

Highway Option 1: Eastern Alignment

	Impacts	Scale
<b>Social</b>		
Physical Activity	<p>It is expected that a new highway route would have a slight beneficial impact on physical activity with the integral provision of segregated walking and cycling infrastructure. It could also improve conditions for walkers and cyclists along the existing corridor including improved interconnectivity between the settlements of Pendoylan and Clawdd Coch and the wider region.</p>	+
Journey Quality	<p>It is anticipated that the implementation of a new highway route would establish improvements in journey quality in comparison to the do-minimum scenario, with enhancements to traveller's care, views and stress. The broadly qualitative assessment completed using DMRB 11.3.9.2 (travellers' views) and 11.3.9.3/4 (traveller stress) has subsequently been considered alongside traveller care elements noted within TAG Unit A4.1.6 (Journey Quality Impacts) to establish an overall assessment score of moderate beneficial.</p> <p>The study area between the M4 Junction 34 and the A48 at Sycamore Cross is predominantly an area of high quality scenic countryside interspersed with ancient woodland, important nature conservation sites, SSSI and conservation areas. The existing highway route interconnecting via Pendoylan is primarily bounded by tall hedgerow with restrictive views of the surrounding landscape. In contrast, the new route would afford more people/ drivers to see the surrounding scenery. Whilst views would in part be intermittent with the route traversing through cuttings, this is unlikely to adversely detract from a traveller's perception of the scene with the impacts on views broadly comparable between the east and west alignment.</p> <p>In addition, it is anticipated that there would be an improvement with regard to traveller stress following implementation of a new road. In line with DMRB 11.3.9.3/4, a range of factors can affect a traveller's exposure to driver stress primarily encompassing frustration, fear of potential accidents, and uncertainty relating to the route being followed. The existing Pendoylan corridor, especially the route section between the village and the A48 Sycamore Cross junction is subsequently characterised by an undulating and narrow sub-standard highway with limited passing places and subsequent potential for vehicle conflict and moderate to high traveller stress.</p> <p>In addition to route characteristics, the DMRB assessment also considers the impact of traffic volume on driver stress categorising the average peak hourly flow per lane (in flow units/ 1 hour) for a 60mph single-carriageway road as low (&lt;600 vehicles), moderate (600-800 vehicles) and high (over 800 vehicles). Implementation of the link road designed to current DMRB standards could subsequently establish high levels of driver stress during the AM and PM peak with maximum forecast peak hourly flows per lane of 1,234 and 1,200 vehicles respectively, both in relation to the northbound direction of flow. The guidance does however note that the advised thresholds are provided for guidance only and that the assessment of specific routes can only be made in the light of full knowledge of local conditions. It is therefore anticipated that the forecast level of traffic flow for the road link would be offset by the superior design standards to which the new scheme would be built with perceived improvements to driver frustration, route uncertainty and fear of potential accidents establishing a low to moderate level of stress in comparison to the existing route. Views out from the road can also provide interest which can further be considered to help alleviate driver stress.</p> <p>Traveller care is less influential with regard to the proposed highway scheme with cleanliness, facilities and information factors considered to retain a neutral impact against the do-minimum scenario. Improvements would however be identified with regard to the traveller's environment with enhanced driver capability anticipated as a</p>	+++

## Highway Option 1: Eastern Alignment

	<p>result of a new and improved route, as well as potential to establish an improved condition and smoothness of ride.</p> <p>The implementation of the new highway route would provide further benefits to walkers and cyclists through enhanced infrastructure provision and interconnectivity. Implementation of an integral shared walking/ cycling route would provide improved traveller care (information, environment), views (similar benefits to those noted for the highways review), and stress with perceived reductions in frustration, fear of potential accidents and route uncertainty. Whilst no new public transport infrastructure or services are specifically proposed as part of this option, the highway route would facilitate more attractive journeys for buses with similar highway benefits as noted herewith.</p> <p>In line with TAG Unit A4.1.6, a high rating has subsequently been applied to the scoring as the number of travellers affected is forecast to be in excess of 10,000 per day.</p>	
Accidents	<p>The provision of a new highway route by-passing Pendoylan is anticipated to reduce traffic flow and with the potential to improve road safety conditions along the existing Pendoylan corridor.</p> <p>In addition, provision of a new highway route to current DMRB highway standards also affords the likelihood of minimising accidents together with the opportunity to integrate segregated sustainable travel measures as part of the integral design.</p> <p>The reduction in traffic flows on the strategic network due to the new link will give rise to accident benefits. The analysis forecasts that the scheme will reduce 446 accidents, which is a significant reduction and represents a 9% reduction compared to the do minimum.</p>	++
Security	<p>A review of security has been completed in line with TAG Unit A4.1.4 (Security Impacts) to assess the implementation of the route alignment. In summary, a slight beneficial impact is considered reasonable given the new road will be DMRB compliant with improvements to several factors including lighting and visibility, landscaping, informal surveillance and site perimeters.</p> <p>Due to the rural nature of the proposed route, new highway lighting for the benefit of vehicles has only been considered at new junctions. This will be implemented to current standards to enhance upon existing provision. In addition, and in accordance with Sustrans guidance, 5m high lighting columns have been chosen for the length of the cycleway at 35m intervals and included within the cost makeup for the option. It is however 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 adversely affect traffic using the bypass.</p> <p>There are also considered to be slight improvements to the site perimeter, landscaping and natural surveillance. The existing route predominantly consists of narrow lanes with tall hedgerow on both sides of the carriageway adversely impacting on visibility. For the new road it has been assumed that the entire length of both sides of the road will require fencing to separate land with provision of Timber Post and Four Rail Fence in accordance with Highways Construction Detail (HCD) HCD/13. Where the bypass passes a number of houses, 4m high Acoustic Fencing has also been allowed for (based on length). In the long term the establishment of hedgerow would be anticipated, however this is likely to be managed so as to maintain suitable safety and security for users of the proposed route including pedestrians and cyclists.</p> <p>It is also noted within the TAG Unit A4.1 guidance that improved natural visibility out from the road subsequently has the potential to provide an enhanced perception of safety and security in comparison to the existing route corridor with its significant visibility constraints.</p>	+

## Highway Option 1: Eastern Alignment

Access to Employment	<p>The traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £36M for commuters and £52M for business. This indicates that the new strategic highway route would afford significant benefits for access to work and for businesses in the region. This would include accessibility to strategic sites in the region including the three sites identified as the Cardiff Airport to St Athan Enterprise Zone (EZ) encompassing Cardiff Airport, St Athan Aerospace Business Park and Gateway Development Zone, as well as employment sites at M4 Junction 34 and 'sub-regional' employment opportunities particularly along the A4119 corridor, at the Mwyndy/ Talbot Green strategic site, and the Llanilid strategic opportunity corridor, by providing a new link with reduced journey times and improved journey time reliability.</p> <p>As highlighted within the Welsh Government PBA report, '<i>Vale of Glamorgan Connectivity Study – The Case for Change (2017)</i>', the proposed commercial developments at the Cardiff Airport to St Athan EZ represent an investment of strategic significance in the Vale of Glamorgan with the Vale of Glamorgan Local Development Plan identifying the need for transport connectivity improvements if the potential of these strategic sites is to be maximised. Furthermore, the report identifies that '<i>facilitating the travel-to-work market, business-to-business interactions and freight movements will require a transport network which facilitates efficient movement to, from and within the Vale of Glamorgan</i>' for which the proposed route option could establish significant value.</p> <p>Improved highway conditions are anticipated to promote the development of more sustainable transport modes for access to employment. In particular it would enable bus services to be enhanced between the A4119 corridor and employment sites in the Vale by providing a suitable highway connection. The Welsh Government PBA report referenced herewith subsequently concludes that '<i>improving the transport connectivity of the Vale of Glamorgan is considered necessary to support national, regional and local economic performance.</i>'</p>	++
Access to Services	<p>The traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £49.8M for other consumers than commuters or business. This indicates that the new strategic highway route could afford significant benefits for access to services in the region. It is therefore considered that a new strategic highway link with reduced journey times and improved journey time reliability would afford significant potential to improve accessibility to services and facilities including strategically to and from the A4119/ Rhondda Valleys and the Vale/ Barry area, and locally for residents within the study area.</p> <p>The Welsh Government PBA report, '<i>Vale of Glamorgan Connectivity Study – The Case for Change (2017)</i>' notes that '<i>there is a significant population base within the Vale of Glamorgan and surrounding areas which would be well placed to access the development opportunities emerging in that area. However, relatively poor north-south connectivity to / from the Vale of Glamorgan is seen by consultees to act as a factor constraining growth (both now and in the future), particularly for those without access to a car.</i>'</p> <p>In addition to the benefits that would be assumed for vehicles travelling along this route, improved highway conditions would also be anticipated to improve the conditions for sustainable transport modes for access to services.</p>	++
Affordability	<p>The potential to divert trips from the car to public transport as a result of likely improved journey time and journey time reliability for buses is mitigated by the potential for the option to retain the car as the dominant mode of travel in the region. A neutral impact is envisaged.</p>	0

