

Welsh Government
**A40 Penblewin to Redstone Cross
Improvements**

WelTAG Stage 1 and 2 Report

A40PRC-ARP-GEN-M02-RP-J-0003

P03 | S4

25/10/19

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Executive Summary

Overview

Welsh Transport Appraisal Guidance (WelTAG) ensures a clear audit trail of decision-making, providing the justification for the promotion, or otherwise, of transport options. It provides decision-makers with all the information they require to make a reasoned and auditable decision on all funding decisions.

This report provides a concise summary of the work undertaken during Stage 1 and 2 of this study. The Stage Report sets out the key findings from the detailed evidence collected and makes reference to the location of the detailed evidence behind the statements made.

This WelTAG Stage 1 & 2 Report provides a combined Strategic Outline Case and Outline Business Case for the proposed A40 Penblewin to Redstone Cross Improvements.

The problems

A number of problems have been identified along the Penblewin to Redstone Cross corridor, in collaboration with the A40 Llanddewi Velfrey to Penblewin Improvements study, the Review Group and informed by stakeholder engagement. The problems are:

- a) The A40 Redstone Cross Junction is below modern design standards. Poor visibility and substandard junction layout can lead to severe road accidents.
- b) Limited overtaking opportunities lead to poor journey time reliability and driver frustration.
- c) Occasional convoys of heavy goods vehicles from the ferry ports and slow-moving agricultural vehicles contribute to period of platooning and journey time unreliability, which is exacerbated with limited overtaking opportunities.
- d) Seasonal spikes in traffic volumes along the A40 especially during the summer months leads to slow moving traffic causing journey time unreliability, which is exacerbated with limited overtaking opportunities.
- e) There are many side road junctions and direct accesses to properties and agricultural fields off the A40, which contributed to operational problems along the road.
- f) A mix of traffic types using the road, contributing to journey time unreliability and driver frustration, risky manoeuvres and collision incidents.

- g) A lack of strategic public transport connectivity in Pembrokeshire generally means there is a dependence on the private car for inter-urban connections.

Problems c) and d) are recognised as being temporal in nature; with problem c) occurring when convoys of heavy goods vehicles or slow-moving agricultural vehicles contribute to periods of platooning and journey time unreliability, and d) occurring largely within the summer months. It is considered that the other problems are more permanent in nature, owing to the substandard design and operation of the road.

Objectives

The objectives seek to address the problems, as well as respond to the strategic issues identified in national and local policy and programmes e.g. the need to improve connectivity to the Enterprise Zone and City Region. In developing the objectives, a review was also undertaken against the well-being goals as presented within the Well-being of Future Generations (Wales) Act 2015. They are:

- O1 To enhance network resilience and improve accessibility along the east-west transport corridor to key employment, community and tourism destinations.
- O2 To improve prosperity and provide better access to the county town of Haverfordwest, the Haven Enterprise Zone and the West Wales ports at Fishguard, Milford Haven and Pembroke Dock.
- O3 To reduce community severance and provide health and amenity benefits.
- O4 To improve the Redstone Cross Junction safety (including perceived safety) and reduce the number and severity of collisions.
- O5 To promote active travel by cycling, horse riding and walking to provide opportunities for healthy lifestyles.
- O6 To deliver a Scheme that promotes social inclusion and integrates with the local transport network to better connect local communities to key transport hubs.
- O7 Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon.
- O8 Give due consideration to the impact of transport on the environment and provide enhancement when practicable.

Options and alternatives

Options were identified through a wide range of historic and more recent technical assessments and stakeholder engagement exercises. Appraisal of different identified options considered how the problems and objectives would be addressed, as well as key risks, adverse impacts, constraints and dependencies.

The Welsh Government determined that doing nothing would not be acceptable as it would lead to the problems continuing. A local public transport option was considered but deemed that it was not able to address the problems given the types of journey being undertaken on the A40 in the area and a lack of suitability for traffic to shift modes.

The Welsh Government is separately progressing its regional plans for public transport improvements, which are better suited for addressing regional issues and opportunities in the longer term (but would not address the identified transport problems on the A40 west of St Clears).

The appraisal process led to the recommendation to progress active travel improvements along with variations of a highway option given it would best address the problems and achieve the objectives. Two of those variations had similar appraisals and served to best address the problems, best achieve the objectives and perform best against the majority of appraisal criteria, although with slight differences in appraisal for the Schemes' impacts on environmental and cultural heritage criteria.

The Scheme and its likely impacts

The Scheme comprises a new offline route between Penblewin and Redstone Cross. It includes a proposed improved section of trunk road, consisting of two lanes in one direction, to allow overtaking, and one lane in the opposite direction.

The redundant sections of existing A40 road between Penblewin Roundabout and Redstone Cross would be reclassified and cease to be a trunk road, reverting to the local authority, providing opportunities for walking, cycling and horse-riding improvements. With the bypass of Redstone Cross taking traffic off of the existing A40, there will be reduced interface between traffic on the existing A40 and walkers, cyclists and horse riders, thereby providing a safer access route from and to Narberth to the north and reducing the potential of accidents, particularly at Redstone Cross.

The Scheme would improve network resilience and improve accessibility along the east-west transport corridor including enhancing connections with key employment, community and tourism destinations, and therefore contributing positively to prosperity. The Scheme's removal of Redstone Cross junction would improve safety and mitigate the risk of fatal and severe accidents. The Scheme would also aim to improve active travel connectivity within the community, reducing severance and providing opportunities for healthy lifestyles and promoting social inclusion.

It is acknowledged that the Scheme is likely to have adverse impacts on noise, greenhouse gases, landscape, historic environment, biodiversity, and water environment. Stage 3 will explore mitigation and enhancement measures in further detail.

Next steps

Sufficient evidence has been presented to demonstrate that the preferred option best addresses the identified problems and best achieves the objectives, as well as contributes to the well-being of future generations. It could be delivered within technical and financial constraints. As such, it is selected as the preferred option.

Given the identified need for the Scheme, and taking into account the information presented within this WelTAG Stage One and Two Impact Assessment Report, the Welsh Government and its Review Group has taken the strategic decision to progress active travel improvements alongside Highway Option 2B, a southern route without junction.

Active travel measures will be developed in detail at the next stage of design development, but they would help achieve the study objectives and contribute positively to government policy priorities. Active travel measures will therefore be implemented as part of the preferred highway option.

WelTAG Stage 3 should be undertaken to provide a full business case in order to progress active travel and Option 2B options. At the next stage of the WelTAG process, a number of areas of the appraisal will require updated in order to reflect new information and the Stage of the process. In particular, the Stage 3 Reports will seek to provide further detail on the following:

- a) Traffic forecast modelling outputs;
- b) Economic appraisal / wider economic impact assessment results;
- c) Environmental Impact Assessment (and survey) results;
- d) Walking, Cycling and Horse-riding Assessment; and
- e) Further details and information around the Transport Case, Delivery, Financial and Commercial Cases.

The BCR is not the only indicator of value for money, particularly for smaller scale schemes that achieve a broad range of objectives, which is the case here. It should also be considered that the Llanddewi Velfrey to Penblewin Improvements need to be seen in the context of the overall A40 corridor improvement, of which it forms an integral component.

It is likely that the economic case for the scheme will be poor, however it is important to note that the quantitative economic analysis does not capture all the expected benefits of the Scheme. For example, the A40 is not forecast to be congested during typical operational conditions but instead experiences journey time reliability problems outside of typical operating conditions e.g. temporarily when there are agricultural vehicles or ferry traffic in platoons. That is not to say there are not likely journey time reliability benefits to be had but they cannot be captured as part of the traffic model and as such cannot be quantified.

Furthermore, the perceived (as well as actual) benefits to safety cannot be captured as a benefit within the economic case, with the improvements offering clear social benefits. The improved overtaking opportunities would also serve to improve the perception of connectivity, of which has been captured within the A40 St Clears to Haverfordwest Study (2015) to form a barrier to investment and for tourism.

A do-nothing approach would not address the safety issues at Redstone Cross junction; the driver frustration, platooning and poor journey time reliability associated with the lack of overtaking opportunities; the operational problems associated with the number of side road junctions and direct accesses off the strategic route; or the problems cause by a mix of traffic types using the road.

1 Introduction

1.1 Context

- 1.1.1 The Welsh Transport Appraisal Guidance (WelTAG) was first published in 2008 and was updated with new WelTAG guidance published in December 2017¹.
- 1.1.2 WelTAG ensures a clear audit trail of decision-making, providing the justification for the promotion, or otherwise, of transport options. It is the mechanism for providing decision-makers with all the information they require to make a reasoned and auditable decision on all funding decisions.
- 1.1.3 As well as embedding the Well-being of Future Generations (Wales) Act 2015, WelTAG combines the principles of the HM Treasury Green Book and the Five Case Model for Better Business Cases, with WelTAG best practice for transport appraisal.
- 1.1.4 The Welsh Government has decided to progress a WelTAG 2017 Stage 1 and 2 study into possible transport improvements to the section of A40 between Penblewin and Redstone Cross (the ‘Scheme’).

1.2 Approach

- 1.2.1 This document represents the **WelTAG Stage 1 and 2 Report** comprising a **Strategic Outline Case (SOC)** and an **Outline Business Case (OBC)** for the A40 Penblewin to Redstone Cross Improvements, with its associated WelTAG Stage 1 and 2 Report and Stage 1 and 2 Impact Assessment Report (IAR).
- 1.2.2 Full and technical details of the evidence base and analysis work undertaken is presented within the associated WelTAG Stage 1 and 2 IAR.
- 1.2.3 In accordance with the WelTAG guidance, a seven-point scale was used in order to appraise the options developed as shown in Table 1 below.

¹<http://gov.wales/docs/det/policy/140923-weltag-guidance-en.pdf>

Table 1 WelTAG Seven Point Assessment Scale

Large Beneficial	+++
Moderate Beneficial	++
Slight Beneficial	+
Neutral	0
Slight Adverse	-
Moderate Adverse	--
Large Adverse	---

1.3 Review Group

1.3.1 As part of WelTAG 2017, involvement is recommended to help shape the identification and appraisal of problems, objectives and possible solutions. WelTAG 2017 specifically requires a Review Group to help steer the appraisal process. A Review Group for the Scheme was established at the outset of the Stage 1 appraisal in order to help ensure that key stakeholders were identified and meet on a regular basis to be involved in any decision making.

1.3.2 The Review Group comprises the Welsh Government’s Project Director, in addition to the Employer’s Agent, the Designer (Arup supported by RML), and Pembrokeshire County Council as the relevant local authority. The Review Group is as outlined in Figure 1.



Figure 1 Review Group

- 1.3.3 The Review Group will meet at key milestones in each of the WelTAG Stages in order to consider the content of the WelTAG reports and actions to be taken forward to the next stage of the process. The Review Group will also play a key role in advising on the methods to be adopted in assessing impacts of the option(s) to be taken forward for subsequent Stages and should make recommendations in relation to any specific additional evidence and/or modelling requirements.

1.4 Report Structure

- 1.4.1 The remainder of this report is presented in line with the WelTAG 2017 guidance and utilises the Five Case Business Model (Five Cases). The report is therefore structured as follows:

Section 2: Strategic Case – presents the context to the appraisal, the problems and objectives and presents option development.

Section 3: Transport Case – considers each option in more detail and explores how these will meet the need identified in the Strategic Case.

Section 4: Management Case – establishes the make-up of the review group and considers, at a high-level, delivery arrangements which may affect the selection of options.

Section 5: Financial Case – considers affordability and long-term financial viability issues that may affect the selection of options.

Section 6: Commercial Case – outlines the commercial considerations.

Recommendations are provided in **Section 7**, which outlines the next steps in the WelTAG appraisal process.

2 History of the Scheme

- 2.1.1 This section provides an overview of the history of the Scheme within a strategic and local context. This section also introduces the need for the Scheme, with further detail provided within Chapter 3. This overview begins by providing the context of the Scheme within a strategic context and finalises by looking at how this particular Scheme has emerged.
- 2.1.2 The strategic need for improvements to the A40 in West Wales has been made clear in national policy documents since the early 2000s and has received continued ministerial support ever since.
- 2.1.3 In November 2001, the National Assembly for Wales published The Transport Framework for Wales. This outlined that the east-west transport corridor in West Wales had been the subject of a multi-modal study in the 1990s, which concluded that the A40 west of St Clears was in need of improvements.
- 2.1.4 In March 2002, the Trunk Road Forward Programme (TRFP) was published and included the A40 West of St Clears, stating:

‘Improvement of the A40 trunk road, whether it be to single or dual carriageway standard, is beneficial in economic terms. Improvement to the road would not affect the number of people travelling on public transport significantly...

The A40 in West Wales forms the lowest standard section of the Trans-European Road Network (TEN-T) in the United Kingdom and there are major problems associated with upgrading the freight carrying capacity of rail in this area which means that significant improvement in the foreseeable future is not viable...

We are therefore satisfied that improvement to the A40 between St Clears and Haverfordwest is needed and that economic benefits will accrue. Upgrading the road to dual carriageway standard is likely to be justified but before a decision is finally made, we need more information on the environmental implications associated with alternative standards.’

- 2.1.5 The multi-modal study² did consider public transport improvements including rail, bus, freight and integrated bus and rail. However, it was concluded that the costs associated with enhanced passenger services were likely to exceed revenue, thus requiring an operating subsidy. It was also acknowledged that improvements to public transport would not reduce the amount of traffic on the A40 trunk road.
- 2.1.6 This early work therefore steered the decision to pursue road-based enhancements on the A40 and a Route Options Report (ROR) was subsequently commissioned to explore single and dual carriageway options.
- 2.1.7 In relation to the section of road between Redstone Cross and Penblewin, three single carriageway options and two dual carriageway options were considered within the A40 West of St Clears Route Options Report, as shown in Table 2.

Table 2 Recommendations from the Route Options Report

Option	Recommendation	Comments
Single Carriageway Option 1 – passes south of properties at Blackmoor Hill, provides junction for these properties at far eastern end of the Scheme. 600m overtaking in each direction.	Take forward	<ul style="list-style-type: none"> • High cost • Demolition of 2 properties • Adverse cultural heritage impact • Very good overtaking opportunities • Beneficial noise impact on 4 properties
Single Carriageway Option 2 – move the road away from the residential properties at Blackmoor Hill, followed by a northern bypass of Redstone Cross, no overtaking opportunities.	Discard	<ul style="list-style-type: none"> • Highest cost option and low economic return • Highest archaeological impact • Adverse impact on Redstone Farm • Adverse cultural heritage impact
Single Carriageway Option 3 – minor re-alignment and improvement of existing A40 including single lane dualling at the Redstone Cross junction and widening the approaches	Take forward	<ul style="list-style-type: none"> • Low cost • Slight increase in overtaking opportunity • Demolition of 2 properties • Adverse cultural heritage impact
Dual Carriageway Option 1 – passing south of Blackmoor Hill with overbridge at Redstone Cross (properties on southern	Take forward	<ul style="list-style-type: none"> • High cost • Good overtaking opportunities • Demolition of 2 properties

² Reported within The National Assembly for Wales – The Transport Framework for Wales, 2001

Option	Recommendation	Comments
side of existing A40 would need to be acquired)		
Dual Carriageway Option 2 – runs to the north of properties at Blackmoor Hill, crossing the existing road midway between Blackmoor Hill and Redstone Cross	Discard	<ul style="list-style-type: none"> • Highest cost with low economic return • Highest potential archaeological impact

2.1.8 A roundabout junction was not considered appropriate from a traffic flow/turning movement consideration or in view of the likely demolition to property required and the delay to traffic flow introduced.

2.1.9 The routes that performed better in addressing the problems balanced with their likely economic, social and environmental impacts, were taken forward for further consideration in a Technical Appraisal Report (TAR) 2004, which was subsequently undertaken.

2.1.10 In July 2013, Edwina Hart, the then Minister for Economy, Science and Transport, published a written statement outlining her priorities for Transport. This statement included:

“Improving the A40 has been identified as a priority by the Haven Waterway Enterprise Zone Board and I intend to undertake further development of previously proposed improvements.”

2.1.11 The issue of the A40 was further expressed in November 2014 following the announcement of the closure of the Milford Haven Refinery. Reflecting on this announcement, the then Minister made the following oral Statement in Plenary:

“In terms of transport links... I have asked my officials to conduct further urgent work to explore additional ways to improve the A40, including the potential for dualling.”

2.1.12 The Welsh Government then commissioned a further study in 2015, the A40 St Clears to Haverfordwest Study, to re-evaluate previous development work and re-considered the strategic issues in the region, which any improvements to the A40 should help address or achieve. An Economic Activity & Location Impacts (EALI) Study as part of the 2015 work found:

- a) The South West Wales region has lagged behind the other areas in Wales in terms of productivity;
- b) The County was disproportionately impacted by the recession and is lagging behind the rest of Wales in terms of its recovery;
- c) Unemployment is highest in the main industrial areas of Milford Haven and Pembroke Dock;
- d) The south-east and south-west of the County, particularly industrial Pembroke Dock and Milford Haven have the lowest levels of attainment reflecting the wider socio-economic profiles of these areas;
- e) The absence of higher education establishments in Pembrokeshire means that prospective students have to leave the County to study; and
- f) Pembrokeshire is perhaps not receiving an equitable share of foreign direct investment projects and this may, in part be due to perceptions of, or the reality of, its peripheral location which are exacerbated by the current standard of the A40.

2.1.13 The 2015 EALI study also explained how a business survey in 2015 suggested:

- a) Enhanced transport connectivity to employment opportunities within the Swansea Bay City Region could reduce the insularity of the Pembrokeshire travel-to-work market, and if the actual or perceived change was such that it created a demand for in-migration to the area (or increased population retention), it is possible that this could enhance the commercial viability of land;
- b) The A40 is seen to be the main route for the agriculture sector and it is acknowledged that this does present some specific problems in terms of tractors moving between fields, tractors towing trailers and the movement of agricultural produce and livestock in standard commercial vehicles. There are numerous farms where the same farmer owns land north and south of the A40, which means that farmers need to use the road when travelling between their different holdings. Whilst they are believed to try and make such movements at off-peak times, this is not always possible, particularly at harvest leading to traffic disruption;
- c) There is evidence to suggest that the travel time to Pembrokeshire and the perception that the area is remote is acting as a barrier to

growing the tourism market, and hence the contribution of the area towards the Welsh Tourism Strategy 2013-20. There was a strong view amongst a number of consultees that an improvement would help to tackle the perception that Pembrokeshire is ‘far away’ by connecting it to the dual carriageway network, thus attracting more visitors;

- d) The top three issues experienced by businesses that responded to a business survey were ‘Poor journey time reliability – summer only’ (42 high / medium adverse impact responses), ‘Vehicle platooning & lack of overtaking opportunities’ (41 high / medium adverse impact responses) and ‘Other congestion on the A40 in West Wales’ (38 high / medium adverse impact responses). Abnormal load restrictions were not considered an issue by the highest number of businesses (45 responses); and
- e) Businesses believed that an upgrade of the A40 between St Clears and Haverfordwest would have a high positive impact especially on customer / visitor numbers, marketing & promotion of their business and future investment plans in Pembrokeshire.

2.1.14 The Welsh Government have considered improvements to the A40 between St Clears and Haverfordwest to address the identified transport and corridor related problems as well as the wider strategic drivers for improvements to access and connectivity within Pembrokeshire and beyond.

2.1.15 As part of the A40 Llanddewi Velfrey to Penblewin Improvements study, a public information exhibition held in 2018 alongside a stakeholder engagement exercise, asked attendees their thoughts on the need or potential to extend the proposed improvements planned for Llanddewi Velfrey to Penblewin to further include the section to Redstone Cross. 51 responses submitted via completed comment forms supported such a need whilst only four comments expressed some reservations / concerns about the proposal to be included as part of the Scheme.

2.1.16 In August 2018 the Cabinet Secretary for Economy and Transport, Ken Skates AM, confirmed in writing to the H M Senior Coroner in response to the inquest into the death of a driver joining the A40 at Redstone Cross, that:

“I acknowledge the very sad circumstances surrounding the death...and accept that in your opinion there is a risk of future deaths at this location unless appropriate action is taken... Preliminary investigations have begun to develop further

overtaking opportunities & safety improvements along the length of the A40. This includes improvements at Redstone Cross. These additional A40 improvements are included in the update of the National Transport Finance Plan (NTFP) (Page 17 ref 'NEW2')."

