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.10	0.01	2.072	A	A
A4119 E	7.93	0.53	2.170	A	A
A4119 W	132.25	8.82	19.831	C	B

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.05	0.00	1.262	A	A
A4119 E	4.88	0.33	1.637	A	A
A4119 W	41.73	2.78	7.156	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	0.03	0.00	0.843	A	A
A4119 E	3.36	0.22	1.324	A	A
A4119 W	13.83	0.92	2.940	A	A

Lane Results

Lanes: Main Results for each time segment

Main results: (07:30-07:45)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	8.11	2.03	8.14	974.26	0.008	0.00	0.00	0.740	A
A4119 E	1	1	397.12	99.28	396.91	1156.91	0.343	0.00	0.18	1.551	A
A4119 E	1	2	187.43	46.86	187.53	1156.91	0.162	0.00	0.04	0.761	A
A4119 E	2	1	584.62	146.15	584.55			0.00	0.01	0.048	A
A4119 W	1	1	1094.87	273.72	1102.86	1774.42	0.617	0.00	0.79	2.763	A

Main results: (07:45-08:00)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	10.29	2.57	10.34	871.12	0.012	0.00	0.00	1.216	A
A4119 E	1	1	476.11	119.03	475.69	1156.91	0.412	0.18	0.25	1.848	A
A4119 E	1	2	230.48	57.62	230.48	1156.91	0.199	0.04	0.06	0.872	A
A4119 E	2	1	706.52	176.63	706.59			0.01	0.02	0.092	A
A4119 W	1	1	1309.78	327.44	1302.49	1769.19	0.740	0.79	1.92	5.153	A

Main results: (08:00-08:15)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	12.52	3.13	12.52	719.61	0.017	0.00	0.00	1.853	A
A4119 E	1	1	575.29	143.82	574.94	1156.87	0.497	0.25	0.40	2.406	A
A4119 E	1	2	295.19	73.80	294.84	1156.87	0.255	0.06	0.09	1.063	A
A4119 E	2	1	869.99	217.50	870.48			0.02	0.06	0.221	A
A4119 W	1	1	1602.79	400.70	1596.01	1762.27	0.910	1.92	8.42	15.860	C

Main results: (08:15-08:30)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	12.40	3.10	12.22	709.84	0.017	0.00	0.01	2.072	A
A4119 E	1	1	579.13	144.78	578.94	1156.90	0.501	0.40	0.40	2.408	A
A4119 E	1	2	289.10	72.27	288.93	1156.90	0.250	0.09	0.09	1.066	A
A4119 E	2	1	868.25	217.06	868.23			0.06	0.05	0.215	A
A4119 W	1	1	1613.11	403.28	1613.51	1762.78	0.915	8.42	9.05	19.831	C

Main results: (08:30-08:45)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	9.75	2.44	9.85	869.92	0.011	0.01	0.00	1.262	A
A4119 E	1	1	476.67	119.17	475.92	1156.91	0.412	0.40	0.26	1.864	A
A4119 E	1	2	229.75	57.44	229.80	1156.91	0.199	0.09	0.06	0.884	A
A4119 E	2	1	706.68	176.67	706.42			0.05	0.02	0.095	A
A4119 W	1	1	1311.70	327.92	1305.60	1769.88	0.741	9.05	1.95	7.156	A

Main results: (08:45-09:00)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Site Access	1	1	9.36	2.34	9.36	977.04	0.010	0.00	0.00	0.843	A
A4119 E	1	1	403.28	100.82	404.06	1156.90	0.349	0.26	0.18	1.524	A
A4119 E	1	2	188.68	47.17	188.77	1156.90	0.163	0.06	0.04	0.751	A
A4119 E	2	1	592.00	148.00	591.96			0.02	0.01	0.048	A
A4119 W	1	1	1101.38	275.35	1098.57	1775.13	0.620	1.95	0.89	2.940	A

Lanes: Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	1	1	0.03	0.00	0.740	A	A
A4119 E	1	1	2.64	0.18	1.551	A	A
A4119 E	1	2	0.61	0.04	0.761	A	A
A4119 E	2	1	0.12	0.01	0.048	A	A
A4119 W	1	1	12.65	0.84	2.763	A	A

Queueing Delay results: (07:45-08:00)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	1	1	0.05	0.00	1.216	A	A
A4119 E	1	1	3.71	0.25	1.848	A	A
A4119 E	1	2	0.85	0.06	0.872	A	A
A4119 E	2	1	0.28	0.02	0.092	A	A
A4119 W	1	1	28.17	1.88	5.153	A	A

Queueing Delay results: (08:00-08:15)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	1	1	0.09	0.01	1.853	A	A
A4119 E	1	1	5.81	0.39	2.406	A	A
A4119 E	1	2	1.31	0.09	1.063	A	A
A4119 E	2	1	0.81	0.05	0.221	A	A
A4119 W	1	1	104.16	6.94	15.860	C	B

Queueing Delay results: (08:15-08:30)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	1	1	0.10	0.01	2.072	A	A
A4119 E	1	1	5.83	0.39	2.408	A	A
A4119 E	1	2	1.32	0.09	1.066	A	A
A4119 E	2	1	0.79	0.05	0.215	A	A
A4119 W	1	1	132.25	8.82	19.831	C	B

Queueing Delay results: (08:30-08:45)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	1	1	0.05	0.00	1.262	A	A
A4119 E	1	1	3.73	0.25	1.864	A	A
A4119 E	1	2	0.86	0.06	0.884	A	A
A4119 E	2	1	0.28	0.02	0.095	A	A
A4119 W	1	1	41.73	2.78	7.156	A	A

Queueing Delay results: (08:45-09:00)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Site Access	**1**	**1**	0.03	0.00	0.843	A	A
A4119 E	**1**	**1**	2.63	0.18	1.524	A	A
A4119 E	**1**	**2**	0.61	0.04	0.751	A	A
A4119 E	**2**	**1**	0.12	0.01	0.048	A	A
A4119 W	**1**	**1**	13.83	0.92	2.940	A	A

Main results: (07:45-08:00)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	11.15	2.79	11.06	934.04	0.012	0.00	0.00	1.007	A
Heol-Y-Sarn	1	1	253.70	63.43	253.26	706.28	0.359	0.19	0.31	4.461	A
Heol-Y-Sarn	1	2	126.83	31.71	128.55	706.28	0.180	0.07	0.09	2.771	A
Heol-Y-Sarn	1	3	6.21	1.55	6.21	706.28	0.009	0.00	0.00	1.688	A
Heol-Y-Sarn	2	1	386.39	96.60	386.74			0.01	0.03	0.283	A
A4119 S	1	2	427.53	106.88	428.06	904.87	0.472	0.20	0.38	2.968	A
A4119 S	1	3	557.40	139.35	563.04	904.87	0.616	0.40	0.63	4.310	A
A4119 S	2	1	984.63	246.16	984.93			0.04	0.15	0.526	A
Site Access	1	1	90.31	22.58	90.93	904.42	0.100	0.02	0.04	1.338	A
A4119 W	1	1	952.20	238.05	951.98	967.42	0.984	1.97	2.84	10.285	B
A4119 W	1	2	267.31	66.83	267.27	967.42	0.276	0.16	0.20	2.599	A
A4119 W	2	2	1290.84	322.71	1219.52			4.42	28.25	53.929	F

Main results: (08:00-08:15)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	14.76	3.69	14.71	909.12	0.016	0.00	0.01	1.142	A
Heol-Y-Sarn	1	1	305.37	76.34	306.56	708.32	0.431	0.31	0.46	5.343	A
Heol-Y-Sarn	1	2	157.67	39.42	158.02	708.32	0.223	0.09	0.13	3.103	A
Heol-Y-Sarn	1	3	7.89	1.97	7.80	708.32	0.011	0.00	0.00	1.540	A
Heol-Y-Sarn	2	1	470.88	117.72	470.93			0.03	0.09	0.598	A
A4119 S	1	2	541.50	135.37	544.36	894.15	0.606	0.38	0.62	4.319	A
A4119 S	1	3	672.42	168.11	671.50	894.15	0.752	0.63	1.15	6.139	A
A4119 S	2	1	1216.34	304.09	1213.92			0.15	0.70	2.050	A
Site Access	1	1	111.41	27.85	111.41	814.99	0.137	0.04	0.07	2.051	A
A4119 W	1	1	935.99	234.00	935.46	945.99	0.989	2.84	2.98	11.332	B
A4119 W	1	2	258.24	64.56	258.94	945.99	0.273	0.20	0.20	2.846	A
A4119 W	2	2	1607.89	401.97	1194.23			28.25	125.11	231.745	F

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Base Junction 5 Arcady_v2.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct5\Network Peak
Report generation date: 01/05/2018 11:04:08

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Scenario 1							
Sterling Drive	0.02	5.03	0.02	A	0.06	3.86	0.05	A
Heol-Y-Sarn	0.34	2.58	0.25	A	0.35	2.20	0.25	A
A4119 S	2.20	6.66	0.69	A	18.22	38.16	0.97	E
Site Access	0.16	5.17	0.13	A	0.98	13.43	0.50	B
A4119 W	5.20	12.12	0.84	B	1.10	4.01	0.52	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Scenario 1, AM " model duration: 07:30 - 09:00
"D2 - Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:04:08

File summary

Title	(untitled)
Location	Ynysmaerdy
Site Number	Junction 5
Date	08/01/2018
Version	Non Validated
Status	(new file)
Identifier	
Client	RCT
Jobnumber	093813
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Scenario 1, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Scenario 1, AM	Scenario 1	AM		ONE HOUR	07:30	09:00	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4,5				8.60	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
Sterling Drive	1	Sterling Drive	
Heol-Y-Sarn	2	Heol-Y-Sarn	
A4119 S	3	A4119 S	
Site Access	4	Site Access	
A4119 W	5	A4119 W	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
Sterling Drive	0.00	99999.00		0.00
Heol-Y-Sarn	0.00	99999.00		0.00
A4119 S	0.00	99999.00		0.00
Site Access	0.00	99999.00		0.00
A4119 W	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Sterling Drive	3.70	7.40	10.00	24.00	90.00	29.00	
Heol-Y-Sarn	7.30	10.50	24.00	23.00	90.00	42.00	
A4119 S	7.50	7.50	0.00	24.00	90.00	62.00	
Site Access	2.70	5.80	15.00	15.00	90.00	41.00	
A4119 W	7.00	8.00	2.00	25.00	90.00	45.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Sterling Drive		(calculated)	(calculated)	0.452	1653.416
Heol-Y-Sarn		(calculated)	(calculated)	0.603	2789.566
A4119 S		(calculated)	(calculated)	0.482	2038.682
Site Access		(calculated)	(calculated)	0.389	1308.131
A4119 W		(calculated)	(calculated)	0.510	2142.958

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
Sterling Drive	ONE HOUR	✓	13.00	100.000
Heol-Y-Sarn	ONE HOUR	✓	427.00	100.000
A4119 S	ONE HOUR	✓	1094.00	100.000
Site Access	ONE HOUR	✓	99.00	100.000
A4119 W	ONE HOUR	✓	1447.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	0.000	4.000	6.000	0.000	3.000
	Heol-Y-Sarn	7.000	0.000	158.000	120.000	142.000
	A4119 S	24.000	369.000	0.000	103.000	598.000
	Site Access	0.000	11.000	38.000	0.000	50.000
	A4119 W	9.000	170.000	1000.000	268.000	0.000

Turning Proportions (PCU) - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	0.00	0.31	0.46	0.00	0.23
	Heol-Y-Sarn	0.02	0.00	0.37	0.28	0.33
	A4119 S	0.02	0.34	0.00	0.09	0.55
	Site Access	0.00	0.11	0.38	0.00	0.51
	A4119 W	0.01	0.12	0.69	0.19	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	1.000	1.000	1.000	1.000	1.000
	Heol-Y-Sarn	1.000	1.000	1.090	1.000	1.010
	A4119 S	1.000	1.010	1.000	1.050	1.010
	Site Access	1.000	1.000	1.000	1.000	1.040
	A4119 W	1.000	1.010	1.010	1.020	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	0.0	0.0	0.0	0.0	0.0
	Heol-Y-Sarn	0.0	0.0	9.0	0.0	1.0
	A4119 S	0.0	1.0	0.0	5.0	1.0
	Site Access	0.0	0.0	0.0	0.0	4.0
	A4119 W	0.0	1.0	1.0	2.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
Sterling Drive	0.02	5.03	0.02	A	11.93	17.89	1.27	4.28	0.01	1.27	4.28
Heol-Y-Sarn	0.25	2.58	0.34	A	391.82	587.73	22.35	2.28	0.25	22.35	2.28
A4119 S	0.69	6.66	2.20	A	1003.87	1505.81	125.03	4.98	1.39	125.04	4.98
Site Access	0.13	5.17	0.16	A	90.84	136.27	10.48	4.61	0.12	10.48	4.61
A4119 W	0.84	12.12	5.20	B	1327.79	1991.69	244.46	7.36	2.72	244.49	7.37

Main Results for each time segment

Main results: (07:30-07:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	9.79	2.45	9.75	30.00	1391.11	0.00	1024.49	537.25	0.010	0.00	0.01	3.546	A
Heol-Y-Sarn	321.47	80.37	320.76	415.35	985.51	0.00	2195.07	1514.85	0.146	0.00	0.18	1.988	A
A4119 S	823.62	205.91	820.37	901.10	405.17	0.00	1843.33	1363.79	0.447	0.00	0.81	3.554	A
Site Access	74.53	18.63	74.20	368.23	857.31	0.00	974.73	573.92	0.076	0.00	0.08	4.076	A
A4119 W	1089.38	272.34	1084.43	594.82	336.68	0.00	1971.26	1735.58	0.553	0.00	1.24	4.084	A

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	11.69	2.92	11.67	35.90	1664.78	0.00	900.77	537.25	0.013	0.01	0.01	4.048	A
Heol-Y-Sarn	383.86	95.97	383.64	497.12	1179.33	0.00	2078.15	1514.85	0.185	0.18	0.23	2.198	A
A4119 S	983.48	245.87	981.93	1078.25	484.72	0.00	1804.98	1363.79	0.545	0.81	1.20	4.425	A
Site Access	89.00	22.25	88.89	440.60	1026.05	0.00	909.11	573.92	0.098	0.08	0.11	4.476	A
A4119 W	1300.82	325.21	1297.65	711.91	403.03	0.00	1937.42	1735.58	0.671	1.24	2.03	5.665	A

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	14.31	3.58	14.29	43.87	2030.25	0.00	735.54	537.25	0.019	0.01	0.02	4.991	A
Heol-Y-Sarn	470.14	117.53	469.74	607.22	1437.32	0.00	1922.52	1514.85	0.245	0.23	0.33	2.565	A
A4119 S	1204.52	301.13	1200.62	1314.97	592.09	0.00	1753.21	1363.79	0.687	1.20	2.18	6.550	A
Site Access	109.00	27.25	108.82	537.92	1254.79	0.00	820.16	573.92	0.133	0.11	0.16	5.159	A
A4119 W	1593.18	398.29	1581.27	870.75	492.86	0.00	1891.61	1735.58	0.842	2.03	5.01	11.322	B

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	14.31	3.58	14.31	44.03	2042.70	0.00	729.91	537.25	0.020	0.02	0.02	5.030	A
Heol-Y-Sarn	470.14	117.53	470.13	609.84	1447.17	0.00	1916.57	1514.85	0.245	0.33	0.34	2.575	A
A4119 S	1204.52	301.13	1204.41	1322.90	594.41	0.00	1752.09	1363.79	0.687	2.18	2.20	6.659	A
Site Access	109.00	27.25	109.00	540.45	1258.36	0.00	818.77	573.92	0.133	0.16	0.16	5.172	A
A4119 W	1593.18	398.29	1592.42	873.05	494.32	0.00	1890.87	1735.58	0.843	5.01	5.20	12.122	B

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	11.69	2.92	11.71	36.13	1682.18	0.00	892.90	537.25	0.013	0.02	0.01	4.085	A
Heol-Y-Sarn	383.86	95.97	384.26	500.83	1193.06	0.00	2069.86	1514.85	0.185	0.34	0.24	2.210	A
A4119 S	983.48	245.87	987.38	1089.33	487.99	0.00	1803.40	1363.79	0.545	2.20	1.23	4.491	A
Site Access	89.00	22.25	89.18	444.16	1031.21	0.00	907.10	573.92	0.098	0.16	0.11	4.490	A
A4119 W	1300.82	325.21	1313.17	715.25	405.14	0.00	1936.35	1735.58	0.672	5.20	2.11	5.955	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	9.79	2.45	9.80	30.17	1401.26	0.00	1019.91	537.25	0.010	0.01	0.01	3.563	A
Heol-Y-Sarn	321.47	80.37	321.70	418.04	993.02	0.00	2190.54	1514.85	0.147	0.24	0.18	1.993	A
A4119 S	823.62	205.91	825.23	907.40	407.32	0.00	1842.29	1363.79	0.447	1.23	0.83	3.594	A
Site Access	74.53	18.63	74.64	370.49	862.06	0.00	972.89	573.92	0.077	0.11	0.09	4.087	A
A4119 W	1089.38	272.34	1092.76	598.03	338.67	0.00	1970.24	1735.58	0.553	2.11	1.26	4.166	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.14	0.01	3.546	A	A
Heol-Y-Sarn	2.62	0.17	1.988	A	A
A4119 S	11.86	0.79	3.554	A	A
Site Access	1.23	0.08	4.076	A	A
A4119 W	17.92	1.19	4.084	A	A

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.19	0.01	4.048	A	A
Heol-Y-Sarn	3.47	0.23	2.198	A	A
A4119 S	17.52	1.17	4.425	A	A
Site Access	1.63	0.11	4.476	A	A
A4119 W	29.19	1.95	5.665	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.29	0.02	4.991	A	A
Heol-Y-Sarn	4.94	0.33	2.565	A	A
A4119 S	31.04	2.07	6.550	A	A
Site Access	2.29	0.15	5.159	A	A
A4119 W	67.20	4.48	11.322	B	B

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.30	0.02	5.030	A	A
Heol-Y-Sarn	5.02	0.33	2.575	A	A
A4119 S	32.88	2.19	6.659	A	A
Site Access	2.34	0.16	5.172	A	A
A4119 W	76.83	5.12	12.122	B	B

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.20	0.01	4.085	A	A
Heol-Y-Sarn	3.59	0.24	2.210	A	A
A4119 S	19.06	1.27	4.491	A	A
Site Access	1.70	0.11	4.490	A	A
A4119 W	33.76	2.25	5.955	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.15	0.01	3.563	A	A
Heol-Y-Sarn	2.70	0.18	1.993	A	A
A4119 S	12.66	0.84	3.594	A	A
Site Access	1.30	0.09	4.087	A	A
A4119 W	19.56	1.30	4.166	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Base Junction 5 Arcady_v2_val.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct5\Network Peak
Report generation date: 01/05/2018 11:05:29

Summary of junction performance

There are warnings associated with this model run - see the 'Data Errors and Warnings' tables.

	AM			
	Queue (PCU)	Delay (s)	RFC	LOS
	A1 [Entry Lane Simulation] - Scenario 1			
Sterling Drive	0.01	1.14	N/A	A
Heol-Y-Sarn	0.68	5.12	N/A	A
A4119 S	2.51	7.39	N/A	A
Site Access	0.07	2.05	N/A	A
A4119 W	244.04	679.90	N/A	F

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Scenario 1, AM " model duration: 07:30 - 09:00
"D2 - Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:05:28

File summary

Title	(untitled)
Location	Ynysmaerdy
Site Number	Junction 5
Date	08/01/2018
Version	Validated
Status	(new file)
Identifier	
Client	RCT
Jobnumber	093813
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	558933144	1363

(Default Analysis Set) - Scenario 1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Entry Lane Analysis	A4119 W - Entry Lane Analysis	Arm 5: Queue at end of modelled period is greater than 10 PCU. Delay for these vehicles has NOT been included in calculations. You may want to increase the modelled period to take account of these vehicles.

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	Entry Lane Simulation		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Scenario 1, AM	Scenario 1	AM		ONE HOUR	07:30	09:00	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4,5			322.70	F

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
Sterling Drive	1	Sterling Drive	
Heol-Y-Sarn	2	Heol-Y-Sarn	
A4119 S	3	A4119 S	
Site Access	4	Site Access	
A4119 W	5	A4119 W	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
Sterling Drive	0.00	99999.00
Heol-Y-Sarn	0.00	99999.00
A4119 S	0.00	99999.00
Site Access	0.00	99999.00
A4119 W	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Sterling Drive	3.70	7.40	10.00	24.00	90.00	29.00	
Heol-Y-Sarn	7.30	10.50	24.00	23.00	90.00	42.00	
A4119 S	7.50	7.50	0.00	24.00	90.00	62.00	
Site Access	2.70	5.80	15.00	15.00	90.00	41.00	
A4119 W	7.00	8.00	2.00	25.00	90.00	45.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Sterling Drive		(calculated)	(calculated)	0.452	1653.416
Heol-Y-Sarn		(calculated)	(calculated)	0.603	2789.566
A4119 S		(calculated)	(calculated)	0.482	2038.682
Site Access		(calculated)	(calculated)	0.389	1308.131
A4119 W		(calculated)	(calculated)	0.510	2142.958

The slope and intercept shown above include any corrections and adjustments.

Entry Lane Analysis: Arm options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Sterling Drive	Evenly split	10.00
Heol-Y-Sarn	Evenly split	10.00
A4119 S	Evenly split	70.00
Site Access	Evenly split	10.00
A4119 W	Evenly split	5.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCU)	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
Sterling Drive	**1**	1		Infinity	0.00	99999.00
Heol-Y-Sarn	**1**	1	✓	3.00	0.00	99999.00
Heol-Y-Sarn	**1**	2	✓	3.00	0.00	99999.00
Heol-Y-Sarn	**1**	3	✓	3.00	0.00	99999.00
Heol-Y-Sarn	**2**	1		Infinity		
A4119 S	**1**	2	✓	3.00	0.00	99999.00
A4119 S	**1**	3	✓	3.00	0.00	99999.00
A4119 S	**2**	1		Infinity		
Site Access	**1**	1		Infinity	0.00	99999.00
A4119 W	**1**	1	✓	3.00	0.00	99999.00
A4119 W	**1**	2	✓	3.00	0.00	99999.00
A4119 W	**2**	2		Infinity		

Entry Lane slope and intercept

Name	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Sterling Drive	(calculated)	(calculated)	0.452	1653.416
Heol-Y-Sarn	(calculated)	(calculated)	0.201	929.855
Heol-Y-Sarn	(calculated)	(calculated)	0.201	929.855
Heol-Y-Sarn	(calculated)	(calculated)	0.201	929.855
A4119 S	(calculated)	(calculated)	0.241	1019.341
A4119 S	(calculated)	(calculated)	0.241	1019.341
Site Access	(calculated)	(calculated)	0.389	1308.131
A4119 W	(calculated)	(calculated)	0.255	1071.479
A4119 W	(calculated)	(calculated)	0.255	1071.479

Lane Movements

Junction	Arm	Lane Level	Lane	Arm				
				Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
(untitled)	**Sterling Drive**	**1**	**1**	✓	✓	✓	✓	✓
(untitled)	**Heol-Y-Sarn**	**1**	**1**			✓	✓	
(untitled)	**Heol-Y-Sarn**	**1**	**2**					✓
(untitled)	**Heol-Y-Sarn**	**1**	**3**	✓	✓			
(untitled)	**Heol-Y-Sarn**	**2**	**1**	✓	✓	✓	✓	✓
(untitled)	**A4119 S**	**1**	**2**				✓	✓
(untitled)	**A4119 S**	**1**	**3**	✓	✓	✓		✓
(untitled)	**A4119 S**	**2**	**1**	✓	✓	✓	✓	✓
(untitled)	**Site Access**	**1**	**1**	✓	✓	✓	✓	✓
(untitled)	**A4119 W**	**1**	**1**	✓	✓	✓		
(untitled)	**A4119 W**	**1**	**2**				✓	✓
(untitled)	**A4119 W**	**2**	**2**	✓	✓	✓	✓	✓

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
Sterling Drive	ONE HOUR	✓	13.00	100.000
Heol-Y-Sarn	ONE HOUR	✓	427.00	100.000
A4119 S	ONE HOUR	✓	1094.00	100.000
Site Access	ONE HOUR	✓	99.00	100.000
A4119 W	ONE HOUR	✓	1447.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - (untitled) (for whole period)

		To				
		Sterling Drive	**Heol-Y-Sarn**	**A4119 S**	**Site Access**	**A4119 W**
From	**Sterling Drive**	0.000	4.000	6.000	0.000	3.000
	Heol-Y-Sarn	7.000	0.000	158.000	120.000	142.000
	A4119 S	24.000	369.000	0.000	103.000	598.000
	Site Access	0.000	11.000	38.000	0.000	50.000
	A4119 W	9.000	170.000	1000.000	268.000	0.000

Turning Proportions (PCU) - (untitled) (for whole period)

		To				
		Sterling Drive	**Heol-Y-Sarn**	**A4119 S**	**Site Access**	**A4119 W**
From	**Sterling Drive**	0.00	0.31	0.46	0.00	0.23
	Heol-Y-Sarn	0.02	0.00	0.37	0.28	0.33
	A4119 S	0.02	0.34	0.00	0.09	0.55
	Site Access	0.00	0.11	0.38	0.00	0.51
	A4119 W	0.01	0.12	0.69	0.19	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	1.000	1.000	1.000	1.000	1.000
	Heol-Y-Sarn	1.000	1.000	1.090	1.000	1.010
	A4119 S	1.000	1.010	1.000	1.050	1.010
	Site Access	1.000	1.000	1.000	1.000	1.040
	A4119 W	1.000	1.010	1.010	1.020	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To				
		Sterling Drive	Heol-Y-Sarn	A4119 S	Site Access	A4119 W
From	Sterling Drive	0.0	0.0	0.0	0.0	0.0
	Heol-Y-Sarn	0.0	0.0	9.0	0.0	1.0
	A4119 S	0.0	1.0	0.0	5.0	1.0
	Site Access	0.0	0.0	0.0	0.0	4.0
	A4119 W	0.0	1.0	1.0	2.0	0.0

Results

Results Summary for whole modelled period

Name	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)
Sterling Drive	1.14	0.01	A	11.82	17.73	0.31	1.03	0.00
Heol-Y-Sarn	5.12	0.68	A	392.19	588.29	43.72	4.46	0.49
A4119 S	7.39	2.51	A	1008.45	1512.67	131.23	5.21	1.46
Site Access	2.05	0.07	A	89.98	134.98	3.59	1.60	0.04
A4119 W	679.90	244.04	F	1330.29	1995.44	11103.60	333.87	123.37

Main Results for each time segment

Main results: (07:30-07:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	9.77	2.44	9.86	29.32	1399.37	0.00	0.00	0.747	A
Heol-Y-Sarn	321.44	80.36	321.13	418.77	990.46	0.00	0.27	3.108	A
A4119 S	816.89	204.22	816.63	908.50	404.02	0.00	0.64	2.958	A
Site Access	72.55	18.14	72.68	363.26	859.33	0.00	0.02	1.053	A
A4119 W	1095.58	273.90	1084.31	589.79	342.22	0.00	6.55	17.787	C

Main results: (07:45-08:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	11.15	2.79	11.06	36.17	1591.19	0.00	0.00	1.007	A
Heol-Y-Sarn	386.39	96.60	386.74	490.40	1111.85	0.00	0.43	4.123	A
A4119 S	984.63	246.16	984.93	1025.02	474.85	0.00	1.16	4.259	A
Site Access	90.31	22.58	90.93	427.84	1038.11	0.00	0.04	1.338	A
A4119 W	1290.84	322.71	1219.52	720.93	408.11	0.00	31.28	62.610	F

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	14.76	3.69	14.71	40.22	1646.30	0.00	0.01	1.142	A
Heol-Y-Sarn	470.88	117.72	470.93	559.30	1101.72	0.43	0.68	5.120	A
A4119 S	1216.34	304.09	1213.92	1054.80	519.30	1.16	2.48	7.389	A
Site Access	111.41	27.85	111.41	467.09	1268.06	0.04	0.07	2.051	A
A4119 W	1607.89	401.97	1194.23	887.36	492.11	31.28	128.29	241.262	F

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	13.39	3.35	13.52	40.13	1655.81	0.01	0.00	1.101	A
Heol-Y-Sarn	466.43	116.61	465.99	561.06	1108.28	0.68	0.66	5.027	A
A4119 S	1209.78	302.44	1205.59	1049.91	522.82	2.48	2.51	7.310	A
Site Access	108.99	27.25	108.68	474.49	1254.19	0.07	0.06	1.899	A
A4119 W	1594.01	398.50	1209.03	874.80	488.06	128.29	225.18	526.870	F

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	11.94	2.98	12.16	33.79	1614.54	0.00	0.00	1.008	A
Heol-Y-Sarn	381.41	95.35	381.06	497.18	1129.52	0.66	0.45	4.186	A
A4119 S	996.70	249.17	998.15	1039.74	472.64	2.51	1.17	4.423	A
Site Access	84.85	21.21	85.37	430.18	1040.62	0.06	0.04	1.400	A
A4119 W	1306.83	326.71	1244.54	723.30	402.69	225.18	244.04	679.898	F

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	9.91	2.48	9.78	32.56	1573.00	0.00	0.00	1.082	A
Heol-Y-Sarn	326.61	81.65	327.05	436.83	1145.95	0.45	0.34	3.578	A
A4119 S	826.34	206.59	827.00	1027.40	443.30	1.17	0.71	3.086	A
Site Access	71.81	17.95	71.94	403.04	867.89	0.04	0.02	1.064	A
A4119 W	1086.61	271.65	1267.18	600.93	338.90	244.04	200.71	559.295	F

Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.03	0.00	0.747	A	A
Heol-Y-Sarn	4.32	0.29	3.108	A	A
A4119 S	10.27	0.68	2.958	A	A
Site Access	0.34	0.02	1.053	A	A
A4119 W	78.70	5.25	17.787	C	B

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.05	0.00	1.007	A	A
Heol-Y-Sarn	6.84	0.46	4.123	A	A
A4119 S	17.54	1.17	4.259	A	A
Site Access	0.52	0.03	1.338	A	A
A4119 W	307.00	20.47	62.610	F	E

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.07	0.00	1.142	A	A
Heol-Y-Sarn	10.35	0.69	5.120	A	A
A4119 S	37.22	2.48	7.389	A	A
Site Access	0.96	0.06	2.051	A	A
A4119 W	1199.50	79.97	241.262	F	F

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.07	0.00	1.101	A	A
Heol-Y-Sarn	10.19	0.68	5.027	A	A
A4119 S	36.80	2.45	7.310	A	A
Site Access	0.89	0.06	1.899	A	A
A4119 W	2654.74	176.98	526.870	F	F

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.05	0.00	1.008	A	A
Heol-Y-Sarn	6.98	0.47	4.186	A	A
A4119 S	18.54	1.24	4.423	A	A
Site Access	0.54	0.04	1.400	A	A
A4119 W	3527.42	235.16	679.898	F	F

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	0.04	0.00	1.082	A	A
Heol-Y-Sarn	5.06	0.34	3.578	A	A
A4119 S	10.87	0.72	3.086	A	A
Site Access	0.35	0.02	1.064	A	A
A4119 W	3336.23	222.42	559.295	F	F

Lane Results

Lanes: Main Results for each time segment

Main results: (07:30-07:45)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	9.77	2.44	9.86	1020.76	0.010	0.00	0.00	0.747	A
Heol-Y-Sarn	1	1	208.57	52.14	208.61	730.69	0.285	0.00	0.19	3.409	A
Heol-Y-Sarn	1	2	107.10	26.78	107.85	730.69	0.147	0.00	0.07	2.296	A
Heol-Y-Sarn	1	3	5.46	1.36	5.59	730.69	0.007	0.00	0.00	1.450	A
Heol-Y-Sarn	2	1	321.44	80.36	321.13			0.00	0.01	0.110	A
A4119 S	1	2	340.98	85.25	341.12	921.94	0.370	0.00	0.20	2.239	A
A4119 S	1	3	475.64	118.91	477.45	921.94	0.516	0.00	0.40	3.168	A
A4119 S	2	1	816.89	204.22	816.63			0.00	0.04	0.182	A
Site Access	1	1	72.55	18.14	72.68	973.95	0.074	0.00	0.02	1.053	A
A4119 W	1	1	854.66	213.66	857.08	984.22	0.868	0.00	1.97	7.850	A
A4119 W	1	2	229.66	57.41	229.39	984.22	0.233	0.00	0.16	1.951	A
A4119 W	2	2	1095.58	273.90	1084.31			0.00	4.42	11.159	B

Main results: (08:15-08:30)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	13.39	3.35	13.52	904.82	0.015	0.01	0.00	1.101	A
Heol-Y-Sarn	1	1	304.98	76.24	304.45	707.00	0.431	0.46	0.45	5.246	A
Heol-Y-Sarn	1	2	153.57	38.39	152.38	707.00	0.217	0.13	0.13	3.077	A
Heol-Y-Sarn	1	3	7.44	1.86	7.62	707.00	0.011	0.00	0.00	1.617	A
Heol-Y-Sarn	2	1	466.43	116.61	465.99			0.09	0.07	0.585	A
A4119 S	1	2	538.33	134.58	538.15	893.30	0.603	0.62	0.70	4.312	A
A4119 S	1	3	667.27	166.82	667.71	893.30	0.747	1.15	1.12	6.180	A
A4119 S	2	1	1209.78	302.44	1205.59			0.70	0.69	1.955	A
Site Access	1	1	108.99	27.25	108.68	820.39	0.133	0.07	0.06	1.899	A
A4119 W	1	1	942.86	235.72	943.26	947.03	0.996	2.98	2.97	11.379	B
A4119 W	1	2	266.17	66.54	264.63	947.03	0.281	0.20	0.24	2.948	A
A4119 W	2	2	1594.01	398.50	1209.03			125.11	221.96	517.440	F

Main results: (08:30-08:45)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	11.94	2.98	12.16	923.48	0.013	0.00	0.00	1.008	A
Heol-Y-Sarn	1	1	247.00	61.75	249.47	702.73	0.351	0.45	0.30	4.536	A
Heol-Y-Sarn	1	2	129.65	32.41	128.81	702.73	0.184	0.13	0.11	2.840	A
Heol-Y-Sarn	1	3	4.41	1.10	4.58	702.73	0.006	0.00	0.00	1.705	A
Heol-Y-Sarn	2	1	381.41	95.35	381.06			0.07	0.03	0.278	A
A4119 S	1	2	432.20	108.05	433.13	905.40	0.477	0.70	0.36	3.084	A
A4119 S	1	3	565.95	141.49	565.02	905.40	0.625	1.12	0.68	4.395	A
A4119 S	2	1	996.70	249.17	998.15			0.69	0.13	0.607	A
Site Access	1	1	84.85	21.21	85.37	903.45	0.094	0.06	0.04	1.400	A
A4119 W	1	1	968.85	242.21	969.60	968.80	1.000	2.97	2.97	11.111	B
A4119 W	1	2	275.68	68.92	276.04	968.80	0.285	0.24	0.21	2.860	A
A4119 W	2	2	1306.83	326.71	1244.54			221.96	240.86	671.049	F

Main results: (08:45-09:00)

Name	Lane Level	Lane	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
Sterling Drive	1	1	9.91	2.48	9.78	942.26	0.011	0.00	0.00	1.082	A
Heol-Y-Sarn	1	1	211.19	52.80	210.04	699.43	0.302	0.30	0.24	3.900	A
Heol-Y-Sarn	1	2	110.53	27.63	109.30	699.43	0.158	0.11	0.09	2.617	A
Heol-Y-Sarn	1	3	5.33	1.33	5.42	699.43	0.008	0.00	0.00	1.837	A
Heol-Y-Sarn	2	1	326.61	81.65	327.05			0.03	0.00	0.155	A
A4119 S	1	2	351.76	87.94	351.45	912.47	0.386	0.36	0.24	2.311	A
A4119 S	1	3	475.24	118.81	476.17	912.47	0.521	0.68	0.43	3.316	A
A4119 S	2	1	826.34	206.59	827.00			0.13	0.04	0.200	A
Site Access	1	1	71.81	17.95	71.94	970.62	0.074	0.04	0.02	1.064	A
A4119 W	1	1	989.03	247.26	988.90	985.06	1.004	2.97	2.97	10.788	B
A4119 W	1	2	278.15	69.54	277.75	985.06	0.282	0.21	0.22	2.706	A
A4119 W	2	2	1086.61	271.65	1267.18			240.86	197.52	552.699	F

Lanes: Queueing Delay Results for each time segment

Queueing Delay results: (07:30-07:45)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	1	1	0.03	0.00	0.747	A	A
Heol-Y-Sarn	1	1	3.10	0.21	3.409	A	A
Heol-Y-Sarn	1	2	1.03	0.07	2.296	A	A
Heol-Y-Sarn	1	3	0.03	0.00	1.450	A	A
Heol-Y-Sarn	2	1	0.16	0.01	0.110	A	A
A4119 S	1	2	3.34	0.22	2.239	A	A
A4119 S	1	3	6.30	0.42	3.168	A	A
A4119 S	2	1	0.63	0.04	0.182	A	A
Site Access	1	1	0.34	0.02	1.053	A	A
A4119 W	1	1	27.49	1.83	7.850	A	A
A4119 W	1	2	1.92	0.13	1.951	A	A
A4119 W	2	2	49.29	3.29	11.159	B	B

Queueing Delay results: (07:45-08:00)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	1	1	0.05	0.00	1.007	A	A
Heol-Y-Sarn	1	1	4.82	0.32	4.461	A	A
Heol-Y-Sarn	1	2	1.50	0.10	2.771	A	A
Heol-Y-Sarn	1	3	0.04	0.00	1.688	A	A
Heol-Y-Sarn	2	1	0.48	0.03	0.283	A	A
A4119 S	1	2	5.34	0.36	2.968	A	A
A4119 S	1	3	10.03	0.67	4.310	A	A
A4119 S	2	1	2.17	0.14	0.526	A	A
Site Access	1	1	0.52	0.03	1.338	A	A
A4119 W	1	1	40.28	2.69	10.285	B	B
A4119 W	1	2	2.89	0.19	2.599	A	A
A4119 W	2	2	263.84	17.59	53.929	F	D

Queueing Delay results: (08:00-08:15)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	1	1	0.07	0.00	1.142	A	A
Heol-Y-Sarn	1	1	7.03	0.47	5.343	A	A
Heol-Y-Sarn	1	2	2.05	0.14	3.103	A	A
Heol-Y-Sarn	1	3	0.05	0.00	1.540	A	A
Heol-Y-Sarn	2	1	1.22	0.08	0.598	A	A
A4119 S	1	2	9.75	0.65	4.319	A	A
A4119 S	1	3	17.14	1.14	6.139	A	A
A4119 S	2	1	10.33	0.69	2.050	A	A
Site Access	1	1	0.96	0.06	2.051	A	A
A4119 W	1	1	44.53	2.97	11.332	B	B
A4119 W	1	2	3.15	0.21	2.846	A	A
A4119 W	2	2	1151.83	76.79	231.745	F	F

Queueing Delay results: (08:15-08:30)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	1	1	0.07	0.00	1.101	A	A
Heol-Y-Sarn	1	1	6.91	0.46	5.246	A	A
Heol-Y-Sarn	1	2	2.03	0.14	3.077	A	A
Heol-Y-Sarn	1	3	0.05	0.00	1.617	A	A
Heol-Y-Sarn	2	1	1.20	0.08	0.585	A	A
A4119 S	1	2	9.72	0.65	4.312	A	A
A4119 S	1	3	17.26	1.15	6.180	A	A
A4119 S	2	1	9.83	0.66	1.955	A	A
Site Access	1	1	0.89	0.06	1.899	A	A
A4119 W	1	1	44.66	2.98	11.379	B	B
A4119 W	1	2	3.29	0.22	2.948	A	A
A4119 W	2	2	2606.78	173.79	517.440	F	F

Queueing Delay results: (08:30-08:45)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	1	1	0.05	0.00	1.008	A	A
Heol-Y-Sarn	1	1	4.93	0.33	4.536	A	A
Heol-Y-Sarn	1	2	1.53	0.10	2.840	A	A
Heol-Y-Sarn	1	3	0.04	0.00	1.705	A	A
Heol-Y-Sarn	2	1	0.47	0.03	0.278	A	A
A4119 S	1	2	5.61	0.37	3.084	A	A
A4119 S	1	3	10.34	0.69	4.395	A	A
A4119 S	2	1	2.59	0.17	0.607	A	A
Site Access	1	1	0.54	0.04	1.400	A	A
A4119 W	1	1	44.65	2.98	11.111	B	B
A4119 W	1	2	3.24	0.22	2.860	A	A
A4119 W	2	2	3479.52	231.97	671.049	F	F

Queueing Delay results: (08:45-09:00)

Name	Lane Level	Lane	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
Sterling Drive	**1**	**1**	0.04	0.00	1.082	A	A
Heol-Y-Sarn	**1**	**1**	3.59	0.24	3.900	A	A
Heol-Y-Sarn	**1**	**2**	1.20	0.08	2.617	A	A
Heol-Y-Sarn	**1**	**3**	0.04	0.00	1.837	A	A
Heol-Y-Sarn	**2**	**1**	0.23	0.02	0.155	A	A
A4119 S	**1**	**2**	3.50	0.23	2.311	A	A
A4119 S	**1**	**3**	6.66	0.44	3.316	A	A
A4119 S	**2**	**1**	0.71	0.05	0.200	A	A
Site Access	**1**	**1**	0.35	0.02	1.064	A	A
A4119 W	**1**	**1**	44.64	2.98	10.788	B	B
A4119 W	**1**	**2**	3.19	0.21	2.706	A	A
A4119 W	**2**	**2**	3288.40	219.23	552.699	F	F

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Base Junction 6 Arcady.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct6\Network Peak
Report generation date: 01/05/2018 11:06:49

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Scenario 1							
A4119 N	2.27	6.20	0.69	A	2.31	7.14	0.70	A
A4119 S	5.50	9.99	0.85	A	3.14	6.19	0.76	A
Magden Park	0.14	4.04	0.12	A	3.40	18.90	0.78	C

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Scenario 1, AM " model duration: 08:00 - 09:30
"D2 - Scenario 1, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:06:48

File summary

Title	(untitled)
Location	Pontyclun
Site Number	Junction 6
Date	08/01/2018
Version	
Status	(new file)
Identifier	
Client	RCT
Jobnumber	093813
Enumerator	Callan.Burchell
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Scenario 1, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Scenario 1, AM	Scenario 1	AM		ONE HOUR	08:00	09:30	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				8.33	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A4119 N	1	A4119 N	
A4119 S	2	A4119 S	
Magden Park	3	Magden Park	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A4119 N	0.00	99999.00		0.00
A4119 S	0.00	99999.00		0.00
Magden Park	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A4119 N	6.20	6.20	0.00	60.00	80.00	23.00	
A4119 S	7.40	8.00	10.80	35.00	80.00	28.00	
Magden Park	3.70	7.40	10.50	55.00	80.00	36.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A4119 N		(calculated)	(calculated)	0.527	1985.474
A4119 S		(calculated)	(calculated)	0.591	2463.416
Magden Park		(calculated)	(calculated)	0.469	1664.999

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
A4119 N	ONE HOUR	✓	1211.00	100.000
A4119 S	ONE HOUR	✓	1852.00	100.000
Magden Park	ONE HOUR	✓	117.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - (untitled) (for whole period)

		To		
		A4119 N	**A4119 S**	**Magden Park**
From	**A4119 N**	0.000	1115.000	96.000
	A4119 S	1113.000	0.000	739.000
	Magden Park	12.000	105.000	0.000

Turning Proportions (PCU) - (untitled) (for whole period)

		To		
		A4119 N	A4119 S	Magden Park
From	A4119 N	0.00	0.92	0.08
	A4119 S	0.60	0.00	0.40
	Magden Park	0.10	0.90	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To		
		A4119 N	A4119 S	Magden Park
From	A4119 N	1.000	1.020	1.010
	A4119 S	1.020	1.000	1.000
	Magden Park	1.000	1.090	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To		
		A4119 N	A4119 S	Magden Park
From	A4119 N	0.0	2.0	1.0
	A4119 S	2.0	0.0	0.0
	Magden Park	0.0	9.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
A4119 N	0.69	6.20	2.27	A	1111.23	1666.85	132.54	4.77	1.47	132.56	4.77
A4119 S	0.85	9.99	5.50	A	1699.43	2549.14	263.35	6.20	2.93	263.37	6.20
Magden Park	0.12	4.04	0.14	A	107.36	161.04	9.82	3.66	0.11	9.82	3.66

Main Results for each time segment

Main results: (08:00-08:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	911.70	227.93	908.13	843.65	78.76	0.00	1943.98	1517.33	0.469	0.00	0.89	3.531	A
A4119 S	1394.28	348.57	1388.84	914.90	71.99	0.00	2420.90	2392.38	0.576	0.00	1.36	3.511	A
Magden Park	88.08	22.02	87.76	626.17	834.65	0.00	1273.25	990.17	0.069	0.00	0.08	3.279	A

Main results: (08:15-08:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1088.66	272.17	1087.05	1009.29	94.31	0.00	1935.79	1517.36	0.562	0.89	1.30	4.315	A
A4119 S	1664.91	416.23	1661.49	1095.19	86.17	0.00	2412.53	2392.38	0.690	1.36	2.22	4.828	A
Magden Park	105.18	26.30	105.09	749.16	998.51	0.00	1196.34	990.17	0.088	0.08	0.10	3.562	A

Main results: (08:30-08:45)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1333.34	333.33	1329.52	1231.14	115.46	0.00	1924.65	1517.36	0.693	1.30	2.25	6.126	A
A4119 S	2039.09	509.77	2026.62	1339.59	105.40	0.00	2401.18	2392.38	0.849	2.22	5.33	9.423	A
Magden Park	128.82	32.20	128.66	914.07	1217.94	0.00	1093.35	990.17	0.118	0.10	0.14	4.030	A

Main results: (08:45-09:00)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1333.34	333.33	1333.24	1238.24	115.60	0.00	1924.57	1517.36	0.693	2.25	2.27	6.202	A
A4119 S	2039.09	509.77	2038.40	1343.15	105.69	0.00	2401.00	2392.38	0.849	5.33	5.50	9.994	A
Magden Park	128.82	32.20	128.82	919.07	1225.02	0.00	1090.02	990.17	0.118	0.14	0.14	4.044	A

Main results: (09:00-09:15)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	1088.66	272.17	1092.46	1019.09	94.53	0.00	1935.67	1517.36	0.562	2.27	1.32	4.370	A
A4119 S	1664.91	416.23	1677.76	1100.39	86.60	0.00	2412.27	2392.38	0.690	5.50	2.29	5.043	A
Magden Park	105.18	26.30	105.34	756.08	1008.28	0.00	1191.75	990.17	0.088	0.14	0.11	3.581	A

Main results: (09:15-09:30)

Name	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
A4119 N	911.70	227.93	913.37	849.15	79.14	0.00	1943.79	1517.33	0.469	1.32	0.91	3.565	A
A4119 S	1394.28	348.57	1397.91	920.10	72.41	0.00	2420.66	2392.38	0.576	2.29	1.39	3.573	A
Magden Park	88.08	22.02	88.18	630.21	840.10	0.00	1270.69	990.17	0.069	0.11	0.08	3.290	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	13.03	0.87	3.531	A	A
A4119 S	19.77	1.32	3.511	A	A
Magden Park	1.18	0.08	3.279	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	18.92	1.26	4.315	A	A
A4119 S	31.96	2.13	4.828	A	A
Magden Park	1.53	0.10	3.562	A	A

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	32.18	2.15	6.126	A	A
A4119 S	72.19	4.81	9.423	A	A
Magden Park	2.12	0.14	4.030	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	33.96	2.26	6.202	A	A
A4119 S	81.55	5.44	9.994	A	A
Magden Park	2.16	0.14	4.044	A	A

Queueing Delay results: (09:00-09:15)

Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	20.53	1.37	4.370	A	A
A4119 S	36.45	2.43	5.043	A	A
Magden Park	1.60	0.11	3.581	A	A

Queueing Delay results: (09:15-09:30)

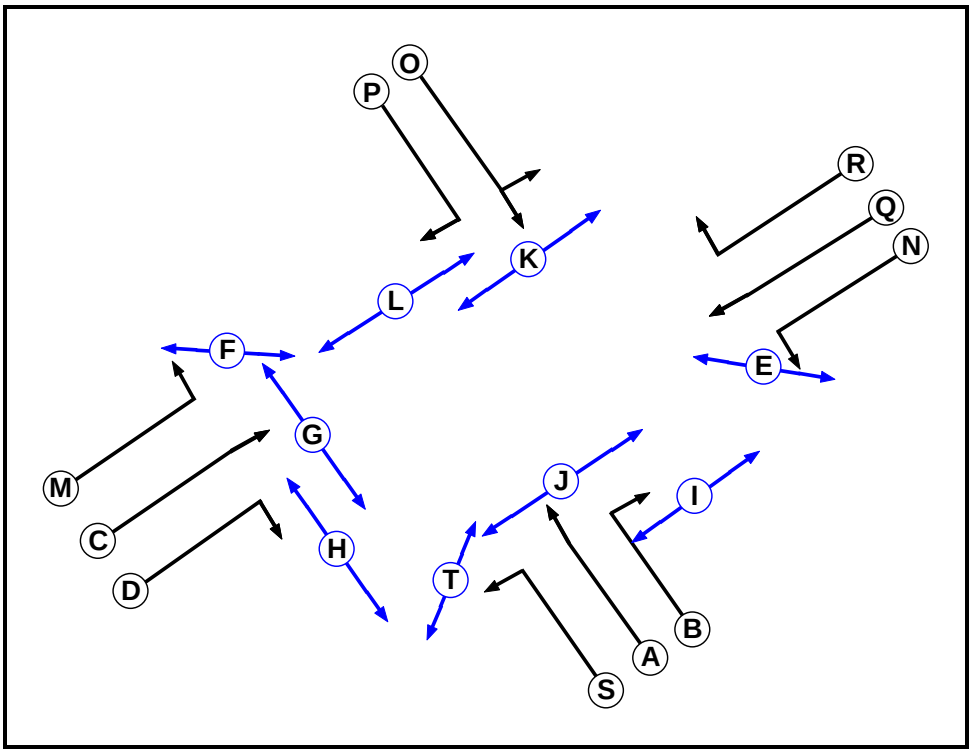
Name	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A4119 N	13.92	0.93	3.565	A	A
A4119 S	21.42	1.43	3.573	A	A
Magden Park	1.23	0.08	3.290	A	A

Basic Results Summary

Project and User Details

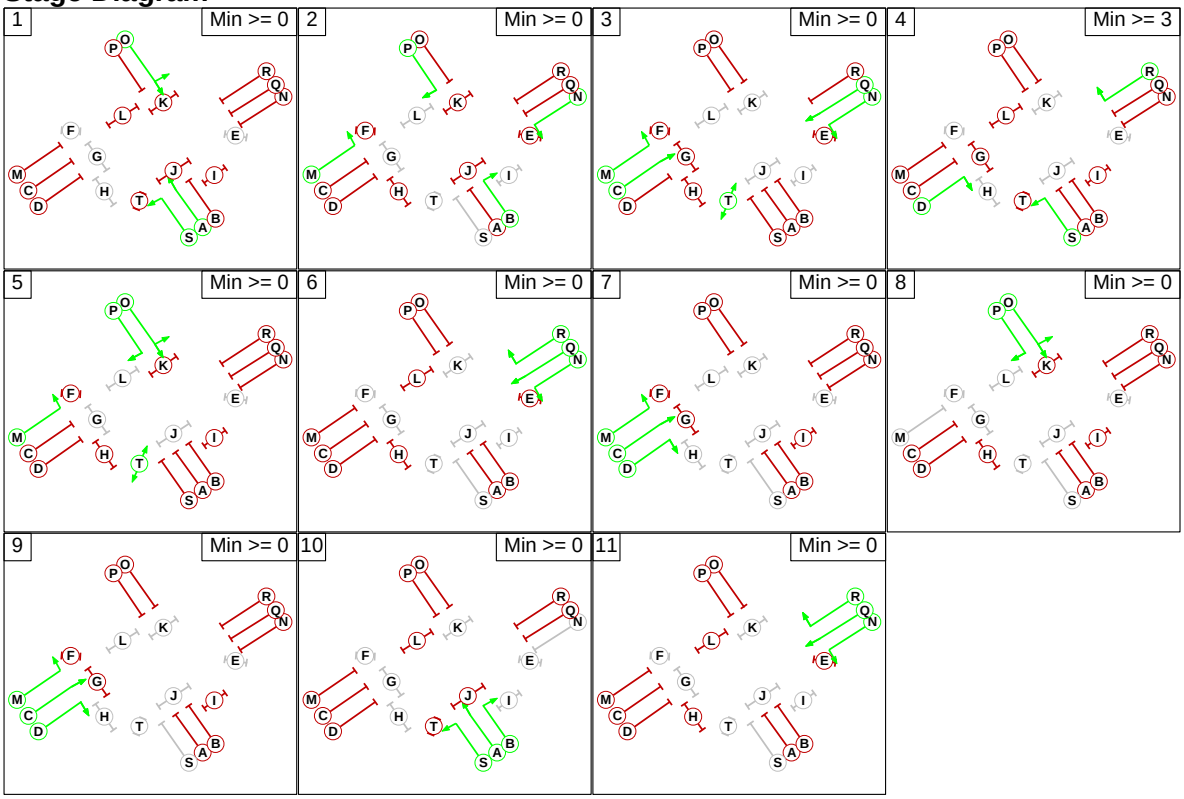
Project:	**A4119 Corridor Assessment**
Title:	**Junction 7 Analysis**
Location:	Talbot Green
Client:	Rhondda Cynon Taf
Site Ref(s):	S6061
Date Started:	October 2017
Additional detail:	Existing Layout
File name:	A4119-Talbot Rd Existing_v2_Net Peak.lsg3x
Author:	Dan Davies
Company:	Capita
Address:	
Linsig Version:	3, 2, 39, 0

