

Scoping study for converting disused railway tunnels into walking and cycling routes as part of the National Cycle Network Wales

November 2015



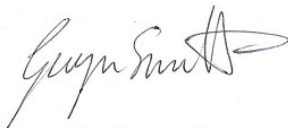


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1 Introduction

1.1 Description and objectives

Sustrans has been commissioned by the Welsh Government to provide high level recommendations with regard to bringing selected former railway tunnels in South Wales into use as walking and cycling routes, enhancing and linking into the existing active travel network in the region.

The objectives of the project are:

1. To identify key stakeholders, including partners, to effectively liaise with and influence to facilitate planning and delivery of the project
2. To undertake a scoping study of the former railway tunnels in the South Wales region, providing Welsh Government with a prioritised programme and to identify key opportunities and constraints to inform recommendations for further work
3. To prioritise the tunnels in the South Wales region to ensure strategic fit with the Welsh Government existing and planned programmes and funding streams.

1.2 Scope of work

- Liaise with key stakeholders to establish the basis of a framework for delivery, particularly local authorities to establish fit with strategic plans and priority schemes
- Evaluate existing technical data sources on selected tunnels
- Review strategic route network to establish required linkages, identifying key opportunities and constraints
- Evaluate existing data on economic impact of similar projects in other locations and develop an economic impact assessment for the programme to inform the business case
- Develop a broad business case for the programme in South Wales to support potential funding applications
- Provide a stage gate analysis of key activities required to achieve technical delivery of the project from feasibility to post construction stages
- Identify key opportunities and constraints for delivery process
- Provide a prioritised programme to inform future funding priorities and optimise delivery and outcome potential
- Develop outline scheme costs
- Provide a clear community engagement strategy and marketing plan for the project
- Provide an overview of possible funding sources and options for the programme

1.3 Stakeholders

A number of stakeholders have been contacted and in broad terms have agreed with the approach taken in the report. A stakeholders list can be seen in appendix 1

2 Tunnel locations

Twenty one disused railway tunnels in south east Wales have been identified as possible candidates for future use as part of the National Cycle Network. We have also included the Tregarth Tunnel near Bethesda in North Wales within this appraisal because as a ‘shovel ready’ scheme it offers a good comparison to tunnels which require more development work.

The approximate locations of the 21 tunnels and their relationship to the National Cycle Network (NCN) is shown below.



Figure 1 Tunnels of south east Wales and their relationship to the NCN

3 Optimising selection of tunnels for appraisal

Not all disused tunnels will be suitable to for walking and cycling. As a first stage in determining which tunnels have most potential we designed a decision matrix to determine what tunnels should be looked at in more detail. Following this initial shortlisting we then used the Sustrans RATE tool

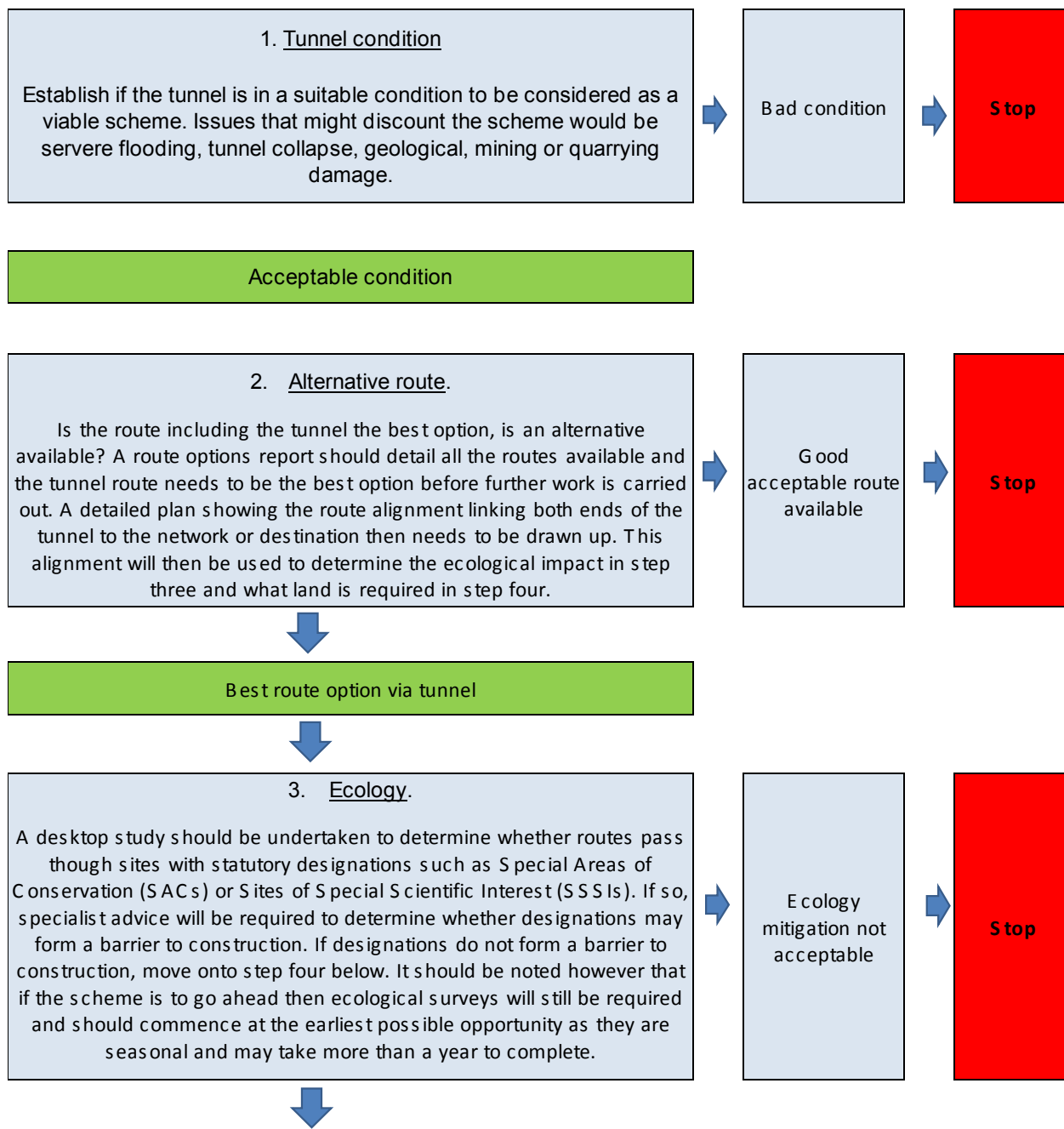
to assess priorities against a set of specific criteria. The RATE prioritisation is covered in Section 5.

