

South Wales Trunk Road Agent

Managing and Improving
Motorways and Trunk Roads
through South Wales



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Cymru

A48 Cross Hands to Pensarn

WelTAG Stage One Report

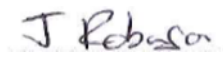


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Working on behalf of the
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A48 Cross Hands to Pensarn

WelTAG Stage One Report

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1. Introduction

1.1. Background

Atkins Limited have been commissioned by the South Wales Trunk Road Agent (SWTRA) to undertake a Stage One WelTAG study for the A48 between Cross Hands and Pensarn. This WelTAG Stage One Report considers a long-list of intervention options along this section of the A48, following identification of the transport problems, informed by a desktop study, site-based observations and stakeholder engagement.

The A48 connects Carmarthen to the east and is a key section of the trunk road network, linking the A40 to the M4. The efficient and safe operation of this section is therefore of primary importance for the Welsh Government / SWTRA as the Strategic Highway Authority, as well as Carmarthenshire County Council (CCC) as the Local Highway Authority.

The location of the scheme area is illustrated in **Figure 1-1**.



Figure 1-1 A48 Cross Hands to Pensarn WelTAG Scheme Area

1.2. WelTAG Stage One

The WelTAG process is an appraisal framework that covers the lifecycle of a potential intervention in the transport system, from an original assessment of the issues through to implementation and evaluation of a proposed scheme. The WelTAG process is separated into five stages, which are presented in **Figure 1-2**.

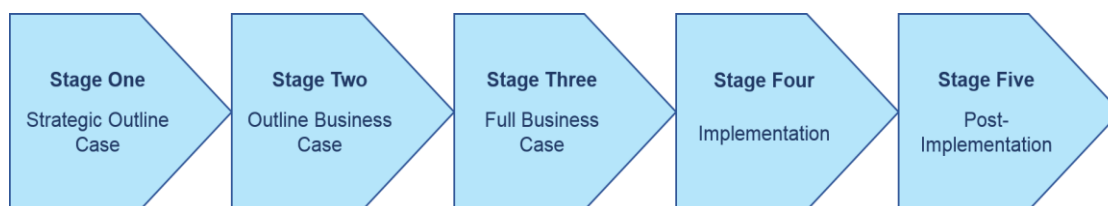


Figure 1-2 WelTAG Process

The purpose of WelTAG Stage One (Strategic Outline Case) is to explore the existing context, issues and opportunities related to a proposed intervention in the transport system. The key outcome of a WelTAG Stage One study is to clearly define and understand the problem in order to make the case for change. It also forms the basis for setting a clear set of objectives for the scheme and is the starting point for developing a well-documented and robust evidence base.

As part of WelTAG Stage One, a long-list of potential transport and non-transport intervention options should be developed and appraised, with a refined or preferred short-list of options taken forward to Stage Two (Outline Business Case) for further analysis. In line with WelTAG, this Stage One report is broadly structured in the context of the 'Five Cases' model, which is a function used by the Welsh Government and HM Treasury for projects requiring public sector funding. The Five Cases are as follows:

- **Strategic Case** – assessment of the need for change in the transport network, through examination of the existing and future scenario within the scheme area. Once the transport problems have been identified and considered in the context of the Well-being of Future Generations (Wales) Act, the strategic case describes the process of setting Transport Planning Objectives (TPOs) and developing a long-list of options to address the identified transport problems and meet the TPOs;
- **Transport Case** – an evidence-based assessment to discover whether the proposed options provide good public value for money. As part of the transport case, the potential interventions will need to be investigated in the context of social and cultural, environmental and economic impacts, as well as the Well-being of Future Generations (Wales) Act;
- **Delivery Case** – an overview of the delivery arrangements for the potential interventions, inclusive of the proposed procurement, construction and on-going operation of the options. The delivery case summarises whether each of the potential interventions are deliverable;
- **Financial Case** – details of the proposed funding mechanisms of the potential interventions and whether the long-term financial viability of each option is acceptable. The financial case summarises whether each of the potential interventions are considered affordable; and
- **Commercial Case** – description of the option aspects which determine whether each option is commercially viable. The commercial case will also specifically detail the relationship of the options with the private sector.

The amount of detail required for each of the Five Cases at different stages of the WelTAG process varies; with the requirement to complete all Cases by the end of WelTAG Stage Three. As part of WelTAG Stage One it is considered that the strategic case will be well developed, with initial assessments undertaken as part of the transport case to inform the identification of a short-list of options.

This WelTAG Stage One study follows the principle of proportionate appraisal and at the early stages of the scheme development presents a largely qualitative appraisal of potential options. It is intended to provide key stakeholders and decision makers with a greater understanding of the problems and potential options.

This WelTAG Stage One report provides a summary of the assessment work undertaken to develop a short-list of options, with further details as to the process of assessment provided within the accompanying 'A48 Cross Hands to Pensarn – Impact Assessment Report'.

1.3. Well-being of Future Generations (Wales) Act

The Well-being of Future Generations (Wales) Act 2015 requires public bodies to consider the long-term impact of decision-making, to ensure that no development will adversely impact the well-being of future generations. The Act plays a fundamental role in shaping WelTAG, with the guidance updated in 2017 to provide clarity as to how WelTAG studies should explicitly consider the well-being of future generations within the development and appraisal of potential interventions.

WelTAG outlines that the five ways of working, as set out in the Well-being of Future Generations (Wales) Act 2015, are required to be followed in order to ensure the sustainability of any potential intervention. This WelTAG Stage One has been developed in line with the five ways of working, which are illustrated in **Figure 1-3**, as explained in the accompanying 'A48 Cross Hands to Pensarn – Impact Assessment Report (IAR)'.

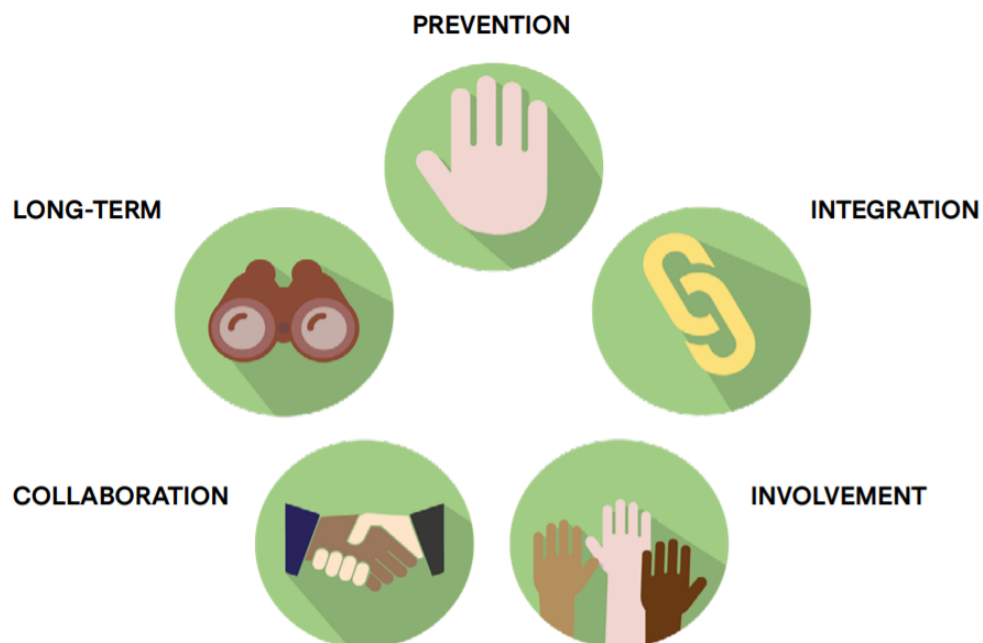


Figure 1-3 Well-being of Future Generations (Wales) Act – Five Ways of Working

Further to the five ways of working, the Well-being of Future Generations (Wales) Act 2015 identifies seven national well-being goals to ensure the sustainability of development and to safeguard the well-being of future generations. In addition to the national well-being goals, all public bodies are required as part of the Act to develop a set of local well-being goals to supplement the national goals. Further consideration of the national and local well-being goals is provided in **Chapter 2** of this report.

Atkins have developed the WellApp Framework, a Well-being of Future Generations (Wales) Act Appraisal Framework that sets out the required considerations from the Act at the different stages of WelTAG, provided in summary in **Figure 1-4**.

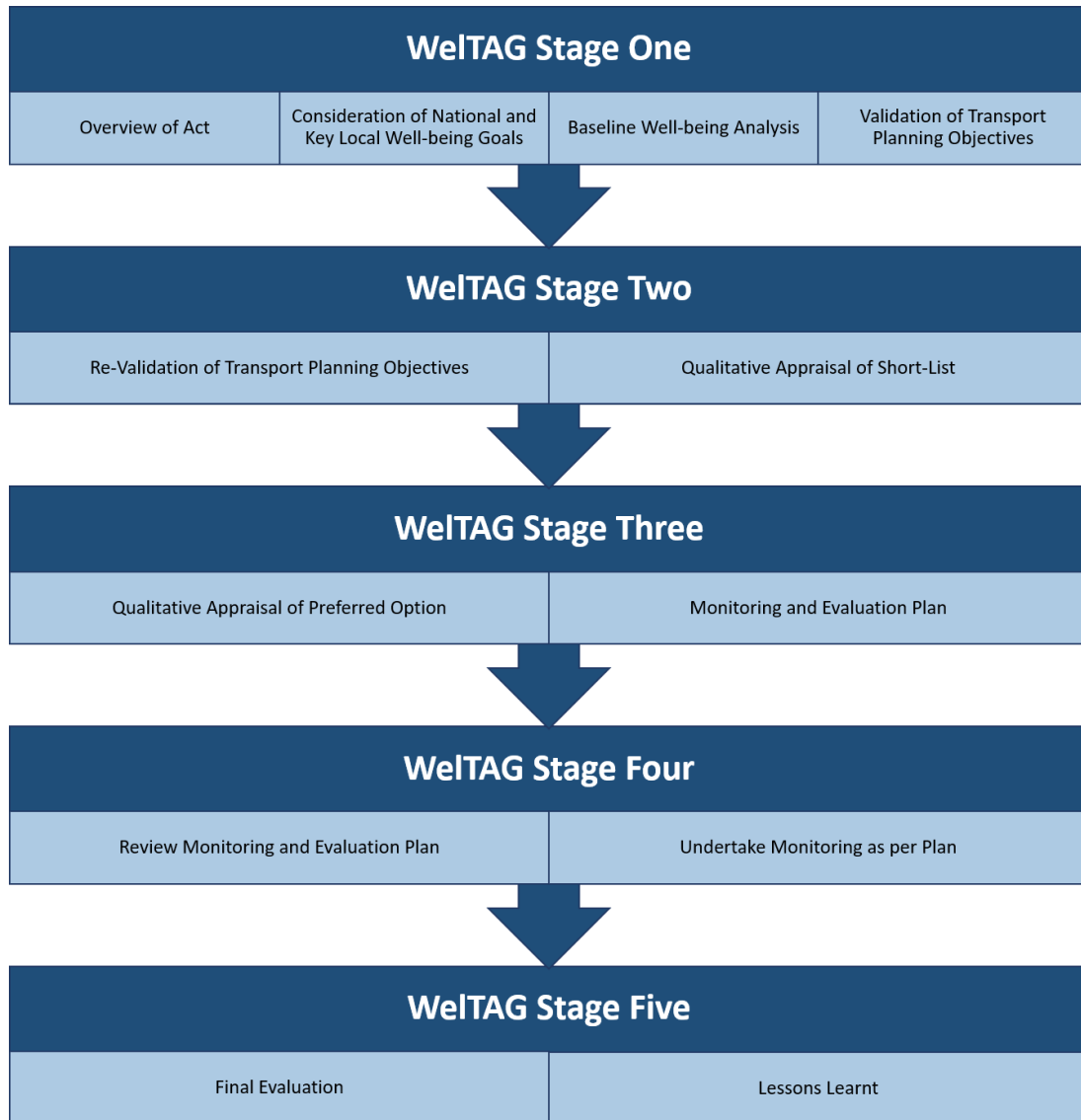


Figure 1-4 WellApp Framework

1.4. Structure of Report

This WelTAG Stage One report is structured in accordance with the Five-Cases model, in order to provide decision-makers with confidence that there is an established need for a scheme, and appropriately evidence at what potential interventions may be required to address this need. This WelTAG Stage One report is therefore structured as follows:

- **Chapter 2** sets out the **Strategic Case** which: identifies the transport problems, sets the study objectives and introduces the long-list of potential interventions;
- **Chapter 3** presents the **Transport Case** which: assesses the long-list of options against the Transport Planning Objectives and well-being goals, and considers a short-list of options for further consideration;
- **Chapter 4** summarises a framework for the **Delivery, Financial and Commercial Case** which, in accordance with WelTAG guidance will be developed in more detail at WelTAG Stage Two and Three; and

- **Chapter 5** recommends **Next Steps** for the study, with reference to appropriate work packages and potential delivery arrangements.

2. **Strategic Case**

2.1. **Overview**

This Chapter reviews the Strategic Case for Change within the A48 Cross Hands to Pensarn scheme area, providing an understanding of the appraisal area, the current transport patterns and perceived transport problems (TPRs). It also considers local and strategic planning data to understand future conditions which may exacerbate, or introduce new, transport problems.

In addition to identifying the Strategic Case for Change, this Chapter identifies a set of TPOs that will be used to frame the assessment of long-list options, which will also be identified as part of this Chapter. It is demonstrated within this Chapter that in combination the TPOs address the transport problems identified and achieve the national and local well-being goals.

Further details as to the assessment work undertaken to support this Chapter is provided within the accompanying IAR.

2.2. **Appraisal Area**

The A48, as part of the trunk road network, is an important transport corridor in south-west Wales connecting Swansea to Carmarthen via Cross Hands. The A48 is a strategically important route which connects international ferry ports and west Wales with the M4 motorway. The majority of the A48, between Carmarthen and Pont Abraham is an all-purpose dual two lane (D2AP) carriageway. The cross-section broadly consists of the standard components of a D2AP road¹, though is unlit in places and is characterised by some lengths of variable gradient, particularly on the western approach to the Nantycaws junction.

The scheme area is the section of the A48 which connects the Pensarn Roundabout to the Cross Hands Roundabout. This section is primarily rural in nature with several farms, small residential settlements and local businesses abutting the A48. The approximate length of this section is 18km (11 miles) and is subject to the National Speed Limit (70-mph).

To the south of the scheme area, the Cross Hands Economic Link Road (ELR) is currently under construction to link the A48 to the south of Cross Hands to the A476. The Cross Hands ELR scheme could potentially reduce vehicular traffic through the Cross Hands Roundabout, improving the operational efficiency of the junction.

The junctions within the scheme area include a grade separated junction at the National Botanical Gardens, 12 priority intersections and two large roundabouts at the eastern and western ends of the scheme area.

¹ As presented within Figure 2.1.1N1e in CD127 (DMRB 2020). Note, no detailed checks of whether the carriageway measurements are to standard have been undertaken at this stage.

The scheme area can be characterised as follows:

- High-speed dual carriageway linking the key regional areas of Carmarthen and Llanelli / Swansea. The scheme area also acts as a key link to the strategic ports of Fishguard, Pembroke Dock and Milford Haven, carrying a significant proportion of heavy-duty vehicles (HDVs); and
- There is limited active travel provision along the majority of the scheme area, this is due to the nature of the A48 as a high-speed trunk road which runs mainly through rural areas and provides little local connectivity.