**Highway Option 1: Eastern Alignment**

<p>Severance</p>	<p>A new route by-passing Pendoylan and Clawdd Coch is anticipated to reduce traffic flow through the small settlements with the potential to lessen the impact of severance. In line with TAG Unit A4.1.5 (Severance Impacts) a slight positive impact is anticipated with less than 200 local residents estimated to benefit from any reductions in traffic flow.</p> <p>There are a number of public rights of way affecting the proposed route alignment. It is anticipated that crossings will however be rationalised by public right of way re-alignment and provision of crossing points under/ over the proposed bypass to maintain existing connectivity. Culverts have been proposed where public rights of way cross the proposed bypass at in-fill sections, and where it crosses through cut sections 3m wide bridges have been assumed.</p> <p>It is not anticipated that the new route will lead to severance issues as existing routes and connections are to be retained, with the new road on bridges over the existing routes.</p> <p>In addition, DMRB 11.3.8 provides guidance on the relief of severance using proportional improvement to traffic flows. Given that relief of severance is not considered significant where traffic flows are already relatively low, the guidance does not apply to roads with an existing AADT flow of less than 8,000 vehicles. The guidance does however acknowledge that a review of any severance relief that can be gained needs to be seen in the context of the size of the community affected noting low to moderate decreases in traffic flow are likely to be more significant for small communities in comparison to larger urban areas.</p>	<p style="text-align: center;">+</p>
<p>Option and Non-Use Values</p>	<p>In line with TAG Unit A4.1.7, 'Option and non-use values should be assessed if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).'</p> <p>Whilst the option does not therefore retain specific measures to enhance public transport, a new strategic highway route affords significant potential to establish robust journey times and journey time reliability. These improved highway conditions are anticipated to assist the development of more sustainable transport modes, although at the same time facilitating car use. The implementation of integral walking and cycling infrastructure also affords some opportunity for alternate modes of travel away from use of the private car. A score of slight beneficial is therefore considered reasonable within the context of the proposed option.</p>	<p style="text-align: center;">+</p>
<p><b>Cultural</b></p>		
<p>Cultural Facilities</p>	<p>The proposed road link may have a minor negative impact on the Cottrell Park Golf Course where the road would require widening, as well as changes to access to the Hensol Golf Driving Range and the Vale Resort. However, access to all facilities will be accommodated. More strategically, there will be improved connectivity between the M4 and A4119 corridors and the cultural attractions of the coast, including Barry Island, Porthkerry Country Park and the beaches. Overall a slight positive impact on cultural facilities is anticipated.</p>	<p style="text-align: center;">+</p>
<p>Welsh Language</p>	<p>The Vale of Glamorgan Council stated in the Local Development Plan that '<i>having assessed the densities of Welsh language use across the Vale of Glamorgan it is not considered to be an issue which requires addressing in the Plan. As a result, the proposals contained in the LDP are not considered to have a detrimental impact upon the Welsh language and culture or materially affect the linguistic balance of the Vale of Glamorgan or the communities within the Vale of Glamorgan.</i>' Subsequently, it is considered there would be no impacts on the Welsh language from the highway option.</p>	<p style="text-align: center;">0</p>

Highway Option 1: Eastern Alignment

Environmental		
Noise	<p>This review is not yet quantifiable in the absence of quantitative data, but a minor adverse impact is considered reasonable to assume whilst also noting the impacts from short-term construction noise associated with the new route.</p> <p>The results acquired from the SEWTM for a new DMRB compliant road indicate peak AM and PM two-way traffic flows of 2026 and 1972 respectively which would establish increased noise pollution in the study area. In most cases mitigation measures should be available to alleviate any associated short and long-term noise pollution, but this would need to be considered against the potential to establish adverse landscape impacts (e.g. implementation of noise bunds).</p> <p>The eastern alignment passes to the east of Clawdd Coch, whereas the current alignment passes through Clawdd Coch. The new route would reduce traffic noise at most properties in Clawdd Coch, but would increase traffic noise at the residential property to the East of Clawdd Coch.</p> <p>The East alignment passes Pendoylan immediately east of the filter beds and approximately 160m from the closest residential properties. The alignment would carry traffic away from Pendoylan and would expect to present an overall benefit to more properties than would experience an increase in noise as a result of the new alignment.</p> <p>To the south of Pendoylan the East alignment would result in an increase in noise at Ffynnon-deilo and Pendoylan Nursery. The area is however rural in nature with a number of isolated residential dwellings and the number of affected residential properties is expected to be low.</p> <p>The traffic noise impacts would however need to be modelled in accordance with DMRB to quantify the noise impacts and consider the detailed propagation path for both alignments. This would allow for a detailed comparison of the proposed alignments against the existing road layout (do-minimum) and quantify the number of properties that are adversely affected by both road alignments and the number of properties that benefit from the respective alignments.</p>	
Air Quality	<p>Based upon the 2016 Air Quality Progress Report for the Vale of Glamorgan, the overall air quality across the county complies with regulations to protect human health<sup>1</sup>. Data from the 2012 Air Quality Progress Report highlighted that at some locations road traffic emissions of Nitrogen Dioxide (NO<sub>2</sub>) were at, or close to, the relevant annual average concentration of 40 ug/m<sup>3</sup>. These were recorded at Culverhouse Cross (Vale of Glamorgan, 2013) within the strategic network of interest to this study.</p> <p>Implementation of a new highway route has the potential to improve local air quality through Pendoylan village with a reduction in local traffic flows forecast, plus the potential for existing car trips to divert to public transport as a result of improved journey times and journey time reliability. It could also have the effect of reducing congestion and air quality issues at Culverhouse Cross by diverting traffic onto the new link.</p> <p>In contrast, a new proposed alignment is forecast to significantly increase traffic flows through the Pendoylan corridor with the potential to establish adverse air quality in the vicinity of a new link. The potential for adverse air quality is most likely to occur at the key junctions north and south of the proposed route.</p> <p>The impact of construction on managing air quality/ dust as well as vibration impacts would also need to be considered.</p>	