3.1 Decision matrix

In determining the viability of opening disused railway tunnels as active travel routes, Sustrans developed a decision matrix methodology, to act as an initial filter for consideration of schemes. Five questions need to be fully considered and answered favourably prior to taking a tunnel scheme to the development stage.

The questions consider tunnel condition, alternative route options, ecology, land and tunnel ownership as well as looking at the business case. (See chapter 6). The diagram below shows how the decision matrix was applied.

For the purpose of making recommendations to Welsh Government for this purpose, Sustrans has gathered information by desk-top study and site visits where access was allowed.



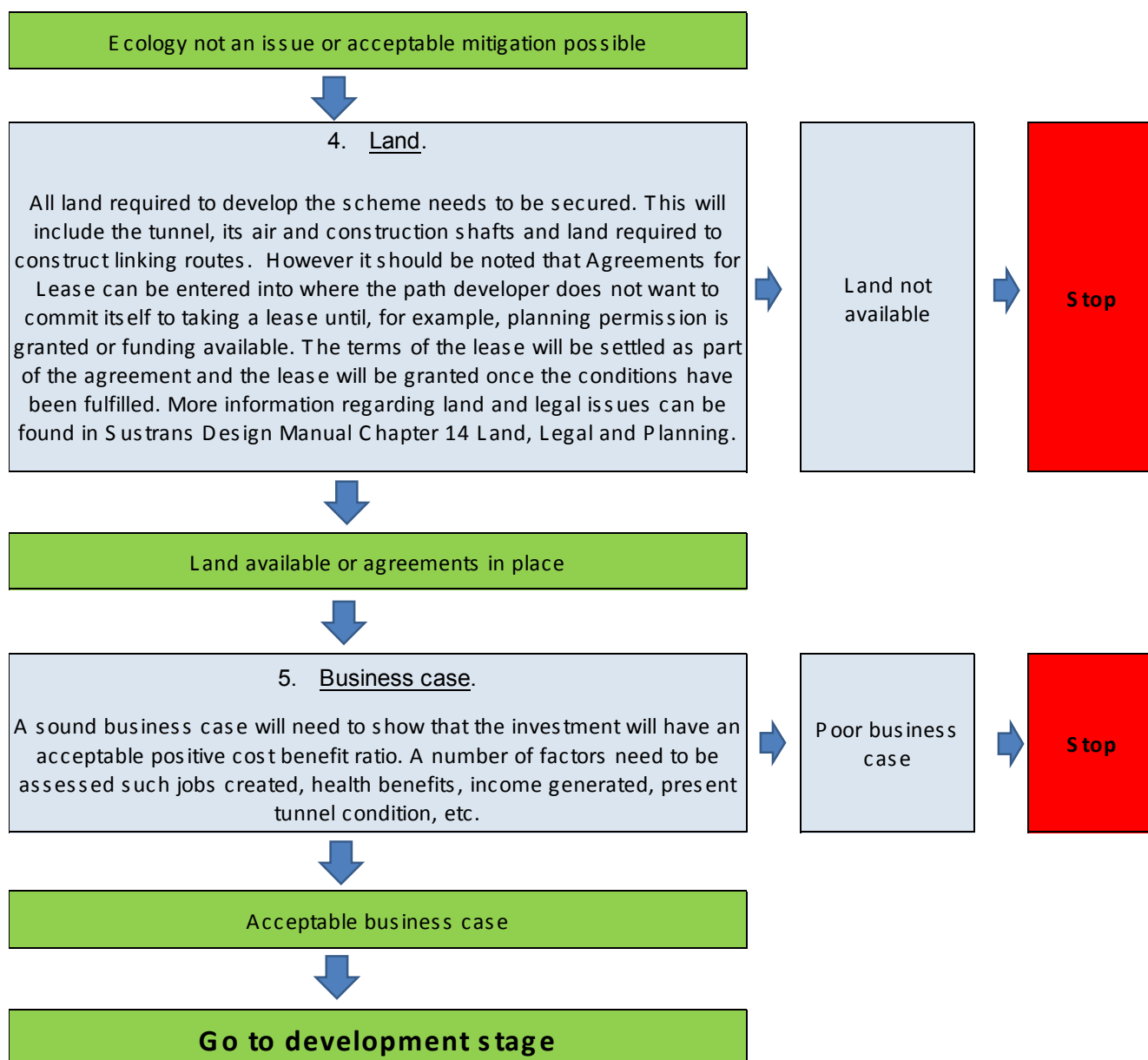


Figure 2 Decision Matrix Diagram

3.2 Decision Matrix Results

By applying the questions through the decision matrix the following conclusions were reached. For simplicity the tunnels have been grouped into 3 categories.

Red – Not suitable

Amber – Recommend further study or alternative use

Green – Tunnels that could be developed into walking and cycling schemes

3.2.1 Tunnels not suitable for further study are:

Barry Island	Hafodyrynys, between Pontypool and Crumlin
Cwm Cerwin between Maesteg and Bryn	Monmouth
Gelli, Afan Valley	Pont Walby, between Hirwaun and Glyn Neath
Gellifelin between Brynmawr and Abergavenny	Redbrook, Wye Valley
Graig, Treforest	Walnut Tree, Taffs Well
Gyfychi. Tonmawr	Wenvoe

3.2.2 Tunnels that justify further study

Whilst applying the decision matrix it was noted that some tunnels could have other value, such as the tunnel at Clydach which is often used by adventure companies. These tunnels are:

Clydach, between Brynmawr and Abergavenny	Quakers Yard
Cymer, between Maesteg and Cymer	Torpantau, Taff Trail between Brecon and Merthyr.
Morlais, Merthyr	

3.2.3 Tunnels that could be developed for walking and cycling

The final set of five tunnels all look promising as potential future walking and cycling routes. They are:

Abernant, between Merthyr and Aberdare	Rhondda
Tregarth, Bethesda	Usk
Pennar, Pontllanfraith	

More details on the findings of the decision making process can be found in appendix 2.

4 How do the tunnels link to the walking and cycling network?

As part of the decision matrix analysis we considered how the tunnel links to the network. Often walking and cycle routes can be constructed in phases over a number of years but with a tunnel scheme this is not always possible. It should be noted that the business case of a tunnel scheme is increased by the existence of high quality connecting routes. The following plans set out how each of the five recommended tunnels can be linked to the network.

4.1 Abernant

Linking to the network is straight forward. To the west paths already exist and will require upgrading to link down to the Cynon Trail (NCN478). To the east a new link will be required from the tunnel to the A470 where an existing bridge and path can be used to connect to the Taff Trail (NCN 8).

