South Wales Trunk Road Agent

Managing and Improving Motorways and Trunk Roads through South Wales

Asiant Cefnffyrdd De Cymru

Rheoli a Gwella'r Traffyrdd a'r Cefnffyrdd yn Ne Cymru

M4 Junction 48 and A4138

WelTAG Appraisal (Stage 3) – The Transport Case

Yn gweithio ar ran Llywodraeth Cymru
Working on behalf of the Welsh Government

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M4 Junction 48 and A4138

WelTAG Appraisal (Stage 3) – The Transport Case

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Contents

1 Introduction

1.1 Introduction

The Welsh Governments (WG) South Wales Trunk Road Agent (SWTRA) has commissioned Atkins to undertake the M4 Junction 48 (J48) and A4138 Pontarddulais Road WelTAG Appraisal. This report presents outputs from the WelTAG (2017) Stage 3 Appraisal.

The A4138 is recognised as a key transport corridor within South West Wales; connecting Pontarddulais with Llanelli via J48 of the M4. The section of the A4138 known as Pontarddulais Road is c.1km in length and extends from M4 J48 to the A4138 / Pontarddulais Road (B4297) Traffic Signals at Talyclun. During peak periods both the A4138 Pontarddulais Road and J48 of the M4 experience significant congestion. These daily congestion problems are concerns for both Carmarthenshire County Council (CCC) as the local highway authority and WG / SWTRA as the strategic highway authority.

This report includes a further four chapters and is structured as follows:

- Chapter 2 – WelTAG 2017;
- Chapter 3 – Stage 1 and 2 Appraisal Overview;
- Chapter 4 – Stage 3 Appraisal;
- Chapter 5 – Summary and Conclusions.

2 WelTAG 2017

2.1 Overview

The Welsh Transport Appraisal Guidance (WelTAG) was produced by the Welsh Government for use in the development, appraisal and evaluation of any proposed transport intervention.

This section of the report provides details of the WelTAG process and its purpose as outlined the Welsh Governments 'WelTAG 2017: Welsh Transport Appraisal Guidance' Report.

The WelTAG process is designed to provide a framework for structuring the thinking around the problem being tackled; identifying possible solutions, refining the design of those options so as to maximise their benefits and minimise any adverse impacts and to consider the wide range of possible consequences of implementing proposed solutions.

The WelTAG process must be applied to all transport projects funded in part or in full by the Welsh Government. The level of detail provided for a WelTAG appraisal should be proportionate to the impacts under consideration but sufficiently accurate for decision to be made.

2.2 WelTAG Process

WelTAG is based on the ROAMEF (Rationale, Objectives, Appraisal, Monitoring Evaluation, Feedback) cycle shown in **Figure 2-1**; covering the whole of a project life cycle.

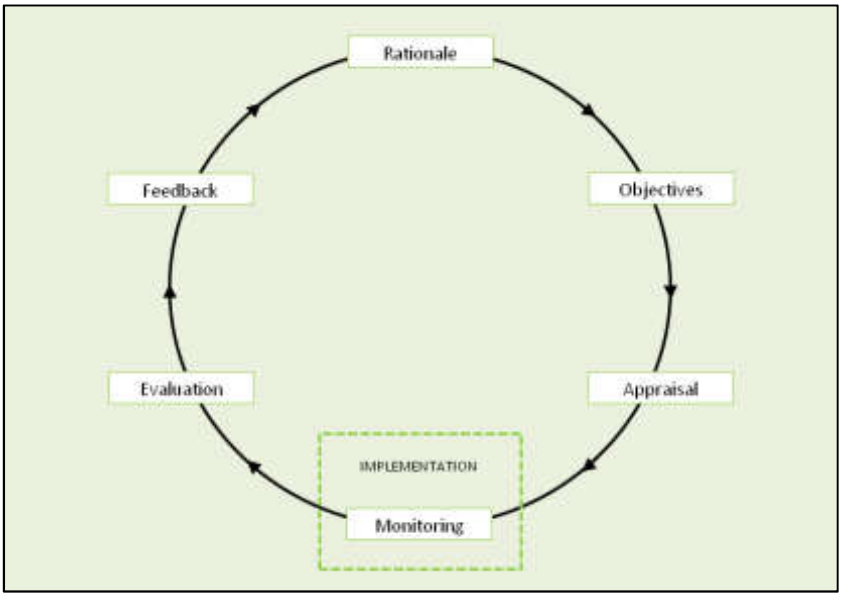

Figure 2-1 *ROAMEF Cycle (HM Treasury – The Green Book: Appraisal and Evaluation in Central Government)*

The ROAMEF cycle starts with a statement of the rationale for the project. This identifies the need for an intervention in the transport system and the development of a set of clear objectives. The appraisal stage considers the social and cultural, environmental and economic impacts of the scheme and provides an assessment of how well the project alternatives achieve these objectives. This stage guides the development of those alternatives and the selection of the final scheme chosen for implementation. The monitoring phase covers the tracking of the performance of the project during and after implementation and the evaluation phase uses this information to consider what is working and why. Feedback is vital; it may lead to modifications of the current project and provides lessons for the development of future schemes.

2.3 WelTAG Stages

There are five WelTAG stages as shown in **Figure 2-2**. Stage 1 to 3 lead to the selection of the proposed intervention whilst the final two stages cover implementation and post implementation respectively.

This report presents outputs from the M4 J48 and A4138 Pontarddulais Road WelTAG (2017) Stage 3 Appraisal.

Stage One: Strategic Outline Case

Task: Understand the problem and develop a long list of possible solutions

Action: Select short list of options

Stage Two: Outline Business Case

Task: Further investigation of the shortlisted options

Action: Select preferred option

Stage Three: Full Business Case

Task: Detailed and thorough appraisal of preferred option

Action: Proceed with preferred option or revisit an alternative

Stage Four: Implementation

Task: Deliver the preferred option

Action: Monitor impacts and make modifications if necessary

Stage Five: Post implementation

Task: On-going operation of the preferred option

Action: Evaluate the intervention and record lessons learnt

Figure 2-2 *WelTAG Stages*

3 M4 J48 WelTAG Combined Stage 1 and 2 Appraisal

3.1 Overview

The A4138 is recognised as a key transport corridor within South West Wales; connecting Pontarddulais with Llanelli via J48 of the M4. The section of the A4138 known as Pontarddulais Road is c.1km in length and extends from M4 J48 to the A4138 / Pontarddulais Road (B4297) Traffic Signals at Talyclun.

During peak periods both the A4138 Pontarddulais Road and the M4 J48 experience significant congestion. These daily congestion problems are concerns for both CCC as the local highway authority and the WG / SWTRA as the strategic highway authority. Consequently, Atkins have been commissioned to undertake the M4 J48 and A4138 Pontarddulais Road WelTAG Appraisal.

In December 2017 Atkins produced a WelTAG report presenting outputs from the work undertaken for the following WelTAG (2017) stages:

- Strategic Outline Case (Stage 1); and
- Outline Business Case (Stage 2) – relating only to the transport planning and engineering aspects of the options identified for further consideration.

3.2 Strategic Outline Case (Stage 1)

The purpose of the Strategic Outline Case is to understand the issue of concern, explore its context and to present a wide list of possible solutions. The Strategic Outline Case is required to facilitate a decision on:

- Whether there are any possible solutions within the transport sector that are worth pursuing; and
- To select a short list of options for more detailed consideration.

Chapter 3 of the combined Stage 1 and Stage 2 WelTAG report provides an evidence based description of the issues that needs addressing, the extent of the problem and how conditions are expected to deteriorate in the future if no action is taken. It also sets out the objectives for the scheme; against which the proposed solutions are ultimately assessed.

The extent of the existing congestion problems were investigated as part the Stage 1 appraisal. This process was informed by a combination of site visits and traffic surveys (undertaken by Tracsis).

3.2.1 Key Issues

There are several issues related to driver behaviour and to the configuration of the A4138 and M4 J48 that contribute to the congestion problems experienced. These issues include:

1. Insufficient provision for right turning traffic from the A4138 to the M4 eastbound on-slip;
2. The configuration of the A4138 from Hendy;
3. The configuration of the A4138 / M4 westbound slip road (right turn lane) priority junction; and
4. Lane discipline on the A4138 southbound (exit from the M4 J48 towards Talyclun).

Issues 3 and 4, in particular, have a significant impact on traffic exiting the M4 from the westbound off-slip at J48, with slip road queues often extending back on to the M4 mainline. This problem is a significant concern to the WG and SWTRA and as such certain minimal interventions have already been implemented comprising of:

- Implementation of yellow box junctions on the A4138 at the westbound and eastbound slip roads; and
- Implementation of Mobile VMS on the M4 westbound carriageway.

In addition to the issue outlined above, the Talyclun Signals also become congested during peak periods; with large slow-moving queues forming in both directions along the A4138. Consequently, any small disruption can severely exacerbate this queueing.

Furthermore, improvement options at M4 J48 have the opportunity to benefit pedestrians and cyclists:

- Signalisation of the westbound slip roads will provide an opportunity for safer slip road crossing for pedestrians;
- Signalisation of the westbound slip roads is expected to reduce conflict between vehicles and cyclists;
- Free flowing traffic as opposed to queuing traffic (due to increased capacity) is likely to assist on-carriageway cycling; and
- A reduction in congestion is likely to alleviate driver frustration.

3.2.2 Objectives

After considering the key issues at the M4 J48, on the A4138, and at the Talyclun Signals, the following Transport Planning Objectives (TPOs) were agreed for the proposed improvement scheme:

- **TPO1**: Improve connection from M4 to the A4138:
  i. Enhance accessibility to Llanelli;
  ii. Enhance accessibility to Hendy; and
  iii. Improve safety for all modes of transport (i.e. vehicular / non-motorised).
- **TPO2**: Improve connection from the A4138 to the M4:
  i. Enhance accessibility from Llanelli;
  ii. Enhance accessibility from Hendy; and
  iii. Improve safety for all modes of transport (i.e. vehicular / non-motorised).
- **TPO3**: Ensure slip-road queueing does not extend onto the M4 mainline:
  i. M4 westbound off-slip; and
  ii. M4 eastbound off-slip.
    - Unexpected queuing on the M4 mainline resulting from slow moving traffic on the slip roads could result in sudden lane changes occurring which in turn may cause following vehicles to have to take evasive action, particularly those who are unfamiliar with this length of the motorway.
- **TPO4**: Improve peak period journey times on the A4138 from Hendy / M4 to the Talyclun signals:
  i. Actual journey times and journey time reliability;
  ii. Reduce queueing; and
  iii. Improve A4138 southbound lane discipline / merge.
- **TPO5:** Improve journey times on the A4138 from Talyclun signals and Hendy / M4:
  i. Actual journey times and journey time reliability; and
  ii. Reduce queueing.
- **TPO6:** To contribute to CCC's Active Travel (Wales) Act 2013 Goals:
  i. To contribute is CCC's 15-year vision to improve cycling and walking routes across the county; and
  ii. To contribute to the long-term ambition for Carmarthenshire to become the cycling hub of Wales.