Phase Diagram



Basic Results Summary

Stage Diagram



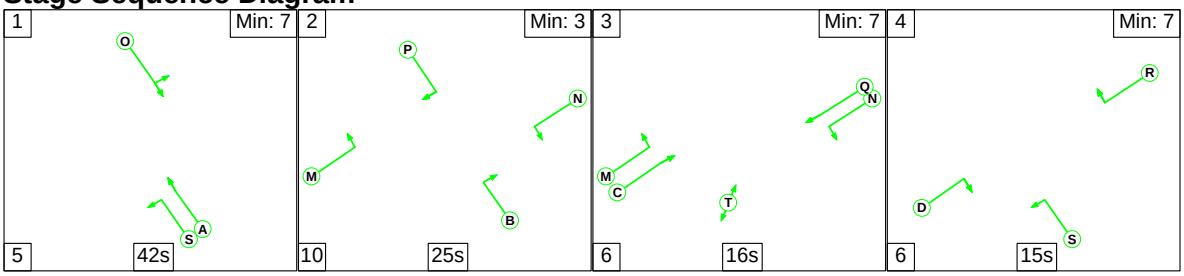
Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A		-	8	7	-	-	-	-	-	6	-	11	10	-	-	6	6	6	-	-
B	-		5	5	-	-	-	-	-	6	-	-	-	-	7	-	6	7	-	-
C	5	5		-	-	-	5	-	-	-	-	-	-	-	7	6	-	6	-	-
D	5	5	-		-	-	6	-	10	-	-	-	-	10	5	5	7	-	-	-
E	-	-	-	-		-	-	-	-	-	-	-	-	7	-	-	-	-	-	-
F	-	-	-	-	-		-	-	-	-	-	-	7	-	-	-	-	-	-	-
G	-	-	12	12	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
H	-	-	-	-	-	-	-		-	-	-	-	-	-	-	8	8	-	-	-
I	-	-	-	8	-	-	-	-		-	-	-	-	-	8	-	-	-	-	-
J	11	11	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
K	-	-	-	-	-	-	-	-	-	-		-	-	-	11	11	-	-	-	-
L	8	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	8	-	-
M	5	-	-	-	-	5	-	-	-	-	-	-		-	-	-	-	5	-	-
N	-	-	-	5	5	-	-	-	-	-	-	-	-		5	-	-	-	-	-
O	-	6	6	6	-	-	-	-	10	-	6	-	-	9		-	8	7	-	-
P	7	-	5	6	-	-	-	11	-	-	6	-	-	-	-		6	5	-	-
Q	5	5	-	5	-	-	-	10	-	-	-	-	-	-	5	5		-	-	-
R	5	5	6	-	-	-	-	-	-	-	-	10	10	-	5	5	-		-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		6
T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	

Basic Results Summary

Scenario 1: 'A.M. Peak Opt' (FG1: 'A.M.', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



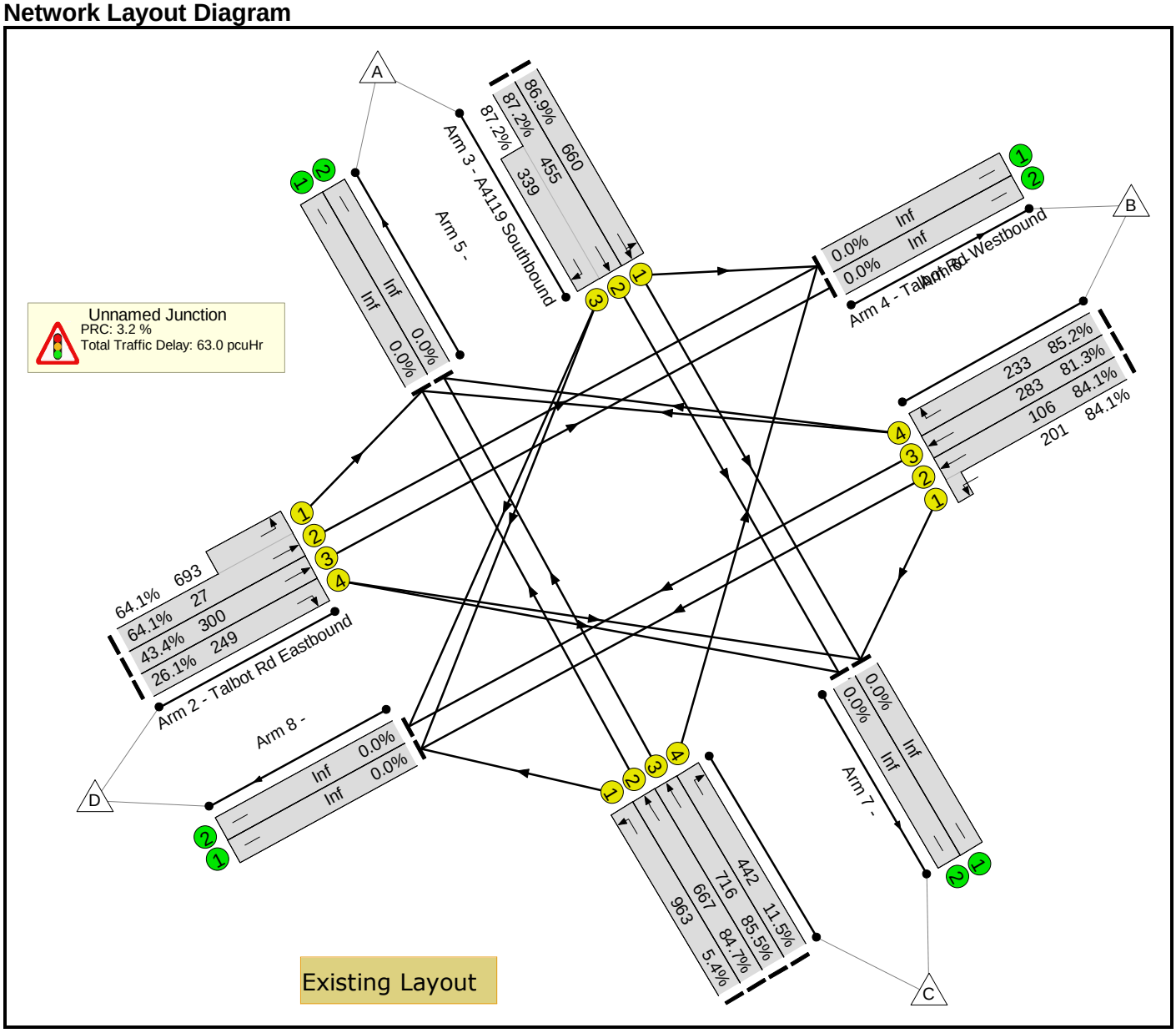
Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	77	894	296	1267
	B	199	0	169	319	687
	C	1177	51	0	52	1280
	D	444	147	65	0	656
	Tot.	1820	275	1128	667	3890

Basic Results Summary

Network Layout Diagram



Basic Results Summary

Network Results

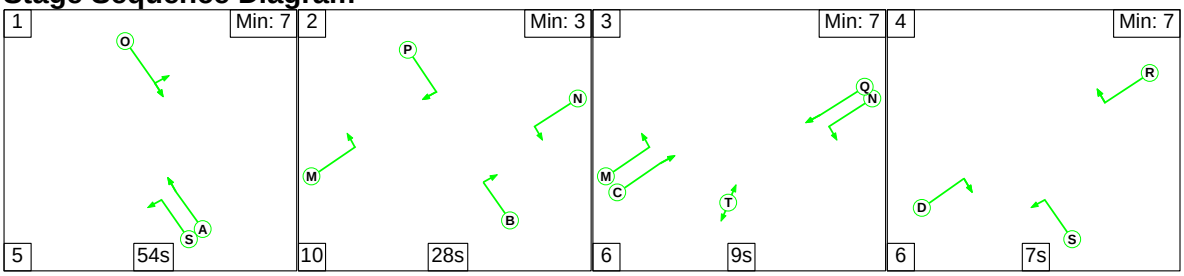
Item	Lane Description	Lane Type	Full Phase	Num Greens	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: LinSig Analysis Existing	-	-	-	-	-	-	-	-	**87.2%**	**63.0**	-	-
Unnamed Junction	-	-	-	-	-	-	-	-	**87.2%**	**63.0**	-	-
1/1	A4119 Northbound Left	U	S	1	62	52	1911	963	5.4%	0.3	17.8	0.9
1/2	A4119 Northbound Ahead	U	A	1	42	565	1940	667	84.7%	8.6	54.7	20.7
1/3	A4119 Northbound Ahead	U	A	1	42	612	2080	716	85.5%	9.3	54.6	22.5
1/4	A4119 Northbound Right	U	B	1	29	51	1841	442	11.5%	0.6	41.8	1.4
2/2+2/1	Talbot Rd Eastbound Left Ahead	U	C M	1	17:47	461	1940:1872	27+693	64.1 : 64.1%	5.0	38.9	13.8
2/3	Talbot Rd Eastbound Ahead	U	C	1	17	130	2080	300	43.4%	2.1	59.4	4.5
2/4	Talbot Rd Eastbound Right	U	D	1	16	65	1830	249	26.1%	1.0	58.1	2.2
3/1	A4119 Southbound Left Ahead	U	O	1	42	574	1920	660	86.9%	9.2	57.8	21.6
3/2+3/3	A4119 Southbound Ahead Right	U	O P	1	42:29	693	2080:1805	455+339	87.2 : 87.2%	10.5	54.4	17.1
4/2+4/1	Talbot Rd Westbound Left Ahead	U	Q N	1	16:48	258	1940:1821	106+201	84.1 : 84.1%	5.6	78.3	10.6
4/3	Talbot Rd Westbound Ahead	U	Q	1	16	230	2080	283	81.3%	5.4	84.1	9.8
4/4	Talbot Rd Westbound Right	U	R	1	15	199	1824	233	85.2%	5.5	98.9	9.3

C1	PRC for Signalled Lanes (%):	3.2	Total Delay for Signalled Lanes (pcuHr):		63.03
	PRC Over All Lanes (%):	3.2	Total Delay Over All Lanes(pcuHr):		63.03

Basic Results Summary

Scenario 2: 'P.M. Peak Opt' (FG2: 'P.M.', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



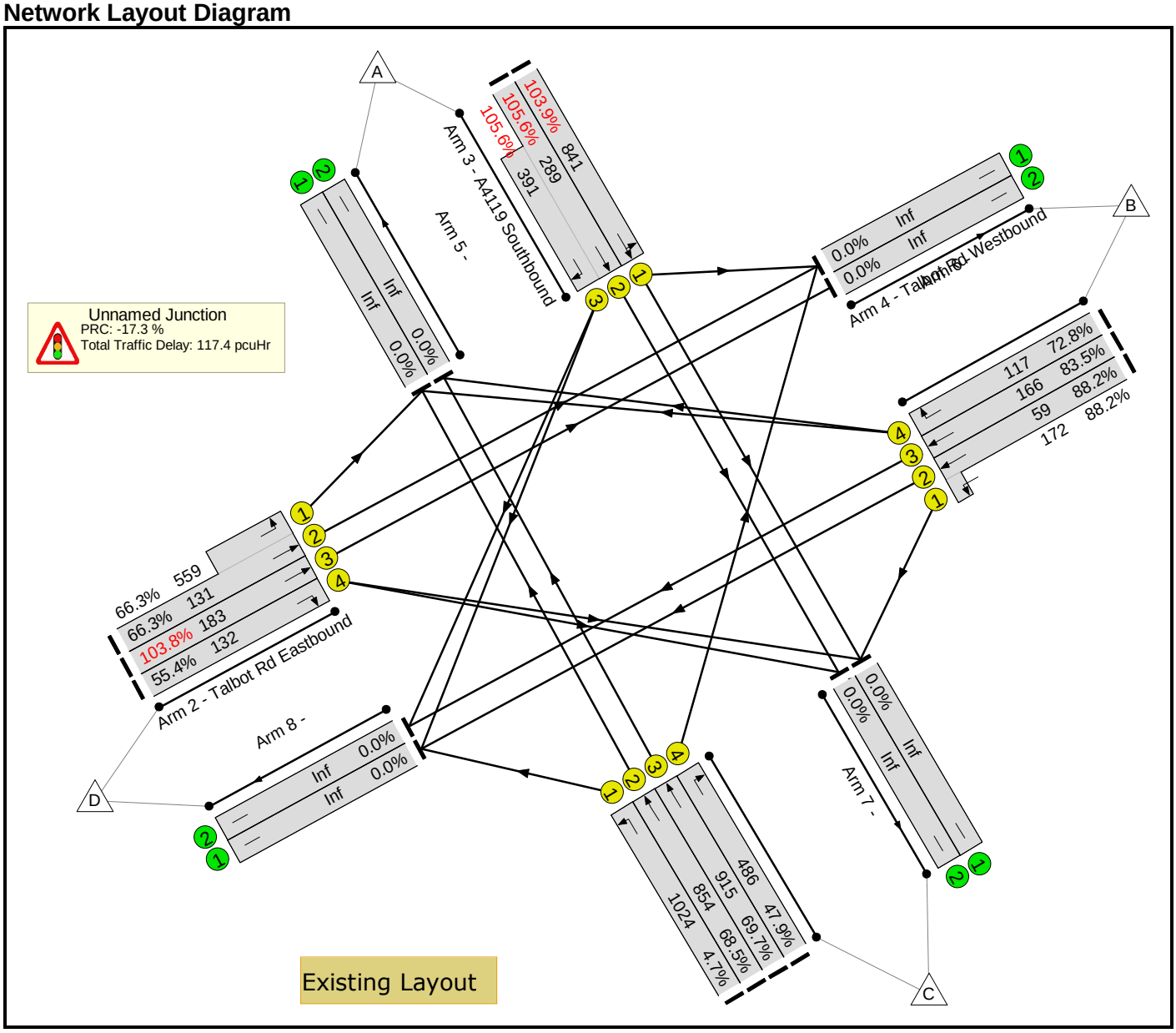
Traffic Flows, Actual

Actual Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	164	1015	413	1592
	B	85	0	152	191	428
	C	1223	233	0	48	1504
	D	371	277	73	0	721
	Tot.	1679	674	1240	652	4245

Basic Results Summary

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Num Greens	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: LinSig Analysis Existing	-	-	-	-	-	-	-	-	**105.6%**	**117.4**	-	-
Unnamed Junction	-	-	-	-	-	-	-	-	**105.6%**	**117.4**	-	-
1/1	A4119 Northbound Left	U	S	1	66	48	1911	1024	4.7%	0.2	15.7	0.8
1/2	A4119 Northbound Ahead	U	A	1	54	585	1940	854	68.5%	5.6	34.7	17.3
1/3	A4119 Northbound Ahead	U	A	1	54	638	2080	915	69.7%	6.2	34.7	18.9
1/4	A4119 Northbound Right	U	B	1	32	233	1841	486	47.9%	3.0	45.9	7.3
2/2+2/1	Talbot Rd Eastbound Left Ahead	U	C M	1	10:43	458	1940:1872	131+559	66.3 : 66.3%	5.7	45.1	13.0
2/3	Talbot Rd Eastbound Ahead	U	C	1	10	190	2080	183	103.8%	12.1	229.8	15.7
2/4	Talbot Rd Eastbound Right	U	D	1	8	73	1830	132	55.4%	1.7	86.1	3.0
3/1	A4119 Southbound Left Ahead	U	O	1	54	874	1912	841	103.9%	35.5	146.4	56.6
3/2+3/3	A4119 Southbound Ahead Right	U	O P	1	54:32	718	2080:1805	289+391	105.6 : 105.6%	34.9	174.9	46.9
4/2+4/1	Talbot Rd Westbound Left Ahead	U	Q N	1	9:44	204	1940:1821	59+172	88.2 : 88.2%	5.4	95.7	9.6
4/3	Talbot Rd Westbound Ahead	U	Q	1	9	139	2080	166	83.5%	4.4	113.3	6.9
4/4	Talbot Rd Westbound Right	U	R	1	7	85	1824	117	72.8%	2.6	110.0	4.1

C1	PRC for Signalled Lanes (%):	-17.3	Total Delay for Signalled Lanes (pcuHr):	117.40
	PRC Over All Lanes (%):	-17.3	Total Delay Over All Lanes(pcuHr):	117.40

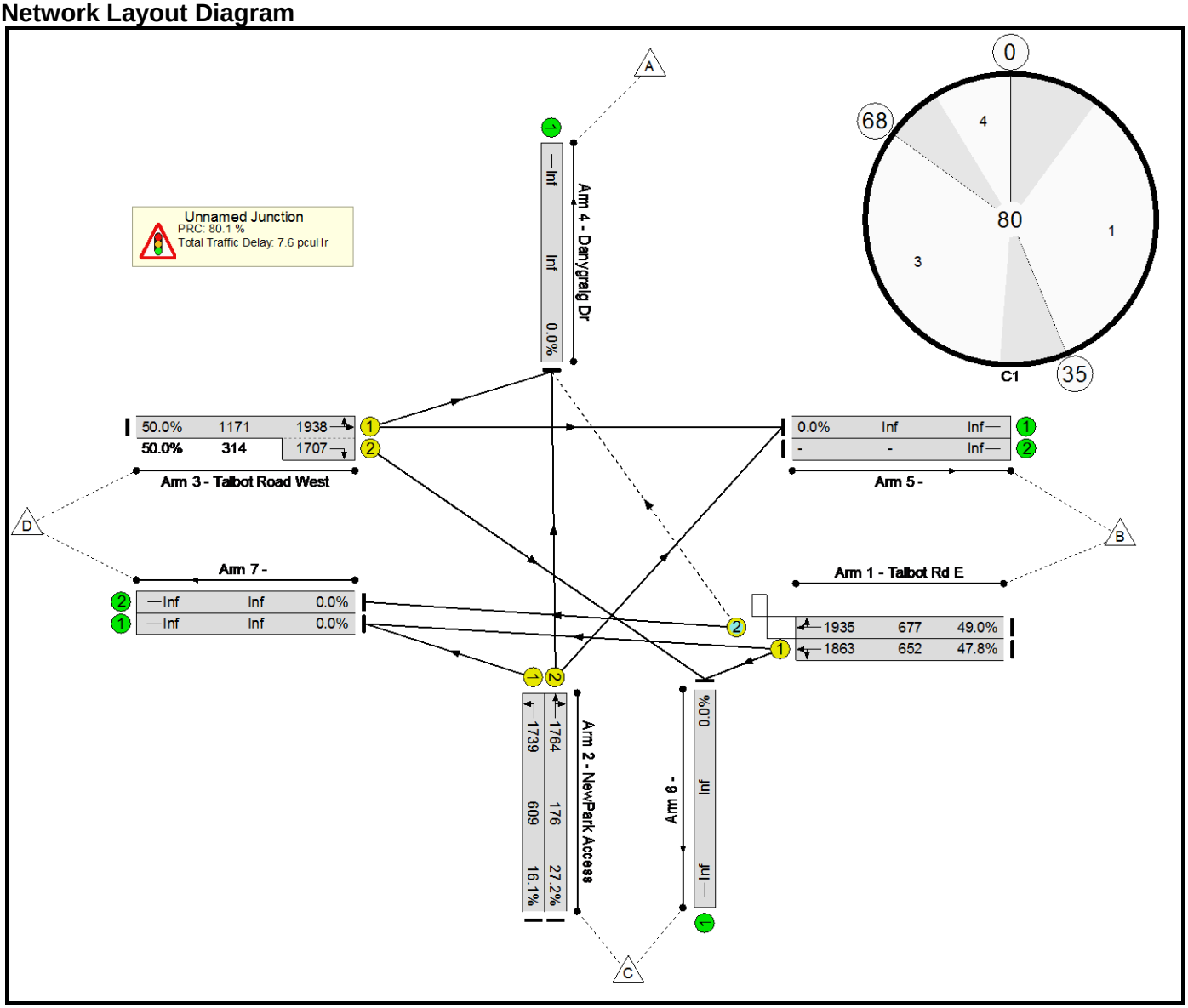
Basic Results Summary

User and Project Details

Project:	**A4119 Corridor Assessment**
Title:	**Junction 8 Assessment**
Location:	Talbot Green
Additional detail:	
File name:	Jct 8 Talbot Rd NewPark Access_Net Peak.lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'AM Base' (FG1: 'AM Peak - Base', Plan 2: 'Network Control Plan 2')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**50.0%**	**7**	**0**	**0**	**7.6**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**50.0%**	**7**	**0**	**0**	**7.6**	-	-
1/1	Talbot Rd E Left Ahead	U	A		1	27	-	312	1863	652	47.8%	-	-	-	2.2	25.6	5.8
1/2	Talbot Rd E Right Ahead	O	A		1	27	-	332	1935	677	49.0%	7	0	0	2.4	25.7	6.2
2/1	NewPark Access Left	U	D		1	27	-	98	1739	609	16.1%	-	-	-	0.6	21.4	1.6
2/2	NewPark Access Ahead Right	U	E		1	7	-	48	1764	176	27.2%	-	-	-	0.6	47.3	1.2
3/1+3/2	Talbot Road West Left Ahead Right	U	B C		1	60:28	-	742	1938:1707	1171+314	50.0 : 50.0%	-	-	-	1.8	8.8	4.9

C1

PRC for Signalled Lanes (%): 80.1
PRC Over All Lanes (%): 80.1

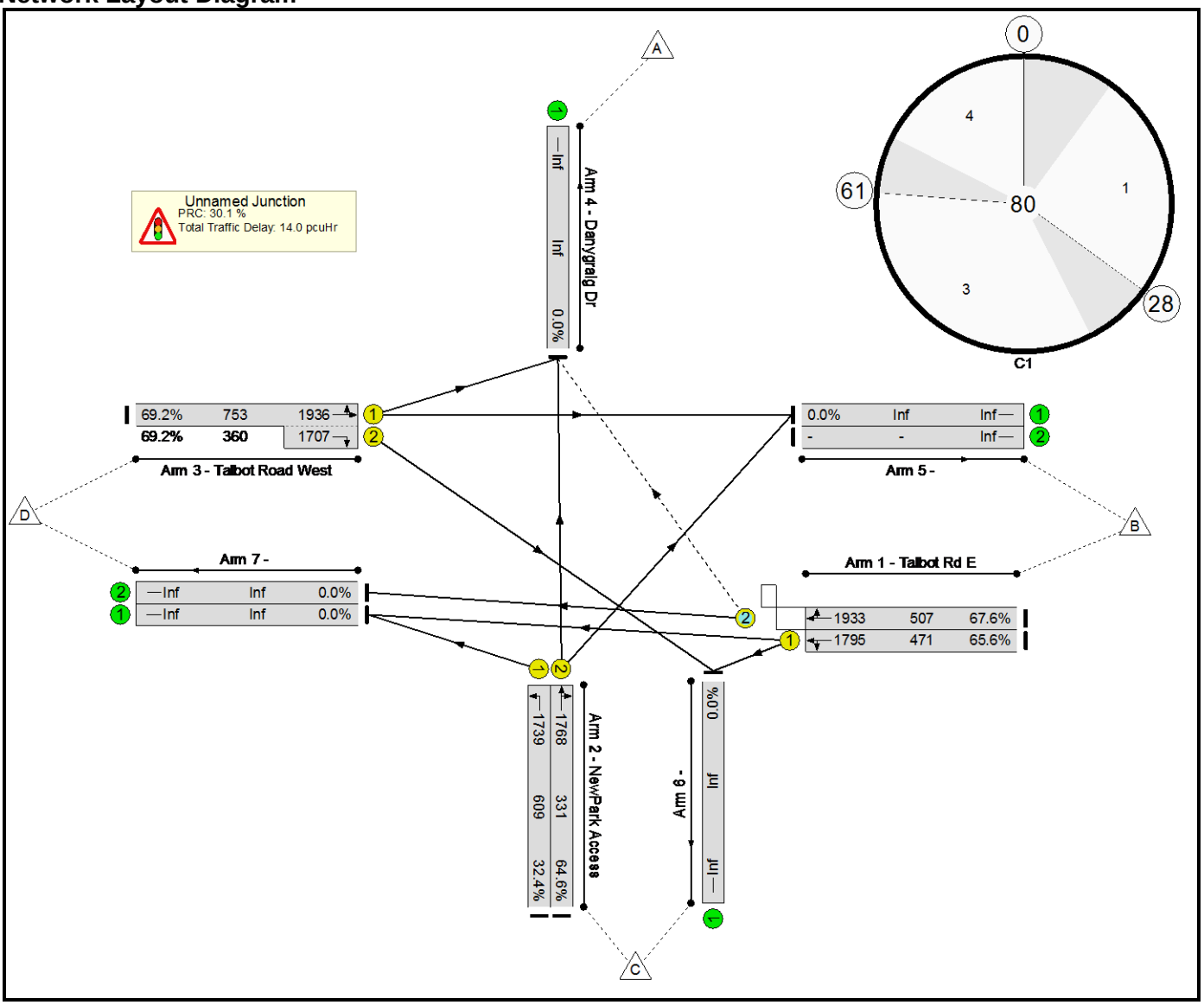
Total Delay for Signalled Lanes (pcuHr): 7.60
Total Delay Over All Lanes(pcuHr): 7.60

Cycle Time (s): 80

Basic Results Summary

Scenario 2: 'PM Base' (FG2: 'PM Peak - Base', Plan 2: 'Network Control Plan 2')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**69.2%**	**11**	**0**	**0**	**14.0**	**-**	**-**
Unnamed Junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**69.2%**	**11**	**0**	**0**	**14.0**	**-**	**-**
1/1	Talbot Rd E Left Ahead	U	A		1	20	-	309	1795	471	65.6%	-	-	-	3.2	37.3	7.0
1/2	Talbot Rd E Right Ahead	O	A		1	20	-	343	1933	507	67.6%	11	0	0	3.6	37.4	7.8
2/1	NewPark Access Left	U	D		1	27	-	197	1739	609	32.4%	-	-	-	1.3	23.4	3.4
2/2	NewPark Access Ahead Right	U	E		1	14	-	214	1768	331	64.6%	-	-	-	2.7	45.1	5.2
3/1+3/2	Talbot Road West Left Ahead Right	U	B C		1	53:28	-	770	1936:1707	753+360	69.2 : 69.2%	-	-	-	3.3	15.3	6.3

C1

PRC for Signalled Lanes (%): 30.1
PRC Over All Lanes (%): 30.1

Total Delay for Signalled Lanes (pcuHr): 14.00
Total Delay Over All Lanes(pcuHr): 14.00

Cycle Time (s): 80

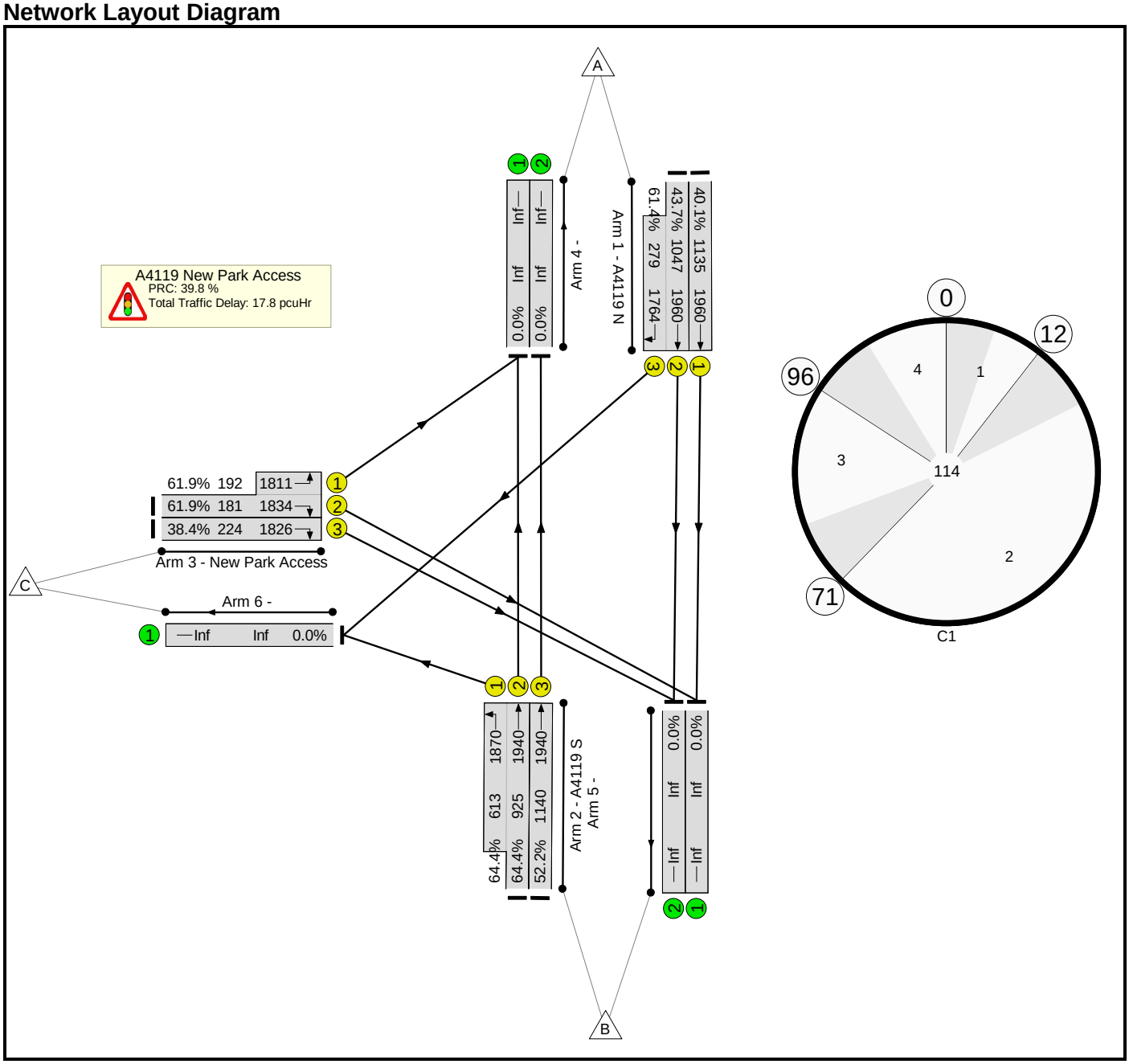
Basic Results Summary

User and Project Details

Project:	**A4119 Corridor Assessment**
Title:	**Junction 9 Analysis**
Location:	Talbot Green
Additional detail:	
File name:	Jct_9_Base_Final.lsg3x
Author:	Dan Davies
Company:	CAPITA
Address:	

Scenario 1: 'AM Base' (FG1: 'AM Base', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

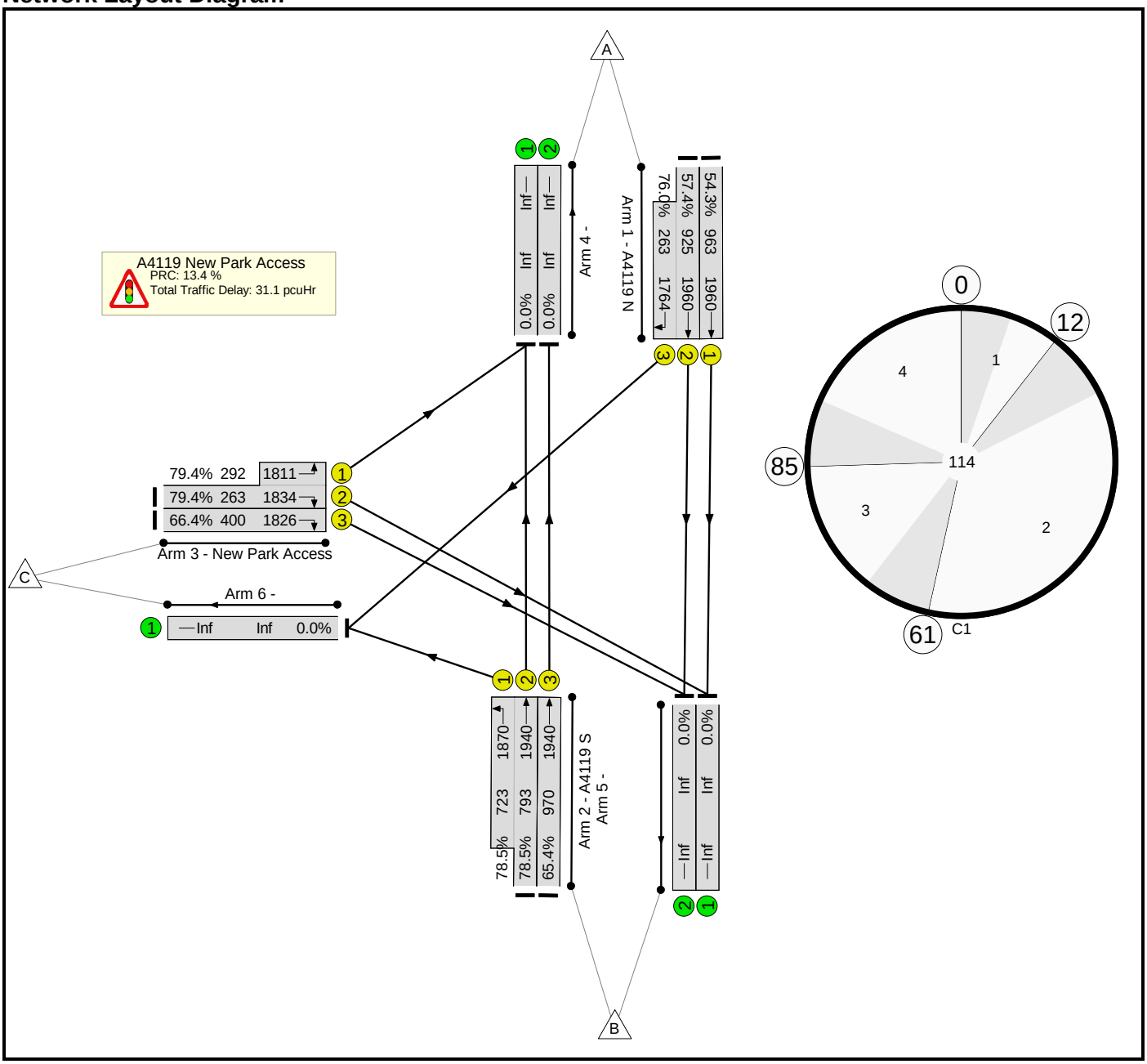
Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**64.4%**	**-**	**-**
A4119 New Park Access	**-**	**64.4%**	**-**	**-**
1/1	A4119 N Ahead	40.1%	15.8	8.2
1/2+1/3	A4119 N Ahead Right	43.7 : 61.4%	24.4	8.3
2/2+2/1	A4119 S Ahead Left	64.4 : 64.4%	14.8	12.0
2/3	A4119 S Ahead	52.2%	17.3	11.6
3/2+3/1	New Park Access Left Right	61.9 : 61.9%	49.9	4.1
3/3	New Park Access Right	38.4%	59.0	2.8

	C1	PRC for Signalled Lanes (%):	39.8	Total Delay for Signalled Lanes (pcuHr):	17.78	Cycle Time (s):	114
		PRC Over All Lanes (%):	39.8	Total Delay Over All Lanes(pcuHr):	17.78		

Basic Results Summary

Scenario 2: 'PM Base' (FG2: 'PM Base', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**79.4%**	**-**	**-**
A4119 New Park Access	**-**	**79.4%**	**-**	**-**
1/1	A4119 N Ahead	54.3%	24.2	12.1
1/2+1/3	A4119 N Ahead Right	57.4 : 76.0%	31.4	12.4
2/2+2/1	A4119 S Ahead Left	78.5 : 78.5%	20.4	16.2
2/3	A4119 S Ahead	65.4%	26.5	15.7
3/2+3/1	New Park Access Left Right	79.4 : 79.4%	47.8	10.7
3/3	New Park Access Right	66.4%	53.9	8.7

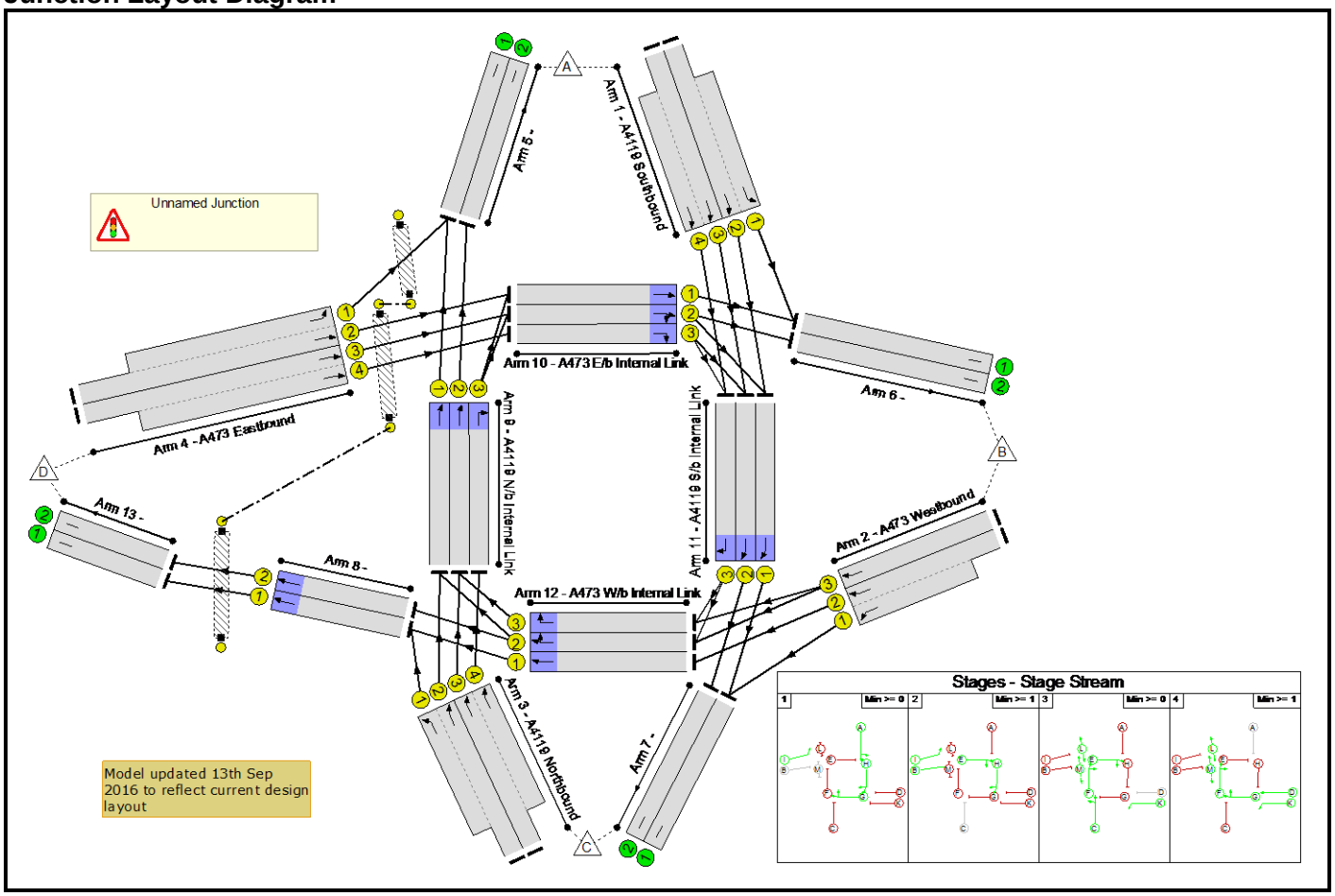
	C1	PRC for Signalled Lanes (%):	13.4	Total Delay for Signalled Lanes (pcuHr):	31.15	Cycle Time (s):	114
		PRC Over All Lanes (%):	13.4	Total Delay Over All Lanes(pcuHr):	31.15		

Basic Results Summary

User and Project Details

Project:	**A4119 Corridor Assessment**
Title:	**Existing Analysis – Junction 10**
Location:	Talbot Green
Company:	Capita
Address:	

Junction Layout Diagram



Lane Input Data

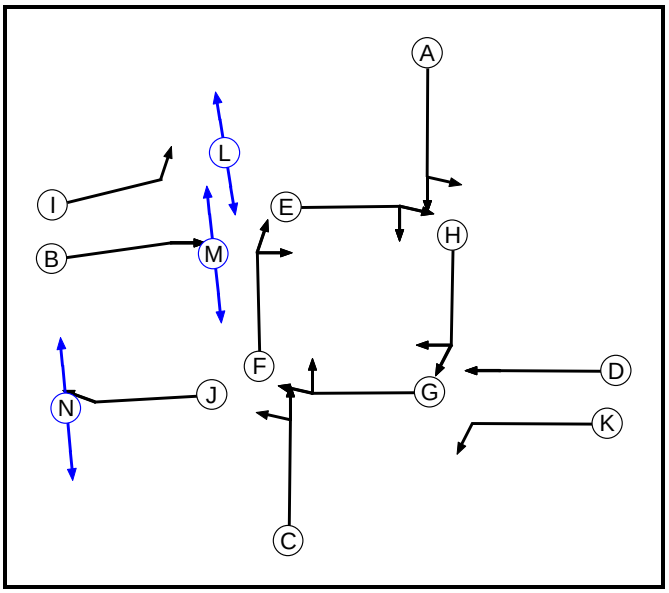
Junction: Unnamed Junction

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (A4119 Southbound)	U	A	2	3	13.0	User	1900	-	-	-	-	-
1/2 (A4119 Southbound)	U	A	2	3	200.0	User	1900	-	-	-	-	-
1/3 (A4119 Southbound)	U	A	2	3	200.0	User	1900	-	-	-	-	-
1/4 (A4119 Southbound)	U	A	2	3	13.2	User	1900	-	-	-	-	-
2/1 (A473 Westbound)	U	K	2	3	17.4	User	1900	-	-	-	-	-
2/2 (A473 Westbound)	U	D	2	3	200.0	User	1900	-	-	-	-	-
2/3 (A473 Westbound)	U	D	2	3	28.9	User	1900	-	-	-	-	-
3/1 (A4119 Northbound)	U	C	2	3	16.5	User	1900	-	-	-	-	-
3/2 (A4119 Northbound)	U	C	2	3	200.0	User	1900	-	-	-	-	-
3/3 (A4119 Northbound)	U	C	2	3	200.0	User	1900	-	-	-	-	-
3/4 (A4119 Northbound)	U	C	2	3	16.5	User	1900	-	-	-	-	-
4/1 (A473 Eastbound)	U	I	2	3	22.6	User	1900	-	-	-	-	-
4/2 (A473 Eastbound)	U	B	2	3	87.0	User	1900	-	-	-	-	-
4/3 (A473 Eastbound)	U	B	2	3	200.0	User	1900	-	-	-	-	-
4/4 (A473 Eastbound)	U	B	2	3	33.0	User	1900	-	-	-	-	-
8/1	U	J	2	3	200.0	User	1900	-	-	-	-	-
8/2	U	J	2	3	60.0	User	1900	-	-	-	-	-
9/1 (A4119 N/b Internal Link)	U	F	2	3	7.0	User	1900	-	-	-	-	-

Basic Results Summary

9/2 (A4119 N/b Internal Link)	U	F	2	3	6.6	User	1900	-	-	-	-	-
9/3 (A4119 N/b Internal Link)	U	F	2	3	6.1	User	1900	-	-	-	-	-
10/1 (A473 E/b Internal Link)	U	E	2	3	7.3	User	1900	-	-	-	-	-
10/2 (A473 E/b Internal Link)	U	E	2	3	6.4	User	1900	-	-	-	-	-
10/3 (A473 E/b Internal Link)	U	E	2	3	5.4	User	1900	-	-	-	-	-
11/1 (A4119 S/b Internal Link)	U	H	2	3	8.2	User	1900	-	-	-	-	-
11/2 (A4119 S/b Internal Link)	U	H	2	3	7.5	User	1900	-	-	-	-	-
11/3 (A4119 S/b Internal Link)	U	H	2	3	6.4	User	1900	-	-	-	-	-
12/1 (A473 W/b Internal Link)	U	G	2	3	60.0	User	1900	-	-	-	-	-
12/2 (A473 W/b Internal Link)	U	G	2	3	60.0	User	1900	-	-	-	-	-
12/3 (A473 W/b Internal Link)	U	G	2	3	7.5	User	1900	-	-	-	-	-

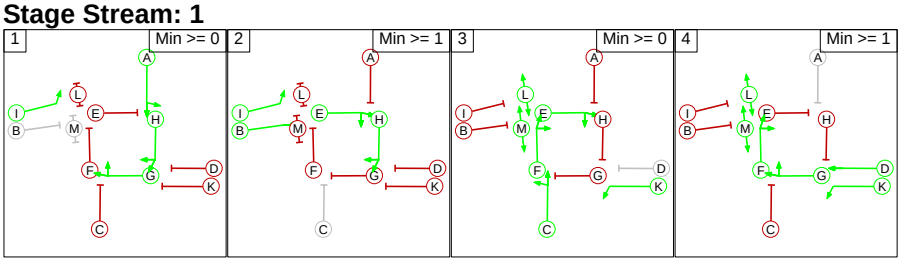
Phase Diagram



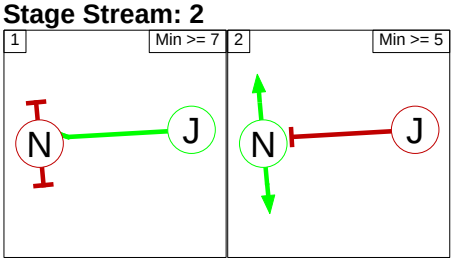
Basic Results Summary

Stages Diagram

Stage Stream: 1



Stage Stream: 2



Phase Delays

Stage Stream: 1

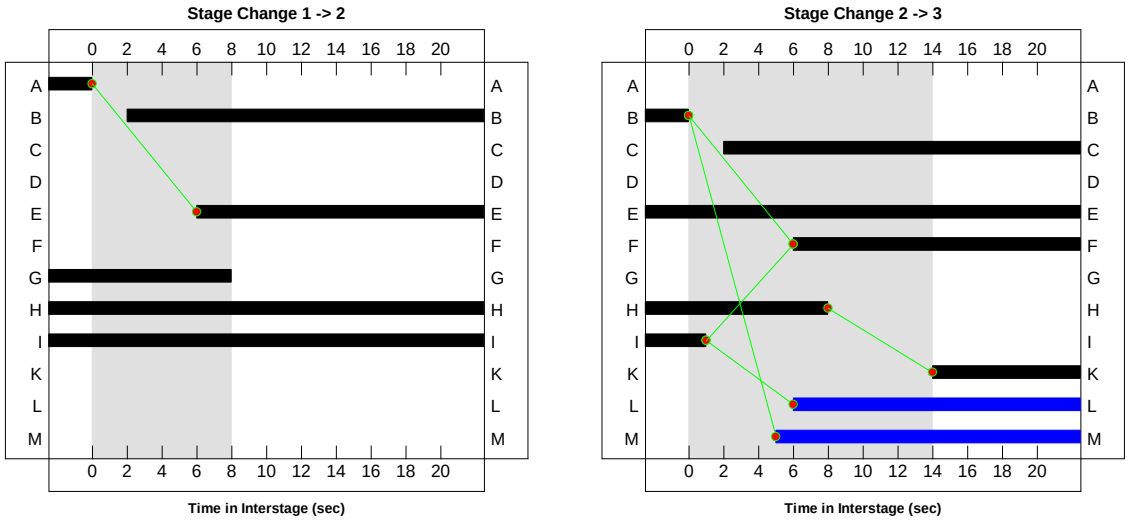
Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	2	G	Losing	8	8
2	3	H	Losing	8	8
2	3	I	Losing	1	1
3	4	E	Losing	8	8
4	1	F	Losing	8	8
4	1	K	Losing	1	1
4	1	L	Losing	9	9

Stage Stream: 2

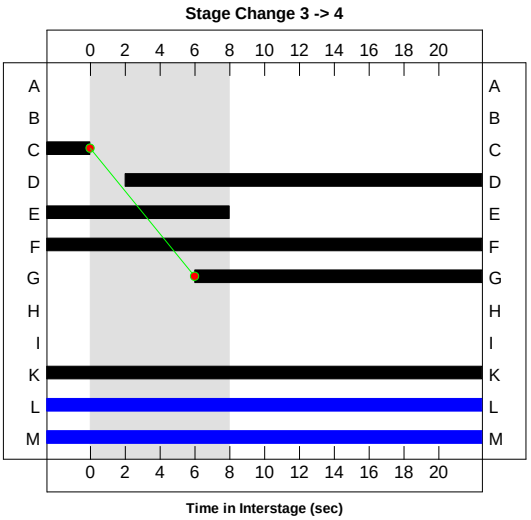
Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

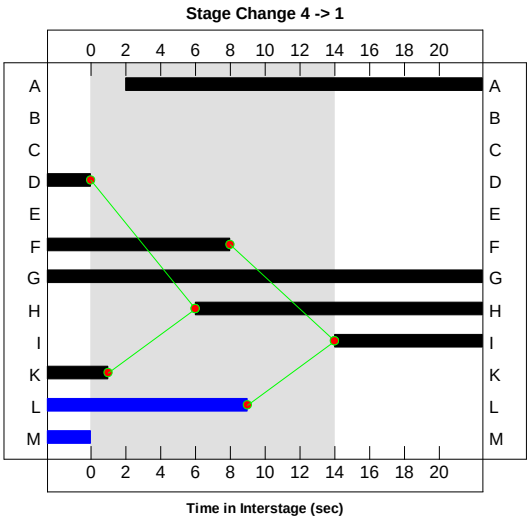
Interstage Diagram

Stage Stream: 1

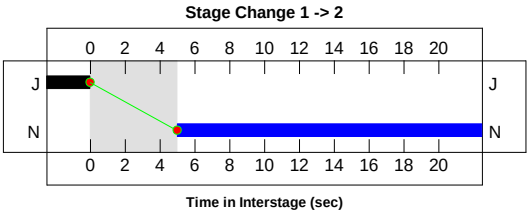


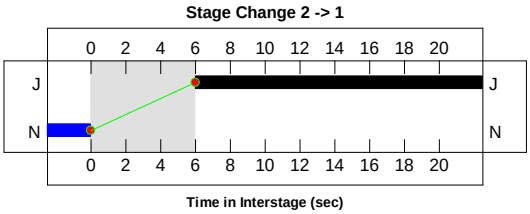
Basic Results Summary





Stage Stream: 2





Basic Results Summary

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Base'	08:00	09:00	01:00	

Scenario 1: '2017 AM Base' (FG1: '2017 AM Base', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	202	722	196	1120
	B	265	0	472	419	1156
	C	1083	327	0	192	1602
	D	188	427	189	0	804
	Tot.	1536	956	1383	807	4682

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	202	722	196	1120
	B	265	0	472	419	1156
	C	1083	327	0	192	1602
	D	188	427	189	0	804
	Tot.	1536	956	1383	807	4682

Basic Results Summary

Lane Green Times

Junction: Unnamed Junction					
Lane	**Description**	**Type**	**Phases**	**Start Green**	**End Green**
1/1	A4119 Southbound Left	U	A	2	17
1/2	A4119 Southbound Ahead	U	A	2	17
1/3	A4119 Southbound Ahead	U	A	2	17
1/4	A4119 Southbound Ahead	U	A	2	17
2/1	A473 Westbound Ahead	U	K	45	1
2/2	A473 Westbound Ahead	U	D	59	0
2/3	A473 Westbound Ahead	U	D	59	0
3/1	A4119 Northbound Left	U	C	33	57
3/2	A4119 Northbound Ahead	U	C	33	57
3/3	A4119 Northbound Ahead	U	C	33	57
3/4	A4119 Northbound Ahead	U	C	33	57
4/1	A473 Eastbound Left	U	I	14	32
4/2	A473 Eastbound Ahead	U	B	19	31
4/3	A473 Eastbound Ahead	U	B	19	31
4/4	A473 Eastbound Ahead	U	B	19	31
8/1	Ahead	U	J	66	50
8/2	Ahead	U	J	66	50
9/1	A4119 N/b Internal Link Ahead	U	F	37	8
9/2	A4119 N/b Internal Link Ahead	U	F	37	8
9/3	A4119 N/b Internal Link Right	U	F	37	8
10/1	A473 E/b Internal Link Ahead	U	E	23	65
10/2	A473 E/b Internal Link Ahead Right	U	E	23	65
10/3	A473 E/b Internal Link Right	U	E	23	65
11/1	A4119 S/b Internal Link Ahead	U	H	6	39
11/2	A4119 S/b Internal Link Ahead	U	H	6	39
11/3	A4119 S/b Internal Link Right	U	H	6	39
12/1	A473 W/b Internal Link Ahead	U	G	63	25
12/2	A473 W/b Internal Link Ahead Right	U	G	63	25
12/3	A473 W/b Internal Link Right	U	G	63	25

Basic Results Summary

Link Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A4119/A473 Roundabout Assessment - Option 8	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.8%**	**0**	**0**	**0**	**54.3**	**-**	**-**
Unnamed Junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.8%**	**0**	**0**	**0**	**54.3**	**-**	**-**
1/2+1/1	A4119 Southbound Left Ahead	U	A		1	15	-	566	1900:1900	405+225	89.8 : 89.8%	-	-	-	8.3	52.7	11.2
1/3+1/4	A4119 Southbound Ahead	U	A		1	15	-	554	1900:1900	405+222	88.3 : 88.3%	-	-	-	7.7	50.1	10.6
2/2+2/1	A473 Westbound Ahead Ahead2	U	D K		1	16:31	-	848	1900:1900	431+610	87.3 : 77.4%	-	-	-	7.2	30.7	9.7
2/3	A473 Westbound Ahead	U	D		1	16	-	308	1900	431	71.5%	-	-	-	3.5	41.2	7.1
3/2+3/1	A4119 Northbound Left Ahead	U	C		1	24	-	728	1900:1900	633+227	84.6 : 84.6%	-	-	-	7.1	35.1	12.9
3/3+3/4	A4119 Northbound Ahead	U	C		1	24	-	874	1900:1900	633+379	86.4 : 86.4%	-	-	-	8.4	34.7	13.7
4/2+4/1	A473 Eastbound Left Ahead	U	B I		1	12:18	-	463	1900:1900	329+475	83.5 : 39.6%	-	-	-	4.2	32.5	6.2
4/3+4/4	A473 Eastbound Ahead	U	B		1	12	-	341	1900:1900	329+329	57.7 : 45.9%	-	-	-	3.2	33.9	4.1
8/1	Ahead	U	J		1	59	-	568	1900	1520	37.4%	-	-	-	0.4	2.4	0.9
8/2	Ahead	U	J		1	59	-	239	1900	1520	15.7%	-	-	-	0.1	1.4	0.1
9/1	A4119 N/b Internal Link Ahead	U	F		1	46	-	629	1900	1191	52.8%	-	-	-	0.6	3.2	0.6

