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IMPROVING STRATEGIC TRANSPORT ENCOMPASSING CORRIDORS FROM M4 JUNCTION 34 TO THE A48

WelTAG Stage Two: Outline Business Case Report

MARCH 2018

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Improving Strategic Transport Encompassing Corridors from M4 Junction 34 to the A48

WelTAG Stage Two: Outline Business Case Report

Author	Matthew Fry
Checker	Janice Hughes
Approver	Janice Hughes
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1 Introduction

1.1 Purpose of the Study

Arcadis Consulting (UK) Limited has been commissioned by Vale of Glamorgan Council to develop and appraise potential options for improving the strategic transport network encompassing corridors from M4 Junction 34 to the A48 (Five Mile Lane) including the Pendoylan Corridor (or alternative). The appraisal of options has been undertaken in accordance with the Welsh Government's latest version of WelTAG (December 2017[1]) including advice on the appraisal in relation to the Future Generations of Wales (2015) Act Well-being Goals[2].

This WelTAG report presents the development, appraisal and evaluation of the transport options recommended for further consideration at the end of Stage One. It has been undertaken with the involvement of key stakeholders and the general public. This report presents the Stage Two: Outline Business Case of the WelTAG process.

The WelTAG Stage One report was prepared by Arcadis and considered by the Review Group on 27th November 2017 and referred to the Vale of Glamorgan Council Scrutiny Committee on the 30th November 2017[3], where the recommendations of the report were endorsed. The report considered the problems, opportunities and constraints, established objectives and appraised a long list of options. As a result, three options were selected to be assessed against the do-minimum, namely:

- Option B – a highway route east of Pendoylan;
- Option C – a highway route west of Pendoylan; and
- Option G – Parkway station with Park and Ride facility and bus integration near to M4 Junction 34.

Prior to this report, Welsh Government commissioned Peter Brett Associates to assess the 'Case for Change' for addressing connectivity issues for strategic employment sites in the Vale of Glamorgan. This work was completed in December 2017. The purpose of this study is to clearly demonstrate and elaborate the 'case for change' - that is, to provide a clear rationale for making an investment, its strategic fit, and how the investment will further the aims and objectives of Welsh Government and its partners. The report concludes with next steps being to undertake a WelTAG appraisal to identify suitable options to address the issues, which is the purpose of this report. The key elements of the Case for Change report have been extracted to inform the Strategic Case within this WelTAG Stage Two report and the full report is included in Appendix A.

1.2 The Appraisal Area

The appraisal area encompasses the existing transport corridors from the M4 Junction 34 to the A48 (Five Mile Lane) including the Pendoylan Corridor (or alternative). The Stage Two assessment considers the impact of transport options on the appraisal area as well as the wider, strategic network.

1.3 WelTAG Stage Two: Outline Business Case

The WelTAG guidance states that the purpose of the Stage Two: Outline Business Case is to 'examine in greater detail the short list of options for tackling the problem under consideration'. During Stage Two, the appraisal team needs to consider how the proposed solution will lead to the desired outcomes, maximising contribution to objectives and well-being goals and use this understanding to refine the design of the options and identify key dependencies and constraints. At the end of the stage, the report should provide the Review Group with the evidence required to select a preferred option to take forward for Stage Three. As such, this Stage Two: Outline Business Case report:

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

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

[3] http://www.valeofglamorgan.gov.uk/en/our_council/Council-Structure/minutes,_agendas_and_reports/minutes/Scrutiny-ER/2017/17-11-30.aspx

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

This Stage Two report follows the principle of proportionate appraisal. For the key areas affecting decision making it provides a quantitative appraisal, and some areas of appraisal are largely qualitative.

The guidance identifies that at the end of Stage Two *'the strategic and transport cases must be virtually complete, and more information provided on the delivery, commercial and financial cases for the shortlisted options'*. The report provides stakeholders and decision makers with sufficient information and understanding of the problems and potential solutions to commit further resources to taking forward options to Stage Three.

In accordance with the WelTAG guidance the significance and scale of the impacts throughout the assessment has been appraised using a seven-point scale, as presented in Table 1.

Table 1 WelTAG Seven-Point Assessment Scale

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

1.4 Wider Context

The Stage Two: Outline Business Case Impact Assessment Report (IAR) provides the wider circumstances and context of the issues that are the subject of the transport appraisal. The detailed evidence, data and analysis underlying the statements made in the Stage Two report is provided in the IAR.

1.5 Report Structure

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

- Chapter 2: Strategic Case;

- Chapter 3: Transport Case;
- Chapter 4: Financial Case;
- Chapter 5: Commercial Case;
- Chapter 6: Management Case; and
- Chapter 7: Conclusions and Recommendations.

2 Strategic Case

2.1 Overview

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

2.2 Scope

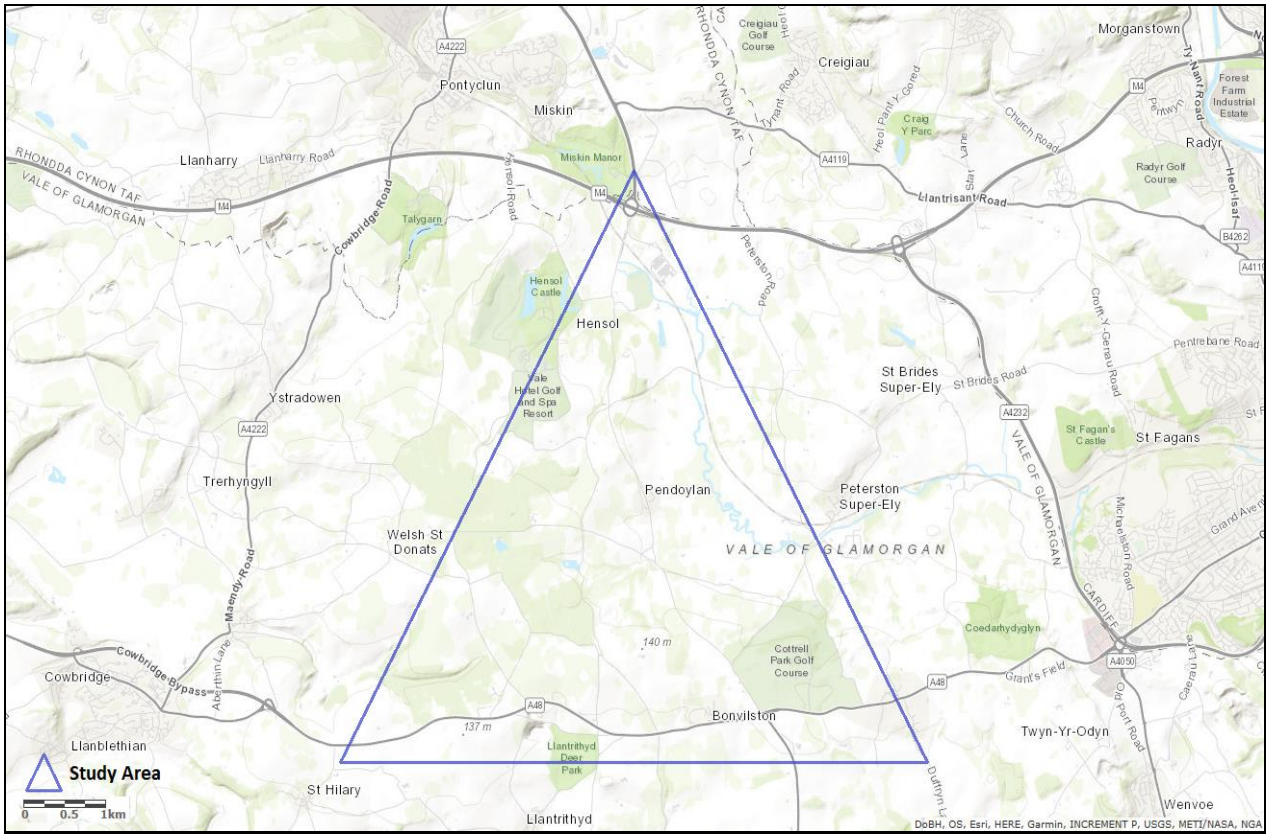
The scope of the study is to consider solutions to improve transport connectivity between the M4 Junction 34 and Five Mile Lane, in order to improve strategic connectivity to strategic employment locations as well as Cardiff Airport. The study firstly considers the Strategic Case, based on a strategic study area, as defined in the Case for Change Report in Appendix A, and extracted below.

The strategic study area as outlined in Figure 1 includes the ten local authorities within the Cardiff Capital Region (Cardiff, Monmouthshire, Torfaen, Blaenau Gwent, Newport, Caerphilly, the Vale of Glamorgan, Merthyr Tydfil, Rhondda Cynon Taf and Bridgend) as well as three of the four members of the Swansea Bay City Region (Swansea, Neath Port Talbot and Carmarthenshire).

Figure 1 Strategic Study Area (Case for Change report)

The study secondly focusses on a local appraisal area representing approximately 24 Sq. Kilometres defined by Junction 34 to the north, and in a triangle approximately 7.3km from either side of the A48 Sycamore Cross junction, as illustrated in Figure 2. The data analysis for the local appraisal area is contained in the accompanying Impact Assessment Report.

Figure 2 Local Appraisal Area[4]



2.3 The Case for Change

2.3.1 Strategic Issues and Opportunities

The 'Case for Change' is set out in the Peter Brett Associates report contained in Appendix A. This forms a fundamental aspect of the Strategic Case, and thus the summary is included below.

Why is the case for improving connectivity to the Vale of Glamorgan being considered?

There are both regional / national and local drivers for improving connectivity to and from the Vale of Glamorgan. From a **regional and national** perspective:

- The emergence of the Cardiff Airport – St Athan Enterprise Zone (EZ) in the Vale of Glamorgan presents a strategically important economic development and employment opportunity for South Wales as a whole. **It is anticipated that this development will create 4,000 new jobs, with further indirect and induced employment across South Wales.**
- As part of the development of the Cardiff Capital Region and corresponding City Deal, there is a desire to improve transport connectivity across South-East Wales, safeguarding and promoting employment and investment and attracting and retaining population. It is envisaged that judicious and targeted investment will ensure that the Capital Region remains attractive and competitive.
- Through an arms-length company, Welsh Government owns and operates Cardiff International Airport. Surface access to the airport has frequently been cited as a problem and there is a desire within Welsh

[4] Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, Geobase, IGN, Kadaster NL, Ordinance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Government to consider options for improving connectivity to and from the airport within the boundaries of European Union (EU) State Aid rules.

From a **local** perspective:

- In partnership with neighbouring Rhondda Cynon Taf County Borough Council, the Vale of Glamorgan Council is pursuing a sub-regional development strategy intended to ensure that the area offers an appropriate and future-proofed balance of employment, commercial and residential opportunities. The current transport infrastructure is considered to be a constraint in realising these aspirations.
- The transport links, across all modes, connecting the Vale of Glamorgan with Cardiff and the wider Capital Region are experiencing significant congestion, which is considered by the Council to be acting as a major constraint on the area in terms of attracting investment and realising development planning opportunities, whilst it is also seen to detract from resident and visitor amenity.

What is the policy fit?

The key policies at the local, regional and national levels, highlighting the policies and proposed delivery programmes and schemes that are relevant to this study are presented in Section 2 of the Case for Change Report (Appendix A) and in more detail at the local level in the IAR.

The Case for Change report identifies that the principle of improving connections to and from the Vale of Glamorgan aligns well with national, regional and local transport, planning and socio-economic policies. In particular, the EZ has been identified as a strategic opportunity area, with the overall policy framework providing guidance as to how the potential of such developments can be realised.

Of particular relevance is the clear alignment with the headline national and regional policies, as follows:

- Improvements to the connectivity of the Vale of Glamorgan would make an enabling contribution to the 'Themes' of **Prosperity for All – The National Strategy**. Enhancing access to a potentially major employment growth area and promoting development at the sub-regional level would support the emergence of regionally significant business and employment opportunities in the Vale of Glamorgan, which would be of benefit to communities across South Wales.
- **Prosperity for All** is underpinned by an **Economic Action Plan (EAP)**, which sets out a vision for "inclusive growth, built on strong foundations, supercharged industries of the future and productive regions". Within the EAP, there is a commitment to both:
    - A new *regionally focussed* model of economic development, which will promote regional interests and issues in Welsh Government. In the context of this study, this can be thought of as the Cardiff Capital Region, of which the Vale of Glamorgan is part.
    - A five-year programme of transport capital funding, linking to mandated regional land-use and planning decisions. Whilst this commitment remains at the strategic stage, it is possible that the EZ would be considered within the context of 'mandated regional land-use'.
- Investment in improved connectivity would also make a significant contribution to the outcomes and, by definition, the strategic priorities identified in the Wales Transport Strategy. As well as supporting access to employment, overall local and national connectivity would be improved, with resulting journey time, reliability and environmental benefits accruing.
- The regional employment opportunity presented by the EZ has the potential to contribute to the Our Valleys, Our Future priorities, particularly in terms of creating good quality jobs and furnishing residents with the skills to do them. However, facilitating this desired outcome will require both transport infrastructure and services which connect the Valleys labour market to employment opportunities in the Vale of Glamorgan.
- The proposal to enhance connectivity to and from the Vale of Glamorgan is also well grounded within the Wales Spatial Plan. The outturn schemes would support access to the Vale of Glamorgan Strategic Opportunity Area and Cardiff Airport, whilst better matching labour with employment opportunities across the area through improving accessibility.