In addition to TPO6, it is understood that a M4 corridor study (incorporating Junction 48) is currently being undertaken by Arcadis. This study will be undertaken in line with the Active Travel (Wales) Act 2013.

The improvement options for the scheme have been assessed against these focused TPO's in addition to:

- General national objectives set by the Welsh Government as set out in the Well-being of Future Generations (Wales) Act 2015; and
- General objectives for the transport system as set out in the Wales Transport Strategy (WTS).

3.2.3 Optioneering

Following confirmation of the key study area issues / constraints and development of the Scheme TPOs, the following improvement options were identified and developed.

- **Option 1, 1a & 1b**: to reduce queueing along the A4138 approaches to M4 J48;
- **Option 2 & 2a**: to reduce queueing along the M4 Westbound Off-Slip (right turn lane);
- **Option 3, 3a, 3b & 3c**: to further reduce queueing on the A4138 southbound from Hendy; and
- **Option 4, 4a, 4b & 4c**: to reduce the queueing on the M4 eastbound Off-Slip (right turn lane).

All options had the opportunity to include formalised pedestrian crossings and on-carriageway cycle lanes, but these were discounted due to:

- The requirement of an 'all red phase' and the subsequent increased delay to traffic; and
- Restricted carriageway width (and capacity) with the inclusion of on-carriageway cycle lanes.

It should also be noted that highway boundary land is required for the widening of the M4 eastbound on-slip (requiring a thin strip of land in the vicinity of the A4138).

3.2.4 Complementary Measures on CCC / SWTRA Road Network

The study area congestion problems are already a concern for both CCC as the Local Highway Authority and the WG / SWTRA as the strategic highway authority; primarily due to the impact they are having on the westbound off-slip at the M4 J48, with slip road queues often extending back on to the M4 mainline.

Improvements are therefore required to address this problem in the short term and it was recommended that the following improvements are implemented prior to any of the options considered as part of this WelTAG study.

A4138 Southbound Improvements

On the A4138 southbound (towards Llanelli) it was proposed that an extended physical separation followed by a change to the lane markings be provided. The physical separation will extend c.200m from the M4 westbound off-slip between the nearside and offside lanes on the A4138 southbound, followed by the TSRGD 1041 (Diagram 1041) lane markings to the point where vehicles will be forced to merge when the A4138 becomes a single carriageway at the top of the hill.

Westbound Off-Slip Extension and Hard Shoulder Running

The Westbound Off-Slip Extension and the proposal to allow hard shoulder running were developed to address the existing slip road queueing concerns in the short term and as a safety net in the event that the expected benefits of Option 2 and the A4138 southbound improvements are not fully achieved if / when they are implemented.

However, as a result of the GD04 risk assessment, this proposal has not been taken forward.

3.3 WelTAG Outline Business Case (Stage 2 Appraisal)

3.3.1 Overview

The purpose of the outline business case is to examine in greater detail the short list of options for tackling the problem under consideration.

The Stage 2 appraisal focused on the transport planning and engineering aspects of the proposals under consideration; with consideration given to the operational, design, social and safety elements of the proposals. Furthermore, due to the similarities between the options considered at Stage 1, all options were retained for further consideration in Stage 2.

The Outline Business Case analysis focused on the following:

- LinSig Operational Analysis,
- Safety Impacts; and
- Social Impacts.

3.3.2 Scheme Ranking

Each of the options under consideration were ranked based on the results of the operational LinSig analysis, safety impact analysis, and the social inclusion analysis.

The operational analysis was considered in relation to the total delay (PCU/hr) forecast at M4 J48 as opposed to the junction PRC (which simply reflects conditions on the most congested arm of the junction).

3.3.3 Preferred Option

The scheme ranking process indicated that **Option 2a** was the preferred option.

Drawings of the improvement options and complementary measures developed at WelTAG Stages 1 and 2 are provided in **Appendix A**.

4 M4 J48 WelTAG Stage 3 Appraisal

4.1 Introduction

The purpose of WelTAG Stage 3 is to make a full and detailed assessment of the preferred option to inform a decision as to whether or not to proceed to implementation. The appraisal focuses on the transport planning and economics, design and engineering aspects of the preferred option.

In accordance with WelTAG 2017 and the agreed study brief, this chapter of the report presents the detailed design and appraisal work undertaken for the preferred option (including outlining the complementary measure required to maximise the benefits of the proposal).

4.2 Background Context

The current issues associated with the M4 Junction 48 westbound off-slip is primarily related to significant queuing occurring during peak periods particularly the PM Peak. A full appraisal of the current issues is provided in the Stage 2/3 WelTAG report with a summary provided below:

- Queueing traffic in both M4 westbound off-slip lanes, with queuing traffic in the nearside lane (to Llanelli) extending back to the M4 mainline and vehicles utilising the hard shoulder for queuing purposes; and
- Vehicles utilising the offside lane (to Hendy) are subject to the 'goodwill' of A4138 traffic to exit the westbound off-slip. This can result in long queues forming along the westbound off-slip, at times extending back onto the M4 mainline.

A contributory factor is congestion along the A4138 which is attributable to capacity constraints and excecated by current driver behaviour. This is summarised as follows:

- During both peaks, the Talyclun Signals become congested, with large slow-moving queues forming on the southbound A4138 arm. Consequently, any small disruption can severely exacerbate queueing;
- On exiting the M4 westbound off-slip (travelling southbound) traffic feeds into the nearside lane and the A4138 traffic from Hendy feeds into the offside lane. Despite this dual lane provision, A4138 traffic (from the direction of Hendy) attempts to merge into the nearside lane as early as possible. This underutilisation of the offside lane, contributes to the formation of long queues along both the A4138 southbound carriageway and the M4 westbound off-slip.

The westbound off-slip has stacking capacity for approximately 50 Passenger Car Units (PCUs) before reaching the M4 mainline. Queue length surveys (undertaken in March 2017) on the westbound off-slip during the PM Peak (1645-1745) demonstrate the extent of the problem with the following queues recorded:

- The average queue (PCU) recorded:
  - Nearside Lane (to Llanelli) – 33 PCU; and
  - Offside Lane (to Hendy) – 31 PCU.
- The maximum queue (PCU) recorded:
  - Nearside Lane (to Llanelli) – 105 PCU; and
  - Offside Lane (to Hendy) – 57 PCU.

4.3 Preferred Option – Design Development

4.3.1 WelTAG Stage 2 – Option 2a

The preferred option retained from the Stage 2 Appraisal is presented in Appendix A and incorporates the following key elements:

- Removal of central reservation under the M4 overbridge, replaced by a right turn lane for traffic travelling from the A4138 to the M4 eastbound on-slip;
- Removal of the give way line on the eastbound on-slip, replaced by the nearside lane being a dedicated lane for Hendy traffic. All other slip road traffic would utilise the offside lane; and
- Signalisation of the M4 westbound off-slip right-turn lane and the right-turn from the A4138 southbound to the M4 westbound on-slip.

The complementary measure associated with the preferred option is as follows:

- A4138 Southbound Improvements
  - On the A4138 southbound (towards Llanelli) it is proposed that an extended physical separation followed by a change to the lane markings is provided. The physical separation will extend c.200m from the M4 westbound off-slip between the nearside and offside lanes on the A4138 southbound, followed by the TSRGD 1041 (Diagram 1041) lane markings to the point where vehicles will be forced to merge when the A4138 becomes a single carriageway at the top of the hill.

4.3.2 Stage 3 Design Review

A detailed design of the preferred option has been developed for the Stage 3 WelTAG appraisal; taking into consideration the outcomes of a design review, consultation, Road Safety Audit (RSA) and operational appraisal. As part of

this process the following amendments have been made to the proposed design:

- The initial proposal included the provision of a physical island between motorists joining the A4138 from the M4 westbound off-slip. This aspect was revised to the provision of hatched markings so as to remove the need to acquire third party land at this location. The land would have been required in order to provide the required lane width;
- Detailed design of the traffic signals has resulted in minor amendments to stop line and traffic island positions and the removal of the A4138 (northbound carriageway) advanced stop line immediately adjacent of the eastbound on-slip;
- A free flow merge was originally proposed on the westbound M4 J48 entry slip, however, a detailed review of the existing levels determined standard gradients could not be achieved without full reconstruction of this area. On the grounds of the level of disruption this would cause to the travelling public being disproportionate to the benefit, the decision was made to revert to the existing give way layout;
- The existing width of the A4138 is slightly less than the DMRB standard. Through discussions with CCC it was agreed that there was no material benefit of widening the southern section of the A4138 by less than 0.5m to achieve the required standard due to the cost and disruption that would result. An appropriate tie in location was identified as a result;
- The earthwork design along the realigned westbound entry slip road has been amended to provide a wider highway verge to improve visibility sight lines to the uncontrolled pedestrian crossing facility which links the northern footway network; and
- The Road Safety Audit (RSA) identified minor issues which are proposed to be addressed by the addition of some louvres, signal aspect amendments and additional vegetation clearance to enhance visibility. Full details of the RSA are provided in **Appendix B**.

4.3.3 Detailed Design

The latest design of the preferred option is shown in **Figure 4-1** below (and in **Appendix C**).