2.3. Policy Context

The policy documents considered of relevance to this WelTAG Study include:

- National:
 - Welsh Language Act (1993)²;
 - Planning Policy Wales (Edition 10, December 2018)³;
 - Technical Advice Note 18: Transport⁴;
 - Wales Transport Strategy⁵;
 - National Transport Finance Plan 2018 Update⁶;
 - Prosperity for All: Economic Action Plan⁷;
 - Prosperity for All: A Low Carbon Wales⁸;
 - Active Travel (Wales) Act⁹;
 - Well-being of Future Generations (Wales) Act¹⁰; and
 - Transport Fit for Future Generations¹¹.
- Regional:
 - Swansea Bay City Deal¹²; and
 - Joint Transport Plan for South West Wales (2015-2020)¹³.

² Welsh Government (1993) *Welsh Language Act*. Available online: <http://www.legislation.gov.uk/ukpga/1993/38/contents>

³ Welsh Government (2018) *Planning Policy Wales*. Available online: <https://gov.wales/sites/default/files/publications/2018-12/planning-policy-wales-edition-10.pdf>

⁴ Welsh Government (2007) *Planning Policy Wales – Technical Advice Note 18: Transport*. Available online: <https://gov.wales/sites/default/files/publications/2018-09/tan18-transport.pdf>

⁵ Welsh Government (2008) *The Wales Transport Strategy*. Available online: <https://gov.wales/sites/default/files/publications/2017-09/wales-transport-strategy.pdf>

⁶ Welsh Government (2018) *National Transport Finance Plan 2018 Update*. Available online: <https://gov.wales/sites/default/files/publications/2019-05/national-transport-finance-plan-2018-update.pdf>

⁷ Welsh Government (2017) *Prosperity for All: Economic Action Plan*. Available online: <https://gov.wales/sites/default/files/publications/2019-02/prosperity-for-all-economic-action-plan.pdf>

⁸ Welsh Government (2019) *Prosperity for All: A Low Carbon Wales*. Available online: https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf

⁹ Welsh Government (2013) *Active Travel (Wales) Act*. Available online: <http://www.legislation.gov.uk/anaw/2013/7/contents/enacted>

¹⁰ Future Generations Commissioner for Wales (2015) *Well-being of Future Generations (Wales) Act 2015*. Available online: <https://futuregenerations.wales/about-us/future-generations-act/>

¹¹ Future Generations Commissioner for Wales (2018) *Transport Fit for Future Generations*. Available online: <https://futuregenerations.wales/wp-content/uploads/2018/11/20180912-Transport-Fit-for-Future-Generations-C-1.pdf>

¹² Swansea Bay City Deal (2017). Available online: <https://www.swanseabaycitydeal.wales/>

¹³ Swansea Council (2015) *Local Transport Plan*. Available online: <https://www.swansea.gov.uk/localtransportplan>

- Local:
 - Carmarthenshire Local Development Plan 2006-2021¹⁴.

A review of the relevant policy indicates that current policy trends emphasise the importance of transport improvement schemes to deliver delay and congestion benefits, without compromising the premise of sustainable development. On this basis, any delay or congestion benefits need to be considered in the context of improvements to public transport and active travel infrastructure, to ensure that use of the private car is not prioritised above other modes of travel. It is noted that the Joint Transport Plan for South West Wales, sets the aspirations within the region for significant public transport improvements through the delivery of the South West Wales Metro scheme.

It is considered that all policy documents are important in understanding the context of transport problems within the scheme area and have therefore been reviewed as part of the accompanying IAR. Notwithstanding, it is considered that the following two policy documents are of particular importance to understanding the context of the scheme area and development of potential interventions within the WelTAG framework.

2.3.1. Well-being of Future Generations (Wales) Act (2015)

National Well-being Goals

The Well-being of Future Generations (Wales) Act 2015 sets out the requirement for all public bodies to utilise the five ways of working (as set out in **Section 1.3**) and always consider the seven national well-being goals (WBGs) in decision-making. The seven national well-being goals are illustrated in **Figure 2-1** and set out as follows:

WBG1 – A Prosperous Wales

This well-being goal recognises the need for an ‘innovative, productive and low carbon society which recognises the limits of the global environment’, resulting in the efficient and proportionate use of resources (including acting on climate change).

Furthermore, the goal encourages the development of a ‘skilled and well-educated population in an economy which generates wealth and provides employment opportunities’, creating a society which allows the population to ‘take advantage of the wealth generated through securing decent work’.

WBG2 – A Resilient Wales

The ‘resilient Wales’ goal creates a vision for a nation which ‘maintains and enhances a biodiverse natural environment with healthy functioning ecosystems’. Furthermore, these ecosystems are envisaged to support ‘social, economic and ecological resilience and the capacity to adapt to change’, with specific reference made to climate change.

¹⁴ Carmarthenshire County Council (2014) *Local Development Plan 2006-2021*. Available online: <https://www.carmarthenshire.gov.wales/home/council-services/planning/planning-policy/local-development-plan-2006-2021/#.XeZqQui7SF4>

WBG3 – A Healthier Wales

The ‘healthier Wales’ goal centres on the vision for a ‘society in which people’s physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood’.

WBG4 – A More Equal Wales

This goal focuses on achieving equality through a ‘society that enables people to fulfil their potential no matter what their background or circumstances’. This includes, amongst other criteria, ‘their socio-economic background and circumstances’.

WBG5 – A Wales of Cohesive Communities

The ‘Wales of cohesive communities’ goal seeks to achieve ‘attractive, viable, safe and well-connected communities’ for future generations in Wales.

WBG6 – A Wales of Vibrant Culture and Thriving Welsh Language

This goal focuses on the retention and projection of culture through the use of the arts and the Welsh language. It states that the overall goal consists of a ‘society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation’.

WBG7 – A Globally Responsible Wales

This goal outlines the importance of improving the ‘economic, social, environmental and cultural well-being’ at a county-wide level in Wales. Furthermore, it promotes the ‘positive contribution to global well-being’ as a result of being economically, socially, environmentally and culturally responsible in Wales.

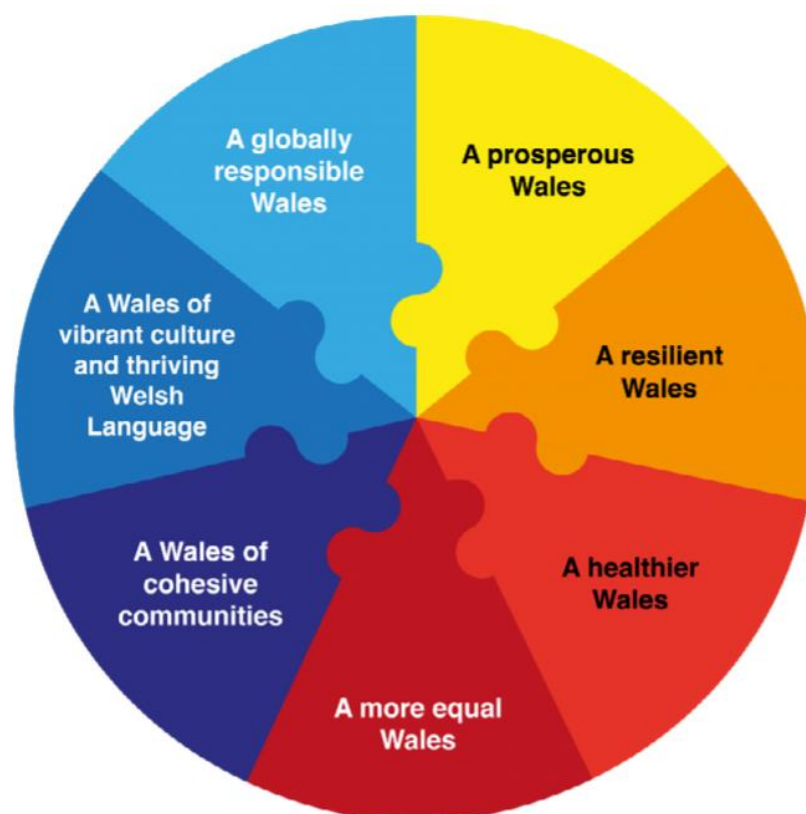


Figure 2-1 Well-being of Future Generations (Wales) Act – National Well-being Goals

Local Well-being Goals

In addition to the seven national well-being goals, the Well-being of Future Generations (Wales) Act 2015 sets out the requirement for all public bodies to adopt local well-being goals (LWBG) for their organisations. Within Carmarthenshire, as set out within the Carmarthenshire Well-being Plan¹⁵, the Carmarthenshire Public Services Board has identified the following four well-being goals for the county:

LWBG1 – Healthy Habits

Ensure people have a good life and make healthy choices about their lives and environment.

LWBG2 – Early Intervention

Make sure that people have the right help at the right time; as and when they need it.

LWBG3 – Strong Connections

Provide and maintain strongly connected people, places and organisations that are able to adapt to change.

¹⁵ Carmarthenshire Public Services Board (2018) *Carmarthenshire Well-being Plan: The Carmarthenshire We Want – 2018-2033*. Available online: <http://www.wales.nhs.uk/sitesplus/documents/862/Carmarthenshire%20Well-being%20Plan%20final%20290118.pdf>

LWBG4 – Prosperous People and Places

Maximise opportunities for people and places in both urban and rural parts of the county.

2.3.2. Carmarthenshire Local Development Plan 2006-2021

As part of the policy context review, a detailed interrogation of the Carmarthenshire Local Development Plan (LDP) has been undertaken to determine whether any allocated development sites could influence any proposed intervention within the scheme area; with more detail included within the IAR.

Within the current adopted LDP, there are several sites that have been allocated for significant development near the settlements of Carmarthen and Cross Hands and within the vicinity of the scheme area, as follows:

Carmarthen

- GA1/MU1 – Mixed-Use:
 - West Carmarthen – residential (1,100 units), employment, community facilities and amenities.
- GA1/MU2 – Mixed-Use:
 - Pibwrlwyd – employment, leisure and education uses.
- GA1/H1 – Residential:
 - Penymorfa – 180 units.

Cross Hands

- GA3/MU1 – Mixed-Use:
 - Cross Hands West – residential (220 units), retail, health care, community facilities and amenities.
- GA3/MU2 – Mixed-Use:
 - Emlyn Brickworks – residential (250 units), community facilities and amenities.
- GA3/E7 – Employment uses.

In addition to the major allocations in Cross Hands and Carmarthen, there are a number of minor allocations within the settlements adjoining the scheme area, though it is not considered that they would result in a significant change in existing traffic patterns.

2.4. The Transport Problem (Case for Change)

2.4.1. Background Reports

A number of studies have previously been undertaken considering a range of issues, which are relevant to this section of the A48, which are summarised within the IAR. The A48 reports investigated potential road safety concerns within the scheme area, with all reports providing recommendations that safety schemes are required to address the issues identified. Of particular note, the A48 Nantycaws Junction Improvements Feasibility Study identified that four potential grade-separated could have a significant benefit to road safety in the vicinity of the Nantycaws junction. Despite this, it is noted that no schemes have been progressed further from any of the A48 reports.

It is also noted that a WelTAG Stage One study was completed in July 2019 for the western end of the M4 corridor between junctions 35 and 49. Although not of direct relevance to the scheme area, it is considered that some of the interventions identified as part of this WelTAG Stage One study could be complimentary to the measures identified in the M4 J35 Pencoed to J49 Pont Abraham report.

2.4.2. Highway Network

The A48 between Carmarthen and Pont Abraham is an all-purpose dual two lane (D2AP) carriageway, with a central reserve in place throughout. This study considers a total of 15 junctions, inclusive of the Pensarn and Cross Hands Roundabouts, located along the A48 within the scheme area.

A summary of the 15 junctions considered as part of this study is provided in **Table 2-1**, with the locations of the junctions illustrated in **Figure 2-2**.

Ref.	Name	Description	Ref.	Name	Description
J1	Pensarn Roundabout	Four-Arm Signalised Roundabout	J9	Bancysych	Priority All Movement Junction
J2	Kings Oak / Penyrcoed	Priority All Movement Crossroad	J10	Llanddarog	Priority All Movement Junction
J3	Nantycaws	Priority All Movement Staggered Crossroad	J11	Pant-y-Ffynnon	Priority All Movement Junction
J4	Ffynnon Las	Priority All Movement Crossroad	J12	National Botanic Gardens	Grade-Separated Left-in / Left-out Slips
J5	Nantycaws Filling Station	Left-in / Left-out Slips	J13	Foelgastell / Llanarthne	Priority All Movement Staggered Crossroad
J6	Carmarthen Landfill Site	Priority All Movement Junction	J14	Maesybont	Priority All Movement Junction
J7	Gelli Uchaf	Priority All Movement Crossroad	J15	Cross Hands Roundabout	Six-Arm Roundabout
J8	Tir-Eithin / Cwmisfael	Priority All Movement Staggered Crossroad			

Table 2-1 List of Junctions**Figure 2-2** Scheme Area and Locations of Junctions

At either end of the scheme area, large at-grade roundabouts are provided. At the western end, the Pensarn Roundabout is a four-arm signalised junction that links the A48 and A40 trunk roads with the A484, acting as the south-eastern access point to Carmarthen. At the eastern end, the Cross Hands Roundabout is a six-arm unsignalised junction that links to a range of employment / retail developments and the A476, which links to Llandeilo in the north and Llanelli in the south.

It is pertinent to note that to the south of the Cross Hands Roundabout, CCC are currently developing the 'Cross Hands Economic Link Road', which will link the A476 in the north to the A48 via the existing grade separated junction. It is expected that the introduction of this new link road will reduce the demand on movements between the A48 South and A476 North arms of the Cross Hands Roundabout, which could alleviate some of the existing capacity constraints at the junction.

2.4.3. Resilience

In the occurrence that a collision occurs within the scheme area, SWTRA have designated diversion routes for traffic from the A48, with the official routes following the trunk road network. In addition to the official diversion routes on the trunk road network, there are informal routes available that utilise the county road network, however it is noted that these are not managed by SWTRA.

It is considered that there is a lack of an alternative principal route available between Nantycaws and Llanddarog. It has also been identified that the only alternative A-road options adjacent to the scheme area require drivers to divert via Kidwelly and Llanelli (A484) to the south, or the A40 and Llandeilo to the north. There are potential B-road routes that may be informally used by drivers between Carmarthen and Cross Hands, which do provide more direct routes than the A-road alternatives, however it is not considered that these routes are suitable to accommodate a notable increase in traffic demand from vehicles re-routing from the A48.

2.4.4. Journey Times

Indicative journey time surveys have been undertaken along the scheme area, with the journey time results are presented in full within the IAR.

The journey time surveys indicate that the total journey time through the scheme area is broadly comparable in an eastbound and westbound direction, and correlates to an average speed of over 60-mph during the IP, which is reasonable considering the need to accelerate and decelerate at either end of the scheme area.

During the AM peak hour, it is considered that the scheme area journey times are broadly comparable to the IP scenario, in both directions, suggesting limited congestion within the scheme area during the AM peak hour.

In an eastbound direction, it is noted that the journey time during the PM peak was higher than the IP, with an increase of approximately 30 seconds. This increase in journey time was due to a slightly larger queue forming on the approach to the Cross Hands Roundabout. In a westbound direction, the journey times are broadly consistent between the IP and PM. On this basis, it is considered that delays are typically higher eastbound during the PM peak, due to congestion at the Cross Hands Roundabout.