- 2.1.17 Further to this, Arup (supported by RML) were instructed by the Welsh Government in January 2019 to develop a solution to address the transport related problems along the A40 between Penblewin Roundabout and Redstone Cross. Supporting the Penblewin Roundabout and Redstone Cross Scheme is this Welsh Transport Planning and Appraisal Guidance (WelTAG) study.
- 2.1.18 The problems and objectives are compatible with those from the A40 Llanddewi Velfrey to Penblewin Improvements. The concern for safety between Penblewin and Redstone Cross is particularly of significance for this Scheme, with particular concern for safety at Redstone Cross junction. The Welsh Government are considering the opportunity to deliver both the A40 Llanddewi Velfrey to Penblewin and A40 Penblewin to Redstone Cross Improvements as one Scheme.
- 2.1.19 The intention is currently for the two Schemes to be delivered independently with opportunities for the Schemes to be delivered together through the Construction Phase of the project.

3 Strategic Case

3.1 Overview

- 3.1.1 The Strategic Case considers the need for change and this section of the report presents the context in terms of legislation, policy and guidance and previous development work which should be taken into account when considering the problems, objectives and possible solutions for the Scheme.
- 3.1.2 Section 2 of the WelTAG Impacts Assessment Report (IAR) sets out in detail the relevant legislation, policy and guidance context for the Scheme and its wider strategic framework of A40 improvements.
- 3.1.3 The need for change is derived from a strategic priority for improved transport connections in West Wales to support economic prosperity, and contribute to the economic, social, cultural and environmental well-being of current and future generations.
- 3.1.4 The A40 in West Wales forms the lowest standard section of the Trans European Road Network in the UK and the Trunk Road Forward Programme since 2002 has identified the strategic need for improvements to the A40 corridor, West of St Clears.
- 3.1.5 Development work has identified the need for improvements along that section of the A40, including localised improvements between Penblewin and Redstone Cross.
- 3.1.6 As such, the need for change is presented at three levels:
1. Strategic (West Wales and beyond);
 2. Corridor (A40 West of St Clears); and
 3. Local Scheme (A40 Penblewin to Redstone Cross)

3.2 Strategic Need

- 3.2.1 The A40 trunk road forms part of the Trans-European Transport Network (TEN-T) in West Wales and is a strategically important link between the national motorway network and the West Wales ports including Milford Haven, Fishguard and Pembroke Dock.

- 3.2.2 In particular, the A40 trunk road is a strategic link to Pembrokeshire, a well-known tourist destination, with coast and countryside providing opportunities for a thriving tourism industry and a rich environment for food producers. Furthermore, the Haven Waterway Enterprise Zone in Pembrokeshire is based uniquely on existing and potential new energy sites, building on the area's established industry base.
- 3.2.3 Around 20% of the UK's energy supplies are received via Pembrokeshire, and the Zone remains an attractive location for energy companies with its excellent access to energy infrastructure, established supply chain and distribution infrastructure, skilled workforce and network of universities with expertise in a range of energy-related fields.
- 3.2.4 The Zone is also gaining a marine energy focus, given its deep-sea port facilities combined with marine conditions suited to wave and tidal stream technologies, plus the benefit of electricity grid access. A new wave energy demonstration zone was established 13km (8 miles) off the Pembrokeshire coast. The Zone, managed by Wave Hub Limited working in partnership with Marine Energy Pembrokeshire and Pembroke Port, has the potential to support the demonstration of wave arrays with a generating capacity of up to 30MW for each project. Today, however, diversity and innovation characterise the range of local businesses and the Zone is particularly keen to support companies in other sectors to locate or expand here, too.
- 3.2.5 Alongside new and established energy, food and tourism businesses and their extensive supply chains, life sciences, ICT and manufacturing firms are being targeted in Haven Waterway Enterprise Zone. These require good access and connections to the transport network to assist the movement of labour and goods accordingly.

Impact of doing nothing

- 3.2.6 The impact of no intervention would mean that the existing problems along the A40, at a strategic scale, would continue and likely worsen with the increasing traffic levels. Issues such as vehicle platooning would continue owing to the lack of overtaking opportunities, impacting on strategic connections along the TEN-T network to the ports, to key tourist destinations, and strategic employment sites such as the Haven Waterway Enterprise Zone. It is likely that poor journey time reliability, particularly in the summer, would continue to have an

adverse impact on the economy. The travel time to Pembrokeshire and the perception of the area's remoteness would continue to act as a barrier to growing the tourism market.

- 3.2.7 A do-nothing approach would be contrary to national policy documents, clearly citing the need for improvements along the A40 over several decades.

3.3 A40 West of St Clears Corridor

- 3.3.1 The A40 corridor West of St Clears provides a key road link between South East Wales and Haverfordwest, which is a gateway town as well as the focus of the tourist economy for central and north Pembrokeshire.

- 3.3.2 The St Clears to Haverfordwest section of the A40 has developed to connect small villages and as such many sections of the A40 pass through these communities, leading to issues around severance, air and noise concerns and safety problems.

- 3.3.3 The A40 accommodates a mix of traffic types, with seasonal variations. In the winter months the road carries local residents (typically car-based traffic); commercial vehicles, particularly around ferry arrival and departure times; and agricultural vehicles. In the summer months, the mix is supplemented by a higher volume of tourist traffic (increasing in some areas by over 40%) including cars and caravans.

Impact of doing nothing

- 3.3.4 The impact of no intervention would mean that with increasing traffic levels, the existing situation would worsen to the west of St Clears. Problems with safety, community severance, air and noise would continue to impact on local communities, commuters, freight and tourists, with the problems exacerbated during the summer months with the additional tourist traffic.

- 3.3.5 The need for improvements to the west of St Clears has been noted since the 1990s. A do-nothing approach would see the A40 in West Wales continue to form the lowest standard section of the TEN-T in the UK. It would also not respond to the clear need for improvements noted within the Trunk Road Forward Programme, and would not provide the infrastructure required to deliver the associated economic benefits.

3.4 A40 Penblewin to Redstone Cross Scheme

3.4.1 The local Scheme aims to provide improvements to the section of A40 between Penblewin roundabout and Redstone Cross junction within the context of wider transport interventions on the A40 corridor West of St Clears.

3.4.1 Arup (supported by RML) were instructed by the Welsh Government in January 2019 to develop a solution to address the transport related problems along the A40 between Penblewin and Redstone Cross. This Welsh Transport Planning and Appraisal Guidance (WelTAG) study supports the Penblewin Roundabout and Redstone Cross Scheme.

3.4.2 A number of problems have been identified along the Penblewin to Redstone Cross corridor, in collaboration with the A40 Llanddewi Velfrey to Penblewin Improvements study, the Review Group and informed by stakeholder engagement.

3.4.3 Accident analysis has observed that a high proportion of accidents result in fatal and serious injuries on this stretch of the A40 and that the likelihood of a fatality is ten times higher than observations on roads of a similar standard. A total of eight PIAs (personal injury accidents) have been recorded within the study area over the most recent ten-year period. The table below provides a summary of the number of vehicles involved, the number of casualties, the location and the circumstances under which each accident occurred.

Date & Time	Vehicles	Casualties	Details
30/06/2009 16:35	4	1	Occurred at Penblewin roundabout. Details of circumstances not recorded.
26/04/2010 11:55	2	1	Occurred at Redstone Cross. Details of circumstances not recorded.
08/03/2011 19:55	4	3	Occurred approximately 400m west of Penblewin roundabout. Details of circumstances not recorded.
27/01/2013 22:35	2	1	Occurred at Redstone Cross, where V1 was travelling eastbound on A40 approaching Redstone Cross when V1 has failed to take the left-hand bend & drifted across the carriageway coming into contact with V2 travelling in opposing direction.
27/06/2013 17:00	2	3	Occurred at Redstone Cross, where V1 pulled out from Redstone Road junction onto the A40 directly into path of V2 which was travelling westbound.
03/07/2013 08:30	2	2	Occurred at Redstone Cross, where V2 travelled along A40 & been indicating left (misleading). V1

Date & Time	Vehicles	Casualties	Details
			been waiting at junction of A40 with B4313 & has seen misleading signal on V2 & pulled out in front of V2 believing it to be turning left into junction.
22/05/2017 08:22	3	2	Occurred approximately 500m east of Redstone Cross, where V1 commenced to overtake unknown V3. As V1 moved to his offside he collided with V2 which was travelling in the opposing direction.
06/03/2018 13:30	2	1	Occurred at Redstone Cross, where V2 travelled towards Haverfordwest on A40. Upon approaching Redstone Cross junction, V1 exited junction from Narberth into nearside of V2 HGV & into its path. V2 swerved across carriageway pushing V1 down the road.

3.4.4 Over the ten-year period, two of the accidents were fatal, two were serious and four were slight in severity. An analysis of accident rates has found that accident severities along this stretch of the A40 are significantly higher than the average default accident rate for this type of road, as shown in the table below. This means that the rate at which fatalities and serious injuries occur on this section of road is much higher than would statistically be expected. The results also show that this section of the A40 generally has slightly lower than average accident rate. Section 3.2.58 of the Impact Assessment Report provides further detail in relation to road safety.

Severity Split	Fatal	Serious	Slight
Observed	25.0%	25.0%	50.0%
COBA-LT default, Older S2 A roads, >40mph	2.8%	15.3%	81.9%

3.4.5 Feedback received at the Public Information Exhibitions demonstrates a strong concern for safety at Redstone Cross junction including respondents having experienced near misses and / or having witnessed accidents. It is evident that there is an existing safety problem at Redstone Cross junction.

3.4.6 Journey time unreliability and platooning is a key problem experienced. This is particularly a problem when there is a ferry arrival, when agricultural vehicles are travelling along the A40 and / or when slow moving vehicles such as caravans travel along the trunk road. During the summer period, the volume of traffic and its associated problems evidence a lack of network resilience with coping with the additional traffic from tourists. A lack of overtaking opportunity along this stretch

of the A40 leads to driver frustration, risky manoeuvres and collision incidents. The Impact Assessment Report provides further detail on these issues within Section 3.2.

Impact of doing nothing

- 3.4.7 The impact on no intervention would mean that the existing problems would continue between Penblewin and Redstone Cross; poor journey quality during periods of traffic and platooning would continue to have adverse impacts on driver stress; and north-west connectivity and connectivity onto the A40 at Redstone Cross would continue to face severance issues. With increasing traffic flows, the existing problems are likely to worsen.
- 3.4.8 A do-nothing approach would also mean that there is a risk of further serious and fatal accidents at Redstone Cross and the junction's substandard nature and visibility problems would continue to be of safety concern to various transport users.

3.5 Summary of Key Issues

- 3.5.1 In summary, the key issues that drive the need for change on the A40 and in particular the section between Penblewin and Redstone Cross, comprise a range of actual and perceived problems:
- a) The A40 mainline and Redstone Cross Junction is substandard
 - b) Limited overtaking opportunities lead to poor journey time reliability and driver frustration.
 - c) Occasional convoys of heavy goods vehicles from the ferry ports and slow-moving agricultural vehicles contribute to periods of platooning and journey time unreliability, which is exacerbated with limited overtaking opportunities.
 - d) Seasonal spikes in traffic volumes along the A40 especially during the summer months leads to slow moving traffic causing journey time unreliability, which is exacerbated with limited overtaking opportunities.
 - e) There are many side road junctions and direct accesses to properties and agricultural fields off the A40, which contributes to operational problems along the road.
 - f) A mix of traffic types using the road, contributing to journey time unreliability and driver frustration, risky manoeuvres and collision incidents.

- g) A lack of strategic public transport connectivity in Pembrokeshire generally means there is a dependence on the private car for inter-urban connections.

3.5.2 The associated evidence base for these issues is provided in full within the IAR.

3.5.3 Whilst there is evident support for improvements to the A40 within national and local policy, this 2017 WelTAG Study takes into account the previous development work and reconsiders the problems, objectives and potential options, to help inform decision making to progress a long term and sustainable solution for the A40 Penblewin to Redstone Cross.

3.6 Stage 1 Workshop

3.6.1 A WelTAG Stage 1, 2 and 3 has been undertaken for the A40 Llanddewi Velfrey to Penblewin Improvements.

3.6.2 As part of WelTAG Stage 1 of this study, a workshop was held on 6 March 2017 to which all members of the review group were invited. The workshop discussed the revised WelTAG process and agreed how to proceed with the Stage 1 appraisal for the Scheme. As outlined in the first section of this report, WelTAG 2017 Stage 1 requires the identification of the problem(s), objectives and possible solutions for appraisal.

3.6.3 In order to inform discussions, a draft list of problems and objectives were presented. These were based on the outcomes of previous development work and the review of relevant legislation, policy and guidance.

3.6.4 The workshop attendees discussed and agreed a list of problems that the Scheme should aim to address, with consensus that the problems whilst taking into account previous development work still remained valid problems today, including additions.

3.6.5 The workshop attendees discussed and reviewed the initial list of objectives against the 2015 Act Well-being goals, and a revised list of objectives were agreed.

3.6.6 Following agreement on the problems and objectives, the workshop

presented an indicative long list of options for the improvements which built on previous development work and included a combination of on-line and off-line options in addition to a number of non-road building options. Agreement was reached that the Stage 1 appraisal should consider a variety of options and not focus only on road building options.

- 3.6.7 The problems and objectives identified in this combined WelTAG Stage 1 and 2 share the same strategic principles as that of the A40 Llanddewi Velfrey to Penblewin Improvements. The local problems and objectives have been reviewed and refined to align with the Penblewin to Redstone Cross Improvements.

3.7 Stage 2 Workshop

- 3.7.1 A WelTAG Stage 2 workshop was held on 29 June 2019. The workshop discussed the outcomes of the WelTAG Stage 1 & 2 Study and agreed how to proceed based upon the preferred recommendation contained within this report.
- 3.7.2 To inform discussions, the long list and short list of options was presented. These were based on the information contained within the Design Options Report and the development work associated with this, the public information exhibition results and the review of relevant legislation, policy and guidance and WelTAG appraisal criteria.
- 3.7.3 Wider discussion on likely impacts against economic, social and environmental criteria helped finalise the WelTAG Stage 2 Reporting.
- 3.7.4 The Strategic Board decided that further consideration should be given to junction strategy during Stage 3, in relation to access from the west at Redstone Cross.

3.8 Public Information Exhibitions

- 3.8.1 WelTAG recommends stakeholder engagement to help shape its outcomes. As part of the study into A40 improvements between Penblewin and Redstone Cross, two Public Information Exhibitions have been held. The first exhibition was held at Llanddewi Velfrey Village Hall, on the 10th April 2019 between 2pm and 8pm and 11th April between 10am and 8pm. The second exhibition was held at Bloomfield House Community Centre, Narberth on the 30th May 2019

between 12pm and 8pm.

3.8.2 The exhibitions were held to:

- a) Attract as many people as possible to each exhibition, from a range of backgrounds and interests;
- b) Share our key messages about the project, openly and honestly, and provide a fair and balanced representation of the project;
- c) Reduce potential opposition to the project by explaining the need for the proposals, addressing any concerns, queries or misconceptions, and putting people at ease;
- d) Give the opportunity and encourage any feedback to be submitted to the Welsh Government; and
- e) Educate people about the process required to progress the project.

3.8.3 Measures that were undertaken to publicise the Public Information Exhibitions included:

- a) Personal Invitation Letters hand delivered throughout the local community;
- b) Personal Invitation Letters via email communication or post to key identified stakeholders (e.g. the local authority); and
- c) Posters displayed at prominent locations;
- d) Local politicians communicated to their constituents; and
- e) Articles were published in the local news.

3.8.4 95 people signed the attendance register at the first Public Information Exhibition and 170 people attended the second. Questionnaires and Verbal Record Sheets helped record feedback.

3.8.5 Details have been recorded within Public Information Exhibition Reports, held by the Welsh Government to support its evidence base for decision making.

3.8.6 Information about how the feedback has helped inform decision making is presented within the relevant sections of this report.

3.9 Public Meeting

3.9.1 A public meeting was held on 20 June 2019, organised by some local residence to discuss the options presented at the Public Information Exhibitions. The meeting was held at the Bloomfield Community Centre and was attended by 35 members of the public, including several councillors. The following views were expressed and recorded by representatives of the project team:

- a) Narberth will see increased traffic which will cause it to be grid-locked;
- b) Improving the road will bring increased environmental impact;
- c) Redstone Road will become isolated;
- d) Increased use of A478 as a route into Narberth;
- e) There will be a detrimental impact on Blaenmarlais Care home;
- f) A poorly designed Scheme will have a big negative impact on Narberth, whereas a well-designed Scheme will keep it as it is;
- g) Noise during night of the convoy of 20 + ferry lorries;
- h) If the route is ever dualled this then the impacts are only going to get worse; and
- i) Any proposal will prevent the 'Secret Owl Garden' from being relocated to Noble Court.

3.10 Public Consultation

3.10.1 A Public Consultation will be undertaken during WelTAG Stage 3 to provide the public with a further opportunity to engage with and respond to proposals.

3.11 Problems

3.11.1 Evidence to support the identification of the problems is provided in Section 3 of the IAR, including:

- a) Journey Times / Reliability Data (road, public transport and port);
- b) Traffic Flows;
- c) Traffic Forecasts;
- d) Road Safety;
- e) Speed Profile;
- f) Social and Cultural Information;

- g) Economic Activity Data;
- h) Travel to Work Data; and
- i) Environmental Information.

3.11.2 It should be noted that these topics involve both actual (quantified or verified) data, as well as perceived (qualitative or unverified) data. Both form evidence for considering and identifying the problems.

3.11.3 It should also be noted that the evidence base will be updated as more detailed information and data becomes available throughout the iterative WelTAG process.

3.11.4 The need for change along this section of the A40 has emerged through a large amount of previous development work, which has helped identify the problems on the corridor and identify a range of potential options that could help address the problems.

3.11.5 The 2015 A40 St Clears to Haverfordwest Study EALI Report explained that whilst the A40 corridor may be seen as an important local issue, it is unlikely that a conventional Transport Economic Efficiency (TEE) analysis would generate a positive Net Present Value (NPV) and Benefit-Cost Ratio (BCR) for a Scheme of this nature given the relatively low traffic volumes. The report clarified that EALI Guidance states that:

“It is important to recognise that perceptions of problems with the transport system by users, operators, the public at large and politicians can be equally as important as problems that can be quantified through analysis of data”.

3.11.6 In the case of this Scheme, the quantitative economic analysis does not capture all of the expected benefits such as those in relation to enhanced network resilience and improved prosperity are only partially reflected. For example, the A40 is not forecast to be congested during typical operational conditions but instead experiences journey time reliability problems outside of typical operating conditions e.g. temporarily when there are agricultural vehicles or ferry traffic in platoons. That is not to say there are not likely journey time reliability benefits to be had but that they cannot be captured as part of the traffic model and as such cannot be quantified.

3.11.7 Furthermore, the BCR is not the only indicator of value for money,

particularly for smaller scale scheme that achieve a broad range of objectives, which is the case here. It should also be considered that the A40 Penblewin to Redstone Cross Improvements need to be seen in the context of the overall A40 corridor improvement, of which it forms an integral component.

- 3.11.8 That work has informed policy development and iterations of decision making by Welsh Ministers which has led to the progression of the A40 Penblewin to Redstone Cross project.
- 3.11.9 At this latest stage of appraisal, an up to date review of the context and baseline information was taken into account (as presented in Section 2 and 3 of the IAR), which has helped refresh the understanding of the problems that any transport intervention should aim to address.
- 3.11.10 The problems identified were discussed and agreed by the Review Group, and are set out within paragraph 3.4.2. A summary of the supporting evidence is provided later in the report within Table 4.