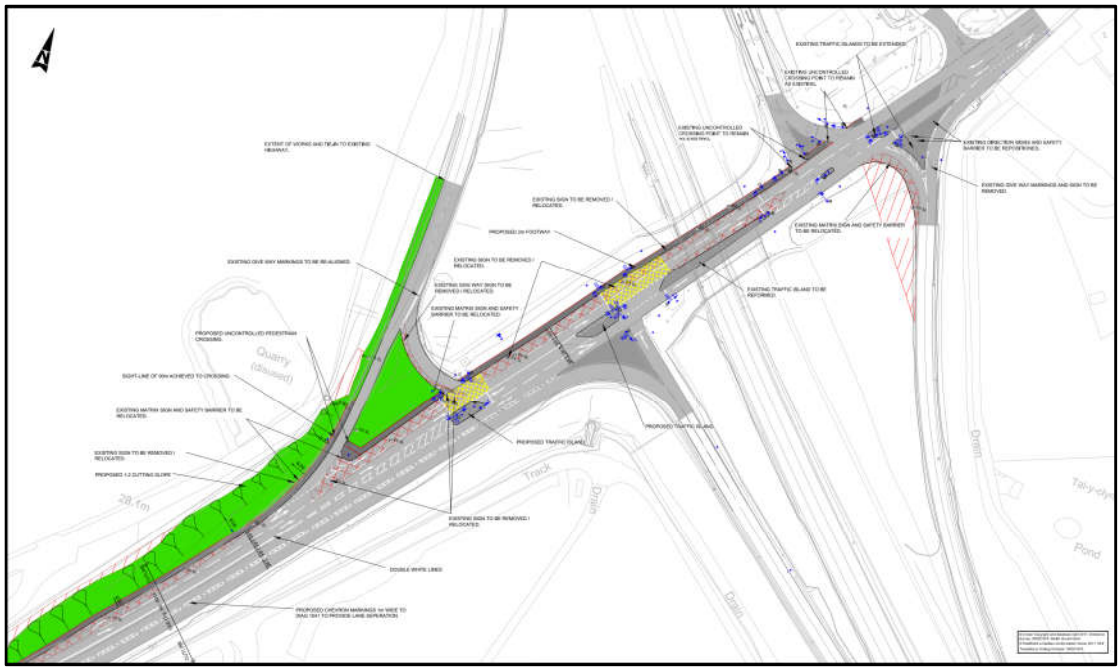

***Figure 4-1** Scheme Detailed Design*

4.4 Transport Case

4.4.1 Introduction

This section considers the Transport Case for the proposed improvements to the A4138 and M4 Junction 48 and incorporates the following:

- Operational Analysis (LinSig);
- Assessment against the Scheme Objectives; and
- Economic Appraisal.

4.4.2 Operational Analysis (LinSig)

Overview

Operational analysis of the preferred option was undertaken using LinSig. LinSig is a computer software package produced by JCT and recommended by the Department of Transport (DfT) for the assessment of traffic signal junctions. The model output shows the maximum Degree of Saturation (DoS) on any one arm of the junction and the maximum queue expressed in Passenger Car Units (PCUs). It also provides forecasts of vehicular delay and these have been utilised to determine the economic benefits of the scheme, which are discussed later in this chapter.

A signalised junction is considered to be over-saturated when one of the phases has a DoS greater than 90%. The model also outputs the Practical Reserve Capacity (PRC), which indicates the level of capacity within the junction that could be utilised before one of the links breaches the 90% DoS

threshold; a positive PRC therefore illustrates a signal junction that has spare operational capacity.

The LinSig model assumes that traffic arrives at a constant rate over the modelled period. It effectively replicates a single 'average' cycle with a single set of signal timings and a demand that is proportional to the number of cycles within the hour. In practice, observations have indicated that the traffic profile at the M4 J48 (and at the Talyclun Signals) are not constant with demand rising and falling during each peak hour, with the current signal timings differing from cycle to cycle due to the implementation of MOVA (Microprocessor Optimised Vehicle Actuation). MOVA continually adjusts the green time required on each approach, whilst understanding the overall impact on the junction, resulting in less queuing and delay.

Option 2a (once implemented on the ground) will run via MOVA, and due to the operation of MOVA not being able to be modelled accurately, the modelling results shown will therefore broadly illustrate the proposed operational benefit of the junction.

The Talyclun signalised junction is also MOVA operated, with the opportunity of the preferred option to be complemented with additional standalone improvements at the Talyclun Signals, which could be considered by CCC.

Figure 4-2 illustrates the LinSig model for the preferred option. The model effectively combines the individual models utilised during WelTAG Stage 2.

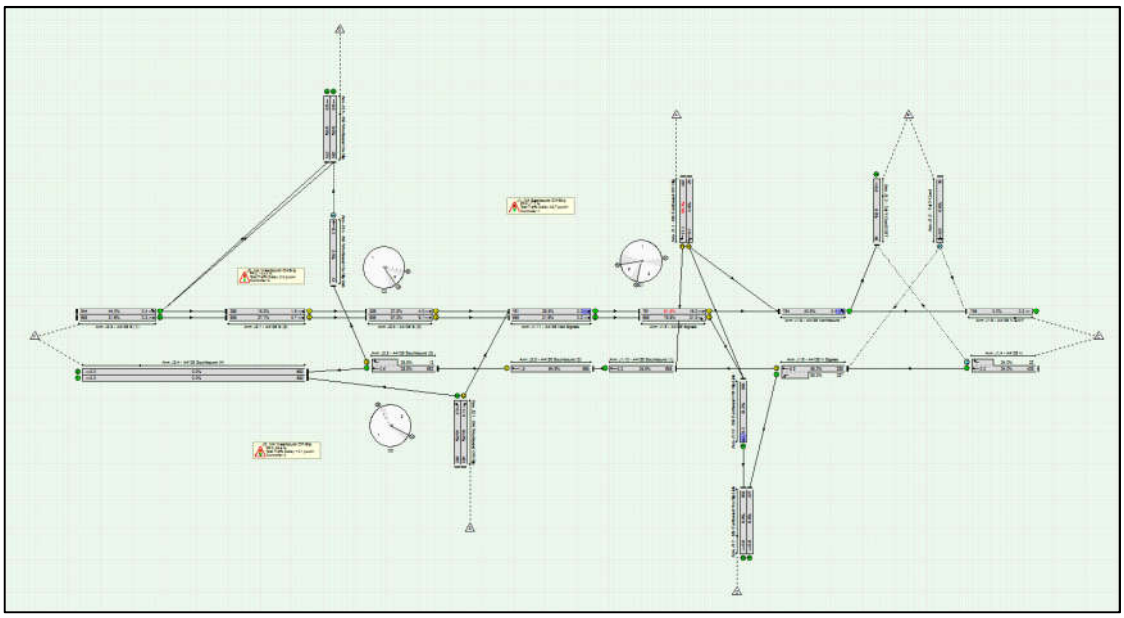

Figure 4-2 *M4 J48 LinSig Model (Option 2a)*

Base Modelling

Current Signal Timings

A model of the existing junction has been developed and has been calibrated to reflect current operational conditions (both in terms of staging and timings).

A model of the preferred option will be compared against the base model to assess the extent to which the proposed improvements will change operational conditions and ultimately address existing constraints and associated concerns.

The model was run for the following scenarios:

- Base Year 2016 AM and PM Peak;
- Opening Year 2019 AM and PM Peak; and
- Design Year 2034 AM and PM Peak.

The Base Year model flows were obtained from the study area survey programme and the future year flows were derived through the application of Tempro / NTM growth factors.

The 2019 and 2034 results of the LinSig modelling using the observed signal timings is shown in **Table 4-1** and **Table 4-2**.

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	137.4%	95.7	105.6%	33.8
M4 Eastbound Off-Slip – Ahead / LT Lane	10.9%	1.2	6.6%	0.8
A4138 SB (Hendy) (M4 Eastbound On-Slip)	121.7%	165.7	62.9%	7.2
A4138 NB (Llanelli) (M4 Eastbound On-Slip)	113.1%	153.2	130.1%	176.5
M4 Westbound Off-Slip – RT Lane	69.8%	5.1	142.2%	109.2
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead)	34.7%	0.2	32.4%	0.2
PRC % (All Lanes)	**-52.6**		**-58.0**	
Total Delay (PCU/hr)	**285.49**		**221.35**	

**Derived from the maximum DoS noted on any lane on the arm.*

Table 4-1 *2019 Existing Layout LinSig Modelling Results (Standard Timings)*

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	152.1%	127.6	116.9%	58.2
M4 Eastbound Off-Slip – Ahead / LT Lane	12.3%	1.4	7.3%	0.9
A4138 SB (Hendy) (M4 Eastbound On-Slip)	134.7%	224.8	69.7%	9.0
A4138 NB (Llanelli) (M4 Eastbound On-Slip)	125.2%	264.2	144.0%	258.0
M4 Westbound Off-Slip – RT Lane	83.7%	8.0	171.3%	147.7
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead)	34.7%	0.2	35.8%	0.2
PRC % (All Lanes)	**-69.1**		**-90.4**	
Total Delay (PCU/hr)	**446.66**		**328.72**	

**Derived from the maximum DoS noted on any lane on the arm.*

Table 4-2 *2034 Existing Layout LinSig Modelling Results (Standard Timings)*

The 2019 analysis shows that with the existing junction arrangement in place the M4 eastbound off-slip right turn lane, A4138 from Hendy, and the A4138 from Llanelli are forecast to operate over capacity during the AM peak. During the PM peak, the M4 westbound off-slip right turn lane, the A4138 from Llanelli

and the M4 eastbound off-slip right turn lane are also forecast to operate over capacity, although the A4138 from Hendy is forecast to operate within capacity during this period.

As expected, the operation of the M4 J48 is forecast to deteriorate significantly by 2034 without intervention; with maximum queues of 264.2 (AM Peak) and 258 (PM Peak) noted on the A4138 from Llanelli.

In relation to queuing on the westbound off-slip, the model indicates that in 2019 (Opening Year) queueing will extend back to the M4 westbound mainline during the PM peak; increasing considerably by 2034 (Design Year). However, the model is shown to exaggerate the extent of these queues as it cannot accurately reflect the behaviour of drivers on the A4138; whereby vehicles regularly stop to allow traffic to exit from the westbound off-slip right turn lane.

In relation to the M4 eastbound off-slip, the 2034 'Design Year' model suggests that queueing back onto the M4 mainline could occur during the AM peak, as the slip-road has capacity for c.121 PCUs (with a maximum 127.6 PCU queue forecast).

It should be noted that the signal timings at the junction (MOVA) would be adapted as traffic volumes and movements change in the future; as such, the model results presented in Table 4-1 and Table 4-2 represent a worst-case ('do-nothing') scenario. Nevertheless, the model results clearly indicate the need for intervention.

Manually Optimised Timings

Further analysis has been undertaken whereby the signal timings of the existing junction have been optimised in LinSig (for PRC %). The timings have been optimised to allow a fair comparison of results; when comparing the proposed improvements against the base model results.

The 2019 and 2034 results of the LinSig modelling using the manually optimised timings is shown in **Table 4-3** and **Table 4-4**.