It is acknowledged that these journey time surveys have been undertaken during school term time, and therefore do not account for spikes in demand which may result from tourism traffic accessing Carmarthenshire and parts of Wales further west; and seasonality may need to be considered in more detail at the next WelTAG stage. A review of Trafficmaster data has been undertaken to gain an understanding of whether journey times could be affected. As **Figure 2-3** indicates, there could be some congestion at the major interchanges within the route, which could increase overall journey times within the scheme area at periods of peak tourism.

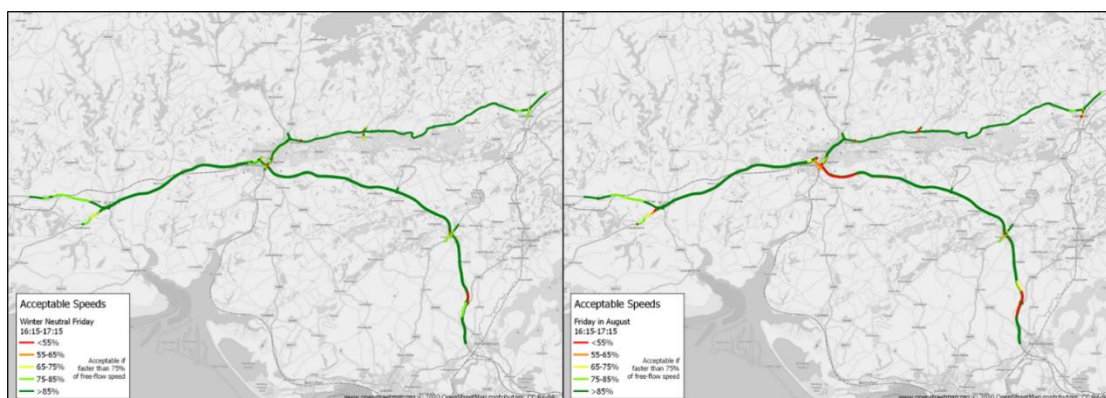


Figure 2-3 Trafficmaster – Winter and August Friday Scenarios

2.4.5. Walking and Cycling

Health Trends

According to Public Health Wales¹⁶, 60% of adults and over 25% of children are currently overweight or obese in Wales.

It is considered that this existing issue is exacerbated by a lack of physical activity, with only 53.7% of people in Wales reporting to undertake more than the recommended 150 minutes of physical activity in a week. To increase physical activity, it is considered that a comprehensive, safe and convenient active travel network can facilitate a modal shift towards active travel modes, which has the benefit of increasing physical activity. This WelTAG Stage One study has been undertaken within this context.

Infrastructure Provision

There is no designated walking or cycling infrastructure along the A48 between the Pensarn and Cross Hands Roundabouts, with the exception of the short sections of footway near the bus stops and within the laybys. This being said, it is understood that it is not illegal to walk along or cross the trunk road within the scheme area, as there is no signage to restrict pedestrians and no traffic regulation orders have been identified during consultation with SWTRA.

¹⁶ Public Health Wales (2019) *Obesity in Wales*. Available online: http://www.publichealthwalesobservatory.wales.nhs.uk/sitesplus/documents/1208/ObesityInWales_Report2018_v1.pdf

Due to the nature of the A48 as a high-speed trunk road of strategic importance, and the fact that the areas abutting the study area are primarily rural in nature, it is considered that walking and cycling infrastructure is not a key requirement along this section. However, it is considered that any intervention within the scheme area should not act as a barrier to walking and cycling, unless a safety concern is identified.

The CCC Active Travel Existing Route Map (ERM) has identified a cycle track along Cefneithin Road which intersects the scheme area via an underbridge located approximately 750m from the Cross Hands Roundabout. In addition, route 47 (Newport to Fishguard) of the National Cycle Network (NCN) is provided along the B4310 in the vicinity of the National Botanic Gardens junction (J12), intersecting the scheme area via an underbridge.

The CCC ERM also identifies a shared pedestrian and cycle path that intersects the scheme area in the vicinity of the Pensarn Roundabout. This provision is via a pedestrian subway that runs below the A48 approach to the junction. The location of where the existing active travel infrastructure intersects the scheme area is provided in **Figure 2-4**.



Figure 2-4 Existing Active Travel Provision

No new walking and cycling routes along the scheme area have been identified in CCC's Active Travel INM. This is to be expected as the primary focus of the INM is to connect key trip attractors such as employment areas to residential areas. The rural nature of the scheme area means that this key aim would not be satisfied, while the distances between settlements and the notable gradient changes may also make it unsuitable for active travel infrastructure.

Although there are no new walking and cycling routes identified within the scheme area, there is a proposed shared-use path identified parallel to the A48 in the vicinity of Cross Hands¹⁷. This new route (CH13) is proposed to link between the A476 in the south (west of the Cross Hands Roundabout) to Cefneithin Road in the north, through the Cross Hands West (GA3/MU1) strategic development site.

There are also a number of Public Rights of Way (PRoW) which are located off the A48 between Cross Hands and Pensarn, all of which are public footpaths, presented in **Figure 2-5**.



Figure 2-5 Public Rights of Way Crossover Locations

There are a number of crossing points for active travel users along the scheme area of varying degrees of safety. It is not considered that the vast majority of the PRoW are well used, with significant overgrowth and poor signage provided.

Further consideration for the active travel provision and existing PRoW within the scheme area is provided in the HD42/17 ('Walking, Cycling and Horse-Riding Assessment and Review')¹⁸ which is appended to the IAR.

2.4.6. Public Transport

Bus

There are a total of four bus stops located within the A48 scheme area, with eastbound / westbound stops located between the Ffynnon Las (J4) and Tir-Eithin / Cwmisfael (J8) junctions. The locations of the bus stops are presented in **Figure 2-6**.

¹⁷ Carmarthenshire County Council (2017) *Cross Hands INM*. Available online: <https://www.carmarthenshire.gov.wales/media/1213263/cross-hands-1-inm.pdf>

¹⁸ It is noted that a later version of the guidance has been issued (CC142); however, it is understood that Welsh Government are yet to formally adopt this guidance and therefore HD42/17 has been utilised.



Figure 2-6 Location of Bus Stops

All four bus stops include a bus layby, with the westbound stop near the Tir-Eithin / Cwmisfael (8) junction also including a shelter and easy access kerbing. Whilst it is noted that a bus layby is provided, no detailed measurements have been undertaken at this stage. The laybys are approximately 50m in length, with buses needing to reduce their speeds significantly on the A48 mainline before accessing the layby.

With regards to pedestrian access to the bus stops, there are currently footways located adjacent to the A48 within the vicinity of the bus stops. The pedestrian footways run adjacent to the A48 between the bus stops and dedicated uncontrolled crossing locations. It is considered that the uncontrolled nature of the crossing provision on a high speed road could potentially deter pedestrians from accessing the bus stops, though this has not been raised during stakeholder consultation.

The bus service provision is presented in more detail within the IAR, with the routing of the bus services presented within **Figure 2-7**. It should be noted that two of the bus services, services 129 and T1s, make cross-carriageway manoeuvres within the scheme area.

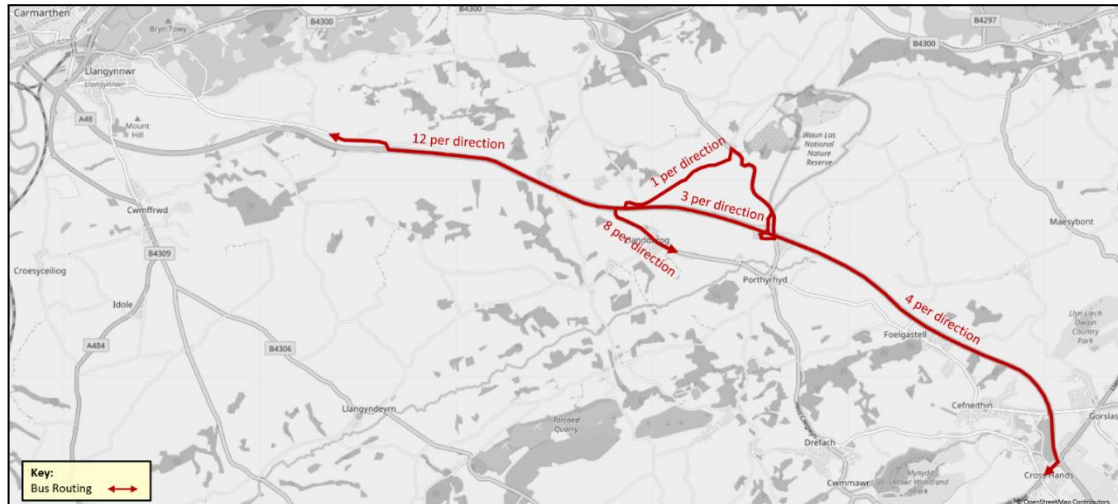


Figure 2-7 Scheme Area – Bus Routing

Rail

Carmarthen Railway Station is the nearest railway station to the scheme area and is located approximately 500m to the north of the Pensarn Roundabout. The station is managed by Transport for Wales (TfW) and provides access to regular services including the Milford Haven – Manchester line which calls at popular destinations such as Cardiff to the east, there are up to two services per hour.

2.4.7. Laybys

In addition to the bus laybys described in **Section 2.4.6**, there are a total of eight eastbound laybys and six westbound laybys provided within the scheme area. The locations of the laybys within the scheme area are provided in **Figure 2-8**.



Figure 2-8 Location of Laybys

A review of the laybys within the scheme area has been undertaken and is presented in full within the IAR. It has identified that the existing facilities do not adhere to the current guidance set out within the Design Manual for Roads and Bridges (DMRB) CD169¹⁹ document. It is identified within the guidance that for dual carriageway roads, a segregation island is required between the laybys and traffic lanes. On the basis that no layby within the scheme area provides a segregation island, all laybys are non-compliant with the standards set out in DMRB CD169 for new laybys.

2.4.8. Collision Data

Overview

Collision data has been obtained for the scheme area, covering the most recent five-year period from September 2013 to October 2018. In order to assist in the interpretation of the collision data, three areas of analysis have been derived for assessment purposes, as shown in **Figure 2-9** and summarised as follows:

- Pensarn Roundabout;
- A48 Scheme Area; and
- Cross Hands Roundabout.

It should be noted that the collision data only records collisions resulting in a casualty and therefore does not capture damage-only collisions and near misses experienced within the scheme area. No damage only hot spots have been identified within the scheme area in consultation with the SWTRA networks team.



Figure 2-9 Collision Data – Areas of Analysis

A detailed review of the collision data is presented within the IAR, with a summary provided below. The total recorded collisions within the scheme area is provided in **Table 2-2**.

¹⁹ Design Manual for Roads and Bridges (2019) *The design of laybys, maintenance hard standings, rest areas, service areas and observation platforms*. Available online: <http://www.standardsforhighways.co.uk/ha/standards/dmrbl/vol6/section3/CD%20169%20The%20design%20of%20laybys%20web.pdf>

Area of Analysis	Severity			Total
	Slight	Serious	Fatal	
Pensarn Roundabout	11	1	0	12
A48 Scheme Area	40	10	3	53
Cross Hands Roundabout	26	1	1	28
Total Scheme Area	77	12	4	93

Table 2-2 Collision Data Summary

During the assessment period, a total of 93 collisions were identified within the scheme area. This is considered a significant number of collisions along an 18km section of rural dual-carriageway, despite being inclusive of two major at-grade roundabouts. Of the collisions, the vast majority (83%) were slight in severity, with 12 serious collisions (13%) and four fatal (4%) also identified.

Pensarn Roundabout

No fatal collisions were identified within the Pensarn Roundabout assessment area, while one serious collision was identified, occurring on the northern approach of the Roundabout (A40). The collision (ref: AC30613) involved four vehicles and two casualties and it was considered to be caused by driver error.

A48 Scheme Area

A total of three fatal collisions were recorded within this section of the scheme area. In terms of the fatal collisions, one collision (ref: AC38013) could potentially be directly be attributed to the layout of the existing highway network; with the issue of having to cross a carriageway with vehicles travelling at high speeds likely to be the cause of the collision. It is noted that another fatal collision (ref: AC24814) included a pedestrian who was reported to be walking along the verge of the A48. Although it is unknown how the pedestrian collided with multiple vehicles, the pedestrian was not in violation of any laws through utilising the verge. The final fatal collision related to driver error and it is not considered that the layout of the A48 had any major role in contributing to the collision.

In addition to the fatal collision, a total of 10 serious collisions were recorded within this section of the scheme area. Of the serious collisions, it is considered that a total of four collisions were related to movements at the junctions within the scheme area; three of which were related to right-turn movements, with all three recorded either at the Nantycaws (J3) or Carmarthen Landfill Site junctions (J6). The other serious collision at a junction, was recorded at the National Botanic Gardens junction (J12) and can be attributed to a misjudgement in the length of the westbound off-slip.

Five of the other six serious collisions are considered typical of dual-carriageway collisions, with driver error the primary collision causation. The majority of these serious collisions were due to vehicles attempting to overtake in the outside lane and losing control. The final serious collision occurred at a layby within the scheme area.

A notable cluster of collisions is recorded at the Nantycaws junction (3) where 12 collisions were recorded across a 900m section of A48. The majority of collisions within this cluster are considered to be due to driver error, including excessive speed and lapses in concentration.

Cross Hands Roundabout

One fatal collision was recorded at the Cross Hands Roundabout, occurring on the northern arm of the junction (ref: AC18516). The fatal collision was due to the driver of the eastbound travelling vehicle suffering a medicinal issue on approach to the Cross Hands Roundabout and subsequently not stopping at the junction.

One serious collision was also identified in the vicinity of the Cross Hands Roundabout, occurring on the A48 eastbound to the north of the Cefneithin Road overbridge (ref: AC23715). The collision occurred as two vehicles collided when travelling down the hill on approach to the Cross Hands Roundabout. The collisions are therefore considered to be applicable to driver error.

Collision Rate

The collision rate used in the Department for Transport (DfT) Cobalt software²⁰ for an A-road dual carriageway, adjusted for the assessment years, translates to a rate of 7.8 per one hundred million vehicles kilometres (HMKM).

A review of the scheme area indicates that it has a comparable collision rate of 10.3 per HMKM, which translates to approximately 20 more collisions across the five-year assessment period than would be expected according to the Cobalt rate. It is therefore considered that the number of collisions within the scheme area is higher than would typically be expected for an A-road dual carriageway.

In addition, the collision data does not include the number of near misses experienced within the scheme area. It is considered that the number of near misses in this area is significant, due to the perceived safety issues and anecdotal evidence obtained during the site visits undertaken.

Seasonality

The collision data does not suggest that there is a significant increase in collision rates during the summer months compared to the winter, with 45% of collisions recorded during the summer. There is also a lower number of severe collisions, compared to the winter, although the total number of fatal collisions are evenly split between the winter and summer.

²⁰ Cost and Benefit to Accidents – Light Touch, used within business case development to identify the economic cost relating to collisions within a defined scheme area. Available online:
<https://www.gov.uk/government/publications/cobalt-software-and-user-manuals>

It is considered that collision rates are typically higher during the winter months due to the longer periods of darkness and typically more adverse weather conditions. This is reflected in the scheme area collision data, suggesting that an increase in tourist vehicle traffic is less of an influence on collision rates than typical seasonal factors.

Pont Abraham Roundabout to Cross Hands Roundabout Review

A range of road safety measures, including restrictions to some cross-carriageway manoeuvres, were undertaken on the A48 between the Pont Abraham and Cross Hands Roundabouts in 2012. It is understood from stakeholder feedback that the implemented measures have had a beneficial impact on the road safety record along the route.