Basic Results Summary

9/2	A4119 N/b Internal Link Ahead	U	F		1	46	-	719	1900	1191	60.4%	-	-	-	0.8	3.8	0.8
9/3	A4119 N/b Internal Link Right	U	F		1	46	-	327	1900	1191	27.5%	-	-	-	0.2	2.1	0.2
10/1	A473 E/b Internal Link Ahead	U	E		1	42	-	407	1900	1089	37.4%	-	-	-	0.3	2.6	0.3
10/2	A473 E/b Internal Link Ahead Right	U	E		1	42	-	385	1900	1089	35.3%	-	-	-	0.3	2.6	0.3
10/3	A473 E/b Internal Link Right	U	E		1	42	-	151	1900	1089	13.9%	-	-	-	0.1	1.9	0.1
11/1	A4119 S/b Internal Link Ahead	U	H		1	33	-	402	1900	861	46.7%	-	-	-	0.4	3.9	0.4
11/2	A4119 S/b Internal Link Ahead	U	H		1	33	-	509	1900	861	59.1%	-	-	-	0.7	5.1	0.7
11/3	A4119 S/b Internal Link Right	U	H		1	33	-	196	1900	861	22.8%	-	-	-	0.1	2.7	0.1
12/1	A473 W/b Internal Link Ahead	U	G		1	37	-	376	1900	963	39.1%	-	-	-	0.3	3.1	0.3
12/2	A473 W/b Internal Link Ahead Right	U	G		1	37	-	332	1900	963	34.5%	-	-	-	0.3	2.9	0.3
12/3	A473 W/b Internal Link Right	U	G		1	37	-	172	1900	963	17.9%	-	-	-	0.1	2.3	0.1
Ped Link: P1	Peds x A473 W/b	-	N		1	5	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Peds x A473 E/b B	-	M		1	39	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Peds x A473 E/b I	-	L		1	47	-	0	-	0	0.0%	-	-	-	-	-	-

C1 - A4119/A473 Roundabout	Stream: 1 PRC for Signalled Lanes (%):	0.2	Total Delay for Signalled Lanes (pcuHr):	53.79
C1 - A4119/A473 Roundabout	Stream: 2 PRC for Signalled Lanes (%):	140.8	Total Delay for Signalled Lanes (pcuHr):	0.47
	PRC Over All Lanes (%):	0.2	Total Delay Over All Lanes(pcuHr):	54.27

Cycle Time (s):	75
Cycle Time (s):	75

Basic Results Summary

Basic Results Summary

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
2: '2017 PM Base'	16:45	17:45	01:00	

Scenario 2: '2017 PM Base' (FG2: '2017 PM Base', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	288	974	266	1528
	B	266	0	386	368	1020
	C	1278	651	0	203	2132
	D	289	454	221	0	964
	Tot.	1833	1393	1581	837	5644

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	288	974	266	1528
	B	266	0	386	368	1020
	C	1278	651	0	203	2132
	D	289	454	221	0	964
	Tot.	1833	1393	1581	837	5644

Basic Results Summary

Lane Green Times

Junction: Unnamed Junction					
Lane	**Description**	**Type**	**Phases**	**Start Green**	**End Green**
1/1	A4119 Southbound Left	U	A	2	21
1/2	A4119 Southbound Ahead	U	A	2	21
1/3	A4119 Southbound Ahead	U	A	2	21
1/4	A4119 Southbound Ahead	U	A	2	21
2/1	A473 Westbound Ahead	U	K	48	1
2/2	A473 Westbound Ahead	U	D	63	0
2/3	A473 Westbound Ahead	U	D	63	0
3/1	A4119 Northbound Left	U	C	36	61
3/2	A4119 Northbound Ahead	U	C	36	61
3/3	A4119 Northbound Ahead	U	C	36	61
3/4	A4119 Northbound Ahead	U	C	36	61
4/1	A473 Eastbound Left	U	I	14	35
4/2	A473 Eastbound Ahead	U	B	23	34
4/3	A473 Eastbound Ahead	U	B	23	34
4/4	A473 Eastbound Ahead	U	B	23	34
8/1	Ahead	U	J	70	54
8/2	Ahead	U	J	70	54
9/1	A4119 N/b Internal Link Ahead	U	F	40	8
9/2	A4119 N/b Internal Link Ahead	U	F	40	8
9/3	A4119 N/b Internal Link Right	U	F	40	8
10/1	A473 E/b Internal Link Ahead	U	E	27	69
10/2	A473 E/b Internal Link Ahead Right	U	E	27	69
10/3	A473 E/b Internal Link Right	U	E	27	69
11/1	A4119 S/b Internal Link Ahead	U	H	6	42
11/2	A4119 S/b Internal Link Ahead	U	H	6	42
11/3	A4119 S/b Internal Link Right	U	H	6	42
12/1	A473 W/b Internal Link Ahead	U	G	67	29
12/2	A473 W/b Internal Link Ahead Right	U	G	67	29
12/3	A473 W/b Internal Link Right	U	G	67	29

Basic Results Summary

Link Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A4119/A473 Roundabout Assessment - Option 8	-	-	-		-	-	-	-	-	-	**99.0%**	**0**	**0**	**0**	**101.6**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**99.0%**	**0**	**0**	**0**	**101.6**	-	-
1/2+1/1	A4119 Southbound Left Ahead	U	A		1	19	-	777	1900:1900	507+298	96.5 : 96.5%	-	-	-	14.2	65.7	18.6
1/3+1/4	A4119 Southbound Ahead	U	A		1	19	-	751	1900:1900	507+278	95.7 : 95.7%	-	-	-	13.1	62.6	17.5
2/2+2/1	A473 Westbound Ahead Ahead2	U	D K		1	12:28	-	712	1900:1900	329+401	99.0 : 96.3%	-	-	-	14.3	72.1	16.3
2/3	A473 Westbound Ahead	U	D		1	12	-	308	1900	329	93.5%	-	-	-	7.6	88.3	11.2
3/2+3/1	A4119 Northbound Left Ahead	U	C		1	25	-	834	1900:1900	659+212	95.8 : 95.8%	-	-	-	13.2	56.8	20.7
3/3+3/4	A4119 Northbound Ahead	U	C		1	25	-	1298	1900:1900	659+659	98.2 : 98.8%	-	-	-	22.6	62.6	27.2
4/2+4/1	A473 Eastbound Left Ahead	U	B I		1	11:21	-	567	1900:1900	304+557	91.4 : 51.9%	-	-	-	5.1	32.5	6.6
4/3+4/4	A473 Eastbound Ahead	U	B		1	11	-	397	1900:1900	304+304	73.0 : 57.6%	-	-	-	4.2	38.1	5.3
8/1	Ahead	U	J		1	59	-	529	1900	1520	34.8%	-	-	-	0.4	2.4	0.9
8/2	Ahead	U	J		1	59	-	308	1900	1520	20.3%	-	-	-	0.1	1.5	0.1
9/1	A4119 N/b Internal Link Ahead	U	F		1	43	-	734	1900	1115	65.8%	-	-	-	1.0	4.7	1.0

Basic Results Summary

9/2	A4119 N/b Internal Link Ahead	U	F		1	43	-	810	1900	1115	72.7%	-	-	-	1.3	5.9	1.3
9/3	A4119 N/b Internal Link Right	U	F		1	43	-	651	1900	1115	58.4%	-	-	-	0.7	3.9	0.7
10/1	A473 E/b Internal Link Ahead	U	E		1	42	-	590	1900	1089	54.2%	-	-	-	0.6	3.6	0.6
10/2	A473 E/b Internal Link Ahead Right	U	E		1	42	-	561	1900	1089	51.5%	-	-	-	0.5	3.4	0.5
10/3	A473 E/b Internal Link Right	U	E		1	42	-	175	1900	1089	16.1%	-	-	-	0.1	2.0	0.1
11/1	A4119 S/b Internal Link Ahead	U	H		1	36	-	535	1900	937	57.1%	-	-	-	0.7	4.5	0.7
11/2	A4119 S/b Internal Link Ahead	U	H		1	36	-	660	1900	937	70.4%	-	-	-	1.2	6.4	1.2
11/3	A4119 S/b Internal Link Right	U	H		1	36	-	266	1900	937	28.4%	-	-	-	0.2	2.7	0.2
12/1	A473 W/b Internal Link Ahead	U	G		1	37	-	326	1900	963	33.9%	-	-	-	0.3	2.8	0.3
12/2	A473 W/b Internal Link Ahead Right	U	G		1	37	-	411	1900	963	42.7%	-	-	-	0.4	3.3	0.4
12/3	A473 W/b Internal Link Right	U	G		1	37	-	163	1900	963	16.9%	-	-	-	0.1	2.3	0.1
Ped Link: P1	Peds x A473 W/b	-	N		1	5	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Peds x A473 E/b B	-	M		1	36	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Peds x A473 E/b I	-	L		1	44	-	0	-	0	0.0%	-	-	-	-	-	-

C1 - A4119/A473 Roundabout Stream: 1 PRC for Signalled Lanes (%): -10.0 Total Delay for Signalled Lanes (pcuHr): 101.07 Cycle Time (s): 75
C1 - A4119/A473 Roundabout Stream: 2 PRC for Signalled Lanes (%): 158.6 Total Delay for Signalled Lanes (pcuHr): 0.48 Cycle Time (s): 75
PRC Over All Lanes (%): -10.0 Total Delay Over All Lanes(pcuHr): 101.56

Basic Results Summary

Junctions 8

PICADY 8 - Priority Intersection Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Jct_11_PICADY_Staggered.arc8
Path: P:\Schemes_CS\cs0938xx\cs093813\07 Transportation\Junction Modelling\Jct11
Report generation date: 01/05/2018 11:21:11

Summary of junction performance

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Base							
Stream B-CD	0.00	0.00	0.00	A	13.02	9999999999.00	9999999999.00	F
Stream B-A	0.00	0.00	0.00	A	13.03	9999999999.00	9999999999.00	F
Stream A-B	-	-	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-	-	-
Stream A-D	-	-	-	-	-	-	-	-
Stream AB-CD	0.33	8.47	0.24	A	0.95	16.25	0.49	C
Stream AB-C	-	-	-	-	-	-	-	-
Stream D-AB	0.73	13.11	0.42	B	67.40	2038.83	9999999999.00	F
Stream D-C	0.05	16.51	0.04	C	5.02	3275.15	9999999999.00	F
Stream C-D	-	-	-	-	-	-	-	-
Stream C-A	-	-	-	-	-	-	-	-
Stream C-B	-	-	-	-	-	-	-	-
Stream CD-AB	0.01	6.16	0.01	A	0.01	8.05	0.01	A
Stream CD-A	-	-	-	-	-	-	-	-

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Base, AM " model duration: 07:45 - 09:15
"D2 - Base, PM" model duration: 16:30 - 18:00

Run using Junctions 8.0.6.541 at 01/05/2018 11:21:10

File summary

Title	A4119 Corridor Assessment
Location	Llantrisant
Site Number	Junction 11
Date	27/12/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	Daniel.Davies
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Last Run	Last Run	Stream B-CD	Capacity of Minor Stream B-CD has been reduced in timesegment(s) 3,4 due to traffic queuing at the center of the junction.

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	N/A		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Base, AM	Base	AM		ONE HOUR	07:45	09:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Major Road Direction	Arm Order	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A4119 Staggered Priority Jct	NS-OS Stagger (UK LR Stagger)	Two-way	A,B,C,D		11.33	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description	Arm Type
A4119 N	A	A4119 N		Major
Unnamed Rd E	B	Unnamed Rd E		Minor
A4119 S	C	A4119 S		Major
Unnamed Rd W	D	Unnamed Rd W		Minor

Major Arm Geometry

Name	Width of carriageway (m)	Has kerbed central reserve	Width of kerbed central reserve (m)	Has right turn bay	Width For Right Turn (m)	Visibility For Right Turn (m)	Blocks?	Blocking Queue (PCU)
A4119 N	15.20	✓	10.00	✓	5.00	200.00	✓	11.00
A4119 S	14.60	✓	9.30	✓	5.00	250.00	✓	11.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Name	Minor Arm Type	Lane Width (m)	Lane Width (Left) (m)	Lane Width (Right) (m)	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate Flare Length	Flare Length (PCU)	Visibility To Left (m)	Visibility To Right (m)
Unnamed Rd E	One lane plus flare				10.00	9.00	5.60	4.00	3.20	✓	2.00	150	62
Unnamed Rd W	One lane plus flare				10.00	8.70	5.00	4.60	4.30	✓	3.00	150	53

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B
1	AB-D	899.987	-	-	-	-	-	0.209	0.209	0.209	-	-
1	B-A	748.032	0.071	0.178	0.178	-	-	0.112	0.255	-	0.112	0.255
1	B-CD	735.980	0.071	0.178	0.178	-	-	-	-	-	-	-
1	CD-B	937.767	0.227	0.227	0.227	-	-	-	-	-	-	-
1	D-AB	767.926	-	-	-	-	-	0.178	0.178	0.071	-	-
1	D-C	629.199	-	0.089	0.203	0.089	0.203	0.142	0.142	0.056	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
A4119 N	ONE HOUR	✓	1399.00	100.000
Unnamed Rd E	ONE HOUR	✓	4.00	100.000
A4119 S	ONE HOUR	✓	1418.00	100.000
Unnamed Rd W	ONE HOUR	✓	194.00	100.000

Turning Proportions

Turning Counts / Proportions (PCU/hr) - A4119 Staggered Priority Jct (for whole period)

		To			
		A4119 N	**Unnamed Rd E**	**A4119 S**	**Unnamed Rd W**
From	**A4119 N**	0.000	16.000	1256.000	127.000
	Unnamed Rd E	1.000	0.000	3.000	0.000
	A4119 S	1406.000	1.000	0.000	11.000
	Unnamed Rd W	182.000	2.000	10.000	0.000

Turning Proportions (PCU) - A4119 Staggered Priority Jct (for whole period)

		To			
		A4119 N	**Unnamed Rd E**	**A4119 S**	**Unnamed Rd W**
From	**A4119 N**	0.00	0.01	0.90	0.09
	Unnamed Rd E	0.25	0.00	0.75	0.00
	A4119 S	0.99	0.00	0.00	0.01
	Unnamed Rd W	0.94	0.01	0.05	0.00

Vehicle Mix

Average PCU Per Vehicle - A4119 Staggered Priority Jct (for whole period)

		To			
		A4119 N	**Unnamed Rd E**	**A4119 S**	**Unnamed Rd W**
From	**A4119 N**	1.000	1.000	1.030	1.020
	Unnamed Rd E	1.000	1.000	1.000	1.000
	A4119 S	1.020	1.000	1.000	1.220
	Unnamed Rd W	1.030	1.000	1.110	1.000

Heavy Vehicle Percentages - A4119 Staggered Priority Jct (for whole period)

		To			
		A4119 N	Unnamed Rd E	A4119 S	Unnamed Rd W
From	A4119 N	0.0	0.0	3.0	2.0
	Unnamed Rd E	0.0	0.0	0.0	0.0
	A4119 S	2.0	0.0	0.0	22.0
	Unnamed Rd W	3.0	0.0	11.0	0.0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
B-CD	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-A	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A-B	-	-	-	-	14.68	22.02	-	-	-	-	-
A-C	-	-	-	-	1152.53	1728.79	-	-	-	-	-
A-D	-	-	-	-	116.54	174.81	-	-	-	-	-
AB-CD	0.24	8.47	0.33	A	116.54	174.81	21.56	7.40	0.24	21.56	7.40
AB-C	-	-	-	-	1152.53	1728.79	-	-	-	-	-
D-AB	0.42	13.11	0.73	B	168.84	253.26	44.73	10.60	0.50	44.73	10.60
D-C	0.04	16.51	0.05	C	9.18	13.76	3.10	13.50	0.03	3.10	13.50
C-D	-	-	-	-	10.09	15.14	-	-	-	-	-
C-A	-	-	-	-	1290.17	1935.26	-	-	-	-	-
C-B	-	-	-	-	0.92	1.38	-	-	-	-	-
CD-AB	0.01	6.16	0.01	A	2.75	4.13	0.39	5.68	0.00	0.39	5.68
CD-A	-	-	-	-	1456.96	2185.44	-	-	-	-	-

Main Results for each time segment

Main results: (07:45-08:00)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	549.31	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	426.56	0.000	0.00	0.00	0.000	A
A-B	12.05	3.01	12.05	0.00	-	-	-	-	-	-
A-C	945.58	236.40	945.58	0.00	-	-	-	-	-	-
A-D	95.61	23.90	95.61	0.00	-	-	-	-	-	-
AB-CD	95.61	23.90	94.95	0.00	676.73	0.141	0.00	0.17	6.305	A
AB-C	945.58	236.40	945.58	0.00	-	-	-	-	-	-
D-AB	138.52	34.63	137.23	0.00	575.41	0.241	0.00	0.32	8.436	A
D-C	7.53	1.88	7.44	0.00	374.11	0.020	0.00	0.02	10.895	B
C-D	8.28	2.07	8.28	0.00	-	-	-	-	-	-
C-A	1058.51	264.63	1058.51	0.00	-	-	-	-	-	-
C-B	0.75	0.19	0.75	0.00	-	-	-	-	-	-
CD-AB	2.24	0.56	2.23	0.00	698.26	0.003	0.00	0.00	5.171	A
CD-A	1194.25	298.56	1194.25	0.00	-	-	-	-	-	-

Main results: (08:00-08:15)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	513.08	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	364.01	0.000	0.00	0.00	0.000	A
A-B	14.38	3.60	14.38	0.00	-	-	-	-	-	-
A-C	1129.12	282.28	1129.12	0.00	-	-	-	-	-	-
A-D	114.17	28.54	114.17	0.00	-	-	-	-	-	-
AB-CD	114.17	28.54	113.95	0.00	633.39	0.180	0.17	0.22	7.065	A
AB-C	1129.12	282.28	1129.12	0.00	-	-	-	-	-	-
D-AB	165.41	41.35	164.90	0.00	537.72	0.308	0.32	0.45	9.928	A
D-C	8.99	2.25	8.95	0.00	323.91	0.028	0.02	0.03	12.685	B
C-D	9.89	2.47	9.89	0.00	-	-	-	-	-	-
C-A	1263.97	315.99	1263.97	0.00	-	-	-	-	-	-
C-B	0.90	0.22	0.90	0.00	-	-	-	-	-	-
CD-AB	2.69	0.67	2.69	0.00	651.78	0.004	0.00	0.00	5.545	A
CD-A	1427.07	356.77	1427.07	0.00	-	-	-	-	-	-

Main results: (08:15-08:30)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	60.00	0.000	0.00	0.00	0.000	A
A-B	17.62	4.40	17.62	0.00	-	-	-	-	-	-
A-C	1382.88	345.72	1382.88	0.00	-	-	-	-	-	-
A-D	139.83	34.96	139.83	0.00	-	-	-	-	-	-
AB-CD	139.83	34.96	139.42	0.00	573.48	0.244	0.22	0.32	8.452	A
AB-C	1382.88	345.72	1382.88	0.00	-	-	-	-	-	-
D-AB	202.59	50.65	201.51	0.00	485.30	0.417	0.45	0.72	13.011	B
D-C	11.01	2.75	10.94	0.00	253.14	0.044	0.03	0.05	16.493	C
C-D	12.11	3.03	12.11	0.00	-	-	-	-	-	-
C-A	1548.03	387.01	1548.03	0.00	-	-	-	-	-	-
C-B	1.10	0.28	1.10	0.00	-	-	-	-	-	-
CD-AB	3.29	0.82	3.29	0.00	587.50	0.006	0.00	0.01	6.161	A
CD-A	1747.35	436.84	1747.35	0.00	-	-	-	-	-	-

Main results: (08:30-08:45)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	60.00	0.000	0.00	0.00	0.000	A
A-B	17.62	4.40	17.62	0.00	-	-	-	-	-	-
A-C	1382.88	345.72	1382.88	0.00	-	-	-	-	-	-
A-D	139.83	34.96	139.83	0.00	-	-	-	-	-	-
AB-CD	139.83	34.96	139.82	0.00	573.48	0.244	0.32	0.33	8.467	A
AB-C	1382.88	345.72	1382.88	0.00	-	-	-	-	-	-
D-AB	202.59	50.65	202.55	0.00	485.26	0.417	0.72	0.73	13.107	B
D-C	11.01	2.75	11.01	0.00	252.97	0.044	0.05	0.05	16.514	C
C-D	12.11	3.03	12.11	0.00	-	-	-	-	-	-
C-A	1548.03	387.01	1548.03	0.00	-	-	-	-	-	-
C-B	1.10	0.28	1.10	0.00	-	-	-	-	-	-
CD-AB	3.30	0.83	3.30	0.00	587.50	0.006	0.01	0.01	6.161	A
CD-A	1748.39	437.10	1748.39	0.00	-	-	-	-	-	-

Main results: (08:45-09:00)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	513.08	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	363.82	0.000	0.00	0.00	0.000	A
A-B	14.38	3.60	14.38	0.00	-	-	-	-	-	-
A-C	1129.12	282.28	1129.12	0.00	-	-	-	-	-	-
A-D	114.17	28.54	114.17	0.00	-	-	-	-	-	-
AB-CD	114.17	28.54	114.57	0.00	633.39	0.180	0.33	0.23	7.082	A
AB-C	1129.12	282.28	1129.12	0.00	-	-	-	-	-	-
D-AB	165.41	41.35	166.47	0.00	537.67	0.308	0.73	0.46	10.013	B
D-C	8.99	2.25	9.06	0.00	323.74	0.028	0.05	0.03	12.700	B
C-D	9.89	2.47	9.89	0.00	-	-	-	-	-	-
C-A	1263.97	315.99	1263.97	0.00	-	-	-	-	-	-
C-B	0.90	0.22	0.90	0.00	-	-	-	-	-	-
CD-AB	2.71	0.68	2.71	0.00	651.78	0.004	0.01	0.00	5.545	A
CD-A	1428.63	357.16	1428.63	0.00	-	-	-	-	-	-

Main results: (09:00-09:15)

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
B-CD	0.00	0.00	0.00	0.00	549.31	0.000	0.00	0.00	0.000	A
B-A	0.00	0.00	0.00	0.00	426.34	0.000	0.00	0.00	0.000	A
A-B	12.05	3.01	12.05	0.00	-	-	-	-	-	-
A-C	945.58	236.40	945.58	0.00	-	-	-	-	-	-
A-D	95.61	23.90	95.61	0.00	-	-	-	-	-	-
AB-CD	95.61	23.90	95.84	0.00	676.73	0.141	0.23	0.17	6.323	A
AB-C	945.58	236.40	945.58	0.00	-	-	-	-	-	-
D-AB	138.52	34.63	139.06	0.00	575.35	0.241	0.46	0.33	8.508	A
D-C	7.53	1.88	7.56	0.00	373.92	0.020	0.03	0.02	10.910	B
C-D	8.28	2.07	8.28	0.00	-	-	-	-	-	-
C-A	1058.51	264.63	1058.51	0.00	-	-	-	-	-	-
C-B	0.75	0.19	0.75	0.00	-	-	-	-	-	-
CD-AB	2.26	0.57	2.27	0.00	698.26	0.003	0.00	0.00	5.173	A
CD-A	1196.06	299.02	1196.06	0.00	-	-	-	-	-	-

Queueing Delay Results for each time segment

Queueing Delay results: (07:45-08:00)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	2.48	0.17	6.305	A	A
AB-C	-	-	-	-	-
D-AB	4.64	0.31	8.436	A	A
D-C	0.32	0.02	10.895	B	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.05	0.00	5.171	A	A
CD-A	-	-	-	-	-

Queueing Delay results: (08:00-08:15)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	3.34	0.22	7.065	A	A
AB-C	-	-	-	-	-
D-AB	6.54	0.44	9.928	A	A
D-C	0.45	0.03	12.685	B	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.06	0.00	5.545	A	A
CD-A	-	-	-	-	-

Queueing Delay results: (08:15-08:30)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	4.87	0.32	8.452	A	A
AB-C	-	-	-	-	-
D-AB	10.30	0.69	13.011	B	B
D-C	0.71	0.05	16.493	C	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.08	0.01	6.161	A	A
CD-A	-	-	-	-	-

Queueing Delay results: (08:30-08:45)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	4.93	0.33	8.467	A	A
AB-C	-	-	-	-	-
D-AB	10.89	0.73	13.107	B	B
D-C	0.75	0.05	16.514	C	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.08	0.01	6.161	A	A
CD-A	-	-	-	-	-

Queueing Delay results: (08:45-09:00)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	3.41	0.23	7.082	A	A
AB-C	-	-	-	-	-
D-AB	7.26	0.48	10.013	B	B
D-C	0.50	0.03	12.700	B	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.06	0.00	5.545	A	A
CD-A	-	-	-	-	-

Queueing Delay results: (09:00-09:15)

Stream	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
B-CD	0.00	0.00	0.000	A	A
B-A	0.00	0.00	0.000	A	A
A-B	-	-	-	-	-
A-C	-	-	-	-	-
A-D	-	-	-	-	-
AB-CD	2.54	0.17	6.323	A	A
AB-C	-	-	-	-	-
D-AB	5.11	0.34	8.508	A	A
D-C	0.36	0.02	10.910	B	B
C-D	-	-	-	-	-
C-A	-	-	-	-	-
C-B	-	-	-	-	-
CD-AB	0.05	0.00	5.173	A	A
CD-A	-	-	-	-	-

Basic Results Summary

User and Project Details

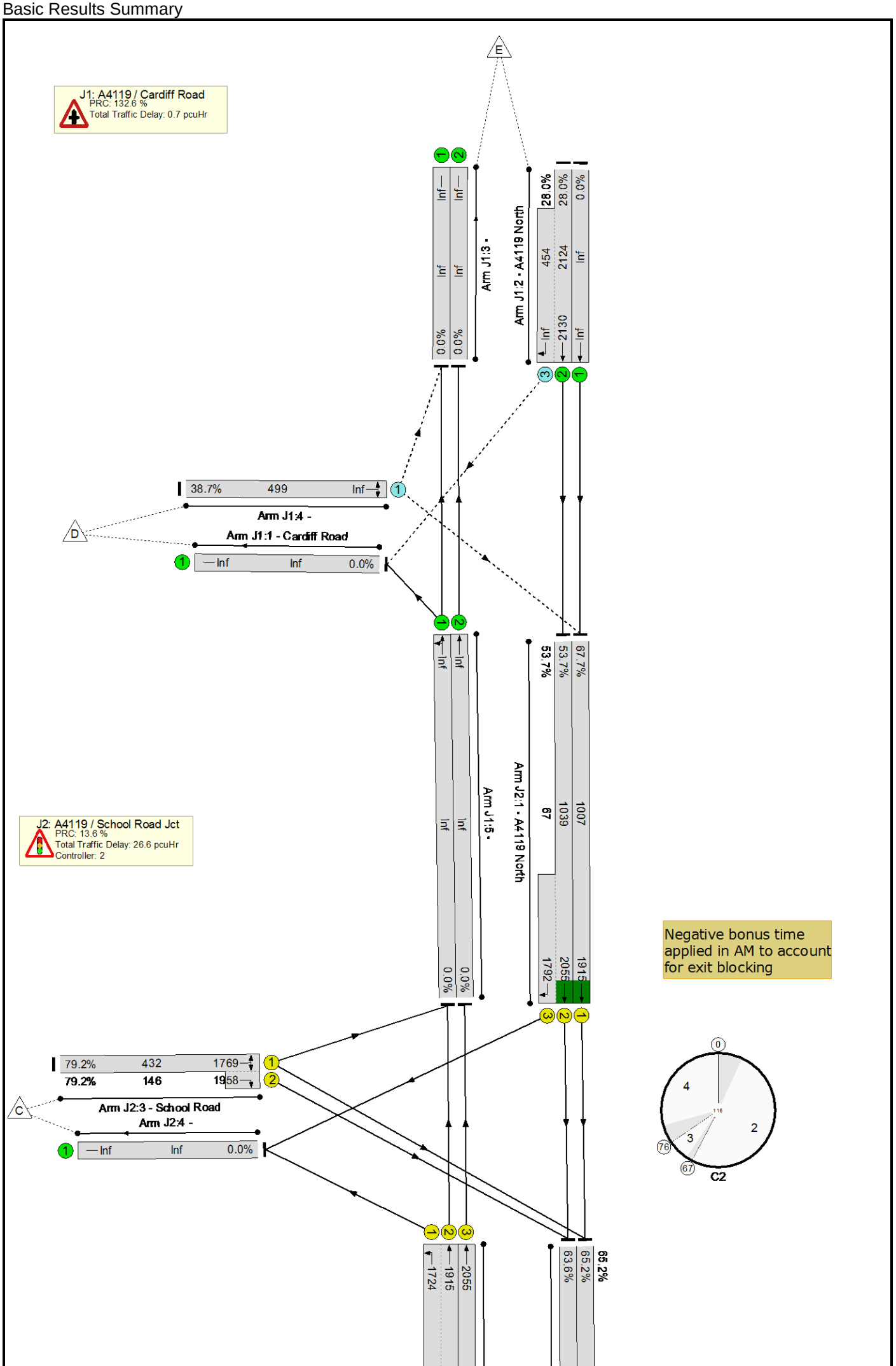
Project:	**A4119 Corridor Assessment**
Title:	**Junction 11,12 and 13 Analysis**
Location:	Talbot Green
Additional detail:	
File name:	A4119 Jct 11 12 13 Corridor Base_v2.lsg3x
Author:	Dan Davies
Company:	CAPITA
Address:	

Basic Results Summary

Scenario 1: '2015 AM Base' (FG3: '2015 AM Base + Q Demand', Plan 1: '2015 AM Base Merged')

Network Layout Diagram

Basic Results Summary



Basic Results Summary

Basic Results Summary

Network Results

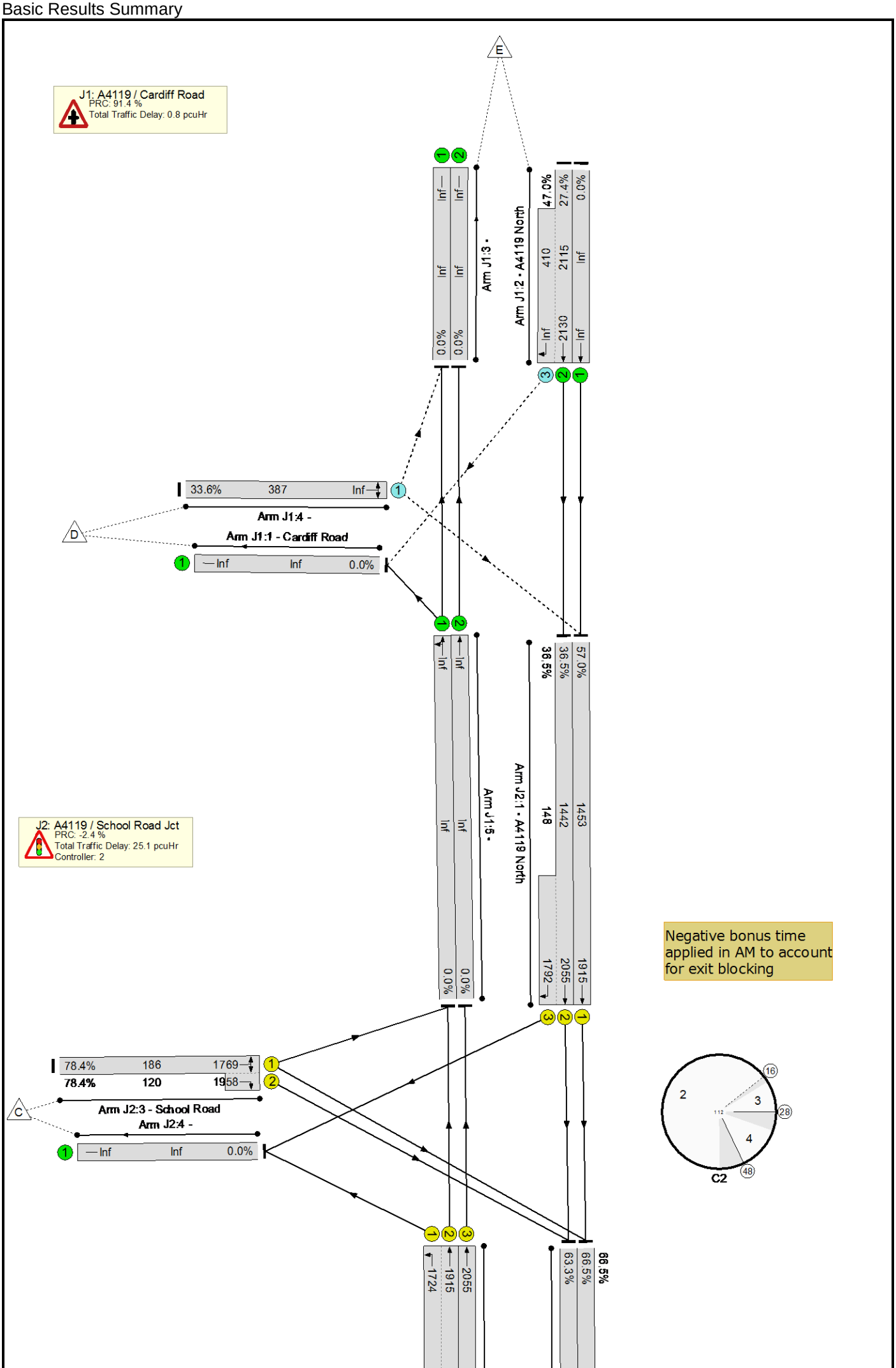
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**80.0%**	**674**	**251**	**0**	**49.1**	**-**	**-**
J1: A4119 / Cardiff Road	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**38.7%**	**320**	**0**	**0**	**0.7**	**-**	**-**
2/2+2/3	A4119 North Ahead Right	U+O	-		-	-	-	721	2130: Inf	2124+454	28.0 : 28.0%	127	0	0	0.2	1.1	1.0
4/1	Right Left	O	-		-	-	-	193	Inf	499	38.7%	193	0	0	0.4	8.1	2.2
J2: A4119 / School Road Jct	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**79.2%**	**0**	**0**	**0**	**26.6**	**-**	**-**
1/1	A4119 North Ahead	U	C2:A		1	68	-	682	1915	1007	67.7%	-	-	-	4.9	25.9	17.2
1/2+1/3	A4119 North Ahead Right	U	C2:A C2:C		1	68:7	-	594	2055:1792	1039+67	53.7 : 53.7%	-	-	-	3.9	23.4	12.2
2/2+2/1	A4119 South Left Ahead	U	C2:B C2:E		1	59:60	-	875	1915:1724	876+270	76.4 : 76.4%	-	-	-	6.3	25.9	17.6
2/3	A4119 South Ahead	U	C2:B		1	59	-	710	2055	1063	66.8%	-	-	-	5.1	25.7	17.8
3/1+3/2	School Road Right Left	U	C2:D		1	34	-	458	1769:1958	432+146	79.2 : 79.2%	-	-	-	6.5	50.7	14.2
J3: A4119 / Groesfaen Road	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**80.0%**	**354**	**251**	**0**	**21.9**	**-**	**-**
1/2+1/1	A4119 N Left Ahead	U+O	C1:C -		1	69	-	987	2035: Inf	989+524	65.2 : 65.2%	241	101	0	5.5	20.0	20.7
1/3	A4119 N Ahead	U	C1:C		1	69	-	674	2120	1060	63.6%	-	-	-	5.1	27.4	17.7
2/2+2/1	A4119 Groesfaen Road Left Right	U+O	C1:D -		1	26	-	561	1741: Inf	373+329	80.0 : 80.0%	113	150	0	6.7	42.7	13.9
3/1	A4119 S Ahead	U	C1:A		1	84	-	577	1985	1361	42.4%	-	-	-	1.8	10.9	9.0
3/2+3/3	A4119 S Right Ahead	U	C1:A	C1:B	1	84	7	892	2125:1781	1219+312	58.3 : 58.3%	-	-	-	2.9	11.5	12.1

Basic Results Summary

C1	PRC for Signalled Lanes (%):	12.6	Total Delay for Signalled Lanes (pcuHr):	21.87	Cycle Time (s):	124
C2	PRC for Signalled Lanes (%):	13.6	Total Delay for Signalled Lanes (pcuHr):	26.60	Cycle Time (s):	116
	PRC Over All Lanes (%):	12.6	Total Delay Over All Lanes(pcuHr):	49.12		

Basic Results Summary
Scenario 2: '2015 PM Base' (FG4: '2015 PM Base + Q Demand', Plan 1: '2015 AM Base Merged')
Network Layout Diagram

Basic Results Summary



Basic Results Summary

Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**92.2%**	**697**	**166**	**0**	**61.9**	-	-
J1: A4119 / Cardiff Road	-	-	-		-	-	-	-	-	-	**47.0%**	**323**	**0**	**0**	**0.8**	-	-
2/2+2/3	A4119 North Ahead Right	U+O	-		-	-	-	773	2130: Inf	2115+410	27.4 : 47.0%	193	0	0	0.4	2.1	3.1
4/1	Right Left	O	-		-	-	-	130	Inf	387	33.6%	130	0	0	0.4	9.8	1.8
J2: A4119 / School Road Jct	-	-	-		-	-	-	-	-	-	**92.2%**	**0**	**0**	**0**	**25.1**	-	-
1/1	A4119 North Ahead	U	C2:A		1	84	-	829	1915	1453	57.0%	-	-	-	2.0	8.6	11.5
1/2+1/3	A4119 North Ahead Right	U	C2:A C2:C		1	84:10	-	580	2055:1792	1442+148	36.5 : 36.5%	-	-	-	1.6	10.1	5.5
2/2+2/1	A4119 South Left Ahead	U	C2:B C2:E		1	72:73	-	1418	1915:1724	973+565	92.2 : 92.2%	-	-	-	10.0	25.3	27.4
2/3	A4119 South Ahead	U	C2:B		1	72	-	1104	2055	1339	82.4%	-	-	-	6.8	22.2	28.1
3/1+3/2	School Road Right Left	U	C2:D		1	14	-	240	1769:1958	186+120	78.4 : 78.4%	-	-	-	4.8	71.5	6.9
J3: A4119 / Groesfaen Road	-	-	-		-	-	-	-	-	-	**90.1%**	**374**	**166**	**0**	**35.9**	-	-
1/2+1/1	A4119 N Left Ahead	U+O	C1:C -		1	60	-	956	2035: Inf	906+533	66.5 : 66.5%	289	65	0	6.2	23.4	22.3
1/3	A4119 N Ahead	U	C1:C		1	60	-	620	2120	980	63.3%	-	-	-	5.5	32.0	18.1
2/2+2/1	A4119 Groesfaen Road Left Right	U+O	C1:D -		1	30	-	549	1741: Inf	407+209	89.1 : 89.1%	86	100	0	9.4	61.8	19.5
3/1	A4119 S Ahead	U	C1:A		1	88	-	1055	1985	1383	76.3%	-	-	-	5.4	18.4	26.5
3/2+3/3	A4119 S Right Ahead	U	C1:A	C1:B	1	88	20	1395	2125:1781	1226+323	90.1 : 90.1%	-	-	-	9.4	24.2	39.4

Basic Results Summary

C1	PRC for Signalled Lanes (%):	-0.1	Total Delay for Signalled Lanes (pcuHr):	35.92	Cycle Time (s):	132
C2	PRC for Signalled Lanes (%):	-2.4	Total Delay for Signalled Lanes (pcuHr):	25.15	Cycle Time (s):	112
	PRC Over All Lanes (%):	-2.4	Total Delay Over All Lanes(pcuHr):	61.86		

Appendix C – Matrix Estimation Results

AM Car Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	2329	3268	939	40.32	17.75	2415.87	86.87	3.73	1.78
31:17:00	17:27	377	601	224	59.42	10.13	373.14	-3.86	-1.02	0.2
19:17	17:30	611	650	39	6.38	1.55	600.1	-10.9	-1.78	0.44
26:17:00	17:23	3396	4051	655	19.29	10.73	3439.81	43.81	1.29	0.75
18:19	19:20	500	772	272	54.4	10.79	562.33	62.33	12.47	2.7
25:26:00	26:27:00	815	965	150	18.4	5.03	811.54	-3.46	-0.42	0.12
37:36:00	36:40:00	538	551	13	2.42	0.56	518.46	-19.54	-3.63	0.85
45:36:00	36:40:00	2314	2805	491	21.22	9.71	2360.23	46.23	2	0.96
45:36:00	36:37:00	440	414	-26	-5.91	1.26	420.51	-19.49	-4.43	0.94
35:36:00	36:39:00	2229	2771	542	24.32	10.84	2263.39	34.39	1.54	0.73
207:37:00	37:39:00	288	285	-3	-1.04	0.18	267.09	-20.91	-7.26	1.26
35:37:00	37:207	817	810	-7	-0.86	0.25	773.49	-43.51	-5.33	1.54
65:42:00	42:44:00	719	839	120	16.69	4.3	714.2	-4.8	-0.67	0.18
65:42:00	42:66	2141	2617	476	22.23	9.76	2221.48	80.48	3.76	1.72
65:42:00	42:46:00	166	171	5	3.01	0.39	152.36	-13.64	-8.22	1.08
46:42:00	42:44:00	655	713	58	8.85	2.22	655	0	0	0
46:42:00	42:57:00	382	413	31	8.12	1.55	409.48	27.48	7.19	1.38
43:42:00	42:57:00	2265	2710	445	19.65	8.92	2245.81	-19.19	-0.85	0.4
43:42:00	42:46:00	136	192	56	41.18	4.37	159.54	23.54	17.31	1.94
44:42:00	42:66	158	170	12	7.59	0.94	146.09	-11.91	-7.54	0.97
44:42:00	42:46:00	332	346	14	4.22	0.76	332	0	0	0
41:43:00	43:44:00	124	154	30	24.19	2.54	125.13	1.13	0.91	0.1
50:44:00	44:57:00	744	916	172	23.12	5.97	771.53	27.53	3.7	1
47:46:00	46:66	464	432	-32	-6.9	1.51	413.17	-50.83	-10.96	2.43
54:72	73:68	1339	1325	-14	-1.05	0.38	1280.5	-58.5	-4.37	1.62
54:72	69:70	2061	2701	640	31.05	13.12	2135.18	74.18	3.6	1.62
68:73	69:70	27	28	1	3.7	0.19	23.12	-3.88	-14.36	0.77
68:73	71:63	264	314	50	18.94	2.94	269.08	5.08	1.92	0.31
75:74	71:63	2706	3262	556	20.55	10.18	2772.51	66.51	2.46	1.27
75:74	73:68	138	125	-13	-9.42	1.13	122.5	-15.5	-11.23	1.36
81:77	77:78	27	46	19	70.37	3.14	29.39	2.39	8.84	0.45
81:77	77:25:00	1031	1292	261	25.32	7.66	1057.85	26.85	2.6	0.83
80:77	77:81	39	23	-16	-41.03	2.87	23.66	-15.34	-39.34	2.74
80:77	77:25:00	3173	3724	551	17.37	9.38	3193.51	20.51	0.65	0.36
82:77	77:78	2505	3381	876	34.97	16.15	2588.35	83.35	3.33	1.65
82:77	77:81	412	537	125	30.34	5.74	427.62	15.62	3.79	0.76
85:79	79:253	3196	3697	501	15.68	8.53	3177.33	-18.67	-0.58	0.33
85:79	79:83	283	351	68	24.03	3.82	293.2	10.2	3.6	0.6
83:79	79:85	375	434	59	15.73	2.93	362.2	-12.8	-3.41	0.67
83:79	79:253	14	25	11	78.57	2.49	18.7	4.7	33.58	1.16
255:79	79:85	2535	3494	959	37.83	17.47	2688.79	153.79	6.07	3.01
255:79	79:83	2	27	25	1250	6.57	9.8	7.8	389.97	3.21
79:85	85:89	19	17	-2	-10.53	0.47	16	-3	-15.78	0.72
88:85	85:89	19	24	5	26.32	1.08	23	4	21.04	0.87
89:85	85:79	3	12	9	300	3.29	6.14	3.14	104.62	1.47
89:85	85:86	5	13	8	160	2.67	6.72	1.72	34.44	0.71
100:107	107:33:00	454	480	26	5.73	1.2	441.54	-12.46	-2.74	0.59
115:110	118:117	290	477	187	64.48	9.55	362.55	72.55	25.02	4.02
115:110	120:112	206	264	58	28.16	3.78	199.15	-6.85	-3.33	0.48
115:110	121:116	286	327	41	14.34	2.34	258.21	-27.79	-9.72	1.68
115:110	123:114	19	22	3	15.79	0.66	18.37	-0.63	-3.33	0.15
111:119	120:112	182	254	72	39.56	4.88	200.53	18.53	10.18	1.34
111:119	121:116	1166	1497	331	28.39	9.07	1204.45	38.45	3.3	1.12

AM Car Matrix Estimation

111:119	123:114	60	78	18	30	2.17	62.38	2.38	3.97	0.3
111:119	110:115	650	902	252	38.77	9.05	692.48	42.48	6.54	1.64
112:120	121:116	130	182	52	40	4.16	143.39	13.39	10.3	1.14
112:120	110:115	21	86	65	309.52	8.89	20.54	-0.46	-2.2	0.1
112:120	118:117	102	112	10	9.8	0.97	97.72	-4.28	-4.2	0.43
113:122	123:114	16	21	5	31.25	1.16	18.11	2.11	13.22	0.51
113:122	110:115	311	372	61	19.61	3.3	319	8	2.57	0.45
113:122	118:117	2433	2775	342	14.06	6.7	2419.69	-13.31	-0.55	0.27
113:122	120:112	526	570	44	8.37	1.88	512.68	-13.32	-2.53	0.58
114:123	110:115	3	8	5	166.67	2.13	1.98	-1.02	-33.91	0.64
114:123	118:117	7	17	10	142.86	2.89	8.24	1.24	17.78	0.45
114:123	121:116	3	7	4	133.33	1.79	2.97	-0.03	-1.05	0.02
131:127	132:129	11	23	12	109.09	2.91	9.83	-1.17	-10.62	0.36
128:133	134:130	1442	1804	362	25.1	8.99	1453.11	11.11	0.77	0.29
128:133	127:131	142	209	67	47.18	5.06	155.9	13.9	9.79	1.14
130:134	127:131	39	37	-2	-5.13	0.32	34.1	-4.9	-12.57	0.81
130:134	132:129	3272	3715	443	13.54	7.5	3259.66	-12.34	-0.38	0.22
145:142	146:141	718	798	80	11.14	2.91	693.3	-24.7	-3.44	0.93
145:142	147:143	58	86	28	48.28	3.3	62.09	4.09	7.05	0.53
145:142	148:144	26	30	4	15.38	0.76	25.09	-0.91	-3.5	0.18
141:146	147:143	7	9	2	28.57	0.71	7.34	0.34	4.86	0.13
141:146	148:144	1282	1606	324	25.27	8.53	1291.49	9.49	0.74	0.26
141:146	142:145	161	193	32	19.88	2.41	156.27	-4.73	-2.94	0.38
143:147	148:144	23	18	-5	-21.74	1.1	22.36	-0.64	-2.8	0.14
143:147	142:145	1	11	10	1000	4.08	1.26	0.26	25.91	0.24
143:147	146:141	13	9	-4	-30.77	1.21	11.45	-1.55	-11.93	0.44
144:148	142:145	11	18	7	63.64	1.84	14.06	3.06	27.81	0.86
144:148	146:141	2608	2945	337	12.92	6.4	2589.01	-18.99	-0.73	0.37
144:148	147:143	184	162	-22	-11.96	1.67	167.57	-16.43	-8.93	1.24
158:157	161:159	128	100	-28	-21.88	2.62	106.12	-21.88	-17.09	2.02
158:157	162:156	1887	2080	193	10.23	4.33	1851.83	-35.17	-1.86	0.81
158:157	163:160	329	440	111	33.74	5.66	351.03	22.03	6.7	1.19
159:161	162:156	267	268	1	0.37	0.06	243.93	-23.07	-8.64	1.44
159:161	163:160	127	150	23	18.11	1.95	128.64	1.64	1.29	0.15
159:161	157:158	141	153	12	8.51	0.99	136.81	-4.19	-2.97	0.36
156:162	163:160	318	356	38	11.95	2.07	293.17	-24.83	-7.81	1.42
156:162	157:158	913	1124	211	23.11	6.61	907.58	-5.42	-0.59	0.18
156:162	161:159	122	174	52	42.62	4.27	138.19	16.19	13.27	1.42
160:163	157:158	524	595	71	13.55	3	513.46	-10.54	-2.01	0.46
160:163	161:159	239	221	-18	-7.53	1.19	239	0	0	0
160:163	162:156	637	777	140	21.98	5.27	674.88	37.88	5.95	1.48
167:166	169:168	88	103	15	17.05	1.53	88.81	0.81	0.92	0.09
167:166	170:165	1564	1646	82	5.24	2.05	1489.45	-74.55	-4.77	1.91
168:169	170:165	777	974	197	25.35	6.66	819.53	42.53	5.47	1.51
168:169	166:167	136	205	69	50.74	5.28	135.87	-0.13	-0.1	0.01
165:170	166:167	997	1179	182	18.25	5.52	974.27	-22.73	-2.28	0.72
165:170	169:168	586	693	107	18.26	4.23	583.59	-2.41	-0.41	0.1
265:193	194:99	1203	1324	121	10.06	3.4	1145.51	-57.49	-4.78	1.68
94:195	196:106	339	558	219	64.6	10.34	373	34	10.03	1.8
94:195	199:107	1983	2490	507	25.57	10.72	2030.63	47.63	2.4	1.06
94:195	192:108	604	876	272	45.03	10	638.08	34.08	5.64	1.37
101:197	192:108	753	991	238	31.61	8.06	753	0	0	0
101:197	194:99	418	555	137	32.78	6.21	457.5	39.5	9.45	1.89
102:198	192:108	478	576	98	20.5	4.27	499.67	21.67	4.53	0.98
102:198	194:99	1873	2181	308	16.44	6.84	1884.39	11.39	0.61	0.26
102:198	196:106	516	595	79	15.31	3.35	491.23	-24.77	-4.8	1.1

AM LGV Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	428	3268	2840	663.55	66.06	406.65	-21.35	-4.99	1.05
31:17:00	17:27	86	601	515	598.84	27.79	86	0	0	0
19:17	17:30	65	650	585	900	30.94	73.9	8.9	13.69	1.07
26:17:00	17:23	527	4051	3524	668.69	73.66	506.15	-20.85	-3.96	0.92
18:19	19:20	64	772	708	1106.25	34.63	64	0	0	0
25:26:00	26:27:00	118	965	847	717.8	36.4	115.48	-2.52	-2.14	0.23
37:36:00	36:40:00	70	551	481	687.14	27.3	79.28	9.28	13.26	1.07
45:36:00	36:40:00	458	2805	2347	512.45	58.11	440.82	-17.18	-3.75	0.81
45:36:00	36:37:00	49	414	365	744.9	23.99	63.57	14.57	29.74	1.94
35:36:00	36:39:00	241	2771	2530	1049.79	65.19	237.74	-3.26	-1.35	0.21
207:37:00	37:39:00	40	285	245	612.5	19.22	32.04	-7.96	-19.89	1.33
35:37:00	37:207	145	810	665	458.62	30.43	123.67	-21.33	-14.71	1.84
65:42:00	42:44:00	114	839	725	635.96	33.21	116.78	2.78	2.44	0.26
65:42:00	42:66	440	2617	2177	494.77	55.68	426.59	-13.41	-3.05	0.64
65:42:00	42:46:00	17	171	154	905.88	15.88	19.45	2.45	14.42	0.57
46:42:00	42:44:00	83	713	630	759.04	31.58	82.69	-0.31	-0.37	0.03
46:42:00	42:57:00	15	413	398	2653.33	27.21	15.53	0.53	3.53	0.14
43:42:00	42:57:00	227	2710	2483	1093.83	64.79	229.5	2.5	1.1	0.17
43:42:00	42:46:00	16	192	176	1100	17.26	20.32	4.32	26.97	1.01
44:42:00	42:66	32	170	138	431.25	13.73	30.64	-1.36	-4.25	0.24
44:42:00	42:46:00	35	346	311	888.57	22.53	35	0	0	0
41:43:00	43:44:00	37	154	117	316.22	11.97	19.97	-17.03	-46.02	3.19
50:44:00	44:57:00	101	916	815	806.93	36.14	96.92	-4.08	-4.04	0.41
47:46:00	46:66	35	432	397	1134.29	25.98	47.16	12.16	34.73	1.9
54:72	73:68	38	1325	1287	3386.84	49.3	42.08	4.08	10.74	0.64
54:72	69:70	301	2701	2400	797.34	61.95	298.68	-2.32	-0.77	0.13
68:73	69:70	6	28	22	366.67	5.34	4.37	-1.63	-27.24	0.72
68:73	71:63	31	314	283	912.9	21.55	35.16	4.16	13.41	0.72
75:74	71:63	536	3262	2726	508.58	62.56	521.37	-14.63	-2.73	0.64
75:74	73:68	7	125	118	1685.71	14.52	7.92	0.92	13.14	0.34
81:77	77:78	4	46	42	1050	8.4	4.11	0.11	2.69	0.05
81:77	77:25:00	96	1292	1196	1245.83	45.4	105.86	9.86	10.27	0.98
80:77	77:81	7	23	16	228.57	4.13	3.91	-3.09	-44.09	1.32
80:77	77:25:00	545	3724	3179	583.3	68.81	515.77	-29.23	-5.36	1.27
82:77	77:78	424	3381	2957	697.41	67.79	408.31	-15.69	-3.7	0.77
82:77	77:81	68	537	469	689.71	26.97	72.24	4.24	6.24	0.51
85:79	79:253	549	3697	3148	573.41	68.32	512.94	-36.06	-6.57	1.56
85:79	79:83	41	351	310	756.1	22.14	38.69	-2.31	-5.63	0.37
83:79	79:85	27	434	407	1507.41	26.81	29.57	2.57	9.52	0.48
83:79	79:253	2	25	23	1150	6.26	2.23	0.23	11.54	0.16
255:79	79:85	431	3494	3063	710.67	69.14	422.45	-8.55	-1.98	0.41
79:85	85:89	2	17	15	750	4.87	3.02	1.02	50.91	0.64
88:85	85:89	7	24	17	242.86	4.32	6.2	-0.8	-11.47	0.31
89:85	85:79	3	12	9	300	3.29	3.24	0.24	7.86	0.13
89:85	85:86	2	13	11	550	4.02	2.6	0.6	29.88	0.39
100:107	107:33:00	58	480	422	727.59	25.73	68.95	10.95	18.88	1.37
115:110	118:117	110	477	367	333.64	21.42	99.92	-10.08	-9.16	0.98
115:110	120:112	3	264	261	8700	22.59	3	0	0	0
115:110	121:116	47	327	280	595.74	20.48	54.21	7.21	15.33	1.01
115:110	123:114	1	22	21	2100	6.19	1	0	0	0
111:119	120:112	24	254	230	958.33	19.51	19.57	-4.43	-18.47	0.95
111:119	121:116	204	1497	1293	633.82	44.34	191.95	-12.05	-5.91	0.86
111:119	123:114	12	78	66	550	9.84	11.12	-0.88	-7.34	0.26