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	112.7%	44.6	133.6%	69.8
M4 Eastbound Off-Slip – Ahead / LT Lane	10.3%	0.8	10.3%	0.6
A4138 SB (Hendy) (M4 Eastbound On-Slip)	105.4%	53.2	114.1%	34.5
A4138 NB (Llanelli) (M4 Eastbound On-Slip)	113.7%	100.1	96.0%	24.2
M4 Westbound Off-Slip – RT Lane	75.1%	4.3	132.9%	83.8
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead)	37.6%	0.3	28.4%	0.2
PRC % (All Lanes)	**-26.4**		**-48.5**	
Total Delay (PCU/hr)	**175.04**		**170.09**	

**Derived from the maximum DoS noted on any lane on the arm.*

***Table 4-3** 2019 Existing Layout Modelling Results (Manually Optimised Timings)*

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	121.2%	66.8	153.0%	101.5
M4 Eastbound Off-Slip – Ahead / LT Lane	11.2%	0.9	11.8%	0.7
A4138 SB (Hendy) (M4 Eastbound On-Slip)	124.1%	140.6	130.7%	63.8
A4138 NB (Llanelli) (M4 Eastbound On-Slip)	126.1%	191.0	104.7%	46.4
M4 Westbound Off-Slip – RT Lane	91.0%	7.8	155.2%	118.1
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead)	37.8%	0.3	27.4%	0.2
PRC % (All Lanes)	**-41.3**		**-72.4**	
Total Delay (PCU/hr)	**345.90**		**282.56**	

**Derived from the maximum DoS noted on any lane on the arm.*

***Table 4-4** 2034 Existing Layout Modelling Results (Manually Optimised Timings)*

In comparison to the results outlined for the current signal timings, the manually optimised results show total junction PRC (%) improving from -52.6% to -26.4% in the 2019 AM peak scenario with total delay reducing from 285.49 to 175.04; and from -58% to -48.5% PRC in the 2019 PM peak scenario with

total delay reducing from 221.35 to 170.09. Optimising the signals timings has also resulted in increasing the DoS on some arms whilst reducing others.

For a 2034 'Design Year', the total junction PRC (%) has improved from -69.1% to -41.3% in the AM peak scenario with total delay reducing from 446.66 to 345.90; and from -90.4% to -72.4% PRC in the PM peak scenario with total delay reducing from 328.72 to 282.56. Optimising the signals timings has again resulted in increasing the DoS on some arms whilst reducing others.

In relation to the M4 westbound off-slip the model again suggests that queueing back onto the M4 mainline could occur during the PM peak, as the slip-road has capacity for c.50 PCUs and the model is forecasting a maximum PCU queue of 83.8 and 118.1 in 2019 and 2034 respectively.

The analysis once again confirms that the operation of the M4 J48 is forecast to deteriorate significantly in its existing arrangement by 2034 without intervention.

Option 2a Scheme Appraisal

Manually Optimised Timings

A model of the preferred junction arrangement (updated Option 2a) has been developed, with the signal times optimised in LinSig (for PRC %). This has been undertaken to fully reflect the potential benefits of the proposed scheme.

The 2019 and 2034 results of the LinSig modelling for Option 2a using the manually optimised timings is shown in **Table 4-5** and **Table 4-6**.

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	104.1%	28.0	83.4%	12.5
M4 Eastbound Off-Slip – Ahead / LT Lane	8.9%	0.7	5.5%	0.5
A4138 SB (Hendy) (M4 Eastbound On-Slip)	103.1%	33.5	81.4%	7.2
A4138 NB (Llanelli) – Ahead Lane	49.6%	2.9	83.8%	11.4
A4138 NB (Llanelli) – RT Lane (M4 Eastbound On-Slip)	105.5%	44.5	72.0%	16.4
M4 Westbound Off-Slip – RT Lane	77.3%	5.6	58.2%	9.2
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead	52.8%	5.6	59.6%	0.8
PRC % (All Lanes)	**-17.3**		**7.4**	
Total Delay (PCU/hr)	**93.92**		**33.28**	

**Derived from the maximum DoS noted on any lane on the arm.*

Table 4-5 *2019 Preferred Scheme Modelling Results (Manually Optimised Timings)*

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	115.3%	53.0	90.3%	17.1
M4 Eastbound Off-Slip – Ahead / LT Lane	10.0%	0.8	5.9%	0.7
A4138 SB (Hendy) (M4 Eastbound On-Slip)	114.2%	85.6	88.2%	9.8
A4138 NB (Llanelli) – Ahead Lane	54.9%	7.4	91.5%	16.0
A4138 NB (Llanelli) – RT Lane (M4 Eastbound On-Slip)	116.9%	85.3	78.9%	21.0
M4 Westbound Off-Slip – RT Lane	65.6%	5.2	64.0%	11.9
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead	55.6%	8.2	64.9%	1.5
PRC % (All Lanes)	**-29.9**		**-1.7**	
Total Delay (PCU/hr)	**207.79**		**45.86**	

**Derived from the maximum DoS noted on any lane on the arm.*

Table 4-6 *2034 Preferred Scheme Modelling Results (Manually Optimised Timings)*

A comparison of the 2019 and 2034 results of the LinSig modelling using the manually optimised timings for Option 2a and for the existing layout is shown in **Table 4-7** and **Table 4-8**.

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	-8.60%	-16.6	-50.20%	-57.3
M4 Eastbound Off-Slip – Ahead / LT Lane	-1.40%	-0.1	-4.80%	-0.1
A4138 SB (Hendy) (M4 Eastbound On-Slip)	-2.30%	-19.7	-32.70%	-27.3
A4138 NB (Llanelli) – Ahead Lane	-8.20%	-55.6	-12.20%	-7.8
A4138 NB (Llanelli) – RT Lane (M4 Eastbound On-Slip)				
M4 Westbound Off-Slip – RT Lane	2.20%	1.3	-74.70%	-74.6
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead	15.20%	5.3	31.20%	0.6
PRC % (All Lanes)	**9.1**		**55.9**	
Total Delay (PCU/hr)	**-81.12**		**-136.81**	

**Derived from the maximum DoS noted on any lane on the arm.*

***Table 4-7** 2019 Preferred Scheme v Existing Layout Modelling Results (changes to LinSig results)*

Arm	AM		PM	
	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Degree of Saturation (%)	Mean Maximum Queue (PCU)
M4 Eastbound Off-Slip – RT Lane	-5.90%	-13.8	-62.70%	-84.4
M4 Eastbound Off-Slip – Ahead / LT Lane	-1.20%	-0.1	-5.90%	0
A4138 SB (Hendy) (M4 Eastbound On-Slip)	-9.90%	-55	-42.50%	-54
A4138 NB (Llanelli) – Ahead Lane	-9.20%	-276.3	-196.20%	-67.4
A4138 NB (Llanelli) – RT Lane (M4 Eastbound On-Slip)				
M4 Westbound Off-Slip – RT Lane	-25.40%	-2.6	-91.20%	-106.2
A4138 SB (Llanelli) – M4 Westbound On-Slip RT / Ahead	17.80%	7.9	37.50%	1.3
PRC % (All Lanes)	**11.4**		**70.7**	
Total Delay (PCU/hr)	**-138.11**		**-236.7**	

**Derived from the maximum DoS noted on any lane on the arm.*

***Table 4-8** 2034 Preferred Scheme v Existing Layout Modelling Results (changes to LinSig results)*

As shown in Table 4-7, the scheme is forecast to provide the following benefits compared to the existing arrangement:

- 2019 AM Peak
  - The junction PRC increases from -26.4% to -17.3% (a 9.1% increase); with
  - The total delay at the junction reducing from 175.04s to 93.92s (a reduction of 81.12s).
- 2019 PM Peak
  - The junction PRC increases from -48.5% to 7.4% (a 55.9% increase); with
  - The total delay at the junction reducing from 170.09s to 33.28s (a reduction of 136.81s).

During the AM peak in 2019, the junction is still forecast to operate over capacity with Option 2a in place, however total delay at the junction has reduced by over a minute compared to the existing layout. During the PM peak in 2019, the modelling for the existing layout demonstrated that the junction is forecast to be operating over-capacity (PRC -48.5%). However, with Option 2a in place, the junction is forecast to be operating with spare capacity (PRC 7.4%) with a reduction in total delay of over two minutes.

As shown in Table 4-8, the preferred option (compared to the existing layout) is forecast to provide the following in the 2034 'Design Year':

- 2034 AM Peak
  - The junction PRC increases from -41.3% to -29.9% (increasing by 11.4%); with
  - The total delay at the junction reducing from 345.9s to 207.79s (a reduction of 138.11s).
- 2034 PM Peak
  - The junction PRC increases from -72.4% to -1.7% (increasing by 70.7%); with
  - The total delay at the junction reducing from 282.56s to 45.86s (a reduction of 236.7s).

During the AM peak in 2034, the junction is still forecast to operate over capacity with Option 2a in place, however total delay at the junction has reduced by over two minutes compared to the existing layout. During the PM peak in 2034, the modelling for the existing layout demonstrated that the junction is forecast to be operating over-capacity (PRC -72.4%), with Option 2a in place, the junction is forecast to be operating close to within capacity (PRC -1.7%) with a reduction in total delay of nearly four minutes.

M4 Off-Slips – Queue Lengths

As previously mentioned in the WelTAG Stage 1 and Stage 2 report, WG and SWTRA are concerned that congestion in the PM peak at the M4 J48 is causing vehicles to queue from the M4 westbound off-slip lanes back to the M4 mainline, with vehicles utilising the hard shoulder for queuing purposes.

A comparison of the slip road queue lengths (as forecast by LinSig for the 2019 'Opening Year' and 2034 'Design Year') for the existing layout and the preferred scheme (utilising manually optimised signal timings) is shown in **Table 4-9.**

Scenario	M4 Westbound Off-Slip (50 PCU Capacity)				M4 Eastbound Off-Slip (121 PCU Capacity)			
	AM Peak	Queuing Availability (PCU)	PM Peak	Queuing Availability (PCU)	AM Peak	Queuing Availability (PCU)	PM Peak	Queuing Availability (PCU)
2019 Existing	4.3	45.7	83.8	-33.8	44.6	76.4	69.8	51.2
2019 Preferred	5.6	44.4	9.2	40.8	28	93	12.5	108.5
2034 Existing	7.8	42.2	118.1	-68.1	66.8	54.2	101.5	19.5
2034 Preferred	5.2	44.8	11.9	38.1	53	68	17.1	103.9

**Maximum value taken from both lanes.*

Table 4-9 *M4 Off-Slips LinSig Analysis Results – Preferred Scheme v Existing Layout (Manually Optimised Signal Timings)*

As demonstrated in Table 4-9, in the 2019 'Opening Year' and 2034 'Design Year', the existing layout of the junction is forecast to result in queuing on the M4 westbound off-slip to extend back onto the M4 mainline in the PM peak. The proposed layout (Option 2a) is forecast to reduce this queuing, with queues shown to be accommodated within the M4 westbound off-slip extent.