- The emerging National Development Framework and Strategic Development Plans are likely to support the development of key sites within the Vale of Glamorgan, including the EZ. This would provide a firm policy basis for supporting accessibility improvements to these sites.
- Powering the Welsh Economy, the document underpinning much of the Cardiff Capital Region City Deal, emphasises the need for investment in improved transport connectivity to both promote economic development and address existing transport problems.
- A Growth Strategy for the Swansea Bay City Region recognises the need for improved connectivity between the City Region, the rest of Wales, the UK more generally and internationally. Access to Cardiff Airport is specifically noted as a desired outcome.

Land-Use Development Baseline

The Peter Brett Associates report notes that the declaration of an EZ in the Vale of Glamorgan has facilitated a strategically important and high value economic development and employment site within the area - 78% of the total employment land allocation for the Vale of Glamorgan falls within the EZ and it is anticipated that the site will create 4,000 direct jobs. The EZ therefore represents a development of strategic importance for the Cardiff Capital Region and South Wales as a whole.

Whilst the report is focussed on the case for improving connectivity to the Vale of Glamorgan, there is also a specific case for considering infrastructure improvements which would support the development of the sub-regional economy, combining the development potential of the EZ and strategic opportunity sites in Rhondda Cynon Taf (the Rhondda Gateway and Llanilid on the M4). The realisation of these sites and the EZ would assist in addressing an identified market failure in respect of the provision of Grade A commercial property within the Capital Region and would assist in ensuring the Region as a whole is competitive against other areas of the UK.

Ensuring that the EZ and the wider Vale of Glamorgan maximises its development and regional economic potential (particularly in terms of the sub-region being developed in partnership with Rhondda Cynon Taf County Borough Council) will require the provision of a safe and efficient transport network capable of meeting the needs of employees, business visitors and freight. As the subsequent sections explain, the transport infrastructure and services in their current form are likely to act as a constraint on the anticipated development of the EZ and the wider sub-regional opportunity.

With regard to the strategic land-use development issue, it is worth noting that the Inspector's Report on the Vale of Glamorgan Local Development Plan (LDP) suggests that without intervention in the relatively short-term, transport infrastructure may start to place a longer-term constraint on land-use aspirations within the Vale of Glamorgan, negatively affecting the economy of the County.

Socio-Economic Baseline

A comprehensive socio-economic baselining exercise by Peter Brett Associates has identified two key points in relation to the socio-economic profile of the study area:

- There is strong evidence of the existence of a 'two-speed economy' with a broadly affluent rural hinterland and coastal zone encircling the Valleys, which suffer high levels of multiple deprivation (including high levels of economic inactivity and unemployment). The imbalance within the regional economy is negative for the study area as a whole.
- There is an evidenced issue with productivity/ competitiveness within the study area as a whole and within constituent local authorities.

Participation (i.e. high levels of economic activity and employment) and productivity are considered to be the building blocks of a strong economy. Whilst there are variances across the study area, there is a clearly evidenced problem in respect of both of these growth factors when the area is considered as a single entity.

At the strategic level, the rationale for improving transport connections to and from the Vale of Glamorgan is based on supporting strategic economic and land-use development within the Vale of Glamorgan, most notably in the context of the EZ. It is anticipated that by improving connectivity (the outcome), there will be a positive impact in terms increased Gross Value Added (GVA), reduced unemployment, and higher household incomes, for example (the impacts).

It is also important to note the economic position of the study area is not static. Improvements to transport connectivity (e.g. improvements to the South Wales Mainline, removal of the tolls on the Severn Bridges) and other infrastructure investments within the study area could disadvantage both the Cardiff Capital Region and Swansea Bay City Region if other areas of the UK, and in particular the south-west of England, are deemed to be more competitive. Whilst the Metro and M4 Newport Relief Road will greatly assist in supporting the economic competitiveness of South Wales, the threat of a loss of economic activity is a real one.

It is in this context that the EZ, and indeed the wider sub-regional opportunity, can be considered so important. The EZ, amongst other developments, presents a regionally significant economic growth opportunity, potentially generating a range of employment opportunities across different occupational categories, both directly and in terms of indirect and induced employment. Of critical importance is the potential creation of jobs in manufacturing (skilled and unskilled) which would be well suited to parts of the study area with high concentrations of residents in these occupational categories.

Effective transport connectivity between the Vale of Glamorgan and the rest of the study area is however likely to be essential in ensuring the EZ is competitive in matching jobs with the labour market and facilitating business-to-business interactions.

Transport Connectivity Baseline

The land-use development and socio-economic 'cases' set out above from the Peter Brett Associates report clearly highlight the scale of the EZ and its socio-economic importance to South Wales. However, the current transport connectivity of the Vale of Glamorgan is considered to be a constraint in the development of the EZ sites and thus the benefits associated with it. Specifically:

- Whilst the M4 provides high quality strategic access points to the Vale of Glamorgan, the local road network within the Vale is generally of a single carriageway standard and suffers significant congestion around the primary 'gateway' of Culverhouse Cross. Accessibility analysis shows that the need to route via Junction 33 of the M4 and the busy Culverhouse Cross does have a negative impact on both journey length and reliability.
- The most direct route from the M4 to the EZ is via Junction 34 of the M4. However, the connecting road is of a poor quality with lengthy single-track sections and poor visibility. The Junction 34 option has become a rat run for those travelling to the Vale of Glamorgan from the west, with negative implications for communities along the route, including Pendoylan village.
- Whilst there is a reasonable public transport network connecting Cardiff City Centre with the Airport (and, to a much lesser extent, St Athan), connections from elsewhere in the Capital Region and areas to the west are limited, infrequent and generally require interchange. It is notable that those currently working in the EZ area generally travel to work by car.
- Public transport journey times to the Vale of Glamorgan generally and the EZ specifically are well in excess of those by car.
- Freight access to and from the Vale of Glamorgan is sub-optimal, with issues associated with journey time reliability, routing through broadly residential areas and a circuitous route to West Wales. The area around Cardiff Airport has a high proportion of freight intensive industries, whilst the focus of the EZ on aerospace and manufacturing means that there is likely to be significant growth in freight movements from the Vale of Glamorgan in the medium-term. The provision of appropriate freight routes to the M4 is a key consideration of any future improvements to Vale of Glamorgan connectivity.

Whilst the EZ presents a regionally significant opportunity, the labour market catchment of the site is limited by the current transport infrastructure and services. If this issue is not resolved, it may have longer term implications for firms currently located in the Vale of Glamorgan and in terms of the business location decisions of prospective investors. The limited labour market catchment of the EZ currently is compounded by comparatively poor business-to-business accessibility. This may have an impact on business location / investment decisions and would also weaken the agglomeration benefits associated with the development of an aerospace cluster in the Vale.

Moreover, the accessibility analysis undertaken (as contained in the report in Appendix A) found that relatively modest reductions in journey times to/ from the Vale of Glamorgan would significantly increase the labour market and business-to-business catchment of the EZ.

The Future of Cardiff International Airport

Whilst the aspiration to improve the connectivity of the Vale of Glamorgan is predominantly focussed on unlocking the land-use development and employment potential of the EZ, any such improvement would clearly be beneficial for Cardiff International Airport. Indeed, the desk-based analysis and consultation demonstrated that the current surface accessibility of the airport is acting as a key constraint on route development, frequency and ultimately passenger numbers.

Analysis of the CAA Passenger Survey data points to the issue of Cardiff Airport being uncompetitive within its target market. There is a significant proportion of leakage – the analysis shows that 58% of South Wales residents surveyed use Bristol, Birmingham and Gatwick when taking a flight, with the overall proportion of leakage likely to be higher if e.g. Heathrow, Manchester etc were included within the analysis.

Benchmarking has also demonstrated that Cardiff is also relatively poorly served in terms of both short and long-haul routes when compared with other EU peripheral secondary airports (Glasgow & Edinburgh and Dublin, for example).

Despite the above points, there are several opportunities within the aviation sector (e.g. low cost long haul, reforms to Air Passenger Duty etc) which could be beneficial for Cardiff. In addition, the securing of the first scheduled long-haul route to Doha with Qatar Airways from May 2018 will significantly enhance the connectivity of Wales to Asia and Australasia. This connection may also provide a template for an expansion of the long-haul market and an embryonic high value and niche freight industry at Cardiff Airport. Realising these and other opportunities will however require resolution of the evidenced problems with surface access to the airport, which is considered by consultees to be a major constraint.

Why invest in improved transport connectivity?

As explained above, improvements in transport connectivity to and from the Vale of Glamorgan would assist in improving the accessibility of the EZ and would better connect jobs to labour and businesses to other businesses within the study area. This concept has been encapsulated by Peter Brett Associates in a logic map (see Figure 3), which is an effective way of visually presenting the linkages between the infrastructure being delivered and the potential outcomes and impacts that could be generated. It is noted that the case for change report places the importance on the WelTAG study to generate a preferred option.

The extent to which each of the desirable outcomes and impacts, and their relative magnitude, will be realised through improving connectivity to the Vale of Glamorgan will be dependent on the preferred option pursued.

Conclusions: The Case for Change

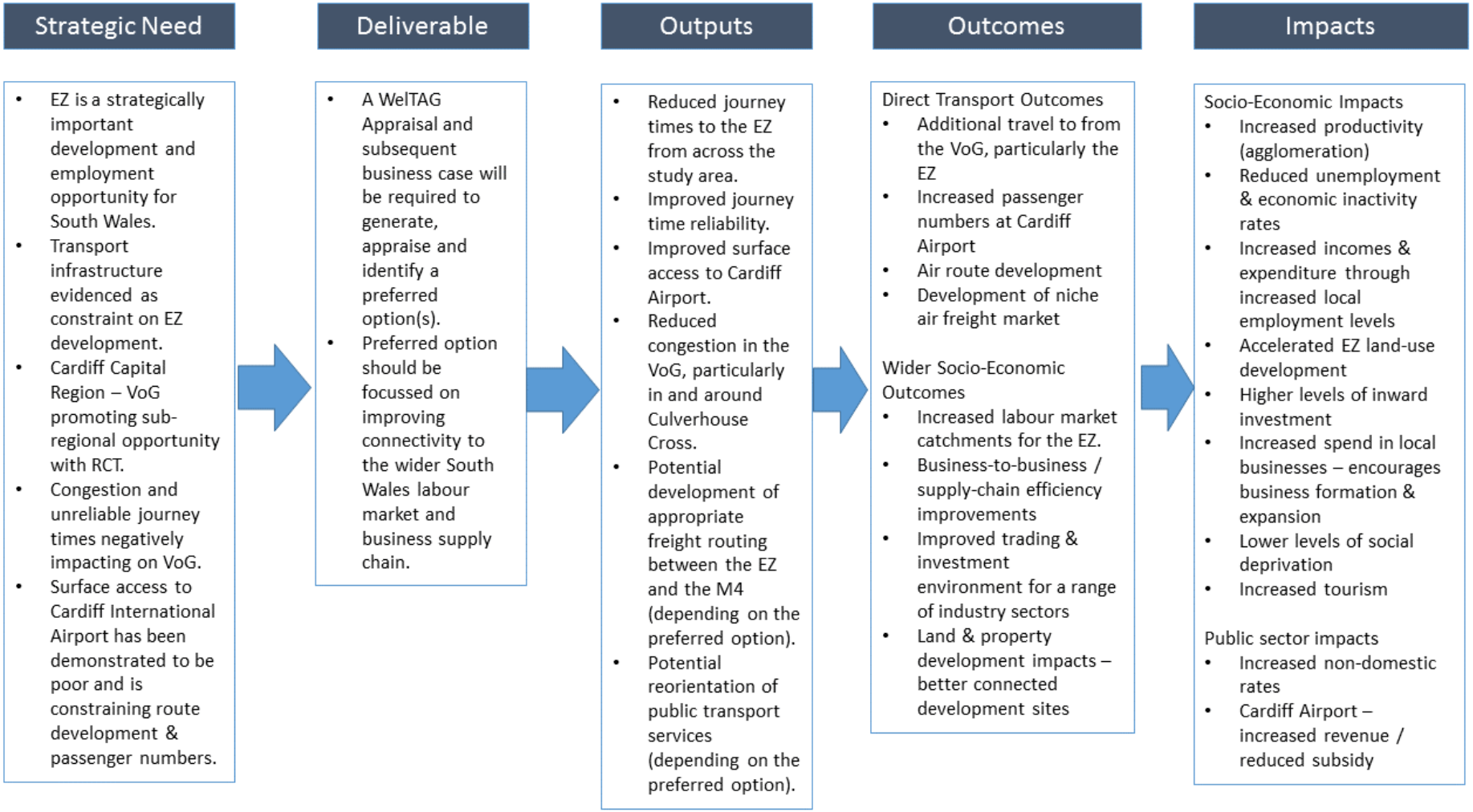
A ‘case for change’ has been made predominantly on the basis of realising the strategic development and employment opportunities associated with the Cardiff Airport – St Athan EZ, which will offer economic development benefits for South Wales as a whole.

Taken together, consultation and desk-based analysis has demonstrated that the current transport connectivity of the Vale of Glamorgan, in the context of the EZ and airport, is sub-optimal in terms of journey times, journey time reliability, public transport coverage and the routing of strategic traffic. If these issues are not addressed, there is a risk that the opportunities offered by the EZ may not be fully realised.