AM LGV Matrix Estimation

111:119	110:115	68	902	834	1226.47	37.87	81.11	13.11	19.27	1.52
112:120	121:116	12	182	170	1416.67	17.26	20.51	8.51	70.93	2.11
112:120	110:115	3	86	83	2766.67	12.44	2.86	-0.14	-4.75	0.08
112:120	118:117	26	112	86	330.77	10.35	21.46	-4.54	-17.48	0.93
113:122	123:114	2	21	19	950	5.6	2.67	0.67	33.61	0.44
113:122	110:115	40	372	332	830	23.13	38.11	-1.89	-4.72	0.3
113:122	118:117	392	2775	2383	607.91	59.88	400.97	8.97	2.29	0.45
113:122	120:112	29	570	541	1865.52	31.26	36.65	7.65	26.37	1.33
114:123	110:115	2	8	6	300	2.68	1.93	-0.07	-3.69	0.05
114:123	118:117	9	17	8	88.89	2.22	6.85	-2.15	-23.84	0.76
114:123	121:116	3	7	4	133.33	1.79	2.53	-0.47	-15.81	0.29
131:127	132:129	9	23	14	155.56	3.5	8.86	-0.14	-1.51	0.05
131:127	134:130	3	4	1	33.33	0.53	2.58	-0.42	-13.97	0.25
128:133	134:130	256	1804	1548	604.69	48.23	255.62	-0.38	-0.15	0.02
128:133	127:131	13	209	196	1507.69	18.6	13.57	0.57	4.42	0.16
130:134	127:131	1	37	36	3600	8.26	1.43	0.43	42.58	0.39
130:134	132:129	452	3715	3263	721.9	71.49	469.54	17.54	3.88	0.82
145:142	146:141	108	798	690	638.89	32.42	108.63	0.63	0.59	0.06
145:142	147:143	12	86	74	616.67	10.57	12	0	0	0
145:142	148:144	12	30	18	150	3.93	9.43	-2.57	-21.43	0.79
141:146	148:144	216	1606	1390	643.52	46.05	224.25	8.25	3.82	0.56
141:146	142:145	41	193	152	370.73	14.05	31.27	-9.73	-23.72	1.62
143:147	148:144	9	18	9	100	2.45	5.57	-3.43	-38.12	1.27
143:147	146:141	6	9	3	50	1.1	1.7	-4.3	-71.6	2.19
144:148	142:145	4	18	14	350	4.22	3.34	-0.66	-16.45	0.34
144:148	146:141	328	2945	2617	797.87	64.69	360.63	32.63	9.95	1.76
144:148	147:143	63	162	99	157.14	9.33	55.38	-7.62	-12.09	0.99
158:157	161:159	37	100	63	170.27	7.61	30.74	-6.26	-16.92	1.08
158:157	162:156	279	2080	1801	645.52	52.44	285.85	6.85	2.46	0.41
158:157	163:160	87	440	353	405.75	21.75	82.39	-4.61	-5.3	0.5
159:161	162:156	40	268	228	570	18.37	42.32	2.32	5.79	0.36
159:161	163:160	24	150	126	525	13.51	24	0	0	0
159:161	157:158	21	153	132	628.57	14.15	21.63	0.63	2.98	0.14
156:162	163:160	67	356	289	431.34	19.87	59.82	-7.18	-10.71	0.9
156:162	157:158	158	1124	966	611.39	38.15	153.78	-4.22	-2.67	0.34
156:162	161:159	20	174	154	770	15.64	25.65	5.65	28.23	1.18
160:163	157:158	78	595	517	662.82	28.18	80.46	2.46	3.15	0.28
160:163	161:159	27	221	194	718.52	17.42	27	0	0	0
160:163	162:156	77	777	700	909.09	33.88	91.18	14.18	18.42	1.55
167:166	169:168	10	103	93	930	12.37	10	0	0	0
167:166	170:165	260	1646	1386	533.08	44.9	252.24	-7.76	-2.98	0.48
168:169	170:165	135	974	839	621.48	35.63	146.74	11.74	8.69	0.99
168:169	166:167	18	205	187	1038.89	17.71	18	0	0	0
165:170	166:167	149	1179	1030	691.28	39.97	155.93	6.93	4.65	0.56
165:170	169:168	104	693	589	566.35	29.51	99.94	-4.06	-3.91	0.4
265:193	194:99	112	1324	1212	1082.14	45.23	70.17	-41.83	-37.35	4.38
94:195	196:106	85	558	473	556.47	26.38	67.64	-17.36	-20.42	1.99
94:195	199:107	267	2490	2223	832.58	59.87	271.77	4.77	1.78	0.29
94:195	192:108	106	876	770	726.42	34.75	112.19	6.19	5.84	0.59
101:197	192:108	157	991	834	531.21	34.81	157	0	0	0
101:197	194:99	116	555	439	378.45	23.97	112.8	-3.2	-2.76	0.3
102:198	192:108	77	576	499	648.05	27.62	82.03	5.03	6.53	0.56
102:198	194:99	362	2181	1819	502.49	51.01	371.63	9.63	2.66	0.5
102:198	196:106	80	595	515	643.75	28.03	66.01	-13.99	-17.48	1.64

AM HGV Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	181	3268	3087	1705.52	74.34	174.35	-6.65	-3.67	0.5
31:17:00	17:27	16	601	585	3656.25	33.31	16	0	0	0
19:17	17:30	45	650	605	1344.44	32.45	43.1	-1.9	-4.23	0.29
26:17:00	17:23	161	4051	3890	2416.15	84.77	163.07	2.07	1.29	0.16
18:19	19:20	17	772	755	4441.18	38.01	17	0	0	0
25:26:00	26:27:00	65	965	900	1384.62	39.66	62.06	-2.94	-4.52	0.37
37:36:00	36:40:00	8	551	543	6787.5	32.48	6.33	-1.67	-20.87	0.62
45:36:00	36:40:00	129	2805	2676	2074.42	69.87	126.96	-2.04	-1.58	0.18
45:36:00	36:37:00	4	414	410	10250	28.36	3.7	-0.3	-7.47	0.15
35:36:00	36:39:00	110	2771	2661	2419.09	70.11	104.98	-5.02	-4.56	0.48
35:37:00	37:207	12	810	798	6650	39.36	14.26	2.26	18.83	0.62
65:42:00	42:44:00	40	839	799	1997.5	38.11	40.85	0.85	2.12	0.13
65:42:00	42:66	113	2617	2504	2215.93	67.77	107.03	-5.97	-5.28	0.57
65:42:00	42:46:00	20	171	151	755	15.45	16.95	-3.05	-15.23	0.71
46:42:00	42:44:00	18	713	695	3861.11	36.35	17.49	-0.51	-2.82	0.12
46:42:00	42:57:00	6	413	407	6783.33	28.12	5.78	-0.22	-3.68	0.09
43:42:00	42:57:00	103	2710	2607	2531.07	69.51	97.38	-5.62	-5.45	0.56
43:42:00	42:46:00	1	192	191	19100	19.44	3.27	2.27	227.45	1.56
44:42:00	42:66	15	170	155	1033.33	16.12	14.14	-0.86	-5.73	0.23
44:42:00	42:46:00	8	346	338	4225	25.41	8	0	0	0
41:43:00	43:44:00	9	154	145	1611.11	16.06	6.9	-2.1	-23.3	0.74
50:44:00	44:57:00	42	916	874	2080.95	39.93	45.4	3.4	8.1	0.51
47:46:00	46:66	5	432	427	8540	28.89	9.49	4.49	89.74	1.67
54:72	73:68	16	1325	1309	8181.25	50.55	18.86	2.86	17.88	0.69
54:72	69:70	138	2701	2563	1857.25	68.03	129.32	-8.68	-6.29	0.75
68:73	69:70	5	28	23	460	5.66	4.92	-0.08	-1.54	0.03
68:73	71:63	32	314	282	881.25	21.44	36.81	4.81	15.02	0.82
75:74	71:63	144	3262	3118	2165.28	75.56	123.12	-20.88	-14.5	1.81
75:74	73:68	1	125	124	12400	15.62	1.14	0.14	13.91	0.13
81:77	77:78	13	46	33	253.85	6.08	10.66	-2.34	-17.99	0.68
81:77	77:25:00	51	1292	1241	2433.33	47.89	62.89	11.89	23.31	1.58
80:77	77:81	11	23	12	109.09	2.91	3.28	-7.72	-70.2	2.89
80:77	77:25:00	180	3724	3544	1968.89	80.21	162.25	-17.75	-9.86	1.36
82:77	77:78	189	3381	3192	1688.89	75.55	177.94	-11.06	-5.85	0.82
82:77	77:81	34	537	503	1479.41	29.77	39.51	5.51	16.21	0.91
85:79	79:253	183	3697	3514	1920.22	79.78	158.8	-24.2	-13.23	1.85
85:79	79:83	11	351	340	3090.91	25.27	11.7	0.7	6.4	0.21
83:79	79:85	17	434	417	2452.94	27.77	21.31	4.31	25.38	0.99
83:79	79:253	8	25	17	212.5	4.19	5.1	-2.9	-36.28	1.13
255:79	79:85	192	3494	3302	1719.79	76.92	183.51	-8.49	-4.42	0.62
255:79	79:83	1	27	26	2600	6.95	1.67	0.67	66.66	0.58
79:85	85:89	10	17	7	70	1.91	7.7	-2.3	-22.97	0.77
89:85	85:79	2	12	10	500	3.78	2.28	0.28	14.24	0.19
89:85	85:86	2	13	11	550	4.02	2.54	0.54	27.13	0.36
100:107	107:33:00	10	480	470	4700	30.03	15.32	5.32	53.15	1.49
115:110	118:117	65	477	412	633.85	25.03	43.61	-21.39	-32.91	2.9
115:110	120:112	2	264	262	13100	22.72	2.01	0.01	0.5	0.01
115:110	121:116	15	327	312	2080	23.86	18.58	3.58	23.89	0.87
111:119	120:112	24	254	230	958.33	19.51	19.91	-4.09	-17.05	0.87
111:119	121:116	73	1497	1424	1950.68	50.82	73.05	0.05	0.07	0.01
111:119	123:114	3	78	75	2500	11.79	0	-3	-100	2.45
111:119	110:115	41	902	861	2100	39.65	41.32	0.32	0.78	0.05
112:120	121:116	9	182	173	1922.22	17.7	2.18	-6.82	-75.75	2.88

AM HGV Matrix Estimation

112:120	118:117	6	112	106	1766.67	13.8	1.61	-4.39	-73.14	2.25
113:122	110:115	13	372	359	2761.54	25.87	8.27	-4.73	-36.38	1.45
113:122	118:117	75	2775	2700	3600	71.52	79.74	4.74	6.32	0.54
113:122	120:112	15	570	555	3700	32.45	14.89	-0.11	-0.73	0.03
114:123	110:115	1	8	7	700	3.3	0.57	-0.43	-42.73	0.48
131:127	132:129	3	23	20	666.67	5.55	2.61	-0.39	-13.01	0.23
128:133	134:130	92	1804	1712	1860.87	55.6	89.53	-2.47	-2.68	0.26
128:133	127:131	3	209	206	6866.67	20.01	4.33	1.33	44.49	0.7
130:134	127:131	1	37	36	3600	8.26	0.58	-0.42	-41.97	0.47
130:134	132:129	98	3715	3617	3690.82	82.84	100.29	2.29	2.34	0.23
145:142	146:141	24	798	774	3225	38.18	8.55	-15.45	-64.38	3.83
141:146	147:143	1	9	8	800	3.58	0	-1	-100	1.41
141:146	148:144	80	1606	1526	1907.5	52.56	78.44	-1.56	-1.95	0.18
141:146	142:145	12	193	181	1508.33	17.88	11.48	-0.52	-4.3	0.15
144:148	146:141	73	2945	2872	3934.25	73.93	92.32	19.32	26.47	2.13
144:148	147:143	1	162	161	16100	17.83	0	-1	-100	1.41
158:157	161:159	2	100	98	4900	13.72	1.77	-0.23	-11.37	0.17
158:157	162:156	58	2080	2022	3486.21	61.84	67.5	9.5	16.37	1.2
158:157	163:160	17	440	423	2488.24	27.98	15.11	-1.89	-11.11	0.47
159:161	162:156	5	268	263	5260	22.51	5.67	0.67	13.48	0.29
159:161	163:160	1	150	149	14900	17.15	0.96	-0.04	-4.12	0.04
159:161	157:158	2	153	151	7550	17.15	2.29	0.29	14.69	0.2
156:162	163:160	22	356	334	1518.18	24.29	21.77	-0.23	-1.06	0.05
156:162	157:158	54	1124	1070	1981.48	44.09	51.46	-2.54	-4.7	0.35
156:162	161:159	4	174	170	4250	18.02	5.52	1.52	37.88	0.69
160:163	157:158	24	595	571	2379.17	32.46	23.33	-0.67	-2.79	0.14
160:163	161:159	3	221	218	7266.67	20.6	2.71	-0.29	-9.6	0.17
160:163	162:156	13	777	764	5876.92	38.44	19.62	6.62	50.93	1.64
167:166	169:168	3	103	100	3333.33	13.74	3	0	0	0
167:166	170:165	53	1646	1593	3005.66	54.66	58.82	5.82	10.98	0.78
168:169	170:165	22	974	952	4327.27	42.66	25.56	3.56	16.2	0.73
168:169	166:167	3	205	202	6733.33	19.81	3	0	0	0
165:170	166:167	50	1179	1129	2258	45.54	49.39	-0.61	-1.22	0.09
165:170	169:168	29	693	664	2289.66	34.95	27.7	-1.3	-4.5	0.25
265:193	194:99	49	1324	1275	2602.04	48.66	16.16	-32.84	-67.01	5.75
94:195	196:106	74	558	484	654.05	27.23	45.66	-28.34	-38.29	3.66
94:195	199:107	93	2490	2397	2577.42	66.7	102.07	9.07	9.75	0.92
94:195	192:108	45	876	831	1846.67	38.72	51.93	6.93	15.41	1
101:197	192:108	61	991	930	1524.59	40.55	61	0	0	0
101:197	194:99	65	555	490	753.85	27.83	63.94	-1.06	-1.64	0.13
102:198	192:108	39	576	537	1376.92	30.62	26.5	-12.5	-32.05	2.18
102:198	194:99	82	2181	2099	2559.76	62.4	92.41	10.41	12.7	1.12
102:198	196:106	20	595	575	2875	32.79	14.23	-5.77	-28.86	1.4

PM Car Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	4744	5101	357	7.53	5.09	4679.86	-64.14	-1.35	0.93
31:17:00	17:27	630	630	0	0	0	630	0	0	0
19:17	17:30	852	925	73	8.57	2.45	839.07	-12.93	-1.52	0.44
26:17:00	17:23	2824	3024	200	7.08	3.7	2815.96	-8.04	-0.28	0.15
18:19	19:20	434	510	76	17.51	3.5	434	0	0	0
25:26:00	26:27:00	788	854	66	8.38	2.3	796.61	8.61	1.09	0.31
37:36:00	36:40:00	1329	1165	-164	-12.34	4.64	1306.28	-22.72	-1.71	0.63
45:36:00	36:40:00	2446	2722	276	11.28	5.43	2460.66	14.66	0.6	0.3
45:36:00	36:37:00	551	567	16	2.9	0.68	536.99	-14.01	-2.54	0.6
35:36:00	36:39:00	2733	2693	-40	-1.46	0.77	2803.17	70.17	2.57	1.33
207:37:00	37:39:00	637	532	-105	-16.48	4.34	594.15	-42.85	-6.73	1.73
35:37:00	37:207	1589	1295	-294	-18.5	7.74	1548.09	-40.91	-2.57	1.03
65:42:00	42:44:00	916	990	74	8.08	2.4	894.61	-21.39	-2.33	0.71
65:42:00	42:66	2411	2677	266	11.03	5.27	2410.47	-0.53	-0.02	0.01
65:42:00	42:46:00	344	330	-14	-4.07	0.76	332.58	-11.42	-3.32	0.62
46:42:00	42:44:00	486	482	-4	-0.82	0.18	486	0	0	0
46:42:00	42:57:00	204	264	60	29.41	3.92	226.44	22.44	11	1.53
43:42:00	42:57:00	2683	2462	-221	-8.24	4.36	2663.73	-19.27	-0.72	0.37
43:42:00	42:46:00	528	580	52	9.85	2.21	568.72	40.72	7.71	1.74
44:42:00	42:66	180	187	7	3.89	0.52	177.85	-2.15	-1.19	0.16
44:42:00	42:46:00	684	766	82	11.99	3.05	684	0	0	0
41:43:00	43:44:00	153	183	30	19.61	2.31	164.87	11.87	7.76	0.94
50:44:00	44:57:00	1008	923	-85	-8.43	2.74	1023.52	15.52	1.54	0.49
47:46:00	46:66	399	425	26	6.52	1.28	409.32	10.32	2.59	0.51
54:72	73:68	429	346	-83	-19.35	4.22	402.71	-26.29	-6.13	1.29
54:72	69:70	3418	3245	-173	-5.06	3	3457.76	39.76	1.16	0.68
68:73	69:70	179	87	-92	-51.4	7.98	155.74	-23.26	-12.99	1.8
68:73	71:63	1088	1235	147	13.51	4.31	1118.55	30.55	2.81	0.92
75:74	71:63	2491	2748	257	10.32	5.02	2492.6	1.6	0.06	0.03
75:74	73:68	59	34	-25	-42.37	3.67	52.77	-6.23	-10.56	0.83
81:77	77:78	41	63	22	53.66	3.05	41.56	0.56	1.36	0.09
81:77	77:25:00	593	536	-57	-9.61	2.4	585.42	-7.58	-1.28	0.31
80:77	77:81	80	32	-48	-60	6.41	58.04	-21.96	-27.45	2.64
80:77	77:25:00	3025	3342	317	10.48	5.62	3027.15	2.15	0.07	0.04
82:77	77:78	4375	4611	236	5.39	3.52	4282.44	-92.56	-2.12	1.41
82:77	77:81	1223	1415	192	15.7	5.29	1236.49	13.49	1.1	0.38
85:79	79:253	3071	3355	284	9.25	5.01	3076.89	5.89	0.19	0.11
85:79	79:83	427	424	-3	-0.7	0.15	425.24	-1.76	-0.41	0.09
83:79	79:85	317	341	24	7.57	1.32	316.76	-0.24	-0.07	0.01
83:79	79:253	7	19	12	171.43	3.33	8.29	1.29	18.5	0.47
255:79	79:85	4378	4760	382	8.73	5.65	4443.37	65.37	1.49	0.98
255:79	79:83	5	63	58	1160	9.95	7.42	2.42	48.42	0.97
79:85	85:89	35	11	-24	-68.57	5	26.8	-8.2	-23.42	1.47
88:85	85:89	3	8	5	166.67	2.13	3.33	0.33	11	0.19
89:85	85:79	12	26	14	116.67	3.21	14.39	2.39	19.95	0.66
89:85	85:86	20	35	15	75	2.86	21.31	1.31	6.53	0.29
100:107	107:33:00	794	667	-127	-15.99	4.7	787.82	-6.18	-0.78	0.22
115:110	118:117	658	752	94	14.29	3.54	676.49	18.49	2.81	0.72
115:110	120:112	50	89	39	78	4.68	50	0	0	0
115:110	121:116	439	395	-44	-10.02	2.15	447.68	8.68	1.98	0.41
111:119	120:112	117	152	35	29.91	3.02	129.86	12.86	10.99	1.16
111:119	121:116	2981	2643	-338	-11.34	6.37	2917.7	-63.3	-2.12	1.17
111:119	123:114	2	9	7	350	2.98	4.08	2.08	104.09	1.19

PM Car Matrix Estimation

111:119	110:115	510	518	8	1.57	0.35	549.01	39.01	7.65	1.7
112:120	121:116	379	519	140	36.94	6.61	460.27	81.27	21.44	3.97
112:120	110:115	54	133	79	146.3	8.17	54	0	0	0
112:120	118:117	199	159	-40	-20.1	2.99	183.7	-15.3	-7.69	1.11
113:122	110:115	334	468	134	40.12	6.69	351.43	17.43	5.22	0.94
113:122	118:117	1665	1803	138	8.29	3.31	1642.72	-22.28	-1.34	0.55
113:122	120:112	264	292	28	10.61	1.68	262.9	-1.1	-0.42	0.07
114:123	110:115	24	27	3	12.5	0.59	24	0	0	0
114:123	118:117	23	60	37	160.87	5.74	32.68	9.68	42.1	1.84
114:123	120:112	2	1	-1	-50	0.82	2	0	0	0
114:123	121:116	37	21	-16	-43.24	2.97	33.13	-3.87	-10.45	0.65
131:127	132:129	116	187	71	61.21	5.77	128.67	12.67	10.92	1.15
131:127	134:130	32	21	-11	-34.38	2.14	31.14	-0.86	-2.67	0.15
128:133	134:130	3831	3572	-259	-6.76	4.26	3850.94	19.94	0.52	0.32
128:133	127:131	9	6	-3	-33.33	1.1	7.84	-1.16	-12.93	0.4
130:134	127:131	8	2	-6	-75	2.68	6.21	-1.79	-22.39	0.67
130:134	132:129	2143	2390	247	11.53	5.19	2136.47	-6.53	-0.3	0.14
145:142	146:141	328	306	-22	-6.71	1.24	306.98	-21.02	-6.41	1.18
145:142	147:143	4	29	25	625	6.15	4	0	0	0
145:142	148:144	17	14	-3	-17.65	0.76	17.7	0.7	4.14	0.17
141:146	147:143	8	20	12	150	3.21	12.31	4.31	53.89	1.35
141:146	148:144	2911	2561	-350	-12.02	6.69	2870.77	-40.23	-1.38	0.75
141:146	142:145	973	1012	39	4.01	1.24	999	26	2.67	0.83
143:147	148:144	204	167	-37	-18.14	2.72	211.59	7.59	3.72	0.53
143:147	142:145	31	127	96	309.68	10.8	31	0	0	0
143:147	146:141	24	10	-14	-58.33	3.4	17.5	-6.5	-27.08	1.43
144:148	142:145	30	31	1	3.33	0.18	30.18	0.18	0.6	0.03
144:148	146:141	1814	2076	262	14.44	5.94	1818.2	4.2	0.23	0.1
144:148	147:143	51	55	4	7.84	0.55	50.33	-0.67	-1.32	0.09
158:157	161:159	168	159	-9	-5.36	0.7	166.31	-1.69	-1.01	0.13
158:157	162:156	1300	1506	206	15.85	5.5	1290.07	-9.93	-0.76	0.28
158:157	163:160	505	577	72	14.26	3.1	537.9	32.9	6.52	1.44
159:161	162:156	226	214	-12	-5.31	0.81	213.04	-12.96	-5.73	0.87
159:161	163:160	206	232	26	12.62	1.76	206	0	0	0
159:161	157:158	209	182	-27	-12.92	1.93	220.72	11.72	5.61	0.8
156:162	163:160	811	791	-20	-2.47	0.71	833.6	22.6	2.79	0.79
156:162	157:158	2176	1756	-420	-19.3	9.47	2063.95	-112.05	-5.15	2.43
156:162	161:159	194	195	1	0.52	0.07	202.51	8.51	4.39	0.6
160:163	157:158	466	472	6	1.29	0.28	463.06	-2.94	-0.63	0.14
160:163	161:159	176	211	35	19.89	2.52	176	0	0	0
160:163	162:156	393	442	49	12.47	2.4	395.6	2.6	0.66	0.13
167:166	169:168	161	170	9	5.59	0.7	161	0	0	0
167:166	170:165	1276	1781	505	39.58	12.92	1368.08	92.08	7.22	2.53
168:169	170:165	703	461	-242	-34.42	10.03	626.2	-76.8	-10.92	2.98
168:169	166:167	122	49	-73	-59.84	7.89	122	0	0	0
165:170	166:167	2206	1535	-671	-30.42	15.51	2029.18	-176.82	-8.02	3.84
165:170	169:168	627	875	248	39.55	9.05	718.54	91.54	14.6	3.53
265:193	194:99	835	871	36	4.31	1.23	836.69	1.69	0.2	0.06
94:195	196:106	480	791	311	64.79	12.34	539.02	59.02	12.3	2.61
94:195	199:107	2810	2640	-170	-6.05	3.26	2759.47	-50.53	-1.8	0.96
94:195	192:108	1431	1694	263	18.38	6.65	1456.14	25.14	1.76	0.66
101:197	192:108	1049	1145	96	9.15	2.9	1049	0	0	0
101:197	194:99	455	498	43	9.45	1.97	455.35	0.35	0.08	0.02
102:198	192:108	814	792	-22	-2.7	0.78	830.8	16.8	2.06	0.59
102:198	194:99	2211	2392	181	8.19	3.77	2199.04	-11.96	-0.54	0.25
102:198	196:106	740	698	-42	-5.68	1.57	732.09	-7.91	-1.07	0.29

PM LGV Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	691	5101.01	4410.01	638.21	81.95	638.43	-52.57	-7.61	2.04
31:17:00	17:27	40	630	590	1475	32.24	40	0	0	0
19:17	17:30	78	925.06	847.06	1085.97	37.82	72.88	-5.12	-6.56	0.59
26:17:00	17:23	325	3024.01	2699.01	830.46	65.96	304.93	-20.07	-6.17	1.13
18:19	19:20	58	510	452	779.31	26.82	58.31	0.31	0.53	0.04
25:26:00	26:27:00	62	854.02	792.02	1277.45	37.01	60.92	-1.08	-1.73	0.14
37:36:00	36:40:00	88	1165.02	1077.02	1223.89	43.03	86.82	-1.18	-1.34	0.13
45:36:00	36:40:00	204	2722.54	2518.54	1234.58	65.84	223.14	19.14	9.38	1.31
45:36:00	36:37:00	33	567	534	1618.18	30.83	31.36	-1.64	-4.98	0.29
35:36:00	36:39:00	453	2693.52	2240.52	494.6	56.49	450.69	-2.31	-0.51	0.11
207:37:00	37:39:00	57	532.04	475.04	833.4	27.68	57.44	0.44	0.78	0.06
35:37:00	37:207	101	1295	1194	1182.18	45.19	105.72	4.72	4.67	0.46
65:42:00	42:44:00	95	990.01	895.01	942.12	38.43	92.74	-2.26	-2.38	0.23
65:42:00	42:66	193	2677.51	2484.51	1287.31	65.58	219.2	26.2	13.57	1.82
65:42:00	42:46:00	13	330.01	317.01	2438.54	24.21	14.23	1.23	9.47	0.33
46:42:00	42:44:00	46	482	436	947.83	26.83	46	0	0	0
46:42:00	42:57:00	15	264.02	249.02	1660.13	21.08	18.25	3.25	21.67	0.8
43:42:00	42:57:00	440	2462.54	2022.54	459.67	53.09	422.43	-17.57	-3.99	0.85
43:42:00	42:46:00	58	580.01	522.01	900.02	29.23	59.66	1.66	2.85	0.22
44:42:00	42:66	23	187.01	164.01	713.09	16.01	15.22	-7.78	-33.83	1.78
44:42:00	42:46:00	49	766	717	1463.27	35.52	49	0	0	0
41:43:00	43:44:00	22	183.01	161.01	731.86	15.9	26.06	4.06	18.43	0.83
50:44:00	44:57:00	28	923	895	3196.43	41.04	39.38	11.38	40.66	1.96
47:46:00	46:66	21	425.02	404.02	1923.9	27.05	20.08	-0.92	-4.38	0.2
54:72	73:68	28	346.04	318.04	1135.86	23.26	26.55	-1.45	-5.17	0.28
54:72	69:70	457	3245.47	2788.47	610.17	64.81	450.7	-6.3	-1.38	0.3
68:73	69:70	15	87.06	72.06	480.4	10.09	14.86	-0.14	-0.9	0.04
68:73	71:63	51	1235.02	1184.02	2321.61	46.69	49.6	-1.4	-2.74	0.2
75:74	71:63	241	2748.4	2507.4	1040.41	64.86	235.13	-5.87	-2.43	0.38
75:74	73:68	6	34.04	28.04	467.33	6.27	5.53	-0.47	-7.77	0.19
81:77	77:78	3	63.1	60.1	2003.33	10.45	5.66	2.66	88.7	1.28
81:77	77:25:00	63	536	473	750.79	27.33	63.3	0.3	0.48	0.04
80:77	77:81	8	32.12	24.12	301.5	5.39	0.02	-7.98	-99.78	3.99
80:77	77:25:00	324	3342.03	3018.03	931.49	70.49	302.55	-21.45	-6.62	1.21
82:77	77:78	666	4611.07	3945.07	592.35	76.8	593.76	-72.24	-10.85	2.88
82:77	77:81	107	1415	1308	1222.43	47.41	117.56	10.56	9.87	1
85:79	79:253	334	3355.3	3021.3	904.58	70.35	301.19	-32.81	-9.82	1.84
85:79	79:83	52	424.03	372.03	715.44	24.11	37.99	-14.01	-26.94	2.09
83:79	79:85	30	341.03	311.03	1036.77	22.84	28.64	-1.36	-4.55	0.25
83:79	79:253	1	19.02	18.02	1802	5.7	1.37	0.37	36.63	0.34
255:79	79:85	654	4760.24	4106.24	627.87	78.92	671.04	17.04	2.61	0.66
79:85	85:89	7	11.02	4.02	57.43	1.34	7.73	0.73	10.5	0.27
88:85	85:89	2	8.15	6.15	307.5	2.73	2.15	0.15	7.73	0.11
89:85	85:79	1	26.02	25.02	2502	6.81	0.47	-0.53	-52.9	0.62
100:107	107:33:00	53	667.03	614.03	1158.55	32.36	62.24	9.24	17.43	1.22
115:110	118:117	37	752.03	715.03	1932.51	36	38.19	1.19	3.23	0.19
115:110	120:112	1	89	88	8800	13.12	1	0	0	0
115:110	121:116	47	395	348	740.43	23.41	44.61	-2.39	-5.08	0.35
111:119	120:112	9	152.05	143.05	1589.44	15.94	8.73	-0.27	-3.05	0.09
111:119	121:116	389	2643.34	2254.34	579.52	57.9	390.46	1.46	0.38	0.07
111:119	110:115	76	518.03	442.03	581.62	25.65	70.4	-5.6	-7.37	0.66
112:120	121:116	24	519.02	495.02	2062.58	30.04	28.32	4.32	17.99	0.84
112:120	110:115	5	133	128	2560	15.41	5	0	0	0

PM LGV Matrix Estimation

112:120	118:117	15	159.02	144.02	960.13	15.44	11.72	-3.28	-21.9	0.9
113:122	110:115	28	468	440	1571.43	27.94	31.74	3.74	13.35	0.68
113:122	118:117	194	1803.32	1609.32	829.55	50.93	178.54	-15.46	-7.97	1.13
113:122	120:112	19	292.01	273.01	1436.89	21.89	19.8	0.8	4.23	0.18
114:123	110:115	2	27	25	1250	6.57	1.72	-0.28	-14.1	0.21
114:123	121:116	1	21.03	20.03	2003	6.04	0.49	-0.51	-51.39	0.6
131:127	132:129	16	187.06	171.06	1069.13	16.98	14.5	-1.5	-9.37	0.38
131:127	134:130	4	21.01	17.01	425.25	4.81	4.52	0.52	12.91	0.25
128:133	134:130	462	3572.26	3110.26	673.22	69.25	461.88	-0.12	-0.03	0.01
128:133	127:131	2	6.13	4.13	206.5	2.05	2	0	-0.03	0
130:134	127:131	1	2.04	1.04	104	0.84	0.93	-0.07	-6.75	0.07
130:134	132:129	225	2390.32	2165.32	962.36	59.88	215.58	-9.42	-4.18	0.63
145:142	146:141	41	306.05	265.05	646.46	20.12	24.1	-16.9	-41.23	2.96
145:142	148:144	4	14	10	250	3.33	3.01	-0.99	-24.85	0.53
141:146	147:143	2	20.13	18.13	906.5	5.45	0	-2	-100	2
141:146	148:144	344	2561.11	2217.11	644.51	58.17	347.23	3.23	0.94	0.17
141:146	142:145	125	1012.03	887.03	709.62	37.2	119.17	-5.83	-4.66	0.53
143:147	148:144	58	167	109	187.93	10.28	57.17	-0.83	-1.43	0.11
143:147	142:145	15	127	112	746.67	13.29	15	0	0	0
143:147	146:141	8	10.14	2.14	26.75	0.71	9.1	1.1	13.69	0.37
144:148	142:145	6	31	25	416.67	5.81	5.34	-0.66	-10.97	0.28
144:148	146:141	173	2076.17	1903.17	1100.1	56.75	183.32	10.32	5.97	0.77
144:148	147:143	11	55	44	400	7.66	0	-11	-100	4.69
158:157	161:159	24	159	135	562.5	14.11	24.03	0.03	0.11	0.01
158:157	162:156	130	1506.07	1376.07	1058.52	48.11	125.77	-4.23	-3.25	0.37
158:157	163:160	67	577	510	761.19	28.42	70.68	3.68	5.5	0.44
159:161	162:156	18	214.05	196.05	1089.17	18.2	18.44	0.44	2.44	0.1
159:161	163:160	26	232	206	792.31	18.14	26	0	0	0
159:161	157:158	25	182	157	628	15.43	25.8	0.8	3.21	0.16
156:162	163:160	82	791.03	709.03	864.67	33.94	83.33	1.33	1.62	0.15
156:162	157:158	302	1756.03	1454.03	481.47	45.33	299.74	-2.26	-0.75	0.13
156:162	161:159	25	195.05	170.05	680.2	16.21	24.34	-0.66	-2.66	0.13
160:163	157:158	90	472	382	424.44	22.79	88.52	-1.48	-1.65	0.16
160:163	161:159	25	211	186	744	17.12	25	0	0	0
160:163	162:156	38	442.05	404.05	1063.29	26.08	44.45	6.45	16.98	1.01
167:166	169:168	5	170	165	3300	17.64	5	0	0	0
167:166	170:165	128	1781.03	1653.03	1291.43	53.5	128.66	0.66	0.52	0.06
168:169	170:165	97	461.04	364.04	375.3	21.79	91.82	-5.18	-5.34	0.53
168:169	166:167	21	49	28	133.33	4.73	21	0	0	0
165:170	166:167	353	1535.01	1182.01	334.85	38.47	341.89	-11.11	-3.15	0.6
165:170	169:168	69	875.02	806.02	1168.14	37.1	72.17	3.17	4.59	0.38
94:195	196:106	71	791	720	1014.08	34.68	29.19	-41.81	-58.89	5.91
94:195	199:107	443	2640.36	2197.36	496.02	55.96	474.57	31.57	7.13	1.47
94:195	192:108	166	1694	1528	920.48	50.11	188.71	22.71	13.68	1.71
101:197	192:108	152	1145	993	653.29	38.99	148.98	-3.02	-1.99	0.25
101:197	194:99	56	498.01	442.01	789.3	26.56	60.12	4.12	7.36	0.54
102:198	192:108	46	792.01	746.01	1621.76	36.44	44.28	-1.72	-3.73	0.26
102:198	194:99	201	2392.44	2191.44	1090.27	60.86	244.49	43.49	21.64	2.91
102:198	196:106	44	698.01	654.01	1486.39	33.95	20.65	-23.35	-53.06	4.11

PM HGV Matrix Estimation

From Link	To Link	Survey Count	First Estimate	First Estimate Difference	First Estimate Difference	First Estimate Difference	Final Estimate	Final Estimate Difference	Final Estimate Difference (percentage)	Final Estimate Difference (GEH)
31:17:00	17:30	119	5101	4982	4186.55	97.52	87.07	-31.93	-26.83	3.15
31:17:00	17:27	10	630	620	6200	34.66	10	0	0	0
19:17	17:30	34	925	891	2620.59	40.69	33.35	-0.65	-1.91	0.11
26:17:00	17:23	66	3024	2958	4481.82	75.25	61.9	-4.1	-6.21	0.51
18:19	19:20	7	510	503	7185.71	31.29	7.1	0.1	1.44	0.04
25:26:00	26:27:00	28	854	826	2950	39.33	26.49	-1.51	-5.39	0.29
37:36:00	36:40:00	2	1165	1163	58150	48.15	2.12	0.12	5.77	0.08
45:36:00	36:40:00	50	2722	2672	5344	71.77	57.2	7.2	14.4	0.98
35:36:00	36:39:00	87	2693	2606	2995.4	69.9	89.77	2.77	3.19	0.29
207:37:00	37:39:00	1	532	531	53100	32.53	0.89	-0.11	-11.5	0.12
35:37:00	37:207	9	1295	1286	14288.89	50.36	4.11	-4.89	-54.36	1.91
65:42:00	42:44:00	19	990	971	5110.53	43.23	21.76	2.76	14.5	0.61
65:42:00	42:66	42	2677	2635	6273.81	71.46	51.76	9.76	23.23	1.43
65:42:00	42:46:00	10	330	320	3200	24.54	8.84	-1.16	-11.55	0.38
46:42:00	42:44:00	13	482	469	3607.69	29.81	10.4	-2.6	-19.96	0.76
46:42:00	42:57:00	5	264	259	5180	22.33	3.59	-1.41	-28.24	0.68
43:42:00	42:57:00	86	2462	2376	2762.79	66.57	83.51	-2.49	-2.89	0.27
44:42:00	42:66	6	187	181	3016.67	18.43	5.35	-0.65	-10.87	0.27
44:42:00	42:46:00	6	766	760	12666.67	38.68	4.85	-1.15	-19.19	0.49
41:43:00	43:44:00	2	183	181	9050	18.82	3.84	1.84	92	1.08
50:44:00	44:57:00	34	923	889	2614.71	40.64	34.55	0.55	1.6	0.09
54:72	73:68	15	346	331	2206.67	24.64	15.09	0.09	0.6	0.02
54:72	69:70	110	3245	3135	2850	76.54	103	-7	-6.36	0.68
68:73	69:70	1	87	86	8600	12.96	1.09	0.09	9.09	0.09
68:73	71:63	23	1235	1212	5269.57	48.33	21.98	-1.02	-4.43	0.21
75:74	71:63	50	2748	2698	5396	72.13	42.36	-7.64	-15.29	1.12
75:74	73:68	1	34	33	3300	7.89	1.38	0.38	38.49	0.35
81:77	77:78	2	63	61	3050	10.7	1.84	-0.16	-7.95	0.11
81:77	77:25:00	8	536	528	6600	32.01	8.81	0.81	10.17	0.28
80:77	77:25:00	86	3342	3256	3786.05	78.65	79.58	-6.42	-7.47	0.71
82:77	77:78	140	4611	4471	3193.57	91.73	104.47	-35.53	-25.38	3.21
82:77	77:81	15	1415	1400	9333.33	52.36	15.95	0.95	6.33	0.24
85:79	79:253	82	3355	3273	3991.46	78.95	76.71	-5.29	-6.45	0.59
85:79	79:83	1	424	423	42300	29.02	1.06	0.06	5.83	0.06
83:79	79:85	3	341	338	11266.67	25.77	4.08	1.08	36.05	0.57
83:79	79:253	4	19	15	375	4.42	2.92	-1.08	-27.03	0.58
255:79	79:85	136	4760	4624	3400	93.46	137.14	1.14	0.84	0.1
255:79	79:83	2	63	61	3050	10.7	1.94	-0.06	-2.92	0.04
79:85	85:89	6	11	5	83.33	1.71	0.19	-5.81	-96.85	3.3
89:85	85:79	2	26	24	1200	6.41	0.9	-1.1	-54.84	0.91
100:107	107:33:00	4	667	663	16575	36.2	5.14	1.14	28.46	0.53

PM HGV Matrix Estimation

115:110	118:117	22	752	730	3318.18	37.11	11.8	-10.2	-46.34	2.48
115:110	121:116	3	395	392	13066.67	27.79	1.63	-1.37	-45.78	0.9
111:119	120:112	8	152	144	1800	16.1	0.75	-7.25	-90.68	3.47
111:119	121:116	47	2643	2596	5523.4	70.79	49.02	2.02	4.29	0.29
111:119	110:115	53	518	465	877.36	27.52	53.82	0.82	1.54	0.11
112:120	121:116	11	519	508	4618.18	31.21	8.27	-2.73	-24.85	0.88
112:120	110:115	2	133	131	6550	15.94	1.95	-0.05	-2.63	0.04
113:122	110:115	10	468	458	4580	29.63	11.37	1.37	13.67	0.42
113:122	118:117	29	1803	1774	6117.24	58.61	27.16	-1.84	-6.35	0.35
113:122	120:112	9	292	283	3144.44	23.07	4.24	-4.76	-52.85	1.85
128:133	134:130	61	3572	3511	5755.74	82.38	58.91	-2.09	-3.42	0.27
130:134	132:129	48	2390	2342	4879.17	67.08	42.77	-5.23	-10.9	0.78
145:142	146:141	13	306	293	2253.85	23.2	6.34	-6.66	-51.21	2.14
141:146	148:144	36	2561	2525	7013.89	70.07	42.08	6.08	16.9	0.97
141:146	142:145	17	1012	995	5852.94	43.87	16.79	-0.21	-1.26	0.05
144:148	146:141	33	2076	2043	6190.91	62.91	36.43	3.43	10.38	0.58
144:148	147:143	1	55	54	5400	10.21	0.7	-0.3	-29.87	0.32
158:157	161:159	3	159	156	5200	17.33	3.07	0.07	2.35	0.04
158:157	162:156	25	1506	1481	5924	53.53	25.38	0.38	1.53	0.08
158:157	163:160	13	577	564	4338.46	32.84	13.82	0.82	6.32	0.22
159:161	162:156	2	214	212	10600	20.4	1.54	-0.46	-22.82	0.34
159:161	157:158	1	182	181	18100	18.92	0.45	-0.55	-55.23	0.65
156:162	163:160	17	791	774	4552.94	38.51	14.17	-2.83	-16.64	0.72
156:162	157:158	22	1756	1734	7881.82	58.16	25.04	3.04	13.83	0.63
156:162	161:159	3	195	192	6400	19.3	2.93	-0.07	-2.2	0.04
160:163	157:158	13	472	459	3530.77	29.48	12.69	-0.31	-2.42	0.09
160:163	161:159	1	211	210	21000	20.4	1	0	-0.46	0
160:163	162:156	11	442	431	3918.18	28.64	11.42	0.42	3.79	0.12
167:166	169:168	2	170	168	8400	18.12	2	0	0	0
167:166	170:165	20	1781	1761	8805	58.68	19.07	-0.93	-4.67	0.21
168:169	170:165	23	461	438	1904.35	28.16	23.21	0.21	0.91	0.04
168:169	166:167	2	49	47	2350	9.31	2	0	0	0
165:170	166:167	25	1535	1510	6040	54.07	24.58	-0.42	-1.7	0.09
165:170	169:168	13	875	862	6630.77	40.91	13.6	0.6	4.62	0.16
265:193	194:99	20	871	851	4255	40.32	14.16	-5.84	-29.19	1.41
94:195	196:106	39	791	752	1928.21	36.91	25.48	-13.52	-34.66	2.38
94:195	199:107	76	2640	2564	3373.68	69.58	84.77	8.77	11.54	0.98
94:195	192:108	23	1694	1671	7265.22	57.03	31.88	8.88	38.59	1.69
101:197	192:108	16	1145	1129	7056.25	46.86	14.46	-1.54	-9.64	0.4
101:197	194:99	22	498	476	2163.64	29.52	22.56	0.56	2.55	0.12
102:198	192:108	11	792	781	7100	38.98	6.67	-4.33	-39.4	1.46
102:198	194:99	39	2392	2353	6033.33	67.49	48.12	9.12	23.39	1.38
102:198	196:106	3	698	695	23166.67	37.12	0.96	-2.04	-68.11	1.45

Appendix D – Model Calibration Results

Calibration	AM	AM				PM	PM			
	Observed Flows		1			Observed Flows		1		
Junction 13	Total	Modelled Flow	GEH	Difference	Difference %	Total	Modelled Flow	GEH	Difference	Difference %
North - South	1276.4	1307.6	0.87	31.2	2%	2148.6	2050.9	2.13	-97.7	-5%
South - East	181.5	191.6	0.74	10.1	6%	288.5	277	0.68	-11.5	-4%
East - North	293.9	303.7	0.57	9.8	3%	361.6	349.2	0.66	-12.4	-3%
North - South	1320.3	1380.3	1.63	60	5%	1223.9	1211.1	0.37	-12.8	-1%
East - South	263	231.2	2.02	-31.8	-12%	183.5	180.1	0.25	-3.4	-2%
North - East	341.9	333.3	0.47	-8.6	-3%	354.6	330.3	1.31	-24.3	-7%
Junction 9										
West - South	156	150.9	0.41	-5.1	-3%	474.9	472.2	0.12	-2.7	-1%
North - South	963.6	1019.5	1.78	55.9	6%	1054.2	1050.7	0.11	-3.5	0%
North - West	144	168.2	1.94	24.2	17%	200.4	214.3	0.97	13.9	7%
South - North	1228.9	1150.4	2.28	-78.5	-6%	1257.3	1212.5	1.27	-44.8	-4%
West - North	122	121.8	0.02	-0.2	0%	232.4	218.9	0.90	-13.5	-6%
South - West	323	356.6	1.82	33.6	10%	568.4	567	0.06	-1.4	0%
Junction 7										
North - West	305	297.7	0.42	-7.3	-2%	413	379.3	1.69	-33.7	-8%
North - South	882.6	968.9	2.84	86.3	10%	1014.7	1038.3	0.74	23.6	2%
North - East	71	64.9	0.74	-6.1	-9%	164.4	139.3	2.04	-25.1	-15%
East - West	282.4	283.3	0.05	0.9	0%	191	190.7	0.02	-0.3	0%
East - North	188.5	211.9	1.65	23.4	12%	85	93.5	0.90	8.5	10%
South - North	1253.5	1139	3.31	-114.5	-9%	1222.8	1149.1	2.14	-73.7	-6%
South - East	61	66.9	0.74	5.9	10%	233.4	205.1	1.91	-28.3	-12%
West - South	63	60.1	0.37	-2.9	-5%	73	71	0.24	-2	-3%
West - East	150	145.4	0.38	-4.6	-3%	276.9	274.5	0.14	-2.4	-1%
South - West	55	64.3	1.22	9.4	17%	48	67.2	2.53	19.2	40%
West - North	408.7	422.8	0.69	14.1	3%	371.4	419.2	2.40	47.8	13%
East - South	165.9	157.8	0.64	-8.1	-5%	152.4	155.7	0.27	3.3	2%
Junction 6										
South - West	738.6	694	1.67	-44.6	-6%	125	123.9	0.10	-1.1	-1%
South - North	1112.5	1063.9	1.47	-48.6	-4%	1554.1	1507	1.20	-47.1	-3%
West - North	11.9	10.4	0.45	-1.5	-13%	93	86	0.74	-7	-8%
West - South	105	100	0.49	-5	-5%	516.4	526.1	0.42	9.7	2%
North - South	1115.1	1208.7	2.75	93.6	8%	1043.6	1055.6	0.37	12	1%
North - West	96	78.7	1.85	-17.3	-18%	26	25	0.20	-1	-4%
Junction 12										
West - North	36	17.2	3.65	-18.8	-52%	19	17.5	0.35	-1.5	-8%
West - South	418.8	412.2	0.32	-6.6	-2%	220	166.5	3.82	-53	-24%
North - West	35.5	18	3.38	-17.5	-49%	55	42.4	1.81	-12.6	-23%
North - South	1238	1287.8	1.40	49.8	4%	1358	1343.2	0.41	-15.1	-1%
South - North	1362.3	1398.1	0.96	35.8	3%	1990	1893.4	2.19	-96.3	-5%
South - West	205.5	221.6	1.10	16.1	8%	521	502.8	0.78	-17.7	-3%
Junction 11										
North - South	1256	1275	0.52	18.6	1%	1391.4	1383.2	0.22	-8.2	-1%
North - West	127	111.8	1.40	-15.3	-12%	193	183.6	0.69	-9.4	-5%
West - North	182	172.9	0.66	-8.8	-5%	119.5	74.6	4.56	-44.9	-38%
West - South	10	11.9	0.57	1.9	19%	9	2.7	2.60	-6.3	-70%
South - North	1406	1415.8	0.25	9.5	1%	2006.2	1978.4	0.62	-27.8	-1%
South - West	11	4.9	2.16	-6.1	-55%	15	8.3	1.96	-6.7	-45%
South - East	1	11.7	4.25	10.7	1070%	4	8.2	1.94	4.7	134%
North - East	16	11	1.36	-5	-31%	0	5.4	3.29	5.4	
East - South	3	4	0.53	1	33%	9	3.8	1.90	-4.7	-55%
East - North	1	3.9	1.85	2.9	290%	13	5.6	2.43	-7.4	-57%
Junction 10										
West - North	188	198.8	0.78	10.8	6%	288.5	217.1	4.49	-71.4	-25%
Junction 5										
North East - South	158	165.3	0.57	7.3	5%	314	310.4	0.20	-3.6	-1%
North East - South West	119.5	96.1	2.25	-23.4	-20%	18	18.9	0.21	0.9	5%
North East - West	141.5	132.1	0.80	-9.4	-7%	181.5	200.2	1.35	18.7	10%
North East - North	7	17.9	3.09	10.9	156%		2.2	2.10	2.2	
South - South West	103.4	99.6	0.38	-3.8	-4%	32	48.8	2.64	16.8	53%
South - West	598	610.1	0.49	12.1	2%	1272	1243.9	0.79	-28.1	-2%
South - North	23.5	31.4	1.51	7.9	34%	1	1.1	0.10	0.1	10%
South - North East	369	334.9	1.82	-34.1	-9%	341.5	288.8	2.97	-52.7	-15%
South West - West	49.5	49.2	0.04	-0.3	-1%	139.4	167.3	2.25	27.9	20%
South West - North East	11	16.3	1.43	5.3	48%	24	25.6	0.32	1.6	7%
South West - South	38	39	0.16	1	3%	79	80.7	0.19	1.7	2%
West - North	9	8.2	0.27	-0.8	-9%		2.9	2.41	2.9	
West - North East	169.5	133.1	2.96	-36.4	-21%	151.5	141.1	0.86	-10.4	-7%
West - South	999.6	1078.3	2.44	78.7	8%	658.6	677.4	0.73	18.8	3%
West - South West	267.5	204.6	4.09	-62.9	-24%	86	107.8	2.21	21.8	25%
North - North East	4	2.1	0.84	-1.4	-40%	15	8.3	1.96	-6.7	-45%
North - South	6	5.4	0.25	-0.6	-10%	16	10.7	1.45	-5.3	-33%
North - South West	3	1.3	1.16	-1.7	-57%	16	11.8	1.13	-4.2	-26%