It is also recommended that traffic signal loops are installed at the entry of both the M4 westbound and eastbound off-slips to ensure queueing does not extend onto the M4 mainline along with Mobile VMS.

4.4.3 Scheme Objectives Assessment

An assessment of the preferred option against the scheme objectives is provided in the combined Stage 1 and Stage 2 WelTAG Report. Given that the detailed design process has only resulted in minimal alterations to the proposal, the assessments undertaken at Stage 2 remain appropriate and no further assessment was considered necessary.

4.4.4 Economic Appraisal

This section provides an appraisal of the economic impacts of the proposed improvements for M4 Junction 48 and incorporates the following:

- Scheme Costs;
- Assessment Methodology;
- Monetised Scheme Benefits; and
- Economic Assessment.

Scheme Costs

2018 Prices

The project scheme cost, estimated in 2018 prices, is £1.5m. The scheme cost allows for the following elements:

- Construction;
- Land;
- Supervision; and
- Preparation.

Optimism Bias

The HM Treasury Green Book (2018, p.30) defines optimism bias as "a demonstrated systematic, tendency for project appraisers to be overly optimistic". This can result in an underestimation of scheme costs. In calculating the appropriate optimism bias for the M4 J48 scheme, reference has been made to WebTAG Unit A1.2 (DfT, Nov 2014) and in particular Tables 7 and 8.

Table 7 defines project categories and the stage of scheme development, with the M4 Junction 48 scheme categorised as a Highway Agency Scheme and at Stage 1 'PCF Options Phase'. Table 8 sets out the recommended optimism bias uplifts for different projects at different stages of the life of a transport project. The recommended optimism bias uplift for a Stage 1 road scheme is 44%.

An uplift of 44% has been applied to the costs and as a result the economic appraisal has been undertaken using a scheme cost of £2.16m: (2018 prices including Optimism Bias).

Present Year Costs

The scheme costs were provided in 2018 prices, but the economic appraisal considers costs and benefits in 2010 prices, referred to as the Present Year. For assessment purposes the 2018 Scheme Cost and Benefits has been deflated to 2010 levels using a 3.5% discount rate.

Assessment Methodology

WelTAG and WebTAG principles have been used to provide an indication of the scheme's economic benefits using outputs from the LinSig model of M4 J48. Details of the LinSig analysis undertaken is provided in **Section 4.6.2.** Comparing the LinSig test results provides an indication of the delay savings associated with the proposed improvements.

Monetised Scheme Benefits

A series of annualisation factors were applied to the reported delay savings (presented in Table 4-7 and Table 4-8) to estimate the total delay savings for the AM and PM peak hours on 253 working days per year in both 2019 and 2034.

The forecast annualised delay savings are shown in **Table 4-10** below.

Year	Delay Savings (PCU-Hrs)
2019	55,136
2034	94,827

Table 4-10 *Annualised Delay Savings*

Economic Appraisal

This section outlines the forecast economic benefits of the delay savings presented in Table 4-10. The monetary benefits of the delay savings have been estimated based on conservative Non-working (Commuting) values of time derived from WebTAG. The results are shown in **Table 4-11** below.

Year	Delay Savings (£)
2019	£422,082
2034	£868,760

Table 4-11 *Monetary Benefits of the Delay Savings*

The journey time savings accrued from the improvements have been capped at 2034 values to provide a 60-year appraisal period using a 3.5% discount rate over the whole appraisal period. Finally, these values were used to generate a stream of discounted benefits and to calculate the Present Value of Benefits (PVBs). The resulting PVB for the scheme (in 2010 prices) is calculated to be:

- Scheme PVB - £14.21m

The benefits outlined above are based solely on vehicular delay savings at Junction 48 and does not take into account changes in accidents or the

potential benefits from improved lane discipline along the A4138 towards Talyclun.

To provide an indication of the Scheme's Benefit to Cost Ratio (BCR) the PVB provided above has been divided by the reported total construction cost for the scheme. The total cost of the scheme is £2.16m (£1.5m uplifted by 44% OB) or £1.64m in 2010 prices. The BCR for the scheme is therefore 8.7.

4.4.5 Deliverability

The following deliverability requirements are envisaged in terms of taking the scheme forward.

Land Take

Highway boundary land is required for the widening of the M4 eastbound on-slip (requiring a thin strip of land in the vicinity of the A4138).

General Buildability

This land is currently vegetated hence clearance would need to be undertaken in accordance with environmental best practice. There are no other restrictions on the works proceeding in this area.

Future Maintenance

Maintenance of the network will remain as present with SWTRA responsible for elements of the scheme on the Trunk Road network and CCC for the local road network.

Funding

It is understood that WG have agreed to fund the scheme.

5 Summary and Conclusions

5.1 Overview

The Welsh Governments (WG) South Wales Trunk Road Agent (SWTRA) has commissioned Atkins to undertake the M4 Junction 48 (J48) and A4138 Pontarddulais Road WelTAG Appraisal.

The A4138 is recognised as a key transport corridor within South West Wales; connecting Pontarddulais with Llanelli via J48 of the M4. The section of the A4138 known as Pontarddulais Road is c.1km in length and extends from M4 J48 to the A4138 / Pontarddulais Road (B4297) Traffic Signals at Talyclun. During peak periods both the A4138 Pontarddulais Road and J48 of the M4 experience significant congestion. These daily congestion problems are concerns for both Carmarthenshire County Council (CCC) as the local highway authority and WG / SWTRA as the strategic highway authority.

In December 2017 Atkins produced a WelTAG report presenting outputs from the work undertaken for the following WelTAG (2017) stages:

- Strategic Outline Case (Stage 1); and
- Outline Business Case (Stage 2) – relating only to the transport planning and engineering aspects of the options identified for further consideration.

This report presents outputs from the WelTAG (2017) Stage 3 Appraisal. The purpose of WelTAG Stage 3 is to make a full and detailed assessment of the preferred option to inform a decision as to whether or not to proceed to implementation. The appraisal focuses on the transport planning and economics, design and engineering aspects of the preferred option.

5.2 Preferred Option – Design Development

The preferred option retained from the Stage 2 Appraisal was Option 2a. This is shown in Appendix A.

A detailed design of the preferred option has been developed for the Stage 3 WelTAG appraisal; taking into consideration the outcomes of a design review, consultation, Road Safety Audit (RSA) and operational appraisal.

The latest design of the preferred option is shown in Appendix C.

5.3 Transport Case

The Transport Case for the proposed improvements to the A4138 and M4 Junction 48 incorporates the following:

- Operational Analysis (LinSig);
- Assessment against the Scheme Objectives; and
- Economic Appraisal.

5.3.1 Operational Analysis (LinSig)

M4 Junction 48

During the AM peak in 2019 with the proposed scheme in place, total delay at the junction is forecast to reduce by over a minute compared to the existing layout. During the PM peak in 2019, the junction is forecast to be operating with spare capacity (PRC 7.4%) with a reduction in total delay of over two minutes.

During the AM peak in 2034 with the proposed scheme in place, total delay at the junction has reduced by over two minutes compared to the existing layout. During the PM peak in 2034, the junction is forecast to be operating close to within capacity (PRC -1.7%) with a reduction in total delay of nearly four minutes.

Westbound Off-Slip

There are concerns that congestion in the PM peak at the M4 J48 is causing vehicles to queue from the M4 westbound off-slip lanes back to the M4 mainline, with vehicles utilising the hard shoulder for queuing purposes.

In the 2019 'Opening Year' and 2034 'Design Year', the existing layout of the junction is forecast to result in queuing on the M4 westbound off-slip to extend back onto the M4 mainline in the PM peak. The proposed layout (Option 2a) is forecast to reduce this queuing, with queues shown to be accommodated within the M4 westbound off-slip extent. Nevertheless, it is recommended that traffic signal loops are installed at the entry of both the M4 westbound and eastbound off-slips to ensure queueing does not extend onto the M4 mainline.

5.3.2 Scheme Objectives Assessment

An assessment of the preferred option against the scheme objectives is provided in the combined Stage 1 and Stage 2 WelTAG Report. Given that the detailed design process has only resulted in minimal alterations to the proposal, the assessments undertaken at Stage 2 remain appropriate and no further assessment was considered necessary.

5.3.3 Economic Appraisal

An appraisal of the economic impacts of the proposed improvements for M4 Junction 48 has been undertaken.

The project scheme cost, estimated in 2018 prices, is £1.5m. An uplift of 44% has been applied to the costs to account for Optimism Bias resulting in a scheme cost of £2.16m (£1.64m in 2010 prices).

WelTAG and WebTAG principles have been used to provide an indication of the scheme's economic benefits using outputs from the LinSig model. The time savings accrued from the improvements have been used to calculate the Present Value of Benefits (PVBs); which was calculated to be £14.21m (in 2010 prices) resulting in a BCR for the scheme of 8.7.