In order to assess the impact of the measures in further detail, the collision rate per HMV KM before and after the implemented measures has been reviewed. The collision rate calculations suggest that the measures have led to a reduction of approximately 25% in the number of collisions per HMV KM. On this basis, it is considered that the road safety measures implemented on the A48 between Pont Abraham and Cross Hands have improved road safety along the route.

2.4.9. Electric Vehicles

It is understood that both the Welsh Government and CCC are developing electric vehicle strategies, to encourage and facilitate further usage of electric vehicles. On this basis, a review has been undertaken of the electric vehicle charging provision in the vicinity of the scheme area, which is described in full within the IAR.

The review has identified that there are currently limited electric vehicle charging opportunities in the vicinity of the scheme area, with no electric vehicle charging points provided within the scheme area itself.

2.4.10. Environment

In order to identify any environmental constraints within the scheme area, consideration has been given to:

- Air Quality;
- Noise;
- Flood Zones;
- Heritage Assets; and
- Environmental Sensitivity.

The following environmental constraints have been identified:

- There is a short section of the scheme area that has been identified as a noise priority area to the east of the Foelgastell / Llanarthne (J13) junction;
- There are three locations where a flood zone intersects the A48, although it is noted that the scheme area is not located in a large extent within a flood area;
- Although there are some heritage assets within the vicinity of the scheme area, it is noted that there are no heritage assets that direct adjoin the A48; and
- The scheme area adjoins a number of ancient woodland, with the most prominent ancient woodland located between the Kings Oak ./ Penycloed (J2) and Nantycaws (J3) junctions.

It should be noted that the scheme area does not form part of any existing air quality management area (AQMA), or exceed EU limit values, while it is also noted that there are currently no non-automatic monitoring sites within the scheme area²¹. It is however considered that an increase in traffic demand within the scheme area could potentially affect air quality and / or carbon emissions along the A48.

It is understood that, whilst not currently adopted, consideration will need to be given to relevant DMRB guidance documents on the requirements for an environmental assessment as the WelTAG process develops²²; particularly noting LA105 (Air Quality), LA111 (Noise and Vibration), and LA114 (Climate Change). This being said, it is considered that the TPOs are an effective assessment framework at this stage of WelTAG, as there is currently a significant level of uncertainty relating to the potential interventions, which represent a sufficient proportional assessment in accordance with DMRB LA101.

2.4.11. Journeys to Work

Census 2011 data has been interrogated in order to assess the existing journeys to / from work via the A48. According to the data, there is a reasonably significant demand within the scheme area for commuting journeys, with approximately three thousand eastbound commuters and approximately five thousand westbound commuters recorded. Of the commuting journeys, there is a larger demand for westbound commuters (towards Carmarthen), although the eastbound demand is also relatively significant.

²¹ Carmarthenshire County Council (2018) *2018 Air Quality Progress Report*. Available online: <https://www.carmarthenshire.gov.wales/media/1219553/2018-annual-progress-report-ccc.pdf>

²² Standards for Highways, Design Manual for Roads and Bridges (2019) *Sustainability and Environment*. Available online: https://www.standardsforhighways.co.uk/dmrB/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT

In addition to the number of commuting journeys undertaken, the Census 2011 data also provides an indication of the modal split of commuters travelling east or west. The Census 2011 data demonstrates that the vast majority of commuting journeys in the area surrounding the scheme area are made by the private car. It is therefore considered that there is currently a significant reliance on the private vehicle for work journeys eastbound and westbound through the scheme area.

2.4.12. Traffic Flow

In order to understand the existing traffic flow patterns within the scheme area, the following sources of data have been interrogated:

- DfT – Annual Average Daily Traffic (AADT) Data;
- Traffic Wales – Permanent Traffic Counters; and
- Traffic Survey Data (2016).

Department for Transport Data

The DfT traffic data identifies that there is a gradual increase in traffic data observed within the scheme area since 2014. It is also noted that traffic flows are typically slightly larger in the western section of the scheme area, compared to the eastern section.

There are no clear trends associated with the proportion of HDV traffic (%HDV) that have been identified, although it is noted that the %HDV is slightly larger in 2018 than 2014. On average, across the scheme area, it is considered that the typical daily %HDV is in the region of 6-7%.

Traffic Wales Data

Weekdays

The average weekday Traffic Wales traffic data demonstrates that there are two distinct westbound peak periods during the AM and PM; in line with typical highway network conditions. It is however noted that there is a limited AM peak period in an eastbound direction, with traffic flows generally increasing during the IP, before peaking during the PM period.

During the AM peak period, it is noted that the westbound direction is the dominant movement, with the eastbound direction more prominent during the PM peak period. This suggests that drivers are predominantly commuting towards Carmarthen for work, with a less prominent flow of commuting traffic in the other direction.

It is also noted that the westbound traffic flows at the eastern Traffic Wales site are slightly larger than the western site, which suggests that a number of vehicles exit the A48 between the two sites. It is likely that the difference in traffic flow is due to drivers exiting the A48 at the Nantycaws junction, in order to bypass the Pensarn Roundabout and access the eastern and central areas of Carmarthen.

Saturday

The average Saturday Traffic Wales data suggests that traffic flows within the scheme area are typical of Saturday conditions; with a steady increase in traffic recorded during the AM, peaking during the middle of the day and reducing during the PM. Although the hourly traffic flows recorded on a Saturday are lower than average weekdays, it is considered that the reduction is not as significant as is often noted for similar roads. As the reduction is not as significant as often noted, it suggests that there is not a considerable demand for commuting traffic within the scheme area.

It is considered that the relatively comparable Saturday to weekday traffic flow is likely attributable to considerable tourist traffic through the scheme area (due to the assessed months of April, May and June) increasing the traffic demand on Saturdays. This assertion is supported by the dominant traffic flow being in a westbound direction, towards Carmarthen and the wider tourist areas in south-west Wales.

Sunday

The recorded average Sunday traffic flows are typically lower than both the weekday and Saturday equivalent data. This being said, the Sunday traffic flows are generally typical of a Sunday traffic profile, although it is acknowledged that the eastbound peak period is later in the day than would typically be expected.

Similar to the Saturday traffic data, it is considered that tourist traffic plays a significant role in increasing traffic demand on Sundays within the scheme area. This is considered the case as the slightly later peak period is likely attributable to the large tourist traffic demand for travelling home following a break in south-west Wales over a weekend. The eastbound demand is also higher on a Sunday, conversely to the Saturday traffic data, suggesting that tourist traffic plays a significant role in traffic demand on a Sunday within the scheme area.

Monthly Variation

In order to compare the daily traffic flow variation by month and to investigate the impact of tourist traffic on demand, the Traffic Wales data has been further interrogated. As the traffic counter provides data for April – August, it is considered to provide a reasonable comparison between typical traffic flows and traffic flows during the peak summer month (August).

A summary of the daily traffic flow variation by month is provided in **Table 2-3**.

Month	Weekday			Saturday			Sunday		
	Ebd	Wbd	2-Way	Ebd	Wbd	2-Way	Ebd	Wbd	2-Way
April	12,084	14,051	26,135	10,129	13,181	23,310	11,748	9,810	21,558
May	11,708	13,248	24,956	9,145	12,411	21,555	10,580	9,755	20,335
June	11,580	13,755	25,334	10,694	12,308	23,001	12,561	9,560	22,121
July	11,645	14,207	25,851	10,455	13,662	24,117	11,925	10,194	22,119
August	12,972	14,654	27,626	11,811	15,191	27,002	12,778	11,416	24,195
Average	11,998	13,983	25,980	10,447	13,351	23,797	11,918	10,147	22,065

Table 2-3 Daily Traffic Variation April – August, 2010 (Traffic Wales Data)

As shown in Table 2-3, the largest daily traffic demand is recorded in August on weekdays, Saturdays and Sundays. Whilst the Traffic Wales data could indicate that traffic demand within the scheme area is increased by tourist traffic during the summer months, it should be noted that the data is over 10 years old and should therefore be treated with caution.

Traffic Survey Data

As part of the A48 Junctions Study Phase 2 (2017), manual classified turning count surveys were undertaken at the majority of the junctions within the scheme area. The traffic survey data did not capture data at the: Pensarn Roundabout (J1), National Botanic Gardens junction (J12) or Cross Hands Roundabout (J15); as well as the number of vehicles exiting the A48 at the Nantycaws Filling Station (J5).

The traffic survey data has been interrogated in order to review the demand on the minor arms and the number of cross-carriageway (right-turn) manoeuvres at each of the junctions within the scheme area; this review is presented within the IAR.

Minor Arm Demand

The turning count survey data shows that the largest minor arm demand within the scheme area is at the Nantycaws junction (J3). The demand at this junction is significantly larger than any other junction within the scheme area, with a significant demand recorded on a typical weekday and Saturday.

Although there is a lower demand than at the Nantycaws junction (J3); the Nantycaws Filling Station (to the A48 only) (J5), Carmarthen Landfill Site (J6), Llanddarog (J10) and Foelgastell / Llanarthne (Foelgastell arm only) (J13) junctions are shown to have a moderate to significant demand on a typical weekday. Of particular note, it is also identified that there is a significant demand for HDVs at the Llanddarog junction (J10), which can be partly explained by the routing of bus services to / from the minor arm of this junction.

The remainder of the junctions are not considered to have a notable existing traffic demand, although it is acknowledged that a number of the junctions have a moderate traffic demand on the minor arms.

Cross-Carriageway Manoeuvres

The traffic survey demonstrates, as the junction with the largest traffic demand, that the vast majority of movements into the Nantycaws (J3) minor arm are cross-carriageway manoeuvres; while only a small proportion of movements from the minor arm are cross-carriageway manoeuvres. This suggests that Heol Llangynnwr is currently utilised as a through-route towards the town centre and east Carmarthen, in order to bypass the Pensarn Roundabout.

In addition to the Nantycaws junction (J3), the vast majority of movements to the minor arm at the Llanddarog junction (J10) are made using cross-carriageway manoeuvres. The only other location where a significant demand occurs for cross-carriageway manoeuvres is to the minor arm at the Foelgastell / Llanarthne junction (Foelgastell arm only) (J13).

There is also considered to be a moderate to significant demand for cross-carriageway manoeuvres to the minor arm at the: Carmarthen Landfill Site (J6), Tir-Eithin / Cwmisfael (Tir-Eithin arm only) (J8) and Foelgastell / Llanarthne (Llanarthne arm only) (J13) junctions.

HDV Diurnal Profile

The HDV diurnal traffic profile does not suggest any significant fleeting of HDV movements within the scheme area, due to no major peaks in HDV movements.

2.4.13. Traffic Growth

TEMPro (Version 7.2) has been interrogated to investigate the potential level of traffic growth in the vicinity of the scheme area and to provide a comparison against the national average. The TEMPro analysis indicates that traffic growth in the vicinity of the scheme area (Carmarthen and Cross Hands) could be typically higher than the national average across Wales. In addition, the traffic growth is forecast to be typically higher in the vicinity of the scheme area than across Carmarthenshire

2.4.14. Stakeholder Engagement**Programme of Engagement**

The collaboration and involvement of key stakeholders is important throughout the whole WelTAG process, particularly with the five ways of working set out within the Well-being of Future Generations (Wales) Act 2015 in mind. On this basis, a programme of engagement with key stakeholders has been developed to inform this WelTAG Stage One study.

The programme of engagement included the provision of initial engagement packs to key stakeholders, agreed with SWTRA and Welsh Government, which requested information from the stakeholders on:

- The existing issues along the A48 between the Pensarn and Cross Hands Roundabouts and the experience of them;
- What is considered important in setting key objectives for a potential improvement scheme; and
- Any improvement options that should be considered as appropriate for the area.

The initial engagement packs distributed to key stakeholders is provided within the IAR.

Consultation Feedback

A total of 14 responses have been obtained as part of the programme of stakeholder engagement, with the respondents ranging from public sector bodies of national, regional and local scale to private sector organisations.

A summary of the key stakeholder responses to the initial engagement packs is provided in **Figure 2-10**, with the more common responses larger in scale.



Figure 2-10 Summary of Consultation Feedback

As shown in Figure 2-10, the following themes were particularly prevalent within the stakeholder feedback:

- **Cross-carriageway manoeuvres** – road safety concerns related to the right-turn movements at the minor junctions within the scheme area;
- **Road Safety** – a number of road safety concerns were raised, including slow moving HDVs, cross-carriageway manoeuvres, and movements to and from the Carmarthen Landfill Site the Nantycaws junction;
- **Carmarthen Landfill Site (J6)** – identified that slow moving HDVs in and out of the site causes significant road safety concerns to the drivers and wider road users;
- **Nantycaws Junction (J3)** – outlined that queueing often occurs back onto the westbound mainline at the Nantycaws junction and there is a high collision rate related to this and wider road safety concerns; and
- **Cross Hands Roundabout (J15)** – identified that congestion and confusing lane allocations increase the potential for collisions at the junction.

In addition to the general themes of feedback, a summary is provided within the accompanying IAR for the key stakeholders from: CCC, Welsh Government and SWTRA, TfW, the Carmarthen Landfill Site, Dyfed-Powys Police and Sustrans.

2.4.15. Summary of Transport Problems

On the basis of the review of the scheme area and engagement with key stakeholders, the perceived issues have been collated and packaged into a set of transport problems specific to the scheme area. The scheme area specific transport problems are summarised in **Table 2-4**.

Ref.	Transport Problem	Rationale
TPR1	Cross-carriageway manoeuvres.	The collision data and feedback from stakeholders has identified that there is an existing road safety issue associated with cross-carriageway manoeuvres at the junctions within the scheme area.
TPR2	Inadequate layout of minor road junctions within the scheme area (junctions 2-14).	In addition to the safety concerns associated with cross-carriageway manoeuvres, it has been identified that the length of the majority of slip-roads are inadequate, considering vehicles will be merging to the A48 where vehicle speeds are often at 70-mph.
TPR3	Sub-standard laybys.	All laybys within the scheme area are sub-standard (not compliant with CD169) and of limited length. Due to the length of the laybys, vehicles are required to significantly reduce their speeds in the nearside lane, which increases the potential for rear-shunt collisions.
TPR4	Limited safe and convenient bus infrastructure and services.	The routing and infrastructure provision for buses within the scheme area requires cross-carriageway manoeuvres and merging / diverging at high-speed to access and egress laybys. The use of this infrastructure available could be potentially challenging for bus operators and users due to the high-speed nature of the road. It is however acknowledged that there is currently limited demand for public transport within the scheme area.
TPR5	Inadequate provision for PRow crossing the A48.	The HD42/17 assessment has identified that there are a number of established PRow which cross the A48 via gaps in the central reserve. These routes are considered to be underutilised and dangerous for pedestrians.
TPR6	Peak period congestion at the Pensarn and Cross Hands Roundabouts, increasing the likelihood of collisions.	Typical traffic speed data and feedback from stakeholders suggests that there are often queues at the two main interchanges at either end of the study corridor. Stakeholder feedback has also noted that during times of congestion, collisions are more likely to occur due to the unclear lane allocations.
TPR7	Poor scheme area resilience.	Feedback from stakeholders has suggested that there is a lack of diversion and alternative routes which reduces the resiliency of the scheme area to deal with incidents such as collisions and closures of junctions.

Table 2-4 Transport Problems

It has also been noted that during holiday seasons there appears to be an increase in traffic associated with tourists and it is acknowledged that a number of stakeholders stated that the scheme area experiences 'high levels of tourism traffic'. However, it has not been established that tourism traffic presents a specific transport problem at this stage, with it being considered that tourism traffic exacerbates other identified problems (e.g. increases the safety risk with cross-carriageway manoeuvres). It is therefore considered that the issue of tourism traffic will be incorporated into the identified options to address the TPRs within Table 2-4 and investigated further at later stages of WelTAG to ensure that any intervention takes into account tourism traffic.