<sup>1</sup> Vale of Glamorgan Council Air Quality Progress Report 2016

## Highway Option 1: Eastern Alignment

Greenhouse Gases	The change in greenhouse gas emissions with the road link compared to the do minimum has been calculated as an output of the traffic modelling. This gives a benefit valued at £1.1M. The reduction in emissions will be based on the reduced overall journey distances.	+
Landscape	The Eastern option of elevated road infrastructure will degrade the landscape character in the Ely River Valley, impact on long distance views and the night time setting. The new highway route will reduce tranquillity, traffic will increase, farmland will be lost and previously unlit landscape will be lit and long distance views will be interrupted. Impacts can be mitigated through landscape design along route, retention or planting of new hedges and design of elevated road sympathetic to local landscape character. Moreover, good landscape design is needed to mitigate lighting impacts at night.	-
Townscape	<p>An alignment to the east of Pendoylan and Clawdd Coch could lead to a reduction in townscape impacts compared to the existing traffic flows. However, there may be other visual impacts on townscape in terms of setting of the communities. Due to the rural nature of the area, the impact on townscape is not assessed as being significant. There may be some opportunities to reduce any slight adverse effects around key areas (i.e. Pendoylan) through detailed design and landscaping.</p> <p>A reduction traffic flow through Pendoylan village would have a beneficial impact on the setting of the village as traffic would be taken away from the rural settlement. Should there be inter-visibility of the alignment from Pendoylan this could establish a slight adverse impact to the setting of the townscape however design measures could help alleviate this impact.</p>	0
Historic Environment	<p>The baseline assessment has completed a thorough analysis of known environmental and land-use characteristics for the study area. This has identified a number of sites of historic interest including scheduled monuments, listed buildings, archaeological sites and registered parks and gardens.</p> <p>The closest listed building is located approximately 300m west from the eastern alignment, there are to be no direct impacts to any listed buildings or their setting as a result of the alignment.</p> <p>The closest scheduled monument is located approximately 550m west of the eastern alignment, there are anticipated to be no direct impacts to the scheduled monument or its setting as a result of the alignment. Hensol Castle Parks and Gardens is located approximately 400m west of the eastern alignment, it is anticipated that there will be no direct impacts to Hensol Castle Park and Garden or to its setting.</p> <p>The Llancarfan Historical Landscape is located south of the A48 at Bonvilston. The historical landscape designated area is located approximately 550m west of the eastern alignment. It is anticipated that there will be no direct impacts to the Historical Landscape as a result of the development.</p> <p>The eastern alignment is located approximately 180m east of the Pendoylan Conservation Area. It is anticipated that there would be a reduction in traffic through the Pendoylan Conservation Area which would likely have a beneficial impact to its setting.</p> <p>However, the eastern alignment may have a negative impact on the setting of the Pendoylan Conservation Area, which would depend upon inter visibility. The Bonvilston Conservation Area located approximately 50m west of the eastern alignment is unlikely to be affected as the alignment would be utilising the existing Pendoylan Corridor road, north of the A48.</p> <p>The eastern alignment does not cross any 'known' archaeological features. The closest archaeological feature is located approximately 80m west of the eastern</p>	-

Highway Option 1: Eastern Alignment

	<p>alignment at Maes' yr haul (730m south east of Pendoylan). Although the alignment avoids any 'known' archaeological features, given the area having numerous archaeological features, it can be assumed that there may be many 'unknown features' in the area which may be impacted by the development.</p> <p>It is anticipated that there is potential for the eastern alignment to have a minor adverse impact on the historic environment, given that there is lack of features within close proximity to the route, however, there is potential for 'unknown' features (i.e. historical environmental records) to be within the area with the requirement for mitigation to alleviate adverse impacts.</p>	
<p>Bio-Diversity</p>	<p>It is anticipated that the route could have an adverse impact on bio-diversity with the development of offline route sections through existing agricultural land, as well as the impact on existing hedgerow for the completion of online improvements.</p> <p>Ely Valley SSSI is at the northern-most point of the scheme, four SINCs and four areas of ancient woodland are crossed by the route. Priority habitats are also present along the route and there is potential for a variety of protected and priority species to be present and to be affected by the proposals.</p> <p>It is anticipated at this stage that the majority of impacts can be mitigated for through standard techniques in accordance with the relevant best practice guidelines. Overall the route is considered to have up to a moderate adverse impact on biodiversity due to the loss and damage of ancient woodland. No Tree Preservation Orders are to be affected by the eastern alignment.</p>	
<p>Water Environment</p>	<p>Sections of the route potentially cross the floodplain in three locations. The floodplain is associated with the Ely River and the floodplain is undefended, NRW flood maps shows that flood risk is high to moderate in the areas where the alignment potentially interacts with the floodplain.</p> <p>Potential effects include for the loss of floodplain storage volume and impediment of floodplain flow paths. To mitigate the effects there may be the need to provide compensation storage and culverts through embankments to maintain continuity of flow conveyance. Any new crossings of smaller watercourses also has the potential to impact flood risk, careful design of crossings should avoid impacts/mitigate risks.</p> <p>In terms of water quality, the Ely and its tributaries are WFD waterbodies and the reach in the study area in the second cycle achieved status of Bad ecological status and Fail with regard to chemical quality. The WFD groundwater body underlying the route is the South East Valleys Southern Devonian Old Red Sandstone and Triassic Mercia Mudstone. This waterbody achieves Good status in terms of both groundwater quality and quantity.</p> <p>With regards to aquifers, there are no groundwater Source Protection Zones along the alignment or in proximity to it. Potential for effects is likely to be relatively limited, there would be some scope for impacts if the new highway was drained to ground via soakaways (rather than discharges to watercourses), or if there were sections in cut (which may trigger the need for groundwater control measures e.g. dewatering).</p>	
<p>Residential Amenity</p>	<p>The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. The combined assessment from the above indicates that the properties in the communities of Clawdd Coch and Pendoylan will largely benefit from reductions in traffic through the village.</p> <p>A small number of properties will experience adverse impacts due to proximity of the eastern alignment, giving a minor adverse impact: property to the east of Clawdd Coch and to the south of Pendoylan, Ffynnon-deilo and Pendoylan Nursery. There may be impacts of visual intrusion based on longer distance views to the east of Pendoylan.</p>	

Highway Option 1: Eastern Alignment		
Economic		
Journey Time Changes	<p>The level of journey time savings to users' totals £132M through the provision of a link, as forecast using the traffic model, which represents a substantial beneficial improvement.</p> <p>The implementation of a new highway route designed to current DMRB standards would be anticipated to result in measurable improvements in journey times with increased average speeds between M4 Junction 34 and A48, together with integral junction improvements at the key junctions interconnecting with the highway route. For strategic journeys, the route would offer an alternative for travelling between the Vale/ Barry area and the Rhondda Valleys, and from west of M4 Junction 34, thus reducing journey times on the strategic network. There is also the potential, if active travel measures are delivered, that additional benefits to walkers and cyclists through enhanced infrastructure provision.</p>	+++
Journey Time Reliability Changes	<p>It is anticipated that the implementation of a new highway route designed to current DMRB standards could establish measurable improvements in journey time reliability. At this stage, a full assessment has not been undertaken, but the reduction in traffic flows on the strategic network together with the provision of a new link between the M4 J34 and the A48 which is to standard, would be expected to increase reliability compared to the do minimum.</p>	++
Transport Costs	<p>Transport costs for road users are anticipated to reduce compared to the do minimum, reflecting the journey time savings. With regards to public transport operating costs, existing bus services would be anticipated to benefit from reduced traffic through Pendoylan and the opportunity to use the new route of good standard. It is therefore anticipated that delivery of a new road link and associated junction improvements would reduce the transport costs compared to the do-minimum option.</p>	+
Accidents	<p>The traffic forecasting has enabled a calculation of accident benefits using the DfT software COBALT.</p> <p>The impacted links were identified by finding the change in AADT (Annual Average Daily Flows) as a result of the scheme and using the standard criteria of finding the links where the change in flows is 5% or more with a flow change of +/- 500 AADT for 2036. The accident benefit assessment has been undertaken for the impacted links only instead of a cordon area. These links are shown in Figure 2-3 in the economic appraisal note in <a href="#">Appendix H</a> of the Outline Business Case report.</p> <p>The results show positive scheme benefits with a reduction in accident cost of £16.6m, over the 60-year period in 2010 prices. The analysis also shows that the scheme will reduce 446 accidents, which is a significant reduction of 9% compared to the do minimum.</p>	++
Wider Economic Impacts	<p>It is anticipated that there would be additional wider economic impacts associated with the option. This may include induced investment through additional strategic development arising due to improved connectivity to the EZ (existing connections are constraining growth). Moreover, there may be benefits to those larger commercial businesses (such as the airport and Aston Martin) through transport improvements where competitive markets are imperfect. In this case, it will assist by providing an improved level of connectivity for the airport and businesses.</p> <p>There may also be beneficial labour supply impacts by improving connectivity between the employment sites and population centres, notably assisting access to employment from the Rhondda Valleys to the EZ. 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</p>	++