The socio-economic baselining of the study area has clearly highlighted the multitude of problems currently being experienced in the Cardiff Capital Region and Swansea Bay City Region. These include low levels of productivity and business competitiveness, limited inward investment, high rates of economic inactivity & unemployment and concentrated areas of multiple deprivation. The EZ is part of a package of measures across the respective City Regions which could begin to tackle these issues through creating (high value) direct, indirect and induced employment opportunities, as well as wider supply-chain opportunities for Welsh businesses across the region. However, its success is dependent on connecting the employment

opportunities to the labour market and ensuring that business-to-business interactions are as seamless as possible.

Figure 3 Logic Map from the Case for Change Report (Peter Brett Associates)



Moreover, with a once in a generation programme of capital investment in transport infrastructure in the Capital Region and connecting Wales with England underway, there is an opportunity for the areas to the west of Cardiff to better access a wider range of employment and business opportunities. However, this improved connectivity also presents a risk, in that by failing to address the transport problems in the Vale of Glamorgan, the economic gravity of the area could shift to the east, with potential for economic leakage to England.

There are also a number of opportunities for Cardiff International Airport to better position itself as the gateway to Wales, particularly in terms of the long-haul market. The presence of a well-connected international airport is generally seen to be positive in promoting economic development and inward investment. However, the current surface access to the airport has been widely cited as a constraint which, if not addressed, could continue to limit the route development potential of the airport.

Finally, within the Vale of Glamorgan itself, the current transport infrastructure is considered to be having a negative impact on the area, particularly in terms of congestion and journey time reliability. The transport issues are considered to be having a negative impact on business performance, the attractiveness of the Vale of Glamorgan as a place to live, work and do business and, in the longer-term, land-use aspirations within the Vale of Glamorgan.

In short, improving the transport connectivity of the Vale of Glamorgan is considered necessary to support national, regional and local economic performance.

2.3.2 Local Appraisal Area Issues and Opportunities

Alongside the strategic case for change, the analysis for this WelTAG study report has focussed on the specific issues within the local appraisal area. This reiterates that the highway network through and near to the Pendoylan corridor between M4 Junction 34 and the A48 is extensively poor, comprising narrow lanes with limited passing opportunities, restricted speed as a result of adverse route alignments, and is predominantly non-compliant to current DMRB standards.

Sustainable transport options are also restricted with no immediate access to local and regional rail services or robust provision for cycling, and although local bus services do operate through Pendoylan village, services are subject to the constraints of the road network and delay. There is a high reliance on car travel to access services and employment with limited public transport options.

Traffic congestion and resilience issues evident throughout the region are particularly affecting the M4 corridor and the A48/ A4232 at Culverhouse Cross during peak commuting hours. There is high car dependency within the local area with 92% of those living within the study area. As a result of congestion, and when there are incidents on the M4, the Pendoylan corridor also functions as a ‘rat-run’.

It is proposed to upgrade ‘Five Mile Lane’ from the A48 to the A4226 north west of Barry. This could have the effect of altering trip patterns on the road network including through Pendoylan village. In addition, the resilience of the strategic network throughout this area is anticipated to deteriorate in the medium to long term with committed development planned for the region.

There are subsequently opportunities to introduce and establish an enhanced and sustainable transport network by improving strategic connectivity southwards from M4 Junction 34 to the A48 and beyond. If no action is taken, it is anticipated that traffic congestion and resilience problems will continue to worsen on the strategic routes, leading to an increasing level of traffic routeing through the Pendoylan area to avoid delays.

2.3.3 Summary of Problems and Opportunities

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

Table 2 Identified Problems

Reference	Heading
P01	Poor highway infrastructure between M4 Junction 34 and the A48 leading to poor access for local communities and businesses.
P02	Poor sustainable access to Cardiff Airport and strategic destinations.
P03	High use of the private car for local and regional trips (e.g. journeys to work).
P04	Existing congestion issues at M4 Junction 34 and on the A48 which are likely to worsen with the committed developments in the area.
P05	Poor infrastructure and local connectivity by walking and cycling.
P06	Environmental issues associated with high use of the car, including adverse greenhouse emissions and noise pollution.
P07	Accessibility for HGVs.
P08	Adverse road safety conditions along existing routes non-compliant to current DMRB highway standards.

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

Table 3 Identified Opportunities

Reference	Opportunity
O1	Improved connections to link the airport to strategic opportunity areas (SOAs) e.g. Llantrisant and other regional centres.
O2	National significance of Cardiff Airport.
O3	Growth of Cardiff Airport and investment in St. Athan EZ infrastructure.
O4	Five Mile Lane upgrade will significantly improve access between the A48 and Cardiff Airport.
O5	Potential to create connections between M4 Junction 34 and A48 to continue Five Mile Lane route.
O6	Northernmost 500m section of route near M4 Junction 34 of good standard with existing bridges over the River Ely which is a Site of Special Scientific Interest (SSSI) and mainline railway.
O7	Proposed improvement at Bonvilston end of route, connecting to Sycamore Cross.
O8	Potential for Park and Ride and bus and cycle connections.

2.3.4 Involvement of Stakeholders

There are a wide range of key stakeholders for this study, who are in summary:

- The communities of Pendoylan, St Nicholas with Bonvilston and Peterston-Super-Ely who directly experience the existing issues of traffic through the lanes, and will also be most affected by transport proposals;
- Businesses in the appraisal area and its vicinity, including Renishaw's, Vale Resort Hotel, Welsh Rugby Union as well as local agricultural, tourism, leisure, and other small businesses;
- The Vale of Glamorgan Council and the neighbouring authorities of Rhondda Cynon Taff and Cardiff;
- Transport network providers including Cardiff Airport, Network Rail, Welsh Government and Transport for Wales;
- Transport operators including Cardiff Bus and New Adventure Travel and Arriva Trains Wales;
- Road haulage businesses, represented by the Road Haulage Association; and
- The wider business community of the affected local authorities.

The strategy has been to involve the stakeholders throughout the WelTAG stages, with key stakeholders also represented on the Review Group. The public have been consulted at both Stages One and Two to gain feedback on issues, objectives and options. The WelTAG reports have also been taken through the political process, involving presentation to Cabinet and Scrutiny Committee of the Vale of Glamorgan Council.

Key Stakeholders

During Stage One, a stakeholder workshop was undertaken on Thursday 7th September 2017 between 16:00 and 18:00 at the Vale of Glamorgan Council Barry Docks Offices and again at Pendoylan War Memorial Hall between 10.00 and 12.00 on Tuesday 19th September, to which representatives from key stakeholders from across the area representing the community councils, local authorities, key employers, public organisations and transport providers were invited.

The workshops informed all of the key stages of the strategic case, whereby stakeholders were asked to discuss and identify problems, opportunities and constraints, set objectives and identify and discuss potential transport options. In order to inform the discussions at the workshops a draft list of problems, opportunities and constraints were presented. These were derived from a review of existing policy and background reports/ data specific to the appraisal area.

Initial objectives were provided as a starter for the discussion, alongside a list of potential transport solutions. At the workshops stakeholders discussed the problems, objectives and transport options in groups, which were then fed back to the group as a whole. The output from the stakeholder workshops was used to inform the strategic case for Stage Two.

Further engagement in Stage Two to be outlined in the final WelTAG Stage Two report.

Public Consultation Events

A public consultation event was held on Thursday 21st September 2017 between 14:00 and 19:00 at the Pendoylan War Memorial Hall. The event afforded members of the public the opportunity to provide feedback on the identified options, opportunities, and constraints, as well as consideration and suggestions for the objectives and potential transport options. The event was attended by members of the Arcadis project team and the Vale of Glamorgan Council officers to facilitate discussion, with specific workstations and feedback forms provided to capture key information from attendees. The output of the public consultation has also been used to inform Stage One.

Further engagement is planned to disseminate the draft findings of this report, during the week beginning 16th April 2018. *The consultation feedback will be included in the final WelTAG Stage Two report.*

Review Group

Key stakeholder representatives were invited to join the Review Group, who met on the 27th November 2017 to receive a presentation on the findings of the Stage One Draft Report and to discuss the recommendations. This led to confirmation of the problems, opportunities and objectives for the study and agreement on the shortlisted options. The review group met on 16th January 2018 at the outset of Stage Two, to discuss the methodology and approach to the consideration of options. *The Review Group will consider this draft report prior to public consultation in Stage Two.*

Collaboration with Neighbouring Authorities

During the WelTAG Stage One and Two studies, collaboration has taken place with the neighbouring authorities on their development and transport plans and with Welsh Government and their consultants with respect to an emerging Masterplan for Cardiff Airport and St Athan and the strategic case for improved connections.

2.4 Objectives

2.4.1 Identification of Objectives

The objectives for the intervention have been derived from general and transport-specific objectives as set by the Welsh Government and through considering the national well-being goals as set out in the Future Generations of Wales (2015) Act. Section 4 of the IAR sets out how stakeholders have informed the development of the objectives and how the proposed objectives positively contribute to Welsh Government policy and well-being.

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

Table 4 Final Proposed Objectives

Objective		What will success look like?	How will success be measured?
1	Enhance connectivity to Cardiff Airport and strategic employment sites in the region.	Reduced and more reliable journey times between strategic network and Cardiff Airport and St Athan.	Forecast journey times.
2	Increase transport options for strategic access and access to and from local communities.	Increased use of sustainable travel modes by residents of local communities.	Length of walking and cycling links provided or improved. Bus journey times.
3	Improve network resilience and road safety on the M4, A48 and A4232 corridors and other connecting roads.	Reduced accidents and delay on adjacent strategic routes.	Journey times, accident rates per vehicle kilometre.
4	Protect and enhance the historic, built and natural environment including the landscape and settlement character of the study area.	Transport network is improved with at least neutral impact on historic, built and natural assets.	Number of historic assets, area of ecological features, area of flood zone affected.
5	Minimise impacts on communities and support social inclusion and health and well-being.	Transport network is improved with at least neutral impact on social and cultural facilities, businesses and residential properties.	Number of properties affected, length of walking and cycling links provided.

2.4.2 Verification of Objectives

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

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

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

Table 5 Relationship of Objectives to Problems

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

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

Table 6 Relationship of Objectives to Well-being Goals

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

In addition, the objectives have been assessed against the Wales Transport Strategy outcomes as outlined in Table 7. A positive relationship has been identified.

Table 7 Objectives Relating to the WTS Outcomes

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

In addition, Table 8 shows a positive relationship between the objectives and the Strategic Priorities as set out in the Wales Transport Strategy.

Table 8 Objectives Relating to the Strategic Priorities

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

2.5 Short List of Options

2.5.1 Stage One Shortlisted Options

Following the appraisal of the seven options in the Stage One study, including the stakeholder engagement, the report recommended that the following options should be taken forward for further investigation in Stage Two (now renamed for simplicity in Stage Two):

- Highway Option 1 – Eastern Alignment;
- Highway Option 2 – Western Alignment; and
- Parkway Station.

The do-minimum option was also to be included as it is required as the 'Without Scheme' reference case for consideration of transport options.

2.6 Stage Two Option Development

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

2.6.1 Highway Options

For the WelTAG Stage Two study, two alignments have been considered as shown in Table 9.

Table 9 Highway Options

Highway Option	Route Description
Eastern Alignment	This alignment passes the village of Pendoylan to the east although utilises a section of existing road at the northern end in order to minimise the impacts on Ancient Woodland (refer to drawing numbers UA009844-ARC-XX-XX-DR-HE-0001, 0002, 0003 and 0004 which are included in Appendix B)
Western Alignment	This alignment passes the village of Pendoylan to the west although shares the same route at the northern and southern end as the eastern alignment (refer to drawings number UA009844-ARC-XX-XX-DR-HE-0005, 0006, 0007 and 0008 in Appendix C).

The alignments as shown on the attached drawings are subsequently based on the following assumptions:

- Alignments comply with the Design Manual for Roads and Bridges and contain no departures for a 60mph speed limit (100kph design speed) single carriageway. This comprises a carriageway width of 3.65m per lane + 1m hard strips (total carriageway width of 9.3m) plus verge width of 2.5m either side of the carriageway;
- A 3.5m wide cycleway has been included to one side of the bypass, separated by a verge;
- Total cross section width of 17.8m + earthworks slopes where required;
- The vertical alignment is based on 5m OS Contours which have an accuracy to +/- 2m;
- Earthworks are assumed to be 1 in 3 embankments and cutting slopes – to be confirmed at a later stage subject to ground investigation and the materials present; and
- Outfall points for drainage are not known at this stage - costs have been estimated.

It has been assumed that access is required from the existing alignment through Pendoylan onto the new alignment, with junctions needing to be considered at the northern and southern ends. Due to residents' concerns in Gwern-y-Steeple and Peterston-Super-Ely with the issues of rat-running being exacerbated, it is possible that the existing access onto the Pendoylan route in the south could be closed off, with traffic gaining access from the existing Pendoylan route further north. This is shown on drawing numbers UA009844-ARC-XX-XX-DR-HE-0001 & 0005. A full compliant design has not been undertaken on the

proposed junctions, but it is considered costs for the construction of the possible accesses are allowed for within the Optimism Bias and Risk Allowance.

In order to keep the existing alignment in operation, bridges have been used to span side roads where required, therefore in many areas the road will be elevated. However, embankment slopes of 1 in 3 allow for environmental mitigation and landscaping for noise and visual impact improvements for local resident's views.

The alignments have been developed in an iterative process involving workshop sessions of the design team as well as with technical specialists of the local authority/ Glamorgan and Gwent Archaeological Trust. The aim through the design process has been to develop alignments that minimise impacts and maximise benefits for the community, businesses and the environment.