3.12 Objectives

- 3.12.1 The objectives for the Scheme were developed in order to help appraise possible options.
- 3.12.2 The Scheme objectives as agreed by the Review Group are:
- O1 To enhance network resilience and improve accessibility along the east-west transport corridor to key employment, community and tourism destinations.
 - O2 To improve prosperity and provide better access to the county town of Haverfordwest, the Haven Enterprise Zone and the West Wales ports at Fishguard, Milford Haven and Pembroke Dock.
 - O3 To reduce community severance and provide health and amenity benefits.
 - O4 To improve the Redstone Cross Junction safety (including perceived safety) and reduce the number and severity of collisions.
 - O5 To promote active travel by cycling, horse riding and walking to provide opportunities for healthy lifestyles.

- O6 To deliver a Scheme that promotes social inclusion and integrates with the local transport network to better connect local communities to key transport hubs.
- O7 Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon.
- O8 Give due consideration to the impact of transport on the environment and provide enhancement when practicable.
- 3.12.3 The objectives have taken account of particular drivers, issues and opportunities identified through the baseline review of relevant legislation, policy, guidance and the social / cultural, environmental and economic position within the study area and wider region.
- 3.12.4 The objectives therefore respond to the identified problems, aiming to help address them, as well as respond to the strategic issues identified in national and local policy and programmes e.g. the need to improve connectivity to the Enterprise Zone and City Region.
- 3.12.5 In developing the objectives, a review was undertaken against the well-being goals as presented within the 2015 Well-being of Future Generations Act.
- 3.12.6 This helps ensure that the Scheme objectives align to the wider sustainable development principle of the Welsh Government, and take into account the needs of Wales' future generations.
- 3.12.7 As aforementioned, each objective aims to address one or more of the identified problems.
- 3.12.8 Therefore, if a transport intervention is appraised to perform positively in addressing the objectives it is given that it would overcome the problems identified.
- 3.12.9 In addition, an option that performs well against the objectives would be expected to align to the Well-being of Future Generations Act well-being goals.
- 3.12.10 Objective 7 in particular helps to consider the impact of the scheme on carbon and the Welsh Government's declaration of a climate change emergency, with associated targets set out in its Low Carbon Wales policy.

3.12.11 The Well-being Goals (WFGA 1-7) are listed within Table 3 and the problems (1-8) are set out within paragraph 3.4.2. These are considered to align to the objectives for the Scheme and problems identified, as shown in Table 3. Given the interlinkages between the problems and objectives in the way that the objectives aim to address the problems, whilst contributing to the Well-being goals, Table 3 provides a detailed summary of the alignment of the Scheme objectives and identified problems with the Well-being Goals.

Table 3 Alignment of Scheme Objectives and corresponding Problems with the Well-being Goals

Objective and corresponding problems	Well-being Goals
<p>Objective 1: To enhance network resilience and improve accessibility along the east-west transport corridor to key employment, community and tourism destinations.</p> <p>Problems: 1, 2, 3, 4, 5, 6, 7</p>	<p>1: A prosperous Wales</p> <p>The objective seeks to improve connectivity along the east-west transport corridor. In achieving this objective, this would provide benefits to the economy by improving access to key employment, community and tourism sites. By improving accessibility, West Wales would become more attractive as a place to invest in, including providing potential additional employment opportunities, and attract people to live and work in the area.</p>
	<p>2: A resilient Wales</p> <p>The objective does not relate directly to the well-being goal however the aim of the Scheme is to give due consideration to the impact of transport on the environment and therefore aims to contribute to a resilient Wales.</p>
	<p>3: A healthier Wales</p> <p>The Scheme aims to improve safety of which relates to having good accessibility. The Scheme would improve the safety of movement by improving the standard of the highway network and providing opportunities for overtaking, thus reducing the likelihood of a collision occurring. Moreover, the Scheme would improve connections to essential services such as to a hospital, GP surgery or dentist.</p>
	<p>4: A more equal Wales</p> <p>Through improving connectivity within West Wales and improving the perception of the area in terms of its accessibility, the Scheme would contribute to improving the economy of a relatively deprived area in comparison to other areas across Wales.</p>

Objective and corresponding problems	Well-being Goals
	<p data-bbox="746 362 1185 394">5: A Wales of cohesive communities</p> <p data-bbox="630 405 1305 571">Improving accessibility along the east-west corridor would enable communities to become more connected. The Scheme would also improve safety for communities by improving the safety of the highway network and also by providing improvements to active travel connectivity.</p> <p data-bbox="676 589 1259 654">6: A Wales of vibrant culture and thriving Welsh Language</p> <p data-bbox="630 665 1305 898">The Scheme would contribute positively to this objective by providing enhanced connectivity to cultural facilities, this includes improving accessibility to the region for tourists; therefore, helping to maintain a thriving culture in West Wales. The Scheme would also improve connections to Welsh Language institutions such as to Welsh Language schools.</p> <p data-bbox="775 916 1158 947">7: A globally responsible Wales</p> <p data-bbox="624 958 1313 1191">The aim of the Scheme is to give due consideration to the impact of transport on the environment and therefore aims to contribute to a globally responsible Wales. The A40 forms part of the TEN-T network of which provides an important link for international connectivity via the ports. The Scheme objective does not specifically relate to this Well-being goal.</p>
<p data-bbox="284 1211 592 1541">Objective 2: To improve prosperity and provide better access to the county town of Haverfordwest, the Haven Enterprise Zone and the West Wales ports at Fishguard, Milford Haven and Pembroke Dock.</p> <p data-bbox="284 1592 592 1657">Problems: 1, 2, 3, 4, 5, 6, 7</p>	<p data-bbox="831 1211 1102 1243">1: A prosperous Wales</p> <p data-bbox="624 1254 1313 1487">The Scheme would contribute to improving prosperity and providing better accessibility to key areas by enhancing connectivity and resilience to key employment and tourism destinations. Improved overtaking opportunities and thus more reliable journey times would contribute to helping improve the perception of Pembrokeshire for both businesses and tourists.</p> <p data-bbox="847 1505 1086 1536">2: A resilient Wales</p> <p data-bbox="624 1547 1313 1812">A resilient Wales is about maintaining and enhancing a biodiverse natural environment with healthy functioning ecosystems of which support economic resilience in conjunction with social and economic resilience. The Scheme aims to improve prosperity and also to give due consideration to the impact of transport on the environment, therefore the Scheme aims to contribute to a resilient Wales.</p>

Objective and corresponding problems	Well-being Goals
	<p style="text-align: center;">3: A healthier Wales</p> <p>A key driver of the Scheme relates to safety and accessibility. The Scheme aims to provide better access to key locations; a key consideration of accessibility is being able to safely travel. By addressing the existing safety concerns at Redstone Cross junction and by improving overtaking opportunities and therefore reducing the likelihood of risky manoeuvres being made, the Scheme would positively contribute to a healthier Wales. The Scheme also provides the opportunity for benefits to be experienced for walking, cycling and horse riding.</p>
	<p style="text-align: center;">4: A more equal Wales</p> <p>Through improving connectivity within West Wales and improving the perception of the area in terms of its accessibility, the Scheme would contribute to improving the economy of a relatively deprived area in comparison to other areas across Wales.</p>
	<p style="text-align: center;">5: A Wales of cohesive communities</p> <p>Providing better access to key locations would enable communities to become more connected. The Scheme would also improve safety for communities by improving the safety of the highway network and also by providing improvements to active travel connectivity.</p>
	<p style="text-align: center;">6: A Wales of vibrant culture and thriving Welsh language</p> <p>The Scheme would contribute positively to this objective by providing enhanced connectivity to cultural facilities, this includes improving accessibility to the region for tourists; therefore, helping to maintain a thriving culture in West Wales. The Scheme would also improve connections to Welsh Language institutions such as to Welsh Language schools.</p>
	<p style="text-align: center;">7: A globally responsible Wales</p> <p>The aim of the Scheme is to give due consideration to the impact of transport on the environment and therefore aims to contribute to a globally responsible Wales. The A40 forms part of the TEN-T network of which provides an important link for international connectivity via the ports. The Scheme objective does not specifically relate to this Well-being goal.</p>

Objective and corresponding problems	Well-being Goals
<p>Objective 3: To reduce community severance and provide health and amenity benefits</p> <p>Problems: 1, 2, 3, 4, 6</p>	<p>1: A prosperous Wales</p> <p>Improvements to the safety of the highway network would lead to the provision of health benefits with a reduced likelihood of collisions occurring and less driver frustration experienced. The Scheme’s contribution to affecting safety and journey time reliability will improve access to key economic sites such as strategic employment sites and tourism destinations, thus contributing to a prosperous Wales.</p>
	<p>2: A resilient Wales</p> <p>This objective demonstrates the Scheme’s commitment to providing health and amenity benefits. Active travel enhancements to the local area will provide the opportunity for more active travel journeys to be made locally; walking, cycling or horse riding would have a better impact on the environment compared to travelling by car for example. The Scheme will nonetheless largely provide benefits to those travelling by car.</p>
	<p>3: A healthier Wales</p> <p>This objective strongly relates to the Well-being goal as a key element of the Scheme is addressing a need to improve safety. By improving the standard of the highway network and addressing safety issues at Redstone Cross junction, the Scheme contributes to building a healthier Wales. Improvements to connectivity via walking, cycling and horse riding will also contribute positively to a healthier Wales.</p>
	<p>4: A more equal Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>5: A Wales of cohesive communities</p> <p>By improving safe connectivity to the A40 and thus reducing the severance issues currently experienced at Redstone Cross, the Scheme would enable improved connectivity for communities and provide improvements to active travel connectivity.</p>
	<p>6: A Wales of vibrant culture and thriving Welsh language</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>7: A globally responsible Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>

Objective and corresponding problems	Well-being Goals
<p>Objective 4: To improve the Redstone Cross Junction safety (including perceived safety) and reduce the number and severity of collisions.</p> <p>Problems: 1, 2, 3, 4, 5, 6</p>	<p>1 A prosperous Wales</p> <p>By improving safety and reducing the number and severity of collisions, there will be beneficial impacts on productivity, on the emergency services and on journey time reliability, all benefits would contribute towards a prosperous Wales.</p>
	<p>2 A resilient Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>3 A healthier Wales</p> <p>This Scheme objective strongly links with this Well-being goal as by improving safety and reducing the number and severity of collisions would have a positive impact on people’s physical health. The improvements to safety would also provide benefits for the perception of safety, benefitting people’s mental health due to reduced driver stress.</p>
	<p>4 A more equal Wales</p> <p>The severity of collisions at this location is proportionately worse than other, similar roads by comparison. Those using Redstone Cross are therefore putting their selves at risk more so in comparison to similar roads, thus by improving safety, the Scheme is contributing towards a more equal Wales.</p>
	<p>5 A Wales of cohesive communities</p> <p>By improving safety, the Scheme would enable improved connectivity for communities and provide improvements to active travel connectivity, contributing towards a Wales of cohesive communities.</p>
	<p>6 A Wales of vibrant culture and thriving Welsh language</p> <p>Through improvements to safety, accessibility is improved for journeys to cultural and Welsh language education facilities.</p>
	<p>7 A globally responsible Wales</p> <p>By improving safety along the A40 of which forms a part of the TEN-T network, accessibility will improve for all users including those travelling via the ports, thus enhancing international connectivity.</p>

Objective and corresponding problems	Well-being Goals
<p>Objective 5: To promote active travel by cycling, horse riding and walking to provide opportunities for healthy lifestyles.</p> <p>No specific problems identified however the Scheme aims to improve active travel connectivity to provide enhancements to walking, cycling, horse riding in the local community.</p>	<p>1 A prosperous Wales</p> <p>By improving active travel connectivity for residents and visitors to the area, enhanced and / or additional routes have the potential to increase active travel journeys, contributing to improvements to health and productivity, with a positive impact on health and care services in the long term.</p>
	<p>2 A resilient Wales</p> <p>Active travel improvements would provide enhanced opportunities for active travel journeys to be made. Journeys that were previously made by car and are now made by active travel would have a positive impact on the environment, contributing to a resilient Wales. The Scheme nonetheless has the potential to encourage more journeys by car on a strategic scale, thus negatively impacting on a resilient Wales. It is anticipated that in the long term, as vehicle technology improves, the environmental impact from cars will reduce.</p>
	<p>3 A healthier Wales</p> <p>This Scheme objective and Well-being goal strongly align with each other. The Scheme aims to provide enhancements to active travel connectivity of which will provide more opportunity for healthy lifestyles, thus contributing to a healthier Wales.</p>
	<p>4 A more equal Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>5 A Wales of cohesive communities</p> <p>Improvements to active travel through the Scheme would provide the opportunity for communities to feel more connected, and also provide improvements to safety for the local community.</p>
	<p>6 A Wales of vibrant culture and thriving Welsh language</p> <p>This Well-being goal aims at promoting and protecting culture such as encouraging people to participate in sports and recreation. By improving active travel connectivity, the Scheme contributes to this Well-being goal.</p>

Objective and corresponding problems	Well-being Goals
	<p>7 A globally responsible Wales</p> <p>Active travel improvements would provide enhanced opportunities for active travel journeys to be made. Journeys that were previously made by car and are now made by active travel would have a positive impact on the environment, contributing to a globally responsible Wales. The Scheme nonetheless has the potential to encourage more journeys by car on a strategic scale, thus negatively impacting on a resilient Wales. It is anticipated that in the long term, as vehicle technology improves, the environmental impact from cars will reduce.</p>
<p>Objective 6: To deliver a Scheme that promotes social inclusion and integrates with the local transport network to better connect local communities to key transport hubs.</p> <p>Problems: 1, 2, 3, 4, 5, 6, 7</p>	<p>1 A prosperous Wales</p> <p>Although the Scheme itself is unlikely to encourage modal shift, it would provide slight benefits for journeys to key public transport hubs through improvements to journey time reliability along the A40 corridor. Improved connectivity would provide benefits for commuting along the corridor, benefitting social inclusion and contributing towards a prosperous Wales.</p>
	<p>2 A resilient Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>3 A healthier Wales</p> <p>The Scheme aims to enhance opportunities for active travel and therefore promote social inclusion and integration with the local transport network, therefore contributing towards a healthier Wales.</p>

Objective and corresponding problems	Well-being Goals
	<p style="text-align: center;">4 A more equal Wales</p> <p>The World Bank Group defines social inclusion as ‘the process of improving the terms for individuals and groups to take part in society, and the process of improving the ability, opportunity, and dignity of those disadvantaged on the basis of their identity to take part in society’³. The Scheme has aimed to encourage engagement with the local community and stakeholders throughout the study’s development. The exhibitions and consultations have been held to include out-of-office hours for example, to maximise attendance and engagement. The Scheme’s Public Liaison Officer is also available on a weekly basis to respond to queries in the local community.</p> <p>Moreover, the Scheme aims to improve active travel connections meaning that walkers, cyclists and horseriders would experience benefits of the Scheme, promoting social inclusion.</p> <p>The Scheme’s aim to improve safety would also contribute to a more equal Wales as the community is currently disadvantaged by the safety issues present at Redstone Cross.</p> <hr/> <p style="text-align: center;">5 A Wales of cohesive communities</p> <p>The engagement undertaken, as outlined above, has enabled the public and stakeholders to put forward their opinions and ideas and thus has provided the community opportunities to consider how and if improvements to transport should be considered between Redstone Cross and Penblewin Roundabout.</p> <p>By addressing safety concerns and providing active travel improvements would also contribute positively to a Wales of ‘attractive, viable, safe and well-connected communities.’</p> <hr/> <p style="text-align: center;">6 A Wales of vibrant culture and thriving Welsh language</p> <p>By promoting social inclusion and accessibility, the Scheme contributed to improving access to cultural and Welsh language facilities. As noted previously, although the Scheme itself is unlikely to encourage modal shift, it would provide slight benefits for journeys to key public transport hubs through improvements to journey time reliability along the A40 corridor</p>

³ The World Bank Group – Social Inclusion - <https://www.worldbank.org/en/topic/social-inclusion>

Objective and corresponding problems	Well-being Goals
	<p>7 A globally responsible Wales</p> <p>By improving active travel improvements, the Scheme aims to enable more journeys to be made on foot, by bicycle or by horse riding. It is nonetheless noted that the Scheme would promote social inclusion on a strategic scale by improvements to journey time reliability for motor vehicles.</p>
<p>Objective 7: Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon.</p> <p>No specific problems however the objective relates to the aim of the Scheme to deliver a sustainable improvement. The Scheme will take steps to reduce or offset waste and carbon where possible.</p>	<p>1 A prosperous Wales</p> <p>By delivering a project that is sustainable, the Scheme would contribute to a prosperous Wales by ensuring that the environment’s natural resources are protected or enhanced where practicable, contributing towards a prosperous Wales.</p>
	<p>2 A resilient Wales</p> <p>This Scheme objective and this well-being goal strongly interconnect as delivering a project that is sustainable and takes steps to reduce or offset waste and carbon that will contribute positively to a resilient Wales; a nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems.</p>
	<p>3 A healthier Wales</p> <p>By aiming for a sustainable project in which reduces or offsets waste and carbon, the Scheme aims to reduce any potential adverse health impacts of the Scheme and providing enhancements for health where possible. Mitigation measures for the waste and carbon impact of the Scheme will be set out for the construction and operation phases.</p>
	<p>4 A more equal Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>5 A Wales of cohesive communities</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>6 A Wales of vibrant culture and thriving Welsh language</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>

Objective and corresponding problems	Well-being Goals
	<p>7 A globally responsible Wales</p> <p>This Well-being goal is embedded within this Scheme objective. In line with the Future Generations (Wales) Act 2015, the Scheme aims to take account of whether the improvements that could be provided to the economic, social, environmental and cultural well-being of Wales, would also make a positive contribution to global well-being.</p>
<p>8: Give due consideration to the impact of transport on the environment and provide enhancement when practicable.</p> <p>No specific problems however the objective relates to the aim of the Scheme to give due consideration to the impact of transport on the environment throughout option development.</p>	<p>1 A prosperous Wales</p> <p>This Scheme objective links with this well-being goal due to the importance of the environment for a strong economy. The environment provides resources to the economy, and so by reducing the environmental quality of a place, economic growth can be adversely affected by lowering the quantity and quality of resources, or due to health impacts⁴.</p>
	<p>2 A resilient Wales</p> <p>This Scheme objective and this well-being goal strongly interconnect as mitigating environmental impacts and enhancing when practicable will contribute positively to a resilient Wales; a nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems.</p>
	<p>3 A healthier Wales</p> <p>The aim of the Scheme is to also improve the active travel network locally. The northern options would sever a Public Right of Way (PRoW) however it is considered that the associated impacts would be mitigated through diversions and reinstatements. Moreover, all proposed options would allow the existing A40, of which would no longer exist as a trunk road, to perform as a local access route and provide safer opportunities for active travel movements. Mitigation and enhancement measures for the impact on the environment e.g. biodiversity and the water environment would also be in place.</p>
	<p>4 A more equal Wales</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>5 A Wales of cohesive communities</p> <p>There is no direct link between the Scheme objective and this Well-being goal.</p>

⁴ The Organisation for Economic Co-operation and Development (OECD) – Global Forum on Environment and Economic Growth - <https://www.oecd.org/economy/greeneco/global-forum-on-environment-2016.htm>

Objective and corresponding problems	Well-being Goals
	<p>6 A Wales of vibrant culture and thriving Welsh language There is no direct link between the Scheme objective and this Well-being goal.</p>
	<p>7 A globally responsible Wales The Scheme would inevitably have environmental impacts including on the landscape, biodiversity and soils. The aim of the Scheme nonetheless is to minimise environmental impact of the Scheme and provide enhancement where practicable.</p>

3.12.12 This demonstrates the positive interrelationship between them.

3.13 Options

Long List of Options

3.13.1 A great deal of development work has previously been undertaken and informed both the location of planned improvements and the preferred design of any highway improvements along the A40 between St Clears and Haverfordwest. This is summarised below.

3.14 Shortlist of Options

3.14.1 The Stage 1 WelTAG builds on the previous development work and further appraises options that take into account the outcomes of the previous development and consultation work, in addition to a do minimum option and a public transport intervention.

3.14.2 The Review Group agreed that the options to be considered as part of the WelTAG Stage 1 appraisal were to include:

- **Do Minimum**

Limited intervention reflecting the existing situation in the future, with the addition of any planned or committed measures as identified in the Pembrokeshire LDP.