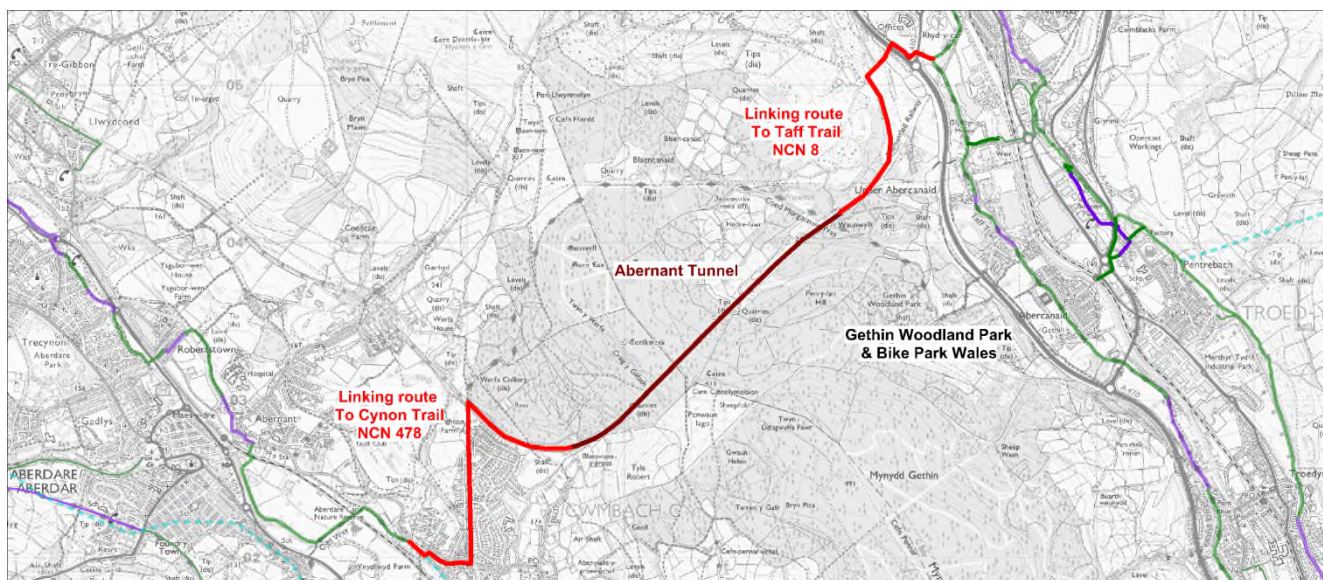


Figure 3 Abernant tunnel links

4.2 Tregarth, Bethesda

This scheme is reported to be at the shovel ready stage and will only require a short new link at its northern end (NCN 82). The path to the south already exists.

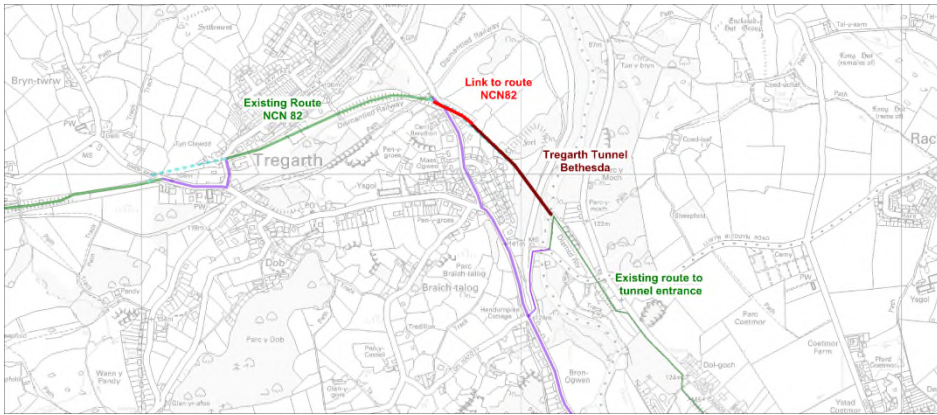


Figure 4 Tregarth tunnel Links

4.3 Pennar, Pontllanfraith

The route proposed (NCN 467) is mainly on disused railway lines which form a very good base. If this section was developed it would be one section in a route proposed as NCN467, “Halls Tram Road”. The route would be isolated from the main NCN, however the Colin Buchanan report “Preliminary Assessment of Pennar Tunnel” showed it would be highly valued and used as a community asset. Value could be added to the route by extending south to Abercarn and Crosskeys where it would link to the railway station and NCN route 47

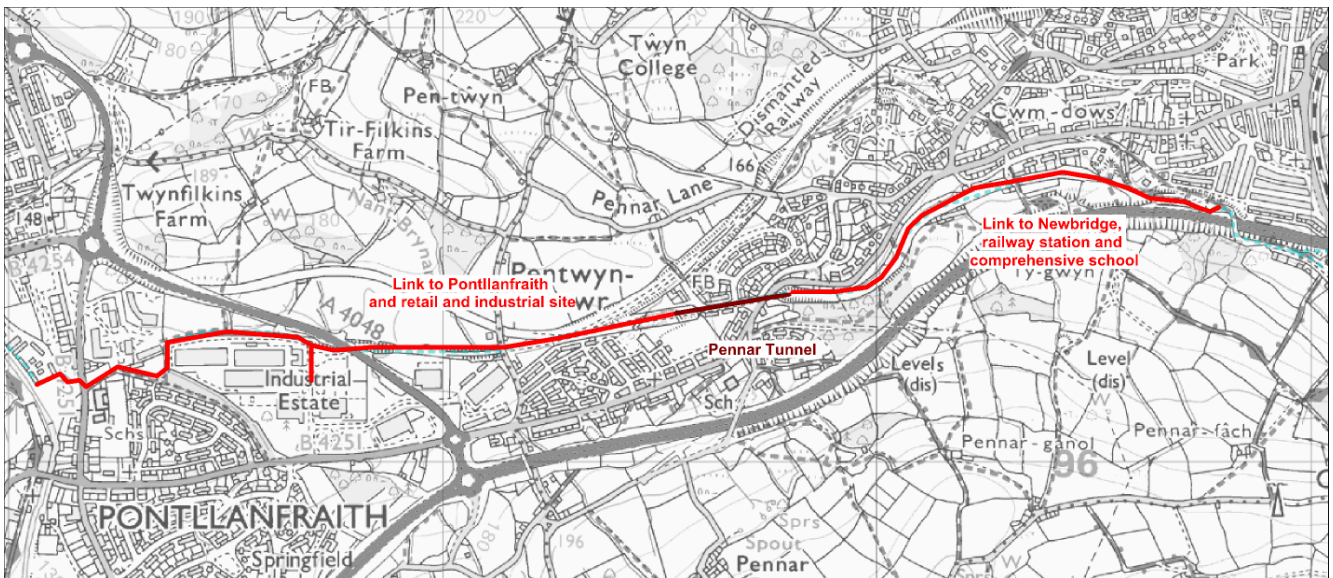


Figure 5 Pennar Tunnel links

4.4 Rhondda

At the western end of the tunnel, at Blaengwynfi, the existing network is within 200m of the tunnel portal. However on east side at Blaencwm a new section of route to link to the station at Treherbert would be required. At present the Rhondda Fawr Valley (Treherbert to Porth) has no existing walking and cycling route and should be considered as a future priority, especially if the tunnel is reopened.