It should be noted that this is a feasibility option study and in order to confirm its accuracy further surveys, investigations and design will be required. This will include such activities as a topographical survey, environmental surveys and ground investigations.

Standards Used

All current alignments considered are compliant with the Design manual for Roads and Bridges and in accordance with TD 9, TD 27 and TA 90.

Structures

The structures that have been used on this route have been positioned so that they provide a minimum height above the existing side road of 5.3m which is in accordance with the DMRB. In addition to the 5.3m a value of 0.7m has been allowed for on top for the construction thickness of the structure.

Junctions

The proposed options include for junctions at locations highlighted on drawing numbers UA009844-ARC-XX-XX-DR-HE-0009 & 0010). However, the junctions shown have not been designed in the current proposals and have only been shown for illustrative purposes. Traffic data and survey work would be required in order to inform the design of each junction.

Sycamore Cross Junction (A48)

A Signalised Cross Roads and a Signalised Roundabout are the two options that have been considered for a revised Sycamore Cross Junction (A48) to remove the constraint of the stagger in alignment.

Neither option has been individually priced within the construction cost estimate due to available data to make an informed assessment, however, it is considered that given the amount of Optimism Bias allowed for within the estimate, there is sufficient allowance to include for the proposed junction improvements (please refer to drawing numbers UA009844-ARC-XX-XX-DR-HE-0009 & 0010).

It should be noted that the inclusion of either junction is likely to impact on the land on the south west side of the A48 and potentially the Golf Course and possibly the ancient woodland which lies adjacent to the A48. However exact impacts are unable to be determined at this stage and would require further investigation and survey work during the next phase of the project.

Public Rights of Way (PRoW)

There are a number of PRoW affected by both of the considered options. It is anticipated that crossings will be rationalised by PRoW re-alignment and provision of crossing point under/over the proposed bypass to maintain existing PRoW, as well as provide access to the walking and cycling route alongside the proposed route.

Where PRoW cross the proposed bypass in fill, Culverts have been proposed and where it crosses in cut, 3m wide bridges have been used.

Constraints

The key constraints and how the design of alignments seeks to address them are summarised in Table 10.

Table 10 Route Alignment Constraints

Constraint	Description
River Ely Floodplain	Where the east option passes through the River Ely floodplain to the east of Pendoylan, it will be necessary to raise the alignment to ensure the new bypass does not flood. A Flood Consequence Assessment will need to be produced and agreed with NRW and it is likely some form of flood compensation mitigation will be required. In order to put some cost against the impacts, 1.8m culverts for the width of the bypass over the length affected by flooding area at 50m intervals have been allowed for within the cost makeup for the option. However, it should be noted that there is a significant risk that some form of viaduct may be required for the east option. This would increase the estimated cost by around £20m and also mean that additional material would need to be disposed of offsite. This has been added to the risk item on top of the 14% allowed. To determine the correct method of construction for the bypass, through the flood area, ground data would be required in the form of an onsite Ground Investigation survey.
Ancient Woodland	The study area contains areas of ancient woodland. The highway alignments have been designed to minimise impact, but in some locations small impacts are probable, although would be limited to the outer areas of the designated sites.
Pendoylan Village	All considered options bypass the village of Pendoylan either to the east or the west and seek to place a distance between the road alignment and properties in the village.
Cottrell Golf Course	The Cottrell Golf course to the south of the project lies adjacent with the A48 and either side of both proposed options. There is a possibility that some of the earthworks may encroach onto land occupied by the golf course, however it is unlikely any significant impacts will be realised to the golf course itself, however the subway that proceeds underneath the existing road will need further investigation due to the additional traffic loading and width of new bypass. There is a possibility that this may have to be relocated. In addition, if realignment of the A48 junction was to be undertaken as part of the improvements, whether a roundabout or cross road are considered, impacts are likely to be significant to the golf course in the area of the proposed junctions (see drawings numbers UA009844-ARC-XX-XX-DR-HE-0009 & 0010), especially the sheds contained within the land adjacent to the Sycamore Cross Junction.
The Vale Resort	Towards to the northwest of the project lies the Vale Resort, direct impacts to the resort have sought to be avoided in all options considered.
Keeping existing road open	Due to the need to keep the existing road through Pendoylan open, the road needs to be elevated in some areas to form bridges to bypass over side roads etc. This enables access to be maintained to existing homes, businesses and facilities such as the primary school in Pendoylan.
Archaeology	Similar to the ancient woodland, the area currently under consideration has known archaeological features. It is also expected (due to known issues at the Five Mile Lane road scheme to the south) that there will be other archaeology within the area, which is currently not known and thus cannot be shown on the constraints plans. There will be a need for further work to determine the likely archaeological risks of each option, but the alignments have been designed to avoid known features wherever possible.

Risks

The key route alignment risks are summarised in Table 11 below.

Table 11 Route Alignment Risks

Risk	Description
Engineering Solutions	Earthwork fill with culverts are currently proposed to lift alignment through the flooding area (1200m on eastern alignment). Flooding levels and ground conditions are currently unknown so there is risk that the alignment would need to be raised further, increasing costs. The outcome of a Flood Consequences Assessment and liaison with NRW could result in this section requiring a viaduct which could increase costs by circa £20m.
Topographic Survey Data	Topographic survey data is OS contours at 5m intervals and is accurate to +/- 2m which could affect earthworks and accuracy of design.
Unknown Archaeology	Unknown archaeology could be encountered during detailed design phases and construction.
River Ely Bridge	Existing bridge over River Ely at the north end of both options may require strengthening and further works to be suitable for possible future traffic loadings. This will need a condition survey and assessment at future stages.
Railway Bridge	In both options the railway bridge may require strengthening and further works to be suitable for possible future traffic loadings. This will need a condition survey and assessment at future stages.
Excavated Material	Excavated material might be used as suitable fill material, therefore requiring import or additional import of suitable fill material and export of unsuitable material.
Cottrell Golf Course Subway	Subway crossing at Cottrell Golf Course could impact on design due to increase in traffic loadings resulting in structural issues with the subway. The subway might need to be re-located.

2.6.2 Parkway Station

The provision of a parkway station was recognised in the Stage One study to bring potentially substantial sustainable travel benefits at a regional scale. It would however require the provision of a road link in order to facilitate access to the station from the Vale of Glamorgan, as in the highway options. Moreover, consideration of a parkway station requires technical feasibility work and economic forecasting as part of the Network Rail Guide to Rail Investment Process (GRIP) and to be in alignment with the rail franchise process by Welsh Government and Transport for Wales. Thus, it was recommended that the Stage Two WelTAG considers the parkway station as a potential add on to the proposals that would add to the benefits of the highway options.

The option to provide a new parkway station on the Cardiff to Bridgend rail line in the vicinity of the M4 Junction 34 has not been further designed as part of this Stage Two study as this is dependent on technical progression and assessment using the Network Rail GRIP process, which has not been available within the timescales to inform this Stage Two study. However, to demonstrate the relationship of the potential station and it's benefits to the options under consideration in this report, the Stage One qualitative assessment has been retained in the subsequent sections. This is based on the assumption of the following:

- A parkway station in the vicinity of Junction 34 served by local rail services between Cardiff and Maesteg and potentially mainline services on the South Wales Mainline, between Cardiff and Bridgend;
- Interchange with regional and local bus services, including services between the A4119 corridor and Cardiff Airport and St Athan; and

- Car parking facilities to reflect the strategic location on the M4 west of Cardiff.

The actual location of a station has not been fixed at this stage, as this will depend on technical feasibility work and environmental constraints. It is anticipated to be at a location in a broad corridor defined by Miskin to the north west and east of Pendoylan village to the south.

2.7 Appraisal of Options

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

Do-Minimum			
Description		Assume continued delivery of transport enhancements via the Local Transport Plan and utilising existing sources of funding but assumes no step change in the level of funding or delivery of any major transport enhancements within the study area (assumes current levels of investment). Assumes the continuation of local bus services and community transport at a similar level as present utilising funding at similar levels to existing. Assumes continued work by local authorities and stakeholders to deliver improvements to the transport network, with the overall aim of addressing the identified problems and the outcomes of the relevant transport policies. The do-minimum is represented by the Reference Case scenario of the South East Wales Transport Model (SEWTM) in 2036. The Base Year 2015 and Reference Case 2036 flows are included in the IAR. The derivation of the Reference Case is described in the technical note in Appendix D. In particular, the Reference Case includes the implementation of the Five Mile Lane improvement and includes the construction of the first part of the Eastern Bay Link in Cardiff. However, the model retains tolls on the Severn Bridge at present (albeit at a reduced level) pending further model development.	
How it tackles the problems		Limited available funding (both capital and revenue) and resources are unlikely to make a step difference in overcoming the identified problems. The Reference Case shows a further deterioration in the performance of the road network with increased traffic flows by 2036 on the key routes of the M4 between Junction 33 and Junction 34 of 28% on the 2015 base year in the AM peak and 26% in the PM peak, 33% between Junction 34 and Junction 35 in the AM peak and 32% in the PM peak and 27% in the AM peak and 25% in the PM peak on the A4232 between Junction 33 and Culverhouse Cross. The A48 west of Sycamore Cross is also anticipated to see a 25% increase in the AM peak and 18% in the PM peak. Traffic routeing through Pendoylan area is forecast to increase by 25% in the AM peak and 18% in the PM peak. The existing problems would be significantly exacerbated.	
Objectives	**Overall**	Overall, the do-minimum option is considered to have an adverse effect at meeting the objectives, due to the modest levels of funding currently able to be invested in transport infrastructure and public transport services. It subsequently assumes that background increases in population and traffic growth exceed investment provision to mitigate increasing impacts and pressure on the existing transport network. It should be noted that policies and programmes are in place to facilitate improved transport services, but limited funding means that beneficial enhancements are currently difficult to achieve. A negative impact on the environment is forecast as the traffic levels between Junction 34 and the A48 would continue to increase, as well as those on the strategic network, whilst the limited funding means that the connectivity issues associated with strategic employment sites and the Airport will pose a constraint on the economy. The well-being of local communities in the local appraisal area would be anticipated to deteriorate, with limited investment in schemes to promote health and well-being and increased traffic impacts.	
	O1	Enhance connectivity to Cardiff Airport and strategic employment sites in the region.	-
	O2	Increase transport options for strategic access and access to and from local communities.	-
	O3	Improve network resilience and road safety on the M4, A48 and A4232 corridors and other connecting roads.	-

Do-Minimum			
	O4	Protect and enhance the historic, built and natural environment including the landscape and settlement character of the study area.	-
	O5	Minimise impacts on communities and support social inclusion and health and well-being.	--
Key Risks		Potential reductions in available funding and resources leading to poor investment in public transport and local highway infrastructure. Do-minimum option will mean that connectivity to residential areas, strategic economic centres and key services/ facilities (including Cardiff Airport) remains a key issue, and not being seen to tackle existing issues or support local and regional development aspirations.	
Adverse Impacts		The anticipated increase in annual traffic volumes (general background traffic growth plus local LDP development) is anticipated to have a significant adverse impact on the environment compared to the existing situation. A poor transport connection remains from the M4 corridor would affect potential users' choices for accessing employment centres and key services, including accessibility to and from Cardiff Airport. Potential for a deterioration in highway safety on routes between M4 Junction 34 and A48, most notably through Pendoylan with potential for local increases in traffic flow. Potential for increased congestion on the alternative routes to strategic employment sites including the A4232 and A48. Potential for adverse development of socio-economic opportunities with restrained accessibility to sustainable travel opportunities. Deterioration of the quality of environment and journey times on the Pendoylan corridor as well as the strategic road network (M4, A4232 and A48) encompassing increase journey time delay, environmental issues, and anticipated worsening of highway junction capacity.	
Constraints		The do-minimum is considered to be relatively unconstrained although any restriction with regard to the availability of funding and resources could jeopardise standard maintenance/ enhancement proposals.	
Dependencies		The implementation of the Five Mile Lane improvement will impact on transport in the study area. The growth of the Airport and strategic employment sites in the sub-region is related to the level of impacts, as well as the transport issues in the do-minimum potentially constraining growth.	