Consideration against Well-being Goals

The Well-being of Future Generations (Wales) Act is considered a key legislation that needs to be explicitly considered during the WelTAG process. On this basis, consideration has been given to how the identified transport problems impact on the national and local well-being goals.

In order to provide a comparative analysis, the impacts of the transport problems on each of the well-being goals have been scored using a three-point scale, as follows:

- Positive Impact (+) – green;
- Neutral Impact (0) – blue; and
- Adverse Impact (-) – red.

A summary of the impacts of the transport problems on the national and local well-being goals is provided in **Table 2-5**, with justification for the scoring provided within the IAR.

Well-being Goals		Transport Problems						
		TPR1	TPR2	TPR3	TPR4	TPR5	TPR6	TPR7
		Cross-carriageway manoeuvres.	Inadequate layout of minor road junctions within the scheme area (junctions 2-14).	Sub-standard laybys.	Limited safe and convenient bus infrastructure and services.	Inadequate provision for PRow crossing the A48.	Peak period congestion at the Pensarn and Cross Hands Roundabouts, increasing the likelihood of collisions.	Poor scheme area resilience.
WBG1	A Prosperous Wales	-	-	-	-	0	-	-
WBG2	A Resilient Wales	-	-	-	-	0	-	-
WBG3	A Healthier Wales	-	-	-	-	-	-	0
WBG4	A More Equal Wales	0	0	0	-	0	0	0
WBG5	A Wales of Cohesive Communities	-	-	0	-	-	-	-
WBG6	A Wales of Vibrant Culture and Thriving Welsh Language	0	0	0	0	0	0	0
WBG7	A Globally Responsible Wales	-	-	-	-	-	-	-
LWBG1	Healthy Habits	0	0	0	-	-	0	0
LWBG2	Early Intervention	0	0	0	0	0	0	0
LWBG3	Strong Connections	-	-	0	-	-	-	-
LWBG4	Prosperous People and Places	-	-	-	-	0	-	-

Table 2-5 Consideration of Transport Problems’ Impacts on Well-being Goals

2.5. Transport Planning Objectives

The setting of TPOs is outlined as a key output of the strategic case within WelTAG. On this basis, a set of five TPOs have been developed for the purpose of the A48 Cross Hands to Pensarn scheme area, based on the transport problems identified which were shown to have a significant adverse impact on the well-being of future generations.

The A48 Cross Hands to Pensarn TPOs, which were presented to SWTRA and Welsh Government at an interim progress meeting, are outlined in **Table 2-6**.

Ref.	Transport Planning Objective	Rationale
TPO1	Improve safety for vehicle users, without having a significant adverse impact on the environment.	There appears to be an existing safety concern, supported by collision statistics and anecdotal evidence from stakeholder feedback and observations during site visits.
TPO2	Minimise the safety risk for active travel users within the scheme area.	Whilst provision for active travel is limited, noting the function and purpose of the scheme area, it is considered that the presence of PRow across the A48 could lead to active travel demand on unsuitable road.
TPO3	Minimise impact on access, without having a significant adverse impact on the environment.	A number of minor junctions provide access to a small number of trip attractors, and it is important that a potential intervention minimises any adverse impact on access to goods and services.
TPO4	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	The assessment of existing conditions has indicated that there are instances of peak hour congestion at the key interchanges at each end of the scheme area; in addition to an increase in traffic demand, relating to tourist traffic, during the summer months. It is therefore considered that both instances of congestion are not exacerbated by any potential intervention.
TPO5	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.	There is an aspiration to develop a South-West Wales Metro, being driven by the four regional Local Authorities (including CCC), and it is considered important that any potential intervention allows for the future development of this strategic plan, in line with CCC's stakeholder feedback. In addition, it is understood that there is an emerging local and national Electric Vehicles Strategy, which any potential intervention should not act as a barrier to.

Table 2-6 Transport Planning Objectives

2.5.1. Validation of Transport Planning Objectives

The identified transport problems and well-being goals have been considered in the context of the TPOs. In order to provide a comparative analysis, the impacts of the TPOs on the transport problems and their contribution to the well-being goals have been scored using a three-point scale, as follows:

- Positive Impact (+) – green;
- Neutral Impact (0) – blue; and
- Adverse Impact (-) – red.

It is considered that the TPOs have been developed using the five ways of working, as set out within Section 1.3.

It is demonstrated that together, the TPOs address all identified transport problems and achieve all well-being goals. On this basis, it is considered that any intervention that achieves all TPOs will address the identified transport problems and achieve the well-being goals.

Validation Against Transport Problems

A summary of how the TPOs address the identified transport problems is provided in **Table 2-7**, with the justification provided within the IAR.

Transport Problems		Transport Planning Objectives				
		TPO1	TPO2	TPO3	TPO4	TPO5
		Improve safety for vehicle users, without having a significant adverse impact on the environment.	Minimise the safety risk for active travel users within the scheme area.	Minimise impact on access, without having a significant adverse impact on the environment.	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.
TPR1	Cross-carriageway manoeuvres.	+	0	0	0	0
TPR2	Inadequate layout of minor road junctions within the scheme area (junctions 2-14).	+	+	0	0	0
TPR3	Sub-standard laybys.	+	0	0	0	0
TPR4	Limited safe and convenient bus infrastructure and services.	+	+	+	0	+
TPR5	Inadequate provision for PRoW crossing the A48.	0	+	+	0	0
TPR6	Peak period congestion at the Pensarn and Cross Hands Roundabouts, increasing the likelihood of collisions.	+	0	0	+	0
TPR7	Poor scheme area resilience.	+	0	+	+	+

Table 2-7 Consideration of Transport Planning Objectives against Transport Problems

Validation Against Well-being Goals

A summary of how the TPOs can lead to a scheme achieving the well-being goals is provided in **Table 2-8**, with the justification provided within the IAR.

Well-being Goals		Transport Planning Objectives				
		TPO1	TPO2	TPO3	TPO4	TPO5
		Improve safety for vehicle users, without having a significant adverse impact on the environment.	Minimise the safety risk for active travel users within the scheme area.	Minimise impact on access, without having a significant adverse impact on the environment.	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.
WBG1	A Prosperous Wales	+	0	+	+	+
WBG2	A Resilient Wales	+	0	0	+	+
WBG3	A Healthier Wales	+	+	0	0	+
WBG4	A More Equal Wales	0	+	+	+	+
WBG5	A Wales of Cohesive Communities	+	+	+	+	+
WBG6	A Wales of Vibrant Culture and Thriving Welsh Language	0	0	0	0	0
WBG7	A Globally Responsible Wales	+	+	+	+	+
LWBG1	Healthy Habits	0	+	0	0	+
LWBG2	Early Intervention	0	0	+	+	+
LWBG3	Strong Connections	+	+	+	+	+
LWBG4	Prosperous People and Places	+	0	+	+	+

Table 2-8 Consideration of Transport Planning Objectives against Well-being Goals

2.6. Establishment of Long-List

It has been identified that there are seven key transport problems within the scheme area, which could potentially be exacerbated in the future without an intervention on the network. The TPOs have been developed to address the key transport problems identified, which have subsequently been used in the development of an options long-list.

The long-list options present a range of interventions that consider all modes of travel, in accordance with WelTAG. To assist interpretation and to reflect potential packages of intervention measures, the long-list options have been split into the 'intervention themes' illustrated in **Figure 2-11**.

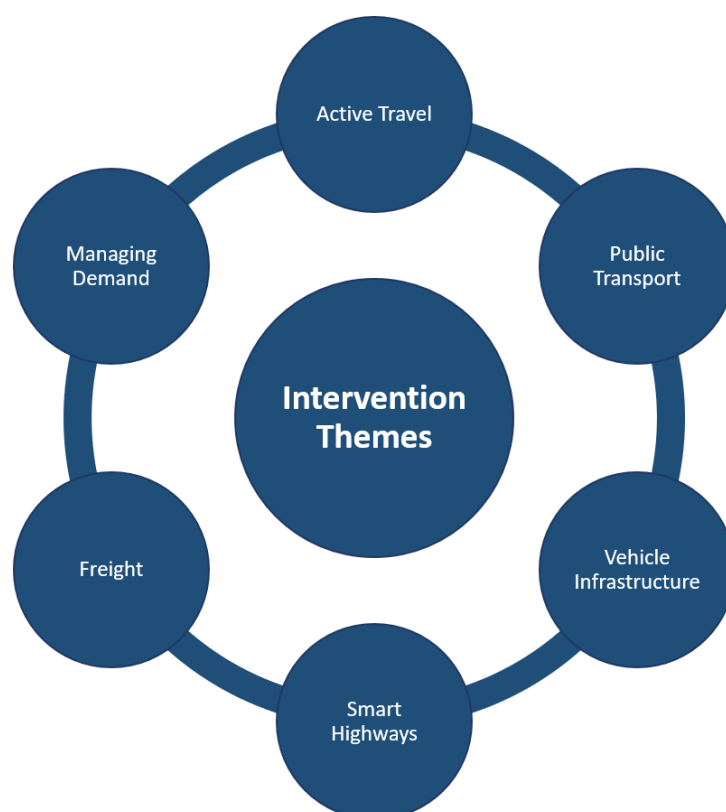


Figure 2-11 Intervention Themes – Long-List Options

2.6.1. Delivery Timescales

As part of developing the long-list options, consideration has been given to the potential timescale for delivery of each option, with reference to the following:

- Short-Term (ST) – within two years;
- Medium-Term (MT) – two to five years; and
- Long-Term (LT) – over five years.

It should be noted that the timescales for delivery does not refer to the priority of each option; with further details relating to the priority of each option provided in **Chapter 5**.

2.6.2. *Long-List of Options*

The long-list of potential options are summarised in **Table 2-9**.

Ref.	Option Description	Rationale	Timescale for Delivery
<i>Active Travel (AT)</i>			
AT1	Provision of a SUP adjacent to the carriageway along length of scheme area.	To provide a direct active travel link between the Pensarn and Cross Hands Roundabouts, particularly for cyclists, which could offer better opportunities for active travel within the scheme area.	MT / LT
AT2	Improvements to NCN47.	The HD42/17 identified that NCN47 would benefit from improvements in the vicinity of the scheme area.	ST
AT3	Closure of PRoW crossing the A48 and identification of suitable alternative routes.	As identified in TPR5, existing PRoW crossing points are considered inadequate across the scheme area.	ST
AT4	New grade-separated crossing opportunities for pedestrians and cyclists within the scheme area.	Grade-separated crossing points could maximise opportunity for north-south active travel movements through the scheme area.	MT / LT
AT5	Improve the existing SUP at the Pensarn Roundabout.	The HD42/17 identified that hazard warning paving is considered a necessity at the approach to the SUP.	ST
AT6	Improve the existing SUP at the Cross Hands Roundabout.	The HD42/17 identified a number of issues with the existing provision at this location, presenting an opportunity for improvements.	ST
AT7	Resurfacing of all SUPs within the scheme area.	The HD42/17 highlighted that the existing SUPs within and adjoining the scheme area are of poor quality.	ST
AT8	Introduction of a Traffic Regulation Order prohibiting the use of A48 by pedestrians.	The A48 functions as a strategic road, and the lack of pedestrian facilities along its length within the scheme area is not conducive to pedestrian movement. Prohibiting pedestrian access would reduce the risk of inadvertent vehicular / pedestrian collisions.	ST
AT9	Introduction of signage warning drivers of pedestrians.	The A48 functions as a strategic road, and the lack of pedestrian facilities along its length within the scheme area is not conducive to pedestrian movement. Providing warning signs along its length could increase driver awareness of potential ad-hoc pedestrian movement, reducing the risk of inadvertent vehicular / pedestrian collisions.	ST
<i>Public Transport (PT)</i>			
PT1	Introduction of a 'Carmarthen East' park and ride facility in the vicinity of Nantycaws.	To encourage drivers to travel into Carmarthen town centre using public transport, addressing perceived congestion issues at the Pensarn Roundabout and supporting the Air Quality Management Area in Carmarthen.	LT
PT2	New bus priority infrastructure at the Pensarn Roundabout.	To improve bus journey times and reliability, which could encourage mode shift towards public bus.	MT / LT
PT3	New bus priority infrastructure along the A48.	To improve bus journey times and reliability, which could encourage mode shift towards public bus.	MT / LT
PT4	New bus priority infrastructure at the Cross Hands Roundabout.	To improve bus journey times and reliability, which could encourage mode shift towards public bus.	MT / LT
PT5	New bus priority infrastructure at the Nantycaws junction.	To improve bus journey times and reliability, which could encourage mode shift towards public bus, and address a potential safety concern of cross-carriageway bus manoeuvres (TPR1).	MT / LT
PT6	New bus priority infrastructure at the Llanddarog junction.	To improve bus journey times and reliability, which could encourage mode shift towards public bus, and address a potential safety concern of cross-carriageway bus manoeuvres (TPR1).	MT / LT
PT7	Bus vehicle actuated (VA) warning signs at the Nantycaws and Llanddarog junctions.	To warn drivers when buses will be crossing the carriageway at the two junctions, addressing in part, the safety concern identified as TPR1.	ST
PT8	Introduction of a strategic bus corridor along the scheme area to facilitate a rapid transit style service between Carmarthen and a potential bus interchange at Cross Hands.	Provision of a high speed, efficient public transport service between key employment settlements could present an opportunity for mode shift away from the private car.	LT
PT9	New local and regional bus services, and increases in bus service frequencies.	To encourage an increase in overall bus patronage and support a modal shift from the private car.	MT
PT10	Improvements to the existing bus stop infrastructure provision.	To improve the attractiveness of existing local bus services and improve the safety of the existing bus laybys for buses accessing and egressing the bus stop, as well as pedestrians accessing the facilities.	MT
PT11	New rail line between Carmarthen and Ammanford via Cross Hands.	To encourage interaction between Carmarthen and Ammanford, supporting sustainable economic growth in the region.	LT
PT12	Improvements to rail infrastructure between Carmarthen, Llanelli and Swansea.	To encourage use of rail services between the key employment areas of Carmarthen, Llanelli and Swansea, reducing traffic demand within the scheme area.	LT
PT13	Increased rail service frequency between Carmarthen, Llanelli and Swansea.	To encourage use of rail services between the key employment areas of Carmarthen, Llanelli and Swansea, reducing traffic demand within the scheme area.	LT
<i>Vehicle Infrastructure (VI)</i>			
VI1	Introduction of targeted speed limit restrictions along the A48.	To reduce the likelihood of collisions in isolated locations, relating to cross-carriageway manoeuvres and rear-shunt collisions.	ST
VI2	Introduction of speed limit reduction along the full length of the scheme area.	To provide better control of vehicular traffic and more efficient engine operation. This could serve to provide air quality improvements within the scheme area and would be consistent with similar schemes introduced elsewhere on the strategic highway network in Wales.	ST / MT
VI3	Introduction of speed enforcement cameras.	To reduce the number of drivers exceeding the speed limit, which reduces the risk of collisions from speeding vehicles.	ST / MT
VI4	Re-configuration of cross-carriageway manoeuvre opportunities at minor junctions.	As identified within TPR1, there are a number of junctions where cross-carriageway manoeuvres present a safety risk for vehicle users. There is an opportunity to reconfigure the junctions to reduce this risk.	ST / MT
VI5	Closure of minor arm junctions (2-14).	As identified within TPR1, there are a number of junctions where cross-carriageway manoeuvres present a safety risk for vehicle users. Removing the opportunity for this movement would alleviate this risk.	MT