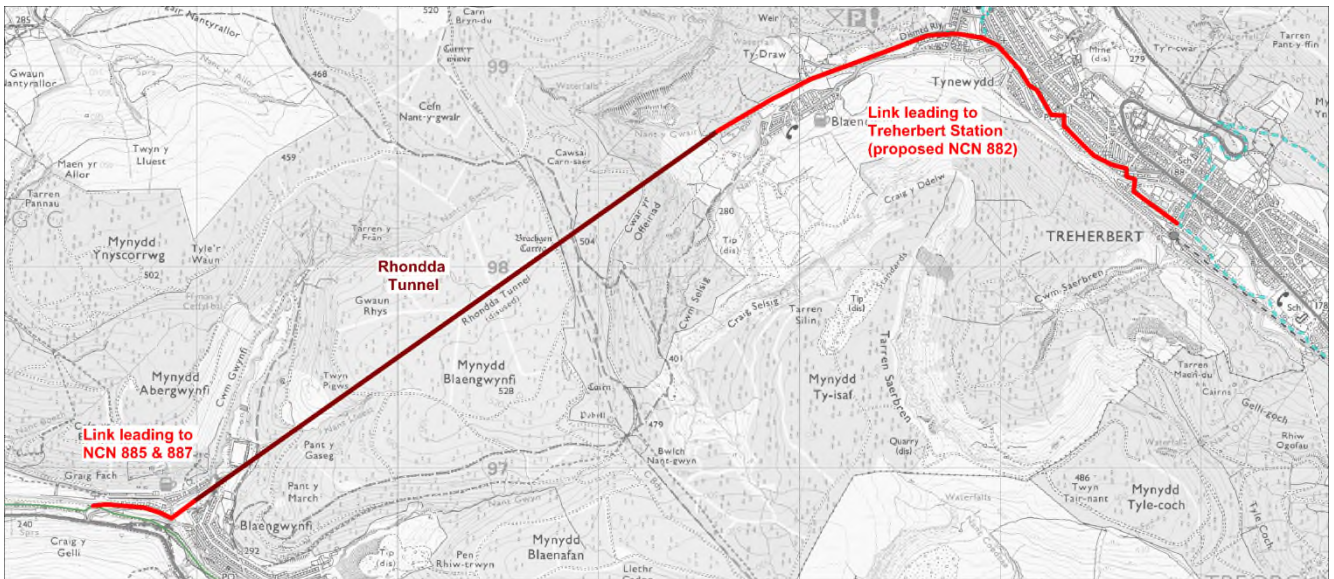


Figure 6 Rhondda Tunnel links

4.5 Usk

This route would avoid the busy A road that runs through the town of Usk and give direct access to the primary school. As with the Pennar tunnel the route would be isolated from the network. However, the value of the route would be increased by connecting to the network at Pontypool (NCN 49) passing three major employers on the way and forming NCN route 466.

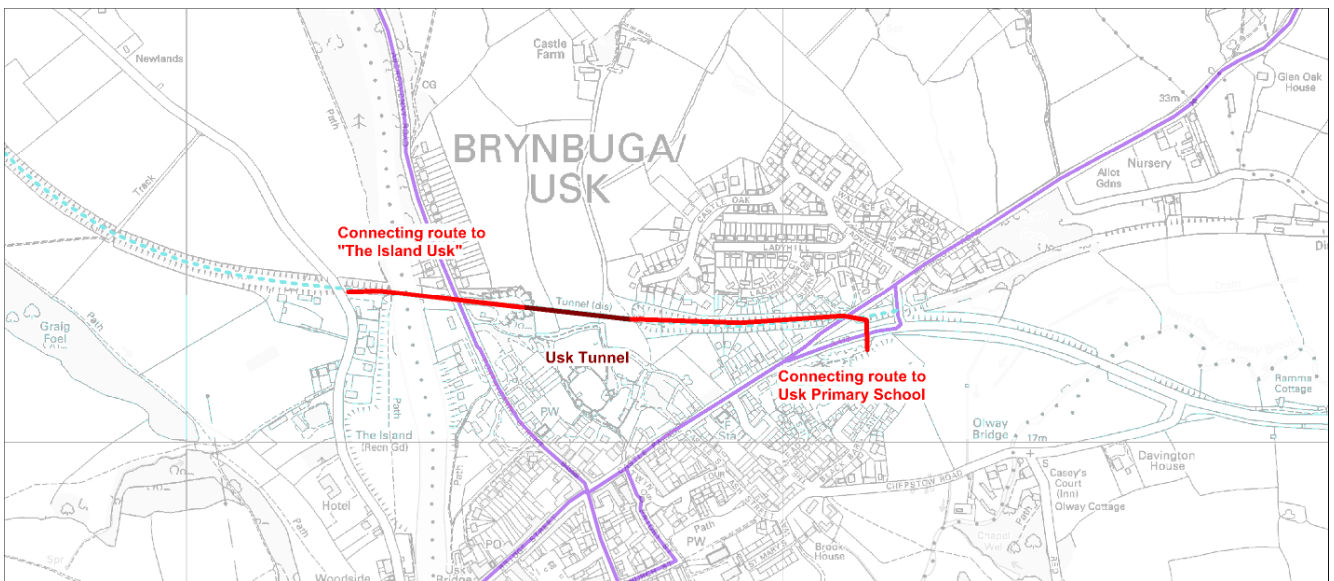


Figure 7 Usk Tunnel links

5 Tunnel development prioritisation

Following the initial assessment under the decision matrix detailed above the tunnels were assessed in more detail for their potential as walking and cycling routes using the Sustrans Route Assessment and Transport Evaluation (RATE) tool.

This tool has been developed by Sustrans as a way to assess cycling/walking schemes and analyse areas for infrastructure development. Assessing schemes on their potential for impact is a key attribute of the RATE tool which is achieved by providing each scheme with an overall rating and ranking. Each scheme is run through the 'RATE process' using thirteen set criteria which includes accessibility to housing, education and employment. Details of the methodology underpinning the tool is provide in Appendix 3.