Highway Option 1 – Eastern Alignment		
Description		Highway Option 1 is an eastern alignment that would connect from just south of Junction 34 of the M4 to the A48 at Sycamore Cross. The northern and southern sections would involve online improvements. The remainder of the route between these two junctions would be offline and bypass Pendoylan to the east of the village. The route would be a single carriageway of national speed limit standard, with the potential to provide integral public transport and include segregated walking/ cycle route infrastructure alongside the carriageway, as well as provision of connectivity for existing public rights of way. The option has been assessed using the SEWTM, with the assumption of three junctions along the route connecting to the existing network. The modelling assumes only minor changes to the Sycamore Cross junction, as proposed for the Five Mile Lane scheme. However, there are options to remove the staggered junction which would increase the scheme benefits. Similarly, the modelling work has not included improvements to Junction 34 to increase capacity, but the brining forward of improvements for the junction would enhance the benefits of the option.
How it tackles the problems		Option 1 has the potential to tackle the following problems – P01 / P02 / P04 / P05 / P07 / P08 • The option would represent a significant highway infrastructure improvement between M4 Junction 34 and A48 with improved vehicle journey time and reliability. • The option would provide robust infrastructure to support the promotion and development of sustainable transport options. • Congestion issues at M4 Junction 34 could be mitigated via the implementation of localised junction improvements. • There is the opportunity to provide integral bus infrastructure, as well as walking and cycling infrastructure encompassing connectivity to existing routes. • The option would provide a new route compliant with current DMRB highway standards in comparison to the broadly non-compliant existing routes through the study area. Improved accessibility for HGV's would also be realised.
Objectives	**Overall**	**O1:** The option should significantly improve strategic connectivity in the region including accessibility to and from local/ regional employment centres and communities, as well as access to services and facilities including Cardiff Airport. The option provides direct interconnectivity with Five Mile Lane via the Sycamore Cross junction (A48) allowing for improved journey time potential to and from the EZ and Cardiff Airport. **O2:** The option provides additional route choices for access between the M4 and strategic employment locations and the airport. Whilst the implementation of a new highway route has the potential to significantly promote the development of other transport modes options by establishing infrastructure anticipated to support the improvement of vehicle journey times and reliability, this is a highways-based option. The highway benefits noted are therefore likely to establish an increase in car trips as opposed to deliver increased trips by sustainable modes of transport. However, cycling and bus infrastructure would be integrated with the scheme, bringing some benefits for sustainable travel options. **O3:** A new route implemented to current highway design standards in combination with the associated junction improvements is anticipated to significantly improve network resilience and road safety. Reduced traffic flows through the settlements of Pendoylan and Clawdd Coch is also anticipated to enhance local highway conditions along the predominantly sub-standard route, both day-to-day and following periods of disruption (diverted traffic) associated with the M4 corridor. The results of the traffic modelling show there would be changes in traffic routeing on the strategic network with the do something compared to the do minimum, with a reduction in traffic on the M4 west of Junction 34, on the A48 east of Sycamore Cross and the A4232/ A48 Culverhouse Cross. There is anticipated to be increased traffic flow resulting from the new route around Junction 34,

Highway Option 1 – Eastern Alignment			
		which would lead to the need to separately consider improvements at the junction to facilitate the additional traffic on the link and mitigate any delays on the A4119 corridor as a result. **O4:** The option has the potential for a moderate adverse impact with regard to the natural and built environment both through the construction of a new by-pass (predominantly upon an existing green field site), the transposition of existing hedgerow adjacent to existing online sections of highway, adverse visual impact affecting the extant rural landscape characteristics of the area, and the potential increase in road traffic impacting on noise and air quality impacts for dwellings situated close the route. **O5:** This option would minimise transport impacts on the existing community of Pendoylan and of Clawdd Coch by leading to a reduction in traffic through the communities. There is potential to proactively enhance social inclusion throughout the region by affording improved access to local services and facilities. There would be increased traffic impacts on properties in the immediate vicinity of the route, but overall this number is low in comparison to those benefitting from reduced traffic.	
	O1	Enhance connectivity to Cardiff Airport and strategic employment sites in the region	+++
	O2	Increase transport options for strategic access and access to and from local communities	+
	O3	Improve network resilience and road safety on the M4, A48 and A4232 corridors and other connecting roads	++
	O4	Protect and enhance the historic, built and natural environment including the landscape and settlement character of the study area	–
	O5	Minimise impacts on communities and support social inclusion and health and well-being	+
Key Risks		Requires a high level of capital investment. Delivery would be in the medium to long term, given the planning requirements, likely funding constraints in current programmes and development work required to take the option forward. There are already a number of large scale transport schemes currently in the Welsh Government's infrastructure delivery programmes (such as the M4 motorway and Five Mile Lane, for example) which require significant capital funding and resources. There may be the opportunity for funding under the City Deal. Any proposal would need to demonstrate robust regional/ national value against other large-scale transport schemes and City Deal proposals. Land acquisitions (time and cost). Environmental considerations, including the potential for protected species to be located along the route and the risks associated with potential impacts on the floodplain, which may lead to the requirement for a design incorporating stilts. Buried archaeological features have the potential to add time and cost to any scheme and may impact on route alignments. Route uncertainties (including topography and ground conditions) make it difficult to fully understand the engineering constraints and potential costs, and associated impacts. Discussions indicate there may be significant ground condition constraints with this route option. There is a need to also bring forward capacity improvements to Junction 34 to minimise	

Highway Option 1 – Eastern Alignment	
	knock on impacts and maximise journey time benefits.
Adverse Impacts	Potential significant adverse impact on the environment including landscape, biodiversity, cultural heritage, noise and air quality. Impact on residents situated adjacent or near to the proposed route (predominantly affecting the settlements of Pendoylan and Clawdd Coch). Impact on local communities during construction. Delay to road users (car, HGVs and public and community transport) during construction. Would require a high level of capital investment, which may have implications on the delivery of other capital schemes in the region for a number of years.
Constraints	Availability of funding and resources. Environmental considerations including the potential for protected species along the proposed route, archaeology and flooding issues. Land ownership constraints and the need to accommodate access to existing properties.
Dependencies	Masterplan proposals for Cardiff Airport and St Athan EZ, as well as other major developments in the region. Impacts on available revenue/ maintenance budgets. Ability to acquire all land required to facilitate the option. Emerging proposals to improve capacity on the M4 corridor including Junction 34, as well as the A4119/ A473.

Highway Option 2 – Western Alignment		
Description		Highway Option 2 is a western alignment that would connect from just south of Junction 34 of the M4 to the A48 at Sycamore Cross. The northern and southern sections would involve online improvements. The remainder of the route between these two junctions would be offline and bypass Pendoylan to the west of the village. The route would be a single carriageway of national speed limit standard, with the potential to provide integral public transport and include segregated walking/ cycle route infrastructure alongside the carriageway, as well as provision of connectivity for existing public rights of way. The option has been assessed using the SEWTM, with the assumption of three junctions along the route connecting to the existing network. The modelling assumes only minor changes to the Sycamore Cross junction, as proposed for the Five Mile Lane scheme. However, there are options to remove the staggered junction which would increase the scheme benefits. Similarly, the modelling work has not included improvements to Junction 34 to increase capacity, but the bringing forward of improvements for the junction would enhance the benefits of the option.
How it tackles the problems		The option has the potential to tackle the following problems – P01 / P02 / P04 / P05 / P07 / P08 • The option would represent a significant highway infrastructure improvement between M4 Junction 34 and A48 with significant potential for improved vehicle journey time and reliability. • The option would provide robust infrastructure to support the promotion and development of sustainable transport options. • Congestion issues at M4 Junction 34 could be mitigated via the implementation of localised junction improvements. • There is opportunity to provide integral bus infrastructure, as well as walking and cycling infrastructure encompassing connectivity to existing routes. • The option would provide a new route compliant with current DMRB highway standards in comparison to the broadly non-compliant existing routes through the study area. Improved accessibility for HGV's would also be realised.
Objectives	**Overall**	**O1:** The option should significantly improve strategic connectivity in the region including accessibility to and from local/ regional employment centres and communities, as well as access to services and facilities including Cardiff Airport. The option provides direct interconnectivity with Five Mile Lane via the Sycamore Cross junction (A48) allowing for improved journey time potential to and from the EZ and Cardiff Airport. **O2:** The option provides additional route choices for access between the M4 and strategic employment locations and the airport. Whilst the implementation of a new highway route has the potential to significantly promote the development of other transport modes options by establishing infrastructure anticipated to support the improvement of vehicle journey times and reliability, this is a highways-based option. The highway benefits noted are therefore likely to establish an increase in car trips as opposed to deliver increased trips by sustainable modes of transport. However, cycling and bus infrastructure would be integrated with the scheme, bringing some benefits for sustainable travel options. **O3:** A new route implemented to current highway design standards in combination with the associated junction improvements is anticipated to establish improved network resilience and road safety. Reduced traffic flows through the settlements of Pendoylan and Clawdd Coch are also anticipated to enhance local highway conditions along the predominantly sub-standard route, both day-to-day and following periods of disruption (diverted traffic) associated with the M4 corridor. The results of the traffic modelling show there would be changes in traffic routeing on the strategic network that would lead to reduced traffic through the M4 Junction 33, and A4232/ A48 Culverhouse Cross, with significant traffic reductions anticipated on the A48 both east and west of Sycamore

Highway Option 2 – Western Alignment			
		Cross. There is anticipated to be increased traffic flow resulting from the new route on the M4 Junction 34, which would lead to the need to separately consider improvements at the junction to facilitate the additional traffic on the link and mitigate any delays on the A4119 corridor as a result. **O4:** The option has the potential for a moderate adverse impact with regard to the natural and built environment both through the construction of a new road alignment, (predominantly upon an existing green field site), the transposition of existing hedgerow adjacent to existing extensive online sections of highway, adverse visual impact affecting the extant rural landscape characteristics of the area, and the potential increase in road traffic leading to air quality and noise pollution for dwellings situated close the route. **O5:** This option would reduce transport impacts on the existing community of Pendoylan and Clawdd Coch. There is potential to proactively enhance social inclusion throughout the region by affording improved access to local services and facilities. There would be increased traffic impacts on properties in the immediate vicinity of the route, but overall this number is low in comparison to those benefitting from reduced traffic	
	O1	Enhance connectivity to Cardiff Airport and strategic employment sites in the region	+++
	O2	Increase transport options for strategic access and access to and from local communities	+
	O3	Improve network resilience and road safety on the M4, A48 and A4232 corridors and other connecting roads	++
	O4	Protect and enhance the historic, built and natural environment including the landscape and settlement character of the study area	–
	O5	Minimise impacts on communities and support social inclusion and health and well-being	+
Key Risks		Requires a high level of capital investment. Delivery would be in the medium to long term, given the planning requirements, likely funding constraints in current programmes and development work required to take the option forward. There are already a number of large scale transport schemes currently in the Welsh Government's infrastructure delivery programmes (such as the M4 motorway and Five Mile Lane, for example) which require significant capital funding and resources. There may be the opportunity for funding under the City Deal. Any proposal would need to demonstrate robust regional/ national value against other large-scale transport schemes and City Deal proposals. Land acquisitions (time and cost). Environmental considerations, including the potential for protected species to be located along the route. Buried archaeological features have the potential to add time and cost to any scheme and may impact on route alignments. Route uncertainties (including topography and ground conditions) make it difficult to fully understand the engineering constraints and potential costs, and associated impacts. There is a need to also bring forward capacity improvements to Junction 34 to minimise knock on impacts and maximise journey time benefits.	
Adverse Impacts		Potential significant adverse impact on the environment including landscape, biodiversity,	

Highway Option 2 – Western Alignment	
	cultural heritage as well as impacts on air quality and noise. Impact on residents situated adjacent or near to the proposed route (predominantly affecting the settlements of Pendoylan and Clawdd Coch). Impact on local communities during construction. Delay to road users (car, HGVs and public and community transport) during construction. Would require a high level of capital investment, which may have implications on the delivery of other capital schemes in the region for a number of years, including the delivery of more sustainable measures.
Constraints	Availability of funding and resources. Environmental considerations including the potential for protected species along the proposed route and archaeology. Land ownership constraints and the need to accommodate access to existing properties.
Dependencies	Masterplan proposals for Cardiff Airport and St Athan EZ, as well as other major developments in the region. Impacts on available revenue/ maintenance budgets. Ability to acquire all land required to facilitate the option. Emerging proposals to improve capacity on the M4 corridor including Junction 34, as well as the A4119/ A473.

Parkway Station		
Description		The option encompasses the implementation of a new parkway station near to M4 Junction 34 including a Park and Ride facility and bus integration. It would be assumed that a new railway station at this location would provide frequent rail service east towards Cardiff and west towards Swansea, with a large Park and Ride facility allowing for robust integration for passengers. It is anticipated that any such facility would provide an integrated bus service between the railway station and strategic employment sites and Cardiff Airport, as well as other regional employment centres. Specific deliverables would be subject to feasibility assessment but would be anticipated to encompass free and secure car parking, ticket office, waiting areas including café and toilet facilities, covered cycle parking facilities, as well as support staff situated on-site. **This option has been considered in isolation in terms of the impact assessment to differentiate the impacts from the highway options. However, it is recognised that it would only be a viable option if there are highway improvements between M4 Junction 34 and the A48. A new parkway station would therefore be reliant upon existing highway network infrastructure for connectivity from the south.**
How it tackles the problems		This option has the potential to tackle the following problems – P02 / P03 / P04 / P06 • A new parkway station with bus integration has the potential to make travel by non-car means an attractive option, reducing dependency on the private car. This may have regional benefits, notably for rail service access to and from the A4119/ Rhondda Valley area, as well as from the A48 corridor in the Vale of Glamorgan. • The option has the potential to positively support improved sustainable accessibility to and from Cardiff Airport as well as other strategic destinations that are regional and outside of Wales. • The option has the potential to help mitigate existing congestion issues on the strategic road network by encouraging trips to be made by more sustainable means. • The potential to remove car trips from the local and regional highway network is anticipated to help mitigate adverse environmental issues associated with high use of the car, including adverse greenhouse emissions and noise pollution.
Objectives	**Overall**	Where noted below, the extent to which car-based trips could be reduced as a result of this sustainable option is related to the provision of a new highway route that could facilitate the additional traffic movements including buses to and from a parkway station from the Vale of Glamorgan. O1: A parkway station provides a significant opportunity to contribute towards enhanced sustainable connectivity within and to and from the region. If developed in combination with bus services to and from the strategic employment sites and the airport, there is potential for significant modal shift to public transport. O2: The option would help promote sustainable access with the potential to reduce both local and strategic car-based trip distances. There may be changes in traffic patterns to access the station which would need to be investigated. O3: Enhancing options for travel by sustainable modes of transport is anticipated to reduce the number/ distance of car-based trips throughout the region. Reduced traffic flows on the strategic highway network subsequently has the potential to improve highway network resilience and road safety particularly on the M4, A48 and A4232 routes, but also on the A4119 north of M4 Junction 34, although traffic would be generated on routes to and from the parkway station. O4: It is anticipated that a new rail parkway facility would be constructed on a greenfield site resulting in an adverse impact on the natural environment, as well as an adverse visual impact affecting the extant rural characteristics of the area. There are flood risk and biodiversity constraints along the rail corridor which might mean adverse impacts from a station facility. The potential for the option to reduce the number of car-based trips could