APPENDIX A

WELTAG STAGE 2 SCHEME DRAWINGS

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Use
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Decommissioning / Demolition
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Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability
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Design Status
S3

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Project Title
M4 J48 Upgrade

Drawing Title
OPTION 1

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	Date	Date	Date	Date
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number
Project | Originator | Volume
JR17_201 - ATK - HGN -
SWTRA - DR - D - 0001
Location | Type | Role | Number

Project Ref. No.
5154498

Revision
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Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

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Scale	Originator	Checked	Approved	Authorised
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Drawing Number: JR17_201 - ATK - HGN - SWTRA - DR - D - 0002
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P01	24/05/17	First Issue	AD	DNJ	JR	JR

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Drawing Number: JR17_201 - ATK - HGN - SWTRA - DR - D - 0003
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Maintenance / Cleaning
(Enter "None" if applicable)
Use
(Enter "None" if applicable)
Decommissioning / Demolition
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Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

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Project Title: M4 J48 Upgrade

Drawing Title: OPTION 2

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Original Size: A3	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17

Drawing Number: JR17_201 - ATK - HGN - SWTRA - DR - D - 0004
(Project | Originator | Volume | Location | Type | Role | Number)

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Maintenance / Cleaning
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Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability
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Design Status
S3

Project Title
M4 J48 Upgrade

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Drawing Title
OPTION 2A

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Original Size	Date	Date	Date	Date
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Drawing Number
Project | Originator | Volume
JR17_201 - ATK - HGN -
SWTRA - DR - D - 0005
Location | Type | Role | Number

Project Ref. No.
5154498

Revision
P01

Plotted by: jone6970 Date: May 26, 2017 - 2:00pm
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Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT

Design Status: S3

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Client

Yn gweithio ar ran Llywodraeth Cymru
Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 3

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	Date	Date	Date	Date
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number (Project / Originator / Volume / Location / Type / Role / Number):
JR17_201 - ATK - HGN - SWTRA - DR - D - 0006

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:00pm
Drawing file saved on ProjectWise

DO NOT SCALE

0 10 100

Millimetres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).
Construction (Enter "None" if applicable)
Maintenance / Cleaning (Enter "None" if applicable)
Use (Enter "None" if applicable)
Decommissioning / Demolition (Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT — Design Status: S3

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Client: South Eastern Wales Trunk Road Agent — Yn gweithio ar ran Llywodraeth Cymru, Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 3A

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	**Date**	**Date**	**Date**	**Date**
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
JR17_201 - ATK - HGN - SWTRA - DR - D - 0007

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:00pm
Drawing file saved on ProjectWise

Millimetres

0 10 100

DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT
Design Status: S3

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Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 3B

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size: A3	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number):
JR17_201 - ATK - HGN - SWTRA - DR - D - 0008

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:40pm
Drawing file saved on ProjectWise

Millimetres

DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	26/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT | Design Status: S3

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Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 3C

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size: A3	Date: 26/05/17	Date: 26/05/17	Date: 26/05/17	Date: 26/05/17

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0009

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:00pm
Drawing file saved on ProjectWise

DO NOT SCALE

Millimetres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT

Design Status: S3

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Client

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Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 4

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR

Original Size	Date	Date	Date	Date
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0010

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:00pm
Drawing file saved on ProjectWise

Millimetres

DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT

Design Status: S3

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Client: Yn gweithio ar ran Llywodraeth Cymru / Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 4A

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size: A3	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17	Date: 24/05/17

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0011

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:01pm
Drawing file saved on ProjectWise

DO NOT SCALE

Millimetres 0 10 100

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT

Design Status: S3

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Project Title: M4 J48 Upgrade

Drawing Title: OPTION 4B

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR

Original Size	Date	Date	Date	Date
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0012

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:01pm
Drawing file saved on ProjectWise

DO NOT SCALE

0 10 100

Millimetres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
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Construction (Enter "None" if applicable)
Maintenance / Cleaning (Enter "None" if applicable)
Use (Enter "None" if applicable)
Decommissioning / Demolition (Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT — Design Status: S3

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Client: Yn gweithio ar ran Llywodraeth Cymru / Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: OPTION 4C

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	**Date**	**Date**	**Date**	**Date**
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
JR17_201 - ATK - HGN - SWTRA - DR - D - 0013

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:01pm
Drawing file saved on ProjectWise

Millimetres 0 10 100

DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).
Construction
(Enter "None" if applicable)
Maintenance / Cleaning
(Enter "None" if applicable)
Use
(Enter "None" if applicable)
Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT — Design Status: S3

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Client: Llywodraeth Cymru Welsh Government — Yn gweithio ar ran Llywodraeth Cymru Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: A4318 CARRIAGEWAY OPTION

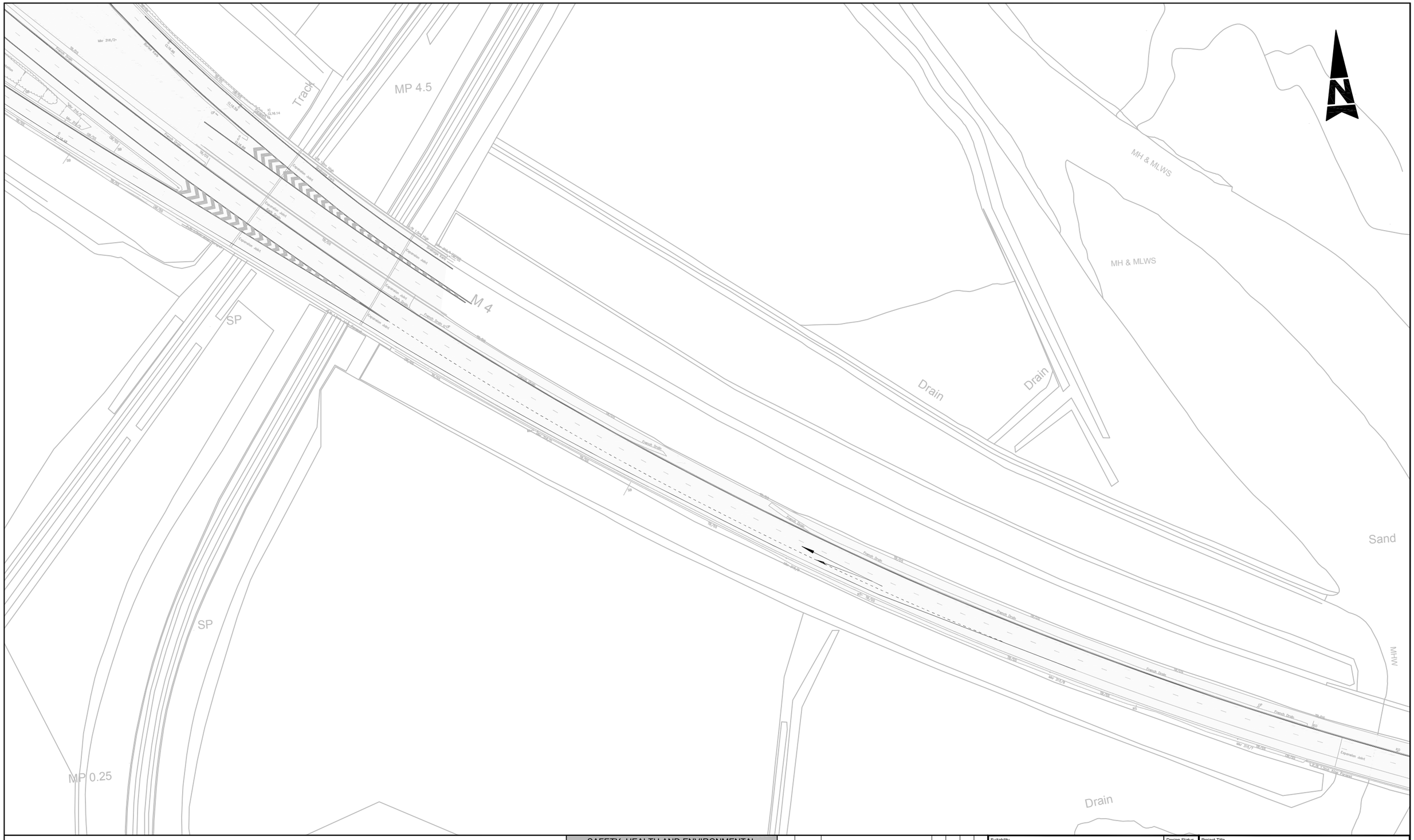
Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	**Date**	**Date**	**Date**	**Date**
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
JR17_201 - ATK - HGN - SWTRA - DR - D - 0014

Project Ref. No.: 5154498

Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:01pm
Drawing file saved on ProjectWise



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR

Suitability: FOR REVIEW AND COMMENT
Design Status: S3

ATKINS
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Client: Llywodraeth Cymru / Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: M4 MAINLINE OPTION

Scale	Originator	Checked	Approved	Authorised
1:1250	AD	DNJ	JR	JR
Original Size	**Date**	**Date**	**Date**	**Date**
A3	24/05/17	24/05/17	24/05/17	24/05/17

Drawing Number: JR17_201 - ATK - HGN - SWTRA - DR - D - 0015
(Project | Originator | Volume | Location | Type | Role | Number)

Project Ref. No.: 5154498
Revision: P01

Plotted by: jone6970 Date: May 26, 2017 - 2:01pm
Drawing file saved on ProjectWise

APPENDIX B

RSA

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South Wales Trunk Road Agent

Managing and Improving Motorways and Trunk Roads through South Wales

Asiant Cefnffyrdd De Cymru

Rheoli a Gwella'r Traffyrdd a'r Cefnffyrdd yn Ne Cymru

M4 Junction 48 and A4138 Improvement Works

Stage 1 Road Safety Audit Response Report

Neath Port Talbot County Borough • Bwrdeistref Sirol Castell-nedd Port Talbot •

Yn gweithio ar ran Llywodraeth Cymru
Working on behalf of the Welsh Government

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M4 Junction 48 and A4138 Improvement Works

Stage 1 Road Safety Audit Response Report

Service Provider/Consultant Name:		**Atkins**	
Service Provider/Consultant Project Number		**5158279_601**	
Scheme Reference:	**16/SW/CPC/001**	Programme:	**Pinch Point**

			.....	.....	.....
			_____	.....	.....
0	24/05/2018	DRAFT	[redacted]	[redacted]	[redacted]
Revision	**Date**	**Status**	**Author**	**Checked**	**Approved**
			Service provider		

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Contents

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1 Introduction

The Design Team for the M4 Junction 48 and A4138 Improvement Works has prepared this report in response to the Stage 1 Road Safety Audit, document reference: 8003-017-001D-SWTRA M4 J48 and A4138 Stage 1 RSA, Draft Report.

The Design Team membership is as follows:

Highways Engineer [redacted]

Highways Principal Engineer [redacted]

Paragraph referencing in this response is in accordance with the Stage 1 Road Safety Audit.

1.1 Scheme Details

The scheme is located on the A4138 Pontarddulais Road, at M4 Junction 48 (approximate co-ordinates 257748, 203170). A WelTAG appraisal was carried out by Atkins on behalf of the Welsh Government (SWTRA) following concerns of significant congestion on the A4138 and J48 of the M4 during peak periods. The appraisal identified the key issues and options and recommended Option 2A to be taken forward and developed.

This option has been developed to preliminary design stage and proposes to reduce congestion by increasing capacity on the A4138 through carriageway widening works and controlling movements on the westbound slip roads by introducing signal control to the existing junctions.