## Highway Option 1: Eastern Alignment

	<p>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 also compounded by comparatively poor business-to-business accessibility.</p> <p>Moreover, the accessibility analysis undertaken (as contained in the report in <a href="#">Appendix A</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.</p> <p>The improvement in accessibility may also bring a relocation of more productive jobs to the area. As the proposed link forms a connection between functioning parts of the Capital Region, there may also be productivity impacts due to agglomeration benefits for the Vale of Glamorgan in terms of linking in developments in the area to similar businesses/ clusters in the region.</p> <p>Moreover, productivity in the Cardiff Capital Region is very low compared to other UK City Regions, so improving connectivity to the Vale of Glamorgan may form part of a package of measures to address this (and in part addressing the issue of a lack of appropriate industrial premises).</p>	
<p>Land and Property</p>	<p>Implementation of a new offline highway route will require significant areas of land predominantly in agricultural use to deliver a new highway route, in addition to land adjacent to existing routes to facilitate the online highway improvements. The exact extent and potential costs are unknown at this stage and would require further exploration, however a cost allowance has been included, as identified in the Financial Case.</p> <p>The option is anticipated to have the following impacts on residential and business properties:</p> <ul style="list-style-type: none"> <li>• Number of buildings directly impacted by alignment = 2 (pair of semi-detached houses to south of junction to Hensol)</li> <li>• Number of buildings with potential with some land take = 4 (farm/ industrial building to rear of Heol St Cattwg, farm buildings to north of Pendoylan Nursery, Pendoylan Nursery and agricultural sheds on Cottrell Golf Course)</li> <li>• Number of residential properties with potential impacts by virtue of proximity = 1 (house on east side of Clawdd Coch)</li> </ul> <p>It should be noted that at this stage, information on land holdings impacted is not known. Impacts are assessed as moderate given the relatively low number of properties impacted for a scheme of this length.</p>	
<p>Capital Costs</p>	<p>The delivery of a new highway route would require a high capital investment from the public sector. The cost estimate, in undiscounted 2017 market prices, is £81.028M.</p>	
<p>Revenue Costs</p>	<p>The highway would continue to require maintenance support from the public sector and it is envisaged that the scheme would result in additional pressure on increasingly stretched highway maintenance budgets. Given the potential need for stilts to raise the road above the flood plain, the ongoing costs of the option may be moderate.</p>	

## Highway Option 2 – Western Alignment

	Impacts	Scale
<b>Social</b>		
Physical Activity	<p>It is expected that a new highway route would have a slight beneficial impact on physical activity with the integral provision of segregated walking and cycling infrastructure. It could also improve conditions for walkers and cyclists along the existing corridor including improved interconnectivity between the settlements of Pendoylan/ Clawdd Coch and the wider region.</p>	+
Journey Quality	<p>It is anticipated that the implementation of a new highway route would establish improvements in journey quality in comparison to the do-minimum scenario, with enhancements to traveller's care, views and stress. The broadly qualitative assessment completed using DMRB 11.3.9.2 (travellers' views) and 11.3.9.3/4 (traveller stress) has subsequently been considered alongside traveller care elements noted within TAG Unit A4.1.6 (Journey Quality Impacts) to establish an overall assessment score of moderate beneficial.</p> <p>The study area between the M4 Junction 34 and the A48 at Sycamore Cross is predominantly an area of high quality scenic countryside interspersed with ancient woodland, important nature conservation sites, SSSI and conservation areas. The existing highway route interconnecting via Pendoylan is primarily bounded by tall hedgerow with restrictive views of the surrounding landscape. In contrast, the new route would afford more people/ drivers to see the surrounding scenery. Whilst views would in part be intermittent with the route traversing through cuttings, this is unlikely to adversely detract from a traveller's perception of the scene with the impacts on views broadly comparable between the east and west alignment.</p> <p>In addition, it is anticipated that there would be an improvement with regard to traveller stress following implementation of a new road. In line with DMRB 11.3.9.3/4, a range of factors can affect a traveller's exposure to driver stress primarily encompassing frustration, fear of potential accidents, and uncertainty relating to the route being followed. The existing Pendoylan corridor, especially the route section between the village and the A48 Sycamore Cross junction is subsequently characterised by an undulating and narrow sub-standard highway with limited passing places and subsequent potential for vehicle conflict and high traveller stress.</p> <p>In addition to route characteristics, the DMRB assessment also considers the impact of traffic volume on driver stress categorising the average peak hourly flow per lane (in flow units/ 1 hour) for a 60mph single-carriageway road as low (&lt;600 vehicles), moderate (600-800 vehicles) and high (over 800 vehicles). Implementation of the link road designed to current DMRB standards could subsequently establish high levels of driver stress during the AM and PM peak with maximum forecast peak hourly flows per lane of 1,234 and 1,200 vehicles respectively, both in relation to the northbound direction of flow. The guidance does however note that the advised thresholds are provided for guidance only and that the assessment of specific routes can only be made in the light of full knowledge of local conditions. It is therefore anticipated that the forecast level of traffic flow for the road link would be offset by the superior design standards to which the new scheme would be built with perceived improvements to driver frustration, route uncertainty and fear of potential accidents establishing a low to moderate level of stress in comparison to</p>	+++

## Highway Option 2 – Western Alignment

	<p>the existing route. Views out from the road can also provide interest which can further be considered to help alleviate driver stress.</p> <p>Traveller care is less influential with regard to the proposed highway scheme with cleanliness, facilities and information factors considered to retain a neutral impact against the do-minimum scenario. Improvements would however be identified with regard to the traveller's environment with enhanced driver capability anticipated as a result of a new and improved route, as well as potential to establish an improved condition and smoothness of ride.</p> <p>The implementation of the new highway route would provide further benefits to walkers and cyclists through enhanced infrastructure provision and interconnectivity. Implementation of an integral shared walking/ cycling route would provide improved traveller care (information, environment), views (similar benefits to those noted for the highways review), and stress with perceived reductions in frustration, fear of potential accidents and route uncertainty. Whilst no new public transport infrastructure or services are specifically proposed as part of this option, the highway route would facilitate more attractive journeys for buses with similar highway benefits as noted herewith.</p> <p>In line with TAG Unit A4.1.6, a high rating has subsequently been applied to the scoring as the number of travellers affected is forecast to be in excess of 10,000 per day.</p>	
Accidents	<p>The provision of a new highway route by-passing Pendoylan has the potential to reduce traffic flow and improve road safety conditions along the existing Pendoylan corridor.</p> <p>In addition, provision of a new highway route to current DMRB highway standards also affords the likelihood of minimising accidents together with the opportunity to integrate segregated sustainable travel measures as part of the integral design.</p> <p>The reduction in traffic flows on the strategic network due to the new link will give rise to accident benefits. The analysis forecasts that the scheme will reduce 446 accidents, which is a significant reduction and represents a 9% reduction compared to the do minimum.</p>	++
Security	<p>A review of security has been completed in line with TAG Unit A4.1.4 (Security Impacts) to assess the implementation of the route alignment. In summary, a slight beneficial impact is considered reasonable given the new road will be DMRB compliant with improvements to several factors including lighting and visibility, landscaping, informal surveillance and site perimeters.</p> <p>Due to the rural nature of the proposed route, new highway lighting for the benefit of vehicles has only been considered at roundabouts and new junctions. This will be implemented to current standards to enhance upon existing provision. In addition, and in accordance with Sustrans guidance, 5m high lighting columns have been chosen for the length of the cycleway at 35m intervals and included within the cost make-up for the option. It is however 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 adversely affect traffic using the bypass.</p> <p>There are also considered to be slight improvements to the site perimeter, landscaping and natural surveillance. The existing route predominantly consists of narrow lanes with tall hedgerow on both sides</p>	+