Junction 4										
North - East	9.5	7.2	0.80	-2.3	-24%	44	46.1	0.31	2.1	5%
East - West	721.5	725.5	0.15	4	1%	1606.3	1602.8	0.09	-3.5	0%
East - North	66	69.5	0.43	3.5	5%	1	3.2	1.52	2.2	220%
West - North	20	14	1.46	-6	-30%	5	2.8	1.11	-2.2	-44%
West - East	1438.7	1418.3	0.54	-20.4	-1%	846.9	884.5	1.28	37.6	4%
Junction 3										
North - East	277.4	261.8	0.95	-15.6	-6%	135.5	118.4	1.52	-17.1	-13%
North - South	9	28.9	4.57	19.9	221%	3	1.3	1.16	-1.7	-57%
North - West	15	13.2	0.48	-1.8	-12%	9	7.7	0.45	-1.3	-14%
East - South	2.5	5	1.29	2.5	100%	4	5.8	0.81	1.8	45%
East - West	652.5	644	0.33	-8.5	-1%	1078.9	1122.2	1.31	43.3	4%
East - North	86	79.1	0.76	-6.9	-8%	535.3	478.5	2.52	-56.8	-11%
South - West	21	10.3	2.70	-10.7	-51%	100.2	89.9	1.06	-10.3	-10%
South - North	0	3.5	2.65	3.5		29.4	15.2	3.01	-14.2	-48%
South - East	7	9	0.71	2	29%	12	11.5	0.15	-0.5	-4%
West - North	4	5.1	0.52	1.1	28%	17	12.5	1.17	-4.5	-26%
West - East	1192.7	1183.8	0.26	-8.9	-1%	717.1	758.7	1.53	41.6	6%
West - South	83.9	87.5	0.39	3.6	4%	28	18.4	1.99	-9.6	-34%
Junction 2				0						
North - East	63.5	57.9	0.72	-5.6	-9%	90.5	73.7	1.85	-16.8	-19%
North - South	912.8	855.7	1.92	-57.1	-6%	544.2	560.2	0.68	16	3%
North - West	184	164.7	1.46	-19.3	-10%	237.4	235.9	0.10	-1.5	-1%
East - South	109.9	102.7	0.70	-7.2	-7%	74.4	70.6	0.45	-3.8	-5%
East - West	62	61.5	0.06	-0.5	-1%	103	102.7	0.03	-0.3	0%
East - North	59.4	59.9	0.06	0.5	1%	105	108.8	0.37	3.8	4%
South - West	172	153.7	1.43	-18.3	-11%	293	305.4	0.72	12.4	4%
South - North	467	447.2	0.93	-19.8	-4%	884.8	794.1	3.13	-90.7	-10%
South - East	65	65.8	0.10	0.8	1%	39.5	73	4.47	33.5	85%
West - North	283.5	278.6	0.29	-4.9	-2%	235	230.5	0.29	-4.5	-2%
West - East	140	137.4	0.22	-2.6	-2%	71.4	70.4	0.12	-1	-1%
West - South	289	312.6	1.36	23.6	8%	156	159.2	0.25	3.2	2%
Junction 1										
North - North East	38.5	38	0.08	-0.5	-1%	68	67	0.12	-1	-1%
North - South	760.4	738.6	0.80	-21.8	-3%	559.1	581.6	0.94	22.5	4%
North East - South	374.4	394.1	1.00	19.7	5%	317.9	288.8	1.67	-29.1	-9%
North East - North	80.5	78.2	0.26	-2.3	-3%	62	60.8	0.15	-1.2	-2%
South - North	537.3	485.3	2.30	-52	-10%	944.2	859.4	2.82	-84.8	-9%
South - North East	287.5	302.1	0.85	14.6	5%	273	275.1	0.13	2.1	1%
Junction 10 Continued										
East - South	472	427.3	2.11	-44.7	-9%	386	318.3	3.61	-67.7	-18%
South - West	192	199	0.50	7	4%	203.3	204.4	0.08	1.1	1%
South - North	1082.5	1049.6	1.01	-32.9	-3%	1277.7	1211.1	1.89	-66.6	-5%
South - East	327.4	337.4	0.55	10	3%	650.8	586.1	2.60	-64.7	-10%
West - East	427.4	418.4	0.44	-9	-2%	453.5	443.2	0.49	-10.3	-2%
West - South	189.4	190.2	0.06	0.8	0%	220.5	218.3	0.15	-2.2	-1%
North - East	202	188.5	0.97	-13.5	-7%	288	312.5	1.41	24.5	9%
North - South	722.4	779.2	2.07	56.8	8%	973.9	926.9	1.52	-47	-5%
North - West	196.3	188.6	0.56	-7.7	-4%	265.5	268.6	0.19	3.1	1%

Appendix E – TRICS Data

Calculation Reference: AUDIT-504502-180322-0308

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : D - INDUSTRIAL ESTATE
VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	BR	BRISTOL CITY	1 days
	CW	CORNWALL	1 days
05	EAST MIDLANDS		
	NR	NORTHAMPTONSHIRE	1 days
06	WEST MIDLANDS		
	WM	WEST MIDLANDS	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	WY	WEST YORKSHIRE	1 days
09	NORTH		
	CB	CUMBRIA	1 days
11	SCOTLAND		
	AG	ANGUS	1 days
	HI	HIGHLAND	1 days

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

Secondary Filtering selection:

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

Parameter: Site area
Actual Range: 4.48 to 28.50 (units: hect)
Range Selected by User: 4 to 182.80 (units: hect)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/09 to 23/10/14

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

Selected survey days:

Monday	2 days
Wednesday	2 days
Thursday	1 days
Friday	3 days

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

Selected survey types:

Manual count	8 days
Directional ATC Count	0 days

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

Selected Locations:

Suburban Area (PPS6 Out of Centre)	2
Edge of Town	5
Neighbourhood Centre (PPS6 Local Centre)	1

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

Selected Location Sub Categories:

Industrial Zone	3
Residential Zone	2
Village	1
No Sub Category	2

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

Secondary Filtering selection:

Use Class:

B1	2 days
B2	5 days
B8	1 days

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

Population within 1 mile:

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

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

Population within 5 miles:

5,001 to 25,000	2 days
25,001 to 50,000	2 days
100,001 to 125,000	1 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days
500,001 or More	1 days

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

Car ownership within 5 miles:

0.6 to 1.0	4 days
1.1 to 1.5	4 days

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

Travel Plan:

No	8 days

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

PTAL Rating:

No PTAL Present	8 days

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

TRIP RATE for Land Use 02 - EMPLOYMENT/D - INDUSTRIAL ESTATE
VEHICLES
Calculation factor: 1 hect
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	8	10.29	3.899	8	10.29	1.033	8	10.29	4.932
07:30 - 08:00	8	10.29	7.216	8	10.29	2.017	8	10.29	9.233
08:00 - 08:30	8	10.29	6.353	8	10.29	3.389	8	10.29	9.742
08:30 - 09:00	8	10.29	5.807	8	10.29	3.499	8	10.29	9.306
09:00 - 09:30	8	10.29	4.033	8	10.29	3.414	8	10.29	7.447
09:30 - 10:00	8	10.29	3.936	8	10.29	3.049	8	10.29	6.985
10:00 - 10:30	8	10.29	3.620	8	10.29	3.389	8	10.29	7.009
10:30 - 11:00	8	10.29	3.013	8	10.29	2.879	8	10.29	5.892
11:00 - 11:30	8	10.29	3.061	8	10.29	3.061	8	10.29	6.122
11:30 - 12:00	8	10.29	3.377	8	10.29	3.474	8	10.29	6.851
12:00 - 12:30	8	10.29	3.997	8	10.29	3.863	8	10.29	7.860
12:30 - 13:00	8	10.29	4.130	8	10.29	4.495	8	10.29	8.625
13:00 - 13:30	8	10.29	4.082	8	10.29	4.750	8	10.29	8.832
13:30 - 14:00	8	10.29	4.568	8	10.29	3.365	8	10.29	7.933
14:00 - 14:30	8	10.29	3.122	8	10.29	3.462	8	10.29	6.584
14:30 - 15:00	8	10.29	3.158	8	10.29	3.146	8	10.29	6.304
15:00 - 15:30	8	10.29	3.426	8	10.29	3.741	8	10.29	7.167
15:30 - 16:00	8	10.29	2.806	8	10.29	4.094	8	10.29	6.900
16:00 - 16:30	8	10.29	3.268	8	10.29	5.794	8	10.29	9.062
16:30 - 17:00	8	10.29	2.685	8	10.29	5.211	8	10.29	7.896
17:00 - 17:30	8	10.29	1.409	8	10.29	5.892	8	10.29	7.301
17:30 - 18:00	8	10.29	1.045	8	10.29	3.644	8	10.29	4.689
18:00 - 18:30	8	10.29	0.935	8	10.29	2.065	8	10.29	3.000
18:30 - 19:00	8	10.29	0.826	8	10.29	1.506	8	10.29	2.332
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			83.772			84.232			168.004

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

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

Parameter summary

Trip rate parameter range selected:	4.48 to 28.50 (units: hect)
Survey date date range:	01/01/09 - 23/10/14
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

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

Calculation Reference: AUDIT-504502-180209-0257

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

02	SOUTH EAST		
	HC	HAMPSHIRE	1 days
	KC	KENT	1 days
	SC	SURREY	1 days
	WS	WEST SUSSEX	1 days
03	SOUTH WEST		
	DV	DEVON	2 days
04	EAST ANGLIA		
	NF	NORFOLK	1 days
06	WEST MIDLANDS		
	SH	SHROPSHIRE	2 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	NY	NORTH YORKSHIRE	3 days
	SY	SOUTH YORKSHIRE	1 days
09	NORTH		
	CB	CUMBRIA	1 days
	DH	DURHAM	2 days
11	SCOTLAND		
	FA	FALKIRK	1 days

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

Secondary Filtering selection:

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

Parameter: Number of dwellings
Actual Range: 50 to 161 (units:)
Range Selected by User: 50 to 200 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/09 to 27/11/17

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

Selected survey days:

Monday	5 days
Tuesday	2 days
Wednesday	2 days
Thursday	5 days
Friday	3 days

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

Selected survey types:

Manual count	17 days
Directional ATC Count	0 days

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

Selected Locations:

Suburban Area (PPS6 Out of Centre)	11
Edge of Town	5
Neighbourhood Centre (PPS6 Local Centre)	1

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

Selected Location Sub Categories:

Residential Zone	14
No Sub Category	3

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

Secondary Filtering selection:

Use Class:

C3	17 days

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

Population within 1 mile:

1,001 to 5,000	3 days
5,001 to 10,000	6 days
10,001 to 15,000	4 days
15,001 to 20,000	2 days
20,001 to 25,000	2 days

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

Population within 5 miles:

5,001 to 25,000	4 days
25,001 to 50,000	3 days
75,001 to 100,000	6 days
100,001 to 125,000	2 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days

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

Car ownership within 5 miles:

0.6 to 1.0	4 days
1.1 to 1.5	13 days

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

Travel Plan:

Yes	2 days
No	15 days

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

PTAL Rating:

No PTAL Present	17 days

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

LIST OF SITES relevant to selection parameters

1 CB-03-A-04 SEMI DETACHED CUMBRIA
MOORCLOSE ROAD
SALTERBACK
WORKINGTON
Edge of Town
No Sub Category
Total Number of dwellings: 82
Survey date: FRIDAY *24/04/09* *Survey Type: MANUAL*

2 DH-03-A-01 SEMI DETACHED DURHAM
GREENFIELDS ROAD

BISHOP AUCKLAND
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 50
Survey date: TUESDAY *28/03/17* *Survey Type: MANUAL*

3 DH-03-A-02 MIXED HOUSES DURHAM
LEAZES LANE
ST HELEN AUCKLAND
BISHOP AUCKLAND
Neighbourhood Centre (PPS6 Local Centre)
Residential Zone
Total Number of dwellings: 125
Survey date: MONDAY *27/03/17* *Survey Type: MANUAL*

4 DV-03-A-02 HOUSES & BUNGALOWS DEVON
MILLHEAD ROAD

HONITON
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 116
Survey date: FRIDAY *25/09/15* *Survey Type: MANUAL*

5 DV-03-A-03 TERRACED & SEMI DETACHED DEVON
LOWER BRAND LANE

HONITON
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 70
Survey date: MONDAY *28/09/15* *Survey Type: MANUAL*

6 FA-03-A-02 MIXED HOUSES FALKIRK
ROSEBANK AVENUE & SPRINGFIELD DRIVE

FALKIRK
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 161
Survey date: WEDNESDAY *29/05/13* *Survey Type: MANUAL*

7 HC-03-A-19 HOUSES & FLATS HAMPSHIRE
CANADA WAY

LIPHOOK
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 62
Survey date: MONDAY *27/11/17* *Survey Type: MANUAL*

8 KC-03-A-03 MIXED HOUSES & FLATS KENT
HYTHE ROAD
WILLESBOROUGH
ASHFORD
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 51
Survey date: THURSDAY *14/07/16* *Survey Type: MANUAL*

LIST OF SITES relevant to selection parameters (Cont.)

9 NF-03-A-02 HOUSES & FLATS NORFOLK
DEREHAM ROAD

NORWICH
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 98
Survey date: MONDAY *22/10/12* *Survey Type: MANUAL*

10 NY-03-A-06 BUNGALOWS & SEMI DET. NORTH YORKSHIRE
HORSEFAIR

BOROUGHBRIDGE
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 115
Survey date: FRIDAY *14/10/11* *Survey Type: MANUAL*

11 NY-03-A-09 MIXED HOUSING NORTH YORKSHIRE
GRAMMAR SCHOOL LANE

NORTHALLERTON
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 52
Survey date: MONDAY *16/09/13* *Survey Type: MANUAL*

12 NY-03-A-10 HOUSES AND FLATS NORTH YORKSHIRE
BOROUGHBRIDGE ROAD

RIPON
Edge of Town
No Sub Category
Total Number of dwellings: 71
Survey date: TUESDAY *17/09/13* *Survey Type: MANUAL*

13 SC-03-A-04 DETACHED & TERRACED SURREY
HIGH ROAD

BYFLEET
Edge of Town
Residential Zone
Total Number of dwellings: 71
Survey date: THURSDAY *23/01/14* *Survey Type: MANUAL*

14 SH-03-A-04 TERRACED SHROPSHIRE
ST MICHAEL'S STREET

SHREWSBURY
Suburban Area (PPS6 Out of Centre)
No Sub Category
Total Number of dwellings: 108
Survey date: THURSDAY *11/06/09* *Survey Type: MANUAL*

15 SH-03-A-05 SEMI-DETACHED/TERRACED SHROPSHIRE
SANDCROFT
SUTTON HILL
TELFORD
Edge of Town
Residential Zone
Total Number of dwellings: 54
Survey date: THURSDAY *24/10/13* *Survey Type: MANUAL*

16 SY-03-A-01 SEMI DETACHED HOUSES SOUTH YORKSHIRE
A19 BENTLEY ROAD
BENTLEY RISE
DONCASTER
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 54
Survey date: WEDNESDAY *18/09/13* *Survey Type: MANUAL*

LIST OF SITES relevant to selection parameters (Cont.)

17 WS-03-A-04 MIXED HOUSES WEST SUSSEX
HILLS FARM LANE
BROADBRIDGE HEATH
HORSHAM
Edge of Town
Residential Zone
Total Number of dwellings: 151
Survey date: THURSDAY *11/12/14* *Survey Type: MANUAL*

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

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	17	88	0.064	17	88	0.244	17	88	0.308
08:00 - 09:00	17	88	0.121	17	88	0.335	17	88	0.456
09:00 - 10:00	17	88	0.140	17	88	0.160	17	88	0.300
10:00 - 11:00	17	88	0.124	17	88	0.161	17	88	0.285
11:00 - 12:00	17	88	0.129	17	88	0.148	17	88	0.277
12:00 - 13:00	17	88	0.156	17	88	0.138	17	88	0.294
13:00 - 14:00	17	88	0.158	17	88	0.153	17	88	0.311
14:00 - 15:00	17	88	0.134	17	88	0.158	17	88	0.292
15:00 - 16:00	17	88	0.223	17	88	0.154	17	88	0.377
16:00 - 17:00	17	88	0.237	17	88	0.147	17	88	0.384
17:00 - 18:00	17	88	0.310	17	88	0.156	17	88	0.466
18:00 - 19:00	17	88	0.190	17	88	0.139	17	88	0.329
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.986			2.093			4.079

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

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

Parameter summary

Trip rate parameter range selected:	50 - 161 (units:)
Survey date date range:	01/01/09 - 27/11/17
Number of weekdays (Monday-Friday):	17
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	0

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

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2.1 Technical Report: Coedely Dualling Transport User Benefit Appraisal (TUBA) and Option Comparison (May 2018)

Technical Report

Report Title	**Coedely Dualling Transport User Benefit Appraisal (TUBA) and Option Comparison**
Date	May 2018
Prepared For	Rhondda Cynon Taf County Borough Council
Prepared By	Daniel Davies Transportation Tel: 02920 803 631 daniel.davies@capita.co.uk
Ref	CS/093813

1.1 Introduction

A high level Transport User Benefit Appraisal (TUBA) and option comparison of the Coedely Dualling scheme has been undertaken in order to quantify certain scheme benefits for the business case and provide a comparison of the present value of benefit provided by each option.

Option A involves carriageway dualling between the A4119 Coedely/Ely Valley Road roundabout and the A4119/South Wales Fire Centre roundabout.

Option B involves carriageway dualling between the A4119 Coedely/Ely Valley Road roundabout and the A4119/South Wales Fire Centre roundabout, as with Option A, and includes the removal of existing A4119/South Wales Fire Centre roundabout.

The A4119 Paramics model has been used to undertake a high level assessment of both options. The Paramics option model results have then been input into the Department for Transport (DfT) Program TUBA for cost benefit appraisal.

The following benefits were quantified:

- Journey Time Benefits
- Vehicle Operating Costs
- Carbon emissions
- Indirect Taxation

1.2 Economic User Classes

The benefits derived from the following user classes have been estimated:

1. Car
2. LGV Personal
3. LGV Freight
4. OGV1
5. OGV2

The proportions of LGV personal and LGV freight were based on average WebTAG values. OGV1 and OGV2 proportions were taken from local traffic count data.

Default WebTAG databook (Dec 17) Journey purposes were used.

1.3 Annualisation

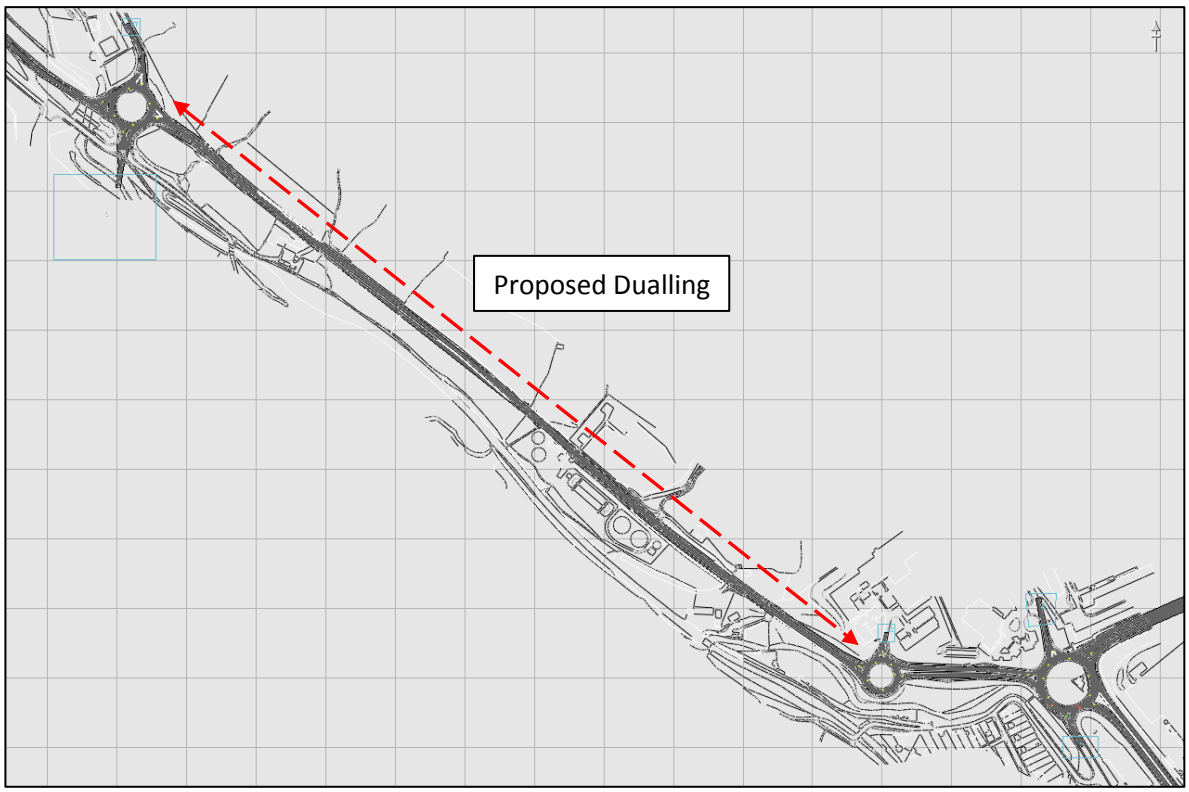
The scheme layout options have been modelled and assessed in the AM peak period (07:00-10:00), Inter-peak (10:00 – 16:00) and PM peak (16:00 – 19:00) within the A4119 Paramics model. An annualization factor of 253 has been used to convert the model benefits into an annual benefit. In light of the above, the benefits estimated do not include benefits that might be gained at night and on the weekend however and so will slightly underestimate the likely benefits of each intervention.

1.4 The Options

The scheme layout options are described and illustrated below:

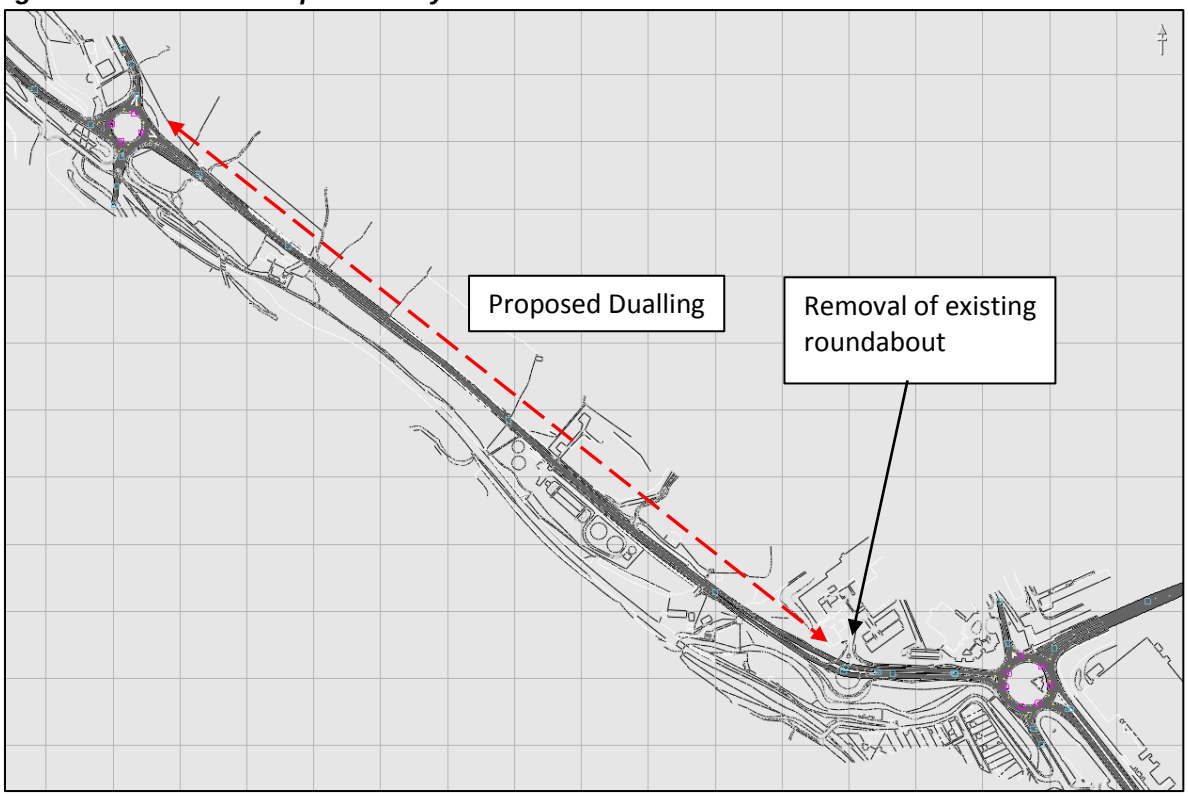
Option A: Carriageway dualling between the A4119 Coedely/Ely Valley Road roundabout and the A4119/South Wales Fire Centre roundabout.

Figure 1 Option A Layout



Option B: Carriageway dualling between the A4119 Coedely/Ely Valley Road roundabout and the A4119/Heol y Sarn/Royal Glamorgan Hospital Access roundabout (including removal of existing A4119/South Wales Fire Centre roundabout).

Figure 2 Option B Layout



1.5 Appraisal Results

The TUBA undertaken indicates that each option would provide the following transport user present value of benefit (PVB):

Table 1.1 Monetised Costs and Benefits

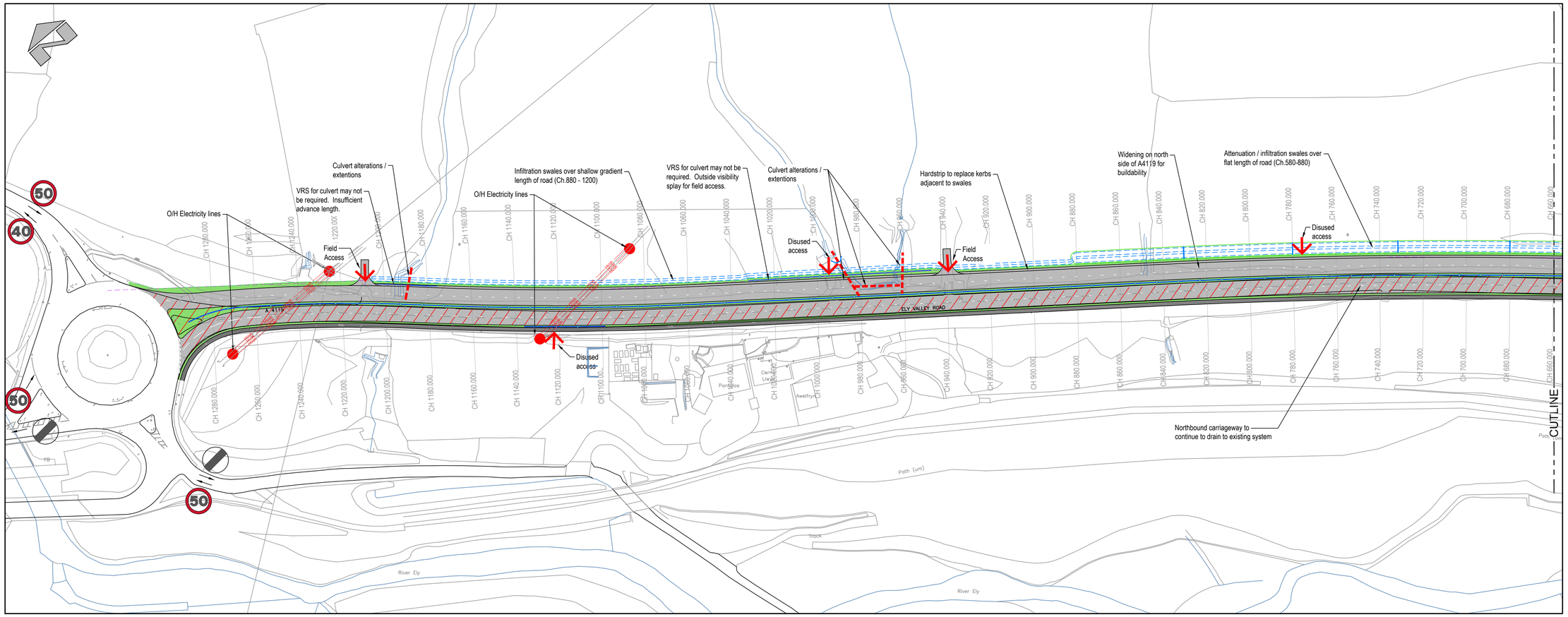
Benefit*	Option A	Option B
Greenhouse Gases	220	194
Economic Efficiency: Consumer Users (Commuting)	4339	5791
Economic Efficiency: Consumer Users (Other)	4496	7025
Economic Efficiency: Business Users and Providers	6921	8606
Wider Public Finances (Indirect Taxation Revenues)	-428	-376
Present Value of Benefit (PVB)	15,548	21,240

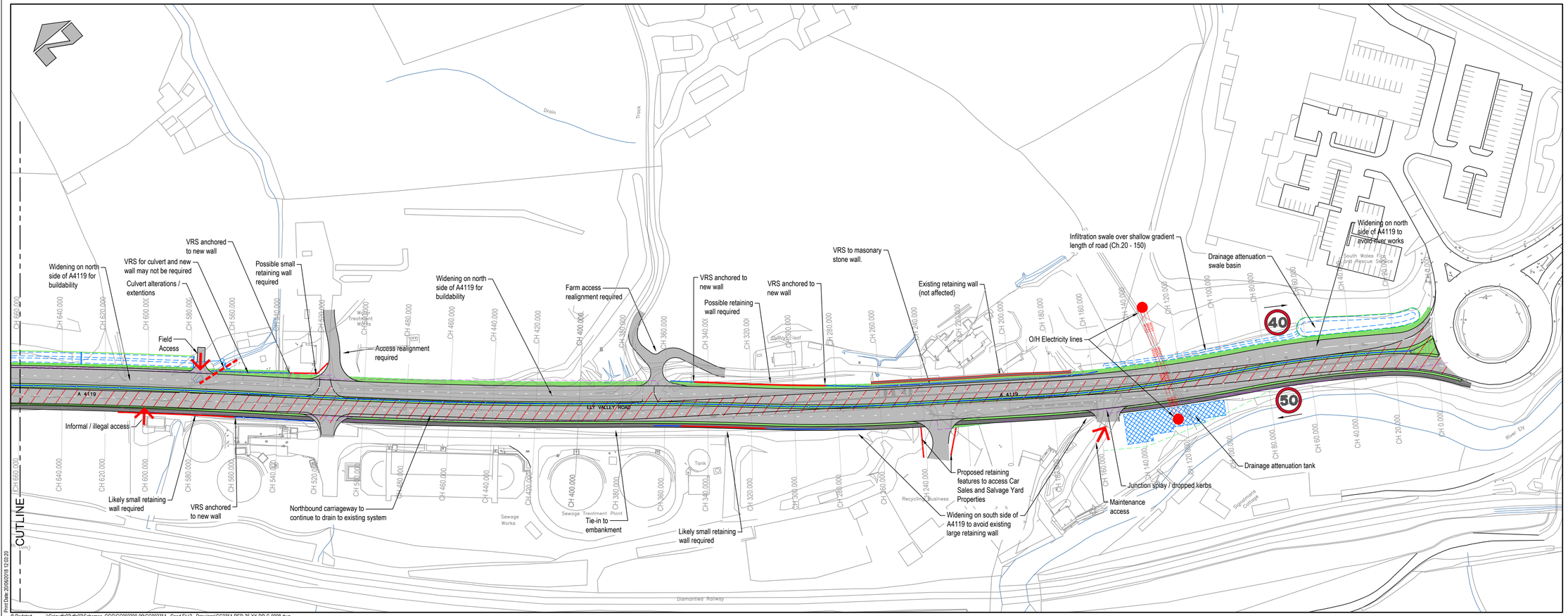
* Benefits are presented as positive numbers and costs are presented as negative numbers.
* All benefits are present values discounted to 2010 in 2010 prices (£000).

The appraisal results indicate that option B provides the greatest PVB. It should be noted that this assessment does not include an analysis of scheme costs so does not indicate which option provides the best value for money.

It should also be noted that the option assessments undertaken were high level in nature and a number of assumptions were undertaken in relation to the option layout designs as no formal design has been developed at this stage.

2.2 Option 1: Dualling of the A4119 with Associated Roundabout Improvements





Key

- New carriageway
- New footway
- New verge
- Existing carriageway
- Field access
- New retaining wall
- Watercourse
- O/H power line
- Vehicle restraint system
- Junction visibility splay
- Swale with weirs for infiltration and attenuation of additional surface water runoff.
- Swale for infiltration and transfer of additional surface water runoff
- Drainage attenuation tank

Notes

1. Concept design based on Ordnance Survey data.
2. Layout may vary following detailed topographical survey.
3. Earthworks to be developed following topographical survey.

Rev	Dwn	Chk'd	App'd	Description	Date

Purpose of Issue

S2 - Suitable for Information

Classification

Commercial in Confidence

Client

Rhondda Cynon Taf
County Borough Council

Project

Coed Ely: Outline Business Case (WELTAG Stage 2)

Drawing

APPENDIX 2.2
Option 1: Dualling of A4119 With Associated Roundabout Improvements

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No. GC/002754

Date June 2018

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number) GC2754-RED-76-XX-DR-C-0008

BS1192 Compliant revision P01

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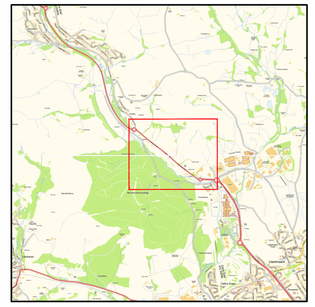
2.3 Option 1A and Option 11(part): A4119 Dualling and South Wales Fire & Rescue Service Roundabout Removal & Adjacent Active Travel Route

Key

- New carriageway
- New footway
- New verge



Rev	Drwn	Chk'd	Appr'd	Description	Date

Purpose of Issue

S2 - Suitable for Information

Classification

Commercial in Confidence

Client

Rhondda Cynon Taf
County Borough Council

Project

Coed Ely: Outline Business Case (WELTAG Stage 2)

Drawing

APPENDIX 2.3

Option 1A & Option 11 (Part): A4119 Dualling and SWFARS Roundabout Removal & Active Travel Route

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.	Date
GC/002754	June 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

GC2754-RED-76-XX-DR-C-0007

BS1192 Compliant revision P01

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2.4A Option 11(part): Active Travel Route adjacent to A4119 (existing routes included)

Key

- Existing off road NCN cycleway
- Existing on road NCN cycleway
- Existing links to NCN cycleway
- Existing footpath
- Proposed footway widening to join Coed Ely widening scheme
- Potential future links

Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
S2 - Suitable for Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely: Outline Business Case
(WELTAG Stage 2)

Drawing
APPENDIX 2.4A
Option 11: Active Travel
Route Adjacent to A4119
(Existing Routes Included)

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.	Date
GC/002754	June 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-76-XX-DR-C-0001

BS1192 Compliant revision
P01

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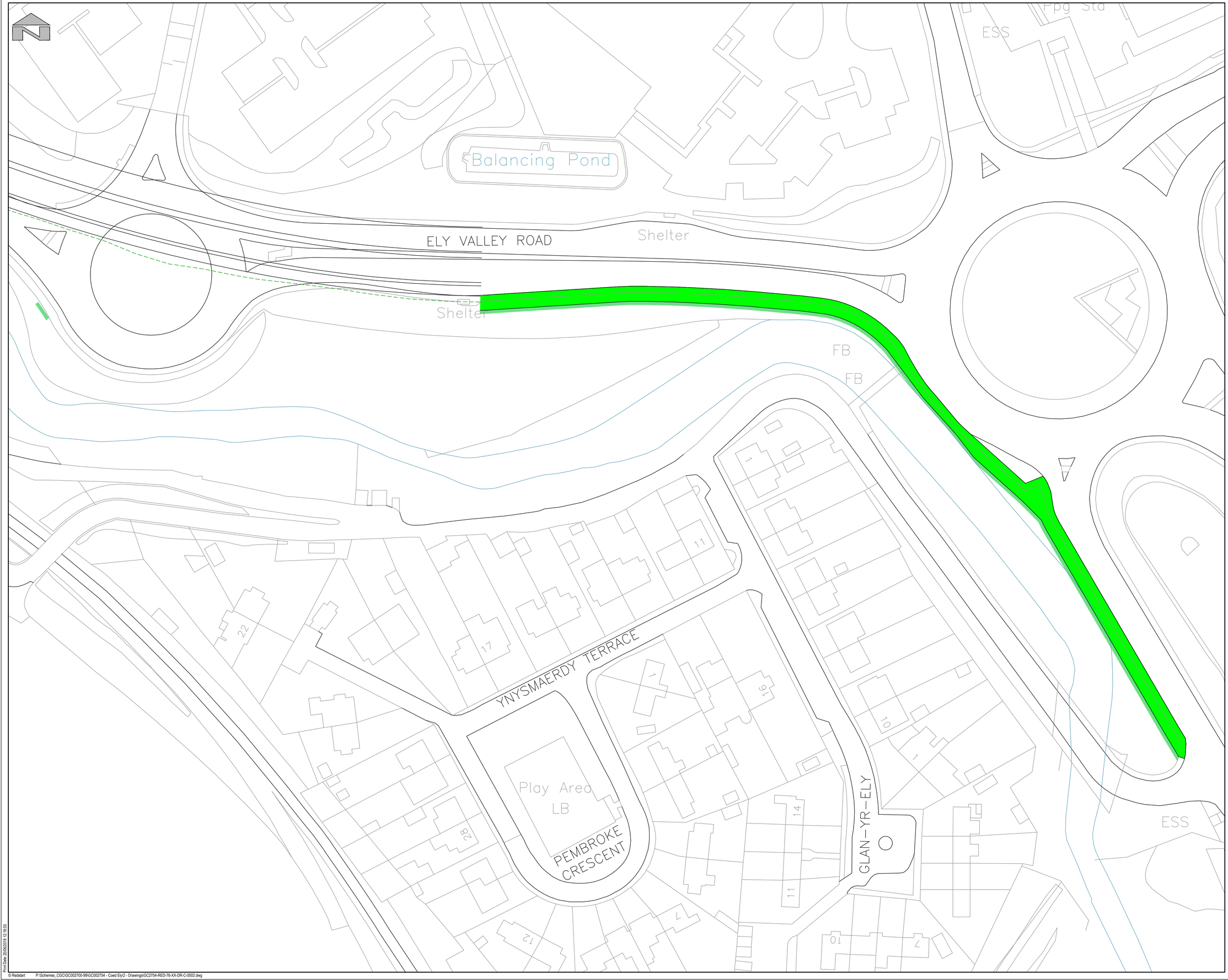
2.4B Option 11(part): Active Travel Route adjacent to A4119



Key

- Proposed footway widening to join Coed Ely widening scheme
- Proposed 1m verge / earthworks

Rev	Drwn	Chk'd	Appr'd	Description	Date

Purpose of Issue
S2 - Suitable for Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely: Outline Business Case
(WELTAG Stage 2)

Drawing
APPENDIX 2.4B
Option 11 (Part): Active Travel
Route Adjacent to A4119

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.	Date
GC/002754	June 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-76-XX-DR-C-0002

BS1192 Compliant revision
P01

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Print Date: 20/06/2018 12:18:05

2.5 Option 2: Park & Ride/Share Facility within SSA 14.1 Development Site

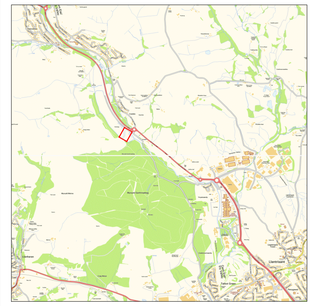
DEVELOPMENT SITE
SSA 14.1

Afon Ely

Key

New carriageway

New 2m wide footway



Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
S2 - Suitable for Information

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely: Outline Business Case
(WELTAG Stage 2)

Drawing
APPENDIX 2.5
Option 2: Park & Ride /
Share Facility Within
SSA14.1 Development Site

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.	Date
GC/002754	June 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-76-XX-DR-C-0003

BS1192 Compliant revision
P01

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2.6 Option 15: Park & Ride Expansion North of Study Area

Collena Road

Llantrisant Road

Key

New carriageway

New 2m wide footway

Rev	Dwn	Chkd	Appd	Description	Date

Purpose of Issue

S2 - Suitable for Information

Classification

Commercial in Confidence

Client

Rhondda Cynon Taf
County Borough Council

Project

Coed Ely: Outline Business Case
(WELTAG Stage 2)

Drawing

APPENDIX 2.6

Option 15: Park & Ride Expansion North of Study Area

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.: GC/002754

Date: June 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number: GC2754-RED-76-XX-DR-C-0004

BS1192 Compliant revision: P01

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2.7 Option 1 - Cost Estimate

	APPENDIX 2.7: A4119 DUALLING WITH FOOTWAYS OPTION 1	**Amount**
	Description	**Amount**
	Page : 1: PRELIMINARIES	see below
	Page : 2: SITE CLEARANCE	£37,832.70
	Page : 3: FENCING	£54,490.00
	Page : 4: ROAD RESTRAINTS	£112,227.50
	Page : 5: DRAINAGE	£290,639.39
	Page : 6: EARTHWORKS	£880,790.90
	Page : 7: PAVEMENTS	£1,198,526.00
	Page : 8: KERBS AND FOOTWAYS	£332,494.00
	Page : 9: TRAFFIC SIGNS AND ROAD MARKINGS	£15,021.29
	Page : 10: ROAD LIGHTING COLUMNS	£57,456.00
	Page : 11: ELECTRICAL WORK FOR ROAD LIGHTING	£50,921.00
	Page : 12: STRUCTURAL CONCRETE	£372,600.00
	Page : 13: LANDSCAPE AND ECOLOGY	£99,790.80
	Sub Total - Measured works (excluding the sections listed below)	**£3,502,789.58**
	Preliminaries (Allowance)	£750,000.00
	Traffic management (Allowance	£876,000.00
	Accommodation works (Allowance)	£175,000.00
	Statutory Undertakers (allowance)	£519,057.77
	Night time working on 10% of pavement	£119,852.60
	Sub Total (excluding contingency and optimism bias)	**£5,942,699.95**
	Add optimism bias at 44%	£2,614,787.98
	Sub Total (Main works and OB)	£8,557,487.93
	Land Costs	£78,000.00
	Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon / Construction Supervision)	£483,000.00
	Estimated 3rd Party Survey costs	£79,000.00
	Estimated 3rd Party costs : solicitors, cpo , advertising etc	£40,000.00
	Risk - See Scheme Risk Register	£366,500.00
	Total scheme cost	**£9,603,987.93**

draft report value

37120

54490

112227.5

290639.39

425968.2

1073818.2

114927

15021.29

57456

50921

372600

construction cost
(not incl prelims)

97259.7

£3,502,789.58

£222,058.95

(prelims)
£5,054,698.35

Preparation costs
£1,046,500.00

2.8 Option 1A - Cost Estimate

APPENDIX 2.8: A4119 DUALLING OPTION, REMOVAL OF ROUNDABOUT (ADDITION TO OPTION 1 TO ARRIVE AT OPTION 1A)

GC2754-RED-76-XX-DR-C-0006
GC002754

High Level Estimate

	Quantity	Unit	Rate	Total
General site clearance; carriageways	0.7	m2	£ 723.59	£ 506.51
		no.	£ 50.00	£ -
Take down unlit traffic sign and set aside for reuse	5	no.	£ 30.00	£ 150.00
Take down unlit traffic sign ADS and set aside for reuse	1	no.	£ 100.00	£ 100.00
Take down lit traffic sign to tip	10	no.	£ 30.00	£ 300.00
Take down lit ads traffic sign to tip	4	no.	£ 250.00	£ 1,000.00
Take down lighting column to tip	12	no.	£ 130.00	£ 1,560.00
Take down bollard to tip	2	no.	£ 100.00	£ 200.00
Take down pedestrian guardrail	20	m	£ 12.00	£ 240.00
Take down existing TSSCB safety barrier	160	m	£ 25.00	£ 4,000.00
Remove gully cover	17	no.	£ 22.00	£ 374.00
New TDSCB safety barrier N2W1	270	m	£ 150.00	£ 40,500.00
Connection to existing TSSCB safety fencing	1	no.	£ 61.85	£ 61.85
P4 terminal	2	no.	£ 3,600.00	£ 7,200.00
New gully & connection	20	no.	£ 330.00	£ 6,600.00
New drainage	500	m	£ 100.00	£ 50,000.00
Backfill existing gully with concrete	17	no.	£ 55.00	£ 935.00
Excavate existing footway and traffic islands, U1B	300	m3	£ 8.00	£ 2,400.00
E.O.Hard material	150	m3	£ 13.52	£ 2,028.00
Excavate acceptable	657.5	m3	£ 5.00	£ 3,287.50
disposal	657.5	m3	£ 12.00	£ 7,890.00
Topsoil + grass	1645	m2	£ 26.00	£ 42,770.00
perforate old roundabout	1040	m2	£ 3.00	£ 3,120.00
Type 1 subbase 150 mm thick.	663	m3	£ 29.00	£ 19,227.00
AC 32 HDM base 40/60rec 150mm thick	4420	m2	£ 26.00	£ 114,920.00
Extra over previous item per 10mm variation in thickness (+/-) item	30940	m2	£ 1.30	£ 40,222.00
AC 20 dense bin 40/60rec 60mm thick	4420	m2	£ 12.00	£ 53,040.00
Extra over previous item per 5mm variation in	-4420	m2	£ 0.70	-£ 3,094.00
HRA 30/14F surf 40/60des with min PSV55, 35mm thick	4420	m2	£ 10.00	£ 44,200.00
Extra over above item for min PSV 65	4420	m2	£ 1.00	£ 4,420.00
Extra over previous item per 5mm variation in thickness (+/-) item	8840	m2	£ 1.00	£ 8,840.00
milling pavement 0 - 50mm thick	3730	m2	£ 2.32	£ 8,653.60
Precast concrete kerb(s) Type HB2 laid straight	1220	m	£ 25.00	£ 30,500.00
Edging	720	m	£ 20.00	£ 14,400.00
Footway	1950	m2	£ 35.00	£ 68,250.00

Road markings (1 visit)	1	item	£ 1,500.00	£ 1,500.00
Road Markings	592	m	£ 2.00	£ 1,184.00
Bus shelter	1	no.	£ 3,000.00	£ 3,000.00
remove from store and re-erect signs	6	no.	£ 550.00	£ 3,300.00
speed limit signs	8	no.	£ 200.00	£ 1,600.00
ADS	1	no.	£ 1,000.00	£ 1,000.00
Lamp columns (including ducting)	30	no.	£ 1,500.00	£ 45,000.00
Statutory bodies works - Covered by Optimism Bias				£ -
				£ 635,385.46
Preliminaries	5%	*	£ 635,385.46	£ 31,769.27
risk - changes to fire station car park				£ 300,000.00
night time	30%		£ 532,891.46	£ 159,867.44
Optimism bias	44%	*	£ 667,154.74	£ 293,548.08
SUB TOTAL (main works and OB) =				**£ 1,420,570.26**
Land Costs				£ 14,000.00
Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon /				£ 100,000.00
Estimated 3rd Party Survey costs				£ 14,000.00
Risk - See Scheme Risk Register				£ 60,000.00
Total stand alone scheme cost				**£1,608,570.26**

Total scheme cost taking out overlap (ie 2/3)	**£1,072,380.17**

2.9A Option 11(part) - Cost Estimate

APPENDIX 2.9A: COEDELY FOOTWAY WIDENING OPTION 11 (PART)

GC2754-RED-76-XX-DR-C-0002
GC002754

High Level Estimate

	Quantity	Unit	Rate	Total
General site clearance; carriageways	0.25	m2	£ 723.59	£ 180.90
Take down bus shelter	1	no.	£ 300.00	£ 300.00
Take down lit traffic sign and set aside for reuse	3	no.	£ 25.00	£ 75.00
Take down big traffic sign and set aside for reuse	3	no.	£ 200.00	£ 600.00
Take down lighting column to tip	7	no.	£ 130.00	£ 910.00
Take down pedestrian guardrail	6	m	£ 12.00	£ 72.00
Take down existing TSSCB safety barrier	20	m	£ 25.00	£ 500.00
New TDSCB safety barrier N2W1	20	m	£ 160.00	£ 3,200.00
Connection to existing TSSCB safety fencing	1	no.	£ 62.00	£ 62.00
P4 terminal	1	no.	£ 3,600.00	£ 3,600.00
New visirail	6	m	£ 140.00	£ 840.00
Raise lower cover	13	no.	£ 70.00	£ 910.00
Excavate existing footway and traffic islands, U1B	1070	m3	£ 8.00	£ 8,560.00
E.O.Hard material	425	m3	£ 13.52	£ 5,746.00
Topsoil + grass	1290	m2	£ 36.00	£ 46,440.00
Precast concrete kerb(s) Type HB2 laid straight	100	m	£ 25.00	£ 2,500.00
Edging	450	m	£ 20.00	£ 9,000.00
Footway	1800	m2	£ 35.00	£ 63,000.00
Road markings (1 visit)	1	item	£ 1,500.00	£ 1,500.00
RM - solid	63	m2	£ 15.00	£ 945.00
Bus shelter	1	no.	£ 3,000.00	£ 3,000.00
remove from store and re-erect lit signs	3	no.	£ 400.00	£ 1,200.00
remove from store and re-erect signs	3	no.	£ 700.00	£ 2,100.00
new cycle signs	6	no.	£ 250.00	£ 1,500.00
Lamp columns (including ducting)	7	no.	£ 1,500.00	£ 10,500.00
Traffic & pedestrian management	100	day	£ 200.00	£ 20,000.00
Statutory bodies works - Covered by Optimism Bias				£ -
				£ 187,240.90
Preliminaries	25%	*	£ 187,240.90	£ 46,810.22
night time	40%		£ 101,243.90	£ 40,497.56
Optimism bias	44%	*	£ 234,051.12	£ 102,982.49
SUB TOTAL (main works and OB) =				**£ 377,531.17**
Land Costs				£ 4,000.00
Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon / Construction Supervision)				£ 27,000.00
Estimated 3rd Party Survey costs				£ 4,000.00
Risk - See Scheme Risk Register				£ 15,000.00
Total scheme cost				**£427,531.17**

2.9B Option 11(part) - Cost Estimate

APPENDIX 2.9B: COED ELY DUALLING
0.5M WIDENING OPTION 11 (PART)

GC2754-RED-76-XX-DR-C-000
GC002754

High Level Estimate

	Quantity	Unit	Rate	Total
General site clearance; carriageways	0.13	m2	£ 723.59	£ 94.07
Fencing	200	m	£ 25.00	£ 5,000.00
Excavate	1290	m3	£ 8.00	£ 10,320.00
E.O.Hard material	850	m3	£ 13.52	£ 11,492.00
Precast concrete kerb(s) Type HB2 laid straight	100	m	£ 25.00	£ 2,500.00
Footway	1800	m2	£ 35.00	£ 63,000.00
Lamp columns (including ducting)	2	no.	£ 1,500.00	£ 3,000.00
Traffic & pedestrian management		day	£ 200.00	£ -
Statutory bodies works - Covered by Optimism Bias				£ -
				£ 95,406.07
Preliminaries / traffic management	25%	*	£ 95,406.07	£ 23,851.52
night time	40%			£ -
Optimism bias	44%	*	£ 119,257.58	£ 52,473.34
SUB TOTAL (main works and OB) =				**£ 171,730.92**
Land Costs				£ 2,000.00
Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon / Construction Supervision)				£ 12,000.00
Estimated 3rd Party Survey costs				£ 2,000.00
Risk - See Scheme Risk Register				£ 7,000.00
Total scheme cost				**£194,730.92**

2.10 Option 2 - Cost Estimate

APPENDIX 2.10: COEDELY PARK & RIDE/SHARE OPTION 2

GC2754-RED-76-XX-DR-C-0003
GC002754

High Level Estimate

	Quantity	Unit	Rate	Total
General site clearance; carriageways	0.35	m2	£ 723.59	£ 253.26
New gully & connection	8	no.	£ 330.00	£ 2,640.00
New drainage	300	m	£ 100.00	£ 30,000.00
Excavate Slag	1750	m3	£ 8.00	£ 14,000.00
Excavate existing footway and traffic islands, U1B	30	m3	£ 8.00	£ 240.00
E.O.Hard material	100	m3	£ 13.52	£ 1,352.00
Type 1 subbase 150 mm thick.	480	m3	£ 29.00	£ 13,920.00
AC 32 HDM base 40/60rec 150mm thick	3200	m2	£ 26.00	£ 83,200.00
Extra over previous item per 10mm variation in thickness (+/-) item	22400	m2	£ 1.30	£ 29,120.00
AC 20 dense bin 40/60rec 60mm thick	3200	m2	£ 12.00	£ 38,400.00
Extra over previous item per 5mm variation in	-3200	m2	£ 0.70	-£ 2,240.00
HRA 30/14F surf 40/60des with min PSV55, 35mm thick	3200	m2	£ 10.00	£ 32,000.00
Extra over above item for min PSV 65	3200	m2	£ 1.00	£ 3,200.00
Extra over previous item per 5mm variation in thickness (+/-) item	6400	m2	£ 1.00	£ 6,400.00
Bond coat	3200	m2	£ 0.56	£ 1,792.00
Precast concrete kerb(s) Type HB2 laid straight	383	m	£ 25.00	£ 9,575.00
Edging	340	m	£ 20.00	£ 6,800.00
Footway	402	m2	£ 35.00	£ 14,070.00
Road markings (1 visit)	1	item	£ 1,500.00	£ 1,500.00
Road Markings	850	m	£ 2.00	£ 1,700.00
RM - solid	63	m2	£ 15.00	£ 945.00
RM - arrow	9	no.	£ 15.00	£ 135.00
Bus shelter	1	no.	£ 3,000.00	£ 3,000.00
Lamp columns (including ducting)	5	no.	£ 1,500.00	£ 7,500.00
Statutory bodies works - Covered by Optimism Bias				£ -
				£ 299,502.26
Preliminaries / traffic management	25%	*	£ 299,502.26	£ 74,875.56
night time	10%		£ 287,502.26	£ 28,750.23
Optimism bias	44%	*	£ 374,377.82	£ 164,726.24
SUB TOTAL (main works and OB) =				**£ 567,854.29**
Land Costs				£ 6,000.00
Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon / Construction Supervision)				£ 35,000.00
Estimated 3rd Party Survey costs				£ 6,000.00
Risk - See Scheme Risk Register				£ 25,000.00
Total scheme cost				**£639,854.29**