- **Active Travel**

Active travel options aimed at improving local connectivity including walking, cycling and horse riding. Complementary active travel measures would be investigated and designed during WelTAG Stage Three, in conjunction with a WCH Assessment and Review Report.

- **Public Transport**

Increase frequency of bus services.

- **Highway Options – Southern Route**

RSX1a

Offline straight alignment between Penblewin and Redstone Cross, with online ghost island junction improvement at Redstone Cross. Vertical tie-in west of Redstone Cross to improve geometry and visibility at the junction.

RSX1b

Offline straight alignment between Penblewin and Redstone Cross, with online ghost island junction improvement at Redstone Cross. Vertical tie-in east of Redstone Cross. No improvement to mainline vertical geometry through the junction.

RSX1c

Offline alignment minimising separation between proposed and existing A40. Online ghost island junction improvement at Redstone Cross. Vertical tie-in east of Redstone Cross Junction. No improvement to mainline vertical geometry through the junction.

RSX1d

Offline alignment between Penblewin and Redstone Cross south of existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). Offline junction improvement south of existing Redstone Cross Junction.

RSX1e

Redstone Cross Junction Improvement works only. No improvements to A40 mainline west of the junction.

RSX1f

Offline alignment between Penblewin and Redstone Cross south of the existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). No Junction provided for Redstone Cross. Side road diversions and underpass provided for north-south connectivity between Narberth & Bethesda.

RSX1g

Offline alignment between Penblewin and Redstone Cross south of the existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). No junction provided for Redstone Cross. Overbridge provided for north-south connectivity between Narberth & Bethesda.

RSX1h

Offline alignment between Penblewin Roundabout and Redstone Cross south of the existing alignment. Offline roundabout constructed to the south of the existing Redstone Cross Junction.

- **Highways Options – Northern Route**

RSX2a

Single carriageway offline alignment to the north of existing Redstone Farm, with offline junction improvement north of Redstone Cross.

RSX2b

Offline alignment between Penblewin Roundabout and Redstone Cross north of the existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). Overbridge provided along Bethesda Road to maintain north – south connectivity between Narberth – Bethesda. New side road provision connecting the A478 south of Penblewin with the existing A40.

RSX2c

Offline alignment between Penblewin Roundabout and Redstone Cross north of the existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). Offline junction improvement north of existing Redstone Cross Junction.

RSX2d

Offline alignment (long option) between Penblewin Roundabout and Redstone Cross north of the existing alignment. Vertical tie-in west of Jacob's Park. Overbridge spanning across the new alignment providing north – south connectivity between Narberth – Bethesda.

RSX2e

Offline alignment between Penblewin Roundabout and Redstone Cross to the north of the existing alignment. Vertical tie-in west of Redstone Cross (approximately at access to Jacob's Park). Offline roundabout to the north of existing Redstone Cross Junction.

- 3.14.3 Each of the options was subject to WelTAG Stage 1 appraisal, with a description of each option, how it would tackle the identified problems, how it would meet the objectives, as well as key risks, adverse impacts, constraints and dependencies.

- 3.14.4 An overview of the sifting exercise of the long list to the shortlist is provided within Section 4.2 of the IAR. To summarise, a number of options were not recommended to be shortlisted for reasons such as not addressing highway safety concerns, impact on property, limitations for improvements to active travel, and not providing sufficient improvements to the standard of the A40
- 3.14.5 To summarise, three options were first recommended to be taken forward for further detailed appraisal. Active travel should form complementary measures alongside any of the four shortlisted highway route options. The shortlisted options therefore are presented as follows:
- a) Active travel, supporting:
 - b) Option 1A: Northern highway route (Ref RSX2b);
 - c) Option 1B: Northern highway route (Ref RSX2c);
 - d) Option 2a: Southern highway route (Ref RSX2d).
- 3.14.6 The first Public Information Exhibition presented the identified problems, objectives and options, as above, in April 2019. Feedback from the exhibition attendees showed no clear preference between the options. With regards to alternative options, suggestions were made for a roundabout to replace Redstone Cross junction; traffic calming measures; alterations to the Southern Option (an underpass or bridge / no junction); and improvements to the existing junction layout.
- 3.14.7 Following feedback received and further route development from highway engineering specialists, Option 2B was developed.
- 3.14.8 A second Public Information Exhibition was held to present the four highway options to the public in May 2019. A summary of the feedback received is presented below:
- a) 52% of respondents preferred an option with no junction at Redstone Cross whilst 26% preferred an option with a junction. 22% of respondents left the response blank or provided an alternative response.
 - b) There was a clear preferred option with 72 respondents stating their preference for Option 2B (Southern Route without a Redstone Cross Junction). The second most preferred route was Option 1B (Northern Route without a Redstone Cross Junction). This demonstrates that the two most favoured options did not include a junction at Redstone Cross. 15 respondents preferred Option 1A (Northern Route with Junction) and 13 respondents

preferred Option 2A. 5 respondents chose both Option 1B and 2B (favouring options without a Junction) and 3 respondents chose both Option 1A and 2A (favouring options with a Junction). 7 respondents chose No option or left the response blank.

- c) 60% of respondents felt all options have been considered. Feedback suggesting alternatives and additions to the proposal included a roundabout to replace Redstone Cross junction, traffic calming measures and the provision of a slip road.

Option 1A – Northern Route with staggered T-junction at Redstone Cross

Description

- 3.14.9 The conceptual design seeks to divert the mainline carriageway to the south of the existing A40 runs through an area of woodland, a watercourse and negatively impacts nearby properties at Redstone Cross.
- 3.14.10 The horizontal alignment runs north of the existing A40. This design option avoids going through the environmentally sensitive areas to the south of the existing highway alignment.
- 3.14.11 An alignment to the north of the existing A40 carriageway has a detrimental effect on land use as it impacts farms and land holdings. It also severs private means of access and public footpaths which is avoided in the conceptual design option.
- 3.14.12 The route also runs in close proximity to the setting of a Scheduled Ancient Monument, with the potential for more archaeological findings along the trace of the route.
- 3.14.13 With the north alignment there is a reduced volume of earthworks with a better cut and fill balance when compared to the conceptual design.
- 3.14.14 The mainline alignment in this vicinity is fully compliant with the DMRB with no departures from standard.
- 3.14.15 The option provides benefit to the buildability and risk in relation to deliverability and safe by design in the short term as it proposes to construct the Redstone Cross junctions offline in comparison to the online approach with the conceptual design.

3.14.16 An illustration is provided in Figure 2.

Option 1B – Northern Route (no Redstone Cross Junction)

Description

- 3.14.17 The conceptual design seeks to divert the mainline carriageway to the south of the existing A40 runs through an area of woodland, a watercourse and negatively impacts nearby properties at Redstone Cross.
- 3.14.18 The horizontal alignment runs north of the existing A40. This design option avoids going through the environmentally sensitive areas to the south of the existing highway alignment.
- 3.14.19 An alignment to the north of the existing A40 carriageway has a detrimental effect on land use as it impacts farms and land holdings. It also severs private means of access and public footpaths which is avoided in the conceptual design option.
- 3.14.20 The route also runs in close proximity to the setting of a Scheduled Ancient Monument, with the potential for more archaeological findings along the trace of the route.
- 3.14.21 With the north alignment there is a reduced volume of earthworks with a better cut and fill balance.
- 3.14.22 The mainline alignment in this vicinity is fully compliant with the DMRB with no departures from standard.
- 3.14.23 The option removes the constraint of the junction therefore allows for a greater length of 2+1. This has the benefit of reducing driver frustration and improving journey time reliability.
- 3.14.24 Removing the junction will eliminate risks associated with the junction turning manoeuvres from the Scheme. North–south connectivity between Narberth and Bethesda will be maintained by the provision of an overbridge along the current alignment of Bethesda Road.
- 3.14.25 It provides benefit to the buildability and risk in relation to

deliverability and safe by design in the short term as it proposes to construct the Redstone Cross junctions offline in comparison to the online approach with the conceptual design.

3.14.26 An illustration is provided in Figure 3.

Option 2A – Southern Route (with Redstone Cross Junction)

Description

3.14.27 The horizontal alignment runs south of the existing A40, leading in a generally south-westerly direction from Penblewin roundabout. The alignment runs to the south of the existing Redstone Cross junction (between Redstone Cottages and Blaenmarlais Care Home) and re-joins the existing A40 near the entrance to Jacob's Park.

3.14.28 A vertical constraint would be at Redstone Road due to the need to provide an at-grade junction at this location to provide access to Bethesda & Redstone Road. The junction would be a staggered ghost island junction.

3.14.29 In comparison with the norther routes, the option has a slightly better cut and fill material balance due to the slightly reduced earthwork embankment between Redstone Junction and Penblewin roundabout. This is achieved by running the mainline alignment south of the existing Redstone Cross junction, thereby removing the vertical tie-in constraint located immediately to the east of the existing Redstone Cross junction in the conceptual design. The embankment height would still be significant (approx. 10 metres).

3.14.30 The option goes through the environmentally sensitive woodland area.

3.14.31 It does avoid the demolition of property at Redstone Cross as the new junction is proposed at a new location to the south of the existing junction.

3.14.32 The mainline alignment in this vicinity is fully compliant with the DMRB with no departures from standard.

3.14.33 This option provides benefits to the deliverability and 'Safe by Design' safety benefits in the short term as a greater length of the mainline, as

well as the proposed Redstone Cross junction, are constructed offline in comparison to the online construction of the junction improvement proposed within the conceptual design.

- 3.14.34 An illustration is provided in Figure 4.

Option 2B – Southern Route (no Redstone Cross Junction)

Description

- 3.14.35 The horizontal alignment is very similar to Option 2A, however due to the omission of a junction at Redstone Cross, it does not tie-in vertically into Redstone Road. Instead, the road travels underneath Redstone Road and ties back in vertically near the access to Jacob's Park.
- 3.14.36 An overbridge is proposed along Redstone Road to maintain the north-south connectivity between Narberth and Bethesda. There would be no junction on the A40 mainline at Redstone Cross.
- 3.14.37 A new side road would be constructed from Penblewin to allow access onto the existing A40 leading to Redstone Road & Bethesda.
- 3.14.38 The design crosses environmentally sensitive land which includes mature trees and a watercourse which would be affected. The option goes through the environmentally sensitive area.
- 3.14.39 It avoids land take from nearby property at Redstone Cross as the new junction is proposed at a new location to the south of the existing junction.
- 3.14.40 It provides a significantly better earthworks balance than the northern routes due to the cutting required to take the road below Redstone Road. This also reduces the volume of material required to import for the embankment between Redstone Cross and Penblewin. The embankment height between Redstone Cross and Penblewin roundabout is significantly lower than the conceptual design, therefore reducing the visual impact.
- 3.14.41 The mainline alignment of this option is fully compliant with the DMRB with no departures from standard. However, in order for the

road to drop below Redstone Road, there are relaxations in the vertical alignment.

- 3.14.42 The removal of the junction from the A40 mainline allows for a greater length of 2+1 carriageway cross-section provision. This will allow for overtaking sections in both directions instead of eastbound only (as specified in the conceptual design). This will reduce driver frustration as a greater length of safe overtaking opportunities will be provided.
- 3.14.43 This option provides benefits to the deliverability and ‘Safe by Design’ safety benefits in the short term as a greater length of the mainline, as well as the proposed Redstone Cross junction, are constructed offline in comparison to the online construction of the junction improvement proposed within the conceptual design.
- 3.14.44 The benefits of this option compared to 2A include:
- a) Reduced disruption during construction for the construction of the proposed A40 alignment;
 - b) Reduced hazards associated with Redstone Cross junction by removing the junction from the Scheme; and
 - c) Provide a greater length of 2+1 sections which improve journey time reliability and reduce driver frustration.
- 3.14.45 An illustration is provided in Figure 5.

Figure 2 Option 1A - Northern Route with staggered T-junction at Redstone Cross

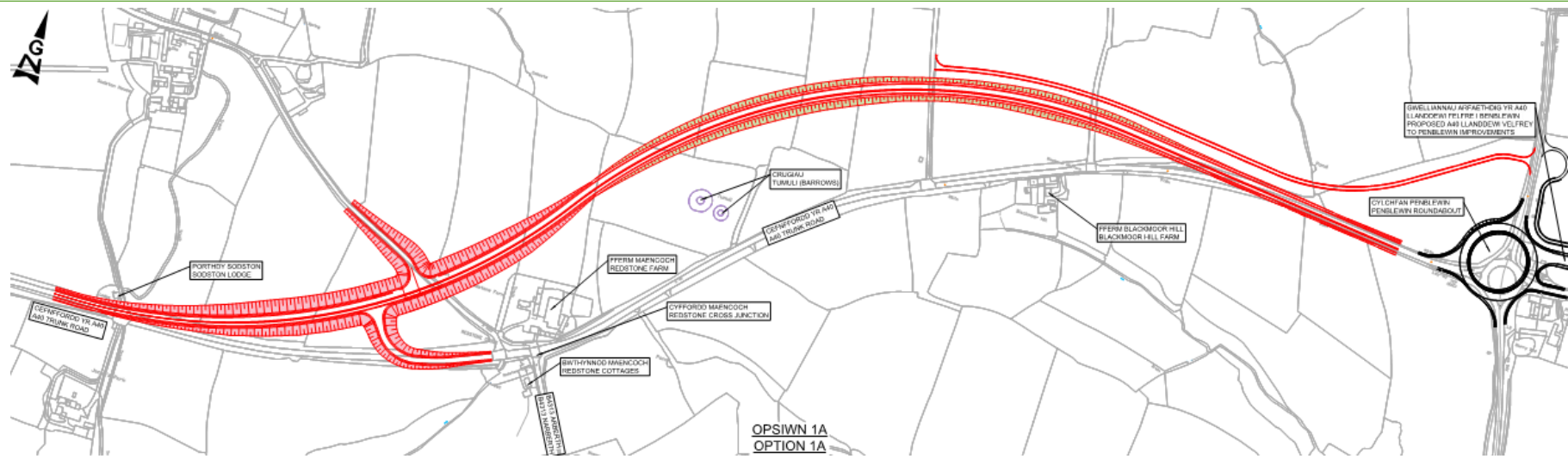


Figure 3 Option 1B - Northern Route (no Redstone Cross Junction)

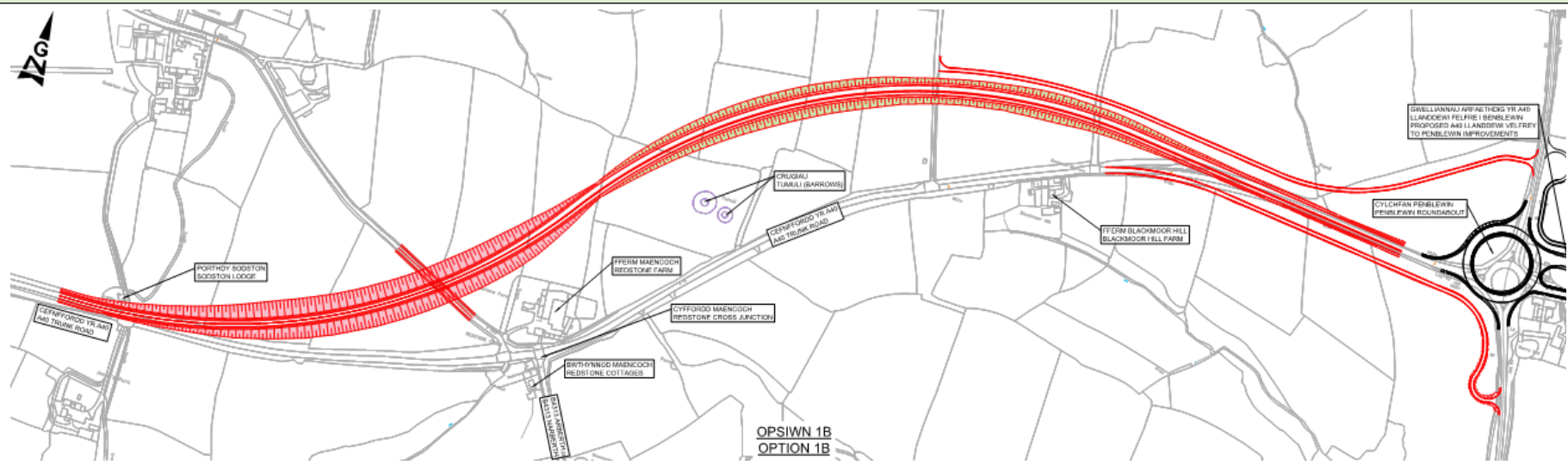


Figure 4 Option 2A - Southern Route with staggered T-junction at Redstone Cross

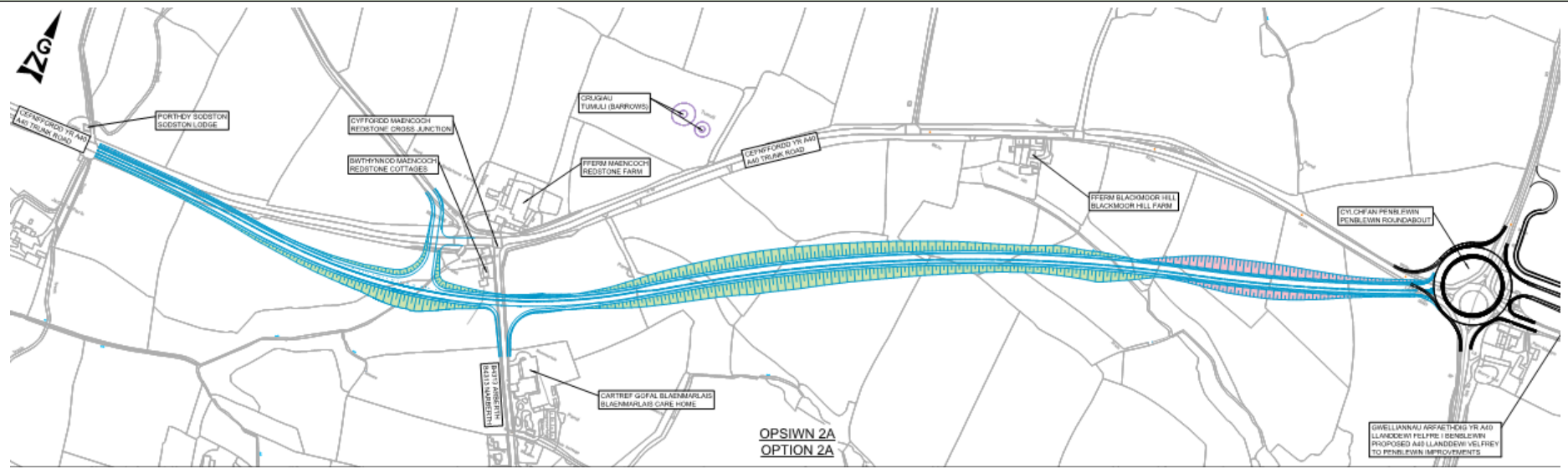
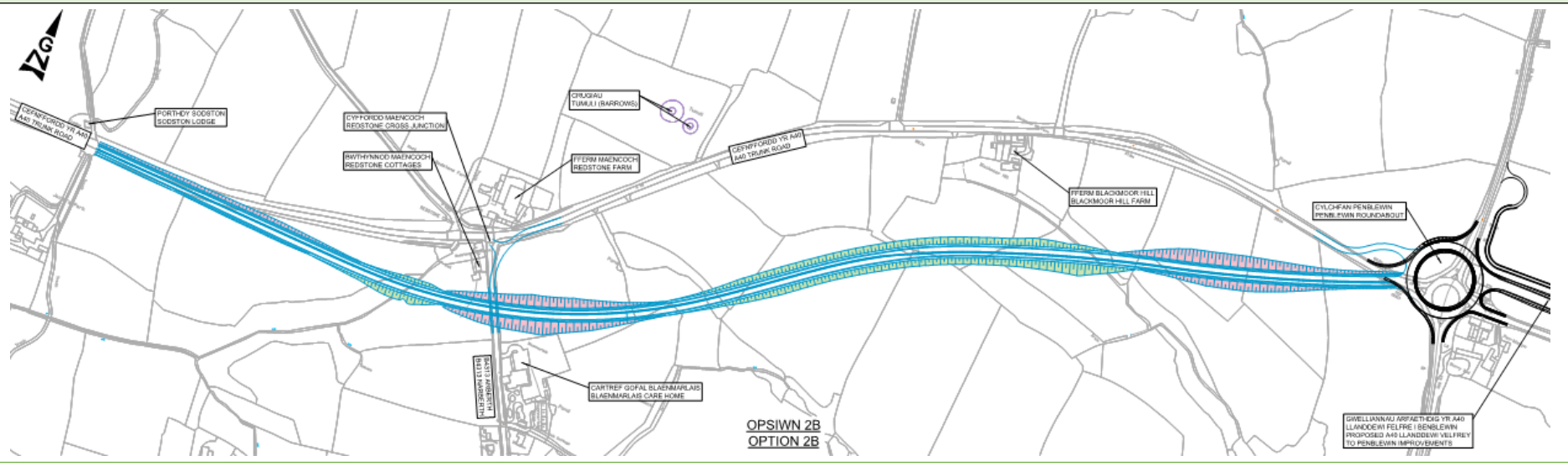


Figure 5 Option 2B - Southern Route (no Redstone Cross Junction)



How are the Problems addressed?