The works Include:

- Removal of central reservation on the A4138 under M4 overbridge
- Removal of the give way line on the eastbound on-slip
- Re-arrangement of the M4 eastbound off-slip signals. Two signalised stop-lines will be provided on the A4138 northbound (either side of the exit point for the eastbound off-slip right turners) and the stop line on the A4138 southbound (from Hendy) will be moved approximately 10mto the south of its existing position.
- Extension of the two-lane A4138 northbound approach to beyond the M4 westbound on slip entry. This arrangement would increase the two-lane approach by c.110m to a total of c.260m, further reducing the likelihood of traffic travelling to the M4 eastbound on-slip blocking straight-ahead traffic to Hendy on the A4138 northbound.
- To signalise the M4 westbound off-slip and the right-turn from the A4138 southbound to the M4 westbound on-slip. Through doing this, the queues on the M4 westbound off-slip right turn lane can be more

effectively controlled to ensure queueing does not extend back onto the M4 mainline.

- As part of the signalisation of the M4 westbound off-slip, signalised stop-lines will be provided on the A4138 in both directions and on the right-turn lane on the off-slip. The new signalised stop line will not control the left turn movement from the Off-slip to the A4138 southbound carriageway.
- For the right-turn to the M4 westbound on-slip, a signalised stop line will be provided at the front of the new right-turn provision on the A4138 southbound. The straight-ahead movement on the A4138 southbound (towards Llanelli from Hendy and the M4 eastbound) will not be signalised. This signalisation will be supported by M4 Junction 48 and A4138 formalising the right-turn through the provision of a physical island separating the movement from Llanelli-bound traffic.

2 Issues Raised by the Stage 1 Road Safety Audit

This section covers the issues raised as part of this Stage 1 Road Safety Audit. Locations of issues raised in this section are shown in Appendix B.

2.1 PROBLEM

Location: A4138 main carriageway through the junction.

Summary: Potential for 'see-through' of downstream traffic signals.

The introduction of additional sets of traffic signals on a straight section of road with a number of junction, traffic islands and traffic lanes is likely to make the road layout more difficult to comprehend. For north-eastbound users on the A4138 there will be three sets of traffic signals that may not be showing the same signal at the same time. This could lead to users seeing a downstream green signal when the immediate signal is red. Users could proceed through the red signal and collide with a vehicle making an opposing manoeuvre.

Recommendation
As the design is progressed, the traffic signal layout/alignment and staging should prevent or minimise the likelihood of 'see-through' for A4138 users in both directions.

Designers Response:
Noted - Additional louvres could be added to the green and amber signal aspects, if required to help minimise the issue of 'see through' on the first 2 sets of traffic signals on the A4138 north-eastbound approach. The 69m distance between the first and second stop line is normally considered sufficient that they will not be required on the second set. The 59m between the second and third stop line may justify louvres on the third set, although It is hoped the phasing/ staging arrangement will negate the need for the louvres, with drivers not seeing a downstream green when held on a red signal.

2.2 PROBLEM

Location: A4138 north-eastbound main carriageway.

Summary: Possible confusion about the location of the right turn.

The right turn from the A4138 onto the M4 eastbound on-slip would be preceded with three sets of traffic signals and six right turn road marking arrows. This may lead to confusion for users looking to make the right turn. This could lead to mistaken manoeuvres onto the M4 westbound off-slip or

unexpected slowing down in the lane marked for the right turn. This could lead to head-on or nose-to-tail collisions.

Recommendation
The traffic signal, traffic sign and road marking layouts should be designed to give clear guidance about the location of the right turn.

Designers Response:
Agreed - On the A4138 north-eastbound approach, the first and second set of signals could display 'ahead only' green arrows that indicate an ahead movement only. These could be backed up with blue box signs to Diagram 606 (indicating direction of travel) mounted on the signal. This would be subject to detailed design, and any Traffic Regulation Orders that may be existing or introduced. The signal head arrangement at the third set of traffic signals, where the right turn is made, is subject to detailed design and final modelling output.

2.3 PROBLEM

Location: M4 westbound on-slip priority layout.

Summary: Traffic signals may lead to misunderstanding priorities.

At present the right turn onto the M4 westbound on-slip is a priority movement, which is followed by another priority movement at the point where it merges with the left turn from the A4138. In contrast, the eastbound on-slip layout has the left and right turns retaining a lane each on the on-slip.

As there is already limited visibility to vehicles approaching from the left at the give way on the on-slip, the introduction of traffic signal control at the right turn from the A4138 could lead to users failing to give way to vehicles approaching from the left, leading to side-wipe or nose-to-tail collisions.

Recommendation
As part of the design proposals, the layout of the give way on the on-slip should be reviewed to ensure priorities are clear. Visibility between the traffic streams approaching from the left and right turns off the A4138 should be improved if the existing layout is to be retained.

Designers Response:
Agreed – The visibility at the give way line to vehicles approaching from the left will be improved by the proposed on-slip carriageway realignment and proposed wider verges behind the footways. Street furniture in the splitter island will be reviewed and relocated as required to provide better visibilities to vehicles approaching and waiting at the give way line.

2.4 PROBLEM

Location: Traffic signal junction at end of the M4 eastbound off-slip.

Summary: Queuing traffic may block other movements at the junction.

The junctions at the end of the westbound off-slip and on-slip both currently have yellow box markings and this would be retained (in a different layout) in the proposals. The introduction of two new sets of traffic signals could change the nature of queuing at the junction. It is not clear if a yellow box marking is required for the traffic signal junction at the end of the eastbound off-slip but, in the event of queuing across the junction on the A4138, a queue could build up on the off-slip reaching back to the main carriageway. The queue could then lead to a collision between stationary vehicles and high-speed main carriageway traffic.

Recommendation
The operation of the junction should be assessed to determine if a yellow box marking is required to assist in keeping the junction clear.

Designers Response:
Agreed - No traffic signal issues are envisaged, however excessive queue lengths on the M4 eastbound off-slip could be detected and subject to queue clearance logic to prevent the queue from reaching the main carriageway. This is subject to detailed design and the outcome of the modelling for maximum queue lengths.
.

2.5 PROBLEM

Location: Right turn onto the A4138 from the M4 eastbound off-slip.

Summary: Users could pass on the wrong side of the traffic island.

The proposals include the removal of part of a traffic island that currently separates opposing directions of traffic on the A4138. The existing traffic island guides right-turning users into the correct lane but, with the removal of a significant section of the island, unfamiliar users may mistakenly pass to the right of the island where there would be two lanes. This could lead to a collision with oncoming vehicles.

Recommendation
As the design is progressed, measures should be included to guide users to the left of the traffic island.

Designers Response:

Agreed - The location of the secondary traffic signal is intended to focus drivers vision on the far kerb edge, with a green arrow indicating the right turn movement.

.

2.6 PROBLEM

Location: Right turns from the A4138 onto both M4 on-slips.

Summary: Provide clarity about priorities for right-turning users.

The existing traffic signals at the right turn onto the M4 eastbound on-slip include a right turn filter signal head which makes it clear to users that they must wait for the green filter arrow before making the right turn.

It is not clear if this arrangement would be retained when the proposals move the stop line further upstream or whether this arrangement would be introduced at the right turn onto the M4 westbound on-slip. Without the right turn green filter arrow (and associated red signal) there is a concern about users failing to give way to oncoming traffic, leading to a head-on or side-impact collision.

Recommendation
Right turn filter signal heads should be included in the traffic signal layout at the right turns onto both on-slips.

Designers Response:
Noted - The existing right turn onto the M4 eastbound on-slip is a separately signalled right turn, with its own red/amber/green. Subject to final modelling results being received for maximum capacity, it is possible this right turn could be retained, separately signalled, with no conflicting traffic, or subject to capacity each movement at the junction could run as a separate movement, with no conflicts.

It is not possible to have the same arrangement at the M4 westbound on-slip, as the right turn already has its own separately signalled movement, with no conflicts.

.

2.7 PROBLEM

Location: Downstream end of the M4 eastbound off-slip.

Summary: Pedestrians at risk of stepping into the path of vehicles.

The existing pedestrian crossing at the bottom/downstream end of the eastbound off-slip is currently uncontrolled, requiring pedestrians to judge

when to cross based upon vehicle movements. This situation would be retained despite the proposals incorporating a more complex layout, which could make it more difficult to judge a safe time to cross. This raises concerns for pedestrians misjudging vehicle movements and being struck as they step into the path of slip road vehicles.

Recommendation
The traffic signal layout should incorporate formal pedestrian aspects and push buttons to give advice when crossing the end of the off-slip.

Designers Response:
Noted - The introduction of pedestrian facilities is possible from a signal operation point of view, with the pedestrian phase running in a 'walk with' situation when the A4138 runs. However, the need for formal facilities should be justified based on the number of pedestrians; the impact on capacity (due to longer intergreens) and the requirement to have pedestrian facilities at the other signal junctions, to complement the NMU route. Pedestrian counts could be undertaken to record the likely level of demand.
.

3 Acceptance/Exceptions

This section to be signed by the Welsh Government Project Sponsor.