2.11 Option 15 - Cost Estimate

APPENDIX 2.11: PARK & RIDE NORTH OF STUDY AREA OPTION 15

GC2754-RED-76-XX-DR-C-0003
GC002754

High Level Estimate

	Quantity	Unit	Rate	Total
General site clearance; carriageways	0.35	m2	£ 723.59	£ 253.26
New gully & connection	8	no.	£ 330.00	£ 2,640.00
New drainage	300	m	£ 100.00	£ 30,000.00
Excavate Slag	1750	m3	£ 8.00	£ 14,000.00
Excavate existing footway and traffic islands, U1B	30	m3	£ 8.00	£ 240.00
E.O.Hard material	100	m3	£ 13.52	£ 1,352.00
Type 1 subbase 150 mm thick.	480	m3	£ 29.00	£ 13,920.00
AC 32 HDM base 40/60rec 150mm thick	3200	m2	£ 26.00	£ 83,200.00
Extra over previous item per 10mm variation in thickness (+/-) item	22400	m2	£ 1.30	£ 29,120.00
AC 20 dense bin 40/60rec 60mm thick	3200	m2	£ 12.00	£ 38,400.00
Extra over previous item per 5mm variation in	-3200	m2	£ 0.70	-£ 2,240.00
HRA 30/14F surf 40/60des with min PSV55, 35mm thick	3200	m2	£ 10.00	£ 32,000.00
Extra over above item for min PSV 65	3200	m2	£ 1.00	£ 3,200.00
Extra over previous item per 5mm variation in thickness (+/-) item	6400	m2	£ 1.00	£ 6,400.00
Precast concrete kerb(s) Type HB2 laid straight	383	m	£ 25.00	£ 9,575.00
Edging	340	m	£ 20.00	£ 6,800.00
Footway	402	m2	£ 35.00	£ 14,070.00
Road markings (1 visit)	1	item	£ 1,500.00	£ 1,500.00
Road Markings	850	m	£ 2.00	£ 1,700.00
RM - solid	63	m2	£ 15.00	£ 945.00
RM - arrow	9	no.	£ 15.00	£ 135.00
Bus shelter	1	no.	£ 3,000.00	£ 3,000.00
Lamp columns (including ducting)	5	no.	£ 1,500.00	£ 7,500.00
Statutory bodies works - Covered by Optimism Bias				£ -
				£ 297,710.26
Preliminaries and traffic management	25%	*	£ 297,710.26	£ 74,427.56
night time	0%		£ 297,710.26	£ -
Optimism bias	44%	*	£ 372,137.82	£ 163,740.64
			SUB TOTAL (main works and OB) =	**£ 535,878.46**

Land Costs	£ 6,000.00
Design Fees (Feasibility / Preliminary design & Planning / Detailed Design / CPO & Precon /	£ 35,000.00
Estimated 3rd Party Survey costs	£ 6,000.00
Risk - See Scheme Risk Register	£ 25,000.00
Total scheme cost	**£607,878.46**

2.12 Option 22 (Do Minimum) - Cost Estimate

APPENDIX 2.12: DO MINIMUM
OPTION 22

Intervention / Treatment (per carriageway)	Treatment cycle	Average treatment cost	Whole life cost (60 year)	Average cost per year
Vehicle restraint system repair	1 per 5 years	£1,000.00	£12,000.00	£200.00
vehicle restraint renewal	1 per 30 years	£24,000.00	£48,000.00	£800.00
gully cleansing	1 per year	£1,000.00	£60,000.00	£1,000.00
maintenance of attenuation tanks	1 per year	£750.00	£45,000.00	£750.00
planned surfacing	1 per 10 years	£140,000.00	£840,000.00	£14,000.00
planned carriageway renewal	1 per 40 years	£667,000.00	£1,000,500.00	£16,675.00
				£33,425.00
			Total 60 years	**£2,005,500.00** (two carriageways)

2.13 Worksheet 14: Appraisal of Packaged Options against the Wales Transport Strategy Outcomes

Appendix 2.13 Worksheet 14: Appraisal of Packaged Options against the Wales Transport Strategy Outcomes

Packaged Option Reference	Option (Long list option number)	Wales Transport Strategy Outcomes																
		Social					Economy					Environment						
		Improve access to healthcare	Improve access to education, training and lifelong learning	Improve access to shopping and leisure facilities	Encourage healthy lifestyles	Improve the actual and perceived safety of travel	Improve access to employment opportunities	Improve connectivity within Wales and internationally	Improve the efficient, reliable and sustainable movement of people	Improve the efficient, reliable and sustainable movement of freight	Improve access to visitor attractions	Increase the use of more sustainable materials	Reduce the contribution of transport to greenhouse gas emissions	Adapt to the impacts of climate change	Reduce the contribution of transport to air pollution and other harmful emissions	Improve the impact of transport on the local Environment	Improve the impact of transport on our heritage	Improve the impact of transport on biodiversity
A	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A)	+	+	+	0	0	++	+	+	+	+	+	+	+	0	-	0	-
B	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11)	+	+	+	+++	+	++	+	+	+	+	+	+	+	+	+	0	0
C	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11) Park & Ride/Park & Share facility within SSA 14.1 development site (Option 2) Park & Ride expansion north of the study area (Option 15)	+	+	+	+++	+	++	+	+	+	+	+	+	+	+	+	0	0
D	Do Minimum (Option 22)	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

2.14 Worksheet 15: Appraisal of Packaged Options against the Well-being of Future Generations (Wales) Act 2015 Goals

Appendix 2.14 Worksheet 15: Appraisal of Packaged Options against the Well-being of Future Generations (Wales) Act 2015 Goals

Pacakaged Option Reference	Option (Long list option number)	A globally responsible Wales	A Wales of vibrant culture and thriving Welsh language	A Wales of cohesive communities	A more equal Wales	A healthier Wales	A resilient Wales	A prosperous Wales
A	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A)	+ +	0	+	+	0	+	+ +
B	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11)	+ +	0	+	+ +	+ +	+	+ +
C	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11) Park & Ride/Park & Share facility within SSA 14.1 development site (Option 2) Park & Ride expansion north of the study area (Option 15)	+ +	0	+	+ +	+ +	+	+ +
D	Do Minimum (Option 22)	0	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

2.15 Worksheet 16: Appraisal of Packaged Options against the Transport Planning Objectives

Appendix 2.15 Worksheet 16: Appraisal of Packaged Options against Transport Planning Objectives (TPOs)

Packaged Option Reference	Option (Long list option number)	Transport Planning Objectives (TPOs)					
		TPO1: To improve highway journey times on the north/south A4119 corridor and improve access to the M4.	**TPO2:** To improve the economic and employment opportunities in the Ely Valley and provide employment and social benefits.	**TPO3:** To improve Active Travel routes with the aim of improving the health and well-being of the local community.	**TPO4:** To improve enviromental conditions, including air quality and noise and to minimise the overall impact on the environment.	**TPO5:** To increase the patronage of public transport and improve public transport reliability.	**TPO6:** To improve safety and reduce the number of collisions and KSIs on the A4119 between Talbot Green and Thomastown.
A	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A)	+ + +	+ + +	0	0	+	+
B	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11)	+ + +	+ + +	+ +	+	+	+
C	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11) Park & Ride/Park & Share facility within SSA 14.1 development site (Option 2) Park & Ride expansion north of the study area (Option 15)	+ + +	+ + +	+ +	+	+	+
D	Do Minimum (Option 22)	0	0	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

2.16 Worksheet 17: Appraisal of Packaged Options (Appraisal Summary Table)

Appendix 2.16 Worksheet 17: Appraisal of Packaged Options (Appraisal Summary Table)

Criteria	Qualititive/Quantitative Assessment			
	Packaged Option A	Packaged Option B	Packaged Option C	Option D (Do Minimum)
	Option 1A	Option 1A Option 11	Option 1A Option 11 Option 2 Option 15	Option 22
Economic				
Business Users & Reliability Impact	**£8.6 million**	**£8.6 million**	**£8.6 million (subsidised)** **£10.7 million (unsubsidised)**	**0**
Regeneration	**+ +**	**+ +**	**+ +**	**0**
Wider Impacts	**+ +**	**+ +**	**+ +**	**0**
Environment				
Noise	**0**	**0**	**0**	**0**
Air Quality	**+**	**+**	**+**	**0**
Greenhouse Gases	**0**	**0**	**0**	**0**
Landscape	**-**	**-**	**-**	**0**
Townscape	**0**	**0**	**0**	**0**
Historic Landscape	**0**	**0**	**-**	**0**
Biodiversity	**-**	**-**	**-**	**0**
Water Environment	**-**	**-**	**-**	**0**
Social				
Commuting and Other Users	+ +	+ +	+ +	0
Reliability Impact on Commuting and Other Users	**+ +**	**+ +**	**+ +**	**0**
Physical Activity	**+**	**+ +**	**+ +**	**0**
Journey Quality	**+**	**+**	**+**	**0**
Accidents	**+**	**+**	**+**	**0**
Security	**+**	**+**	**+**	**0**
Access to Services	**+ +**	**+ +**	**+ +**	**0**
Affordability	**+ +**	**+ +**	**- - (subsidised)** **+ + (unsubsidised)**	**0**
Severance	**0**	**0**	**0**	**0**
Option Values	**0**	**0**	**+**	**0**
Public Accounts				
Cost to Broad Transport Budget	**-£5.4 million**	**-£5.7 million**	**-£16.6 million (subsidised)** **-£6.3 million (unsubsidised)**	**0**
Indirect Tax Revenues	**-£0.4 million**	**-£0.4 million**	**-£0.4 million**	**-£0.4 million**

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

2.17 Worksheet 18: How the Packaged Options will Tackle the Identified Problems, and Other Relevant Issues

Appendix 2.17 Worksheet 18: How the Packaged Options will Tackle the Identified Problems, and Other Relevant Issues

Packaged Option Reference	Option (Long list option number)	How the Option will Tackle the Identified Problems	Other Relevant Issues
A	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A)	This option will widen the existing A4119 to a dual carriageway standard, which will require alterations to Coedely Roundabout. It will involve the removal of the South Wales Fire & Rescue Centre headquarters roundabout so that the option can link into the existing dual carriageway. The dualling will increase link capacity and the removal of a roundabout will reduce traffic delays. This will benefit existing traffic flow as well as that generated by the SSA 14.1 development in the future. There will be additional traffic flow on Sterling Drive due to the relocation of the South Wales Fire & Rescue Centre headquarters access.	It is considered that the lack of a dual carriageway all the way north to Coedely roundabout is reducing the attractiveness of the SSA 14.1 to developers. In addition, the frequency of roundabouts does not help.
B	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option Adjacent Active Travel route (Option 11)	As well as the benefits given by the dualling option (above), an Active Travel route in this part of the Ely Valley, will give additional travel choice. It will link into existing facilities and eventually link to the completion of the Llantrisant to Tonyrefail Community Route.	In addition to the above, there is already an Active Travel Route that follows a former railway to the immediate west of the A4119. The Active Travel route proposed as Option 11 will be higher profile.
C	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11) Park & Ride/Park & Share facility within SSA 14.1 development site (Option 2) Park & Ride expansion north of the study area (Option 15)	As well as the benefits given by the dualling option (above), and the Active Travel route option, the provision of Park & Ride/Share facilities will give further transport choice and will lead to a reduction in traffic flow on the A4119, and the benefits that this will bring. Of the two sites proposed, it is likely that the one within the SSA 14.1 site has the potential to offer greater benefits due to its location.	In addition to the above, the proposed Park & Ride/Share facility within the SSA 14.1 site is unlikely to impact upon its ability to be fully developed for business and general industry (B1 and B2 uses). The site to the north of the Study Area will have to be acquired.
D	Do Minimum (Option 22)	Other than ensuring that the A4119 continues to be fit for purpose in maintenance terms, this option will not change the way that the A4119 operates. With no improvements, the situation will deteriorate.	Regular maintenance only.

2.18 Worksheet 19: Appraisal of Packaged Options against Deliverability

Appendix 2.18 Worksheet 19: Appraisal of Packaged Options against Deliverability

Packaged Option Reference	Option (Long list option number)	Feasibility	Affordability	Acceptability	Timescale	Risks
A	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A)	+ +	+ +	+	+	-
B	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11)	+ +	+ +	+	+	-
C	Dualling of the A4119, improvements to Coedely Roundabout, and removal of the South Wales Fire & Rescue Service headquarters roundabout (Option 1A) Adjacent Active Travel route (Option 11)	- - (subsidised)	- - (subsidised)	0 (subsidised)	- - (subsidised)	- - (subsidised)
	Park & Ride/Park & Share facility within SSA 14.1 development site (Option 2) Park & Ride expansion north of the study area (Option 15)	- - (unsubsidised)	+ + (unsubsidised)	0 (unsubsidised)	- - (unsubsidised)	- - - (unsubsidised)
D	Do Minimum (Option 22)	-	0	0	0	0

Large positive (+ + +)
Moderate positive (+ +)
Slight positive (+)
Neutral (0)
Slight negative (-)
Moderate negative (- -)
Large negative (- - -)

2.19 Economic Analysis Spreadsheets (A - T)

Dualling Option 1: Analysis of Monetised Costs and Benefits

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£220,000	*(14)*
Journey Quality - Congestion Relief	-	*(15)*
Physical Activity	-	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£4,339,000	*(1a)*
Economic Efficiency: Consumer Users (Other)	£4,495,000	*(1b)*
Economic Efficiency: Business Users and Providers	£6,921,000	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£428,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£15,547,000	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£2,657,496	*(10)*
Present Value of Costs (see notes) (PVC)	£2,657,496	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£12,889,504	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	5.9	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Dualling Option 1: Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£3,988,000		£3,988,000			
Vehicle operating costs	£351,000		£351,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£4,339,000	*(1a)*	£4,339,000	£0	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£3,813,000		£3,813,000			
Vehicle operating costs	£682,000		£682,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£4,495,000	*(1b)*	£4,495,000	£0	£0	£0

Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£5,723,000		£2,675,000	£3,048,000				
Vehicle operating costs	£1,198,000		£833,000	£365,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£6,921,000	*(2)*		£3,413,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue	£0							
Station Operating costs								
Bus Operating costs	£0							
Investment costs								
Grant/subsidy	£0							
Subtotal	£0	*(3)*			£0		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£6,921,000	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£15,755,000	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Dualling Option 1: Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding						
Revenue						
Operating Costs	£ 159,800.34		£ 159,800.34			
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments	£0			£0		
NET IMPACT	£159,800	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£2,497,695				£2,497,695	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£2,497,695	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£428,000	*(9)*				
TOTALS						
Broad Transport Budget	£2,657,496	*(10) = (7) + (8)*				
Wider Public Finances	£428,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Packaged Option A (1A): Analysis of Monetised Costs and Benefits

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£194,000	*(14)*
Journey Quality - Congestion Relief	-	*(15)*
Physical Activity	-	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£5,791,000	*(1a)*
Economic Efficiency: Consumer Users (Other)	£7,025,000	*(1b)*
Economic Efficiency: Business Users and Providers	£8,607,000	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£376,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£21,241,000	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£5,445,907	*(10)*
Present Value of Costs (see notes) (PVC)	£5,445,907	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£15,795,093	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	3.9	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Packaged Option A (1A): Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£5,441,000		£5,441,000			
Vehicle operating costs	£350,000		£350,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£5,791,000	*(1a)*	£5,791,000	£0	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£6,333,000		£6,333,000			
Vehicle operating costs	£692,000		£692,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£7,025,000	*(1b)*	£7,025,000	£0	£0	£0

Business							
				Business Cars			
User benefits			**Goods Vehicles**	**& LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£7,418,000		£2,910,000	£4,508,000				
Vehicle operating costs	£1,189,000		£759,000	£430,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£8,607,000	*(2)*		£4,938,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue	£0							
Station Operating costs								
Bus Operating costs	£0							
Investment costs								
Grant/subsidy	£0							
Subtotal	£0	*(3)*			£0		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£8,607,000	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£21,423,000	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Packaged Option A (1A): Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding						
Revenue						
Maintenance Costs	£ 170,357.11		£ 170,357			
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments	£0			£0		
NET IMPACT	£170,357	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£5,275,550				£5,275,550	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£5,275,550	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£376,000	*(9)*				
TOTALS						
Broad Transport Budget	£5,445,907	*(10) = (7) + (8)*				
Wider Public Finances	£376,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Packaged Option B (1A, 11) 10 AT trips: Analysis of Monetised Costs and Benefits

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£194,000	*(14)*
Journey Quality - Improved Active Travel Route	£8,809	*(15)*
Physical Activity	£394,593	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£5,791,000	*(1a)*
Economic Efficiency: Consumer Users (Other)	£7,025,000	*(1b)*
Economic Efficiency: Business Users and Providers	£8,607,000	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£376,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£21,644,402	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£5,661,120	*(10)*
Present Value of Costs (see notes) (PVC)	£5,661,120	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£15,983,281	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	3.8	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Packaged Option B (1A, 11) 10 AT trips: Economic Efficiency of the Transport

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£5,441,000		£5,441,000			
Vehicle operating costs	£350,000		£350,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£5,791,000	*(1a)*	£5,791,000	£0	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£6,333,000		£6,333,000			
Vehicle operating costs	£692,000		£692,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£7,025,000	*(1b)*	£7,025,000	£0	£0	£0

Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£7,418,000		£2,910,000	£4,508,000				
Vehicle operating costs	£1,189,000		£759,000	£430,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£8,607,000	*(2)*		£4,938,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue								
Station Operating costs								
Bus Operating costs								
Investment costs								
Grant/subsidy								
Subtotal		*(3)*			£0		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£8,607,000	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£21,423,000	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Packaged Option B (1A, 11) 10 AT trips: Public Accounts (PA) Table

	ALL MODES		ROAD	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue						
Operating Costs	£ 177,380.62		£ 177,381			
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	£177,381	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£5,483,739				£5,483,739	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£5,483,739	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£376,000	*(9)*				
TOTALS						
Broad Transport Budget	£5,661,120	*(10) = (7) + (8)*				
Wider Public Finances	£376,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Packaged Option B (1A, 11) 40 AT trips: Analysis of Monetised Costs and Benefits

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£194,000	*(14)*
Journey Quality - Improved Active Travel Route	£34,121	*(15)*
Physical Activity	£1,532,841	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£5,791,000	*(1a)*
Economic Efficiency: Consumer Users (Other)	£7,025,000	*(1b)*
Economic Efficiency: Business Users and Providers	£8,607,000	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£376,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£22,807,962	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£5,661,120	*(10)*
Present Value of Costs (see notes) (PVC)	£5,661,120	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£17,146,842	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.0	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Packaged Option B (1A, 11) 40 AT trips: Economic Efficiency of the Transport

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£5,441,000		£5,441,000			
Vehicle operating costs	£350,000		£350,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£5,791,000	*(1a)*	£5,791,000	£0	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£6,333,000		£6,333,000			
Vehicle operating costs	£692,000		£692,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£7,025,000	*(1b)*	£7,025,000	£0	£0	£0

Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£7,418,000		£2,910,000	£4,508,000				
Vehicle operating costs	£1,189,000		£759,000	£430,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£8,607,000	*(2)*		£4,938,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue								
Station Operating costs								
Bus Operating costs								
Investment costs								
Grant/subsidy								
Subtotal		*(3)*			£0		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£8,607,000	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£21,423,000	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Packaged Option B (1A, 11) 40 AT trips: Public Accounts (PA) Table

	ALL MODES		ROAD	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue						
Operating Costs	£ 177,380.62		£ 177,381			
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	£177,381	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£5,483,739				£5,483,739	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£5,483,739	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£376,000	*(9)*				
TOTALS						
Broad Transport Budget	£5,661,120	*(10) = (7) + (8)*				
Wider Public Finances	£376,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Packaged Option C (1A, 11, 2, 15) 40 AT trips, subs PT: Analysis of Monetised Costs and Benefits

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£194,000	*(14)*
Journey Quality - Improved Active Travel Route	£34,121	*(15)*
Physical Activity	£1,448,688	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£8,272,055	*(1a)*
Economic Efficiency: Consumer Users (Other)	£7,025,000	*(1b)*
Economic Efficiency: Business Users and Providers	£8,607,000	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£376,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£25,204,864	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£16,529,867	*(10)*
Present Value of Costs (see notes) (PVC)	£16,529,867	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£8,674,997	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.5	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Packaged Option C (1A, 11, 2, 15) 40 AT trips, subs PT: Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£5,441,000		£5,441,000			
Vehicle operating costs	£1,807,552		£1,807,552			
User charges	£1,023,503			£1,023,503		
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£8,272,055	*(1a)*	£7,248,552	£1,023,503	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£6,333,000		£6,333,000			
Vehicle operating costs	£692,000		£692,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£7,025,000	*(1b)*	£7,025,000	£0	£0	£0

Business							
				Business Cars			
User benefits			**Goods Vehicles**	**& LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£7,418,000		£2,910,000	£4,508,000				
Vehicle operating costs	£1,189,000		£759,000	£430,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£8,607,000	*(2)*		£4,938,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue								
Station Operating costs								
Bus Operating costs								
Investment costs								
Grant/subsidy								
Subtotal		*(3)*			£0		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£8,607,000	*(5) = (2) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£23,904,055	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Packaged Option C (1A, 11, 2, 15) 40 AT trips, subs PT: Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding						
Revenue	-£ 2,071,520.57			-£ 2,071,520.57		
Operating Costs	£ 12,501,101.68		£ 191,437	£ 12,309,664.48		
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	£10,429,581	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£6,100,286				£6,100,286	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£6,100,286	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£376,000	*(9)*				
TOTALS						
Broad Transport Budget	£16,529,867	*(10) = (7) + (8)*				
Wider Public Finances	£376,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Packaged Option C (1A, 11, 2, 15) 40 AT trips, unsubs PT: Analysis of Monetised Costs and Benefi

Noise	-	*(12)*
Local Air Quality	-	*(13)*
Greenhouse Gases	£194,000	*(14)*
Journey Quality - Improved Active Travel Route	£34,121	*(15)*
Physical Activity	£1,448,688	*(16)*
Accidents	-	*(17)*
Economic Efficiency: Consumer Users (Commuting)	£8,362,087	*(1a)*
Economic Efficiency: Consumer Users (Other)	£7,025,000	*(1b)*
Economic Efficiency: Business Users and Providers	£10,678,521	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-£376,000	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	£27,366,417	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	£6,291,723	*(10)*
Present Value of Costs (see notes) (PVC)	£6,291,723	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	£21,074,694	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.3	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Packaged Option C (1A, 11, 2, 15) 40 AT trips, unsubs PT: Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£5,441,000		£5,441,000			
Vehicle operating costs	£1,807,552		£1,807,552			
User charges	£1,113,535			£1,113,535		
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	£8,362,087	*(1a)*	£7,248,552	£1,113,535	£0	£0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	**Parking**
Travel time	£6,333,000		£6,333,000			
Vehicle operating costs	£692,000		£692,000			
User charges	£0					
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	£7,025,000	*(1b)*	£7,025,000	£0	£0	£0

Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	**Parking**
Travel time	£7,418,000		£2,910,000	£4,508,000				
Vehicle operating costs	£1,189,000		£759,000	£430,000				
User charges	£0							
During Construction & Maintenance								
Subtotal	£8,607,000	*(2)*		£4,938,000	£0		£0	£0
Private sector provider impacts						**Freight**	**Passengers**	**Parking**
Revenue	£2,071,521				£2,071,521			
Station Operating costs								
Bus Operating costs								
Investment costs								
Grant/subsidy								
Subtotal	£2,071,521	*(3)*			£2,071,521		£0	£0
Other business impacts								
Developer contributions		*(4)*						
NET BUSINESS IMPACT	£10,678,521	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	£26,065,607	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Packaged Option C (1A, 11, 2, 15) 40 AT trips, unsubs PT: Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	ROLLING STOCK
Local Government Funding						
Revenue	£ -					
Operating Costs	£ 191,437.20		£ 191,437	£ -		
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	£191,437	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	£6,100,286				£6,100,286	
Developer and Other Contributions	£0					
Grant/Subsidy Payments	£0				£0	
NET IMPACT	£6,100,286	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	£376,000	*(9)*				
TOTALS						
Broad Transport Budget	£6,291,723	*(10) = (7) + (8)*				
Wider Public Finances	£376,000	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

2.20 Ecological Appraisal

REDSTART

COED ELY BUSINESS CASE

ECOLOGICAL APPRAISAL

JUNE 2018

REDSTART

Project No: CS/094984 Doc Ref: - Rev: 01

CLIENT: Rhondda Cynon Taf County Borough Council
ISSUE DATE: June 2018

Coed Ely Buisness Case
Ecological Appraisal

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Contents

Drawings

Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0001-74-0001 – Area 1 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0002-74-0002 – Area 2 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0003-74-0003 – Area 3 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0004-74-0004 - Area 4 Statutory and Non-Statutory Sites

Preliminary Proposals

GC2754-RED-76-XX-DR-C-0001 – Existing and Proposed Links Alongside Hospital

GC2754 – RED-76-XX DR-C-0002 – Footway Widening Between Ely Valley Road Roundabout

GC2754-RED-76-XX-DR-C-0003 – Park and Share North Coed Ely Northern Route

GC2754 – RED-76-XX DR-C-0004 - Park and Share Alternatives North of Tonyrefail

GC2754 – RED-76-XX DR-C-0005 – Alternative Access to Fire Service Headquarters

GC002498-CAP-74-XX-DR-C-0007 – A4119 Preliminary Proposals with Footways

Previous Phase 1 Habitat Survey

GC2498-CAP-74-XX-DR-L-0001 – Phase 1 Habitat Plan

Appendices

Non-Technical Summary

Site Location	**Areas 1-3: Between Coed Ely and Talbot Green** Central British National Grid Reference: Area 1 - ST 02067 85409, Area 2 - ST 03299 84607, Area 3 - ST 03488 84300 **Area 4: Land North of Tonyrefail** Central British National Grid Reference: ST 01551 89377
Proposed Development	Coed Ely Business Case – Ecological Appraisal
Purpose of survey/s	To identify possible ecological constraints to development.
Dates of survey and names of surveyors	N/A
Overview of Results	**Area 1-** • Rhos Tonyrefail SSSI and Llantrisant Common and Pastures SSSI exist within 2 km of Area 1. • The River Ely and Llantrisant Forestry and Craig Melyn SINCs fallswithin Area 1. Five additional SINCs exist within 2 km of the site. • Habitat previously recorded on site include: semi-natural broad-leaved woodland, colliery spoil, running water and hardstanding. • Trees within the woodland and the concrete road bridge may have bat roosting potential and there is a known soprano pipistrelle roost within 300 m. • Otter potential has been identified within the River Ely. • Woodland on site has the potential to support low numbers of dormice. • Breeding bird potential was noted within the woodland and a road bridge on site. • Reptile potential within road verges and colliery spoil on site. • Badger potential within wooded areas. • There is potential for invasive species on site. **Area 2** - • Rhos Tonyrefail SSSI and Llantrisant Common and Pastures SSSI exist within 2 km of Area 2. • The River Ely Llantrisant Forestry and Craig Melyn SINCs fall within Area 2. Five additional SINCs exist within 2 km of the site. • Habitats previously recorded on site include: semi-natural broad-leaved woodland, broad-leaved plantation woodland, dense scrub, poor semi-improved grassland, improved grassland and running water. • Trees, buildings and culverts in or directly adjacent to the site have bat roost potential and there is a known soprano pipistrelle roost within 50 m of the northern end of the site.

- Otter potential was identified within the River Ely and other watercourses adjacent to the site.
- Woodland, scrub and hedgerows have the potential to support dormice.
- Breeding bird potential exists within woodland, trees and scrub habitats on site.
- Reptile potential within grassland and scrub habitats on site.
- Badger potential within woodland and agricultural fields.
- Japanese knotweed, Himalayan balsam and cotoneaster have previously been recorded on site.

Area 3

- Rhos Tonyrefail SSSI and Llantrisant Common and Pastures SSSI exist within 2 km of Area 3.
- The River Ely SINC and Llantrisant Forestry and Craig Melyn SINCs fallwithin Area 3. Five additional SINCs exist within 2 km of the site.
- Habitat previously recorded on site includes semi-natural broad-leaved woodland, dense scrub and running water.
- Additional habitats identified from aerial photography appear to be a continuation of semi-natural broad-leaved woodland, hardstanding and residential housing.
- Bat roosting potential may exist in trees, residential housing and bridges on site.
- Otter potential exists within the River Ely.
- Woodland on site has the potential to support dormice.
- Breeding bird potential exists within woodland, structures and residential houses on site.
- Reptile potential has been identified within road verges and residential gardens on site.
- Badger potential exists within woodland on site.
- Japanese knotweed and Himalayan balsam have previously been recorded on site.

Area 4

- Rhos Tonyrefail SSSI exists directly adjacent to Area 4.
- Seven SINCs exist within 2 km of Area 4.
- Habitats identified from aerial photography appear to be: semi-natural broad-leaved woodland, scattered scrub and semi-improved grassland.
- Bat roosting potential may exist within trees and in nearby houses.
- The habitat on site appears to be of low suitability for dormice.
- Breeding bird potential exists within trees and scrub habitats on site.
- Reptile potential exists within the semi-improved grassland and scrub habitats on site.

	• Badger potential may exist within the woodland and semi-improved grassland on site. • Marsh fritillary butterfly potential may exist within the semi-improved grassland on site. • There is potential for invasive species on site.
Further Surveys / Action Required	**Areas 1-3** • Protection of the River Ely and Llantrisant Forestry and Craig Melyn SINCs. • Extended Phase 1 Habitat Survey to confirm the requirement / extent for further targeted surveys (likely to include bats, dormice, otters, great crested newts (2018 surveys may need to be repeated for Areas 1 and 2), badgers, breeding birds, reptiles and invasive species). • Lighting restrictions. • Pollution prevention. **Area 4** • Protection of Rhos Tonyrefail SSSI. • Extended Phase 1 Habitat Survey to confirm the requirement / extent for further targeted surveys (likely to include bats, badgers, breeding birds, reptiles, marsh fritillary butterfly and invasive species). • Lighting restrictions.
Opportunities for enhancement	• Opportunities will be dependent on the results of further surveys.

1. Introduction

Capita was commissioned by Rhondda Cynon Taf County Borough Council (RCTCBC) to undertake a business case study for a number potential work schemes along the A4119. The study was carried out to identify any ecological constraints to the proposed scheme and to identify the scope for further ecological assessment/surveys.

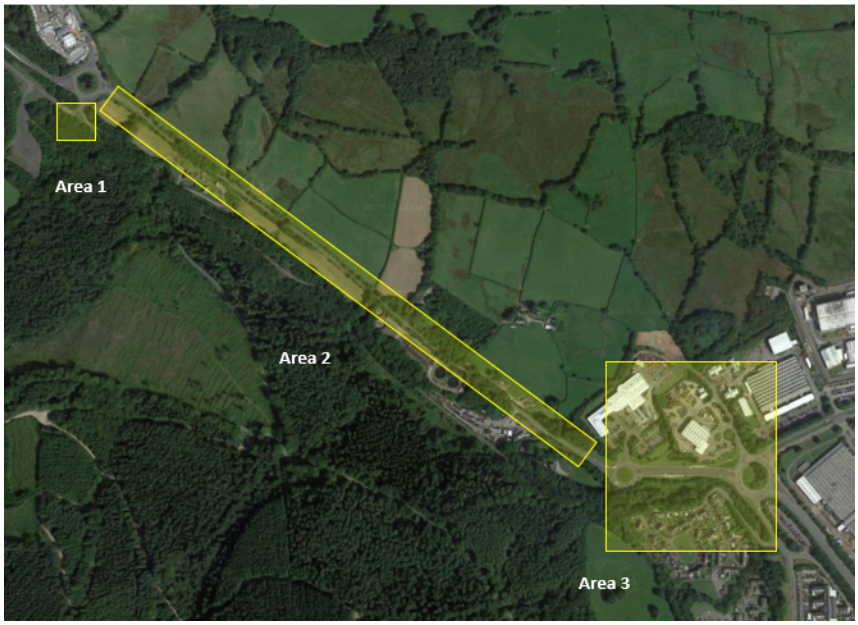
This report includes details of the survey methodologies, results and discussion and contains recommendations for further survey/mitigation where appropriate.

1.1 Site Description

For the purpose of this report the proposed works have been separated into four distinct areas.

Areas 1-3 begin at Coed Ely roundabout along the A4119 and end alongside the Royal of Glamorgan hospital. Area 4 is located north of Tonyrefail just off the A4233 on Collenna Road.

Figure 1: Areas 1 - 3 (Google Earth, 2018).



Area 1 (Central Grid Reference: ST 02067 85409)

The vast majority of the surrounding area consists of agricultural land, woodlands and hedgerows. Area 1 is located on Coed Ely roundabout along the A4119 and sites on the northern border of Llantrisant Forest and Craig Melyn woodland SINC (Sites of Importance for Nature Conservation). The River Ely runs from north to south through the site. There is a caravan dealership to the north.

Area 2 (Central Grid Reference: ST 02169 85402 - ST 03123 84644)

This section of the A4119 Ely Valley Road runs between at Coedely and Ynysmaerdy.
The vast majority of the surrounding area consists of agricultural land, woodlands and hedgerows. The River Ely runs from west to east and Llantrisant forest and Craig Melyn woodland SINC's are

both located to the south of the site. The South Wales Fire and Rescue Service, industrial units and car dealerships are located to the south of the site and a caravan dealership to the north.

Area 3 (Central Grid Reference: ST 03488 84300)

This area is situated on the eastern border of Llantrisant Forest and Craig Melyn woodland SINC on Ely Valley road. The Ely River runs from west to east and sits parallel to site. The South Wales Fire and Rescue Service is situated immediately to the north, industrial units are located to the north/northwest of the site and the Royal Glamorgan Hospital and housing to the south.

Figure 2: Area 4 (Google Earth, 2018).

Area 4 (Central Grid Reference: ST 01551 89377)

The vast majority of the surrounding area consists of agricultural land, woodlands and hedgerows. Nant Muchudd SINC and Cilely Farm Rhos Pasture SSSI located to the east of the site.

Trebanog is located to the north and Tonyrefail to the south.

1.2 Proposed Works

Area 1: Park and Share - Coed Ely roundabout

The proposed works consist of a 3600 m^2, 100 space (approx.) Park and Share. The works are located adjacent to SSA 14.1 allocated in RCTCBC LDP, in the Southern Strategy Area for employment (Please refer to drawing GC2754-RED-76-XX-DR-C-0003).

Area 2: Ely Valley Road Dualling

The proposed works consist of the dualling of approx. 1.3 km of the A4119 Ely Valley Road, between the Fire Service roundabout and the Coed Ely Roundabout (Please refer to drawings GC2895-RED-76-XX-DR-C-0003 and GC2895-RED-76-XX-DR-C-0004).

Area 3: A4119 between the Fire Station Roundabout and Royal Mint Roundabout.

The proposed works consist of the removal of the Fire Station roundabout to facilitate the continuation of the A4119. An alternative access to the fire station will be provided (Refer to drawing GC2754 – RED-76-XX DR-C-0005). The footprint for the whole of these works is approx. 6300 m^2.

Footway widening between the Fire Station Roundabout and Royal Mint Roundabout. The proposed works consist of footway improvements, along on the A4119, between the Fire Station Roundabout and Royal Mint Roundabout (Refer to drawing GC2754 – RED-76-XX DR-C-0002). The footprint of the works are approx. 2140 m^2.

Area 4: Park and share - North of Tonyrefail
The proposed works consist of a 3600 m^2, 100 space (approx.) Park and Share (refer to Drawing GC2754-RED-76-XX-DR-C-0004).

The potential development sites are shown on Drawings: GC2754 – RED-76-XX DR-C- 0001, GC2754 – RED-76-XX DR-C-0002, GC2754-RED-76-XX-DR-C-0003 and GC2754 – RED-76-XX DR-C-0004.

1.3 Previous Reports

Capita was previously commissioned by Rhondda Cynon Taf County Borough Council (RCTCBC) to undertake Preliminary Ecological Assessment (PEA) for the potential dualling of the A4119 (referred to in this report as Area 2) (Capita, 2016).

The results of this survey will be included within this report.

The habitats identified on site are illustrated on Drawing GC2498-CAP-74-XX-DR-L-0001.

2. Methodology

2.1 Desktop Study

The following organisations/persons were consulted for ecological information about the sites and surrounding areas:

- South East Wales Biodiversity Records Centre (SEWBReC, 2017, 2018);
- Multi-Agency Geographic Information System (MAGIC, 2017, 2018);
- Rhondda Cynon Taf County Ecologist (*Pers Comm*, 2017a).

A request was made in 2017 for information on any ecologically designated sites and protected/notable species within a 2 km radius of each potential future work areas (5 km for bats). The data received will inform the desktop study results for Areas 1, 2 and 3.

And additional request was made in 2018 for information on any ecologically designated sites and protected/notable species within a 2km radius of the Land to the North of Tonyrefail (5 km for bats). The data received will inform the desktop study results for Area 4.

The requests were made for records dated within the last ten years only.

2.2 Review of Aerial Photography / Previous Reports

The following sources were used to identify habitats / species potential on each site:

- Google Earth (Google Earth, 2018);
- Google Street View (Google, 2018);
- Multi-Agency Geographic Information System (MAGIC, 2018);
- A4119 Dualling Preliminary Ecological Appraisal (PEA) (Capita, 2016).

2.3 Constraints

This report is often reliant on aerial photography and records of habitats, flora and fauna species provided by SEWBReC, RCT and Natural Resources Wales (NRW). The habitats and potential for protected species within these areas will need to be validated with site visits.

3. Desktop Study Results

3.1 Statutory Sites

3.1.1 Sites of Special Scientific Interest

Two SSSI's exist within 2 km of the scheme Areas 1-4 and are detailed below:
Table1. Distance and direction of SINC's from proposed future works/site.

SSSI	Area 1	Area 2	Area 3	Area 4
Llantrisant Common and Pastures	2 km SE	1 km SE	800 m SE	-
Rhos Tonyrefail	1 km SE	1.5 km NE	300 m N	0 m SE

Llantrisant Common and Pastures SSSI is 113.2 ha in size and.is designated for its extensive area of predominantly acidic marshy grassland in a lowland setting and for smaller areas of species-rich neutral and acidic grassland and soligenous flush. It is also of special interest for its populations of the nationally rare liverwort (*Scapania paludicola)* and the nationally scarce cornish moneywort (*Sibthorpia europaea)* plant species.

Rhos Tonyrefail SSSI is 224. 7 ha in size and consists of a network of seven groups of fields around Tonyrefail. The site is a large lowland site of special interest for its marshy grassland, acid flush, species-rich neutral grassland, acid grassland, wet heath and blanket mire which are associated with areas of woodland. The site is also of special interest for its population of marsh fritillary butterfly (*Euphydryas aurinia*).

3.2 Non-statutory sites

3.2.1 Sites of Importance for Nature Conservation

A total of 12 SINCs were identified within 2 km of Areas 1-4, the nearest and most relevant of which are shown in the table and discussed below (any blanks in the table indicate the site is outside of the 2 km buffer zone).

Table 2. Distance and direction of SINC's from proposed future works/site.

SINC	Area 1	Area 2	Area 3	Area 4
Ely River	Lies within Area 1	Lies within Area 2	Lies within Area 3	550 SW
Llantrisant Forestry and Craig Melyn	Lies within Area 1	Lies within Area 2	Lies within Area 3	-
Tonyrefail Mountains	700 m NW	2 km NW	2 km SE	-
Rhiwfelin Fawr	350 m NE	400 m N	1 km NW	-
Garth –Grabban Slopes	1 km NE	1 km S	1.6 km NW	-
Nant Muchudd	2 km NW	1.5 km SE	550 m NW	450 m E
Y Graig	2 km NW	1.8 km SE	950 m NW	-
Ciely Farm Rhos Pasture	-	-	-	400 m SW
Penrhiw-fer Road Woodland	-	-	-	650 m SW
Trebanog Slopes	-	-	-	900 m SW
Mynydd dinas Mynydd y Cyymmer	-	-	-	1 km SE
The Glyn	-	-	-	800 m SE

The River Ely SINC covers approximately 50 ha. The River Ely is a prime wildlife corridor and the SINC includes the river, and associated bank side habitats, between Tonyrefail and Talbot Green. The Ely, although previously polluted, has now recovered to generally good water quality. It is a key river for otter (*Lutra lutra*), and it supports kingfisher (*Alcedo atthis*) dipper (*Cinclus cinclus*) and grey wagtail (*Motacilla cinerea*). Brown trout (*Salmo trutta)* and salmon (*Salmo salar*) both breed within its length. The river supports wooded banks, with alder (*Alnus glutinosa*) the primary tree and associated areas of wet alder woodland. Monkshood (*Aconitum napellus*), is a speciality of the wooded banks of the River Ely.

Llantrisant Forestry and Craig Melyn SINC (Grid ref: ST 02525 84337) is approximately 307 ha in size. Llantrisant Forest is the oldest Forestry Commission conifer forest in Wales. It is an extensive (several hundred hectares) mixed conifer plantation, which includes areas of replanted ancient woodland at Coed Melyn and Coedynysmaerdy. Both woods retain areas of relic semi-

natural woodland including oak (*Quercus robor*), alder and hazel (*Corylus avellana*) woodland with elements of ancient woodland ground floras (bluebell (*Hyacinthoides non-scripta*) and wood anemone (*Anemone nemorosa*). **Tonyrefail Mountains SINC** (Central Grid Reference: ST 01122 85700) is approximately 198 ha in size. The SINC is an extensive area of un-enclosed upland habitat associated with Mynydd Maendy, Mynydd Hugh and Mynydd Portref, to the south of Tonyrefail. The SINC is a mosaic of wet heath, marshy grassland, acid grassland, acid flush and valley and basin mire. The mosaic of upland wet habitat supports a characteristic upland bird assemblage with meadow pipit (*Anthus pratensis*), skylark (*Alauda arvensis*), stonechat (*Saxicola tortquata*), reed bunting (*Emberiza Schoeniclus*), linnet (*Carduelis cannabina*) and wheatear (*Oeanthe oenanthe*) all recorded. Great crested newt (*Triturus cristatus*) has been recently recorded in ponds on the Coed Ely land reclamation site. Brown hare (*Lepus europaeus*) occur in the mosaics of wetlands and short grassland. Dark green fritillary butterflies (*Argynnis aglaja*) have also been recorded.

Rhiwfelin Fawr SINC (Central Grid Reference: ST 02560 85474) is approximately 7 ha in size and contains a mosaic of marshy grassland and woodland habitat, which lies within the wider complex of the Rhos Tonyrefail SSSI. Although much of the grassland has been modified by agricultural improvement, the site represents an important wet grassland resource. The SINC supports a mosaic of soft rush (*Juncus effusus*) and purple moor-grass (*Molinia caerulea*) dominated marshy grassland (National Vegetation Classifications M23 and M25) with sharp-flowered rush *(Juncus acutiflorus)*, marsh bedstraw *(Galium palustre)*, greater bird's-foot trefoil (*Lotus pedunculatus*), tormentil *(Potentilla erecta)*, cross-leaved heath *(Erica tetralix)*, yellow sedge (*Carex demissa*), and carnation sedge (*Carex panicea*). The SINC supports marsh fritillary (*Eupydryas aurinia*) habitat and devil's-bit scabious (*Succisa pratensis*) is locally common.

Garth – Grabban Slopes SINC (Central Grid Reference: ST 03021 86255) is approximately 7 ha in size. This SINC is a small modified valley mire and associated marshy grassland, which occupies a strategically important location for marsh fritillary butterfly. The bog and marshy grassland are dominated by soft rush, with purple moorgrass, tormentil, carnation sedge, and cuckooflower *(Cardamine pratensis)*. Large parts of the SINC have been identified as suitable marsh fritillary habitat. The strategic importance of the site for marsh fritillary butterflies is based on its potential role in linking the Rhos Tonyrefail SSSI (to the north) and marsh fritillary habitat around Llantrisant Common to the south.

Nant Muchudd SINC (Central Grid Reference: ST 03876 84523) is approximately 29 ha in size. The Nant Muchudd is a clean, fast flowing, shallow stream, with gravel shoals, undercut banks, and variously braided channels. The stream supports salmon, brown trout, otter, dipper, and grey wagtail *(Motacilla cinerea)*. The steam banks are predominantly wooded. Much of the wooded valley is ancient woodland, including Rhiwfelen-fach Woodland. Typical composition includes alder woodland along the riverbank and valley bottom, and more mixed oak, ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*), wych elm (*Ulmus glabra*) and sycamore (*Acer pseudoplatanus*) on drier valley side. The woodlands have generally good structure, and represent important woodland bird habitat.

Y Graig SINC (Grid ref: ST 04119 83500) is approximately 18 ha in size. The Hillside Common overlooks Talbot Green. Bracken dominates most of the Common, but grows over very species rich acid grassland with dog violet *(Viola riviniana)*, bluebell, saw-wort *(Serratula tinctoria)*, goldenrod *(Solidago sp)*, devil's-bit scabious and betony *(Stachys officinalis)*, with heather and bilberry on steeper ground, and path banks. Mature oak trees and developing woodland border the lower slopes, gorse *(Ulex)* and broom occur elsewhere and a disused quarry support fern communities. Adder-tongue fern *(Ophioglossum vulgatum)* is present and Cornish moneywort

occurs on the sides of spring lines. Meadow pipit and linnet breed on the Common and stonechat and whinchat *(Saxicola rubetra)* have been recorded. Common lizard *(Zootoca vivipara)* and slowworm *(Anguis fragilis)* are both present. Y Graig is excellent invertebrate habitat with small pearl-bordered fritillary, grayling, purple hairstreak *(Neozephyrus quercus)*, dingy skipper *(Erynnis tages)* butterflies and the National Biodiversity Action Plan micro-moth *(Anania funebris)*. The site supports slowworm, common lizard and adder *(Vipera berus)*. Common is criss-crossed by footpaths and has a high amenity value. The site is managed by the Freemen of Llantrisant and recently grazing has been re-introduced.

Cilely Farm Rhos Pasture SINC (Central Grid Reference: ST 01310 89535) is approximately 12 ha in size and contains an area of species rich habitat, which forms an extension to the Rhos Tonyrefail SSSI. The SINC includes areas of semi-improved neutral grassland, with bracken, mixed scrub and old colliery spoil.

Penrhiw-fer Road Woodland (Central Grid Reference: ST 00874 88987) is approximately 13 ha in size. This SINC supports habitat, which forms an extension to part of the Rhos Tonyrefail SSSI. The SINC is the large area of wet alder woodlands (and associated wet grassland and bracken/acid grasslands) centred on NGR ST 009890 and associated with old mine workings, and wet floodplain of the River Ely. The woodlands support good bird and bat habitat and areas of marshy grassland have potential for small pearl-bordered fritillary *(Boloria selene)* and marsh fritillary *(Euphydryas aurinia)* butterflies.

Trebanog Slopes SINC (Central Grid Reference: ST 02387 90158) is approximately 153 ha in size and covers an extensive area of hillside ffridd, which encompasses the north facing valley side between Trebanog and Trehafod. The SINC supports a complex mosaic of dry and wet heath, acid flushes, marshy grassland, acid grassland, bracken, old quarries, and land reclamation grassland. Dry heath and acid grassland mosaics dominate the western half of the SINC. Typical species of the drier heath include abundant heather *(Calluna vulgaris)*, bilberry *(Vaccinium myrtillus)*, sweet vernal grass *(Anthoxanthum odoratum)*, heath woodrush *(Luzula multiflora)*, sheep's fescue *(Festuca ovina)*, wavy-hair grass *(Deschampsia flexuosa)*, tormentil and bracken *(Pteridium)*. There are numerous wet flushes with marshy grassland and these support cross-leaved heath, sphagnum bog mosses *(Sphagnum)*, bog asphodel *(Narthecium ossifragum)*, ivy-leaved bellflower *(Wahlenbergia hederacea)* and purple moor-grass. Cornish moneywort has recently been discovered in the SINC. Damper marshy grassland areas include soft rush *(Juncus effuses)*, articulated rush *(Juncus articulates)*, marsh thistle *(Cirsium palustre)*, and Yorkshire fog *(Holcus lanatus)*. The SINC includes the open acidic/calcareous grasslands of the Lewis Merthyr land reclamation site. The site has much erosion/bare ground and evidence of motorbike scrambling. The vegetation is characterised by a typically eclectic mix of open ground habitat. This includes established dry heath/acid grassland on undamaged faces with heather, bilberry and acid grassland (with affinities to the National Vegetation Classification communities of U2 and U4 acid grassland). Elsewhere there is a lot of thin, low growing vegetation with sweet vernal grass *(Anthoxanthum odoratum)*, crested dog's-tail *(Cynosurus cristatus)*, sheep's fescue, wavy-hair grass, common bent *(Agrostis capillaris)* , carline thistle *(Carlina vulgaris)*, mouse eared hawkweed *(Hieracium pilosella)*, hawkweed spp, (*Cladonia)* lichens, heather, bilberry, fairy flax *(Linum catharticum)*, bird's foot-trefoil *(Lotus corniculatus)*, goats beard *(Aruncus dioicus)*, tormentil, marsh thistle *(Cirsium palustre)*, thyme leaved speedwell *(Veronica serpyllifolia)*, and pearly everlasting *(Anaphalis margaritacea)*. The SINC includes a number of pennant sandstone quarries. These include heath (heather and bilberry), and wavy hair grass acid grassland (National Vegetation Classification communities of U2), together with ferns (lady fern, male fern, broad buckler etc) and mosses. There is excellent ffridd bird habitat. Species recorded include breeding whinchat, meadow pipits *(Anthus pratensis)*, and skylarks *(Alauda arvensis)*, whitethroats *(Sylvia communis)*, willow warbler *(Phylloscopus trochilus)*, bullfinch *(Pyrrhula*

pyrrhula), wren (Troglodytes troglodytes) and blackbird *(Turdus merula),* linnets *(Linaria cannabina)*, kestrel *(Falco tinnunculus)* and buzzard *(Buteo buteo).* Butterflies include grayling *(Hipparchia Semele)*, large skipper *(Ochlodes Sylvanus)*, speckled wood *(Pararge aegeria)*, small heath *(Coenonympha pamphilus)*, small skipper *(Thymelicus sylvestris)* and painted lady *(Vanessa cardui)*, and the golden ringed dragonfly (*Cordulegaster boltoni*).

Mynydd dinas Mynydd y Cyymmer SINC (Central Grid Reference: ST 01141 90701) is approximately 155.8 ha in size and covers an extensive area of upland and ffridd habitat and defined as a visually striking SINC. The steep slopes of the hill system supports a superb mosaic of dry heath, acid grassland, bracken, flushes and scree. The heathland is characterised by abundant heather and bilberry, with lesser amounts of bell heather. Areas of acid grassland include U2 (National Vegetation Classification) with wavy-hair grass, and U4 (National Vegetation Classification) with heath bedstraw, tormentil and sheep's sorrel *(Rumex acetosella)*. Areas of bracken are associated with acid grassland, and acid flushes. The flat plateau of Mynydd Dinas boasts one of the largest blanket bogs and wet heath mosaics in the County Borough, supporting purple moor-grass, cotton grass *(Eriophorum angustifolium)*, crossleaved heath sphagnum bog mosses. The mosaic of heath, acid grassland and bracken represents good quality ffridd bird habitat, with potential for stonechat, whinchat and tree pipit *(Anthus trivialis)*. The habitat is also valuable invertebrate and reptile habitat.

The Glyn SINC 119 (Central Grid Reference: ST 02327 89189) is 9.70 ha in size and is a wooded valley and associated marshy grassland, which lies along the eastern edge of part of the Rhos Tonyrefail SSSI. The valley is steep sided, with a fast flowing 'mountain' stream. The valley gorge supports apparent ancient woodland with oak, ash and alder trees, and a shrub layer, which includes hazel, holly and hawthorn *(Crataegus monogyna)*. There is a species rich ground flora with bluebell, wood sorrel *(Oxalis acetosella)*, dog violets, enchanter's nightshade *(Circaea lutetiana)*, male fern *(Dryopteris filix-mas)*, broad buckler fern *(Dryopteris dilatata)*, and hart's tongue fern *(Asplenium scolopendrium)*. The valley represents good bird and bat habitat. The valley stream originates in purple moor grass and soft rush marshy grassland at NGR ST023893. Although lying outside the SSSI this grassland has potential to support marsh fritillary butterflies.

The locations of the non-statutory sites are illustrated on the following Drawings; GC002498-CAP-74-XX-DR-L00001 (Area 1), GC2754-RED-74-XX-DR-C-0002-74-0002 (Area 2) GC2754-RED-74-XX-DR-C-0003-74-0003 (Area 3) and GC2754-RED-74-XX-DR-C-0004-74-0004 (Area 4).

3.3 Tree Preservation Order (TPO)

There are no records of TPO's in Areas 1-4 (*Pers Comm, 2018).*

3.4 Species

Appendix A lists protected or priority species within a 2 km radius of the site (5 km for bats) within the last 10 years. A summary of the records is detailed below. Relevant legislation is outlined in Appendix B.

3.4.1 European Protected Species

Bats

Areas 1-3

The data searched identified 20 records of bats within 2 km and 333 records within 5 km of Areas 1-3. Records include brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), greater horseshoe bat (*Rhinolophus ferrumequinum),* lesser horseshoe (*Rhinolophus hipposideros*), lesser noctule *(Nyctalus noctula),* Nathusius's pipistrelle (*Pipistrellus nathusii)*, serotine (*Eptesicus serotinus*), soprano pipistrelle, whiskered bat (*Myotis mystacinus).*

The closest record was a common pipistrelle bat found hanging inside an office block. The record is located between 200 m north of Areas 3, in an office block along the western side of A4119 carriageway.

Area 4

The data searched identified 580 records of bats within 5 km of the Land to the North of Tonyrefail. Records include brown long-eared bat, common pipistrelle, soprano pipistrelle, greater horseshoe bat, lesser horseshoe, noctule *(Nyctalus noctula),* Nathusius's pipistrelle and serotine bats. The closest record was of a common pipistrelle approximately 1.5 km north-east from site.

Otters

Areas 1-3 and 4

Although no SEWBReC returned no records of otters, the River Ely and Nant Muchudd exist within the search areas. Otter presence is included within the SINC designations for these watercourses and therefore in can be concluded that otters are likely to be present within or near to these Areas.

Dormice

Areas 1-3 and 4

Although no SEWBReC records of dormouse exist within the search areas 1-4 several dormice (*Muscardinus avellanarius*) records exist within Coed Trecastell woodland, which is located approximately 2 km south of the southern end of Areas 1-3. There is connectivity, though limited, between this woodland and the woodland mapped along the western carriageway of the sites.

Marsh Fritillary

Area 4:

There were 10 records of marsh fritillary butterfly (*Euphydryas aurinia*) within the Land to the North of Tonyrefail search area. The closest record was located approximately 100 m south-west of site.

3.4.2 UK Protected/Priority Species

Badgers

Areas 1-3:

One badger scat was recorded within Y Graig SINC which is situated approximately 1.5 km south-east of Area 3.

Area 4:

A badger road traffic causality has been recorded approximately 1.1 km southwest of the site, on the B4278.

Reptiles - Areas 1-3:

A total of 14 records of reptiles were identified within 2 km of Areas 1-3 including adder *(Vipera berus),* grass snake (*Natrix natrix*), common lizard *(Zootoca vivipara)* and slow worm *(Anguis fragilis)*. The nearest record is of a common lizard located within approximately 1 km south of Areas 1

Area 4:

One record of common lizard exists approximately 1.3 km north-west of the site.