3.14.46 The table below outlines how the problems would be addressed by the shortlist.

Table 4 How the proposed options would address the problems

Problem	How the Problem is addressed
<p>1. The A40 mainline and Redstone Cross junction is substandard.</p>	<p>All options are designed to the requirements within the Design Manual for Roads and Bridges (DMRB). In particular the standards “Highways Link Design-TD9/93”, “Design of Wide Single 2+1 Roads-TD70/08” and “Geometric Design of Major/Minor Priority Junctions-TD42/95”.</p> <p>Option 2A would require a departure from standard for the layout of the Staggered T- Junction arrangement. The allowable (to standard) arrangement contained within TD70, is for a right/left junction stagger. The proposed layout reverses this layout, which would be a right/left stagger, which requires a departure from standard.</p> <p>Option 2B has a marginally reduced standard, due to a reduction in vertical geometry (crest curve), which is an allowable relaxation within the standard. This is to allow the proposed realigned A40 to pass beneath Redstone Cross Road. Redstone Cross Road would pass over the top on an overbridge.</p> <p>The number and severity of collisions having been recorded at Redstone Cross junction highlights a safety concern. In addition to this, many respondents as part of the Public Information Exhibitions voiced their safety concerns including related to witnessing collisions and near-misses. Concerns also related to any proposed staggered junction at this location. Options 1B and 2B would therefore remove the junction onto the A40. It is nonetheless considered that Options 1A and 2A would provide significant improvements to the current situation.</p>
<p>2. Limited overtaking opportunities lead to poor journey time reliability and driver frustration.</p>	<p>Options 1B and 2B provide the longest extent of 2+1 carriageway and therefore maximise safe overtaking opportunities within this section of the trunk road which in turn will positively contribute to improved resilience and journey time reliability. These options would provide approximately 1.2km of 2+1 overtaking opportunity. There is potential for these options to provide opportunities for overtaking (two lanes) for both directions at different sections of the route.</p> <p>In addition, Options 1B and 2B do not include provision for a staggered junction at the location of Redstone Cross, which means transport users travelling east-west do not need to negotiate / slow down at this location.</p> <p>Options 1A and 2A would provide approximately 0.9km of 2+1 carriageway. The two lanes could be provided in either</p>

Problem	How the Problem is addressed
	<p>direction however it is not possible to provide overtaking opportunities (two lanes) for both directions owing to the length of the route.</p> <p>All options would provide significantly enhanced overtaking opportunities along the A40, improving east-west connectivity by improving journey times and journey time reliability, and reducing likelihood of driver frustration.</p>
<p>3. Occasional convoys of heavy goods vehicles from the ferry ports and slow-moving agricultural vehicles contribute to periods of platooning and journey time unreliability, which is exacerbated with limited overtaking opportunities.</p>	<p>Through the provision of enhanced overtaking opportunities, the likelihood and/or length of platooning is reduced. All options present a significantly enhanced opportunity for vehicles to overtake slow-moving vehicles such as heavy goods vehicles from the ferry ports and slow-moving agricultural vehicles. By improving overtaking opportunities, all options present benefits to journey time reliability.</p> <p>Moreover, many agricultural vehicles travelling between the existing Redstone Cross Junction and Penblewin Roundabout would utilise the detrunked route (the existing A40), thus removing a proportion of slow-moving traffic away from the new A40, reducing the likelihood of platooning to a greater extent.</p> <p>Options 1B and 2B remove direct access to and from Redstone Cross, by removing the junction. This increases the lengths of overtaking available, which benefits the strategic road network and improves journey time reliability. Local traffic would access Redstone Cross via Penblewin and utilise the existing A40 carriageway. This would increase journey times for local traffic travelling to/from the west.</p>
<p>4. Seasonal spikes in traffic volumes along the A40 especially during the summer months leads to slow moving traffic causing journey time unreliability, which is exacerbated with limited overtaking opportunities.</p>	<p>Seasonal spikes in traffic volumes especially during the summer months are clearly evidence within the Impact Assessment Report. Providing enhanced overtaking opportunities would allow for improved journey time reliability and enhanced highway capacity; of which would reduce the likelihood and severity of traffic problems during the summer period.</p>
<p>5. There are many side road junctions and direct accesses to properties and agricultural fields off the A40, which contributes to operational</p>	<p>All options would reduce the number of side road junctions and direct accesses onto the A40, with Option 1B and 2B removing all accesses between Redstone Cross junction and Penblewin Roundabout. By removing these junctions and accesses, there is a reduced likelihood of traffic slowing down as well as a reduced conflict between vehicles on the A40 and vehicles joining the A40. There is less overtaking opportunity provided within Options 1A and 2A owing to the proposed Redstone Cross junction.</p>

Problem	How the Problem is addressed
problems along the road.	

How are the Objectives addressed?

3.14.47 The appraisal of the performance of the options against the objectives is informed by the appraisal as presented within the IAR. This will be updated at Stage 3 for a preferred option, which will be informed by the appraisal but with a more detailed evidence base.

O 1	<p>To enhance network resilience and improve accessibility along the east-west transport corridor to key employment, community and tourism destinations.</p> <p>As a key east-west route, the options will improve accessibility along the A40 to key towns such as Haverfordwest and Carmarthen. This will provide associated benefits for car-based journeys as well as accessibility for those using public transport. This would improve accessibility to key employment, community and tourism destinations. The potential benefits are maximised given the high dependency on the private car in light of the socio-demographic and geographical context of the region.</p> <p>Options 1B and 2B provide the longest extent of 2+1 carriageway and therefore maximises safer overtaking opportunities within the section of the trunk road which in turn will positively contribute to improved resilience and journey time reliability. These options would provide approximately 1.2km of 2+1 overtaking opportunity. There is potential for these options to provide opportunities for overtaking (two lanes) for both directions at different sections of the route. In addition, Options 1B and 2B do not include provision for a staggered junction at the location of Redstone Cross, which means transport users travelling east-west do not need to negotiate / slow down at this location. Options 1A and 2A would provide approximately 0.9km of 2+1 carriageway. The two lanes could be provided in either direction however it is not possible to provide overtaking opportunities (two lanes) for both directions owing to the length of the route. Both 1A and 2A include a staggered junction. This would require traffic to negotiate joining, crossing and leaving the junction of which would increase the likelihood of east-west traffic needing to slow down and thus slightly reducing strategic connectivity benefits in comparison to Options 1B and 2B of which do not include a Redstone Cross junction.</p>	Option 1A ++
		Option 1B +++
		Option 2A ++
		Option 2B +++

<p>O 2</p>	<p>To improve prosperity and provide better access to the county town of Haverfordwest, the Haven Enterprise Zone and the West Wales ports at Fishguard, Milford Haven and Pembroke Dock.</p> <p>As a key east-west route, the options will improve accessibility along the A40 to key towns such as Haverfordwest and Carmarthen as well as key employment areas. Maximising the extent of 2+1 carriageway would provide the maximum benefit in terms of journey reliability and wider prosperity. Options 1B and 2B would provide 1.2km of overtaking opportunity compared to 0.9km for Options 1A and 2A. It is therefore considered that Options 1B and 2B would provide greater benefits for strategic connectivity when compared to Options 1A and 2A.</p> <p>Providing no junction onto the new A40 at Redstone Cross would enable maximised strategic benefits for connectivity as vehicles would not need to negotiate vehicles joining the carriageway from the north and south. It would also provide transport users with improved opportunities to overtake slow moving vehicles.</p> <p>Without a new Redstone Cross junction, some transport users would be adversely affected, for example, those living and working within proximity of the existing Redstone Cross junction and along Redstone Road. With Option 1B and Option 2B, transport users would need to take a longer journey to join the A40 in comparison to the current situation.</p> <p>An initial economic assessment has been undertaken for the four short-listed options. The BCR results indicate that Option 2A provides the best BCR. Option 2B provides similar strategic benefits but with a local disbenefit.</p> <p>Feedback received at the Public Information Exhibitions suggested that whilst some respondents stated a negative impact on accessibility to the A40, more comments were received in support for no Redstone Cross junction as part of proposals. 73 respondents stated their preference for no junction whilst 36 stated their preference for a junction. It is noted that 31 respondents did not provide a response or provided an alternative response. Many respondents cited their safety concerns for any staggered junction at Redstone Cross during both events; this included safety concerns for the existing situation and Options 1A and 2A.</p> <p>With all this considered, it is anticipated that Option 1B and 2B would provide greater outcomes for this objective because of the routes' connectivity benefits on a strategic scale. A large number of respondents also preferred the removal of the Redstone Cross junction.</p>	<p>Option 1A +</p>
		<p>Option 1B ++</p>
		<p>Option 2A +</p>
		<p>Option 2B ++</p>

<p>O 3</p>	<p>To reduce community severance and provide health and amenity benefits</p> <p>It is considered that all options would reduce community severance and provide health and amenity benefits largely due to the removal of a significant proportion of traffic off the existing A40. This would allow the existing A40, of which would be no longer be a trunk road, to perform as a local access route and also provide safer opportunities for active travel movements.</p> <p>Options 1B and 2B would remove direct access onto the new A40 at the location of the existing Redstone Cross junction. Although some respondents stated a desire for the maintained connection onto the A40 at this location, more respondents stated their preference for no junction. This demonstrates that no junction may not create significant concerns about severance for many of the local community. It is nonetheless noted that removing a direct connection would increase journey times e.g. for locals and for those accessing Redstone Cross industrial park.</p>	<p>Option 1A +</p>
	<p>Options 1B and 2B would retain a north-south connection. Options 1A and 1B would sever direct access onto the A40 from unnamed roads to the north of the A40 however accesses would be created to run parallel to the new route, with a new access connecting to the A478 to the north of Penblewin roundabout. These new access routes would provide a longer route for accessing the A40 to the west, however the routes would no longer have a junction onto a trunk road.</p>	<p>Option 1B ++</p>
	<p>Options 1A and 2A provide access from both the north and the south onto the new A40 via a staggered junction designed to modern design standards. This would maintain direct access onto the A40 at this location however from feedback received from the community, a junction at this location was not favoured by most respondents, with many comments relating to concerns for any staggered junction. The option to use the new Redstone Cross junction would nonetheless be preferable to some of the community, and with the junction designed to modern design standards, this would provide an improvement upon its existing situation.</p> <p>All options would maintain north-south connectivity between Narberth and Bethedsda. Options 1B and 2B would facilitate this connection via an overbridge as opposed to a staggered junction. Although the staggered junction would be designed to modern design standards and would be an improvement on its existing situation, an overbridge would produce more benefits as transport users do not need to negotiate the crossing against the traffic.</p> <p>Overall, it is considered that all options would reduce community severance and provide health and amenity</p>	<p>Option 2A +</p>

	<p>benefits. It is nonetheless noted that Option 1B and 2B would revise the junction arrangement, creating more benefits for north-south connectivity. Active travel movements would be enhanced within the local area most through Options 1B and 2B as walkers, cyclists and horse riders would not need to cross the A40 for north-south movements.</p>	<p>Option 2B ++</p>
<p>O 4</p>	<p>To improve the Redstone Cross Junction safety (and perceived safety) and reduce the number and severity of A40 mainline collisions.</p> <p>Maximising the lengths of 2+1 carriageway means that Options 1B and 2B provide greatest benefit in terms of removing direct accesses onto the trunk road and providing the maximum extent of safe, unambiguous overtaking opportunities, reducing the likelihood of collisions through risky manoeuvres.</p> <p>Potential conflict is removed to a slightly greater extent with Options 1B and 2B, given no intermediate junctions.</p> <p>Options 1B and 2B would therefore remove the junction onto the A40; an option supported by most respondents during stakeholder engagement. It is however the case that Options 1A and 2A would provide a significant improvement upon the existing situation.</p> <p>Given that a majority of collisions identified over the study period within the study area have been recorded at Redstone Cross, all of the options would provide significant improvements to safety. This would include improvements to perceived safety. It is anticipated that Options 1B and 2B would provide slightly greater benefits owing to the increased overtaking opportunities and there being no junction at this location for vehicles to negotiate.</p>	<p>Option 1A ++</p> <p>Option 1B +++</p> <p>Option 2A ++</p> <p>Option 2B +++</p>

O 5	<p>To promote active travel by cycling, horse riding and walking to provide opportunities for healthy lifestyles</p> <p>Options 1A and 1B would sever one PRow however it is considered that associated impacts will be mitigated through diversions and reinstatements. The parallel access road along the western section of the new road would help maintain local accesses.</p> <p>The options also provide the opportunity to improve / enhance walking, cycling and horse-riding links within the local community through diversions of existing routes and provision of new routes. The measures would be established as part of WelTAG Stage 3 with a WCH Assessment and Review likely to then be available.</p> <p>All options would reduce the traffic flow along the existing A40, and thus provide opportunities for safer and more pleasant active travel journeys.</p> <p>Options 1B and 2B would provide greater benefits for active travel connectivity between Narberth and Bethesda, as walkers, cyclists and horse riders are able to cross the new A40 via an overbridge, and therefore do not need to negotiate the traffic along the A40.</p>	Option 1A 0
		Option 1B +
		Option 2A 0
		Option 2B +
O 6	<p>To deliver a Scheme that promotes social inclusion and integrates with the local transport network to better connect local communities to key transport hubs</p> <p>Although the options are unlikely to encourage modal shift they would provide slight benefits for journeys to key public transport hubs through improvements to journey time reliability. Access to local communities would also be benefited by improved highway and WCH conditions.</p>	Option 1A +
		Option 1B +
		Option 2A +
		Option 2B +
O 7	<p>To deliver a project which is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon</p> <p>Although the options would not encourage modal shift to</p>	Option 1A --

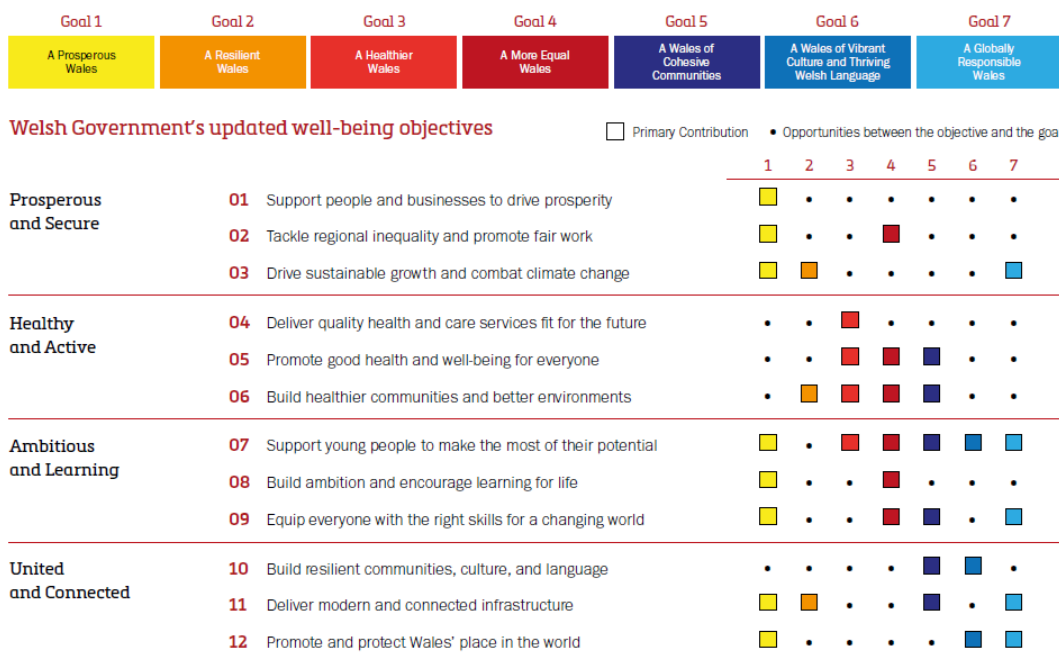
	<p>more sustainable transport options, it would, through maximising overtaking opportunities, provide sustainability benefits in terms of the overall efficiency of journeys as well as improving access to key employment areas, supporting economic growth and social inclusion.</p> <p>However, the highway options would all involve construction carbon impacts. Option 2B would have less adverse impact given its improved conditions for operational traffic, reducing the impact of vehicle emissions.</p>	<p>Option 1B --</p>
		<p>Option 2A --</p>
		<p>Option 2B -</p>
<p>O 8</p>	<p>Give due consideration to the impact of transport on the environment and provide enhancement when practicable</p> <p>There would be land take required for all route options with associated environmental impacts on the landscape, biodiversity, soils etc. which requires further survey and assessment. However, this needs to be balanced against the opportunities for mitigation and enhancement and wider Scheme benefits.</p> <p>Options 2A and 2B travel through more environmentally-sensitive land, however Options 1A and 1B travel through more cultural heritage-sensitive land.</p>	<p>Option 1A --</p>
		<p>Option 1B --</p>
		<p>Option 2A --</p>
		<p>Option 2B --</p>

3.15 Well-being Objectives

3.15.1 Whilst much of the previous development work and associated decision making leading up to this latest WelTAG study precedes the Well-being of Future Generations (Wales) Act 2015 (WFGA), WelTAG 2017 Supplementary Guidance sets out that:

“When using WelTAG it is essential to comply with the duties set out in the Well-being of Future Generations (Wales) Act 2015. They are to follow the sustainable development principle through following the five ways of working and set well-being objectives that maximise contribution to the seven well-being goals.”

- 3.15.2 The WFGA places a duty on 44 public bodies in Wales places a duty on 44 public bodies in Wales, including Welsh Ministers, to carry out sustainable development. This means that each public body must work to improve the economic, social, environmental and cultural well-being of Wales. To do this they must set and publish well-being objectives designed to maximise their contribution to each of the seven well-being goals. Public bodies must then take action to make sure they meet the objectives they set.
- 3.15.3 WelTAG 2017 guidance explains how it is important that the way the WelTAG framework is used for thinking about proposed changes to the transport system, helps public bodies fulfil their well-being duty. It is essential therefore that the sustainable development principle of the WFGA is applied to the way the WelTAG framework is used.
- 3.15.4 The WFGA well-being goals have been taken into account as part of the objectives for this Scheme (see section 4.3 of the IAR). In developing the objectives, a review was undertaken against the well-being goals as presented within the 2015 Act. This ensures that the Scheme objectives align to the wider sustainable development principle of the Welsh Government, and take into account the needs of Wales' future generations. For example, Scheme Objective 7 is to: 'Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon', which is clearly aligned to the national well-being goal to create 'A globally responsible Wales'. As such, an option that performs well against the objectives is expected to contribute to the well-being goals.
- 3.15.5 As is set out in section 4.5 of the IAR, the preferred option performs well against all but one of the Scheme objectives, and as such is expected to contribute positively to the well-being goals.
- 3.15.6 A review has been undertaken of the preferred option to help demonstrate how its implementation would contribute to the well-being goals, by considering the Welsh Government's well-being objectives. The Welsh Government's well-being objectives were last updated in its Well-being Statement published alongside its Prosperity for All: The National Strategy document. Table 1 of the Well-being Statement sets out the Welsh Government's contribution to the well-being goals, explaining how each of its 12 well-being objectives aligns to its four cross cutting themes and contributes to one or more of its seven well-being goals:



3.15.7 It is clear that a positive contribution to a well-being objective would align to the cross-cutting strategies and result in a positive contribution to one or more of the well-being goals. As such, a commentary of how the preferred option would contribute to the well-being objectives is provided below.