Provided below is a summary of the RATE methodology applied to the five top schemes defined by the decision matrix. More than one scenario was applied for the Rhondda and Pennar tunnels – one scenario is the tunnel only and others relate to the inclusion of routes as well as the tunnel. It is only the schemes which include tunnels and route links that have come out in the top 5 rank. A listing of RATE assessment for all schemes is shown in appendix 3.

Suggested Rank	Name	Description	Usage potential (3 = high)
1	Abernant tunnel	Route linking Aberdare to Merthyr via the Abernant tunnel	3
2	Rhondda tunnel (scenario 2)	Rhondda Tunnel and link to cycle path in Blaengwynfi and Treherbert station	2
3	Pennar tunnel 1	Pennar Tunnel part of the Halls Tram Road route	2
4	Tregarth Tunnel, Bethesda	Alternative route via tunnel to avoid road and steep climb	2
5	Usk Tunnel	Cycle Scheme using Usk tunnel to by-pass the town and give direct access into school	2

5.1 Priority order - Opportunities and constraints

Combining the RATE score and wider considerations based on local knowledge, the following schemes have been identified as priorities for development. Potential for level of usage and modal shift is indicated by the bicycle tags, 3 bikes being the highest potential.

5.1.1 The Abernant Tunnel

The Abernant tunnel at 2283m is the second longest tunnel reviewed. It could provide a direct traffic free route from Aberdare to Merthyr and has the highest potential of all the routes analysed to encourage modal shift by encouraging commuting. On the west side a cycle and walking route already exists and on the east side a bridge over the A470 and path that directly links to the Taff trail is in place It has high tourist potential being close to Bike Park Wales and would offer opportunities to expand the park. The route using the tunnel would link to areas of very high deprivation and population density as well as interchanges with the public transport network, particularly rail at Aberdare and Merthyr.

The east side network connection to the Taff Trail (NCN 8) would require private land. There is no community support (yet) for this project however Merthyr Tydfil Council has shown a keen interest and recognises its tourism and commuting potential. Basic assessments of the tunnel condition show no major constraints, hence the tunnel presents a viable project in terms of benefit to cost.

5.1.2 Rhondda Tunnel (scenario 2 with NCN link to Treherbert) -

This scheme will link the existing cycle network in the Afan Valley to the station at Treherbert via the second longest walking and cycling tunnel in the world (3148m). Its length and location gives it tremendous appeal as a tourist destination and the scheme already has strong backing of the Rhondda Tunnel Society (RTS) supported by the local community and politicians. The main strengths of this scheme, assuming inclusion of the route to Treherbert, is its ability to overcome a particularly difficult inter-valley link, cross-boundary location and ability to service areas of high deprivation and significant population density at the Rhondda end. Extending the route along the Rhondda Valley would further enhance these benefits.

On existing information the tunnel is in reasonable condition. However because access is very limited there are some unknown factors so it will be crucial to complete a fully structural survey which will be difficult and expensive. This scheme will be the most expensive to deliver and its final cost will be several million pounds. Current development costs are estimated at £300,000. A separate study has been undertaken identifying next steps for taking forward the Rhondda Tunnel.

5.1.3 The Pennar Tunnel (scenario 1) -

Opening the tunnel will form part of the proposed Halls Tram Road NCN 467 and the RATE score is based on an initial link to Newbridge to ensure its viability. It will provide a cross valley route that will overcome the topography in the area and avoid a busy road, as well as linking to areas of deprivation and relatively high population density. Positive support for the project has been demonstrated locally. It has the advantage of being a short tunnel at 364m and therefore relatively easy to return to use. The suggested scheme does not propose a connection to the wider network beyond Newbridge but will provide a good local route that can be linked into the network in the future. If wider linkages are considered, the scheme has a correspondingly higher score within the RATE model.

5.1.4 The Tregarth Tunnel, Bethesda -

This tunnel scheme has been fully worked up to the shovel ready stage by Gwynedd County Council. They are now seeking funding £550,000 to construct the scheme. This would be a good opportunity to carry out a “pilot” scheme, especially with regards to lighting design, prior to tackling the longer tunnels in South East Wales. The tunnel provides a level and direct alternative to a steep climb and a road as well as linking key communities through the wider route network including areas of deprivation and locally high population density. It also has the potential to assist commuting to support employment centres in Bangor and Bethesda.

5.1.5 The Usk Tunnel

The route would provide a direct link to Usk Primary School avoiding the busy main A472 that runs through the centre of the town. There is good local support for the scheme.

Although the route is likely to have local use only initially without connection to the network, its value would be greatly increased when connected to Pontypool NCN 49. High costs could be incurred to deal with ecology issues (newts and bats).

5.2 Tunnels outside of the priority routes

The Cymer Tunnel scored high on the RATE analysis but failed the Decision Matrix on two issues; the in-filled northern end of the tunnel and the land in private ownership at the southern end. These two issues should be revisited to see if it can be included in the priority list.

The Morlais and Quakers Yard tunnels could be developed and, whilst not essential, would be “nice to have” additions to the network.

Torpantau and Clydach tunnels have potential for a separate function than as active travel routes. They could be developed as a resource for outdoor pursuits adventure companies, schools outward bound courses and possibly training areas for emergency services.

6 Economic impact assessment

6.1 New infrastructure to overcome barriers and link communities

Physical barriers, whether natural or man-made, can strongly influence the extent to which people are willing and able to travel by bike. Local travel can be transformed by overcoming these barriers to enable cycling to become part of everyday life for more people.

Examples of these infrastructure projects (see below) from recent years, including bridges, tunnels and traffic free links demonstrate a range of positive impacts, including benefits to local amenities (schools and businesses) and health, as well as overall positive returns on investment. Such benefits may all be expected with the opening of the Rhondda, Pennar, Tregarth, Abernant and Usk tunnels. Further examples can be found in appendix 4

6.1.1 Connect2 – Bath Two Tunnels

No adequate cycling and walking link existed between rural North East Somerset and the centre of Bath. As part of Connect2, a four-mile stretch of the former Somerset and Dorset railway line was transformed. The route was designed to run through Linear Park to the disused Devonshire Tunnel at Bloomfield and over the Tucking Mill Viaduct, which were both renovated. The second tunnel at Combe Down is presently the longest cycling tunnel in Britain, at just over a mile long.

Several thousand people flocked to Bath from all over the country to celebrate the opening of the Two Tunnels Greenway and to experience the UK’s longest cycling tunnel. Not only has it become a well-used route for local people, but it has also become a tourist attraction in its own right.