Parkway Station			
		however retain a long-term positive impact on the effects of climate change, with a reduction in associated vehicle emissions as well as reductions in noise pollution. O5: A parkway station has the potential to proactively enhance social inclusion throughout the region by expanding transport options and affording improved sustainable accessibility.	
	O1	Enhance connectivity to Cardiff Airport and strategic employment sites in the region	++
	O2	Increase transport options for strategic access and access to and from local communities	+++
	O3	Improve network resilience and road safety on the M4, A48 and A4232 corridors and other connecting roads	+
	O4	Protect and enhance the historic, built and natural environment including the landscape and settlement character of the study area	-
	O5	Minimise impacts on communities and support social inclusion and health and well-being	++
Key Risks		The provision of a parkway station in itself is anticipated to involve a moderate level of cost in comparison to the highway options. However, there is a need for the highway improvements in order for the parkway station to be a viable option, otherwise access to the station from the Vale would be via the existing substandard route. Delivery would be in the medium to long term, given the planning requirements, likely funding constraints in current programmes and development work required to take the option forward. Moreover, it is dependent on the rail franchise and programme for the Metro by Transport for Wales. There are considerable pressures on funding for the Metro network. There would be a need to demonstrate robust regional/ national value against other large-scale transport schemes and City Deal proposals. Constructability and operational impacts of a new railway station on the South Wales Main Line. There would be a need for feasibility work to be undertaken. There is a risk that a new station brings disbenefits to other communities through changes in timetabling and journey times. Suitable land availability and land acquisitions (time and cost). Environmental considerations (time and cost). Is there sufficient demand to justify the investment when availability of funding is diminishing? This would require further analysis.	
Adverse Impacts		Environmental considerations on the natural environment and construction impact. Localised traffic congestion associated with parkway station access and parking.	
Constraints		The availability of suitable capacity on the South Wales Main Line to accommodate additional rail services, and impact on existing stations and services (e.g. Pontyclun). Bus service journey times and reliability between M4 Junction 34 and the A48 would be dependent on the improvements to the existing road network. Availability of funding and resources. Bus integration provision would benefit from promotion and marketing of services, such as utilising the full potential of social media to maximise patronage and attract new	

Parkway Station	
	passengers. Subject to further analysis and as part of a viable financial business case, the ability to deliver a competitive fare price structure could be essential in achieving suitable patronage, in competition from other forms of transport and the availability of Cardiff Airport car parking, for example.
Dependencies	Improvement of highway links between M4 Junction 34 and the A48, and upgrade of M4 Junction 34. Masterplans for Cardiff Airport and strategic employment sites. Welsh Government/ Transport for Wales priorities and committed expenditure. Local authority delivery programmes. Development of new highway infrastructure to realise the full potential for any proposed bus Park and Ride scheme integrating with a new parkway station by establishing robust journey times and reliability. Investment and 'buy-in' from rail industry/ train operator. Ability to acquire all land required to facilitate the option.

3 Transport Case

3.1 Overview

The aim of the Transport Case is to explain the expected impacts of the project, how the project will contribute to the well-being goals and whether a project will provide value for public money. The social, cultural, environmental and economic costs and benefits of each option are considered.

The transport case presents the approach and assessment of impacts of each option under the headings of social, cultural, environmental and economic impacts and an evidence-based assessment of the following:

- What the impacts will be;
- The scale of those impacts;
- Where will they occur; and
- Who/ what will experience them.

The three options as described in Section Two have been tested, namely the two highway alignment options and a parkway station near to Junction 34 of the M4.

3.2 Approach to Impact Assessment

The anticipated impact of the highway route options on traffic and the subsequent economic, social and environmental impacts has been quantified through use of the SEWTM. A model run was commissioned by the Vale of Glamorgan Council to incorporate a single carriageway way, 60mph link from just south of Hensol to the Sycamore Cross junction on the A48. The longest of the two highway route alignments was used as a worst case for journey times. It has been assumed that there would be three junctions with local roads on the route and the Sycamore Cross junction will be an improved staggered signalised junction, in line with the current proposals as part of the Five Mile Lane upgrade.

Model flows, journey times and user benefits have been obtained for the Base Year 2015 and for the With and Without Scheme in 2036. This has enabled Arcadis to undertake a Cost Benefit Analysis, including accident benefits and prepare a Transport Economic Efficiency (TEE) table for each option.

Where possible, other impacts have been quantified. At this stage social, cultural and environmental impacts have been assessed through measurement of receptors likely to be affected, but this is prior to environmental and technical surveys being undertaken, and a full Environmental Impact Assessment, which will be needed to progress an option in Stage Three.

The impacts considered and the means of assessment for each is summarised below.

3.2.1 Social Impacts

The social impacts have been assessed with reference to the guidance in WebTAG Unit A4.[5.] The assessment is qualitative with the exception of accidents, for which a quantified analysis has been undertaken using COBALT from the traffic modelling results (and is reported under the economic impacts appraisal). The topics covered are physical activity, security, severance, journey quality, option and non-use values, accessibility and personal affordability.

3.2.2 Cultural Impacts

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

[5] https://www.gov.uk/government/publications/webtag-tag-unit-a4-1-social-impact-appraisal-december-2017

3.2.3 Environmental Impacts

The environmental impacts appraisal for this Stage Two report is based on WebTAG Unit A3.6. The topics covered are noise, air quality, greenhouse gases, landscape, townscape, historic environment, biodiversity and water environment. At this stage, surveys have not been undertaken and the appraisal has been undertaken using desk top analysis. For landscape and visual impacts and biodiversity, site visits by professionals to identify key issues and constraints. The IAR sets out the environmental data utilised to inform the appraisal.

3.2.4 Economic Impacts

The economic impacts appraisal considers the changes in journey time, reliability and accidents as derived from the traffic modelling using the outputs from the SEWTM. The methodology for undertaking the modelling by the consultants for Transport for Wales are contained in a technical note in Appendix D. Arcadis has used the outputs to subsequently undertake the economic assessment.

The WebTAG guidance highlights that wider economic impacts can also be appraised. The wider economic appraisal is a short qualitative statement at present, pending further analysis in a Stage Three assessment. The Department for Transport (DfT) has recently revised the WebTAG guidance on the induced investment, employment effects and productivity impacts, with new guidance made available in December 2017. New software is expected to be available to support the quantification of these benefits from March 2018.

3.3 Option Assessment

3.3.1 Impact Assessment

The detailed assessment of impacts for each of the options is provided within Appendix E with a summary of results outlined within Table 12. Each assessment is in comparison to the do-minimum in 2036. The WelTAG seven-point assessment scale, as set out in Table 1, has been used to present the scale of the impact. Appendix F contains the Worksheets for the eastern alignment option and Appendix G for the western alignment option, that provide the analysis behind the impacts as undertaken for Stage Two.

Table 12 Impact Assessment Summary

Impact	Highway Option 1 Eastern Alignment	Highway Option 2 Western Alignment	Parkway Station
Social			
Physical Activity	+	+	+
Journey Quality	+++	+++	++
Accidents	++	++	+
Security	+	+	++
Access to Employment	++	++	++
Access to Services	++	++	+
Affordability	0	0	+

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638648/TAG_unit_a3_envir_imp_app_dec_15.pdf

Impact	Highway Option 1 Eastern Alignment	Highway Option 2 Western Alignment	Parkway Station
Severance	+	+	NYA
Option and Non-Use Values	+	+	+++
Cultural			
Cultural Facilities	+	+	NYA
Welsh Language	0	0	0
Environmental			
Noise	-	-	NYA
Air Quality	-	-	NYA
Greenhouse Gases	+	+	+
Landscape	--	--	NYA
Townscape	0	0	NYA
Historic Environment	-	-	NYA
Bio-Diversity	--	--	NYA
Water Environment	--	-	NYA
Residential Amenity	-	--	NYA
Economic			
Journey Time Changes	+++	+++	+
Journey Time Reliability Changes	++	++	+
Transport Costs	+	+	+
Accidents	++	++	+
Wider Economic Impacts	++	++	++
Land and Property	--	--	NYA
Capital Costs	---	---	---
Revenue Costs	--	-	-

The summary table shows that the two highway options perform similarly in terms of the social, environmental, cultural and economic assessment. The differences are related to the water environment, whereby the Eastern alignment presents more potential impacts on the floodplain, and on residential amenity, for which the Western alignment impacts on more properties (albeit there is a small number for each option).

3.3.2 Value for Money Assessment

This section sets out the impact on public accounts and the results of the Analysis of Monetarised Costs and Benefits (AMCB) for the highway options, based on the costs calculated by Arcadis and the benefits derived from the outputs of the SEWTM. Full discussion of the methodology and results is included in Appendix H. Table 13 shows the effects of the options on public finances, taking into account the impact on the broad transport budget after allowing for changes in revenues. It also includes changes in the broader indirect tax revenues which accrue to the government.

Table 13 Public accounts (PVC £000's 2010 prices discounted to 2010)

Scheme Costs	Eastern Alignment	Western Alignment
Investment Costs	56,810	41,132
Operator Costs	-	-
Revenue	-	-
Indirect Tax Revenue	-2,460	-2,460

The indirect tax revenue values shown are increase in revenue to the wider public finances and, in accordance with WebTAG guidance, are included in the calculation of the Present Value of Benefits (PVB). The sign of the value in the PA table is therefore reversed in the AMCB table because the PA table presents costs to the public accounts as positive values. The AMCB tables combine results from the TEE tables and the PA tables supplemented by information on accidents. A sensitivity test was undertaken to provide further information regarding the impact of the straight-line interpolation/ extrapolation methodology undertaken due to a lack of transport model data. This sensitivity used a National Trip End Model (NTEM) derived trip reduction factor to estimate the impact a reduced level of traffic in 2023 would have on the scheme benefits. The resultant Table 14 gives the AMCB including the impact of a reduced 2023 trip matrix on the PVBs and BCRs.

Table 14 AMCB summary table for sensitivity test (prices in £000's, discounted to 2010)

	Scheme costs	Eastern Alignment	Western Alignment
A	Accidents	16,591	16,591
B	Economic efficiency: Commuting	35,745	35,745
C	Economic efficiency: Other	49,471	49,471
D	Economic efficiency: Business	52,020	52,020
E	Wider Public Finances (ITR)	-2,532	-2,532
F	PVB (A+B+C+D+E)	151,295	151,295
G	PVC	56,810	41,132
H	NPV (F-G)	94,485	110,163
I	BCR (F/G)	2.66	3.68

In summary, the benefits for the eastern and western alignment have been assumed to be the same with the only difference being introduced with the costs.

The methodology used to undertake the transport user benefits using TUBA will likely lead to an overestimation of benefits, whereas in case of accident benefits using COBALT, there might be an underestimation of the benefits. However, given the context specific data provided, it has been deemed as the most robust approach.

The western alignment has a higher BCR of 3.7 and NPV of £111.0m than the eastern alignment which has a BCR of 2.7 and NPV of £96m. This is due to providing the lowest cost estimate of around £41 million for the western alignment (at 2010 prices). The model runs in SEWTM did not include for a substantial improvement to the Sycamore Cross junction of the A48 nor any improvements to the M4 Junction 34. It would be anticipated that the benefits of the link would increase with these improvements. Further modelling in Stage Three would be able to refine the cost benefit results.

On the basis of greatest economic advantage, the western alignment route is the best performing option, although it is recognised that economic performance is only one of the elements which must be taken into account in decision making.

4 Financial Case

4.1 Overview

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

4.2 Option Costs

This section sets out the costs of delivering the eastern and western alignment highway options. The costs of developing a parkway station are not known at this stage and will be subject to further development, as set out in the Commercial and Management Case. However, a new station cost with interchange facilities is typically **£25m**.

At this stage, the lifetime costs of the options have not been estimated. Costs presented are the implementation costs, including the further development and assessment work required in later WelTAG stages to take the option forward. The costs would fall from the start of Stage Three WelTAG up to and including delivery of the scheme. Costs beyond the scheme delivery would relate to ongoing maintenance and monitoring. The maintenance costs are dependent on the number and characteristics of structures. A commentary is provided.

4.2.1 Assumptions

The costing of the options has been developed with the following assumptions:

- The following items have been taken from the average cost of three live projects (based on construction cost value), currently within the realm of Arcadis:
    - Preliminaries at 25%;
    - Detailed Design at 4.5%;
    - Supervision at 2%;
    - Contractors Fee at 9%;
    - Without NRSWA C2 enquiries to identify the statutory undertakers' costs involved we have assumed Statutory Undertakers diversion costs of £1.5m. This is based on our experience of other similar schemes, however, C2 enquiries at a later stage will be required to confirm the actual budget;
    - Based on other projects, Employers Agent fess have been assumed at £1.5m, with an estimated Employers Risk of £2.5m (such risks would include significant requirements for addressing environmental issues such as archaeology or biodiversity); and
    - An allowance of £2m has been placed against the Sycamore Cross Junction Improvements.
- A risk item of 14% has been used to build up the cost for the all alignment options, with an additional amount of £20m added for the potential risk of stilts being required through the flood zone area for the eastern alignment option.
- An Optimism Bias (OB) of 30%, which is averaged between the Stage One and Stage Two from recommendations in TAG Unit 1.27, has also been used. OB is used to allow for additional junctions/accommodation works that may come about as further investigative and survey works are carried out. It is considered that the 30% is still valid due to the unknowns within the projects such as ground data, additional junctions and possible improvements required to existing junctions.