Table 5 Alignment between Well-being objectives and the Preferred Option

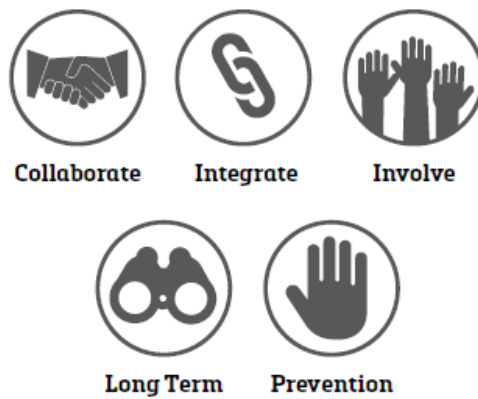
Well-being Objective	How the preferred option would contribute
Support people and businesses to drive prosperity	The Scheme would address the transport problems on the network, improving journey reliability and improving journey times at times of incidents and delays, as well as enhance accessibility to employment areas including those at Milford Haven, Pembroke Dock and the Haven Waterway Enterprise Zone. Improved access to employment opportunities and enhanced conditions for the movement of people and goods along the TEN-T strategic route would support people and businesses to drive prosperity and reduce inequality.
Tackle regional inequality and promote fair work	
Drive sustainable growth and combat climate change	Although the option would not encourage modal shift to more sustainable transport options, it would, through maximising the opportunity to overtake provide benefits in terms of the overall efficiency of journeys as well as improving access to key employment areas, support economic growth. Increased journeys are likely to result in increased GHG. The new road infrastructure will also produce embodied carbon in addition to the operational GHG emissions. Adverse operational

Well-being Objective	How the preferred option would contribute
	<p>carbon effects could be offset in the longer term once ultra-low emission vehicle technology has a higher uptake.</p> <p>Active travel improvements aim to improve opportunities for walking, cycling and horse riding, therefore on a local scale, making sustainable journeys more attractive to the community.</p>
<p>Deliver quality health and care services fit for the future</p>	<p>The Scheme would not directly contribute to this objective but would help improve accessibility to health and care services. The Scheme also provides the opportunity to improve / enhance walking, cycling and horse-riding links. This would help increase physical fitness, which would benefit health and care services in the longer term.</p>
<p>Promote good health and well-being for everyone</p>	<p>The Scheme would help to improve the active travel network locally by providing enhancements for walking, cycling and horse riding. The Scheme would also remove a significant proportion of traffic from the existing A40, of which would no longer exist as a trunk road, and allow for safer, more attractive opportunities to make active travel movements. In terms of building better environments, the Scheme will look to incorporate mitigation and enhancement measures for the Scheme’s impact on the environment.</p>
<p>Build healthier communities and better environments</p>	
<p>Support young people to make the most of their potential</p>	<p>The Scheme would address the transport problems on the network, improving journey reliability and improving journey times at times of incidents and delays. That would improve accessibility to education services and other opportunities for learning and development, including employment areas such as the Haven Waterway Enterprise Zone (with innovative opportunities at new and established energy, food, tourism, life sciences, ICT and manufacturing firms). The construction phase of the Scheme would also offer opportunities for local recruitment and training, including apprenticeships for young people. Furthermore, addressing the transport problems would also help parents to better plan their journeys to work, which in turn would help parents spend more time with their children.</p>
<p>Build ambition and encourage learning for life</p>	
<p>Equip everyone with the right skills for a changing world</p>	
<p>Build resilient communities, culture and language</p>	<p>The Scheme would provide slight benefits for journeys to key public transport hubs through improvements to journey time reliability and would support prosperity with improved access to employment opportunities and tourist destinations. That would help retain the existing population and provide opportunities for young people to stay</p>

Well-being Objective	How the preferred option would contribute
	living and working in the area, which has above national average levels of Welsh speakers.
Deliver modern and connected infrastructure	The proposed solution would provide a high-quality road built to modern standards, which would replace the worst section of TEN-T in the UK. The improvements would reduce the current actual and perceived barriers to investment in the region and it would provide an improved connection to key employment areas and communities in South West Wales, forming part of the wider A40 enhancements, of strategic importance to the Welsh Government.
Promote and protect Wales' place in the world	

3.15.8 From the appraisal above, it is clear that the proposed solution would result in opportunities to help achieve the well-being objectives, thus aligning positively to the cross-cutting strategies, contributing to the well-being goals, and helping Welsh Ministers satisfy their duties and obligations under the 2015 Act.

3.15.9 The Act also outlines five key ways of working that the Welsh Government is obliged to take account of and its objectives have been framed by the ways of working:



3.15.10 A review of how the project would embed the five ways of working is provided in the Delivery Case.

4 Transport Case

4.1 Introduction

4.1.1 The **Transport Case** considers how the proposed solution (options) will meet the need identified in the **Strategic Case** and the objectives set. The assessment considers potential impacts under the following key themes:

- a) Social and cultural
- b) Environmental; and
- c) Economic.

4.2 Options Assessment

4.2.1 As stated earlier, WelTAG Stage 1 recommended the following options to be taken forward for further appraisal at Stage 2:

- a) Active travel, supporting:
- b) Northern highway route (Ref RSX2b) – referenced as Option 1A;
- c) Northern highway route (Ref RSX2c) – referenced as Option 1B;
- d) Southern highway route (Ref RSX1d) – referenced as Option 2A; and
- e) Southern highway route (Ref RSX1g) – referenced as Option 2B.

4.2.2 These options were put forward by the Review Group and as appraised in the Design Options Report to help progress towards a preferred option.

4.2.3 Full and technical details of the evidence base and analysis work undertaken is presented within Section 3 and 4 of the WelTAG Stage 1 and 2 IAR. A summary of the key evidence presented is shown below:

Transport Network

- a) The A40 West of St Clears forms the lowest standard section of the TEN-T in the UK;
- b) The A40 provides a key highway link between south-east Wales and Haverfordwest, a gateway town to the ports of Milford Haven, Fishguard and Pembroke Dock, as well as the Pembrokeshire tourist economy;
- c) The A40 accommodates a mix of traffic types, with seasonal variations. In the winter months, the road carries local residents

(typically car-based traffic); commercial vehicles, particularly around ferry arrival and departure times; and agricultural vehicles. In the summer months, the mix is supplemented by a higher volume of tourist traffic (increasing in some areas by over 40%) including cars and caravans;

- d) Redstone Cross junction forms a staggered junction of which is not built to modern highway standards;
- e) Public transport services are largely not competitive with car-based transport on the longer routes;
- f) It is a priority of Pembrokeshire County Council and the Welsh Government to help ensure that the infrastructure is in place in order to make the ports and associated Haven Waterway Enterprise Zone as attractive as possible to future investment;
- g) There is limited formal active travel infrastructure within the local area;
- h) Journey time reliability has been identified as one of the key problems associated with the A40 between St Clears and Haverfordwest. The long stretches of single carriageway and alignment of the road limits safe overtaking opportunities and causes platooning behind slow moving vehicles (e.g. HGVs, agricultural vehicles and caravans);
- i) The relatively higher journey times during the morning, evening and inter-peak compared to the off-peak are likely to be the result of lack of overtaking opportunities rather than traffic congestion resulting from road sections or junctions exceeding their theoretical capacity;
- j) Improvements between Penblewin and Slebech Park have helped to relieve the problem of lack of overtaking opportunities to an extent, however there continues to be long stretches to the west of Penblewin where overtaking opportunities are limited, including around the study area;
- k) Traffic flows have fluctuated over the past couple of decades, over a 19-year period, traffic growth has increased by 18%;
- l) It is clear that there are significant seasonal variations in traffic volumes, with a clear trend towards higher traffic volumes during the summer and lower traffic volumes during the winter, reflecting the prominence of Pembrokeshire as a tourism destination;
- m) Historically there has been safety concerns along the A40 St Clears to Milford Haven with eight PIAs recorded within the study area for the most recent ten-year period, two of which were fatal, two were serious and four were slight in severity. In comparison to the average accident rate, the severity of accidents on this section of the A40 is particularly skewed towards fatalities, with likelihood of a fatality ten times higher than observations on roads of similar standard;

Social and Cultural

- a) Pembrokeshire is one of the most rural counties in Wales with a population density of 76 people per square kilometre compared to the Welsh average of 149.2;
- b) Rushacre Enterprise Park is located within approximately 700m south of Redstone Cross junction, off Redstone Road; other local facilities are clustered within Narberth;
- c) In line with national and regional averages, a vast majority of workers in the study area travel to work by car, taxi or motorbike, with car ownership within the study area higher than a national and regional level. Residents of the study area are more likely to travel longer distances to work in comparison to Pembrokeshire and Wales as a whole;
- d) The Welsh Index of Multiple Deprivation shows that the local area experiences relatively high rates of deprivation in terms of access to services;

Environmental

- a) The study area is within a Noise Action Plan Priority Area, which comprises Redstone Cross and extends for approximately 600m east;
- b) The study area is located in an area rich in archaeological and cultural heritage, including a Scheduled Ancient Monument to the north of the existing A40 north east of Redstone Cross. A full non-invasive geophysical survey and an archaeological walkover survey of the land to the north and south of the existing A40 have identified the likely remains of a significant number of previously unrecorded barrows and associated bronze age features along the ridge to the north of the existing A40. There have been no similar features identified to the south;
- c) According to the Predictive Agricultural Land Classification Map, the study area predominantly comprises of sub-grade 3b moderate quality agricultural land with some small areas of sub-grade 4 poor quality agricultural land as well as non-agricultural land. To the south of Redstone Cross, Narberth is classified as urban;

Economic

- a) Pembrokeshire is a relatively low-wage economy, recording median gross weekly earnings that are significantly below the national average on both a resident and workplace basis. This is despite Census data showing that Pembrokeshire has a relatively highly-qualified workforce in comparison to Wales as a whole; and
- b) Strategic developments and regeneration initiatives relevant to the study include the formation of the Swansea Bay City Region; the further growth of the Haven Waterway Enterprise Zone; the

growth plans for Pembroke Port and the Port of Milford Have; and Pembrokeshire County Council Local Development Plan proposals, of which include an employment allocation for Rushacre Enterprise Park Extension and a number of housing allocations.

4.2.4 Table 6 provides a comparative analysis of the options considered at Stage 2. Following the well-being, summary narrative considers the relative performance of the options in meeting the objectives and in relation to key social and cultural, environmental and economic considerations.

Table 6 Appraisal Summary Table – Comparative Analysis

	Do Minimum	Option 1A	Option 1B	Option 2A	Option 2B
<i>Social & Cultural</i>					
Physical Activity	0	+	++	+	++
Journey Quality	-	+	++	+	++
Accidents	-	++	+++	++	+++
Security	-	+	++	+	++
Commuting and Other users	-	+	++	+	++
Reliability impact on Commuting and Other users	-	++	+++	++	+++
Access to Services	-	+	++	+	++
Affordability	0	0	0	0	0
Severance	-	+	++	+	++
Option and non-use values	-	+	++	+	++
<i>Environment</i>					
Noise	0	-	-	-	-
Air Quality	0	+	+	+	+
Greenhouse gases	0	--	-	--	-
Landscape	-	--	--	--	-

	Do Minimum	Option 1A	Option 1B	Option 2A	Option 2B
Townscape	N/A	N/A	N/A	N/A	N/A
Historic Environment	-	---	---	-	-
Biodiversity	0	--	--	--	--
Water Environment	0	-	-	--	--
<i>Economic</i>					
Business users & transport providers	-	+	++	+	++
Reliability impact on Business users	-	++	+++	++	+++
Regeneration	0	0	0	0	0
Wider Impacts	-	++	+++	++	+++
<i>Public Accounts</i>					
Cost to Broad Transport Budget	0	+++	+++	+++	+++
Indirect Tax Revenues	0	+	++	+	++
<i>Objectives</i>					
O 1		++	+++	++	+++
O 2		+	++	+	++
O 3		+	++	+	++
O 4		++	+++	++	+++
O 5		0	+	0	+
O 6		+	+	+	+
O 7		--	--	--	-
O 8		--	--	--	--

4.2.5 Appraisal undertaken at Stage 2 makes it clear that Options 2B and 2A would best address the problems, best achieve the objectives and perform best against the majority of cultural, social and economic appraisal criteria, appreciating that there would be some adverse impacts in particular on the environment.

- 4.2.6 As explained in sections 4.2.4-4.2.16 of the IAR, stakeholders have expressed strong support for Option 2B e.g. for perceived safety reasons.
- 4.2.7 The Welsh Government recognised that Option 2B would be more likely to avoid objections from local residents and politicians in light of their concerns about a junction at Redstone Cross. This offers reduced risks to delivery through the statutory process.

4.3 Summary

- 4.3.1 Options 1B and 2B best address most of the objectives, with limited variations including accidents and journey time reliability change benefits when compared with each other.
- 4.3.2 None of the options would address the environment focused Objectives 7 (Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon) or Objective 8 (Give due consideration to the impact of transport on the environment and provide enhancement when practicable), although further survey work, Environmental Impact Assessment and mitigation strategies are anticipated/needed at Stage 3.
- 4.3.3 The options perform poorly against the environmental criteria, but with Option 2A performing best against the greenhouse gases, landscape and historic environment. Option 2A performs worse than Options 1A and 1B in relation to impacts on the water environment.
- 4.3.4 Options 1B and 2B best address all of the social and cultural appraisal criteria through best addressing issues such as journey quality, accidents and access to employment and services. By removing the Redstone Cross junction, greater network resilience is provided to the strategic network.
- 4.3.5 Options 1B and 2B also perform well against the economic appraisal criteria in comparison to the other options. Benefits include improvements to journey time reliability and accidents. All options score poorly in terms of their impact on land, the capital costs and revenue costs, with Option 2B having a slightly less adverse impact on capital and revenue costs than two of the other options.

4.4 Sustainable Development Principle

4.4.1 In accordance with the 2017 WelTAG guidance, the objectives have taken into account the well-being goals as set out in the Well-being of Future Generations (Wales) Act 2015.

4.4.2 As set out at Figure 1, the well-being goals include:

1. A prosperous Wales
2. A resilient Wales
3. A healthier Wales
4. A more equal Wales
5. A Wales of cohesive communities
6. A Wales of vibrant culture and thriving Welsh Language
7. A globally responsible Wales

4.4.3 The Options would contribute to most of the well-being goals as follows:

- a) A Prosperous Wales: Enhancing network resilience and improving accessibility to key employment, community and tourism destinations will support prosperity, for example increased productivity would create a more attractive Pembrokeshire to work in and to invest in.
- b) A resilient Wales: Whilst all options would have an adverse impact on biodiversity and the natural environment, throughout the project, mitigation and enhancement measures are integrated within Scheme development.
- c) A healthier Wales: Improving accessibility to health services will contribute to a healthier Wales. Moreover, complementary active travel measures are integrated within Scheme development. Whilst it is anticipated that there will be adverse noise and air quality impacts for certain areas, it is anticipated there will also be benefits for other areas.
- d) A Wales of cohesive communities: By improving accessibility, connectivity between communities will be enhanced. Moreover, removing a large proportion of traffic off the existing A40, benefits for both active travel and car movements would improve, enhancing community cohesion.
- e) A Wales of vibrant culture and Welsh Language: Options would also improve accessibility to cultural facilities, whilst the WelTAG Scheme itself has been developed in line with Welsh Language guidance, providing exhibition materials in both English and Welsh for example.

- f) A globally responsible Wales: All options are developed to minimise the environmental impact of the Scheme, alongside addressing the problems and meeting the other objectives of the Scheme.

4.4.4 The Welsh Government and other public bodies are required to publish their own well-being objectives, seeking to achieve the above well-being goals. A detailed assessment of how the preferred option may align to the sustainable development principle, taking into account the well-being goals, objectives and ways of working, will be provide at WelTAG Stage 3, when sufficient detailed information is available to inform that assessment.

4.4.5 At this stage, the appraisal indicates that Option 2B is most likely to perform best compared to the other options in contributing towards the well-being goals and any well-being objectives, given it performs best against the majority of cultural, social and economic appraisal criteria, appreciating that there would be some adverse impacts on the environment.

5 Management Case

- 5.1.1 The Management Case considers delivery arrangements for the project to include management during the lifetime of the project moving forward. It demonstrates that the project is achievable and outlines the arrangements that have been put in place or will be considered further at the next stage (WelTAG Stage 4). It is considered that the proposed Scheme is deliverable based on the information available at this stage.
- 5.1.2 This case will need to be updated when a new Design and Build (D&B) Contractor is procured, following completion of Key Stage 4 of the project.
- 5.1.3 The project will likely be delivered using the NEC Engineering and Construction Contract. These types of contract have been successfully used on a number of Schemes including the A40 Penblewin to Slebech Park, A477 St Clears to Red Roses and A465 Heads of the Valley Dualling, Sections 2 and 3.
- 5.1.4 The Scheme is split into three key stages which cover design, statutory process, construction and aftercare in accordance with the Welsh Government’s Transport Division’s Key Stage Approval Process. The KSA process provides a staged financial approval system to manage the process of projects from inception, through to construction and initial maintenance and complies with the principles of PRINCE2 project management (Figure 6):

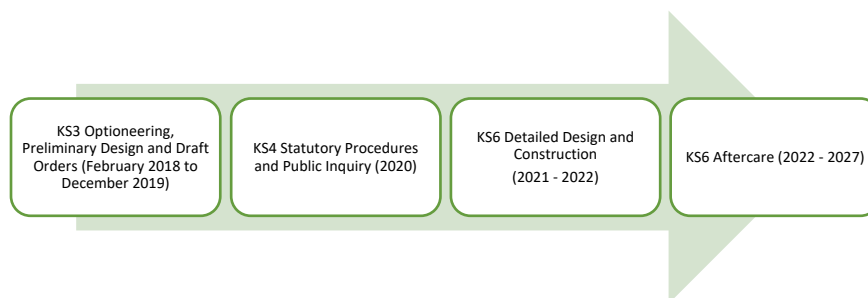


Figure 6 Project Timeline

Key Stage 3

- 5.1.5 Key Stage 3 (KS3) includes Optioneering, Preliminary Design and setting of land required for the Scheme and associated Statutory Orders required to obtain land via Compulsory Purchase Order (CPO) and any

need to designate new sections of road as trunk road. This will be delivered by Arup / RML.

5.1.6 KS3 is planned to run from January 2019 until January 2020 and involves the development of the outline design and Outline Business Case, preparation of a Scheme Cost Estimate, publication of draft Orders documentation and associated environmental documentation such as the Environmental Statement.

5.1.7 The table below (Table 7) identifies the illustrative dates associated with Key Stage 3 programme.

Table 7 Outline Key Stage 3 Programme

Event	Time in weeks after contract award
1. Commencement of Key Stage 3 Services	21 January 2019
2. Issue WelTAG Stage 1 & 2 Report to WG	05 July 2019
3. Completion of WelTAG Stage 3	24 October 2019
4. Submission of Final Draft Orders to Employer	31 October 2019
5. Employer's Approval of Preliminary Design	20 December 2019
6. Publish Draft Line and Side Road orders (End of KS3)	22 January 2019

5.1.8 An Environment Statement and other technical assessments are submitted alongside the draft Orders for the Scheme. Statutory Orders are prepared by Welsh Ministers and published in draft. The draft Orders for the Scheme include the following:

- a) A draft Line Order to provide for the new section of trunk road and the reclassification of the existing A40 (de-trunking);
- b) A draft Side Roads Order to deal with local highway issues (including roads, footpaths, bridleways, byways and cycleways) and private access issues. Side Roads Orders can relate to closure, diversion, improvement or new provision; and
- c) A draft Compulsory Purchase Order, which provides for the acquisition of the land and rights required.