Highway Option 2 – Western Alignment

	<p>of the carriageway adversely impacting on visibility. For the new road it has been assumed that the entire length of both sides of the road will require fencing to separate land with provision of Timber Post and Four Rail Fence in accordance with Highways Construction Detail (HCD) HCD/13. Where the bypass passes a number of houses, 4m high Acoustic Fencing has also been allowed for (based on length). In the long term the establishment of hedgerow would be anticipated, however this is likely to be managed so as to maintain suitable safety and security for users of the proposed route including pedestrians and cyclists.</p> <p>It is also noted within the TAG Unit A4.1 guidance that improved natural visibility out from the road subsequently has the potential to provide an enhanced perception of safety and security in comparison to the existing route corridor with its significant visibility constraints.</p>	
<p>Access to Employment</p>	<p>The traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £36M for commuters and £52M for business. This indicates that the new strategic highway route would afford significant benefits for access to work and for businesses in the region. This would include accessibility to strategic sites in the region including the three sites identified as the Cardiff Airport to St Athan EZ encompassing Cardiff Airport, St Athan Aerospace Business Park and Gateway Development Zone, as well as employment sites at M4 Junction 34 and 'sub-regional' employment opportunities particularly along the A4119 corridor, at the Mwyndy/ Talbot Green strategic site, and the Llanilid strategic opportunity corridor, by providing a new link with reduced journey times and improved journey time reliability.</p> <p>As highlighted within the Welsh Government PBA report, '<i>Vale of Glamorgan Connectivity Study – The Case for Change (2017)</i>', the proposed commercial developments at the Cardiff Airport to St Athan EZ represent an investment of strategic significance in the Vale of Glamorgan with the Vale of Glamorgan Local Development Plan identifying the need for transport connectivity improvements if the potential of these strategic sites is to be maximised. Furthermore, the report identifies that '<i>facilitating the travel-to-work market, business-to-business interactions and freight movements will require a transport network which facilitates efficient movement to, from and within the Vale of Glamorgan</i>' for which the proposed route option could establish significant value.</p> <p>Improved highway conditions are anticipated to promote the development of more sustainable transport modes for access to employment. In particular it would enable bus services to be enhanced between the A4119 corridor and employment sites in the Vale by providing a suitable highway connection. The Welsh Government PBA report referenced herewith subsequently concludes that '<i>improving the transport connectivity of the Vale of Glamorgan is considered necessary to support national, regional and local economic performance.</i>'</p>	<p>++</p>
<p>Access to Services</p>	<p>The traffic modelling completed to assess the route option has quantified user and provider benefits (£000's PVB 2010 prices discounted to 2010) for the new link totalling £49.8M for other consumers than commuters or business. This indicates that the new strategic highway route could afford significant benefits for access to services in the region. It is therefore considered that a new strategic highway link with reduced journey times and improved journey time reliability would afford significant potential to improve accessibility to services and facilities including strategically to</p>	<p>++</p>

Highway Option 2 – Western Alignment

	<p>and from the A4119/ Rhondda Valleys and the Vale/ Barry area, and locally for residents within the study area.</p> <p>The Welsh Government PBA report, ‘Vale of Glamorgan Connectivity Study – The Case for Change (2017)’ notes that <i>‘there is a significant population base within the Vale of Glamorgan and surrounding areas which would be well placed to access the development opportunities emerging in that area. However, relatively poor north-south connectivity to / from the Vale of Glamorgan is seen by consultees to act as a factor constraining growth (both now and in the future), particularly for those without access to a car.’</i></p> <p>In addition to the benefits that would be assumed for vehicles travelling along this route, improved highway conditions would also be anticipated to improve the conditions for sustainable transport modes for access to services.</p>	
Affordability	<p>The potential to divert trips from the car to public transport as a result of likely improved journey time and journey time reliability for buses is mitigated by the potential for the option to retain the car as the dominant mode of travel in the region. A neutral impact is envisaged.</p>	0
Severance	<p>A new route by-passing Pendoylan and Clawdd Coch is anticipated to reduce traffic flow through the small settlements with the potential to lessen the impact of severance. In line with TAG Unit A4.1 / Section 5 (Severance Impacts) a slight positive impact is anticipated with less than 200 local residents estimated to benefit from any reductions in traffic flow.</p> <p>There are a number of public rights of way affecting the proposed route alignment. It is anticipated that crossings will however be rationalised by public right of way re-alignment and provision of crossing points under/ over the proposed bypass to maintain existing connectivity. Culverts have been proposed where public rights of way cross the proposed bypass at in-fill sections, and where it crosses through cut sections 3m wide bridges have been assumed.</p> <p>It is not anticipated that the new route would lead to severance issues as existing routes and connections will be retained, with the new road on bridges over the existing route.</p> <p>In addition, DMRB 11.3.8 provides guidance on the relief of severance using proportional improvement to traffic flows. Given that relief of severance is not considered significant where traffic flows are already relatively low, the guidance does not apply to roads with an existing AADT flow of less than 8,000 vehicles. The guidance does however acknowledge that a review of any severance relief that can be gained needs to be seen in the context of the size of the community affected noting low to moderate decreases in traffic flow are likely to be more significant for small communities in comparison to larger urban areas.</p>	+
Option and Non-Use Values	<p>In line with TAG Unit A4.1.7, ‘Option and non-use values should be assessed if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).’</p> <p>Whilst the option does not therefore retain specific measures to enhance public transport, a new strategic highway route affords significant potential to establish robust journey times and journey time reliability. These improved highway conditions are anticipated to assist the development of more sustainable transport modes, although at the same</p>	+

Highway Option 2 – Western Alignment

	time facilitating car use. The implementation of integral walking and cycling infrastructure also affords some opportunity for alternate modes of travel away from use of the private car. A score of slight beneficial is therefore considered reasonable within the context of the proposed option.	
<b>Cultural</b>		
Cultural Facilities	The proposed road link may have a minor negative impact on the Cottrell Park Golf Course where the road would require widening, as well as changes to access to the Hensol Golf Driving Range and the Vale Resort. However, access to all facilities will be accommodated. More strategically, there will be improved connectivity between the M4 and A4119 corridors and the cultural attractions of the coast, including Barry Island, Porthkerry Country Park and the beaches. Overall a slight positive impact on cultural facilities is anticipated.	+
Welsh Language	The Vale of Glamorgan Council stated in the Local Development Plan that <i>'having assessed the densities of Welsh language use across the Vale of Glamorgan it is not considered to be an issue which requires addressing in the Plan. As a result, the proposals contained in the LDP are not considered to have a detrimental impact upon the Welsh language and culture or materially affect the linguistic balance of the Vale of Glamorgan or the communities within the Vale of Glamorgan.'</i>  Subsequently, it is considered there would be no impacts on the Welsh language from the highway option.	0
<b>Environmental</b>		
Noise	This review is not yet quantifiable in the absence of quantitative data, but a minor adverse impact is considered reasonable to assume whilst also noting the impacts from short-term construction noise associated with the new route.  The results acquired from the SEWTM for a new DMRB compliant road indicate peak AM and PM two-way traffic flows of 2026 and 1972 respectively which would establish increased noise pollution in the study area. In most cases mitigation measures should be available to alleviate any associated short and long-term noise pollution, but this would need to be considered against the potential to establish adverse landscape impacts (e.g. implementation of noise bunds).  The western alignment passes to the east of Clawdd Coch, whereas the current alignment passes through Clawdd Coch. The new route would reduce traffic noise at most properties in Clawdd Coch, but will increase traffic noise at the residential property to the East of Clawdd Coch.  At Pendoylan, the West alignment passes approximately 135m from a cluster of properties at Kingswood and Little Orchard to the east and 240m from Old Vicarage to the west. The alignment would carry traffic away from Pendoylan and would expect to present an overall benefit to more properties than would experience an increase in noise as a result of the new alignment.  To the south of Pendoylan, the West alignment would be closer to Pen-y-Bryn, Bryn Bedal and Tyn-y-Cae and would potentially affect more properties than the East alignment. The area is however rural in nature with a number of isolated residential dwellings and the number of affected residential properties is expected to be low.	-