Birds

Areas 1-3:

SEWBReC held 70 records of protected and priority bird species within the 2km search area including Schedule 1 species such as common crossbill (*Loxia curvirostra)* hobby (*Falco subbuteo*), merlin *(Falco columbarius) and* redwing *(Turdus iliacus)*.

Area 4

SEWBReC held 88 records of protected and priority bird species within the 2 km radius area of search including Schedule 1 species such as barn owl *(Tyto alba)*, fieldfare (*Turdus pilaris)*, Goshawk *(Accipiter gentilis)*, Hen Harrier *(Circus cyaneus)*, Peregrine *(Falco peregrinus)* and Redwing *(Turdus iliacus).*

Amphibians

Area 1-3

There are six records of common frog and four common toad and one palmate newt exist within the search area. The nearest record is for common frog located within approximately 1 km north / north-west of the Area 3.

Fish

Area 1-3

One record of brown trout was provided by SEWBReC and located within approximately 2 km south / south-east of Areas 1-3.

Invertebrates

Area 1-3

Records of invertebrates identified within the 2 km search area include brambling (*Fringilla montifringilla),* broom moth (*Ceramica pisi),* buff ermine *(Spilosoma lutea),* rustic *(Hoplodrina blanda),* small pearl-bordered fritillary *(Boloria selene)* and white-spotted sable *(Anania funebris).*

Area 4

Aside from the European Protected marsh fritillary butterfly (further detail provided in Section 3.4.1) additional invertebrate species records include small pearl-bordered fritillary (*Boloria selene*) and keeled skimmer (*Orthetrum coerulescens*).

Small Mammals

Area 1-3

Records of hedgehog (*Erinaceus europaeus*), polecat (*Mustela putorius*) and weasel (*Mustela nivalis*) exist within the search area. The closest record is of a polecat road traffic causality, located approximately 500 m south within the site boundary.

Area 4

Two records of hedgehog (*Erinaceus europaeus*) exist within the search area. The closest record was located approximately 700 m south-east from site.

Plants and Fungi

Area 1-3

There are 9 records of bluebell within 2 km of Areas 1-3, the nearest record is located approximately 1 km south / south-west within Llantrisant Forest.

Area 4

There were records of two Priority and Protected plant and fungi species within 2 km of the site bluebell and annual knawel *(Scleranthus annuus* subsp. *annuus)*.

Invasive Species

Area 1-3

A total of five invasive species have been recorded within 2 km of Areas 1-3; including harlequin ladybird *(Harmonia axyridis)* Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), montbretia (*Crocosmia pottsii*) and ring-necked parakeet *(Psittacula krameri)*.

Area 4

A total of eight invasive species records have been recorded within 2 km of site; including cherry laurel *(Prunus laurocerasus),* Himalayan balsam, Japanese knotweed, montbretia.

4. Review of Aerial Photography / Previous Reports

4.1 Area 1: Park and Share - Coed Ely roundabout

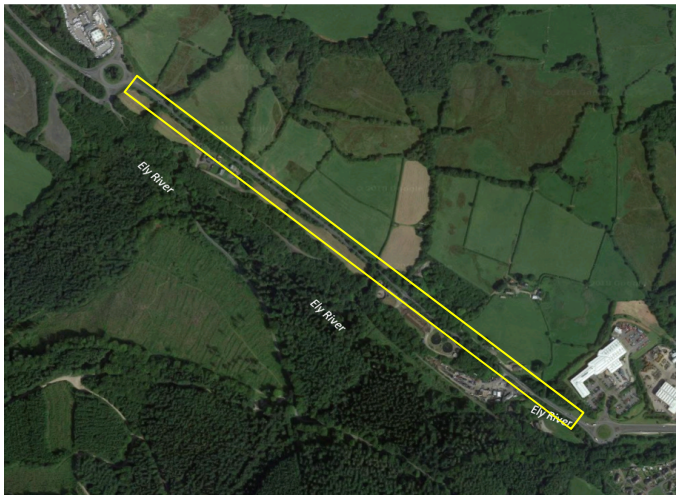
Habitats previously identified within Area 1 include semi-natural broad-leaved woodland, colliery spoil, ponds, hardstanding (a concrete road bridge) and running water (River Ely) (Capita, 2016). The habitats present within Area 1 are illustrated on Drawing GC2498-CAP-74-XX-DR-L-0001 (taken from Capita, 2016).

Figure 3. Area 1: Park and Share - Coed Ely roundabout

4.2 Area 2: Ely Valley Road Dualling

Habitats previously identified within Area 2 include semi-natural broad-leaved woodland, broad-leaved plantation woodland, dense scrub, poor semi-improved grassland, improved grassland and running water (River Ely and various other small watercourses running underneath the A4119) (Capita, 2016). The habitats present within Area 2 are illustrated on Drawing GC2498-CAP-74-XX-DR-L-0001 (taken from Capita, 2016).

Figure 4 Area 2: Ely Valley Road Dualling



4.3 Area 3: A4119 between the Fire Station Roundabout and Royal Mint Roundabout

Habitats previously recorded on site include semi-natural broad-leaved woodland, dense scrub and running water (Capita, 2016). Additional habitats identified from aerial photography appear to be a continuation of semi-natural broad-leaved woodland, hardstanding (including a road bridge and a small footbridge over the River Ely (see Figures 5, 6 and 7 below)) and residential housing.

Figure 5. Area 3 - A4119 between the Fire Station Roundabout and Royal Mint Roundabout.

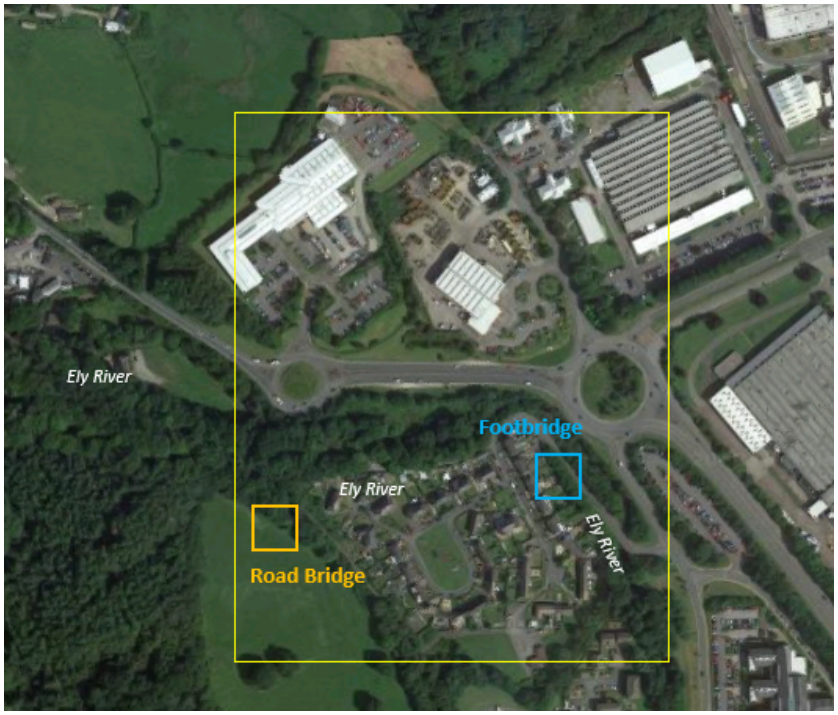


Figure 6. Area 3- Road Bridge

Figure 7. Area 3 – Footbridge

4.4 Area 4: Park and share - North of Tonyrefail

Habitats within Area 4 appear (from aerial photography) to include semi-natural broad-leaved woodland, scattered scrub and semi-improved grassland.

Figure 8. Area 4 - Park and share - North of Tonyrefail

5. Discussion

5.1 Statutory Sites

Rhos Tonyrefail SSSI is situated immediately adjacent to Area 4. The SSSI will require protection during the works to avoid pollution and light spillage and any potential habitat loss kept to a minimum. Further detail can be found in Section 7.1.

Llantrisant Common and Pastures SSSI is unlikely to be impacted by the works due to the nature of its designation and the distance from the sites (>800 m).

5.2 Non-Statutory Sites

The River Ely SINC and Llantrisant Forestry and Craig Melyn SINC fall within Areas 1, 2 and 3. These SINCs will require protection during the works to avoid pollution and light spillage and habitat loss will need to be kept to a minimum. Further detail can be found in Sections 7.1 and 7.4 and 7.6.

The remaining SINCs are unlikely to be impacted by the proposed works due to the nature of its designation and the distance from the sites (>350 m).

5.3 Bats

Ongoing surveys by Capita ecologists have noted a large soprano pipistrelle roost within a residential property located approximately 300 m south-east of Area 1 and 50 m south of Area 2 (*Report in Preparation*).

Bat roosting potential has been noted within trees in Areas 1-4, culverts in Area 2, bridges in Areas 1 and 3 and buildings within or near to Areas 1-4.

Habitat identified across Areas 1-4 appears to be suitable for foraging and commuting routes and includes tree lines, woodland, semi-improved grassland and the River Ely.

All species of bats and their roosts are strictly protected by a range of legislation, including the following:

- Conservation of Habitats and Species Regulations 2017;
- Wildlife and Countryside Act (WCA) 1981;
- Environment Act (Wales) 2016.

Further assessment and / or surveys would therefore be required in order to comply with the relevant legislation.

5.4 Otters

Otters are known to be present along the River Ely which falls within Areas 1-3.

Otters and their holts are strictly protected by a range of legislation, including the following:

- Conservation of Habitats and Species Regulations 2017;

- Wildlife and Countryside Act (WCA) 1981;
- Environment Act (Wales) 2016.

It will therefore be necessary to carry out otter to establish if there are any holts nearby and to protect otters during the works.

5.5 Dormice

Woodlands within Areas 1-2 and woodland and hedgerows within Area 2 could be suitable for dormice due to pre-existing records of the species and their extensive connectivity to the wider area (see Section 4.2.1). Woodland habitat within Area 4 had a limited connectivity and appeared to be of low suitability but this can only be confirmed by carrying out a site visit.

Dormice are strictly protected by a range of legislation, including the following:

- Conservation of Habitats and Species Regulations 2017;
- Wildlife and Countryside Act (WCA) 1981;
- Environment Act (Wales) 2016.

It is likely that further habitat assessment and / or surveys will be required.

5.6 Great crested newts

Two conservation ponds were previously identified within Area 1 (Capita, 2016) and an additional pond has since been identified approximately 350 m from Area 1 and 30 m from Area 2.

Four great crested newt presence / absence surveys were carried out on these ponds between 11th April 2018 and 8th May 2018 2018 as part of the Coed Ely Dualling commission. The surveys did not record great crested newts, but palmate newts and common frog were recorded during the surveys (Capita, 2018 (*Report in Preparation*)).

Great crested newts are strictly protected by a range of legislation, including the following:

- Conservation of Habitats and Species Regulations 2017;
- Wildlife and Countryside Act (WCA) 1981;
- Environment Act (Wales) 2016.

Presence / absence surveys for great crested newts are usually valid for a period of 2 years. If the proposed works are to take place after this timeframe the surveys may need to be repeated.

5.7 Badgers

The woodland and agricultural fields identified in Areas 1-4 are suitable for badgers.

Badgers are protected under the Protection of Badgers Act 1992 (see Appendix B).
It is likely that badger surveys will be required for Areas 1-4.

5.8 Breeding birds

Habitats such as broadleaved woodland, scrub and hedgerows identified within Areas 1-4 offer suitable habitat for breeding birds. Residential houses within or near to Areas 1-4 and bridge structures within Areas 1 and 3 may also offer nesting habitat.

Nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended) (detailed in Appendix B).

5.9 Reptiles

Habitats such as the colliery spoil within Area 1, road verges and field edges within Areas 2 and 3 and scrub and semi-improved grassland within Area 4 are suitable to support reptiles such as common lizard and slow worm.

Reptiles (slow worm, grass snake, common lizard and adder) receive protection under the Wildlife and Countryside Act (1981), as amended (see Appendix B).

5.10 Fish

A number of protected fish species are likely to be present in the Ely River which lies within Areas 1-3.

Measures will need to be undertaken to avoid polluting these watercourses during the works and impacting upon fish (see Section 7.12).

5.11 Marsh Fritillary Butterfly

Marsh fritillary butterflies have been recorded within 100 m of Area 4 and Rhos Tonyrefail SSSI (which is located directly adjacent to Area 4) is partially designated its population of the species. Semi-improved grassland within Area 4 appears to offer suitable habitat.

Marsh fritillary butterflies are strictly protected by a range of legislation, including the following:

- Conservation of Habitats and Species Regulations 2017;
- Wildlife and Countryside Act (WCA) 1981;
- Environment Act (Wales) 2016.

Further survey within Area 4 may therefore be required.

5.12 Invasive species

Records of invasive species were identified within the search areas for Areas 1-4. Japanese knotweed, Himalayan balsam and cotoneaster have previously been identified within Area 2 (Capita, 2016).

Japanese knotweed and Himalayan balsam are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). Further surveys to map the extent of any invasive species

within Areas 1-4 will be required and (if present) mitigation to avoid spreading the invasive species into the local area.

6. Conclusion

Area 1:

The River Ely SINC and Llantrisant Forestry and Craig Melyn SINC fall within Area 1 and will require protection during the proposed works.

Habitat on site includes semi-natural broad-leaved woodland, colliery spoil, running water and hardstanding.

Area 1 has potential to support bats, otters, dormice, badgers, breeding birds, reptiles and invasive species.

Area 2:

The River Ely SINC and Llantrisant Forestry and Craig Melyn SINC fall within Area 2 and will require protection during the proposed works.

Habitats previously recorded on site include semi-natural broad-leaved woodland, broad-leaved plantation woodland, dense scrub, poor semi-improved grassland, improved grassland and running water.

Area 2 has potential to support bats, otters, dormice, badgers, breeding birds and reptiles. The invasive species Japanese knotweed, Himalayan balsam and cotoneaster have previously been recorded on site.

Area 3:

The River Ely SINC andf Llantrisant Forestry and Craig Melyn SINC falls within Area 3 and will require protection during the proposed works.

Habitat previously recorded on site includes semi-natural broad-leaved woodland, dense scrub and running water. Additional habitats identified from aerial photography appear to be a continuation of semi-natural broad-leaved woodland, hardstanding and residential housing.

Area 3 appears to have the potential to support bats, otters, dormice, badgers, breeding birds and reptiles. The invasive species Japanese knotweed and Himalayan balsam have previously been recorded on site.

Area 4:

Rhos Tonyrefail SSSI is situated directly adjacent to Area 4 and will require protection during the proposed works.

Habitats identified from aerial photography appear to be semi-natural broad-leaved woodland, scattered scrub and semi-improved grassland.

Area 4 appears to have potential to support bats, badgers, breeding birds, reptiles, marsh fritillary butterfly and invasive species.

In order to comply with the relevant legislation (detailed in Appendix B) recommendations have been provided below.

7. Recommendations

7.1 SSSI protection

The Rhos Tonyrefail SSSI will require protection throughout the duration of the proposed works within Areas 4. Habitat loss within the SSSI will need to be avoided.

7.2 SINC protection

The River Ely SINC and Llantrisant Forest and Craig Melyn Woodland SINC will require protection throughout the duration of the proposed works within Areas 1, 2 and 3. Habitat loss will need to be kept to a minimum, lighting of the river channel restricted (see Section 7.4) and measures will need to be in place to prevent pollution (see Section 7.6).

7.3 Extended Phase 1 Habitat Survey

An Extended Phase 1 Habitat Survey will need to be carried out on each potential site. This will involve a site visit by surveyors to confirm the habitats on site, map any invasive species present and confirm any further targeted survey requirements.

The recommended surveys are likely to include the following:

- Bat roost assessment survey (all areas);
- Bat activity surveys (all areas);
- Bat emergence surveys (dependent on results of assessment survey);
- Static bat detector surveys (all areas);
- Dormice surveys (Areas 1-3);
- Otter survey (Areas 1-3);
- Great crested newt surveys (dependent on timings of the proposed works) (Area 1 and 2);
- Breeding bird surveys (all areas);
- Badger survey (all areas);
- Reptile surveys (all areas);
- Marsh fritillary surveys (Area 4).

7.4 Lighting restrictions

The specification and layout of any new lighting that may be included within the design should be agreed with an experienced ecologist at the design stage.

Night-time working should be avoided and no artificial lighting should be used around watercourses to avoid disturbing species such as bats, otters and fish.

7.5 Maintaining / enhancing connectivity

Maintaining habitat connectivity along the woodland and hedgerows on site is required during and after the works and should be discussed with the ecologist throughout the feasibility and design stages. This is to ensure bat flight lines and wildlife corridors are retained at all times.

Enhancement could be achieved by reducing gaps within the canopy and planting native and diverse species that would benefit a wide range of species.

7.6 Water pollution prevention

Pollution prevention measures should be followed to avoid impacting water quality and prevent impacting species such as otters, fish and freshwater invertebrates.

To avoid polluting the watercourse during the works the following recommendations should be adhered to:

- All materials (especially if hazardous or toxic) should be stored at least 7m away from the watercourse;
- All static machinery should be placed drip-trays or oil absorbent nappies. Trays should be emptied regularly to ensure that they contain any spills.
- Silt fences should be erected where appropriate.

8. References

- Capita (2016) Coed Ely Dualling Preliminary Ecological Appraisal
- Capita (2018) Bat Survey Report (*Report in Preparation*).
- Capita (2018) Great Crested Newt Survey Results (*Report in Preparation*).
- Conservation of Habitats and Species Regulations 2017.
- Environment (Wales) Act 2016.
- Google Earth.
- Google Street View.
- JNCC. 2010. Handbook for Phase 1 habitat survey. A technique for environmental audit. Joint Nature Conservation Committee
- MAGIC (2017, 2018). Multi-Agency Geographic Information System
- Personal Communication (*Pers Comm,* 2018). Email from Lousia Gillet – RCT Administration Officer, Parks & Countryside Department.
- Personal Communication (*Pers Comm,* 2017a, 2018a). Email from Richard Wistow –RCT County Ecologist - received on 1st May 2018.
- Personal Communication (*Pers Comm,* 2018b). Email from Louisa Gillett – Administration Officer, Parks and Countryside Department received on 14th May 2018.
- Protection of Badgers Act 1992.
- SEWBReC, (2017, 2018). South East Wales Biodiversity Records Centre.
- Wildlife and Countryside Act 1981 (as amended).

Drawings

Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0001-74-0001 – Area 1 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0002-74-0002 – Area 2 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0003-74-0003 – Area 3 Statutory and Non-Statutory Sites

GC2754-RED-74-XX-DR-C-0004-74-0004 - Area 4 Statutory and Non-Statutory Sites

Preliminary Proposals

GC2754-RED-76-XX-DR-C-0001 – Existing and Proposed Links Alongside Hospital

GC2754 – RED-76-XX DR-C-0002 – Footway Widening Between Ely Valley Road Roundabout

GC2754-RED-76-XX-DR-C-0003 – Park and Share North Coed Ely Northern Route

GC2754 – RED-76-XX DR-C-0004 - Park and Share Alternatives North of Tonyrefail

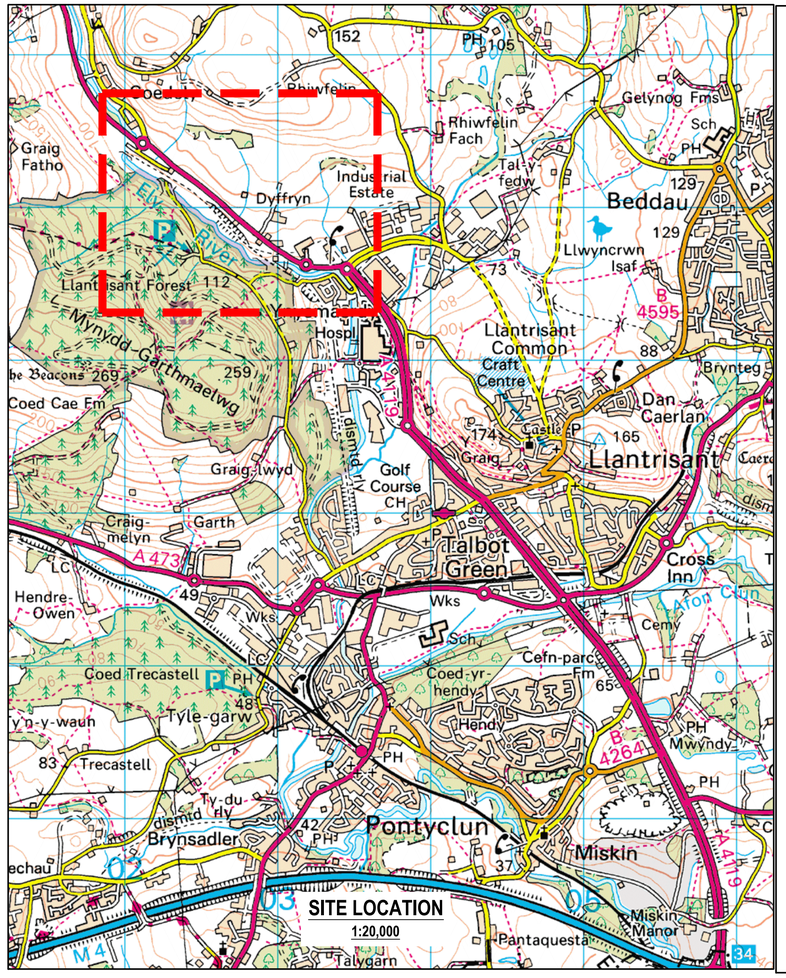
GC2754 – RED-76-XX DR-C-0005 – Alternative Access to Fire Service Headquarters

GC2895-RED-76-XX-DR-C-0003 – A4119 Ely Valley Road Dualling - Concept Preliminary Alignment 85kph Design Speed Widened on North Side for Buildability Reduced Retaining Walls

GC2895-RED-76-XX-DR-C-0004 - A4119 Ely Valley Road Dualling - Concept Preliminary Alignment 85kph Design Speed Widened on North Side for Buildability Reduced Retaining Walls

Previous Phase 1 Habitat Survey

GC2498-CAP-74-XX-DR-L-0001 – Phase 1 Habitat Plan



Key

- Semi-natural Broad-leaved Woodland
- Plantation Coniferous Woodland
- Dense / Continuous Scrub
- Tall Ruderal
- Buildings / Hard Standing
- Scattered Trees (coniferous)
- Scattered Trees (broad-leaved)
- Marsh / Marshy Grassland
- Poor Semi Improved Grassland
- Improved Grassland
- Plantation Mixed Woodland
- Wall
- Running Water
- Scattered Scrub
- Plantation Broad-leaved Woodland
- Standing Water
- Introduced Shrub
- Spoil
- Recently-Felled Woodland (mixed)
- Target Note

SITE LOCATION
1:2,000

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
Reference Plan

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Ecology
Phase 1 Habitat Plan

Scale @ A1	Drawn	Checked	Approved
As Shown	GB	JS	AF

Project No.
GC/002498

Date
June 2016

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2498-CAP-74-XX-DR-L-0001

BS1192 Compliant revision
P01

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Civil Engineering
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
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Capita Property and infrastructure Ltd.

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Key

- Potential future works Area 1
- Sites of Importance for Nature Conservation
- Sites of Special Scientific Interest

SINC - Garth Grabben Slopes

SINC - Rhiwfelin Fawr

SINC - Tonyrefail Mountains

SINC - River Ely

SINC - Llantrisant Forest and Craig Melyn Woodland

Kennels and Cattery
Tynycoed Villas
El Sub Sta
Craig Afon
ELY VALLEY ROAD
The Chestnut..
Garth-grabban Bungalow
Garth-grabban
Community Centre
Garth Hall
COEDLWYN STREET
ELWYN STREET
Trial Shafts
Trial Level
Bedw
Rhiwfelin Fawr
Coedely
Quarries
Workings
Graig Fatho
A4119
Pantglas
Mynydd Garthmaelwg
Dyffryn-uchaf
Ppg Sta
Dyffryn-isaf
Facto
Car Park
Trial Shafts
Cwm Du
Nant Cwm-du
Mynydd Meiros
Trial Level
YNYSMAERDY TERR
Hall
Ynysmaerdy
Nursery
Car Park
Ty-Maelwg
Tip
Car Park

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Ecology
Area 1

Scale @ A1	Drawn	Checked	Approved
NTS	JS	RH	

Project No. GC/002754

Date May 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-74-XX-DR-C-0001

BS1192 Compliant revision P01.1

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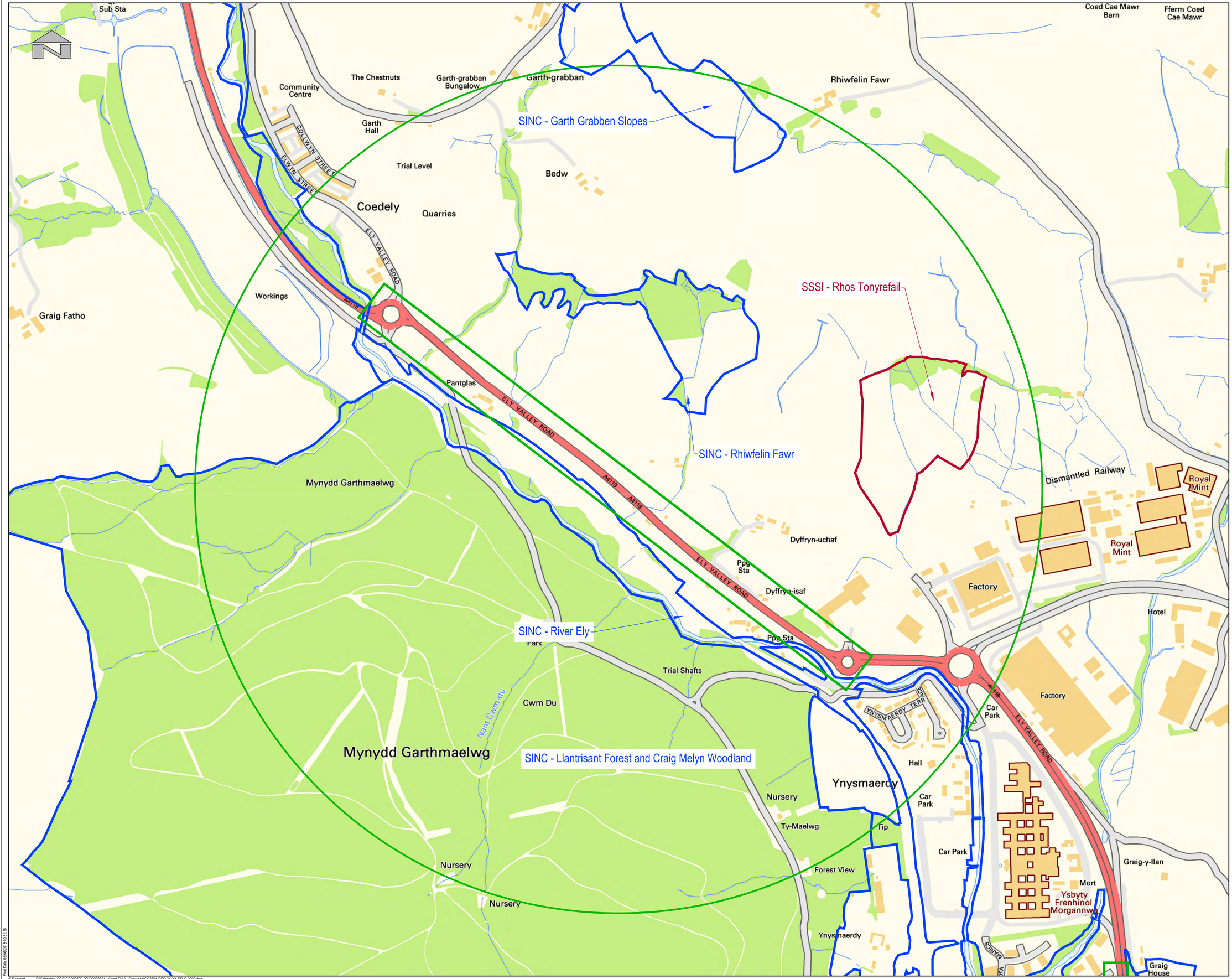

Key

- Potential future works Area 3
- Sites of Importance for Nature Conservation
- Sites of Special Scientific Interest

Rev	Dwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Ecology
Area 2

Scale @ A1	Drawn	Checked	Approved
NTS	JS	RH	

Project No.	Date
GC/002754	May 2018

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number) — BS1192 Compliant
GC2754-RED-74-XX-DR-C-0002 — revision P01.1

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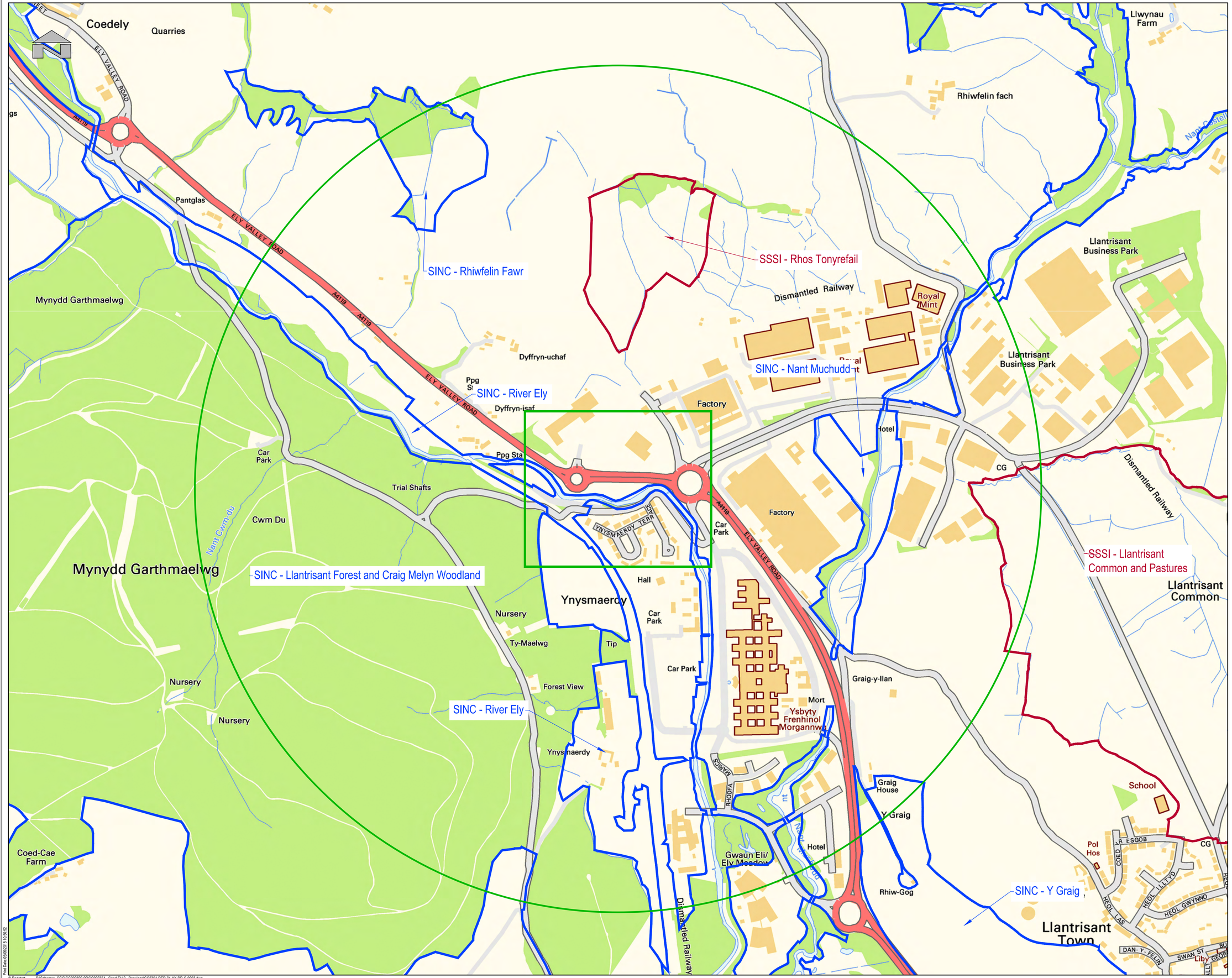

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Ecology
Area 3

Scale @ A1	Drawn	Checked	Approved
NTS	JS	RH	

Project No.
GC/002754

Date
May 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-74-XX-DR-C-0003

BS1192 Compliant revision
P01.1

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Key

- Potential future works Area 4
- Sites of Importance for Nature Conservation
- Sites of Special Scientific Interest

Rev	Dwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Ecology
Area 4

Scale @ A1	Drawn	Checked	Approved
NTS	JS	RH	

Project No.: GC/002754
Date: May 2018

Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC2754-RED-74-XX-DR-C-0004
BS1192 Compliant revision: P01.1

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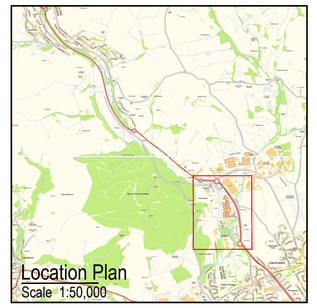
Key

- Existing off road NCN cycleway
- Existing on road NCN cycleway
- Existing links to NCN cycleway
- Existing footpath
- Proposed footway widening to join Coed Ely widening scheme
- Potential future links



Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Existing and Proposed Links Alongside Hospital

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.: GC/002754
Date: February 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-76-XX-DR-C-0001
BS1192 Compliant revision: P01.1

DRAFT 28/02/2018

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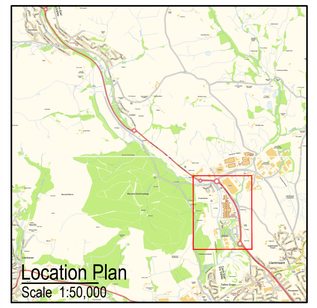
Key

- Existing off road NCN cycleway
- Existing on road NCN cycleway
- Existing links to NCN cycleway
- Existing footpath
- Proposed footway widening to join Coed Ely widening scheme
- Potential future links



Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Existing and Proposed Links Alongside Hospital

Scale @ A1	Drawn	Checked	Approved
NTS	JS	PS	

Project No.: GC/002754
Date: February 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2754-RED-76-XX-DR-C-0001
BS1192 Compliant revision: P01.1

DRAFT 28/02/2018

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

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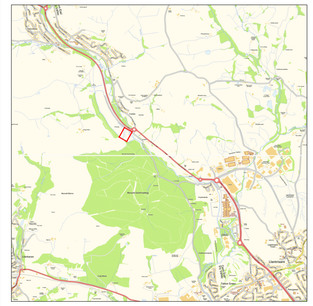
Key

New carriageway

New 2m wide footway



Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
Coed Ely A4119

Drawing
Park and Share North of
Coed Ely Northern Roundabout

Scale @ A1	Drawn	Checked	Approved
1:500	JS	PS	

Project No.	Date
GC/002754	February 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

GC2754-RED-76-XX-DR-C-0003

BS1192 Compliant revision
P01.1

DRAFT
28/02/2018

REDSTART
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Print Date: 28/02/2018 11:32:12

Key

New carriageway

New 2m wide footway

Rev	Drwn	Chkd	Appd	Description	Date

Purpose of Issue

S0 - Work in Progress

Classification

Commercial in Confidence

Client

Rhondda Cynon Taf
County Borough Council

Project

Coed Ely A4119

Drawing

Park and Share Alternative
North of Tonyrefail

Scale @ A1	Drawn	Checked	Approved
1:500	JS	PS	

Project No.

GC/002754

Date

February 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number

GC2754-RED-76-XX-DR-C-0004

BS1192 Compliant revision

P01.1

DRAFT
28/02/2018

REDSTART
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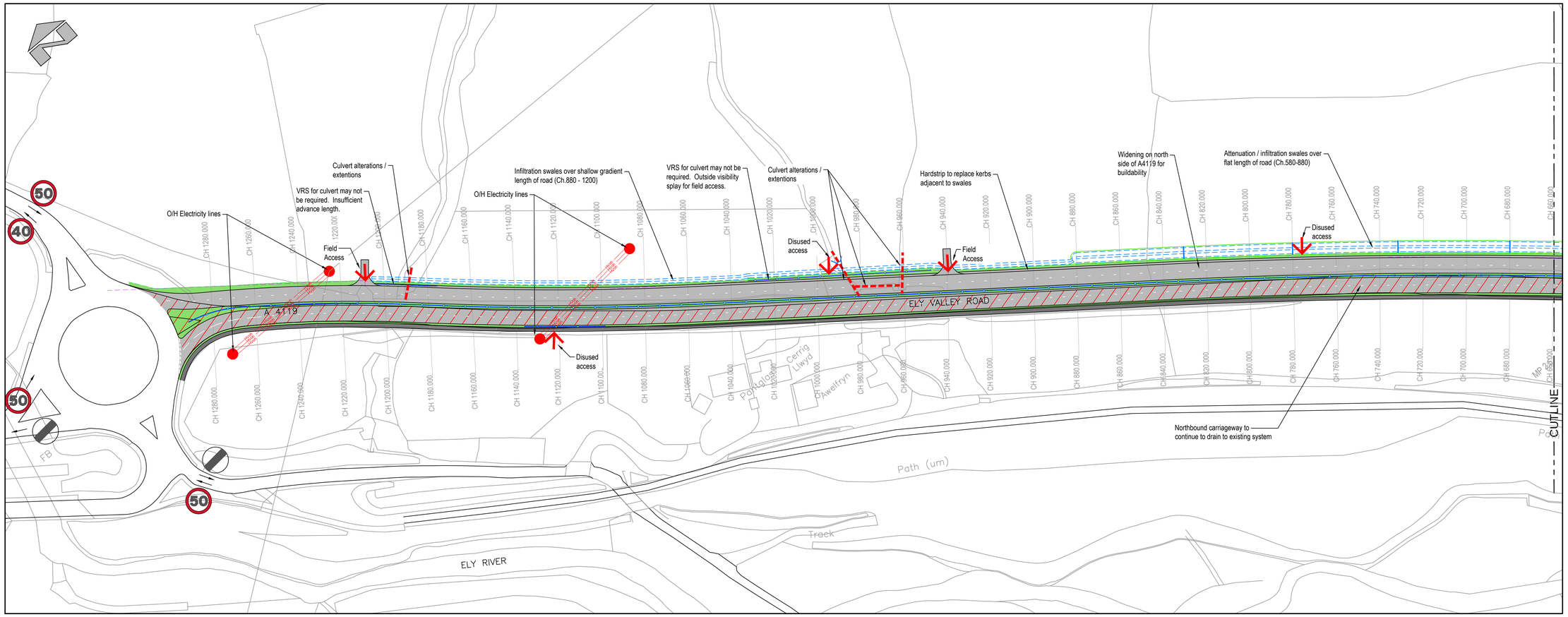
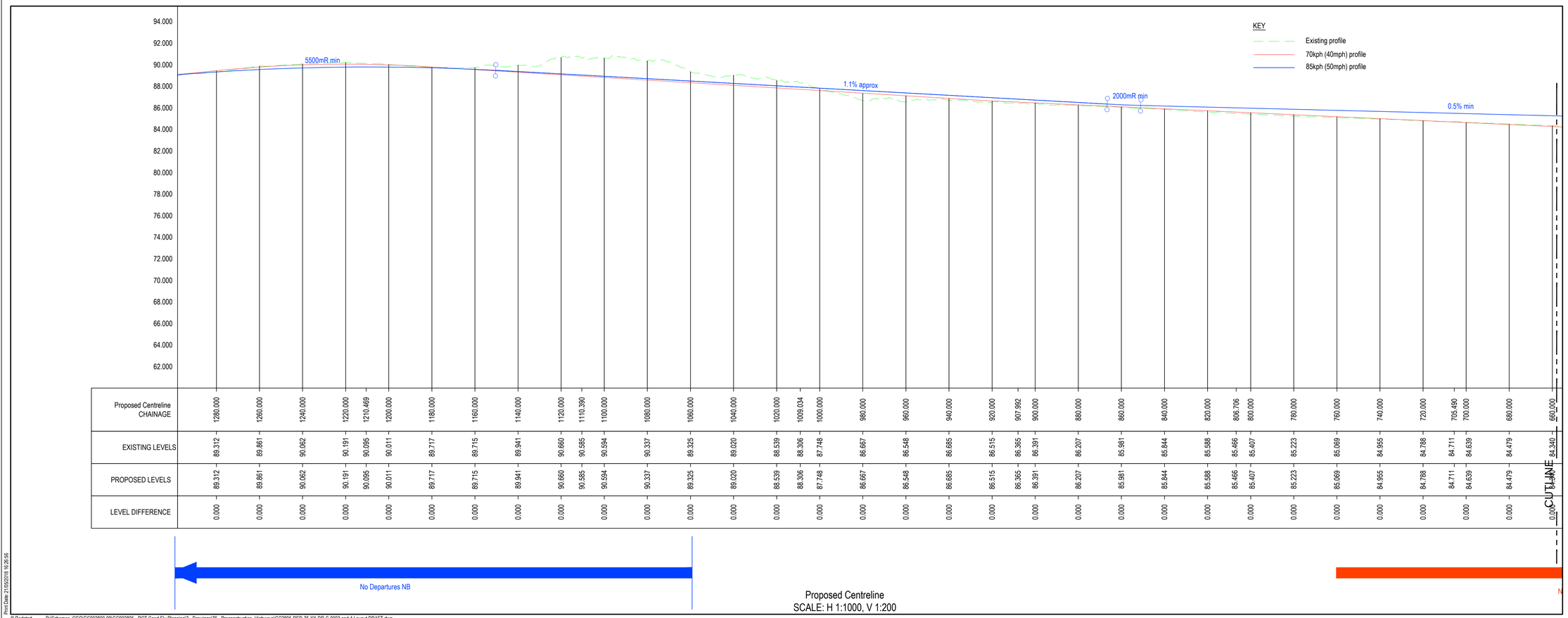


Key

- New carriageway
- New footway
- New verge
- Existing carriageway
- Field access
- New retaining wall
- Watercourse
- O/H power line
- Vehicle restraint system
- Junction visibility splay
- Swale with weirs for infiltration and attenuation of additional surface water runoff.
- Swale for infiltration and transfer of additional surface water runoff
- Drainage attenuation tank

Notes

1. Concept design based on Ordnance Survey data.
2. Layout may vary following detailed topographical survey.
3. Earthworks to be developed following topographical survey.



Proposed Centreline
SCALE: H 1:1000, V 1:200

Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Concept Preliminary Alignment
85kph Design Speed
Widened on North Side for Buildability
Reduced Retaining Walls

Scale @ A1	Drawn	Checked	Approved
1:1,000	NM		

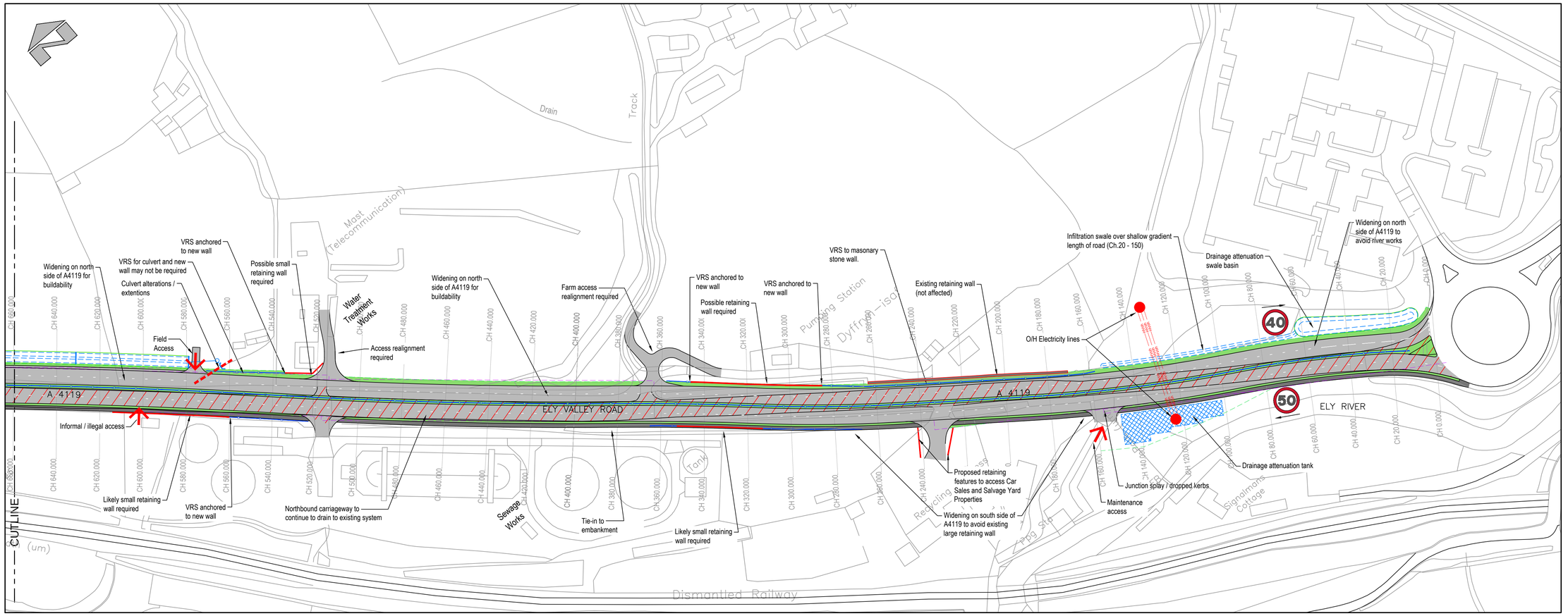
Project No.	Date
GC/002895	April 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2895-RED-76-XX-DR-C-0003

BS1192 Compliant revision
P01

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

P:\Schemes_CGC\GC002800-99\GC002895 - RCT Coed Ely Planning\2 - Drawings\76 - Preconstruction_Highways\GC2895-RED-76-XX-DR-C-0003 and 4 Layout DRAFT.dwg



Key

- New carriageway
- New footway
- New verge
- Existing carriageway
- Field access
- New retaining wall
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- Junction visibility splay
- Swale with weirs for infiltration and attenuation of additional surface water runoff.
- Swale for infiltration and transfer of additional surface water runoff
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Notes

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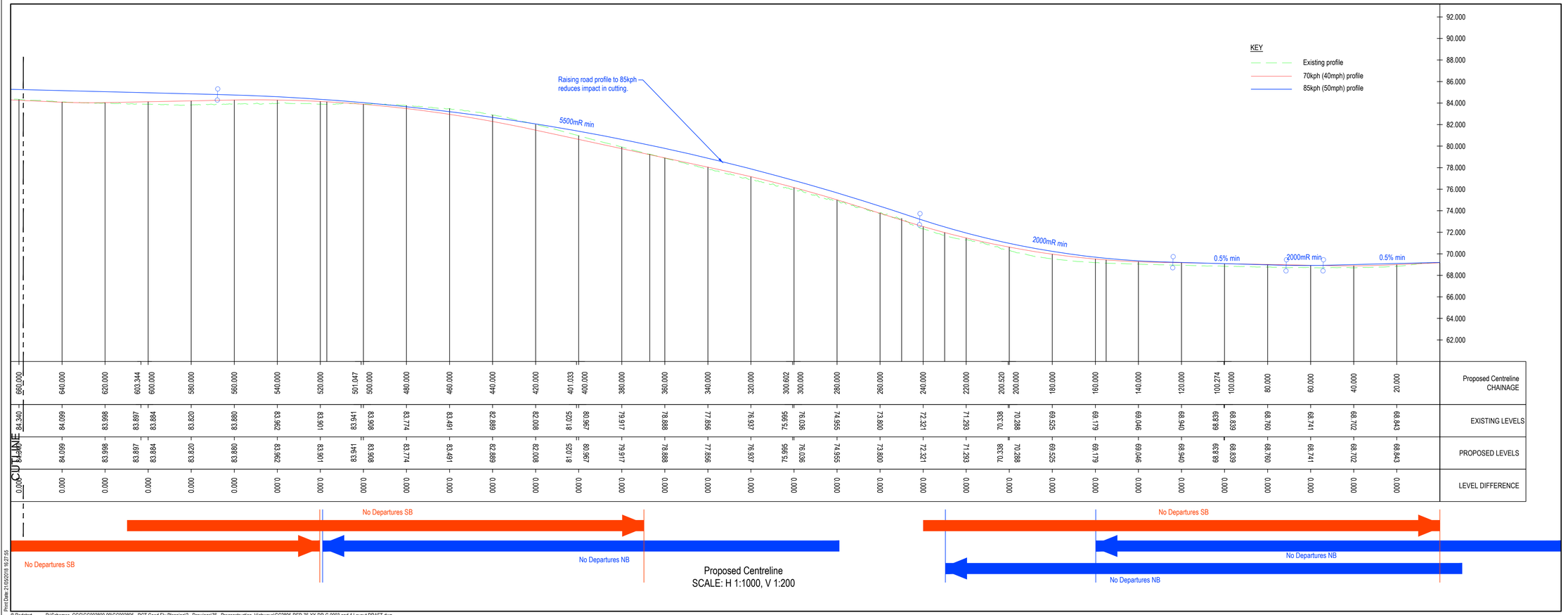
3. Earthworks to be developed following topographical survey.



Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue
S0 - Work in Progress

Classification
Commercial in Confidence

Client
Rhondda Cynon Taf
County Borough Council

Project
A4119 Ely Valley Road Dualling

Drawing
Concept Preliminary Alignment
85kph Design Speed
Widened on North Side for Buildability
Reduced Retaining Walls

Scale @ A1	Drawn	Checked	Approved
1:1,000	NM		

Project No.	Date
GC/002895	April 2018

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC2895-RED-76-XX-DR-C-0004

BS1192 Compliant revision
P01

REDSTART
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Appendix A- SEWBReC Data Areas 1-3 and 4

Areas 1 -3 Protected and Priority Species within 5 km (bats only)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Bats	*Chiroptera*	EPS, WCA5, S42, LBAP (ANG, DEN, FLI, RCT, SNP, TRA, TRF)	31	Sept 2013
Bats	*Vespertilionidae*	EPS, WCA5, S42, LBAP (ANG, DEN, FLI, RCT, SNP, TRA, TRF)	10	Oct 2011
Brown Long-eared Bat	*Plecotus auritus*	EPS, HDir, WCA5, S42, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	16	Oct 2016
Common Pipistrelle	*Pipistrellus pipistrellus*	EPS, HDir, WCA5, S7, Bonn, Bern, LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	93	July 2011
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD1 (UK), RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CRM, DEN, FLI, MON, PEM, POW, SNP, TRA, TRF, VOG)	2	Oct 2011
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	7	Sept 2011
Lesser Noctule	*Nyctalus leisleri*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	2	Oct 2011
Nathusius's Pipistrelle	*Pipistrellus nathusii*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	3	Oct 2011
Noctule Bat	*Nyctalus noctula*	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	26	Aug 2011
Pipistrelle	*Pipistrellus pipistrellus agg.*	EPS, HDir, WCA5, S7, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	2	Oct 2012
Pipistrelle Bat species	*Pipistrellus*	EPS, WCA5, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	36	Sept 2016
Serotine	*Eptesicus serotinus*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (GWY, POW, TRA, TRF)	3	July 2014

Soprano Pipistrelle	*Pipistrellus pygmaeus*	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CLY, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	69	Aug 2011
Unidentified Bat	*Myotis*	EPS, HDir, WCA5, Bonn, Bern, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	30	Aug 2011
Whiskered Bat	*Myotis mystacinus*	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	Sept 2015

Area 4 Protected and Priority Species within 5 km (bats only)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Bats	Chiroptera	EPS, WCA5, S7, LBAP (ANG, DEN, FLI, RCT, SNP, TRA, TRF)	40	July 2017
Bats	Vespertilionidae	EPS, WCA5, Bonn, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	28	Aug 2011
Brown Long-eared Bat	Plecotus auritus	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	20	Aug 2015
Common Pipistrelle	Pipistrellus pipistrellus	EPS, HDir, WCA5, S7, Bonn, Bern, LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	165	July 2017
Greater Horseshoe Bat	Rhinolophus ferrumequinum	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD1 (UK), RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CRM, DEN, FLI, MON, PEM, POW, SNP, TRA, TRF, VOG)	2	Oct 2011
Lesser Horseshoe Bat	Rhinolophus hipposideros	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CLY, CON, CRM, DEN, FLI, GWY, MON, PEM, POW, SNP, TRA, TRF, VOG, WRE)	2	Sept 2010
Lesser Noctule	Nyctalus leisleri	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	5	Oct 2011
Long-eared Bat species	Plecotus	EPS, HDir, WCA5, Bonn, Bern, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	1	May 2013
Nathusius's Pipistrelle	Pipistrellus nathusii	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	9	Oct 2011
Natterer's Bat	Myotis nattereri	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	Aug 2012
Noctule Bat	Nyctalus noctula	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	40	July 2017
Nyctalus Bat species	Nyctalus	EPS, HDir, WCA5, Bonn, Bern, LBAP (ANG, DEN, FLI, SNP, TRA)	4	July 2012

Pipistrelle	Pipistrellus pipistrellus agg.	EPS, HDir, WCA5, S7, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	1	Jan 2012
Pipistrelle Bat species	Pipistrellus	EPS, WCA5, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	59	May 2016
Serotine	Eptesicus serotinus	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (GWY, POW, TRA, TRF)	3	Aug 2011
Soprano Pipistrelle	Pipistrellus pygmaeus	EPS, HDir, WCA5, S7, UKBAP, Bonn, Bern, RD2 (UK), LBAP (ANG, BBNP, CLY, DEN, FLI, GWY, PEM, POW, SNP, TRA, TRF, VOG)	133	July 2017
Unidentified Bat	Myotis	EPS, HDir, WCA5, Bonn, Bern, LBAP (ANG, DEN, FLI, SNP, TRA, TRF)	66	Sept 2011
Whiskered Bat	Myotis mystacinus	EPS, HDir, WCA5, Bonn, Bern, RD2 (UK), LBAP (ANG, DEN, FLI, GWY, POW, SNP, TRA, TRF)	1	Sept 2015

Areas 1-3 Protected and Priority Species within 2 km (excluding bats)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Mammals				
Eurasian Badger	*Meles meles*	BA, Bern, LBAP (CLY, CON, DEN, FLI, PEM, POW, TRF, WRE)	1	Dec 2016
Polecat	*Mustela putorius*	HDir, S7, UKBAP, Bern, RD2 (UK), LBAP (BGW, BRG, CON, FLI, GWY, NEW, POW, SNP, VOG)	1	Sept 2010
Weasel	*Mustela nivalis*	NRW, Bern, LBAP (ANG, BGW, BRG, CON, FLI, NEW, POW)	1	April 2008
West European Hedgehog	*Erinaceus europaeus*	S7, UKBAP, Bern, LBAP (ANG, BGW, BRG, CON, FLI, GWY, NEW, POW, RCT, VOG)	2	Aug 2016
Birds				
Bullfinch	*Pyrrhula pyrrhula*	S7, UKBAP, WBR(RSPB), LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, TRF, VOG), UKBR(RSPB)	5	April 2017
Common Crossbill	*Loxia curvirostra*	WCA1.1, Bern, LBAP (CON, POW), LI(VC43)	6	Jan 2015
Dunnock	*Prunella modularis*	S7, UKBAP, Bern, LBAP (CON, POW, VOG), UKBAm(RSPB)	9	April 2017
Hawfinch	*Coccothraustes coccothraustes*	S7, UKBAP, Bern, LBAP (CON, DEN, FLI, GWY, POW, VOG), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	1	May 2013
Hobby	*Falco subbuteo*	WCA1.1, Bonn, Bern, CITES, LBAP (CON, GWY, POW, VOG), WBAm(RSPB), LI(VC43)	1	June 2014
House Sparrow	*Passer domesticus*	S7, UKBAP, Bern, LBAP (CLY, CON, FLI, GWY, VOG), WBAm(RSPB), UKBR(RSPB)	3	April 2015
Kestrel	*Falco tinnunculus*	S7, Bonn, Bern, CITES, WBR(RSPB), LBAP (ANG, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), LI(VC43), UKBAm(RSPB)	3	May 2015
Lesser Redpoll	*Acanthis cabaret*	S7, UKBAP, WBR(RSPB), LBAP (CON), LBAP (DEN, POW, VOG), UKBAm(RSPB)	2	April 2014
Linnet	*Linaria cannabina*	S7, Bern, WBR(RSPB), LBAP (ANG, BBNP, CER, CLY, DEN, FLI, PEM, VOG), LBAP (CON, GWY), UKBR(RSPB)	4	May 2015
Merlin	*Falco columbarius*	BDir1, WCA1.1, Bonn, Bern, CITES, LBAP (CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	1	Nov 2009
Redwing	*Turdus iliacus*	BDir22, WCA1.1, LBAP (CON, POW), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	2	Dec 2013

Reed Bunting	*Emberiza schoeniclus*	S7, UKBAP, Bern, LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), WBAm(RSPB), UKBR(RSPB)	4	May 2015
Skylark	*Alauda arvensis*	BDir22, S7, LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG), WBAm(RSPB), UKBR(RSPB)	3	April 2017
Song Thrush	*Turdus philomelos*	BDir22, S7, UKBAP, Bern, LBAP (ANG, BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG, WRE), WBAm(RSPB), UKBR(RSPB)	14	May 2015
Spotted Flycatcher	*Muscicapa striata*	S7, UKBAP, Bonn, Bern, WBR(RSPB), LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), UKBR(RSPB)	1	May 2014
Starling	*Sturnus vulgaris*	BDir22, S7, UKBAP, Bern, WBR(RSPB), LBAP (BBNP, CON, FLI, GWY, VOG), UKBR(RSPB)	5	May 2015
Tree Pipit	*Anthus trivialis*	S7, UKBAP, Bern, LBAP (CON, DEN, FLI, GWY, POW, VOG), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	2	May 2015
Wood Warbler	*Phylloscopus sibilatrix*	S7, UKBAP, WBR(RSPB), LBAP (CON, GWY, SNP, VOG), UKBR(RSPB), UKBAm(RSPB)	4	May 2014
Reptiles				
Adder	*Vipera berus*	WCA5, S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	2	2008-2009
Common Lizard	*Zootoca vivipara*	WCA5, S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	6	June 2016
Grass Snake	*Natrix natrix*	S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, VOG)	3	Aug 2016
Slow-worm	*Anguis fragilis*	WCA5, S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, VOG)	3	May 2017
Amphibians				
Common Frog	*Rana temporaria*	HDir, WCA5, Bern, LBAP (ANG, CLY, CON, FLI, POW, TRA)	6	Aug 2017
Common Toad	*Bufo bufo*	WCA5, S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, TRA, VOG)	4	Jan 2013
Palmate Newt	*Lissotriton helveticus*	WCA5, Bern, LBAP (ANG, CLY, CON, DEN, FLI, POW, TRA), LI(BIS)	1	March 2016

Invertebrates				
Brambling	*Fringilla montifringilla*	WCA1.1, LBAP (CON)	2	Jan 2015
Broom Moth	*Ceramica pisi*	S7, UKBAP, LBAP (GWY, VOG)	2	Sept 2016
Buff Ermine	*Spilosoma lutea*	-	3	June 2017
Rustic	*Hoplodrina blanda*	-	1	July 2013
Small Pearl-bordered Fritillary	*Boloria selene*	S7, UKBAP, RD1 (UK), LBAP (BGW, BRG, CON, DEN, FLI, GWY, MTR, NEW, POW, RCT, SNP, SWN, TRF, VOG), LI(SEWBReC), LI(VC43)	5	May 2017
White-spotted Sable	*Anania funebris*	S7, UKBAP, RD2 (UK)	3	May 2014
Fish				
Brown/Sea Trout	*Salmo trutta*	S7, UKBAP, LBAP (BGW, CLY, CON, GWY, MTR, RCT, TRA, TRF, VOG), LI(BIS)	1	April 2011
Plants				
Bluebell	*Hyacinthoides non-scripta*	WCA8, LBAP (ANG, CLY, CON, FLI, SNP, TRA, TRF)	9	June 2016

Area 4 Protected and Priority Species within 2 km (excluding bats)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Mammal				
Eurasian Badger	Meles meles	BA, Bern, LBAP (CLY, CON, DEN, FLI, PEM, POW, TRF, WRE)	1	Sept 2014
West European Hedgehog	Erinaceus europaeus	S7, UKBAP, Bern, LBAP (ANG, BGW, BRG, CON, FLI, GWY, NEW, POW, RCT, VOG)	2	Aug 2014
Birds				
Barn Owl	Tyto alba	WCA1.1, WCA9, Bern, CITES, LBAP (ANG, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRA, VOG, WRE), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	7	July 2012
Cuckoo	Cuculus canorus	S7, UKBAP, WBR(RSPB), LBAP (CON, DEN, FLI, GWY, VOG), UKBR(RSPB), UKBAm(RSPB)	3	May 2012
Curlew	Numenius arquata	BDir22, S7, UKBAP, Bonn, RD1 (UK), WBR(RSPB), LBAP (ANG, BBNP, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, VOG), LI(VC43), UKBAm(RSPB)	1	Apr 2010
Dunnock	Prunella modularis	S7, UKBAP, Bern, LBAP (CON, POW, VOG), UKBAm(RSPB)	15	Oct 2010
Fieldfare	Turdus pilaris	BDir22, WCA1.1, LBAP (CON, POW), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	3	Oct 2010
Golden Plover	Pluvialis apricaria	BDir1, BDir22, S7, Bonn, WBR(RSPB), LBAP (BBNP, CON, CRM, FLI, GWY, POW, SNP, VOG), LI(VC43)	2	Oct 2010
Goshawk	Accipiter gentilis	WCA1.1, WCA9, Bonn, CITES, LBAP (CLY, CON, POW, VOG)	3	Oct 2010
Grasshopper Warbler	Locustella naevia	S7, UKBAP, WBR(RSPB), LBAP (BBNP, CON, DEN, FLI, GWY, POW, VOG), UKBR(RSPB)	2	July 2010
Hen Harrier	Circus cyaneus	BDir1, S7, Bonn, CITES, WBR(RSPB), LBAP (BBNP, CON, DEN, FLI, GWY, POW, SNP, VOG), LI(VC43), UKBR(RSPB)	1	Oct 2010
House Sparrow	Passer domesticus	S7, UKBAP, Bern, LBAP (CLY, CON, FLI, GWY, VOG), WBAm(RSPB), UKBR(RSPB)	13	Aug 2015
Kestrel	Falco tinnunculus	S7, Bonn, Bern, CITES, WBR(RSPB), LBAP (ANG, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), LI(VC43), UKBAm(RSPB)	7	Oct 2010
Lapwing	Vanellus vanellus	BDir22, S7, UKBAP, Bonn, WBR(RSPB), LBAP (ANG,	3	July 2010

		BBNP, CLY, CON, CRM, DEN, FLI, GWY, MON, PEM, POW, SNP, TRF, VOG), LI(VC43), UKBAm(RSPB)		
Linnet	Linaria cannabina	S7, Bern, WBR(RSPB), LBAP (ANG, BBNP, CER, CLY, DEN, FLI, PEM, VOG), LBAP (CON, GWY), UKBR(RSPB)	1	July 2012
Peregrine	Falco peregrinus	BDir1, WCA1.1, Bonn, Bern, CITES, LBAP (ANG, CLY, CON, GWY, PEM, POW, TRF, VOG), LI(VC43), UKBAm(RSPB)	2	April 2015
Red Kite	Milvus milvus	BDir1, WCA1.1, WCA9, Bonn, CITES, RD1 (UK), LBAP (CON, CRM, GWY, POW), WBAm(RSPB), UKBAm(RSPB)	6	Oct 2010
Redwing	Turdus iliacus	BDir22, WCA1.1, LBAP (CON, POW), WBAm(RSPB), UKBR(RSPB), UKBAm(RSPB)	3	Oct 2010
Reed Bunting	Emberiza schoeniclus	S7, UKBAP, Bern, LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), WBAm(RSPB), UKBR(RSPB)	2	Oct 2010
Skylark	Alauda arvensis	BDir22, S7, LBAP (ANG, BBNP, CER, CLY, CON, CRM, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG), WBAm(RSPB), UKBR(RSPB)	1	Aug 2010
Song Thrush	Turdus philomelos	BDir22, S7, UKBAP, Bern, LBAP (ANG, BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, SNP, TRF, VOG, WRE), WBAm(RSPB), UKBR(RSPB)	3	June 2011
Spotted Flycatcher	Muscicapa striata	S7, UKBAP, Bonn, Bern, WBR(RSPB), LBAP (BBNP, CER, CLY, CON, DEN, FLI, GWY, PEM, POW, VOG), UKBR(RSPB)	1	July 2010
Starling	Sturnus vulgaris	BDir22, S7, UKBAP, Bern, WBR(RSPB), LBAP (BBNP, CON, FLI, GWY, VOG), UKBR(RSPB)	9	Jan 2009
Reptiles				
Common Lizard	Zootoca vivipara	WCA5, S7, UKBAP, Bern, LBAP (ANG, CLY, CON, DEN, FLI, GWY, POW, SNP, TRA, TRF, VOG)	1	Aug 2013
Invertebrates				
Marsh Fritillary	Euphydryas aurinia	EPS, HDir, WCA5, S7, UKBAP, Bern, RD1 (UK), RD2 (UK), LBAP (ANG, BBNP, CER, CON, CRM, GWY, PEM, POW, SNP, TRA, VOG), LI(SEWBReC)	10	May 2015
Small Pearl-bordered Fritillary	Boloria selene	S7, UKBAP, RD1 (UK), LBAP (BGW, BRG, CON, DEN, FLI, GWY, MTR, NEW, POW, RCT,	10	July 2012

		SNP, SWN, TRF, VOG), LI(SEWBReC), LI(VC43)		
Plants				
Annual Knawel	Scleranthus annuus subsp. annuus	S7, UKBAP, RD1 (UK), LBAP (GWY), LI(VC49, LS)	1	June 2015
Bluebell	Hyacinthoides non-scripta	WCA8, LBAP (ANG, CLY, CON, FLI, SNP, TRA, TRF)	6	Oct 2016

Areas 1-3				
Other species of conservation concern (Within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Birds				
Coal Tit	*Periparus ater*	Bern, LBAP (CON, POW), WBAm(RSPB)	19	Feb 2015
Dipper	*Cinclus cinclus*	Bern, LBAP (BRG, CLY, CON, MTR, POW, RCT, TRA), WBAm(RSPB), UKBAm(RSPB)	6	April 2016
Garden Warbler	*Sylvia borin*	LBAP (BRG, CON, POW), WBAm(RSPB)	3	May 2015
Goldcrest	*Regulus regulus*	Bern, LBAP (CON, POW), WBAm(RSPB), UKBAm(RSPB)	6	Dec 2013
House Martin	*Delichon urbicum*	Bern, LBAP (BRG, CON, POW, RCT, VOG), WBAm(RSPB), UKBAm(RSPB)	3	Oct 2013
Lesser Black-backed Gull	*Larus fuscus*	BDir22, Bonn, Bern, LBAP (CON, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	4	May 2016
Long-tailed Tit	*Aegithalos caudatus*	WBAm(RSPB)	6	June 2014
Meadow Pipit	*Anthus pratensis*	Bern, LBAP (CON), WBAm(RSPB), UKBAm(RSPB)	8	Sept 2015
Snipe	*Gallinago gallinago*	BDir21, Bonn, LBAP (ANG, CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	4	June 2014
Swallow	*Hirundo rustica*	Bern, LBAP (ANG, CON, GWY, POW, VOG), WBAm(RSPB), UKBAm(RSPB)	11	Sept 2015
Swift	*Apus apus*	LBAP (BRG, RCT, VOG), WBAm(RSPB), UKBAm(RSPB)	2	May 2017
Wheatear	*Oenanthe oenanthe*	Bern, LBAP (BRG, CON, POW), WBAm(RSPB)	1	April 2015
Whitethroat	*Sylvia communis*	LBAP (CON, POW), WBAm(RSPB)	3	May 2015
Willow Warbler	*Phylloscopus trochilus*	WBR(RSPB), LBAP (CON), UKBAm(RSPB)	9	May 2015
Invertebrates				
Clouded Cosmet	*Mompha langiella*	RD2 (UK), LI(BIS)	1	Sept 2016
Double Line	*Mythimna turca*	RD2 (UK), LBAP (BBNP, CER, POW)	1	July 2013

Areas 1-3 Other species of conservation concern (Within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Golden-rod Pug	Eupithecia virgaureata	RD2 (UK), LI(BIS)	1	May 2017
Green Woodpecker	*Picus viridis*	Bern, LBAP (CLY, CON, DEN, FLI, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	3	July 2016
Little Thorn	*Cepphis advenaria*	RD2 (UK), LBAP (BGW, CLY)	1	May 2014
Marsh Grey	*Eudonia pallida*	RD2 (UK)	3	June 2017
Neat Cosmet	*Mompha divisella*	RD2 (UK), LI(BIS)	2	April 2017
Oak-tree Pug	*Eupithecia dodoneata*	-	4	April 2017
Sedge Fanner	*Glyphipterix forsterella*	RD2 (UK)	1	June 2012
Sloe Pug	*Pasiphila chloerata*	-	1	May 2017
Plants				
Charlock	*Sinapis arvensis*	WVP	1	May 2016
Common Cottongrass	*Eriophorum angustifolium*	RD1 (UK), LI(VC47)	1	July 2016
Cornish Moneywort	*Sibthorpia europaea*	RD2 (UK), LBAP (BGW, CDF, CLY, RCT), LI(SEWBReC)	1	Jan 2014
Deergrass	*Trichophorum caespitosum*	RD1 (UK), LI(VC50, LR)	1	July 2016
Heath Milkwort	*Polygala serpyllifolia*	RD1 (UK), LI(VC47)	2	July 2016
Ivy-leaved Bellflower	*Wahlenbergia hederacea*	RD1 (UK), LBAP (DEN), LI(VC50, LR), LI(VC52, LR)	3	Sept 2016
Minute Pouncewort	*Cololejeunea minutissima*	RD2 (UK)	1	June 2019
Monk's-hood	*Aconitum napellus*	RD2 (UK), LBAP (CDF, RCT, VOG), LI(BIS), LI(SEWBReC), WVP	1	Aug 2015
Overleaf Pellia	*Pellia epiphylla*	RD2 (UK)	4	Sept 2016
Petty Whin	*Genista anglica*	RD1 (UK), LBAP (GWY), LI (VC43), LI(VC48, LS), LI(VC49, LS), LI(VC50, LR), LI(VC51, LR), LI(VC52, LS)	1	Jan 2014
Smaller White-moss	*Leucobryum juniperoideum*	RD2 (UK), LI(VC44, LS), LI(WWBIC)	1	Sept 2016
Wild Strawberry	*Fragaria vesca*	RD1 (UK)	6	May 2014
Wood-sorrel	*Oxalis acetosella*	RD1 (UK), LI(VC47)	7	June 2016

Area 4 Other species of conservation concern (Within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Coal Tit	Periparus ater	Bern, LBAP (CON, POW), WBAm(RSPB)	11	Jan 2009
Common Gull	Larus canus	BDir22, Bonn, WBR(RSPB), UKBAm(RSPB)	1	Jan 2009
Dipper	Cinclus cinclus	Bern, LBAP (BRG, CLY, CON, MTR, POW, RCT, TRA), WBAm(RSPB), UKBAm(RSPB)	1	April 2011
Goldcrest	Regulus regulus	Bern, LBAP (CON, POW), WBAm(RSPB), UKBAm(RSPB)	1	Jan 2009
Green Woodpecker	Picus viridis	Bern, LBAP (CLY, CON, DEN, FLI, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	5	June 2011
Lesser Black-backed Gull	Larus fuscus	BDir22, Bonn, Bern, LBAP (CON, GWY, PEM, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	3	Oct 2010
Long-tailed Tit	Aegithalos caudatus	WBAm(RSPB)	8	Oct 2010
Meadow Pipit	Anthus pratensis	Bern, LBAP (CON), WBAm(RSPB), UKBAm(RSPB)	3	Dec 2015
Redstart	Phoenicurus phoenicurus	Bern, LBAP (CON, GWY, POW, SNP), WBAm(RSPB), UKBAm(RSPB)	2	Aug 2010
Sand Martin	Riparia riparia	Bern, LBAP (CON, DEN, FLI, GWY, POW, VOG), WBAm(RSPB), UKBAm(RSPB)	1	April 2011
Snipe	Gallinago gallinago	BDir21, Bonn, LBAP (ANG, CON, DEN, FLI, GWY, POW), WBAm(RSPB), LI(VC43), UKBAm(RSPB)	3	Dec 2010
Swallow	Hirundo rustica	Bern, LBAP (ANG, CON, GWY, POW, VOG), WBAm(RSPB), UKBAm(RSPB)	2	July 2012
Swift	Apus apus	LBAP (BRG, RCT, VOG), WBAm(RSPB), UKBAm(RSPB)	7	Aug 2015
Wheatear	Oenanthe oenanthe	Bern, LBAP (BRG, CON, POW), WBAm(RSPB)	3	April 2015
Woodcock	Scolopax rusticola	LBAP (CON, POW), WBAm(RSPB)	1	Dec 2010

Areas 1-3 Species of local conservation concern (within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Invertebrates				
Beautiful Demoiselle	Calopteryx virgo	LBAP (CLY, SNP), LI(BIS), LI(SEWBReC)	2	July 2016
Golden-ringed Dragonfly	Cordulegaster boltonii	LBAP (CLY, SNP), LI(BIS), LI(SEWBReC)	1	July 2016
Keeled Skimmer	Orthetrum coerulescens	LBAP (BGW, BRG, CLY, SNP), LI(BIS), LI(SEWBReC)	1	July 2009
Short-winged Cone-head	Conocephalus dorsalis	LBAP (BRG, TRF), LI(SEWBReC)	1	Sept 2012
Plants				
Alder Buckthorn	*Frangula alnus*	LBAP (GWY, NEW), LI(SEWBReC), LI(VC47), LI(VC48, LR), LI(VC49, LR), LI(VC50, LR), LI(VC51, LR)	1	Sept 2012
Bee Orchid	*Ophrys apifera*	CITES, LBAP (CLY, GWY, TRA, TRF), LI(SEWBReC), LI(VC47), LI(VC48, LR), LI(VC49, LS)	1	June 2008
Climbing Corydalis	*Ceratocapnos claviculata*	LI(SEWBReC), LI(VC47)	1	May 2017

Area 4 Species of local conservation concern (within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Birds				
Grey Heron	Ardea cinerea	Bonn, LBAP (BRG, RCT)	1	Oct 2010
Invertebrates				
Keeled Skimmer	Orthetrum coerulescens	LBAP (BGW, BRG, CLY, SNP), LI(BIS), LI(SEWBReC)	1	July 2013
Flora				
Broadleaf Grimmia	Schistidium platyphyllum	RD2 (UK), LI(VC35, LS), LI(VC41, LR), LI(VC42, LR), LI(VC43, LR), LI(VC47, LR)	2	Sept 2011
Climbing Corydalis	Ceratocapnos claviculata	LI(SEWBReC), LI(VC47)	1	June 2013
Heath Spotted-orchid	Dactylorhiza maculata	LBAP (CLY, RCT, TRA), LI(VC47), LI(VC50, LS)	1	May 2011
Small Cudweed	Filago minima	RD1 (UK), LBAP (BRG, CON, DEN), LI (VC43), LI(SEWBReC), LI(VC47), LI(VC48, LR), LI(VC49, LS), LI(VC50, LR), LI(VC51, LR), LI(VC52, LS)	1	Sept 2011
Smooth Lady's-mantle	Alchemilla glabra	LBAP (BGW), LI(SEWBReC), LI(VC47)	1	May 2015
Southern Polypody	Polypodium cambricum	LBAP (ANG, CON, FLI, GWY, PEM), LI (VC43), LI(SEWBReC), LI(VC47), LI(VC48, LR), LI(VC49, LS), LI(VC50, LS), LI(VC51, LR), LI(VC52, LS)	1	April 2015

Areas 1-3 Invasive Non-Native Species (Within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Birds				
Ring-necked Parakeet	*Psittacula krameri*	WCA9, CITES, INNS	1	Oct 2015
Invertebrates				
Harlequin Ladybird	*Harmonia axyridis*	INNS	2	Nov 2015
Plants				
Indian Balsam	*Impatiens glandulifera*	WCA9, INNS	10	April 2017
Japanese Knotweed	*Fallopia japonica*	WCA9, INNS	9	June 2017
Montbretia	*Crocosmia pottsii x aurea*	WCA9, INNS	1	June 2016

Area 4 Invasive Non-Native Species (Within 2 km)				
Common Name	**Scientific Name**	**Legislation / Conservation Status**	**Number of Records**	**Most Recent Record**
Cherry Laurel	Prunus laurocerasus	INNS	1	May 2015
Indian Balsam	Impatiens glandulifera	WCA9, INNS	9	Oct 2017
Japanese Knotweed	Fallopia japonica	WCA9, INNS	6	May 2015
Montbretia	Crocosmia pottsii x aurea	WCA9, INNS	2	May 2015

Appendix B Legislation

Legislation and Conservation Designations

European Protected Species

European Protected Species are those species listed on Schedule 2 of The Conservation of Habitats and Species Regulations 2017. The list includes all species of bats, dormouse, great crested newt and otter. The species listed on Schedule 2 are afforded protection against:

- deliberate capture, injury or killing;
- deliberate disturbance;
- deliberate taking or destruction of the eggs;
- damage or destruction of a breeding site or resting place of such an animal.

Where a European protected species is present, a development may only proceed, under a licence issued by Natural England.

Birds Directive Annex 1

Annex 1 of the Birds Directive lists species and sub-species which are:

- in danger of extinction;
- vulnerable to specific changes in their habitat;
- considered rare because of small populations or restricted local distribution;
- requiring particular attention for reasons of the specific nature of habitat.

For these species Member States must conserve their most suitable territories in number and size as Special Protection Areas (SPAs). Species listed on Annex 1 of the Birds Directive include kingfisher and red kite.

Wildlife and Countryside Act 1981 (as amended)

Schedule 1

All naturally occurring British bird species are protected under the Wildlife and Countryside Act 1981 (as amended). The legislation protects all birds, their nests and eggs and it is an offence to:

- intentionally kill, injure and take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- intentionally take or destroy the egg of any wild bird.

Birds listed on Schedule 1 of the above legislation (e.g. kingfisher and red kite) are afforded further protection and it is an offence to:

- intentionally or recklessly disturb the bird while nest building or while at (or near) a nest with eggs or young; or
- disturb the dependent young of such a bird.

Schedule 5

Section 9 of the Wildlife and Countryside Act 1981 (as amended) offers varying degrees of protection to species including otter, bats, dormice, amphibians and reptiles. Animals listed on Schedule 5 of the Act are protected against one or more of the following:

- intentional killing, injuring or taking (not applicable to bats);
- intentional or reckless damage or destruction, or obstruction of access to any structure or place which any wild animal included in Schedule 5 uses for shelter or protection;
- disturbance of any such animal while it is occupying a structure or place which it uses for that purpose;
- sell, offer or exposes for sale, or has in his possession or transports for the purpose of sale, any live or dead wild animal included in schedule 5, or any part of, or anything derived from such an animal

Schedule 8

Plant species listed on Schedule 8 are protected under Section 13 of the Wildlife and Countryside Act 1981 (as amended). Section 13 protects plants from:

- intentional picking, uprooting or destruction;
- selling, offering for sale, possessing or transporting for the purpose of sale (live or dead, part or derivative);
- advertising (any of these) for buying or selling.

Schedule 9

Section 14 of the Wildlife and Countryside Act 1981 (as amended) makes it an offence to “plant or otherwise cause to grow in the wild any plant which is included in Part II of Schedule 9”.

Protection of Badgers Act 1992

Badgers and their setts are protected under the Protection of Badgers Act 1992; the Act makes it an offence to:

- Kill, injure, take or attempt to kill, injure or take a badger; or
- Intentionally or recklessly damage, destroy or obstruct access to a badger sett, or disturb a Badger whilst it is occupying a sett.

Any works within 30m of badger setts can only be carried out under a licence issued by Natural England.

Environment (Wales) Act 2016

Section 7 of the Environment (Wales) Act has replaced the Section 42 of the NERC Act 2006 in Wales. Section 7 lists the living organisms and types of habitat in Wales which are considered to be of key significance to sustain and improve biodiversity in relation to Wales.

The Act states that Welsh Ministers must take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and encourage others to take such steps.

UK BAP

UK BAP priority species are those that have been identified as being the most threatened and requiring conservation action. This includes (but is not limited to) species such as common toad, otter, great crested newt, slow worm, common lizard, brown long-eared bat, noctule and soprano pipistrelle.

Red and Amber Lists

Red-listed bird species are those which:

- Are globally threatened;
- Have suffered a historical population decline in the UK during 1800–1995;
- Have suffered a severe (at least 50%) decline in the UK breeding population over the last 25 years, or longer-term period (the entire period used for assessments since the first review, starting in 1969);
- Have suffered a severe (at least 50%) contraction of the UK breeding range over the last 25 years, or the longer-term period;

Amber-listed bird species are those which:

- Have unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern)
- Have suffered a historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years
- Have suffered a moderate (25-49%) decline in the UK breeding population over the last 25 years, or the longer-term period
- Have suffered a moderate (25-49%) contraction of the UK breeding range over last 25 years, or the longer-term period
- Have suffered a moderate (25-49%) decline in the UK non-breeding population over last 25 years, or the longer-term period
- Are rare breeders; 1–300 breeding pairs in UK
- Are rare non-breeders; less than 900 individuals
- Are localised; at least 50% of the UK breeding or non-breeding population in 10 or fewer sites, but not applied to rare breeders or non-breeders

- Are internationally important; at least 20% of European breeding or non-breeding population in UK (NW European and East Atlantic Flyway populations used for non-breeding wildfowl and waders respectively)

Nationally Scarce

These are species occurring in 16-100 hectads in Great Britain.

Invasive Non-Native Species

Any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live.

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2.21 Environmental Business Case

REDSTART

COED ELY BUSINESS CASE:

ENVIRONMENTAL BUSINESS CASE

JULY 2018

REDSTART

Project No: CS/092493 Doc Ref: CS/092493 Rev:

CLIENT: Rhondda Cynon Taf County Borough Council
ISSUE DATE: July 2018

Coed Ely Business Case:
Environmental Business Case

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Contents

Appendices

1. Options

The recommendations for Stage 2 align with the suggestions from REDSTART, which are:

A. Dualling of the A4119 with associated roundabout improvements (Option 1);

B. Dualling of the A4119 with associated roundabout improvements, plus an adjacent Active Travel route, (Option 1 and Option 11);

C. Dualling of the A4119 with associated roundabout improvements, plus an adjacent Active Travel route, a Park & Ride/Park & Share facility within the SSA 14.1 development site, plus Park & Ride expansion north of the study area (Option 1, Option 2, Option 11, and Option 15);

D. Do Minimum (Option 22).

It is clear that the dualling of the A4119 (Option 1) addresses the greatest number of objectives and as such forms the basis of all suggestions, apart from D (Do Minimum) and is recommendation A. However, the dualling does not adequately address objectives regarding Active Travel and public transport. Recommendation B includes Active Travel (Option 11), and Recommendation C includes Active Travel as well as additional Park & Ride/Share provision (Options 2 and 15).

Following the completion of the Strategic Outline Case report (WelTAG Stage 1), RCT requested that consideration be given to an alternative A4119 dualling option. This option differs from Option 1 in the long list inasmuch as it involves the removal of the roundabout that gives access to the South Wales Fire & Rescue Service headquarters. The new access will be via the roundabout that serves the Royal Glamorgan Hospital from the north, and Sterling Drive. The alternative dualling option has been referenced Option 1A. The following descriptions are based on the dualling Option 1A rather than the original dualling Option 1.

1.1 Dualling of the A4119 with associated roundabout improvements (Part of standalone Option A, and part of Options B and C)

This will extend the dualled section of the A4119 further north to Coed Ely Roundabout. As well as requiring alterations to this and the South Wales Fire & Rescue Service headquarters roundabout, it will require the widening of the existing highway corridor to provide the additional lanes plus a central reserve. This will be achieved through widening to the northern and southern sides of the road and it is likely that this will require the acquisition of land outside the highway boundary. Alterations will be required to all the accesses that border the road on each side. To the north, this includes a Welsh Water/Dyr Cymru treatment works access, a private access, and field accesses. To the south, this includes a Welsh Water/Dyr Cymru sewage works access and a common access serving miscellaneous vehicle-related businesses.

Although the standalone Option 1A does not include any Active Travel facilities, Options B and C do in the form of a shared use path on the western/southern side of the dual carriageway. The existing northbound and southbound bus stops, which are located at the approximate mid-point between the roundabouts, will be removed. This is partly due to their current lack of use but also due to the avoidance of the need to provide bus bays and a safe means of crossing the dual

carriageway to reach the opposite stops. Inclusion of these features would impact on the design of the proposal and raise safety issues.

1.1.1 Environmental Comments

It is likely that there will be reduced congestion with this option. This leads to a potential for improving localised air quality during peak periods.

There are no cultural heritage assets within the immediate vicinity of the site. Two listed buildings occur within 500 metres:

- Grade II listed explosives store of former Llantrisant Colliery, 320 metres south of the proposed scheme;
- Grade II listed Cow shed at Ynysmaerdy Farm (formerly stores of Llantrisant Colliery), 420 metres south of proposed scheme.

This option is not anticipated to have an effect on cultural heritage due to distance and intervening vegetation.

This option is not expected to amend the landscape character significantly. The proposed scheme is located within a steep river valley, with the River Ely flowing parallel to the west of the A4119. Direct landscape impacts will include the loss of vegetation within the footprint of the proposed scheme as well as the imposition of a wider road.

Significant visual impacts are similarly, not anticipated.

1.2 Dualling of the A4119 with removal of at-grade roundabout at the South Wales Fire & Rescue Centre headquarters (Part of standalone Option A, and part of Options B and C)

The roundabout on the A4119 north of Talbot Green serves the South Wales Fire & Rescue Service headquarters is considered unnecessary. Removal would improve the flow of north/south traffic on the A4119. Access could then be via Sterling Avenue to the north east. Horizontal alignment standards will have to be maintained.

1.2.1 Environmental Comments

The removal of the roundabout is likely to improve air quality by allowing traffic to flow more freely reducing queuing and idling at the roundabout, with a consequent beneficial impact on climate change through a reduction in greenhouse gas emissions.

The roundabout is approximately 300 metres south of the Rhos Tonyrefail SSSI and its removal will not directly affect the SSSI or its interests. Further ecology issues are reported separately.

There are no Scheduled Ancient Monuments within the vicinity of the roundabout. A number of listed buildings lie south of the roundabout, the closest being the Grade II listed explosives store of the former Llantrisant Colliery, approximately 330 metres south. There will be no impact on these buildings from the removal of the roundabout.

The Llantrisant Conservation Area lies approximately 1.4 kilometres south of the roundabout, but no impacts are anticipated on the character or setting of the area.

There would be no significant landscape or visual impacts associated with the removal of the roundabout.

Construction works associated with the removal of the roundabout are likely to take place partially within the C2 flood zone, but no significant impacts are anticipated from the proposal.

1.3 Active Travel Route adjacent to dualling of the A4119 (part of Options B and C)

An Active Travel route, which will complement the facility that follows the disused railway line north from Ynysmaerdy, is proposed adjacent to the A4119. As well as running alongside the proposed dualled section (as outlined in 1.1), it will extend eastwards and southwards with the ability to link up to the existing route in Ynysmaerdy.

The provision of a shared use Active Travel facility will increase the overall width of the dual carriageway improvement. At the northern end of the dualled A4119, this will link up with the existing shared use facility at Coedely Roundabout.

The route will be adjacent to the A4119 dualling where the South Wales Fire & Rescue Service headquarters roundabout will be removed. The existing footway leading to Ynysmaerdy Roundabout will be widened. As it passes around the western side of the roundabout the Active Travel route will require slight narrowing of the circulatory carriageway. Along the Royal Glamorgan Hospital access road to the junction of the road leading to Ynysmaerdy itself, the footway will also be widened to 4.5 metres with a verge.

From the Ynysmaerdy junction, the Active Travel route will link to the existing shared use route in one of two ways. It could follow the Ynysmaerdy road and then pass along Glan-Yr-Ely, followed by a path to the disused railway line, which is an indirect route. The alternative is for the route to follow the hospital access road to beyond the southern hospital roundabout at the northern end of Rhodfa Marics. This is where the existing route deviates westwards to the disused railway line. The advantage of this is its directness and the opportunity for an Active Travel route to pass through a hospital site and the promotional benefits that this could give. Although there is a vehicular barrier at the deviation point, it is possible to bypass this via the footway on the eastern side. Consultation will be required to approve this option.

1.3.1 Environmental Comments

Air quality would be anticipated to improve due to a reduced number of cars travelling along the A4119, with an increased number of people using Active Travel. This would also have a positive effect on climate change, as it would reduce the amount of greenhouse gas emissions released from use of the A4119.

There are no cultural heritage assets along the alignment of the Active Travel route, so there are no anticipated effects.

Landscape and visual amenity are not expected to be affected significantly, particularly compared to Option A. There may be some visual impacts from tree removal.

1.4 Park & Ride/Share facility within the SSA 14.1 development site (part of Option C)

The SSA 14.1 development site at Coedely covers an area of 14.32 hectares and is currently for sale. Although it is identified for B1 and B2 use, the southern end has been identified as a potential Park & Ride/Share site. It will not be possible to provide an access to such a facility directly from Coedely Roundabout due to the minor road that junctions with it on the southern side. Development of the SSA 14.1 site will be from the access road that passes along its eastern boundary and the proposed Park & Ride/Share facility access will do the same. The access lies approximately 150 metres from the roundabout.

An area of land separate from the main site, has been identified for a facility, which will accommodate 99 spaces (including for the disabled) although this may be able to be increased if demand is high. The layout includes a bus stop, a roundabout turning area, and peripheral footways.

1.4.1 Environmental Comments

This option has the potential to improve air quality, as it would reduce the number of vehicles on the A4119. This would also have a positive effect on climate change, as it would reduce the amount of greenhouse gas emissions released from use of the A4119.

There are no cultural heritage assets within the park are ride/share facility area, therefore no impacts have been identified.

Landscape and visual amenity are not expected to be affected significantly, as the area (according to satellite imagery) has already been mostly cleared. There may be some visual impacts from tree removal.

1.5 Park & Ride expansion north of the Study Area (part of Option C)

There are a number of general locations north of Coedely where another Park & Ride site could be provided. However, with the need to be easily accessible from a major road, this limits locations that have been considered. Most roundabouts either do not have sufficient space to provide an additional access and those that do, do not have a suitable adjacent site or the local topography precludes this.

With both the A4119 and the A4233 leading to the Rhondda, the identification of a site has been based on the criteria outlined above. A site adjacent to the A4233 between Trebanog and Tonyrefail offers a good location with the desired attributes although it is accessed from a conventional junction rather than a roundabout.

The site is accessed from Collenna Road close to its junction with the A4233. Here there is a level site although no ownership details are known. A Park & Ride layout similar in many respects to the one proposed as part of Option C is proposed. This will accommodate 99 spaces, including those for the disabled, as well as a bus stop, a roundabout turning area, and peripheral footways.

1.5.1 Environmental Comments

This would likely improve air quality, however potentially less than the Park & Ride/Share option at Coedely, as this location is likely to mean that people south of Tonyrefail will not use the facility if they are travelling south.

The site is adjacent to the Rhondda Registered Historic Landscape. This landscape represents one of the largest and best-known mining conurbations and coalfield communities in Britain. According to the Glamorgan-Gwent Archaeological Trust (GGAT), the area is actively under threat from a wide variety of agencies, both public and private, in particular from landscape improvement, reclamation and urban renewal schemes. Therefore, there is potential that the park and ride will have an adverse effect on this historic landscape.

There are no scheduled monuments or listed buildings within the vicinity of the park and ride.

There may be some landscape impacts, as the site is rural in character. However, effects are not anticipated to be significant.

The site is very close to Rhos Tonyrefail SSSI – covered separately in the Ecology Appraisal report.

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2.22 Geotechnical Reports on Elements of Packaged Options (A to D)

A4119 Main line for WelTAG Assessment

Historical use of the site

1876- The proposed development area was occupied by a number of agricultural fields at this time. A watercourse crossed the route at around Chainages 225m, 550m, 950m and 1200m. A single line railway (Llantrisant Common Branch) crosses the site at Ch. 100m in a small cutting. The River Ely was present alongside the area of the proposed development.

1919/1920- A road was constructed along the majority of the area. At around Ch.1250 the road bends away from the current alignment. A sewage works was built on the north east side of the development area around Ch. 425m.

1940 - A new road was constructed, indicated to be the A4119, slightly to the north of the current road alignment.

1961 - The railway line previously located at Ch. 100 is now dismantled.

1972 – Little change. A new sludge bed was constructed on the west side of the road at Ch. 425m. A pumping station was present on the east side of the road at Ch. 300m.

1981 - The existing roundabout at Ch.1300m was constructed. Little change to other areas.

1988 - The railway is no longer shown to the west of the site.

1993 – Little change on line. A large sewage works was constructed on the western side of the proposed development. A scrap yard was shown on the west side around Ch. 225m. The number of buildings at Dyffryn Isaf was reduced.

1996 – little change.

2000 - The existing roundabout at Ch.1300m was constructed. The reminder of the site has changed very little. The sewage works on the east side of the site area is no longer present, the area is now a grassed field.

2006 and 2018 – Little change to the site.

Geology

Superficial deposits – indicated as being predominantly glaciofluval deposits. An area of Alluvium is indicated to be present at the very southern end of the proposed development. Made Ground may be present, associated with the existing embankments and road pavement.

Bedrock - The Brithdir Formation, part of the Pennant Sandstone Formation. (Formerly Upper Coal Measures).

The site is located to the south of an east west orientated regional fault, the Ty'n y Nant Fault. Fault is downthrown to the south some 90m. Bedrock dips to the north by 15-18 degrees.

Hydrogeology

Superficial material - Minor aquifer with high soil class, now redefined as a secondary A aquifer.

Bedrock – Secondary Aquifer – 'A'.

Not within a source protection zone.

Limited potential for groundwater flooding to occur.

The Envirocheck report indicates one discharge consents has historically been granted within the site boundaries, this related to trade effluent discharge from the Royal Mint to the River Ely close to the current roundabout at the southern end of the site.

The Envirocheck report contains records of seventeen pollution incidents within 500m of the site. majority of the incidents were located towards the southern end of the site.

Geological Hazards

Potential Hazard	Hazard Potential
Mining Instability	Inconclusive
Collapsible Ground	No Hazard & Very Low
Compressible Ground	No Hazard & Moderate
Ground Dissolution	No Hazard
Landslide Low	Running Sand Low
Shrinking and Swelling	Clay No Hazard
Radon Gas	Lower probability radon area. No radon protective measures are necessary in the construction of new dwellings or extensions

Coal Mining

The Coal Authority report indicates that one seams of coal has been extracted under the site between 310m and 390m depth. These are indicated to have last been worked in 1930 and that any surface movements due to coal mining activity should have ceased.

In addition the property is in an area where the Coal Authority believe that there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity.

Other

Three historical landfill sites are located within 1000m of the site. The closest is sited 400m north west of the site. Records indicate waste from the Coed Ely Coke Works was deposited within this tip including coal tar, hard core and rubble, inert wastes, sludge waste and spent iron oxide.

One site license for waste management facilities have been granted on site at the site of the current automotive scrap yard, adjacent to the proposed road.

Access road for Fire service and footway/cyclepath for A4119 works- Site summary for WelTAG assessment

Historical use of the site

1876 –A railway line at its northern end of the location of the proposed access road. A stream runs south along the line of the proposed access road. The area of proposed additional improvement between the two roundabout cuts through a farm, Ynys y Allan. The proposed cycleway to the south passes through farmland adjacent to the River Ely. An embankment has been constructed to the south of the site (possible tramway). A river ford is located to the south of where the current eastern roundabout is located.

1899-1900 – little change from previous.

1919-1920 – little change from previous plan.

1940 – The A4119 and Heol y Sarn has been constructed and loops a little further south than the current configuration. A triple road junction is noted where the eastern most roundabout is located. A sewage works is present to the south/west of the site, between the River Ely and Ynysmaerdy Terrace.

1961 – Both the railway line to the north of the proposed access road to the Fire service headquarters, and the tramway to the south of the site have been dismantled. A bridge has been constructed in the former position of the ford.

1972 - A large "Filter Factory" has been constructed to the east of the eastern roundabout, and an "Analytical Instruments Factory" has been constructed to the east of the proposed location of the access road. Road improvements has been carried out along Heol y Sarn. A small pumping station has been built adjacent to proposed. A tank is still present at the sewage works located between the River Ely and Ynysmaerdy Terrace but the site is no longer referred to as sewage works.

1973 - little change from previous.

1981 - Little change from previous.

1988 - Approximately seven small buildings are indicated next to Ynys y Allan. Little change from previous plan. Small roundabout constructed where Ely Valley Road and Heol y Sarn converge.

1990 – Little change from previous.

1993 – Little change to the proposed site areas from previous.

1994 - Little change from previous plan.

1996 – Yns y Allan Farmhouse and buildings are no longer present. The small roundabout has been increased in size.

2000 – A second roundabout has been constructed to the west of the existing roundabout, allowing access into the new industrial units. These units have built on the former Ynys y Allan farmland. They includes South Wales Fire and Rescue Service Headquarters and Finning Ltd (part of the CAT group). An access road has been constructed between Finnings Ltd and the "Analytical Instruments Factory" (Now Voltcom) called Sterling Drive.

Geology

Access road (extension of Sterling Drive)

Superficial deposits – Site underlain by glaciofluvial materials (sands and gravels). Made Ground may cover the site.

Bedrock - The Brithdir Formation, part of the Pennant Sandstone Formation. (Formerly Upper Coal Measures).

Extension of the A4119 (between two roundabouts)

Superficial deposits - Alluvial deposits (clays, silts, sands, gravels) are indicated along this section of the A4119. Made Ground may cover the site.

Bedrock - The Brithdir Formation, part of the Pennant Sandstone Formation. (Formerly Upper Coal Measures).

Cyclepath to south of A4119

Superficial deposits – Alluvium and River Terrace Gravels. Although not indicated on the geological plan, Made Ground may cover the site.

Bedrock - The Brithdir Formation, part of the Pennant Sandstone Formation. (Formerly Upper Coal Measures).

Structural Geology

A North south trending fault is located some 200m west of these locations. Bedrock dips to the north by 15-18 degrees.

No landslips are indicated on the geological maps covering this area.

Hydrogeology and hydrology

Groundwater vulnerability – Across the majority of the area the bedrock is a minor aquifer with soils of a high leaching potential. The northern end of the access road is designated as a minor aquifer with soils of low leaching potential.

Bedrock Aquifer Designation – Secondary A Aquifer.

Superficial Aquifer Designation – Secondary A Aquifer.

Not within a Groundwater Source Protection Zone.

BGS Flood GFS Data – Limited potential for groundwater flooding to occur.

Two Substantiated Pollution Incidents. Both incidents located at River Ely adjacent to the eastern end of the site.

- Natural Resources Wales, 5th August 2004. Incident No 256468 , WATER IMPACT - Category 1 - Major Incident, AIR IMPACT - Category 4 - No Impact, LAND IMPACT - Category 4 - No Impact. Pollutant Not Identified.
- Natural Resources Wales, 24th June 2001, Incident No. 11115, WATER -Category 1 - Major Incident, AIR IMPACT - Category 4 - No Impact, LAND IMPACT - Category 4 - No Impact. Pollutant = Crude Sewage.

Two revoked discharge consents into the River Ely were previously granted to the Royal Mint. These were revoked in 1998 and 2006.

A sewage pumping station is located to the east of this area.

Geological Hazards

Potential Hazard	Hazard Potential
Mining Instability	Inconclusive coal and metalliferous mining
Collapsible Ground	No hazard to Very low
Compressible Ground	No hazard to moderate
Ground Dissolution	No hazard
Landslide Low	Very low to low
Running sand	Very low to low
Shrinking and Swelling	No hazard to very low
Radon Gas	The property is in a Lower probability radon area. No radon protective measures are necessary in the construction of new dwellings or extensions

Coal Mining

Coal Authority Report indicates:

- The property is in a surface area that could be affected by underground mining in 1 seam of coal at 310m to 390m depth, and last worked in 1930.
- Any movement in the ground due to coal mining activity should have stopped. In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past
- There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
- The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

A Mining risk assessment report is recommend if the site is to be developed.

Other

Sites of Special Scientific Interest located to the east (600m away) and north (50m from end of access road) of the site. These are Rhos Tonyrefail, and Llantrisant Common and Pastures both designated due to biological features.

Small clusters of ancient woodland are located some 200m to 400m west of the roundabout leading to the Fire Service Headquarters.

Potentially infilled Ground (Pond, marsh, river, stream, dock etc) on 1921 plan adjacent to the roundabout at the eastern end of this site.

A sewage pumping station is located to the east of this area

Registered Radioactive substances are held within Perkinelmer Ltd at Llantrisant Business Park, to the east of the site.

Park and Share North of Coed Ely Northern Roundabout- Site summary for WelTAG assessment

Historical use of the site
1876 – access into proposed site across a railway line. Main car park area within a wooded area. The River Ely noted some 25m to the NE of the proposed car park location. Trial level located 100m west of the site. 1899 – wooded area no longer appears to be present, now trees with rough grassland. Old Coal level noted 100m west of the proposed car park. Railway line and River Ely are unchanged. Small stream appears to cross the northern part of the site. 1920 – Streams cross the site towards the north part and south western part of the site. Both flow into the River Ely. No further change on site from previous. 1953 – Little change on site from previous. 1960/61 – Issues now noted where the stream to the north of the proposed car park emerges from the ground. Little change on site from previous. 1965 – Little change on site from previous. 1974/75 – A railway siding is present cutting the site in an ESE – NWN direction. Railway sidings likely to have come from Coed Ely Colliery to the NW of the site. Little change on site from previous. 1993 –Both the sidings and the railway line to the north of car park area are no longer present, a footpath is indicated along the railway line. A roundabout has been constructed as part of the A4119. The stream that crossed the northern side of the proposed parking site is no longer indicated. 1999 – Little change on site. Overhead power cables are noted to the south east of the site. A number of roads now join onto the roundabout to the north of the site 2006 - A plateau area is indicated to the NW of the site. The stream that crossed the SW corner of the site is no longer indicated. Drainage is shown as passing around the southern boundary.
Geology
Superficial deposits – Site underlain by glaciofluvial materials (sands and gravels). Alluvial deposits are indicated to the north of the proposed car park adjacent to the River Ely. Made Ground may cover the site, which may have occurred as part of the Coed Ely Reclaimation Works. Bedrock - The Brithdir Formation, part of the Pennant Sandstone Formation. (Formerly Upper Coal Measures). The Ty'n y Nant Fault is indicated just to the north of the roundabout. This is an east west orientated regional fault, downthrown to the south some 90m. Bedrock dips to the north by 15-18 degrees. No landslips are indicated on the geological maps of the area.
Hydrogeology and hydrology
Groundwater vulnerability – Bedrock is a major aquifer with a low soil class. Bedrock Aquifer Designation – Secondary A Aquifer. Superficial Aquifer Designation – Secondary A Aquifer. Not within a Groundwater Source Protection Zone. BGS Flood GFS Data – Limited potential for groundwater flooding to occur Surface water abstraction from the River Ely licenced to Edmund Nuttall Limited in 22nd August 2000. Ref No. 21/57/31/0063 – end date not supplied. Discharge consents have been granted to Rhondda Cynon Taf County Council associated with the Land Reclamation Scheme, Former Coedely Colliery Pt. 2, Rhondda Cynon Taff between 1994 and 2000. The National Assembly for Wales were granted a discharge consent for a Sewage Discharges - Pumping Station - Not Water Company into the River Ely in 2006.

Geological Hazards

Potential Hazard	Hazard Potential
Mining Instability	Inconclusive coal mining
Collapsible Ground	No hazard to Very low
Compressible Ground	No hazard to moderate
Ground Dissolution	No hazard
Landslide Low	Very low to low
Running sand	No hazard to low
Shrinking and Swelling	No hazard to very low
Radon Gas	The property is in a Lower probability radon area. No radon protective measures are necessary in the construction of new dwellings or extensions

Coal Mining

Coal Authority Report indicates:

- The property is in a surface area that could be affected by underground mining in 1 seam of coal at 310m to 390m depth, and last worked in 1930.
- Any movement in the ground due to coal mining activity should have stopped. In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past
- There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
- The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

A Mining risk assessment report is recommend if the site is to be developed.

Other

Ancient woodland located to the south, east and north of the site.

Potentially Infilled Land (Non-Water) to the west of the site – likely to have been associated with the Coed Ely Reclamation Scheme.

Unknown Filled Ground (Pond, marsh, river, stream, dock etc) some 40m NE of the site – as indicated on 1965 map.

Tonyrefail North Car Park - Site summary for WelTAG assessment

Historical use of the site

1875 –rough grassland on site, possible old spoil heap. A small stream cuts the SE corner of the site from issues to the NE. Old Shaft and quarry located adjacent to site. Old shaft located some 100m to the SW. Old levels located some 150m to the west.
1899 – footpath crosses site in NE corner. Little change to site. Three air shafts indicated some 70m to 120m to the west .
1919 – Little change to site. Old quarry and shafts no longer indicated.
1921 – Little change to the site.
1947 – Little change to the site.
1953 – little change to the site.
1963 – footpath now located to the north of the site. Little change to the site.
1974 – little change to the site.
1988 – Little change to the site.
1993 – New road (A4233) indicated some 30m to the west of the site. Little change to the site.
1999 – No change to the site.
2006 – No change to the site.
2018 – No change to the site.

Geology

No superficial deposits, underlain by rocks from the Llynfi Member, part of the Pennant Sandstone Formation, Upper Coal Measures.

Site located between two north west to south east faults.

Hydrogeology and hydrology

Groundwater vulnerability – bedrock is a Minor aquifer covered with a high soil class.
Bedrock aquifer designation - Secondary A aquifer.
No Superficial deposits present therefore no Superficial Aquifer Designation.

Not within a source protection zone.

BGS Flood GFS Data - Limited potential for groundwater flooding to occur.

Geological Hazards

Potential Hazard	Hazard Potential
Mining Instability	Inconclusive Coal Mining – Coal Mining Risk assessment required
Collapsible Ground	No hazard to very low
Compressible Ground	No hazard to high
Ground Dissolution	No hazard
Landslide Low	Very low to moderate
Running sand	No hazard to very low
Shrinking and Swelling	No hazard to very low
Radon Gas	Lower to intermediate probability radon area. Basic radon protective measures are necessary in the construction of new dwellings or extensions

Coal Mining

BGS recorded mineral site located adjacent to the southern boundary – Cottage Bach Opencast site, for Sandstone. A further recorded site is located some 130m south west of the site – Cottage Bach Underground site for coal. A number of collieries are located in the surrounding area greater than 250m away. These include Cil Ely, Cottage Bach, and Collena Colleries.

Coal Authority report states:

- The property is not in an area likely to be affected from any planned future underground coal mining. However, reserves of coal exist in the local area which could be worked at some time in the future.
- The property is in a surface area that could be affected by underground mining in 9 seams of coal at 60m to 450m depth, and last worked in 1950. Any movement in the ground due to coal mining activity should have stopped.
- Within, or within 20 metres of the boundary of the property there is 1 mine entry, the approximate position of which is shown on the enquiry boundary plot. There is no record of what steps, if any, have been taken to treat the mine entry. There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

Other

A biological SSSI, Rhos Tonyrefail, located to the east and south of the site.

Potentially infilled ground located near to the south west corner of the site (old Quarries). A large area of potentially infilled ground some 200m to the west of the site.

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