Key Stage 4

5.1.9 Key Stage 4 (KS4) is from publication of Draft Orders through a statutory process to Notice to Proceed to Construction. A Public Local Inquiry may be held if deemed necessary by the Welsh Government. This will be delivered by Arup / RML. KS4 is planned to run from January 2020 to January 2021 and involves completion of statutory processes, including publication of the draft Orders, Orders

Exhibitions, dealing with objections, and representations, preparation for and conduct of the Public Inquiry (if required), finalising the Orders and preparing Contract Documentation ready for the procurement of the Design and Build (D&B) Contractor. Table 8 below identifies the illustrative key dates associated with Key Stage 4 programme requirements.

Table 8 Outline Key Stage 4 Programme

Event	Time in weeks following start of KS4
Start of Key Stage 4	0
Publication of draft CPO	3
Public Orders Exhibition	3
End of Objection/Comment Periods	6
State of Public Inquiry	22
Inspector's report received	32
Review of SASICOM Annex IV (if required)	-
Minister's Decision Letter (approx. 3-4 months after receipt of Inspector's Report depending on complexity of issues)	42
Confirmation of Orders (approximately 3-4 weeks after Minister's decision)	44
High Court Challenge Period begins	44
End of High Court Challenge Period	50
Notice to Treat	52

Key Stage 5

- 5.1.10 Key Stage 5 (KS5) will proceed subject to the satisfactory completion of the statutory procedures, the availability of finance and the Minister's decision as to whether the Orders should be made.
- 5.1.11 During KS5 a Design and Build (D&B) Contract will be procured in compliance with European Union Procurement Directives⁵ and the corresponding UK Public Contract Regulations 2015. Further detail of this is provided within Section 7 of this Report.

Key Stage 6

- 5.1.12 KS6 involves detailed design and construction of the Scheme including an environmental and landscape aftercare period. The suppliers for this stage of the project are unknown and will be chosen following the procurement process carried out in KS5.

⁵ Directive 2004/18/EC

5.1.13 KS6 is planned to run from 2021 and involves the detailed design / construction period for all works, plus environmental, landscape and ecological aftercare and management (up to 2027). KS6 also includes Gateway Review No. 3, preparation of the KSA7 and Completion Report. Table 9 below contains the illustrative programme requirements for Key Stage 6, including the main submission events and anticipated timing.

Table 9 Outline Key Stage 6 Programme

Event	Timing
Commence detailed design	On WG's instruction
Submission of Key Stage 6 programme	2 weeks after commencement of KS6
Submission of Statutory Authorities' diversion works	In accordance with Contractor's programme
Submission of Construction Quality Plan	4 weeks prior to start on site
Submission of Health and Safety Plan	4 weeks prior to start on site
CEMP (update of Pre-CEMP)	4 weeks prior to start on site
Contractor's KS6 Design submission including updated SU Works Report	3 weeks prior to start on site
Submission of Stage 2 Road Safety Audit	In accordance with the Contractor's programme following completion of detailed design
Licences and Consent applications	In accordance with Contractor's programme
Construction start on site	To be determined by Contractor
Submission of Stage 3 Road Safety Audit	3 weeks (min) prior to road opening
Road opening	To be arranged
Completion of KS6 construction works	69 weeks after Key Stage 6 starting date
Health and Safety File (including all 'as built' and manuals etc.)	At time of certification of Completion by the Project Manager

Construction Programme

- 5.1.14 The construction programme has not yet been defined. This case will be updated during Stage 3 and will include further information on the proposed Construction Programme.
- 5.1.15 This section outlines an indicative construction sequence and the likely key construction activities. The details of the construction programme would be updated by the appointed D&B Contractor shortly after award.
- 5.1.16 A description of the outline construction programme will be included within the Environmental Statement Chapter 2.

Overall Duration

- 5.1.17 Detailed design and construction works are currently planned to commence in 2021 and continue for around 16 months.
- 5.1.18 Maintenance and aftercare of the environmental aspects of the Scheme remain the responsibility of the Contractor for five years after the completion of the Works (likely to be up to 2027).

Sequence of Operations

- 5.1.19 Following the issue of the Notice To Proceed To Construction, there would be a period when the detailed design will be developed. Prior to work starting on site, property precondition surveys and vegetation surveys would be carried out. Early construction activities would be undertaken.
- 5.1.20 The site would be made secure as early as possible by the erection of permanent fencing. Where this is not possible, temporary fencing would be erected. Site clearance work would commence with vegetation clearance. Main site accesses would be established at either end of the Scheme at the junction locations;
- 5.1.21 Bulk earthworks would mainly be carried out in the summer season but would take advantage of any periods of dry weather in the other seasons. Pre-earthworks drainage would follow the earthworks sequence. Mainline pavement would commence in 2022 and intermittently continue through to completion.

- 5.1.22 Structures would be progressed throughout the construction period. Subject to agreement with a Contractor, the construction sequence would help ensure that the Scheme would be built with minimum disruption to the local environment, local population and the travelling public.
- 5.1.23 The latter stages of construction would include: Mainline, side road and tie-in pavement works, installation of street furniture, such as traffic signs and street lighting and landscaping and planting of soft estate.

Contract Management Plan

- 5.1.24 The appointed D&B Contractor would likely operate an Integrated Management System (IMS) which will form the foundation for the management of the Scheme. The system would be accredited to appropriate British and international standards.

In accordance with the IMS, a Contract Management Plan (CMP) would be developed for the Scheme. The objective of the CMP would be to provide a coordinated approach to the management of the Works and to clearly define policy, standards, processes, procedures, organisation, roles and responsibility and key performance indicators.

- 5.1.25 Under the overall control of the CMP would be:
- a) Health and Safety Management; (see Section 2.12 of the Environmental Statement);
 - b) Construction Environmental Management Plan (CEMP) (see Section 2.13 of the Environmental Statement);
 - c) Quality management (see Section 1.14 of the Environmental Statement); and
 - d) Public Relations (See Section 2.15 of the Environmental Statement).
- 5.1.26 The Register of Environmental Actions and Commitments (REAC) would be an appendix to the CEMP. The REAC will be developed throughout Key Stage 3 and will continue to be developed through Key Stage 4 taking into account any changes. This will become a requirement of the D&B Contractor during Key Stage 6.

Governance, organisational structures and roles

- 5.1.27 The core parties involved in the delivery of the project are:
- a) Welsh Government (the Employer) – representing the Welsh Ministers. The project is being led by the Transport group which sit within the Economy and Transport Division, with the Project Director and Project Engineer as the main points of contact.
 - b) Arcadis (Employer’s Agent) – acting as the Welsh Government’s representative, providing financial, project management, contract and technical advice (support from Mott MacDonald) throughout the project.
 - c) Arup / RML– employed by the Welsh Government to carry out the preliminary environmental and engineering design for the preferred route, as well as undertake all activities necessary for the publication of orders. They will also support the Welsh Government through the Statutory process. Their involvement in the project will cease at the end of Key Stage 4.
 - d) Project Manager and Supervisor: under the NEC ECC Contract. During Key Stage 6 of the contract the role will be undertaken by Arcadis and Mott MacDonald as delegated by Welsh Government.
- 5.1.28 D&B Contractor: During Key Stage 5 of the project a D&B Contractor will be procured by the Welsh Government (refer to Section 7.3). The D& B Contractor will be responsible for the delivery of the detailed design and construction (Key Stage 6) and aftercare (Key Stage 7) of the Scheme. Figure 7 below sets out a typical organisational structure for the delivery of Key Stage 6 – Detailed Design and Construction.

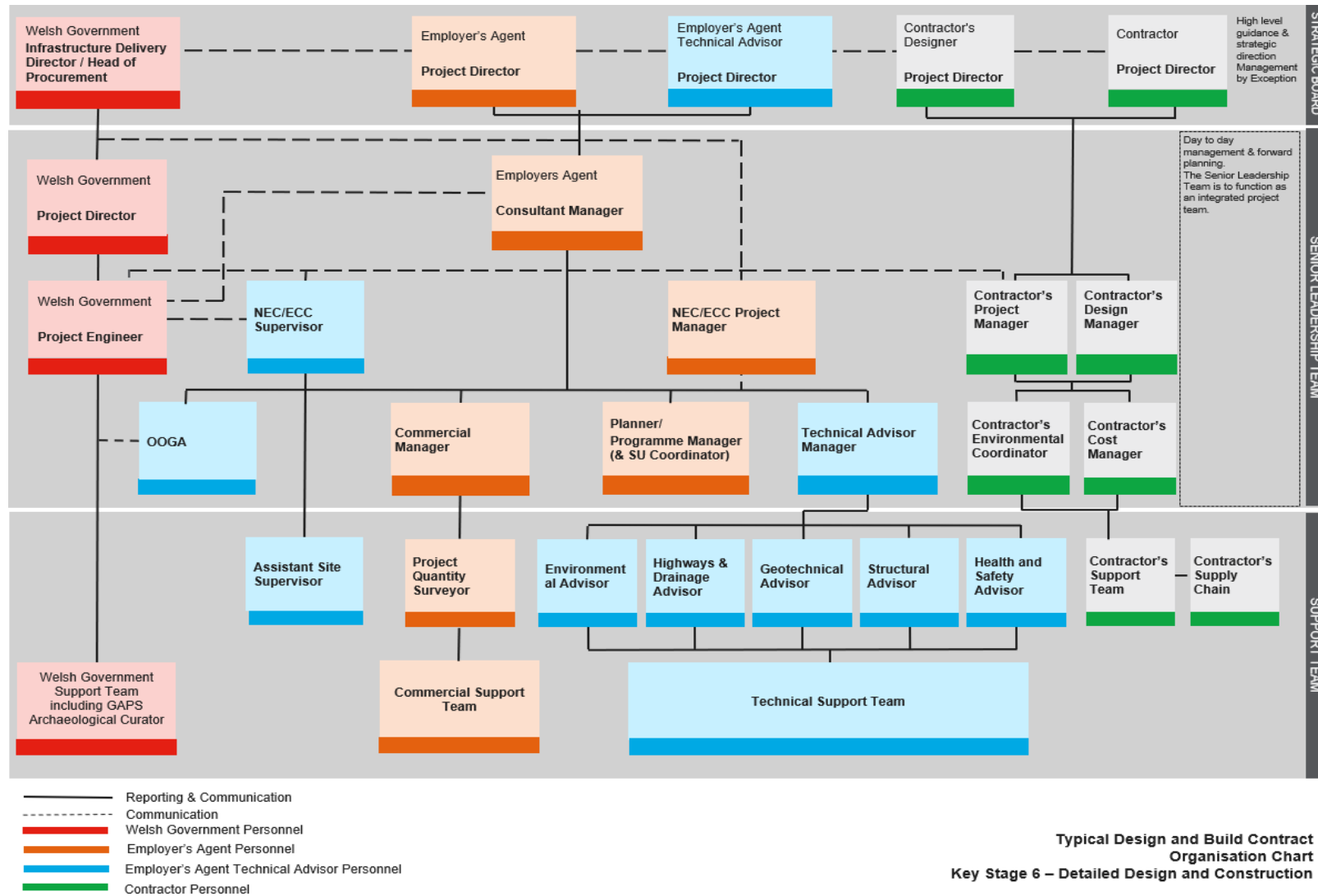


Figure 7 Organisational Structure

6 Financial Case

- 6.1.1 The Financial Case considers the affordability and long-term financial viability of the option(s). Consideration is given to both capital and annual revenue requirements.
- 6.1.2 This case will need to be updated when a new Design and Build (D&B) Contractor is procured, following completion of Key Stage 4 of the project.
- 6.1.3 An initial Scheme Cost Estimate has been undertaken and is likely to represent a worst case in advance of the appointment of a new D&B Contractor, largely given all of the risk currently sits with the Employer. The base year prices have also been updated to 2018 prices.
- 6.1.4 The initial cost Estimate for the Scheme is likely to be between £14,700,000 and £17,800,000, as follows:

Table 10 Scheme initial cost summary

Component	Estimate
Preparation	£300,000 to £500,000
Supervision	£700,000 to £1,000,000
Construction	£12,500,000 to £14,500,000
Land	£1,200,000 to £1,800,000
Total (excluding VAT and inflation to completion)	£14,700,000 to £17,800,000

- 6.1.5 Optimism Bias has been included within the indicative costs outlined above. These initial cost estimates will be updated once further information is available and the Scheme has been developed in more detail during Stage 3. There will also be an updated Risk and Optimism Bias at Stage 3.
- 6.1.5.1 These costs are assumed on the basis that this Scheme would be delivered separately to the A40 Llanddewi Velfrey to Penblewin Improvements Scheme. The intention is currently for the two Schemes to be delivered independently with opportunities for the Schemes to be delivered together through the Construction Phase of the project. The main advantages/opportunities of delivering construction as one scheme are: optimised project delivery programme, reduced

Construction Preliminary Costs and Overhead Costs, optimised design/construction for certain elements for such things as earthworks movements and balancing, consistency in one Contractor delivering all works (no interface).

- 6.1.6 It should be acknowledged that the cost estimate is likely to change with the appointment of a D&B Contractor. At that stage the cost could reduce, should risk be shared, and a result of greater cost certainty and with local market conditions being taken into account.
- 6.1.7 The procurement of the D&B Contractor will include requirements for them to implement Welsh Government Policy as outlined in the following guidance: “Community Benefits: Delivering Maximum Value for the Welsh Pound” and “the Welsh Procurement Policy Statement (WPPS)”. This would maximise opportunities in: Training and Employment; Supply Chain and SMEs; work with local schools and colleges; and contributing to community regeneration. This would be part of the requirements for the D&B Contractor and they will be required to make commitments through the procurement process. Through implementation of this policy it is anticipated that much of the cost could be spent in Wales, of which about half could be spent in the local area.
- 6.1.8 The new trunk road would also have revenue implications in terms of maintenance costs, which would be the responsibility of the Welsh Governments Network Management team. Some of the revenue cost would be covered by a transfer of spend from the existing trunk road, which would be de-trunked and ownership / maintenance responsibility passed to Pembrokeshire County Council as the local highway authority.
- 6.1.9 The option therefore brings revenue implications for Pembrokeshire through increased maintenance costs associated with the de-trunked section of carriageway which could be in the region of 1km length.
- 6.1.10 Capital costs will be funded jointly, with the allocation of funding being a third Welsh Government and two thirds WEFO. The costs are drawn over the duration of the project with WEFO funding already being claimed to undertake activities such as Ground Investigation.
- 6.1.11 Regarding maintenance, the D&B Contractor, once appointed, will be responsible for maintenance of the Environmental Mitigation for five

years post completion (forecast to be 2022 to 2027). Further detail is set out in Section 7 of Volume 2 – of the ECI Contract Works Information, which is assumed to be similar to the contract with the D&B Contractor. The cost will be included in the tender price.

6.1.12 The relevant extract of the Works Information is:

7.2 Environmental Aftercare and Management

7.2.1 The *Contractor* shall carry out environmental aftercare and management for a period of five years following the completion of the *works*. It shall be undertaken in accordance with the agreed Construction Environmental Management Plan Aftercare (CEMPA) (written in accordance with the requirements of DMRB and associated Procedural Advice and Guidance Notes (PAGs) and IANs.) which will have been submitted to the *Employer* 6 months prior to the end of the construction period.

7.2.2 Annual Environmental Performance and Monitoring Report (AEPMR) will be prepared to monitor performance, followed by a Final Environmental Performance and Monitoring Report (FEPMR) at the end of the aftercare period.

7.2.3 Six months before the end of the aftercare period the *Contractor* shall update the CEMPA into a suitable Handover Environmental Management Plan (HEMP) written in accordance with the requirements of DMRB and associated Procedural Advice and Guidance Notes (PAGs) and IANs. The HEMP will cover the management of all environmental features (both hard and soft environmental measures).

7.2.4 The HEMP will set out the environmental maintenance and management required for the completed project for the next 10 year maintenance period and will be developed in consultation with the *Employer* and their Environmental Representatives of the Managing Agent responsible for the Trunk Road Network.

7.2.5 The *Contractor* shall consult with the *Employer* and Managing Agents Environmental Representative to ensure that the HEMP compliments the existing Route Environmental Management Plan (REMP) and is compatible with their current systems.

7.2.6 The HEMP will provide indicative costs for the management and maintenance of the environmental measures (including but not limited to, landscape, ecological, water quality and drainage, and noise and vibration measures) for the 10 year period following handover to allow the receiving agent to make reasonable adjustment to their maintenance costs. The HEMP will be submitted to the *Employer* 6 weeks before the issue of the Environmental Aftercare Certificate. The general requirements are set out in Volume 2A Appendix D/3.

6.1.13 Regarding defects to the highway, the D&B Contractor will be responsible for rectifying defects within five years after completion, at their own cost if defects are found to be as a fault of design and/or construction.

- 6.1.14 Welsh Government will fund ongoing maintenance of the road via the South Wales Trunk Road Agent (SWTRA). This will include, but not be limited to, structural inspections, highway resurfacing works, winter maintenance, road lighting maintenance and any repair works required as a result of a road collision.
- 6.1.15 Pembrokeshire County Council will be responsible for similar maintenance on all highways transferred to their ownership as part of the Scheme. The draft Side Roads Order details highways that are to be constructed or modified as part of the Scheme that will be adopted by Pembrokeshire County Council. The details of any detrunking works of the existing A40 carriageway are yet to be confirmed and it is the intention to have agreed the details prior to the start of Key Stage 6 and would then form part of a de-trunking package between Welsh Government and Pembrokeshire County Council.
- 6.1.16 The initial cost estimate has a base date of September 2018. The initial cost estimate will be refined during Stage 3 with a Scheme Cost Estimate being defined, which will form part of the Scheme's economic appraisal. The Scheme Cost Estimate would be updated during Key Stage 4 of the project and will be in line with this base date.
- 6.1.17 The Scheme is being jointly funded from Welsh Government Infrastructure Delivery Department and the ERDF.
- 6.1.18 Following the acceptance of a Business Case prior to the instruction to proceed with Stages 3 and 4, WEFO have confirmed that ERDF funding for the Scheme is secured, despite 'Brexit' and the UK's withdrawal from the European Union.

Affordability and risk

- 6.1.19 The Welsh Government has a proven track record of managing and delivering large and complex infrastructure projects. These include projects which have attracted significant contributions from the ERDF. Welsh Government will be responsible for ensuring that WEFO funding is spent as the grant required. WEFO will provide 66.6% for the delivery of the Scheme with Welsh Government funding the remaining 33.3%.
- 6.1.20 WEFO funding is required to be claimed by the end of 2022. The current road opening date is anticipated to be end of 2022. If the road

opening date is postponed beyond the end of 2022 there is a risk that the Welsh Government will not be able to claim all the funding available for the Scheme. This could affect the deliverability of the scheme and would require the Welsh Government to fund the remaining outstanding project costs. This risk will be managed through the following stages.