Highway Option 2 – Western Alignment

	<p>The traffic noise impacts would however need to be modelled in accordance with DMRB to quantify the noise impacts and consider the detailed propagation path for both alignments. This would allow for a detailed comparison of the proposed alignments against the existing road layout (do-minimum) and quantify the number of properties that are adversely affected by both road alignments and the number of properties that benefit from the respective alignments.</p>	
Air Quality	<p>Based upon the 2016 Air Quality Progress Report for the Vale of Glamorgan, the overall air quality across the county complies with regulations to protect human health<sup>2</sup>. Data from the 2012 Air Quality Progress Report highlighted that at some locations road traffic emissions of Nitrogen Dioxide (NO<sub>2</sub>) were at, or close to, the relevant annual average concentration of 40 ug/m<sup>3</sup>. These were recorded at Culverhouse Cross (Vale of Glamorgan, 2013) within the strategic network of interest to this study.</p> <p>Implementation of a new highway route has the potential to improve local air quality through Pendoylan village with a reduction in local traffic flows forecast, plus the potential for existing car trips to divert to public transport as a result of improved journey times and journey time reliability. It could also have the effect of reducing congestion and air quality issues at Culverhouse Cross by diverting traffic onto the new link.</p> <p>In contrast, a new proposed alignment is forecast to significantly increase traffic flows through the Pendoylan corridor with the potential to establish adverse air quality in the vicinity of a new link. The potential for adverse air quality is most likely to occur at the key junctions north and south of the proposed route.</p> <p>The impact of construction on managing air quality/ dust as well as vibration impacts would also need to be considered.</p>	-
Greenhouse Gases	<p>The change in greenhouse gas emissions with the road link compared to the do minimum has been calculated as an output of the traffic modelling. This gives a benefit valued at £1.1M. The reduction in emissions will be based on the reduced overall journey distances.</p>	+
Landscape	<p>The Western Option of road infrastructure through undulating land will degrade landscape character, impact on short distance views and the night time setting. The new highway route will reduce tranquillity, traffic will increase, farmland will be lost, and previously unlit landscape will be lit and short distance views will be interrupted. Impacts can be mitigated through landscape design along route, retention or planting of new hedges and design of elevated road sympathetic to local landscape character. Moreover, good landscape design is needed to mitigate lighting impacts at night.</p>	-
Townscape	<p>An alignment to the west of Pendoylan (and east of Clawdd Coch) could lead to a reduction in townscape impacts compared to the existing traffic flows. However, there may be other visual impacts on townscape in terms of setting of the communities. Due to the rural nature of the area, the impact on townscape is not assessed as being significant. There may be some opportunities to reduce any slight adverse effects around key areas (i.e. Pendoylan) through detailed design and landscaping.</p>	0

<sup>2</sup> Vale of Glamorgan Council Air Quality Progress Report 2016

Highway Option 2 – Western Alignment

	<p>A reduction traffic flow through Pendoylan village would have a beneficial impact on the setting of the village as traffic would be taken away from the rural settlement. Should there be inter-visibility of the alignment from Pendoylan this could establish a slight adverse impact to the setting of the townscape however design measures could help alleviate this impact.</p>	
<p>Historic Environment</p>	<p>The baseline assessment has completed a thorough analysis of known environmental and land-use characteristics for the study area. This has identified a number of sites of historic interest including scheduled monuments, listed buildings, archaeological sites and registered parks and gardens.</p> <p>The closest listed building is located approximately 300m east from the western alignment, there are no direct impacts anticipated to any listed buildings or their setting as a result of the alignment. The closest scheduled monument is located approximately 550m west of the western alignment, there are to be no direct impacts to the scheduled monument or its setting as a result of the alignment. Hensol Castle Park and Garden is located approximately 400m west of the western alignment, it is anticipated that there will be no direct impact to the park and garden or to its setting.</p> <p>The Llancarfan Historical Landscape is located south of the A48 at Bonvilston. The historical landscape designated area is located approximately 550m west of the western alignment. It is anticipated that there will be no impacts to the Historical Landscape as a result of the development.</p> <p>The western alignment is located approximately 160m west of the Pendoylan Conservation Area. It is anticipated that there would be a reduction in traffic through the Pendoylan Conservation Area which would likely have a beneficial impact to its setting. However, the western alignment may have a negative impact on the setting of the Pendoylan Conservation Area, which would depend upon inter visibility. The Bonvilston Conservation Area located approximately 50m west of the western alignment is unlikely to be affected as the alignment would be utilising the existing Pendoylan Corridor road, north of the A48.</p> <p>The western alignment does not cross any 'known' archaeological features. The closest archaeological feature (Medieval) is located approximately 20m east of the western alignment (approximately 300m south of Pendoylan). Although the alignment avoids any 'known' archaeological features, given that the area has numerous archaeological features, it can be assumed that there may be many 'unknown features' in the area which may be impacted by the development.</p> <p>It is anticipated that there is potential for the western alignment to have a minor adverse impact on the historic environment, given that there is lack of features within close proximity to the route, however, there is potential for 'unknown' features to be within the area with the requirement for mitigation to alleviate adverse impacts.</p>	
<p>Bio-Diversity</p>	<p>It is anticipated that the route could have an adverse impact on bio-diversity with the development of offline route sections through existing agricultural land, as well as the impact on existing hedgerow for the completion of online improvements.</p> <p>Ely Valley SSSI is at the northern-most point of the scheme, three Sites of Importance for Nature Conservation (SINC), one tree preservation order and four areas of ancient woodland are crossed by this route option. Priority habitats are present along the route and there is potential</p>	



**Highway Option 2 – Western Alignment**

	<p>for a variety of protected and priority species to be present and therefore could be affected by the western alignment proposals. It is anticipated at this stage that the majority of impacts can be mitigated for through standard techniques in accordance with the relevant best practice guidelines. Overall the route is considered to have up to a moderate adverse impact on biodiversity due to the loss and damage of ancient woodland. Moreover, the western alignment would cross two rows of Tree Preservation Orders approximately 200m south west of Pendoylan.</p>	<p>---</p>
<p>Water Environment</p>	<p>Sections of the route touch the margins of the floodplain in two locations. Floodplain impacts are largely avoided.</p> <p>In terms of water quality, the Ely and its tributaries are WFD waterbodies and the reach in the study area in the second cycle achieved status of Bad ecological status and Fail with regard to chemical quality. The WFD groundwater body underlying the route is the South East Valleys Southern Devonian Old Red Sandstone and Triassic Mercia Mudstone. This waterbody achieves Good status in terms of both groundwater quality and quantity.</p> <p>With regards to aquifers, there are no groundwater Source Protection Zones along the alignment or in proximity to it. Potential for effects is likely to be relatively limited, there would be some scope for impacts if the new highway was drained to ground via soakaways (rather than discharges to watercourses), or if there were sections in cut (which may trigger the need for groundwater control measures e.g. dewatering).</p>	<p>-</p>
<p>Residential Amenity</p>	<p>The impact on residential amenity considers the cumulative impact of air quality, noise and visual intrusion on residential properties. The combined assessment from the above indicates that the properties in the communities of Clawdd Coch and Pendoylan will largely benefit from reductions in traffic through the village. A number of properties will experience adverse impacts due to proximity of the western alignment which includes property to the east of Clawdd Coch and five dwellings to the south of Pendoylan as well as Pendoylan Nursery. There may be impacts of visual intrusion based on short distance views to the west of Pendoylan. The effects on those properties close to the route are likely to be significant and given that a larger cluster of properties south of Pendoylan is affected with this option, the overall impact is assessed as moderate adverse, prior to detailed consideration.</p>	<p>---</p>
<p><b>Economic</b></p>		
<p>Journey Time Changes</p>	<p>The level of journey time savings to users' totals £132M through the provision of a link, as forecast using the traffic model, which represents a substantial beneficial improvement.</p> <p>The implementation of a new highway route designed to current DMRB standards would be anticipated to result in measurable improvements in journey times with increased average speeds between M4 Junction 34 and A48, together with integral junction improvements at the key junctions interconnecting with the highway route. For strategic journeys, the route would offer an alternative for travelling between the Vale/ Barry area and the Rhondda Valleys, and from west of M4 Junction 34, thus reducing journey times on the strategic network. There is also the potential, if active travel measures are delivered, that additional benefits to walkers and cyclists through enhanced infrastructure provision.</p>	<p>+++</p>