Ref.	Option Description	Rationale	Timescale for Delivery
VI6	Capacity improvements at the minor junctions (2-14).	Providing capacity improvements at the junctions could reduce waiting time for vehicles, reducing the likelihood for driver frustration and associated un-safe manoeuvres.	LT
VI7	Closure of, or amendments to, the laybys within the scheme area.	To reduce the likelihood of vehicle collision on access and egress, applicable to the sub-standard layout of the facilities, as identified as TPR3.	ST / MT
VI8	New service station facility adjacent to the A48.	To reduce the likelihood of collisions through increasing opportunities for rest stops.	LT
VI9	Improved signage to the food and drink facilities accessed from the Pensarn and Cross Hands Roundabouts.	To reduce the likelihood of collisions through maximising driver awareness of existing rest stops.	ST
VI10	New climbing lanes for HDVs at steep gradients.	To maximise the operational efficiency of the A48. Anecdotal evidence from stakeholder feedback and site visits indicates that slower moving vehicles in both lanes can lead to driver frustration and potential safety risks sudden speed changes. A climbing lane could potentially reduce potential driver frustration due to slower moving HDVs inhibiting the free-flow of general traffic.	MT
VI11	Provision of additional all traffic lanes in both directions within the scheme area.	Increasing the operational efficiency of the existing A48 could potentially reduce the likelihood of collisions and improve driver comfort.	LT
VI12	Congestion improvement scheme at the Pensarn Roundabout.	To alleviate the existing peak period congestion experienced at the junction, as identified as TPR6.	LT
VI13	Congestion improvement scheme at the Cross Hands Roundabout.	To alleviate the existing peak period congestion experienced at the junction, as identified as TPR6.	LT
VI14	Road safety improvement scheme at the Cross Hands Roundabout.	Stakeholder feedback and collision data (28 in five years) suggests that lane allocation markings and signage at the Cross Hands Roundabout potentially lead to driver confusion, resulting in collisions. A road safety improvement scheme could potentially reduce this risk.	MT
VI15	Strategic link road to the south and east of Carmarthen, linking White Mill to the west of Carmarthen, via the A48.	A strategic link road could provide an opportunity to provide relief to the perceived congestion during peak hours at the Pensarn Roundabout (TPR6) and the surrounding area.	LT
VI16	New westbound off-slip linking to the Pibwrlwyd College development site, in the vicinity of the Pensarn Roundabout.	To reduce the potential exacerbation of congestion at the Pensarn Roundabout, resulting from the development of the strategically important site for CCC.	LT
VI17	Relief Road to the west of Cross Hands, between the north and south, linking to the A476.	To reduce the volume of traffic routeing through the Cross Hands Roundabout by providing an alternative route between north / south Cross Hands. This could address the congestion identified as TPR6.	LT
VI18	Relief Road to the east of Cross Hands, linking to the new Cross Hands Economic Link Road.	To enhance the economic benefits of the Cross Hands ELR, further reducing the volume of traffic routeing through the Cross Hands Roundabout. This could address the congestion identified as TPR6.	LT
VI19	Improvements to alternative and diversion routes.	Stakeholder feedback indicates that the resilience of the corridor is affected by the poor quality of alternative and diversionary routes. Improvements to these routes could potentially address the issues identified as TPR7.	MT
VI20	Introduction of a hard shoulder.	Stakeholder feedback indicates that the resilience of the corridor is affected by the poor quality of alternative and diversionary routes utilised during collisions within the scheme area. Provision of a hard shoulder could potentially provide further resiliency to the scheme area, addressing the issues identified as TPR7.	LT
VI21	Introduction of air quality monitoring sites.	Whilst the area has not been identified as an AQMA, the provision of air quality monitoring sites could provide a better database of information for future monitoring.	ST
<i>Smart Highways (SH)</i>			
SH1	Introduction of VA warning signs.	Improving the information for vehicle users could improve the user experience and safety of the corridor, warning drivers when exceeding the speed limit or if there is a known issue upstream.	ST
SH2	Introduction of an automated variable speed limit, inclusive of associated infrastructure.	To provide better control of vehicular traffic, improving traffic flow, air quality and safety within the scheme area.	LT
SH3	Introduction of variable information boards.	To provide information for vehicle users of issues or events, such as conditions at the strategic ports in Pembrokeshire.	ST / MT
SH4	Provide new and additional electric vehicle charging opportunities within the scheme area.	To support the UK-wide aspiration to shift from petrol / diesel cars, including the ban on petrol and diesel car sales from 2035.	MT
SH5	Introduction of high-occupancy vehicle lanes.	To reduce the vehicle demand within the scheme area, which could reduce both congestion and carbon emissions.	MT
SH6	Introduction of autonomous vehicle infrastructure.	To support future technology trends as it is noted that autonomous vehicles could form a proportion of the vehicle fleet in the coming decades.	LT
SH7	Amendments to tax regimes relating to alternative fuel vehicles (such as electric vehicles).	As electric vehicles will form a larger proportion of the vehicle fleet in the future, a new tax regime will need to be considered in order to replace the revenue lost from fuel and vehicle excise duty taxation.	LT
<i>Freight (FR)</i>			
FR1	Prioritise the movement of freight by rail, as oppose to road-based methods.	To reduce the amount of pollution caused by road-based freight, facilitating a shift to a carbon neutral economy.	LT
FR2	Restrict HDVs from accessing the outside lane of the A48.	To ensure that light vehicles, travelling at a faster speed, are able to pass the HDVs without conflict, maximising the operational efficiency of the A48.	ST
FR3	New HGV parking site, adjacent to the A48.	To provide a safe and convenient location for HGV drivers to park and rest, as appropriate.	LT

Ref.	Option Description	Rationale	Timescale for Delivery
Managing Demand (MD)			
MD1	Compose a new regional Travel Planning Strategy.	To ensure that all existing major and new developments are sustainable and maximise usage of sustainable travel modes, where appropriate.	LT
MD2	Introduction of dynamic road user charging.	To manage traffic demand, road capacity could be dynamically priced so that road users pay the full marginal social cost of their journey. Through introducing dynamic road user charging, such as peak-hour tolls, road users could pay an appropriate taxation based on their impact on congestion and air / noise pollution.	LT

Table 2-9 Long-List of Options

3. **Transport Case**

3.1. **Overview**

The purpose of the Transport Case, which should be well developed by the end of WelTAG Stage Two, is to outline the forecast impacts and consider the value for money of each of the options. At Stage One, it is proportionate to consider the Transport Case within a qualitative review to inform the sifting of the long-list to a short-list of appropriate measures for further consideration.

The long-list options of options have been assessed against the identified TPOs, which is considered proportionate at this stage of the study. It is demonstrated within Table 2-7 and Table 2-8 that the TPOs address all the identified Transport Problems and meet all the national and local well-being goals, respectively. On this basis, it is considered that the TPOs are a suitable assessment framework for this stage of WelTAG, with further appraisal undertaken at later stages of WelTAG.

3.2. **Assessment of Long-List**

The assessment of the long-list options in the context of the TPOs is provided in **Table 3-1**.

As the likely extent of the impacts relating to each of the long-list options is not known at this stage, a comparative analysis of the TPOs on each of the long-list options has been undertaken. The following three-point appraisal scale has been utilised:

- Likely Positive Impact (+) – green;
- Likely Neutral Impact (0) – blue; and
- Likely Adverse Impact (-) – red.

Option		Transport Planning Objectives				
		TPO1	TPO2	TPO3	TPO4	TPO5
		Improve safety for vehicle users, without having a significant adverse impact on the environment.	Minimise the safety risk for active travel users within the scheme area.	Minimise impact on access, without having a significant adverse impact on the environment.	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.
Active Travel						
AT1	Provision of a SUP adjacent to the carriageway along length of scheme area.	0	+	+	+	0
AT2	Improvements to NCN47.	0	+	+	+	0
AT3	Closure of PRoW crossing the A48 and identification of suitable alternative routes.	0	+	0	+	0
AT4	New grade-separated crossing opportunities for pedestrians and cyclists within the scheme area.	0	+	+	+	0
AT5	Improve the existing SUP at the Pensarn Roundabout.	0	+	+	+	0
AT6	Improve the existing SUP at the Cross Hands Roundabout.	0	+	+	+	0
AT7	Resurfacing of all SUPs within the scheme area.	0	+	0	+	0
AT8	Introduction of a Traffic Regulation Order prohibiting the use of A48 by pedestrians.	0	+	-	+	0
AT9	Introduction of signage warning drivers of pedestrians.	0	+	0	+	0
Public Transport						
PT1	Introduction of a 'Carmarthen East' park and ride facility in the vicinity of Nantycaws.	0	0	+	+	+
PT2	New bus priority infrastructure at the Pensarn Roundabout.	0	0	+	-	+
PT3	New bus priority infrastructure along the A48.	0	0	+	-	+
PT4	New bus priority infrastructure at the Cross Hands Roundabout.	0	0	+	-	+
PT5	New bus priority infrastructure at the Nantycaws junction.	+	0	+	-	+
PT6	New bus priority infrastructure at the Llanddarog junction.	+	0	+	-	+
PT7	Bus vehicle actuated (VA) warning signs at the Nantycaws and Llanddarog junctions.	+	0	0	+	+
PT8	Introduction of a strategic bus corridor along the scheme area to facilitate a rapid transit style service between Carmarthen	0	0	+	+	+
PT9	New local and regional bus services, and increases in bus service frequencies.	0	0	+	+	+
PT10	Improvements to the existing bus stop infrastructure provision.	+	+	+	+	+
PT11	New rail line between Carmarthen and Ammanford via Cross Hands.	0	0	+	+	+
PT12	Improvements to rail infrastructure between Carmarthen, Llanelli and Swansea.	0	0	+	+	+

Option		Transport Planning Objectives				
		TPO1	TPO2	TPO3	TPO4	TPO5
		Improve safety for vehicle users, without having a significant adverse impact on the environment.	Minimise the safety risk for active travel users within the scheme area.	Minimise impact on access, without having a significant adverse impact on the environment.	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.
PT13	Increased rail service frequency between Carmarthen, Llanelli and Swansea.	0	0	+	+	+
Vehicle Infrastructure						
VI1	Introduction of targeted speed limit restrictions along the A48.	+	0	0	+	0
VI2	Introduction of speed limit reduction along the full length of the scheme area.	+	0	0	+	0
VI3	Introduction of speed enforcement cameras.	+	0	0	+	0
VI4	Re-configuration of cross-carriageway manoeuvre opportunities at minor junctions.	+	0	0	+	0
VI5	Closure of minor arm junctions (2-14).	+	+	-	+	0
VI6	Capacity improvements at the minor junctions (2-14).	0	0	+	+	0
VI7	Closure of, or amendments to, the laybys within the scheme area.	+	0	0	+	0
VI8	New service station facility adjacent to the A48.	0	0	0	+	+
VI9	Improved signage to the food and drink facilities accessed from the Pensarn and Cross Hands Roundabouts.	0	+	0	+	0
VI10	New climbing lanes for HDVs at steep gradients.	+	0	0	+	0
VI11	Provision of additional all traffic lanes in both directions within the scheme area.	-	0	0	+	0
VI12	Congestion improvement scheme at the Pensarn Roundabout.	0	0	+	+	0
VI13	Congestion improvement scheme at the Cross Hands Roundabout.	0	0	+	+	0
VI14	Road safety improvement scheme at the Cross Hands Roundabout.	+	0	0	0	0
VI15	Strategic link road to the south and east of Carmarthen, linking White Mill to the west of Carmarthen, via the A48.	+	0	+	+	+
VI16	New westbound off-slip linking to the Pibwrlwyd College development site, in the vicinity of the Pensarn Roundabout.	0	0	+	+	0
VI17	Relief Road to the west of Cross Hands, between the north and south, linking to the A476.	+	0	+	+	+
VI18	Relief Road to the east of Cross Hands, linking to the new Cross Hands Economic Link Road.	+	0	+	+	+
VI19	Improvements to alternative and diversion routes.	+	+	+	0	0
VI20	Introduction of a hard shoulder.	+	0	0	+	0
VI21	Introduction of air quality monitoring sites.	0	0	0	+	+

Option		Transport Planning Objectives				
		TPO1	TPO2	TPO3	TPO4	TPO5
		Improve safety for vehicle users, without having a significant adverse impact on the environment.	Minimise the safety risk for active travel users within the scheme area.	Minimise impact on access, without having a significant adverse impact on the environment.	Ensure no significant adverse impact on the operational efficiency of the strategic highway network.	Consider the future-proofing of the scheme area to enable delivery of emerging aspirational strategic and local schemes relating to public transport and electric vehicles.
Smart Highways						
SH1	Introduction of VA warning signs.	+	0	0	+	0
SH2	Introduction of an automated variable speed limit, inclusive of associated infrastructure.	+	0	0	+	0
SH3	Introduction of variable information boards.	0	0	+	+	+
SH4	Provide new and additional electric vehicle charging opportunities within the scheme area.	0	0	+	+	+
SH5	Introduction of high-occupancy vehicle lanes.	-	0	0	-	0
SH6	Introduction of autonomous vehicle infrastructure.	+	0	0	+	+
SH7	Amendments to tax regimes relating to alternative fuel vehicles (such as electric vehicles).	0	0	0	+	+
Freight						
FR1	Prioritise the movement of freight by rail, as oppose to road-based methods.	+	0	0	+	0
FR2	Restrict HDVs from accessing the outside lane of the A48.	0	0	0	+	0
FR3	New HGV parking site, adjacent to the A48.	+	0	0	+	0
Managing Demand						
MD1	Compose a new regional Travel Planning strategy.	0	0	+	+	+
MD2	Introduction of dynamic road user charging.	0	0	0	+	+

Table 3-1 Consideration of Long-List Options against Transport Planning Objectives

3.3. Determination of Short-List

A key output of a WelTAG Stage One study is to determine a short-list of options for further consideration as part of WelTAG Stage Two, or relevant equivalent reports. **Table 3-2** presents a summary of whether each long-list option is appropriate for inclusion in the short-list for further consideration, making reference to the identified transport problems and how they align with the TPOs. The indicative timescales for delivery of the options are also provided for reference.

At this stage of the study, it has not been determined how each of the options would be delivered, with it being acknowledged that a number of the options would require collaboration with the Local Highway Authority and wider Authorities. It should be noted that a recommendation for further consideration within the short-list does not prescribe delivery by Welsh Government, with further consideration of the route to delivery forming a key aspect of review group discussions following completion of this WelTAG Stage One study.