Both the Rhondda and Abernant tunnels could also be expected to have considerable impact as a tourist attraction.

- Schools benefiting from the scheme: Oldfield Park Junior School;
- Amenities benefiting from the scheme: Bath Queens Square, Sydney Gardens, Royal Victoria Park;
- 131% increase in total route usage after the opening of the route – 366% increase in cycling, and 50% increase in walking;
- Estimated economic benefits over 30 years – £13,760,994 (with 62% of these benefits coming to health), giving a BCR of 3.4.

6.1.2 Monsal Trail

The Monsal Trail is in the centre of the Peak District National Park. There are hundreds of interesting things to see along the Monsal Trail including wildlife, geology, industrial and rail heritage. The trail is a way-marked route with coordinated interpretation panels and listening posts to help people enjoy all it has to offer. You travel through four railway tunnels – each tunnel is about 400 metres long and are lit during normal daylight hours. They are operated by a light sensor, so in winter when the hours of daylight are less, the lights in the tunnels will switch off earlier in the day – around 4.30pm. The route was recently voted the nation's favourite cycle route under 30 miles, demonstrating the clear potential for tunnels located within the attractive Welsh Valleys to develop as popular tourist attractions for pedestrians and cyclists.

6.1.3 Connect2 - Argoed

People living in and around Argoed were limited in their ability to access the beautiful surrounding countryside on foot and by bike. There was a missing link on the National Cycle Route 467 between Blackwood and Hollybush and people were forced to use a busy rural road that was dangerous for cyclists and pedestrians. Sustrans, in partnership with Caerphilly County Borough Council and the Valleys Regional Park (VRP), accessed European Regional Development funding and part of a Big Lottery Grant to build a new bridge which forms the centrepiece of a traffic-free walking, horse riding and cycling network.

With the bridge in place, local people have been able to make smarter travel choices and travel by foot or bike for more of their journeys. The route is incredibly popular with 44% of people using it every day to get to work, school, shops, or for leisure. Because the route is safe and traffic free it has given people a great place to exercise more frequently with 18% of cyclists on the route having recently started riding again.

- Schools benefiting from scheme: Markham Primary School;
- Workplaces benefiting from scheme: Argoed High Street, Oakdale Industrial Estate;

- 127% increase in total route usage after the opening of the route – 203% increase in walking;
- Estimated economic benefits over 30 years – £2,181,070 (with 81% of these benefits coming to health), giving a BCR of 17.2.

6.2 Direct job creation

Every time Sustrans delivers a project or scheme that spends money in the local and wider economy, jobs are created. In 2012 Sustrans' Research and Monitoring Unit began an interim study into the level of jobs sustained by the construction of walking and cycling routes. Using data from two infrastructure projects, the number of direct and indirect jobs that were supported could be estimated. The two projects were Community Links in Scotland and the Valley Cycle Network (VCN) in Wales; both related to investment in 2011/12. Further work was then undertaken to revisit Community Links with the 2012/13 schemes and add the 2012/13 Links to Communities projects in England. These four infrastructure projects accounted for 127 cycle and walking schemes and some of the data taken during the monitoring were cost, length and staff hours of each scheme. Key findings from the Sustrans Jobs Study (July 2013) include:

- 12.7 jobs are supported or sustained for every £1 million of investment in sustainable transport infrastructure;
- 1.6 jobs (direct, indirect and induced) are supported or sustained for every km of route constructed;
- The average cost per km of construction was £103,891.

The average cost per scheme was £128,199 and there were on average 0.74 FTE jobs per km of path constructed. With the opening of new link routes and tunnels, a considerable number of jobs could be created for the community.

6.3 Economic benefits of cycle tourism

Tourism is a crucial sector of the UK economy. It is the UK's fifth largest industry, employs 2.72 million people (2011) and is worth £115 billion a year. The industry is therefore critical to rebuilding the UK's economy and for generating employment, particularly among young school-leavers and in rural communities.

Tourism can contribute to the economy through direct spending, indirect spending and social value – determined by a 'willingness to pay' calculation. Cycle tourism represents a growing and valuable tourist market, particularly in rural areas, and can provide new incentives for people to visit an area and help support local trade and businesses.

6.3.1 Tourism spend on the VCN

In 2013, the Cycle Route Economic Impact Model (developed by Sustrans and The University of Central Lancashire) was used to estimate the impact of tourist spending on the Wales Valleys

Cycle Network (VCN), and indicates the significant potential for the attraction of tunnel routes to bring considerable economic benefits to the local area. Here it was estimated that:

- average home-based spend per head was £8.77
- average tourist spend per head at sites where tourists were surveyed was £22.52
- average total yearly spend was £103,050 per site
- In 2011, tourists contributed 11% of the annual spend with home-based cyclists contributing 89%.
- In 2012 tourists contributed 4% and home-based cyclists 96%.

An extension of the above model was to consider the results as part of a WebTAG transport scheme appraisal model. All required inputs for the model were taken from the aggregated outputs of all VCN RUIS results from 2013 (to maintain consistency with the source of the values used in the WebTAG estimations). As the tourism model only estimates the economic impact of cyclists on the route, only the different AUE uplift scenarios for cyclists were modelled.

This model showed that the total annual route spend by cycling tourists varied upwards from £120,360 (for a 50% increase in cycling) to as much as £184,552 (for a 130% increase in cycling). Most of this spend is estimated in the food and drink sector. The average spend for cycling tourists on the routes is estimated to be £25.71 per head and £9.25 per head for home-based cycling tourists.

6.3.2 Tourism spend on the Celtic and Taff Trails

The economic impact of these multi user routes in South Wales (with over 30 walking/cycling infrastructure projects) has also been explored.

The total demand for the Celtic Trail is estimated to be over 1.5 million user trips per annum; in comparison the Taff Trail attracts an estimated 628,000 user trips per annum. The level of expenditure by users estimated in the study is over £54 million on the Celtic Trail and £21 million on the Taff Trail each year. This includes direct expenditure and indirect expenditure by businesses that benefit from the existence of the trails. This gives a total impact of £75 million per year in the local economies of South Wales.

Of the total economic impact, the element generated by tourists using the trails amounts to £8.3 million per annum on the Celtic Trail and £1.6 million on the Taff Trail, i.e. this is additional income to Wales from inbound visitors.

The overall economic impact brings employment. It generates or safeguards 1,002 jobs on the Celtic Trail of which 153 can be attributed to inbound tourism. On the Taff Trail the figures are 367 jobs in total, of which 30 are generated by inbound tourism. This gives an overall employment

figure of 1,399 in the South Wales economy that can be directly attributed to the existence of the trails.