## Highway Option 2 – Western Alignment

Journey Time Reliability Changes	<p>It is anticipated that the implementation of a new highway route designed to current DMRB standards could establish measurable improvements in journey time reliability. At this stage, a full assessment has not been undertaken, but the reduction in traffic flows on the strategic network together with the provision of a new link between the M4 J34 and the A48 which is to standard, would be expected to increase reliability compared to the do minimum.</p>	++
Transport Costs	<p>Transport costs for road users are anticipated to reduce compared to the do minimum, reflecting the journey time savings. With regards to public transport operating costs, existing bus services would be anticipated to benefit from reduced traffic through Pendoylan and the opportunity to use the new route of good standard. It is therefore anticipated that delivery of a new road link and associated junction improvements would reduce the transport costs compared to the do-minimum option.</p>	+
Accidents	<p>The traffic forecasting has enabled a calculation of accident benefits using the DfT software COBALT.</p> <p>The impacted links were identified by finding the change in AADT (Annual Average Daily Flows) as a result of the scheme and using the standard criteria of finding the links where the change in flows is 5% or more with a flow change of +/- 500 AADT for 2036. The accident benefit assessment has been undertaken for the impacted links only instead of a cordon area. These links are shown in Figure 2-3 in the economic appraisal note in <a href="#">Appendix H</a> of the Outline Business Case report.</p> <p>The results show positive scheme benefits with a reduction in accident cost of £16.6m, over the 60-year period in 2010 prices. The analysis also shows that the scheme will reduce 446 accidents, which is a significant reduction of 9% compared to the do minimum.</p>	++
Wider Economic Impacts	<p>It is anticipated that there would be additional wider economic impacts associated with the option. This may include induced investment through additional strategic development arising due to improved connectivity to the EZ (existing connections are constraining growth). Moreover, there may be benefits to those larger commercial businesses (such as the airport and Aston Martin) through transport improvements where competitive markets are imperfect. In this case, it will assist by providing an improved level of connectivity for the airport and businesses.</p> <p>There may also be beneficial labour supply impacts by improving connectivity between the employment sites and population centres, notably assisting access to employment from the Rhondda Valleys to the EZ. 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 also compounded by comparatively poor business-to-business accessibility.</p> <p>Moreover, the accessibility analysis undertaken (as contained in the report in <a href="#">Appendix A</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.</p> <p>The improvement in accessibility may also bring a relocation of more productive jobs to the area. As the proposed link forms a connection between functioning parts of the Capital Region, there may also be</p>	++

## Highway Option 2 – Western Alignment

	<p>productivity impacts due to agglomeration benefits for the Vale of Glamorgan in terms of linking in developments in the area to similar businesses/ clusters in the region.</p> <p>Moreover, productivity in the Cardiff Capital Region is very low compared to other UK City Regions, so improving connectivity to the Vale of Glamorgan may form part of a package of measures to address this (and in part addressing the issue of a lack of appropriate industrial premises).</p>	
Land	<p>Implementation of a new offline highway route will require significant areas of land predominantly in agricultural use to deliver a new highway route, in addition to land adjacent to existing routes to facilitate the online highway improvements. The exact extent and potential costs are unknown at this stage and would require further exploration, however a cost allowance has been included, as identified in the Financial Case.</p> <p>The option is anticipated to have the following impacts on residential and business properties:</p> <ul style="list-style-type: none"> <li>• Number of buildings directly impacted by alignment = 2 (pair of semi-detached houses to south of junction to Hensol)</li> <li>• Number of buildings with potential with some land take = 6 (four homes south of Pendoylan, Pendoylan Nursery and agricultural sheds on Cottrell Golf Course)</li> <li>• Number of residential properties with potential impacts by virtue of proximity = 1 (house to north west of Pendoylan Nursery)</li> </ul> <p>It should be noted that at this stage, information on land holdings impacted is not known. Impacts are assessed as moderate given the relatively low number of properties impacted for a scheme of this length.</p>	
Capital Costs	<p>The delivery of a new highway route would require a high capital investment from the public sector. The cost estimate, in undiscounted 2017 market prices, is £58.666M.</p>	
Revenue Costs	<p>The highway would continue to require maintenance support from the public sector and it is envisaged that the scheme would result in additional pressure on increasingly stretched highway maintenance budgets. Given the need for bridge structures, a minor adverse impact on ongoing costs is anticipated.</p>	

**Parkway Station**

	<b>Impacts</b>	<b>Scale</b>
<b>Social</b>		
Physical Activity	<p>It is expected that the option would have a slight beneficial impact on physical activity based on the assumption that a new parkway station would have walking and cycling connections from communities to the north and south of the M4.</p>	+
Journey Quality	<p>It is anticipated that a new parkway station could provide high quality public transport to main destinations including Cardiff, Bridgend and beyond establishing enhancements to traveller's care, views and stress throughout the region. A qualitative assessment has been completed in line with TAG Unit A4.1.6 (Journey Quality Impacts) that identifies an impact score of moderate beneficial.</p> <p>The provision of public transport within the study area is currently extensively limited with restricted alternatives available for travel by non-car modes. A new strategic and modern railway station located at M4 Junction 34 and designed to current standards could subsequently provide significant enhancements for traveller care with improvements to strategic facilities, cleanliness, information and environment in comparison to the existing situation.</p> <p>The number of rail services that would be implemented to facilitate the new railway station is subject to further assessment, however the establishment of new rail trips within and through the study area would have potential to improve the quality of a traveller's experience with regard to views. As noted for analysis of the highway route options, the immediate study area and subsequent location of a station is predominantly within an area of high quality scenic countryside interspersed with ancient woodland, important nature conservation sites, SSSI and conservation areas. Encouraging new trips to be made by rail could therefore improve a traveller's perception of the local scene, as well as throughout the region with the South Wales Main Line predominantly traversing through a rural landscape. An alternative perspective on townscape could also enhance a travellers' interest as part of the rail trip as the route interconnects with urban settlements.</p> <p>It is further anticipated that there would be an improvement with regard to traveller stress following implementation of a new railway station. Whilst the majority of travellers would still require a car to access the station, the potential to reduce journey distances by car could reduce the impact of driver related stress associated with frustration and the fear of potential accidents. In addition, the implementation of a high quality interchange with good security measures, environment and information provision could alleviate route uncertainty as part of the journey experience, enhancing upon existing access to public transport infrastructure and services.</p> <p>To facilitate robust accessibility to and from the interchange, the option for a Parkway Station already assumes delivery of a strategic link road between the M4 Junction 34 and the A48 at Sycamore Cross. The benefits to bus journeys as a consequence of an enhanced highway network have been captured separately as part of the two road-based options (east and west alignments).</p> <p>Whilst significant benefits have been identified when considered against current local and strategic provision of public transport, a moderate impact has been allocated for the overall assessment with a proposed</p>	++