4.2.2 Bill of Quantities Items

[7] https://www.gov.uk/government/publications/webtag-tag-unit-a1-2-scheme-costs-july-2017

The following section describes the assumptions used in the bill of quantities for the scheme cost estimates.

Preliminaries

A percentage of the estimated construction cost of has been used to establish the amount for preliminaries, using the live project rates (as above).

Site Clearance

The site clearance has been determined by the extent of the project with boundaries taken to the extent of earthworks. A hedge has been assumed within each parcel of land that the proposed option intersects with, this has been estimated at 30m in length multiplied by the number of parcels.

The cost of removing properties has been included at a sum of £20k each, this includes for possible asbestos. Further site clearance items have been allowed for and are indicated as items as quantities are unable to be estimated at this stage. For these items, values have been taken from a live project.

Fencing

To determine fencing requirements, it has been assumed that the entire length of both sides of the road will require fencing to separate land. Fencing has been assumed to be a Timber Post and Four Rail Fence in accordance with Highways Construction Detail (HCD) HCD/13.

Steel gates for Accommodation Works have been allowed for where existing parcels of land have been segregated, this has been determined from analysis of the OS data available. Gates would be in accordance with HCD/H19. Where the new highway passes a number of houses and element of 4m high Acoustic Fencing has been allowed for (based on length).

Road Restraint Systems

Safety barrier has been allowed for on both sides of the new carriageway in order to protect cyclists from live running traffic and also protect traffic from embankment areas. It is considered that through further design and the completion of a RRRAP Assessment the length of Road Restraint can be reduced.

Drainage

Carriageway drainage has been assumed as a concrete channel placed in the verge areas, which will drain to gullies then into a carrier drain below. Cut-off drainage via concrete channels has also been allowed for at back of cycleway in cuttings.

Formal drainage outfall points cannot be determined at this stage however, six outfalls have been allowed for with drainage pipes/headwalls etc in the cost estimate.

Earthworks

Earthworks have been determined using the provided data from the Vale of Glamorgan Council which has been input into Civils 3D. From this, using 1 in 3 embankments, the cut and fill has been determined;

Pavements

Pavement calculations have been performed from information obtained within the Five Mile Lane tender which indicates poor ground conditions. Taking this into account the greatest depth of sub-base has been allowed within the construction make up of 450mm with a geotextile membrane. Other elements of the pavement make up are as below:

- Surface Course – 40mm thick;
- Binder Course – 60m thick;
- Base Course – 200mm thick;
- Sub-Base – 450mm thick; and
- Geotextile membrane.

Footway/ Cycleway

The footway/cycleway has been positioned on the same side of the village of Pendoylan on both options, so for the Eastern option, the footway/cycleway will be positioned on the west for direct access form the village, and for the Western option the footway/cycle way will be positioned on the east side. The shared footway/cycleway has been designed at 3.5m wide and allows for no segregation of pedestrians and cyclists. The vertical and horizontal alignment will follow that of the proposed carriageway option, however where junctions need to be negotiated, there will be localised amendments to the alignment. This would be identified during the next stage of the project where junctions have been designed and greater knowledge of the surrounding area is understood. The makeup of the footway/cycleway is assumed to be:

- Surface Course (40mm thick)
- Binder Course (60mm thick)
- Sub-base (100mm thick)

Signage and Road Markings

An estimate has been allowed for the cost of signs and road markings as £130k for both options, which has been based on similar projects. Carriageway centre line and edge of carriageway ribbed lines have been determined based on the length of road considered.

Lighting and Electricity

Lighting has been considered at roundabouts and new junctions only, due to the rural nature of the route.

Lighting of Footway/ Cycleway

LTN 2/04 states *'Pedestrians and cyclists dislike using unlit facilities after dark for personal security reasons, particularly when they are located away from well used routes. On facilities alongside existing carriageways, street lighting may be adequate, but old or sub-standard street lighting may need to be replaced to improve conditions to encourage greater use. New lighting may need to be considered on new facilities away from the carriageway. If lighting cannot be provided or is deemed undesirable, a lit on-road alternative should be signed where available. Issues of light pollution should be considered, particularly in rural areas.*

- *Adequate lighting and sightlines, and the absence of any hiding places close to the route can help to provide a sense of security for pedestrians and cyclists. This is particularly important for isolated facilities'.*
- Taking this statement into account and in accordance with Sustrans Guidance 5m high columns have been chosen for the length of the cycleway at 35m centre and included within the cost makeup for each option. It is recommended that due to the close proximity to the proposed carriageway that a risk assessment be carried out during the next stage to ensure that the lighting doesn't confuse traffic using the bypass.

Ducting

Communication ducting has been allowed for the entire length of new road, with road crossings included where required.

Structures

In order to determine the cost of the structures, the square area costs have been calculated from a live project of a similar type bridge that will be required. This square area cost has then been multiplied by the estimated square area for each bridge. Structures have an assumed headroom clearance of 5.3m above exiting ground level with an estimate of 0.7m on top to allow for the structure construction depth;

Accommodation Works and Statutory Undertakers

A percentage cost for Accommodation Works has been determined from the average of three live projects, due to the current stage of the project we are unable to determine the extent of Statutory Undertakers works required and any accommodation works due to unknown land owner and extents of land owned by others. Therefore, an amount of £1.5m has been allowed for Statutory Undertakers Works with a 3% value of the construction cost allowed for Accommodation Works.

Landscaping and Environmental Works

A percentage cost for Landscaping and Environmental Works has been determined from the average of three live projects, due to the current stage of the project it is difficult to calculate actual costs, therefore it was considered that a percentage allowance of 1.84% would be the best way to inform the cost.

Land Costs

The cost of land has been determined using the estimate included within the Five Mile Lane tender and prorating this estimate in accordance with the length of the alignment options.

4.2.3 Option Cost Summary

Table 15 summarises the key features and costs of each of the two highway options. It can be seen that the eastern alignment is higher in cost which is largely due to the incorporation of the risk of the road requiring stilts for construction on the flood zone areas.

Table 15 Option Cost Summary

Element	East Alignment	West Alignment
Bypass Pendoylan	To the east	To the west
Length of New Bypass	5560m	5691m
Cut and Fill Balance	Disposal of 73,000m3	Import of 97,000m3
Public Right of Way Impacts	3 Bridges 1 Culvert	1 Bridge 3 Culverts
No of Structures	2	4
Length of Floodplain affected	1200m	100m
Construction Cost	£27.954	£27.618m
Total Cost including Stage Three	£81.028m	£58.666m
Maintenance Costs	Potentially higher than western alignment if stilts are required.	Potentially less than the eastern alignment, although if embankment can be used on the eastern alignment, there are more structures to maintain on the western alignment.

4.3 Funding and Accounting Implications

4.3.1 Highway Options

There are no certainties with respect to funding sources for the highway options at present. A funding bid has been submitted by the Vale of Glamorgan Council to Welsh Government to support the Stage Three WelTAG of a preferred option, to take a scheme through to consent. However, whilst no funding is specifically identified for scheme delivery, a connection from the M4 Junction 34 to the A48 is named in the National Transport Finance Plan as updated in December 2017, for expenditure over the next two financial years.

It is assumed that the scheme would be delivered by the Vale of Glamorgan Council with funding support from Welsh Government and potentially from the City Deal. If any public-sector borrowing is undertaken for the project, it is assumed that this would be paid back over time by the local authority. There may be potential for some private contributions from strategic developments via Section 106 agreements, and this would need to be explored.

On-going revenue costs of maintaining the scheme are assumed to be met by the Vale of Glamorgan Council through highways maintenance budgets. The costs of the scheme and ongoing costs are assumed to be captured on the Council's budget accounting procedures, although the source of grant funding would also fall on the grant body (e.g. Welsh Government).

4.3.2 Parkway Station

It is assumed that funding for a parkway station is likely to be required as part of the Metro development, using funding via City Deal/ Transport for Wales/ Welsh Government. There may also be contributions from the Train Operating Company through the franchise arrangements, as well as other private contributions from developers through Section 106 agreements. Ongoing revenue costs (as well as any income from car parking revenue, for example) would typically fall on the Train Operating Company.

4.4 Financial Case Assessment

The financial case is summarised in Table 16, giving an evaluation of each element for each of the options.

Table 16 Financial Case Assessment

Option	Lifetime Costs of the Project		Source of Funding	Accounting Implications	
Eastern Alignment	---	High initial capital costs to deliver a new highway route. Revenue implications are likely to exist throughout the lifetime of the project in terms of maintaining the asset, with the potential to adversely impact on the increasingly stretched local authority revenue budgets.	Local transport fund (capital) Welsh Government (capital and revenue) Local authority funding (capital and revenue) Road safety grant (capital) Cardiff Capital Region City Deal	**Capital**	Welsh Government Local Authority Cardiff Capital Region City Deal
				Revenue	Local Authority
Western Alignment	---	High initial capital costs to deliver a new highway route. Revenue implications are likely to exist throughout the lifetime of the project in terms of maintaining the asset, with the potential to adversely impact on	Local transport fund (capital) Welsh Government (capital and revenue) Local authority	**Capital**	Welsh Government Local Authority Cardiff Capital Region City Deal

Option	Lifetime Costs of the Project		Source of Funding	Accounting Implications	
		the increasingly stretched local authority revenue budgets.	funding (capital and revenue) Road safety grant (capital) Cardiff Capital Region City Deal	**Revenue**	Local Authority
Parkway Station	---	The investment costs would be lower than a highway option but developing a Parkway Station is dependent on the improved highway link, thus the total costs are high. It is anticipated that high costs associated with delivering new rail services could be accommodated by wider regional investment. Revenue implications are likely to exist throughout the lifetime of the project with any increases in services. Capital costs to purchase buses would be at the commencement of the project, but there would be continued revenue costs to maintain the vehicles and purchase replacement vehicles over time. Public and/ or private revenue implications are likely to exist throughout the lifetime of the project.	Network Rail (capital) Welsh Government / Metro (capital and revenue) Local transport fund (capital) Train Operating Company Cardiff Capital Region City Deal Private investment (other than Train Operating Company)	**Capital**	Welsh Government Cardiff Capital Region City Deal Train Operating Company (dependent on franchise arrangements) Private investment (other than Train Operating Company)
				Revenue	Welsh Government
				Revenue	Local Authorities via the Regional Transport Services Grant and Bus Services Support Grant from Welsh Government Welsh Government

5 Commercial Case

5.1 Overview

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

5.2 Procurement Strategy

5.2.1 Full Business Case

A WelTAG Stage Three study would need to be commissioned to progress development of the full business case for the preferred option. The study would need to undertake the relevant environmental and topographical surveys, together with a ground investigation assessment to support progression of the preferred route option. In addition, the business case would need to be refined with further transport modelling to test the final scheme and junction arrangements and provide an update to the cost benefit analysis. A wider economic impact assessment should also be undertaken.

With regard to development of a parkway station, this would require technical feasibility work and economic forecasting as part of the Network Rail GRIP process, and to be in alignment with the rail franchise process by Welsh Government and Transport for Wales.

At this stage it is anticipated that the Vale of Glamorgan would procure the WelTAG Stage Three study via competitive tender or framework, however the proposed procurement strategy is subject to confirmation.

5.2.2 Scheme Implementation

A consultant, contractor or a combination of both would be required to take the project forward through the statutory process, detailed design, construction and post-implementation. The different procurement options available for this stage are as outlined below:

- Early Contractor Involvement (ECI) – Under ECI, the Contractor is appointed under a two-stage Engineering and Construction Contract before the final scheme design has been fully developed and priced. This procurement method has its advantages where the construction of the project is complex.
- Design and Build (D&B) – Under a Design and Build Contract, the Employer employs a consultant under a Professional Services Contract who takes the project through the design and statutory process. A Contractor with Consultant is then procured to carry out the detailed design and construction of the works. This procurement method is more suited to the simpler projects where an ECI contractor wouldn't have much to bring the early stages of the design process.
- Employers Design (ED) – With an Employers Design Contract the Employer employs a consultant under a Professional Services Contract who takes the project through the design, statutory process and into the detailed design process. Once the detailed design is complete a contractor is procured to complete the construction and maintenance works.

It is assumed that funding for a parkway station is likely to be required as part of the Metro development, using funding via City Deal/ Transport for Wales/ Welsh Government. There may also be contributions from the Train Operating Company through the new franchise arrangement (planned to commence from October 2018), as well as other private contributions from developers through Section 106 agreements. Ongoing revenue costs (as well as any income from car parking revenue for example) would typically fall on the Train Operating Company.