University of Lancashire (2008) research suggests users of the nearby Celtic Trail spend on average £94 (day trips) and £140 (overnight trips).

6.3.3 Wider benefits of cycle tourism

There are other benefits of cycle tourism too; including enhanced personal health and fitness, as well as the improving of cycling provision for local people, thereby encouraging utility cycling. It can also lead to a reduction in pollution and traffic congestion. Moreover, cycling is a socially inclusive activity and appeals to many ages and demographics.

6.4 Estimating the impact of tunnel projects

A study of existing research and a look to the benefits already enjoyed by similar routes and developments, make a strong case for the likely impacts from opening tunnels:

- Improved links between communities, bringing benefits to a range of local amenities including schools, workplaces and services;
- Direct and indirect job creation from the infrastructure works themselves and increased numbers of users now cycling and walking on the route;
- Increased tourism and associated spending at local businesses;
- Positive benefits to health from the increased levels of walking/cycling in the region;
- Overall positive return on investment.

6.4.1 WebTAG – Web-based Transport Analysis Guidance

Sustrans RMU modelling, as an England based function, uses the Department for Transport's WebTAG methodology in making estimations towards the possible impact and appraisal of sustainable transport initiatives. This tool models the expected monetized benefits from different scenarios of increase in the annual usage estimate (AUE) of pedestrians and cyclists on the route that might be expected with the tunnel opening.

It should be noted that in Wales the WelTAG rather than WebTAG tool is typically used in the appraisal of transport initiatives. WelTAG is adapted to Welsh-specific objectives and the outcomes and strategic priorities of the Wales Transport Strategy. The methodology is closely similar to WebTAG, and therefore the appraisals presented in this report using the Sustrans RMU model are directly relevant despite being based on WebTAG.

6.4.2 Estimating the Annual Usage

Currently, no Annual Usage Estimate (AUE) for four of the tunnels proposed exists. Instead a proxy value had to be used as the best estimate, taken from the average AUE seen across all

sites in the Valley Cycle Network (VCN) for which 2012 or 2013 estimates were available. The following sites were used in the calculation:

Site	Year	Total AUE	Cyclist AUE	Pedestrian AUE
Aberavon	2012	47,521	20,764	24,687
Aberbeeg	2012	15,213	1,520	13,240
Afan Argoed	2012	35,045	5,583	29,462
Blaenau Gwent	2013	8,749	2,202	6,547
Brynmwar	2012	26,923	6,334	19,160
Church Village Bypass	2013	59,533	24,319	29,747
Darran Valley	2012	8,979	3,573	5,104
Dowlais Top	2012	35,887	1,507	34,313
Ebbw Vale	2012	57,574	8,748	47,943
Gellideg	2012	14,126	858	13,013
Glyntaff	2012	103,365	43,399	57,862
Hirwaun Cynon Trail	2012	76,011	15,570	55,262
Llantrisant	2013	72,909	7,383	60,622
Llynfi	2012	40,971	7,274	32,802
Maesteg	2013	31,235	5,944	24,764
Parc Bryn	2012	140,434	15,980	116,292
Pontymoel Basin	2013	124,098	44,289	71,604
Sirhowy Country Park	2012	97,618	45,888	48,099
Torfaen	2013	30,685	2,079	28,010
Treforest	2013	31,138	5,334	24,364

From this average, a total baseline AUE of 50,606 can be generated, equating to 13,437 cyclists and 37,145 pedestrians. These values have been used as a proxy for the level of use on the routes close to the Tunnels. From this baseline level of use, the economic impact of different scenarios of increased use resulting from the tunnel opening can be modelled for.

It should be noted that for this exercise a basic estimation has been used, based on experience of increased usage of Valleys Cycle Network routes. In relation to walking trips especially further work is required for more sophisticated modelling with regarding to how pedestrian use of tunnels differs to shared use paths.

6.4.3 AUE increase scenarios

The Bath Two Tunnels case has been used as the maximum increase in AUE on which the impact of the Rhondda and Abernant Tunnels opening will be modelled. (These sites both have a tourist focus with the Rhondda Tunnel the second longest walking and cycling tunnel in the world and Abernant has a long tunnel located next to the Taff Trail and the very popular Bike Park Wales.) This was decided because the Bath Two Tunnels was the first Sustrans project of its kind and had lots of momentum through events and promotional activity. After the tunnel had opened annual overall usage on the route increased by 130%.

WebTAG will be used to model the expected monetized impacts from a maximum increase in the cyclist and pedestrian AUE of 130%. In-order to estimate the impact for different scenarios of AUE uplift, WebTAG will also be used to measure the impact for smaller increases in AUE, of 50%, 70%, 90% and 110%. Such increases are within the range of increases seen at similar developments (Afan Argoed and Rodney Street Tunnel in Edinburgh).

The following post-development AUE's for cycling and walking have therefore been used in WebTAG:

Increase	Post cycling AUE	Post walking AUE
50%	20,156	55,717
70%	22,844	63,146
90%	25,531	70,575
110%	28,219	78,004
130%	30,906	85,433

Other inputs required in WebTAG include:

- Trip frequency
- Journey Purpose
- Trip distance
- Proportion of users not using a car for any part of their journey
- Proportion of users who could have used a car for their journey but have chosen not to