- 6.1.21 The executive management arrangements of the Welsh Government backed up by the professional audit and financial scrutiny mechanisms of central government will help ensure compliance with programme regulations and ensure the associated transparency and propriety of investments sanctioned under the project.
- 6.1.22 The budget will be reassessed by the Employer and this assessment will use the Scheme Cost Estimate that will be prepared by Arup as a base cost which will be inflated as necessary to take include items such as Contractor risk, Contractor fee percentage, Employer's risk, Employer's technical advisor cost, Employer's cost, land compensation.
- 6.1.23 Finally, As the Scheme is part funded by WEFO, WG only need to source 33% of monies associated with the delivery of Key Stage 6.
- 6.1.24 The requirements of Clause 3.17 of the Works Information Volume 2 and Appendix P Volume 2A will apply during Key Stage 6.
- 6.1.25 The tenderers will be required to price for risks which they "own" within the Key Stage 6. The relevant extract of the Works Information is:

3.17 Risk Management

- 3.17.1 The *Contractor* shall manage risk on the project in accordance with the procedures set out in the Latest version of the Value for Money Manual – risk Analysis and Management. This shall include the use of graphical presentations of risk drawn down.
- 3.17.2 The *Contractor* shall set up a risk workshop early in Key Stage 3 to review the Risk Register submitted with the tender and update as necessary. The Contractor shall review and update the Risk Register as a minimum every 3 months (or at such shorter times as directed by the *Employer*) during Key Stage 3 & 4 and 1 month during KS6 and carry out/manage the actions identified.
- 3.17.3 The Risk Register will be discussed at each Progress Meeting and include the following:
- (i). A description of the key risks to the Project delivery/cost;
 - (ii). The likely effect/cost of each risk (quantified);
 - (iii). The organisation best placed to remove/manage each risk;
 - (iv). Target dates for action; and,
 - (v). Hazards with implications under the CDM Regulations.
- 3.17.4 At intervals not exceeding 6 months the Technical Advisor shall carry out, a risk identification and assessment exercise and shall report the results of such exercise to the *Employer*. The *Contractor* shall arrange and take part in a Risk Workshop which will include other advisors appointed by the *Employer* where appropriate. The risks identified shall be taken into account in the preparation of cost estimates in a manner to be agreed with the *Employer*.

7 Commercial Case

- 7.1.1 The Commercial Case considers whether it will prove possible to procure the Scheme and then continue with it into the future. The case considers the level and type of involvement from the private sector, as well as potential effects on the on-going viability of the option/Scheme.
- 7.1.2 This case will need to be updated when a new Design and Build (D&B) Contractor is procured, following completion of Key Stage 4 of the project.
- 7.1.3 The choice of procurement type for the project is based on a number of basic principles applied to achieve best value including:
- a) Selection of Contractors on the basis of quality and price;
 - b) Fair Allocation of Risk;
 - c) Optimising Quality of Design, buildability and Sustainability;
 - d) Adopting a non-contractual Partnering Approach.
- 7.1.4 The Welsh Government have decided to follow EU Procurement regulations for the tender of a Design and Build Contract, following successful completion of the Statutory Process (Key Stage 4).
- 7.1.5 The Welsh Government are considering the opportunity for delivering both the A40 Llanddewi Velfrey to Pemblewin and A40 Penblewin to Redstone Cross Improvements as one Scheme. This would provide continuity and potential efficiencies in the delivery. This case will be updated at Stage 3 following further consideration of this opportunity.
- 7.1.6 The procurement process is in compliance with European Union Procurement Directives⁶ and the corresponding UK Public Contract Regulations 2015.

Original ECI Contract 2017 - 2018

- 7.1.7 An OJEU Prior Information Notice (PIN) was first published in TED (Tenders Electronic Daily – Supplement to the Official Journal of the EU) on 22 December 2015, reference 2015/S 247-448808⁷. The scope of works outlined in the PIN included: *developing the outline design,*

⁶ Directive 2004/18/EC

⁷ <http://ted.europa.eu/udl?uri=TED:NOTICE:448808-2015:TEXT:EN:HTML>

preparing the necessary statutory orders and EIA documentation, publishing draft Orders (Key Stage 3), progressing the project through the statutory process including Public Inquiry if required (Key Stage 4) and, if successful, then undertaking detailed design, construction and after-care of the project (Key Stage 6).

- 7.1.8 In the PIN, the value of Orders was estimated at around £30,000,000 and the total Scheme costs circa £50,000,000 excluding VAT.
- 7.1.9 An OJEU Contract Notice was published on the Welsh Government's Sell2Wales⁸ website on 25th March 2016, reference 2016/S 061-102869. The contract value was estimated at £55,000,000 – £65,000,000.
- 7.1.10 Those who successfully completed the PQQ were then invited to tender in June 2016, in accordance with the '*ECI Design and Build Contract – Volume 0, Instructions for Tenderers*'. These instructions provided guidance to tenderers on the form and assessment of tenders relating to the contract for the design development of the A40 Llanddewi Velfrey to Penblewin improvement project and the provision of assistance with the statutory procedures.
- 7.1.11 The Contract Notice stated that contract award would be based on the most economically advantageous tender in terms of the criteria stated in the specifications, in the invitation to tender or to negotiate or in the descriptive document. Detailed tender evaluation criteria were set out in the '*ECI Design and Build Contract – Volume 0, Instructions for Tenderers*' covering quality and price.
- 7.1.12 The final tender assessment was based on a weighting of the Quality and Financial submissions in the ratio 50:50 respectively.
- 7.1.13 The contract was awarded on 3rd February 2017 to Carillion, with engineering and environmental design provided by Arup and RML.
- 7.1.14 In addition to the above process, Welsh Government also procured the provision of support (Employer's Agent) through a management consultancy works and services contract. An OJEU contract notice for this was published on 6th June 2015, reference 2015/S 108-196566⁹.

⁸ Sell2Wales is the procurement portal set up by the Welsh Government

⁹ <http://ted.europa.eu/udl?uri=TED:NOTICE:196566-2015:TEXT:EN:HTML>

- 7.1.15 The procurement process was an open procedure with an estimated contract value of £1,500,000 excluding VAT. The contract award was based on the most economically advantageous tender in terms of:
- a) Project team and management (14%)
 - b) Project delivery - Technical (17%)
 - c) Project delivery - Commercial (25%)
 - d) Resources and programme (14%)
 - e) Cost. Weighting (30%)
- 7.1.16 The contract award decision was made on the 9th October 2015 with three offers having been received and evaluated. Arcadis (and Technical Advisor Mott Macdonald) were awarded the contract of Employer's Agent for the project, with a total final value of contract of £1,342,461.13, excluding VAT. A contract award notice was published on 6th November 2015, reference 2015/S 215-392974.

Key Stage 3 and 4 Development

- 7.1.17 Following the liquidation of Carillion, revised contractual arrangements were made and implemented by the Welsh Government.
- 7.1.18 Arcadis (and Technical Advisor Mott Macdonald) continued their contract of Employer's Agent for the project.
- 7.1.19 Arup (supported by sub-Contractor RML) were directly appointed to the Welsh Government to continue the development of Key Stage 3 and to support the Welsh Government through the Statutory Process (Key Stage 4).

Key Stage 5 Procurement of a D&B Contractor

- 7.1.20 The Welsh Government will be required to follow EU Procurement regulations for the tender of a Design and Build Contract. The procurement strategy adopted would follow the OJEU Restricted process as outlined in Figure 8.

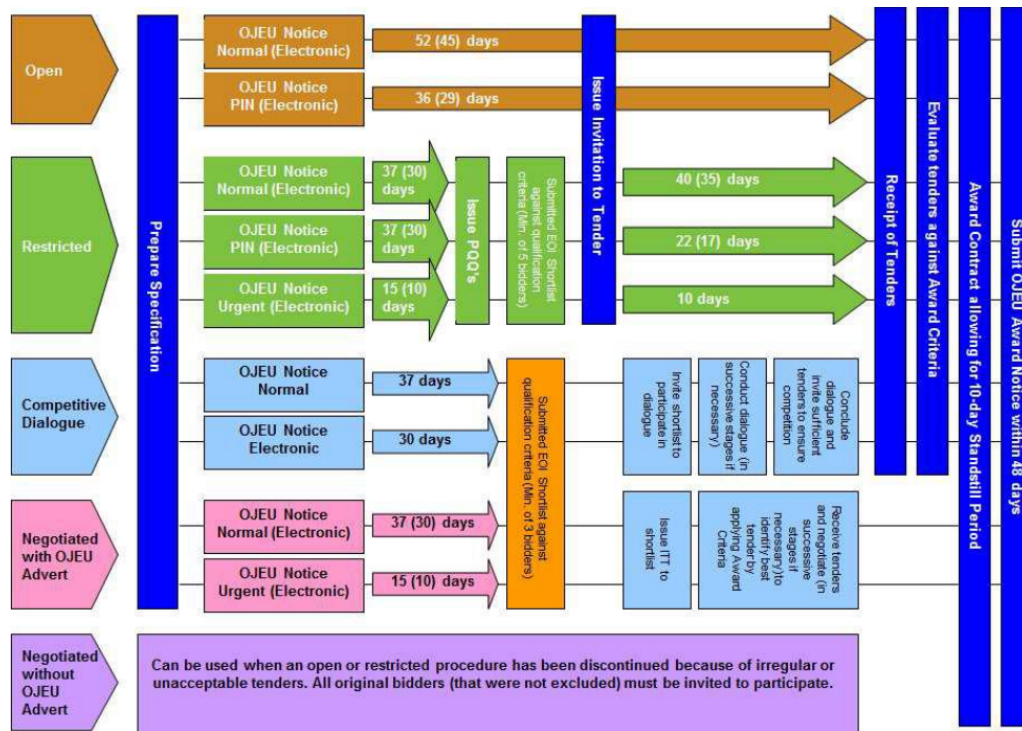


Figure 8 OJEU Process

7.1.21 The Welsh Government will conduct a PQQ process before undertaking a full Design and Build tender. The tender will likely span over 3 months / 12 weeks to enable the tenderers to sufficiently develop their design to be able to inform their tendered estimate of the overall price.

7.1.22 As per the previous ECI tender process, the evaluation of the tender will be based upon a quality submission and a financial submission. The ratio of Quality and Financial will be determined in due course but is likely to be similar to the original ECI tender, which was 50:50 Quality:Financial. There is the potential for the weightings to be amended to more heavily favour the quality or financial, but this has not been determined yet.

7.1.23 The arrangements moving forward into the conduction stage would likely be:

Employers Agent – Arcadis;

Technical Advisor to Employers Agent – Mott Macdonald;

Design and Build Contractor – To Be Confirmed via procurement. Likely to be sole entity but could be a joint venture; and

Design and Build Contractor’s Designer – To Be Confirmed via procurement. Likely to be sole entity but could be a shared

appointment between Engineering Design and Environmental Design.

Contract length

- 7.1.24 The following timescales are anticipated for the proposed Construction Contract:
- a) Anticipated contract start is May 2021;
 - b) Anticipated start on site for construction is Summer 2021;
 - c) Anticipated completion on site is Early 2023; and
 - d) Anticipated end of the aftercare period is Winter 2027.
- 7.1.25 The anticipated duration is up to seven years.

Specification of required outputs

- 7.1.26 The specification of outputs are included within the relevant Contracts as outlined in the following points. done in line with the relevant key stages:
- 7.1.27 Key Stage 3 and 4 deliverables are listed in detail within the Key Stage 3 and 4 Professional Services Contract - Volume 2 Scope of Service provided in the subsequent sections of Chapter 4: Requirements for Key Stage 3 and Chapter 5: Requirements for Key Stage 4.
- 7.1.28 Key Stage 6 deliverables are listed in detail in the original ECI Design and Build Contract Volume 2 Works Information as tendered. Further detailed is provided in the subsequent sections of Chapter 6: Requirements for Key Stage 6. The relevant extract of the Works Information is:
- 7.1.29 Key Stage 6 detailed design will be based upon Key Stage 3 and 4 design submissions. The Key Stage 6 Detailed Design submission will be sufficiently detailed to demonstrate compliance with the relevant codes and standards to enable the works to be constructed in accordance with the contract requirements and specification.

6 REQUIREMENTS FOR KEY STAGE 6

6.1 Key Stage 6 Programme Requirements

6.1.1 The table below contains the *Employer's* programme requirements for Key Stage 6. It identifies the main submission events and the number of weeks after Contract Award when they are expected.

TABLE 6.1 Key stage 6 Event Programme:

Event	Time required
Commence Detailed Design	On <i>Employer's</i> instruction
Submission of Key Stage 6 programme	2 weeks after commencement of Key Stage 6
Submission of <i>Statutory Authorities'</i> Works Report	4 weeks after commencement of KS6
Placing orders for <i>Statutory Authorities'</i> diversion works	In accordance with <i>Contractor's</i> programme
Submission of Construction Quality Plan	4 weeks prior to start on site
Submission of Health and Safety Plan	4 weeks prior to start on site
CEMP (update of draft CEMP)	4 weeks prior to start on site
<i>Contractor's</i> Key Stage 6 Design submission including updated SU Works Report	3 weeks prior to start on site
Submission of Stage 2 Road Safety Audit	In accordance with <i>Contractor's</i> programme following completion of the detailed design
Licences and Consent applications	In accordance with <i>Contractor's</i> programme
Construction start on site	To be determined by <i>Contractor</i>
Submission of Stage 3 Road Safety Audit	3 weeks (min) prior to road opening
Road Opening	To be arranged
Completion of KS6 construction works	By May 2020
Health and Safety File (including all 'as built' and manuals etc.)	At time of certification of Completion by the <i>Project Manager</i> .

6.1.2 Key Stage 6 activities shall commence with the start of detailed design. The *Employer* may instruct the *Contractor* to commence detailed design in advance of the end of the High Court Challenge Period but this is entirely at the discretion of the *Employer*.

Allocation of risk

- 7.1.30 The allocation of risk was originally covered in the Risk Register (2nd August 2016). Allocation of risk was also specified in the PSC and ECC contracts.
- 7.1.31 Allocation of risk for Key Stage 3 was covered in the *Professional Services Contract (PSC) for Early Contractor Involvement (ECI) Design and Build Contract Volume 1* at Volume 1e – clause Z.6 and Volume 1f – clause Z.6 for Key Stage 4.
- 7.1.32 The allocation of Key Stage 6 risk is likely to be similar to that originally covered by clause Z.9 of the Engineering and Construction Contract (ECC) for Early Contractor Involvement (ECI) Design and Build Contract Volume 1h.
- 7.1.33 The Project Risk Register, as discussed included within the Impact Assessment Report, outlines foreseeable project risks, which include risks that will be allocated to the D&B Contractor. The Project Risk Register will quantify the likely cost if the risk becomes an eventuality. This Risk Register has been assessed to inform a Risk allowance and an allowance incorporated into the Scheme Budget. Section 5.9 provides a summary of several of the top risks included within the Project Risk Register.
- 7.1.34 Whilst the future allocation of risk involving the D&B Contractor (once appointed) has not been fully determined, at this point in time it is not unreasonable to assume that the risk allocation, and therefore Compensation Event clauses which will be removed, will be:
- 60.1(12) – Physical Conditions;
- 60.1(13) – Weather; and
- 60.1(19) – Force majeure.

Contractual agreements

- 7.1.35 The key Contractual arrangements are set out for each of the three Key Stages as outlined below.

Key Stage 3 & 4

- 7.1.36 For Key Stage 3 under the original ECI contract with Carillion, the conditions of contract were the core clauses and the clauses for main Option C (Target Contract), dispute resolution Option W2 and secondary Options X1, X2, X4, X9, X10, X11, X18, Y(UK)2, Y(UK)3 and Z (of the Employers) of the NEC3 Professional Services Contract April 2013.
- 7.1.37 Following the liquidation of Carillion and the direct appointment of Arup to the Welsh Government, the Key Stage 3 and 4 conditions of contract are the core clauses and the clauses for main Option E (Time Based Contract), dispute resolution Option W2 and secondary Options X1, X2, X9, X10, X11, X18, Y(UK)2, Y(UK)3 and Z (of the Employers) of the NEC3 Professional Services Contract April 2013.

Key Stage 6

- 7.1.38 For Key Stage 6, outline contractual arrangements are not currently available. The contract is likely to take the form of either NEC3 ECC or NEC4 contract with the option to be determined in due course.
- 7.1.39 The option choice is likely to be between Option A (Fixed Price) or Option C (Target Price).
- 7.1.40 Under the original ECI contract, the payment process was the PSC Main Option C (Target Contract), amended slightly in accordance with Volume 1e Clause Z.5. For Key Stage 4, the payment process was the PSC Main Option E (Time Based Contract), amended slightly in accordance with Volume 1f Clause Z.5.
- 7.1.41 For Key Stage 6, the payment mechanism will be defined by the contract chosen. The payment assessment period will be monthly.

8 Recommendations

8.1 Preferred Option

- 8.1.1 WelTAG 2017 clarifies that a preferred option should be taken forward to WelTAG Stage 3 appraisal.
- 8.1.2 Given the identified need for the Scheme, and taking into account the information presented within this WelTAG Stage One and Two Impact Assessment Report, the Welsh Government and its Review Group has taken the strategic decision to progress active travel improvements alongside Highway Option 2B, a southern route without junction.
- 8.1.3 Active travel measures will be developed in detail at the next stage of design development, but they would help achieve the study objectives and contribute positively to government policy priorities. Active travel measures will therefore be implemented as part of the preferred highway option.
- 8.1.4 In light of the appraisal undertaken, it is clear that Highway Option 2B best address the problems, best achieves the objectives and performs best against the majority of cultural, social and economic appraisal criteria, appreciating that there would be some adverse impacts in particular on the environment. It is the preferred option as a result of stakeholder engagement, favoured by the majority of participants. This indicates it is likely to be the most acceptable to local communities, the people and businesses of Wales.
- 8.1.5 The Welsh Government recognises that Option 2B would be more likely to avoid objections from local residents and politicians in light of their concerns about a junction at Redstone Cross. This offers reduced risks to delivery through the statutory process.
- 8.1.6 WelTAG Stage 3 should be undertaken to provide a full business case in order to progress active travel and Option 2B options.

8.2 Stage 3 WelTAG

8.2.1 At the next stage of the WelTAG process, a number of areas of the appraisal will require updated in order to reflect new information and the Stage of the process. In particular, the Stage 3 Reports will seek to provide further detail on the following:

- a) Traffic forecast modelling outputs;
- b) Economic appraisal / wider economic impact assessment results;
- c) Environmental Impact Assessment (and survey) results;
- d) Walking, Cycling and Horse-riding Assessment; and
- e) Further details and information around the Transport Case, Delivery, Financial and Commercial Cases.

8.2.2 A key risk of the Scheme relates to time constraints. Should the current road opening date be postponed beyond the end of 2022, there is a risk that the Welsh Government will not be able to claim all the funding available for the Scheme.

8.2.3 It is considered that issues concerning stakeholder and public acceptability are minimal given the engagement to date. Highway Option 2B has presented itself as the preferred option during the second Public Information Exhibition, by a significant proportion of respondents. This indicates it is likely to be the most acceptable to local communities, the people and businesses of Wales. The project team will continue to engage with the local community through Stage 3 to identify further opportunities for enhancement and to help to address any concerns.

8.3 WelTAG Stages 4 and 5

8.3.1 Should the Welsh Ministers decide to proceed with the Scheme, then at the next stage of the WelTAG process, Stage 4 is to record what is actually delivered, the wider content at the time at which the Scheme is delivered and to record the impacts that actually occur during implementation. That aims to allow for an immediate alert if there are any unintended adverse impacts during implementation and can assist in the realisation of any benefits. It also acts as a record of what is actually delivered, which is required in the Stage 5 evaluation work.

8.3.2 The aim of Stages 4 and 5 is to record what happens so that lessons can be learnt. It may lead to alterations to the current Scheme and will form

valuable evidence for use in future WelTAG appraisals.

- 8.3.3 Records should be kept of the impacts during implementation as these will be required to evaluate both the process of implementation and the outcomes. External events which could affect the evaluation should be recorded as they occur, such as adverse weather events, changes in legislation, the outcomes regarding key risks identified at Stage 3 and any changes made to the Scheme during implementation.
- 8.3.4 The monitoring and evaluation plan (see section 5.12) describes the methods that will be used to provide the evidence required during and post-implementation. No required ‘before’ studies have been identified given the detailed level of survey and assessment undertaken at Stage 3. If there is an unforeseen lengthy delay between this Stage 3 report and implementation, the Welsh Government should consider updating its evidence base as appropriate.
- 8.3.5 If the observed impacts differ from the anticipated impacts then an interim Stage 4 report should be produced to record this, and to offer ways of maximising any unintended benefits or to mitigate any unintended adverse impacts. The final Stage 4 report will record an immediate post opening evaluation recording the actual outputs delivered and the initial impacts. This should cover the first six months of operation and be completed within 12 months’ post opening or completing of the intervention.
- 8.3.6 Then at Stage 5 the Welsh Government should produce a record of what was delivered, an evaluation of the process of delivering the option, a record of the actual impacts compared to the anticipated impacts and an assessment into the extent to which it met the original objectives.