Option		Timescale for Delivery	Inclusion on Short-List	Justification
<i>Active Travel</i>				
AT1	Provision of a SUP adjacent to the carriageway along length of scheme area.	MT / LT	Yes	This measure supports the Active Travel (Wales) Act and could benefit access for active travel users in the scheme area; it is therefore considered appropriate to include on a short-list. A high-level review of highway boundary information indicates that there may be pinch-points along the route where additional land may be required, which may lead to deliverability challenges. This would be investigated in more detail at WelTAG Stage Two.
AT2	Improvements to NCN47.	ST	Yes	The existing NCN47 provides the opportunity for cyclists to travel between Carmarthen, Cross Hands and Llanelli in the vicinity of the scheme area. It is considered that improvements to this route could provide a safer, alternative route for cyclists away from the A48 and it is therefore considered appropriate to investigate in further detail. It is recognised that the majority off the improvements to NCN47 would be off SWTRA's network.
AT3	Closure of PRoW crossing the A48 and identification of suitable alternative routes.	ST	Yes	TPR5 identified that the existing PRoW crossing points are inadequate within the scheme area and therefore it is considered appropriate that closure of the PRoW crossing points is investigated in further detail. Further investigation into how the closures would be implemented would form part of the WelTAG Stage Two considerations.
AT4	New grade-separated crossing opportunities for pedestrians and cyclists within the scheme area.	MT / LT	Yes	This intervention could either assist in delivery of AT3, as alternative routes would need to be identified as part of closing PRoW crossing points, or as a standalone option to improve north-south active travel crossing opportunities. Further investigation into the viability of such structures would form part of a WelTAG Stage Two report.
AT5	Improve the existing SUP at the Pensarn Roundabout.	ST	Yes	This minor intervention is not considered to have any significant engineering or environmental constraints to delivery and could provide slight benefits to safety and access for active travel users within the scheme area. It is therefore considered appropriate to be included on the short-list. The benefits of such an intervention and the route to delivering the option will be considered in more detail at WelTAG Stage Two.
AT6	Improve the existing SUP at the Cross Hands Roundabout.	ST	Yes	This minor intervention is not considered to have any significant engineering or environmental constraints to delivery and could provide benefits to safety and access for active travel users within the scheme area. It is therefore considered appropriate to be included on the short-list. The benefits of such an intervention and the route to delivering the option will be considered in more detail at WelTAG Stage Two.
AT7	Resurfacing of all SUPs within the scheme area.	ST	Yes	This minor intervention is not considered to have any significant engineering or environmental constraints to delivery, and could reduce the likelihood of slips, trips and falls; having a slight beneficial impact on safety for active travel users. The benefits of such an intervention and the route to delivering the option will be considered in more detail at WelTAG Stage Two.
AT8	Introduction of a Traffic Regulation Order prohibiting the use of A48 by pedestrians.	ST	Yes	It is noted that this intervention cannot be delivered in conjunction with option AT1, however it is considered that it could potentially address the risk of pedestrians using the existing verge of the A48. Further investigation into the merits of this option would be included at WelTAG Stage Two.
AT9	Introduction of signage warning drivers of pedestrians.	ST	Yes	This intervention could provide a minor benefit to safety for active travel users within the scheme area, as an alternative to AT8. The merits of this option would be considered further at WelTAG Stage Two.
<i>Public Transport</i>				
PT1	Introduction of a 'Carmarthen East' park and ride facility in the vicinity of Nantycaws.	LT	Yes	This intervention could provide a significant improvement to the public transport offering to the east of Carmarthen, assisting with delivery of the South-West Wales Metro. It is therefore considered appropriate that this option is progressed as part of a WelTAG Stage Two study.
PT2	New bus priority infrastructure at the Pensarn Roundabout.	MT / LT	Yes	Although it is noted that no existing bus services utilise the Pensarn Roundabout (to or from the A48 arm), this option could assist delivery of the South-West Wales Metro through introducing an opportunity for a new bus route which avoids a potential pinch-point.
PT3	New bus priority infrastructure along the A48.	MT / LT	Yes	Although it has been identified that there is no significant vehicle delay along the A48 within the scheme area, this intervention could assist in future proofing commuter bus routes within the scheme area, assisting delivery of the South-West Wales Metro. It is noted that this could be considered in more detail as an alternative to PT8 within a WelTAG Stage Two study.
PT4	New bus priority infrastructure at the Cross Hands Roundabout.	MT / LT	Yes	This intervention could assist delivery of the South-West Wales Metro through reducing delay for buses at a key pinch-point on the highway network and should therefore be included on the short-list for further investigation.
PT5	New bus priority infrastructure at the Nantycaws junction.	MT / LT	Yes	This intervention could improve the safety and efficiency of bus movements at the Nantycaws junction, further assisting delivery of the South-West Wales Metro. It should therefore be included on the short-list for further investigation.
PT6	New bus priority infrastructure at the Llanddarog junction.	MT / LT	Yes	This intervention could improve the safety and efficiency of bus movements at the Llanddarog junction, further assisting delivery of the South-West Wales Metro. It should therefore be included on the short-list for further investigation.
PT7	Bus vehicle actuated (VA) warning signs at the Nantycaws and Llanddarog junctions.	ST	Yes	This short-term intervention could provide a safety benefit to both vehicle and bus users through warning traffic of upcoming cross-carriageway bus manoeuvres. It may be considered an appropriate short-term measure to address the existing safety concern and should be investigated further at WelTAG Stage Two.
PT8	Introduction of a strategic bus corridor along the scheme area to facilitate a rapid transit style service between Carmarthen and a potential bus interchange at Cross Hands.	LT	Yes	A rapid transit style service could significantly improve the public transport offering for people towards Carmarthen from the east, assisting delivery of the South-West Wales Metro. Although the demand and deliverability is currently not known, it is considered that this intervention should be included on the short-list for further investigation.
PT9	New local and regional bus services, and increases in bus service frequencies.	MT	Yes	This intervention could improve the existing bus service offering in the vicinity of the scheme area, without having a noticeable impact on the operation of the existing highway network. It can also assist delivery of the South-West Wales Metro and should therefore be included on the short-list for further investigation into future demand patterns.
PT10	Improvements to the existing bus stop infrastructure provision.	MT	Yes	The existing bus stop infrastructure has been identified as a potential safety risk, and therefore this option is considered a suitable option to progress for further investigation.

Option		Timescale for Delivery	Inclusion on Short-List	Justification
PT11	New rail line between Carmarthen and Ammanford via Cross Hands.	LT	No	Whilst this option could assist in the delivery of the South-West Wales Metro (referenced in TPO5), it does not relate to the identified TPRs and would likely be a disproportionate cost for the resulting benefits. The options relating to bus provision between Carmarthen and Cross Hands are considered more appropriate for further investigation at this stage. Therefore, it is not considered as a suitable option to include on the short-list for a WelTAG Stage Two study.
PT12	Improvements to rail infrastructure between Carmarthen, Llanelli and Swansea.	LT	Yes	This option could assist in the delivery of the South-West Wales Metro (referenced in TPO5) and facilitate a modal shift away from the private car, without the cost commitment of a new rail line. Whilst it does not directly relate to the identified TPRs, it could be considered as a further benefit to public transport and it is therefore reasonable to investigate this option further.
PT13	Increased rail service frequency between Carmarthen, Llanelli and Swansea.	LT	Yes	This option could assist in the delivery of the South-West Wales Metro (referenced in TPO5) and facilitate a modal shift away from the private car, without the cost commitment of a new rail line. Whilst it does not directly relate to the identified TPRs, it could be considered as a further benefit to public transport and it is therefore reasonable to investigate this option further.
Vehicle Infrastructure				
VI1	Introduction of targeted speed limit restrictions along the A48.	ST	Yes	It is considered that safety benefits could be realised through targeted speed limit restrictions which are commensurate with key collision points within the scheme area. However, further investigation would be needed as to the impact of varying speed limits within the scheme area and the potential relationship with other options (such as VI3). It is considered appropriate that this option is included within the short-list for a WelTAG Stage Two study.
VI2	Introduction of speed limit reduction along the full length of the scheme area.	ST / MT	No	The key benefits of this option would be to influence the operational efficiency of vehicles within the scheme area, resulting in lower vehicle emissions or more controlled flow to improve capacity. However, neither air quality or link capacity have been identified as issues within the scheme area and it is not considered that this option merits further investigation at this stage.
VI3	Introduction of speed enforcement cameras.	ST / MT	Yes	This intervention could have benefits at targeted locations within the scheme area to manage vehicular speeds and is therefore considered an appropriate option to consider further. It is noted that this intervention could be delivered independently or could be used as a supporting measure.
VI4	Re-configuration of cross-carriageway manoeuvre opportunities at minor junctions.	ST / MT	Yes	TPR1 identified that cross-carriageway manoeuvres present a significant safety concern within the scheme area and therefore this intervention could provide significant safety benefits to vehicle users. This option should therefore be included on the short-list for further investigation at WelTAG Stage Two.
VI5	Closure of minor arm junctions (2-14).	MT	Yes	This intervention could alleviate TPR1 through removing the opportunity for cross-carriageway manoeuvres at the minor junctions within the scheme area and is considered appropriate for further investigation. The impacts of the closure of minor junctions, particularly on access, would be considered in full at WelTAG Stage Two.
VI6	Capacity improvements at the minor junctions (2-14).	LT	No	This WelTAG Stage One study has not identified any significant capacity constraints at the minor junctions within the scheme area. On this basis, it is not considered that this option should be taken forward for further consideration at this stage.
VI7	Closure of, or amendments to, the laybys within the scheme area.	ST / MT	Yes	TPR3 identified that the existing laybys within the scheme area are of sub-standard layout and therefore pose a safety risk. This option should therefore be included on a short-list for further investigation at Stage Two.
VI8	New service station facility adjacent to the A48.	LT	No	Due to the location of a significant number of food and drink facilities, presenting rest stop opportunities at either end of the scheme area, it is not considered that this is a necessary option. On this basis, the intervention should not be considered further at this stage.
VI9	Improved signage to the food and drink facilities accessed from the Pensarn and Cross Hands Roundabouts.	ST	Yes	This option could maximise driver awareness of the existing rest stops at either end of the scheme area, providing a slight benefit to road safety. It could also complement any schemes taken forward at the junctions (such as VI12-14) and is therefore considered appropriate for inclusion in the short-list.
VI10	New climbing lanes for HDVs at steep gradients.	MT	Yes	This intervention could provide a slight benefit to safety for vehicle users and therefore warrants further investigation. The impact and deliverability of this option should be considered further at WelTAG Stage Two.
VI11	Provision of additional all traffic lanes in both directions within the scheme area.	LT	No	This WelTAG Stage One study has not identified any significant capacity constraints relating to the flow of traffic along the A48 within the scheme area. On this basis, it is considered that this option would be a disproportionate measure that encourages the use of the private car.
VI12	Congestion improvement scheme at the Pensarn Roundabout.	LT	Yes	It has been noted that there is a perception of peak period congestion at the junction (TPR6), and therefore it is considered that this option should be investigated further as part of the WelTAG Stage Two short-list.
VI13	Congestion improvement scheme at the Cross Hands Roundabout.	LT	Yes	It has been noted that there is a perception of peak period congestion at the junction (TPR6), and therefore it is considered that this option should be investigated further as part of the Stage Two short-list.
VI14	Road safety improvement scheme at the Cross Hands Roundabout.	MT	Yes	The review of collision data identified that a significant number of collisions occurred at the Cross Hands Roundabout, which informed the development of TPO1. On this basis, it is considered that a road safety improvement at the at the Cross Hands Roundabout should be considered for further investigation at WelTAG Stage Two.
VI15	Strategic link road to the south and east of Carmarthen, linking White Mill to the west of Carmarthen, via the A48.	LT	Yes	This option could potentially meet a number of the TPOs (TPO1, TPO3, TPO4, TPO5), and is therefore considered suitable for further investigation. The need and feasibility of such a scheme with reference to the benefits should be considered at WelTAG Stage Two.
VI16	New westbound off-slip linking to the Pibwrlwyd College development site, in the vicinity of the Pensarn Roundabout.	LT	Yes	Delivery of this option could provide an appropriate access to Pibwrlwyd College, enabling the strategic site to be developed with minimal impact on the strategic highway network. It is therefore considered appropriate to take forward as part of a WelTAG Stage Two study for further investigation.
VI17	Relief Road to the west of Cross Hands, between the north and south, linking to the A476.	LT	Yes	This intervention could benefit the operation of the Cross Hands Roundabout, improving safety at the junction for vehicle users (TPO1) and improving the operational efficiency of the strategic highway network (TPO4). The option is therefore considered suitable to include on the short-list for a WelTAG Stage Two study.

Option		Timescale for Delivery	Inclusion on Short-List	Justification
VI18	Relief Road to the east of Cross Hands, linking to the new Cross Hands Economic Link Road.	LT	Yes	This intervention could benefit the operation of the Cross Hands Roundabout, improving safety at the junction for vehicle users (TPO1) and improving the operational efficiency of the strategic highway network (TPO4). The option is therefore considered suitable to include on the short-list for a WeITAG Stage Two study.
VI19	Improvements to alternative and diversion routes.	MT	Yes	This option has the potential to address the poor resilience identified as TPR7 and is therefore considered appropriate for further investigation as part of a WeITAG Stage Two study.
VI20	Introduction of a hard shoulder.	LT	Yes	This intervention would reduce the potential for vehicles suffering engine issues being stranded in live traffic lanes, improving safety for vehicle users (TPO1) as well as improving scheme area resilience (TPR7). It is therefore considered appropriate to include on the short list for further investigation, where potential constraints such as land availability would be considered in further detail.
VI21	Introduction of air quality monitoring sites.	ST	No	Whilst this option could assist in developing future-proofing strategies and future monitoring, it is not related to any of the TPRs and does not directly meet any of the TPOs. On this basis, it is not considered suitable for inclusion in a short-list for further investigation, however could be included as a supplementary measure at future stages.
Smart Highways				
SH1	Introduction of VA warning signs.	ST	Yes	This option could provide drivers with information that could improve the user experience and safety (TPO1) of the scheme area. It is therefore deemed suitable for inclusion on the short-list, with further investigation into associated infrastructure requirements forming part of a WeITAG Stage Two study.
SH2	Introduction of an automated variable speed limit, inclusive of associated infrastructure.	LT	No	This option could potentially provide better control of vehicular traffic in order to improve traffic flow and air quality in the scheme area. It is noted however, that no significant traffic flow congestion or air quality issues have been identified within the scheme area, and it is considered that the intervention would be a disproportionate measure. It is not considered that this option should be considered any further at this stage.
SH3	Introduction of variable information boards.	ST / MT	Yes	This minor intervention would enable to drivers to plan their onward journeys based on the information displayed. In addition, information could be presented to display the availability and location of electric vehicle charging points, achieving TPO5. On this basis, the minor intervention has been included on the short-list, with further investigation into associated infrastructure requirements (such as existing ITS provision) forming part of a WeITAG Stage Two study.
SH4	Provide new and additional electric vehicle charging opportunities within the scheme area.	MT	Yes	This intervention could improve access for electric vehicle users (TPO3) and assist delivery of the local and national Electric Vehicles Strategy (TPO5). This option is therefore considered a reasonable measure to include on the short-list for further investigation.
SH5	Introduction of high-occupancy vehicle lanes.	MT	No	It is not considered that this intervention would meet the TPOs and it is not considered an appropriate measure within this scheme area. On this basis, it is not considered that this intervention should be considered any further at this stage.
SH6	Introduction of autonomous vehicle infrastructure.	LT	Yes	It is outlined within the Transport Fit for Future Generations document that autonomous vehicles are expected to form a significant proportion of the vehicle fleet in the coming decades and it is considered that a proportionate autonomous vehicle intervention could assist in future-proofing the scheme area. This intervention is therefore considered a reasonable measure to include on the short-list for further investigation.
SH7	Amendments to tax regimes relating to alternative fuel vehicles (such as electric vehicles).	LT	Yes	Through amending the tax regimes relating to electric vehicles, it is considered that this will present a new revenue opportunity for the Welsh Government which could support delivery of the local and national Electric Vehicles Strategy. It is therefore considered that alternative fuel vehicles' tax regimes should be further investigated to determine the most appropriate measures.
Freight				
FR1	Prioritise the movement of freight by rail, as oppose to road-based methods.	LT	Yes	It is considered that this measure could potentially lead to a reduction in road-based freight through the scheme area, which could have a beneficial impact on safety for vehicle users (TPO1) and assist in decarbonisation of the economy. This option is therefore considered a reasonable measure to include on the short-list for further investigation.
FR2	Restrict HDVs from accessing the outside lane of the A48.	ST	No	Whilst this option may have a minor benefit to road safety (TPO1), it is not considered to be significant and is likely to be challenging to enforce. On this basis, it is not considered that this option should be considered further at this stage.
FR3	New HGV parking site, adjacent to the A48.	LT	Yes	This option could assist in addressing TPR3, through providing alternative parking opportunities away from the existing sub-standard laybys within the scheme area. On this basis, it is considered that this option should be investigated further.
Managing Demand				
MD1	Compose a new regional Travel Planning strategy.	LT	Yes	This would facilitate a coherent approach to new development in the area, maximising the opportunity for facilitating sustainable modes of travel. It is therefore considered appropriate as a measure for further investigation.
MD2	Introduction of dynamic road user charging.	LT	Yes	It is considered that through introducing road user charging the traffic demand could be reduced both locally and nationally, encouraging a shift towards more sustainable modes of travel which will reduce transport emissions, in line with the aspirations set out within the Prosperity for All: A Low Carbon Wales document.