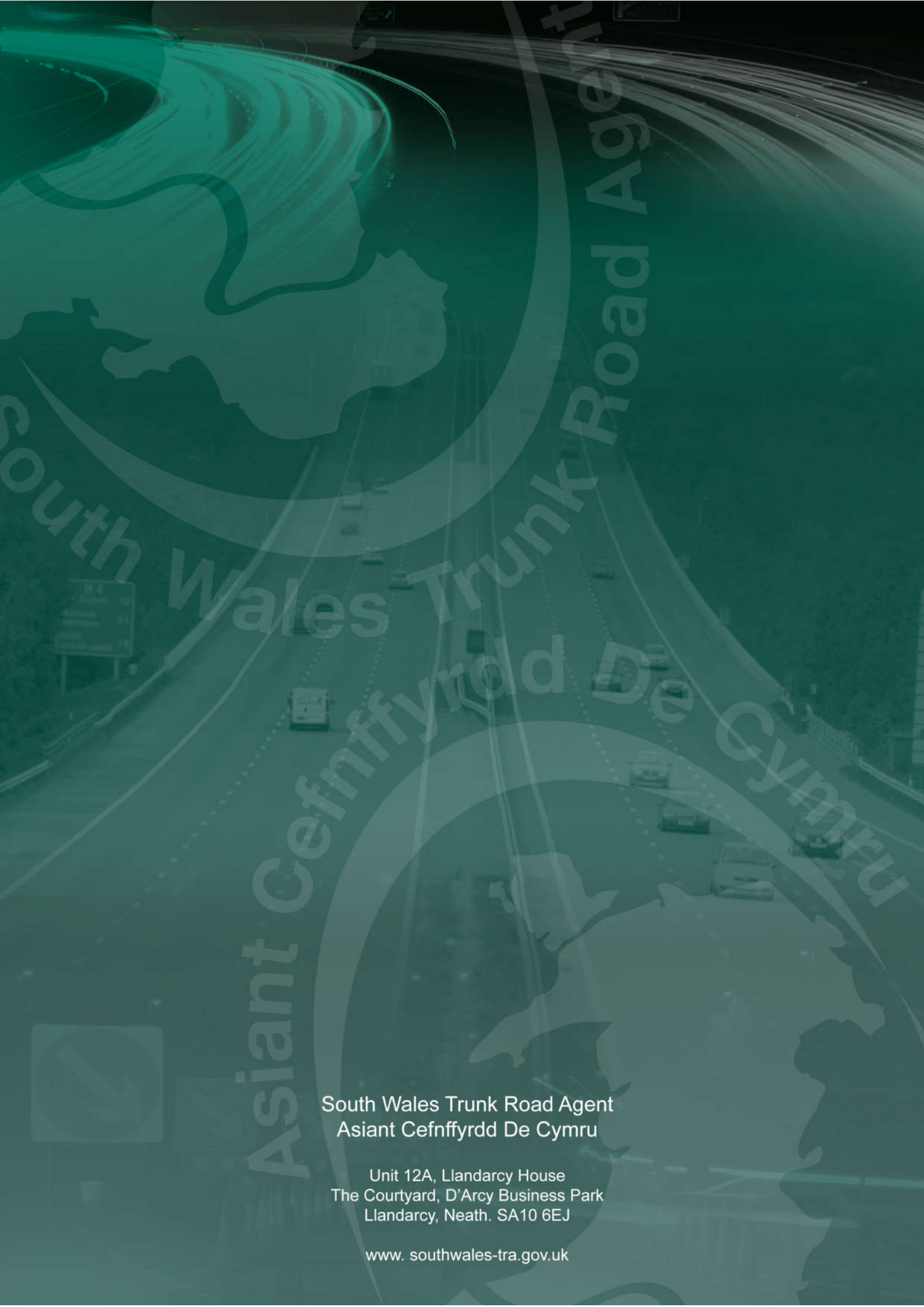
In connection with the Stage 1 Road Safety Audit Response Report prepared for the M4 Junction 48 and A4138 Improvement Works, I accept all / some of* the problems and / or recommendations in accordance with HD19.

Where I except from the problems and / or recommendations for item numbers……. in this Road Safety Audit Response Report, I will prepare a separate Exceptions Report for each exception.

Signed: …….. Date: ……..

Name: …… Position: …….
Project Sponsor

** delete as appropriate*



South Wales Trunk Road Agent
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APPENDIX C

PREFERRED SCHEME – DETAILED DESIGN

Left blank intentionally

DO NOT SCALE

NOTES

1. ALL MEASUREMENTS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS TO BE USED, DO NOT SCALE.
3. FOR SIGNAL LAYOUT DETAILS PLEASE SEE DRAWING JR17_201-ATK-HTS-SWTRA-DR-D-0001.

KEY:

- EX SL — EXISTING LIGHTING COLUMN TO BE RELOCATED / RENEWED
- PROPOSED PRIMARY / SECONDARY SIGNAL HEAD
- PROPOSED CARRIAGEWAY
- PROPOSED VERGE / EMBANKMENT
- EXISTING PAVED AREA / VERGE TO BE EXCAVATED TO PROVIDE FULL DEPTH CARRIAGEWAY CONSTRCUTION
- PROPOSED AREA OF TREE CLEARANCE. PROPOSED LANDSCAPE PLANTING TO BE AGREED.
- PROPOSED / REFORMED TRAFFIC ISLAND
- PROPOSED 2m WIDE FOOTWAY

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR
P02	26/01/18	First Issue	SW	DNJ	JR	JR
P03	09/02/18	First Issue	SW	DNJ	DJM	JR
P04	26/04/18	First Issue	SW	DJM	JR	JR
P05	01/08/18	First Issue	SW	DNJ	CJ	CJ

Suitability: FOR INFORMATION
Design Status: S2

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Client: Asiant Cefnffyrdd De Cymru / South Wales Trunk Road Agent; Yn gweithio ar ran Llywodraeth Cymru / Working on behalf of the Welsh Government

Project Title: M4 J48 Upgrade

Drawing Title: GENREAL ARRANGEMENT 1 OF 2

Scale	Originator	Checked	Approved	Authorised
1:500	SW	DNJ	CJ	CJ
Original Size: A1	Date: 01/08/18	Date: 01/08/18	Date: 01/08/18	Date: 01/08/18

Drawing Number (Project - Originator - Volume - Location - Type - Role - Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0005

Project Ref. No.: 5154498

Revision: P05

Plotted by: WILS3241 Date: Aug 01, 2018 - 4:03pm
Drawing file saved on ProjectWise

NOTES

1. ALL MEASUREMENTS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS TO BE USED, DO NOT SCALE.

KEY:

- EX SL — EXISTING LIGHTING COLUMN TO BE RELOCATED / RENEWED
- PROPOSED 2m WIDE FOOTWAY
- PROPOSED CARRIAGEWAY
- PROPOSED VERGE / EMBANKMENT
- EXISTING PAVED AREA / VERGE TO BE EXCAVATED TO PROVIDE FULL DEPTH CARRIAGEWAY CONSTRCUTION
- PROPOSED AREA OF TREE CLEARANCE. PROPOSED LANDSCAPE PLANTING TO BE AGREED.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Rev.	Date	Description	Org	Chk'd	App'd	Aut'd
P01	24/05/17	First Issue	AD	DNJ	JR	JR
P02	26/01/18	First Issue	SW	DNJ	DJM	JR
P03	09/02/18	First Issue	SW	DNJ	DJM	JR
P04	26/04/18	First Issue	SW	DJM	JR	JR
P05	01/08/18	First Issue	SW	DNJ	CJ	CJ

Suitability: FOR INFORMATION
Design Status: S2

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Project Title: M4 J48 Upgrade

Drawing Title: GENERAL ARRANGEMENT 2 OF 2

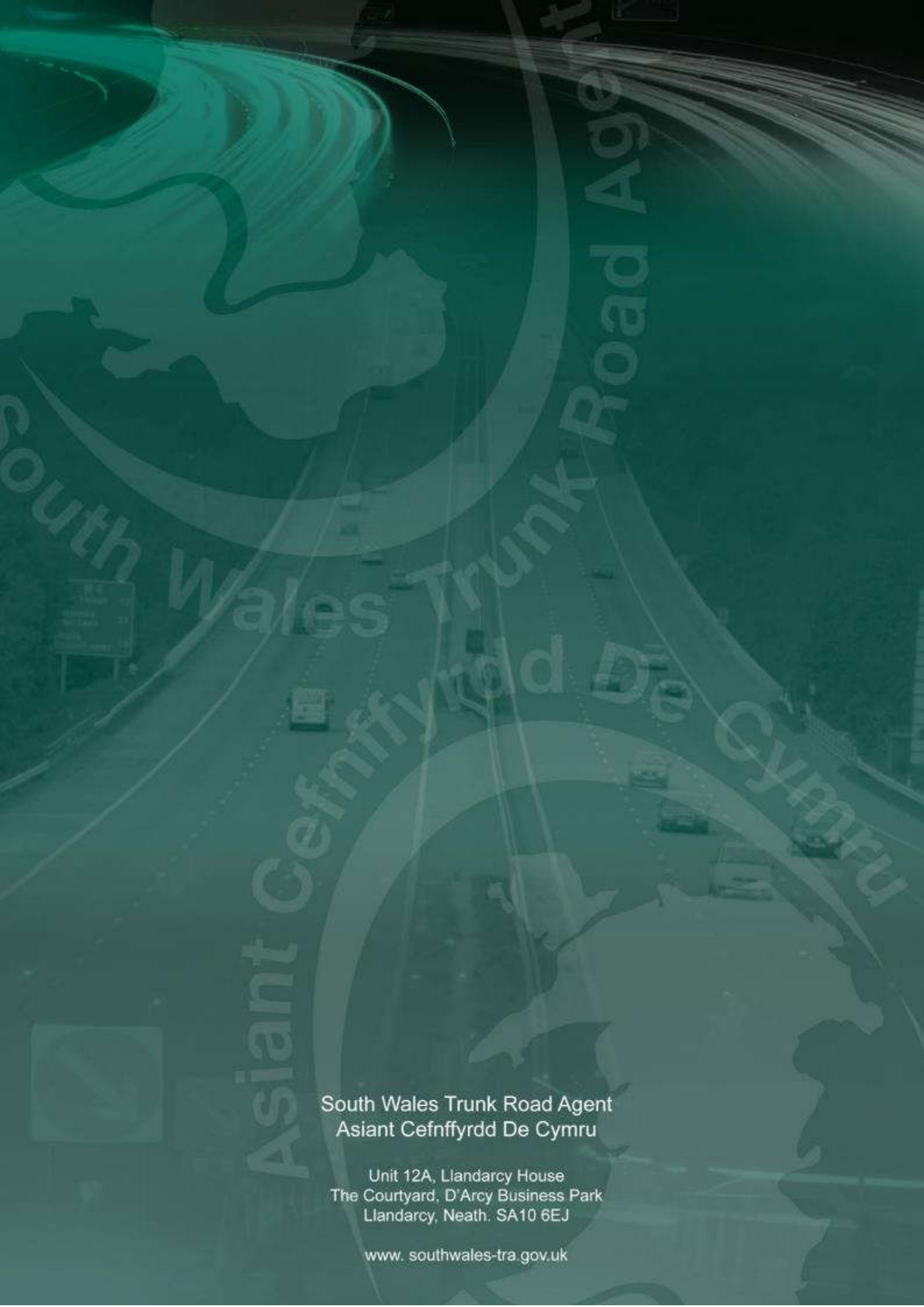
Scale	Originator	Checked	Approved	Authorised
1:500	SW	DNJ	CJ	CJ
Original Size	Date	Date	Date	Date
A1	01/08/18	01/08/18	01/08/18	01/08/18

Drawing Number (Project - Originator - Volume - Location - Type - Role - Number): JR17_201 - ATK - HGN - SWTRA - DR - D - 0014

Project Ref. No.: 5154498

Revision: P05

Plotted by: WILS3241 Date: Aug 01, 2018 - 3:55pm
Drawing file saved on ProjectWise



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