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

5.2.3 Contract Type

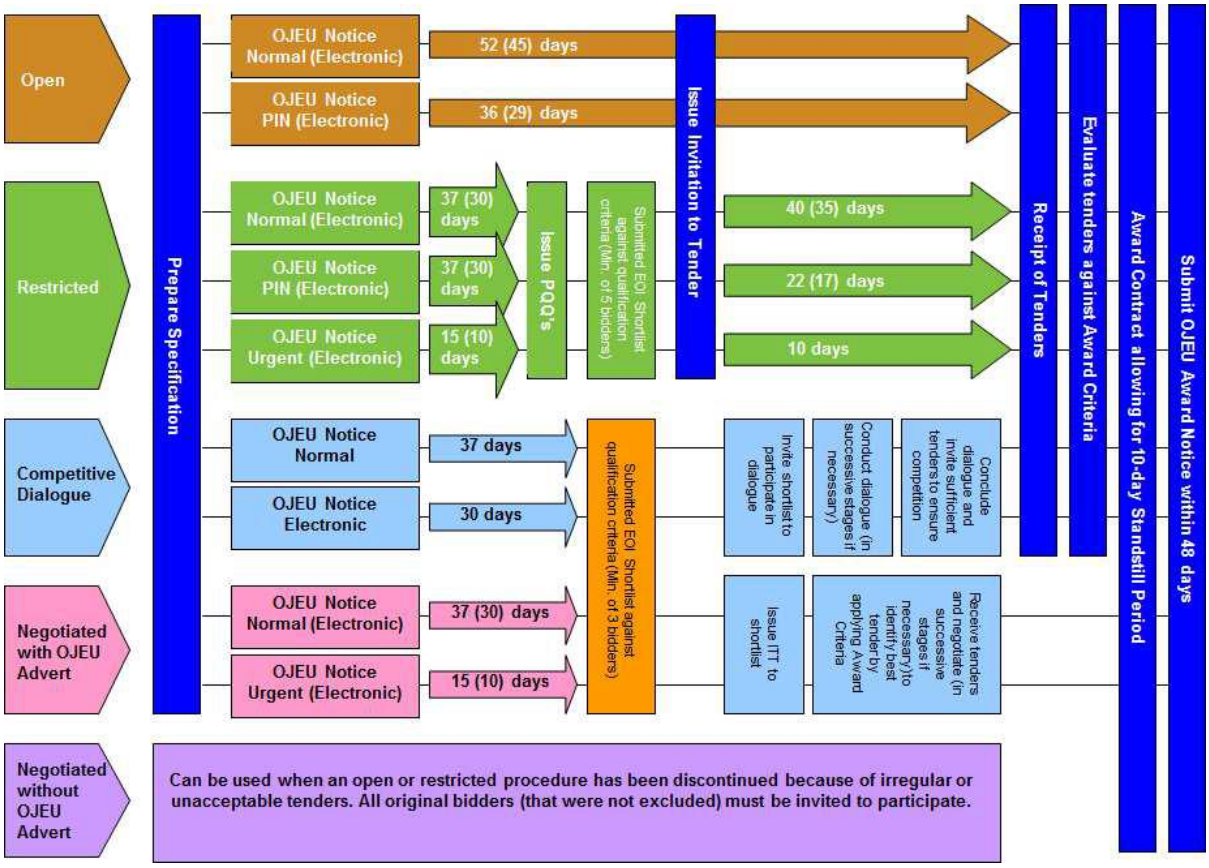
The type of contract is dependent upon which procurement option is chosen. With regard to the above procurement options it would be recommended that one of the options from the NEC is used, ideally a Target Cost option for the construction stage which provides the client and chosen consultant/ contractor with a fair allocation of risk and also allows for a fair pain/ gain result. Due to the nature of the project, it would not be advised to use a bill of quantities option as this has the potential to place the client at risk due to the many unknown quantities.

5.3 Procurement Process

The procurement process should comply with the corresponding UK Public Contract Regulations 2015 and the Welsh Government Key Stage Approval process.

Given the estimated contract value, an OJEU Prior Information Notice (PIN) would need to be published, giving potential bidders notification of the proposed contract. The PIN will detail the scope of works along with the cost estimate of the scheme. The procurement strategy adopted would follow the OJEU Restricted process as set out in Figure 4. This would mean that potential bidders for the work would need to complete and submit a Pre-Qualification Questionnaire (PQQ).

Figure 4 OJEU Process[8]



Bidders who successfully complete the PQQ process would then be invited to tender for the works in accordance with the procurement method, whether an ECI or Employers Design contract. Subject to the outcome of the statutory procedures and the performance of the Contractor, the contract also provides a procedure for the Contractor to undertake the detailed design and construction of the works.

[8] Source: http://www.hacw.nhs.uk/our-services/procurement/ojeu-tenders/

5.4 Suppliers

Within the OJEU Notice, the Employer can stipulate where the consultant/ contractor should operate. In addition to this the Employer can insert additional clauses into the contract which stipulates that the employed contractor/ consultant should use make use of local resources/ materials/ suppliers where possible. A percentage of overall costs may also be inserted into the contract which ensures the employed contractor/ consultant complies with the relevant clauses and uses all local resources/ materials/ suppliers.

5.5 Contract Length

Within the Contract Notice, the duration of the chosen contract is estimated, it is estimated by providing a given an estimated start and end date. In addition, the contract would be structured around key stages, relating to Welsh Government's Transport Division's linear Key Stage Approval process which is used to obtain approval for projects through all stages of design, construction and aftercare. Therefore, it is likely within each key stage within the project, week numbers will be identified which in turn show the overall duration. Depending on the procurement method chosen, the following Key Stages apply:

- Key Stage 3 (KS3) – Preliminary design and preparation of Environmental Statement and draft Orders;
- Key Stage 4 (KS4) – Public Inquiry (if required);
- Key Stage 5 (KS5) – Procure Contractor (this key stage is only used where an Employers Design or Design and Build Contract is utilised, and does not apply to ECI Contracts); and
- Key Stage 6 (KS6) – Detailed Design, Construction and Maintenance (ECI and D&B Stages only, for Employers Design KS6 relates to Construction and Maintenance as Detailed Design is completed during KS4).

5.6 Allocation of Risk

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

5.7 Payment Mechanisms

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

5.8 Whole Life Costs

There would be on-going revenue support required for each of the options, although these are expected to be greatest for the public transport options (but the extent of each is currently unknown). It is however also anticipated that the delivery of a new highway route between the M4 Junction 34 and the A48 would have the potential to adversely impact on existing maintenance budgets which are already under considerable pressure.

6 Management Case

6.1 Overview

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

6.2 Highway Options

6.2.1 Project Plan

How the project is to be delivered is to be determined at the next stage, however the two options available are to Procure an ECI Contractor or to Procure via a Design and Build Contract.

ECI - design and build contract using the NEC Professional Services and Engineering Construction target cost Contracts. These types of contract have been successfully used on a number of schemes including the A40 Penblewin to Slebech Park, A477 St Clears to Red Roses and A465 Heads of the Valley Dualling, Sections 2 and 3.

As mentioned above, which ever procurement method is chosen, the project will need to align with the Welsh Government Approvals Process. The KSA process provides a staged financial approval system to manage the process of projects from inception, through to construction and initial maintenance and complies with the principles of PRINCE2 project management:

- Milestones
- Approvals

6.2.2 Legal Requirements

The Highway scheme would be required to conform to all legal requirements and will be delivered under the Highways Act 1980. Land required for the Scheme will be acquired via the Acquisition of Land Act 1981 via a Compulsory Purchase Order.

Design and construction of the project should g will be undertaken with due consideration of the following key items:

- Construction (Design and Management) Regulations 2015;
- Equality Act 2010;
- Active Travel (Wales) Act 2013;
- The Wellbeing and Future Generations (Wales) Act 2015;
- Wales Act 2017 and Welsh Language Standards (Welsh Ministers, County and County Borough Councils, and National Park Authorities) Regulations 2015; and
- The project should also conform to all EU and UK Environmental Legislation.

6.2.3 Governance

Organisational Structure

Depending on the type of procurement method used for further design and construction, the anticipated core parties involved in the delivery of the project would be:

- The Employer – representing the Vale of Glamorgan.
- The Employer's Agent – acting as the Vale of Glamorgan's representative, providing financial, project management, contract and technical advice throughout the project.

Design and Build Contract

Contractor – commissioned to undertake detailed design, construction and aftercare of the project.

Designers – commissioned 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, and procure the Contractor

ECI Contract (ECI)

ECI Contractor – commissioned to develop the outline design, prepare the necessary statutory orders and EIA documentation, publish draft Orders, progress the project through the statutory process, including Public Inquiry if required and, if successful, then to undertake the detailed design, construction and aftercare of the project.

ECI Contractor's Designers – employed by the ECI Contractor 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, and to complete detailed design.

Employers Design (ED)

Contractor – commissioned to undertake construction and aftercare of the project.

Designers – commissioned 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, Detailed Design and procure the Contractor

6.2.4 Project Reporting

The project would be managed following the principles of the PRINCE2 project management process combined with a compatible web-based project management system. The key stages of the project will form the Stage Boundaries within PRINCE2 and will require Project Board approval.

The project will be led by the Vale of Glamorgan Council as the Employer. The Employer will also include other individuals and departments within the local authority identified by the Project Engineer and Project Director for the delivery of the project.

Interaction with the Employer, unless otherwise agreed, will be made through the Project Director or the Project Engineer as identified within the contract documents (once the procurement route has been determined).

Progress meetings should be held at monthly intervals with the Designer/ Contractor/ Employers Agent and Employer

Quarterly Financial Review meetings should also be utilised to discuss financial matters and to ensure the project stays on track within budget and to agreed timescales.

6.2.5 Communication and Stakeholder Management

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

6.2.6 Monitoring and Evaluation

Some of the Monitoring that would be required to be undertaken during the life of the project are outlined below:

- Environmental aftercare;
- Annual Environmental Performance and Monitoring Report (AEPMR);
- Health and Safety File; and
- Safety audits following completion of design and then construction works.

WelTAG 2017 includes the requirement for a detailed monitoring and evaluation plan to be drawn up in Stage Three. This plan would describe what evidence would be used in the project's evaluation report and

how it will be collected. Evidence is required on the actual inputs used when implementing the scheme and during its on-going operation, what was actually delivered, the impacts experienced, to what extent the intervention met its objectives and how they were achieved.

6.2.7 Risk Management

Risk will be managed on the project in accordance with the procedures set out in the latest version of the Value for Money Manual – Risk Analysis and Management.

A risk workshop should be conducted early in the next stage of the project (WelTAG Stage Three). A Risk Register should then be developed and reviewed and updated (where required) as a minimum every three months throughout the projects life.

6.3 Parkway Station

At this stage of the appraisal it would be assumed that Network Rail would be responsible for the delivery of a parkway station scheme, however this would be subject to confirmation by Welsh Government/ Transport for Wales and would be anticipated to align with the aspirations of the next Wales & Borders franchise (due to start in October 2018) and programme for the south east Wales Metro proposals. The management and delivery of the scheme would likely follow the key stages Network Rail GRIP process encompassing scheme initiation & feasibility, option selection, design development, construction and project close out. The development of a parkway station scheme would subsequently be anticipated to be progressed in close consultation with integral stakeholders as well as through public consultation.

7 Conclusion and Recommendations

The WelTAG Stage Two report has developed and appraised options to address the study objectives and thereby counter the problems identified and contribute to the Well-being Goals of the Future Generations of Wales Act 2015, together with Welsh Government strategies and outcomes.

This represents an outline business case, for which a quantitative assessment of the value for money of the scheme, and further appraisal of the social, environmental, cultural and economic impacts has been undertaken.

Following the appraisal of the three options, it is evident that a strategic link between the M4 Junction 34 and the A48 offers potentially substantial benefits in terms of connectivity and appears to represent value for money. The two highway options vary in terms of cost, with the eastern alignment potentially being costlier as it includes for the risk item of constructing the road on stilts to avoid the floodplain. Both options are relatively similar in terms of impacts, apart from the flooding issues and number of properties affected, based on what is known at this stage.

It is recommended that on the basis of this draft report, feedback from stakeholders and the public is obtained to inform the appraisal. Moreover, given the unknowns particularly relating to archaeology and approach to flooding, there is a need for further technical work on these key aspects as a first part of a Stage Three study in order to gain a fuller understanding of the impacts of the two alignments. We would recommend therefore that both options are initially progressed into Stage Three in order that these impacts can be considered, unless other factors arising through consultation assist in confirming a decision.

As concluded in Stage One, the provision of a parkway station could bring substantial sustainable travel benefits at a regional scale. It would however require the provision of a road link in order to facilitate access to the station from the Vale of Glamorgan, as in the two highways options. Moreover, consideration of a parkway station requires technical feasibility work and economic forecasting as part of the Network Rail GRIP process. It is therefore recommended that separate studies are undertaken to consider the feasibility and impacts of a parkway station in the identified corridor.

Appendix A

The Case for Change: Peter Brett Associates (February 2018)

Appendix B

Highway Option 1 – Eastern Alignment Drawings

Appendix C

Highway Option 2 – Western Alignment Drawings

Appendix D

South East Wales Transport Model Technical Note

Appendix E

Transport Case Impact Assessment Tables

Appendix F

Impact Assessment Worksheets – Highway Option 1 (Eastern Alignment)

Appendix G

Impact Assessment Worksheets – Highway Option 2 (Western Alignment)

Appendix H

Value for Money Assessment

Arcadis Consulting (UK) Limited

Arcadis Cymru House
St Mellons Business Park
Fortran Road
Cardiff
CF3 0EY
United Kingdom

T: +44 (0)29 2079 9275

arcadis.com