Table 3-2 Determination of Short-List

4. Delivery, Financial and Commercial Case

4.1. Overview

WelTAG prescribes that prior to completion of WelTAG Stage Three, the Five Cases (Strategic, Transport, Financial, Commercial and Management) will need to be completed. However, at this early stage of the study it is only the Strategic Case that should be fully developed, alongside a qualitative appraisal in the Transport Case. Therefore, this WelTAG Stage One report provides a broad summary of the outstanding cases that will be completed as part of WelTAG Stage Two and Three.

4.2. Financial Case

The Financial Case identifies whether an option is affordable at construction and in the long-term, covering both capital and revenue requirements over the life-time of an option. It will also outline the sources of funding, inclusive of a risk register and details on which sector of the economy the funding will be supplied from, and any potential capital or revenue shortfalls.

The costs of the options have not been considered in this WelTAG Stage One study, as this is not considered to be a key differentiator at this stage of the process. The Financial Case will therefore be developed at WelTAG Stages Two and Three.

4.3. Commercial Case

The Commercial Case demonstrates whether an option is commercially viable and whether it is possible to procure the scheme and continue with it in the future. Of particular note, the Commercial Case focuses on the relationship of the private sector with an option and outlines the expected key contractual arrangements for procurement.

At this stage of WelTAG, the Commercial Case has not been developed; however, as the Strategic Highway Authority, SWTRA have a significant amount of experience at successfully procuring construction works and therefore this aspect of the Commercial Case is not expected to be complex.

The Commercial Case will be developed at WelTAG Stages Two and Three.

4.4. Management Case

The Management Case outlines whether an option is deliverable at construction and over the scheme life-time. It covers the procurement, construction and on-going operation, as well as details of the monitoring arrangement and the Review Group. The Management Case should embed the five ways of working identified within the Well-being of Future Generations (Wales) Act.

Although the full Management Case will be developed at WelTAG Stages Two and Three, it is noted that a Review Group has been established as part of this WelTAG Stage One, including the following:

- Welsh Government;
- SWTRA; and
- Atkins.

The Review Group is responsible for disaggregating the information presented within the WelTAG Stage One report, before actioning the required steps for progressing.

5. Recommendations of Next Steps

5.1. Overview

This WelTAG Stage One study has reviewed the existing transport context within the scheme area and identified that there are key transport problems that justify the need for a scheme. The accompanying IAR presents information which evidences the development of the TPOs which are summarised within this Stage One report.

A range of potential measures have been developed within the options long-list and appraised against how they meet the TPOs and well-being goals. It is considered that there is a short-list of options that are appropriate for further investigation in how they could potentially address the Transport Problems.

5.2. Next Steps

Consideration has been given as to how the measures could be developed, and in order to assist the Review Group in establishing the priority of schemes going forward, a series of work packages are recommended to cover different areas of the short-list.

A potential approach to progressing the analysis of the short-list, arranged in the recommended order of priority, is illustrated in **Figure 5-1**, with the description of the work packages provided in **Table 5-1**.

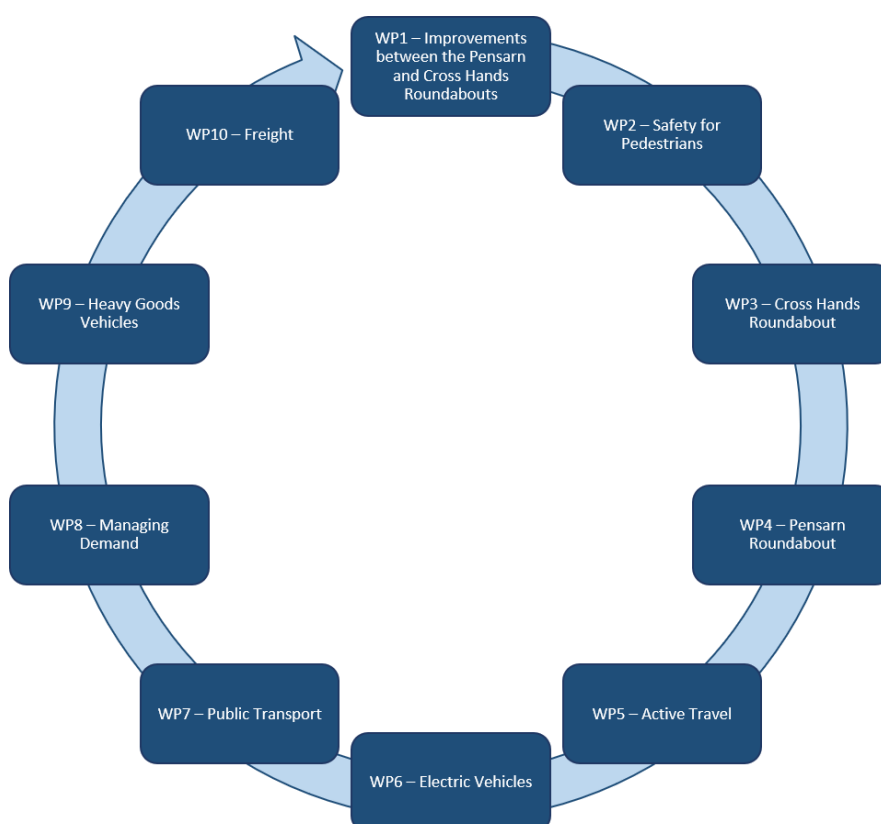


Figure 5-1 Potential Work Packages

Work Package	Option Ref.	Next Step	Description
Improvements between the Pensarn and Cross Hands Roundabouts			
WP1	PT5	Undertake a WelTAG Stage Two relating to ‘A48 Cross Hands to Pensarn’	It is considered that the short-list options included within this work package all have the potential to address a combination of TPR1, TPR2, TPR3, and TPR7; in turn achieving all TPOs set within this WelTAG Stage One study. On the basis that these short-list options could have the potential to address the known transport problems, particularly associated with safety for vehicle users, it is considered that this work package is of priority one.
	PT6		
	PT7		
	PT10		
	VI1		In order to progress the work package, it is recommended that a WelTAG Stage Two study is undertaken for the scheme area, assessing the suitability of the short-list options to determine a preferred scheme. It is noted that this work package would primarily focus on the A48, although there would be significant interaction required with the Local Highway Authority. In addition, the WelTAG Stage Two study (in particular options PT5, PT6 and PT10) would need to consider the emerging South-West Wales Metro and Electric Vehicles Strategy (TPO5) to ensure the preferred option does not prejudice delivery of either aspirational scheme, while future-proofing the scheme for autonomous vehicles (SH6) will also be a consideration.
	VI3		
	VI4		
	VI5		
	VI7		Although the short-list option would need to be considered across the scheme area in its entirety, it may be beneficial to disaggregate the scheme area into separate deliverable areas to reflect the priority of schemes. The priority of these separate deliverable areas could be split as follows, on the basis of potential delivery timescales: - National Botanic Gardens (J12) to Cross Hands Roundabout (J15); - Nantycaws (J3) to Gelli Uchaf (J7); - Tir-Eithin / Cwmisfael (J8) to Pant-y-Ffynnon (J11); and - Pensarn Roundabout (J1) to Kings Oak / Penycloed (J2).
	VI10		
	VI19		
	VI20		
	SH1		
	SH3		
SH6			
Safety for Pedestrians			
WP2	AT3	Undertake a WelTAG Stage Two relating to ‘A48 Public Rights of Way’	As the inadequate provision for PRoW crossing the A48 has been identified as a key transport problem (TPR5) and minimising the safety risk for active travel users within the scheme area has been identified as TPO2, it is considered that a WelTAG Stage Two investigating the possibility of addressing this problem within the scheme area is a key works package.
	AT4		
	AT8		It is considered that this work package would need to be undertaken con-currently with the ‘A48 Cross Hands to Pensarn’ WelTAG Stage Two study, in order to ensure any impacts on the PRoW within the scheme area are addressed appropriately; however, it is considered as a separate works package on the basis that the objectives of the study would differ.
	AT9		

Work Package	Option Ref.	Next Step	Description
Cross Hands Roundabout			
WP3	AT6	Undertake a WelTAG Stage Two relating to 'Cross Hands Roundabout'	The review of the existing situation within the scheme area, alongside feedback received from key stakeholders, has identified that the Cross Hands Roundabout suffers from peak period congestion (TPR6), which increases the likelihood of collisions.
	PT4		
	VI9*		
	VI13		In order to fully understand the significance of the issues identified at the Cross Hands Roundabout, it is considered that a WelTAG Stage Two study should be undertaken for the junction in isolation. Although considered in isolation, the Cross Hands Roundabout WelTAG Stage Two would consider the wider implications of a scheme at the junction and include the impacts of WP1. The Cross Hands Roundabout WelTAG Stage Two would also need to consider the integration of any scheme with the emerging South-West Wales Metro and Electric Vehicles Strategy.
	VI14		
	VI17		
	VI18		
Pensarn Roundabout			
WP4	AT5	Undertake a WelTAG Stage Two relating to 'Pensarn Roundabout'	The feedback received from key stakeholders, has indicated that the Pensarn Roundabout is subjected to some peak period congestion (TPR6).
	PT2		
	VI9*		In order to fully understand the significance of the issues identified at the Pensarn Roundabout, it is considered that a WelTAG Stage Two study should be undertaken for the junction in isolation. Although considered in isolation, the Pensarn Roundabout WelTAG Stage Two would consider the wider implications of a scheme at the junction and include the impacts of WP1. The Pensarn Roundabout WelTAG Stage Two would also need to consider the integration of any scheme with the emerging South-West Wales Metro and Electric Vehicles Strategy.
	VI12		
	VI15		
	VI16		
Active Travel			
WP5	AT1	Strategic Review of Active Travel Provision	It is considered that the short-list options included within this work package should feed into a wider area strategic review of active travel provision within the vicinity of the strategic highway network. In close collaboration with CCC, it is considered that a strategic review of the existing active travel provision on the strategic highway network in the region could assist in identifying any wider area active travel measures, as well as ensuring a consistent approach to active travel across the strategic highway network.
	AT2		
	AT7		It should be noted that the WelTAG Stage Two work packages will consider active travel provision, however it is considered that this strategic review of active travel provision will ensure a joined-up approach across the region can be achieved. It is noted that this strategic review could be undertaken alongside work currently being undertaken by the Local Authorities in the region to update the Active Travel Wales maps in line with national policy.

Work Package	Option Ref.	Next Step	Description
Electric Vehicles			
WP6	SH4	Electric Vehicles Strategy	It has been identified during stakeholder consultation that both a local and national Electric Vehicles Strategy is currently under development. On this basis, it is considered that options SH4 and SH7 could be considered as part of these. It should however be noted that provision for electric vehicles would be considered as part of all WelTAG Stage Two work packages, in order to ensure that any scheme progressed to WelTAG Stage Three does not prejudice delivery of the Electric Vehicles Strategy. Whilst this has a low priority in terms of the works packages identified from this WelTAG study, it is noted that the development of the local and national strategies is understood to be imminent.
	SH7		
Public Transport			
WP7	PT1	South-West Wales Metro	The South-West Wales Metro is currently under development and is expected to include improvements to multi-modal infrastructure and public transport service enhancements. On this basis, it is considered that the short-list options identified as part of this work package could be considered in further detail within the current concept development of the South-West Wales Metro.
	PT3		
	PT8		
	PT9		
	PT12		
	PT13		
Managing Demand			
WP8	MD1	Travel Demand Strategy	It is considered that a Travel Demand Strategy could be produced as part of delivering options MD1 and MD2 to cover the Swansea Bay City Region. It is considered that MD1 would ensure an integrated and coherent approach to development in the region, encouraging use of sustainable travel modes so far as is reasonably practical, while MD2 can further discourage road users from travelling using the private car.
	MD2		It is noted that a Travel Demand Strategy for the Swansea Bay City Region could compliment a strategy for the M4 J35 Pencoed to J49 Pont Abraham area.
Heavy Goods Vehicles			
WP9	FR3	Lorry Parking Strategy	The M4 J35 Pencoed to J49 Pont Abraham WelTAG Stage One study recommended development of a Lorry Parking Strategy for the study area considered. As the A48 Cross Hands to Pensarn scheme area can be considered as an extension of the strategic highway network from the M4 towards Carmarthen, providing a key route onwards towards the strategic ports in south-west Wales, the Lorry Parking Strategy could be extended to cover this scheme area. Option FR3 could be considered within further detail in this Lorry Parking Strategy.

Work Package	Option Ref.	Next Step	Description
<i>Freight</i>			
WP10	FR1	Rail Freight Strategy	The M4 J35 Pencoed to J49 Pont Abraham WelTAG Stage One study recommended development of a Rail Freight Strategy for the study area considered. As the A48 Cross Hands to Pensarn scheme area can be considered as an extension of the strategic highway network from the M4 towards Carmarthen, providing a key route onwards towards the strategic ports in south-west Wales, a Rail Freight Strategy would need to consider the impact of shifting freight onto rail (FR1) within this scheme area. It is therefore considered appropriate to extend the Rail Freight Strategy to consider the implications of a shift towards rail freight on the scheme area considered as part of this WelTAG Stage One study.

* Option VI9 has been included in both the Pensarn Roundabout and Cross Hands Roundabout WelTAG Stage Two study, due to the presence of rest stops food and drink facilities surrounding both junctions.

Table 5-1 Work Package Delivery

5.3. Review Group Resolutions

Following submission of the draft A48 Cross Hands to Pensarn WelTAG Stage One report, the review group has reviewed the recommendations which have been discussed at a review meeting.

Whilst all the proposed work packages were considered appropriate, it is acknowledged that a number of the work packages would be taken forward under different work programmes. However, following discussion, it has been agreed that the recommended commissions that are to progress within the current works programme include:

1. Progression of an intervention at the Nantycaws junction (J3), in line with the schemes developed as part of the A48 Junction Improvements Feasibility Study (2011). This intervention will be developed as part of a proportionate WelTAG Stage Two / Three study;
2. Implementation of minor safety improvement schemes to the east of the Llanddarog junction (J10), in line with the recommendations set out within the A48 Junctions Study Phase 2 (2017) report. It is considered that interventions along this section of the scheme area represent potential quick-wins that could improve safety for road users; and
3. Development of a WelTAG Stage Two study for the A48 Cross Hands to Pensarn scheme area, inclusive of active travel considerations (namely rationalisation of PRow) and corridor-wide improvements. This WelTAG Stage Two study would need to consider the schemes developed as part of the two tasks outlined above.

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