Parkway Station		
	interchange station anticipated to affect between 500 to 10,000 travellers per day. This impact assumption encompasses all travellers who would benefit from the improvements to rail provision at this strategic location, as well as those who would transfer to buses as a consequence of the public transport infrastructure and service enhancements.	
Accidents	It is expected that the parkway station would have a minor beneficial impact on accidents, through transfer of longer distance trips in and out of the region to rail and bus.	+
Security	<p>A qualitative assessment of security has been completed against TAG Unit A4.1.4 to assess the security impacts as a result of a new rail interchange facility. The subsequent delivery of a high quality rail and bus interchange with likely implementation of suitable lighting and CCTV to current design standards would establish robust formal surveillance throughout the station environment. It would also be anticipated that a new interchange would be designed so as to maximise the potential for natural surveillance by passengers and staff, further enhancing the perception of safety.</p> <p>Informal surveillance of the station environment would likely be supported by positive use of landscaping features (design layout of planting, for example) to contribute towards visibility and deter intruders. This would be especially pertinent throughout the car park and waiting points so as to minimise the potential for hidden and screened areas to essentially improve users' perception of safety on site when leaving their vehicles. In addition, it would be anticipated that the new station would be designed with clearly marked site perimeters and well-lit, secure entrance points ensuring way-finding and accessibility throughout the station is not compromised.</p> <p>Current station design standards would also carefully consider the requirements of good, efficient lighting whilst ensuring that daytime lighting enhances the station environment. Robust lighting provision would ensure signage, and information/ help (emergency) points are well-lit at all times, as well as reduce the potential for adverse shadows that could affect the integrity of CCTV coverage.</p> <p>Whilst not specifically noted as part of the TAG Unit A4.1.4 assessment, the usability of the station by all passengers is key to ensuring a safe and secure station environment. It is therefore anticipated that a new interchange would subsequently be designed to the latest design standards for accessible railway stations providing full accessibility for disabled passengers in terms of car parking facilities, waiting areas and inter-platform accessibility (lifts/ ramps) for example.</p> <p>Whilst significant benefits have been identified when considered against current local and strategic provision of public transport, a moderate impact has been allocated for the overall assessment with a proposed interchange station anticipated to affect between 500 to 10,000 travellers per day. This impact assumption encompasses all travellers who would benefit from the improvements to rail provision at this strategic location, as well as those who would transfer to buses as a consequence of the public transport infrastructure and service enhancements.</p>	++
Access to Employment	Rail services within close proximity of the study area (at Pontyclun), already interconnect with the Cardiff City Region, however the option for a parkway station inclusive of bus integration could further improve access to employment by providing interconnectivity to Cardiff Airport and other key local and regional employment areas. Employment sites in the	++

**Parkway Station**

	<p>vicinity of Junction 34 (both north and south of the M4) could particularly benefit. Moreover, it could assist in improving access between the Rhondda Valleys/ A4119 corridor and the wider City Region.</p> <p>As noted previously, a parkway station option assumes prior implementation of a new highway link between M4 Junction 34 and the A48 at Sycamore Cross, maximising potential for bus integration with improved journey times and journey reliability south of the M4 corridor. The wider public transport benefits realised as a result of enhancements to the highway network have been captured separately as part of the highway option analysis.</p> <p>The combination of highway and public transport improvements would therefore be considered to complement each other in supporting connectivity to local and strategic employment sites.</p> <p>The degree of benefit would depend on the level of rail service that can be provided at the new station, as well the extent of bus connectivity between the interchange and employment sites. The parkway railway station would also serve existing residents situated near to M4 Junction 34 and would thus improve access to employment for those in the immediate area, in conjunction with those travelling from further distances by rail.</p> <p>The Welsh Government PBA report referenced herewith subsequently concludes that <i>'improving the transport connectivity of the Vale of Glamorgan is considered necessary to support national, regional and local economic performance.'</i></p>	
Access to Services	<p>Rail services within close proximity of the study area (at Pontyclun), already interconnect with the key urban settlements throughout the region, however the option for a parkway station inclusive of bus integration could further improve access to services with new and enhanced rail provision establishing enhanced interconnectivity. The extent of local public transport connections would be subject to proposed bus route and timetable options provided to support the interchange facility.</p>	+
Affordability	<p>The rising cost of transport is resulting in many households struggling to afford to own and run a car. The provision of a reliable and direct public transport option has the potential to make travel more affordable for some sections of society, most notable the young and elderly (21% of the study area's residents are retired which is much greater than the percentage for The Vale of Glamorgan (16%), South East Wales (15%) and Wales (16%) as a whole). This is particularly the case if car parking costs at the facility are cheaper than those at the user's desired destination. However, public transport services are often unaffordable for some groups within society.</p> <p>It should be noted however that some users may require car travel in order to utilise the facilities.</p>	+
Severance	<p>At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.</p>	NYA
Option and Non-Use Values	<p>A parkway station provides a more viable alternative to journeys currently made by car and increases the resilience of the transport network through the provision of a more sustainable transport network. This would be for local and regional journeys as well as those from further afield.</p>	+++

Parkway Station		
<b>Cultural</b>		
Cultural Facilities	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Welsh Language	<p>The Vale of Glamorgan Council stated in the Local Development Plan that <i>'having assessed the densities of Welsh language use across the Vale of Glamorgan it is not considered to be an issue which requires addressing in the Plan. As a result, the proposals contained in the LDP are not considered to have a detrimental impact upon the Welsh language and culture or materially affect the linguistic balance of the Vale of Glamorgan or the communities within the Vale of Glamorgan.'</i></p> <p>Subsequently, it is considered there would be no impacts on the Welsh language from the rail option.</p>	0
<b>Environmental</b>		
Noise	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Air Quality	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Greenhouse Gases	It would be anticipated that a parkway station would lead to an overall reduction in journey distances by car and thus have a beneficial impact on greenhouse gas emissions.	+
Landscape	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Townscape	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Historic Environment	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Bio-Diversity	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Water Environment	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Residential Amenity	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
<b>Economic</b>		
Journey Time Changes	The implementation of a parkway station could result in a reduced journey time by public transport to Cardiff Airport and other strategic destinations, as well as lead to some reductions in congestion given the transfer of trips to rail/ bus, especially during peak commuter periods.	+
Journey Time Reliability Changes	The implementation of a parkway station could result in improved journey time reliability by public transport to Cardiff Airport and other strategic	+

Parkway Station		
	destinations, as well as lead to some reductions in congestion given the transfer of trips to rail/ bus, especially during peak commuter periods	
Transport Costs	<p>Rising cost of transport is resulting in many households struggling to afford to own and run a car. The provision of new public transport options has the potential to make travel more affordable for some sections of society, most notable the young and elderly - 21% of the study area's residents are retired which is much greater than the percentage for the Vale of Glamorgan (16%), South East Wales (15%) and Wales (16%). This is particularly the case if car parking costs at the facility are cheaper than those at the user's desired destination.</p> <p>However, it should be noted that public transport services can be unaffordable for some groups within society, although the provision of linked bus and rail services means they are usable for those without access to a car.</p>	+
Accidents	It is expected that a parkway station could have a minor beneficial impact on accidents, through transfer of longer distance trips in and out of the region to rail.	+
Wider Economic Impacts	<p>It is anticipated that there would be additional wider economic impacts associated with the option. This may include induced investment through additional strategic development arising due to improved connectivity to the EZ (existing connections are constraining growth). Moreover, there may be benefits to those larger commercial businesses (such as the airport and Aston Martin) through transport improvements where competitive markets are imperfect. In this case, it will assist by providing an improved level of connectivity for the airport and businesses.</p> <p>There may also be beneficial labour supply impacts by improving connectivity between the employment sites and population centres, notably assisting access to employment from the Rhondda Valleys to the EZ. 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 also compounded by comparatively poor business-to-business accessibility.</p> <p>Moreover, the accessibility analysis undertaken (as contained in the report in <a href="#">Appendix A</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.</p> <p>The improvement in accessibility may also bring a relocation of more productive jobs to the area. As a parkway station would improve connections between functioning parts of the Capital Region, there may also be productivity impacts due to agglomeration benefits for the Vale of Glamorgan in terms of linking in developments in the area to similar businesses/ clusters in the region.</p> <p>Moreover, productivity in the Cardiff Capital Region is very low compared to other UK City Regions, so improving connectivity to the Vale of Glamorgan, as well as Rhondda Cynon Taff, may form part of a package of measures to address this (and in part addressing the issue of a lack of appropriate industrial premises).</p>	++



Parkway Station		
Land	At this stage a specific site has not been identified and thus the impacts cannot be assessed at present.	NYA
Capital Costs	No firm capital costs are currently available. However it is anticipated that a new parkway station would be of high cost in terms of capital investment, however further work is required to provide more accurate cost estimates. A typical parkway station cost is in the order of £25M, and this would be combined in this option with the costs of delivering a highway improvement option.	
Revenue Costs	New revenue costs would have to be established with regard to enhanced rail and bus services. There may be knock on revenue costs on existing services as a result and this would require evaluation.	-