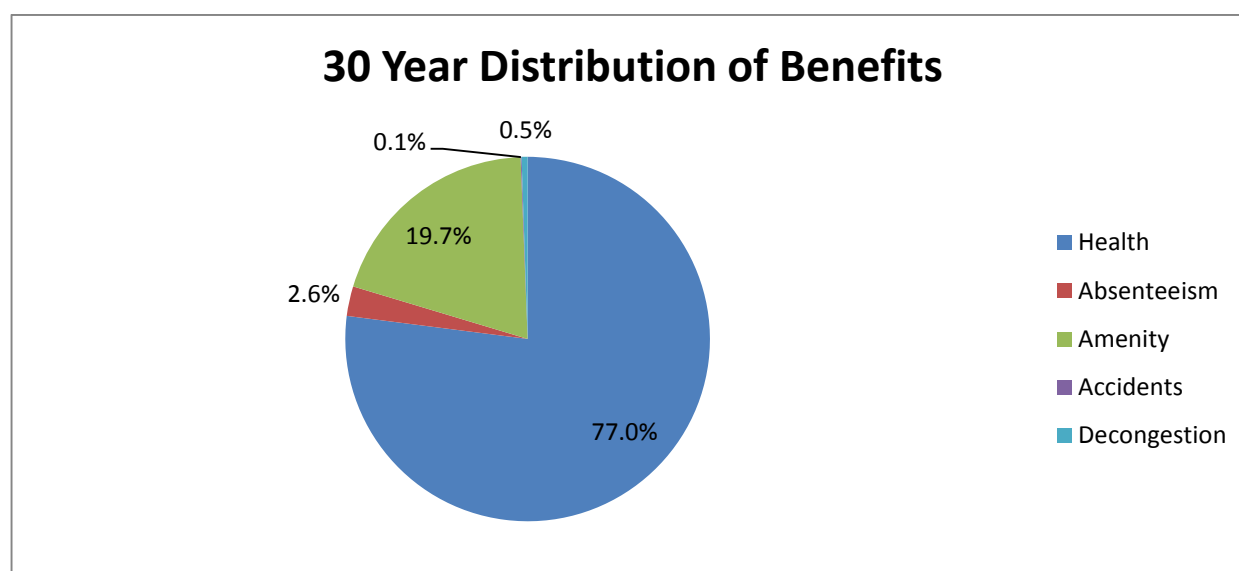
These inputs were all taken from the outputs from aggregated results across all VCN Route User Intercept Survey (RUIS) results from 2013, deemed the most relevant proxy information for the tunnels that was available. The values used in each of these variables have been kept consistent between baseline and follow-up, in-order to measure the effect of uplift in AUE only. Although many of these variables might be expected to change between baseline and follow-up (for example, an increase in recreational use) it is difficult to make accurate estimations as to the level of changes expected here. As a result, these variables have all been kept consistent, to allow for the impact of an increased AUE to be measured only. The outputs given should therefore be considered conservative, as they are not considering the likely positive impact of these other variables changing between baseline and follow-up.

6.4.4 WebTAG estimated economic impact

The table below shows the estimated economic impacts for each of the different scenarios of AUE uplift over a 30 year appraisal period:

		Cycling AUE increase				
		50%	70%	90%	110%	130%
Walking AUE increase	50%	£5,036,350.93	£5,347,563.30	£5,637,613.86	£ 5,927,664.43	£ 6,238,876.80
	70%	£6,189,625.19	£6,500,837.55	£6,790,888.12	£ 7,080,938.68	£ 7,392,151.05
	90%	£7,342,899.44	£7,654,111.80	£7,944,162.37	£ 8,234,212.94	£ 8,545,425.30
	110%	£8,494,762.91	£8,805,975.27	£9,096,025.84	£ 9,386,076.40	£ 9,697,288.77
	130%	£9,648,037.16	£9,959,249.53	£ 10,249,300.09	£ 10,539,350.66	£ 10,850,563.02

These benefits are spread across a range of areas, as exemplified in the chart below (from the 90% increase in cycling and walking AUE scenario):



6.4.5 Tourist impact

The impact of Tunnel openings will extend beyond that possible to measure through WebTAG. The Sustrans tourism model can also be used to estimate the economic impact of cycle tourists on the route from each of the different scenarios of AUE uplift already discussed. ***Such impacts can be considered additional to those estimated through WebTAG.***

The model estimates the total annual spend and a 'spend per head' for all recreational cyclist users on the route (separated into home-based and tourist users). It also calculates the number of full time equivalent (FTE) roles this would support.

The model was developed in 2007 by Sustrans and the University of Central Lancashire (UCLAN) to estimate the economic impact of cycle tourism in the North East of England. The original research was based on four key long distance tourism routes in the North East. Since 2007, the model has been updated iteratively within Sustrans to improve the usability of the model, most recently in March 2014.

All required inputs for the model were taken from the aggregated outputs of all VCN RUIS results from 2013 (to maintain consistency with the source of the values used in the WebTAG estimations). As the tourism model only estimates the economic impact of cyclists on the route, only the different AUE uplift scenarios for cyclists have been modelled for.

The table below shows the total annual route spend by cycling tourists to vary upwards from £120,360 (for a 50% increase in cycling) to as much as £184,552 (for a 130% increase in cycling). Most of this spend is estimated in the food and drink sector. The average spend for cycling tourists on the route is estimated to be £25.71 per head and £9.25 per head for home-based cycling tourists.

Area of benefit		Pre	50%	70%	90%	110%	130%
Social value of trips	All recreational	£47,314	£70,973	£80,437	£89,899	£99,364	£108,825
Route spend	Total route spend	£80,238	£120,360	£136,411	£152,456	£168,507	£184,552
Spending by sector	Accommodation	£1,422	£2,133	£2,417	£2,701	£2,986	£3,270
	Food and drink	£58,387	£87,582	£99,262	£110,938	£122,618	£134,294
	Retail	£1,605	£2,407	£2,728	£3,049	£3,370	£3,691
	Car costs	£9,319	£13,980	£15,844	£17,707	£19,572	£21,435
	Cycle costs	£2,376	£3,564	£4,040	£4,515	£4,990	£5,465
	Public transport	£2,407	£3,611	£4,092	£4,574	£5,055	£5,537
	Other	£4,722	£7,082	£8,027	£8,971	£9,916	£10,860
Employment	Direct employment	1.2 FTE	1.8 FTE	2.0 FTE	2.3 FTE	2.5 FTE	2.7 FTE
	Indirect employment	0.68 FTE	1.02 FTE	1.15 FTE	1.29 FTE	1.43 FTE	1.56 FTE
Spend per head	All recreational	£9.48	£9.48	£9.48	£9.48	£9.48	£9.48
	Tourists	£25.71	£25.71	£25.71	£25.71	£25.71	£25.71
	Home-based	£9.25	£9.25	£9.25	£9.25	£9.25	£9.25

It should be reiterated that all the estimated spends here are based on cyclists only. It has been estimated that a considerable number of pedestrians would also use on this route, which would also likely have a significant spend in the local area. The levels of spend presented above should therefore be considered as conservative estimations for cyclists only.

6.4.6 Combined tourist and WebTAG impact

To give a more holistic estimation for the economic impact of opening the Tunnels to cycling and walking, the total route spend by cycle tourists on the route can be combined with the outputs provided through WebTAG. Given that WebTAG's outputs are given over a 30 year appraisal period, first the cyclists' total route spend (above) must be adjusted to reflect the total spend by the 30th year. To maintain consistency with the methodology used in WebTAG, a discount rate of

3.5% per annum has been applied to each of the total route spend scenarios presented above, giving the following outputs:

Scenario	Cycling tourist route spend by year 30
Pre	£1,527,392
50%	£2,291,145
70%	£2,596,688
90%	£2,902,117
110%	£3,207,660
130%	£3,513,089

The total spend by cycling tourists over 30 years can now be combined with the outputs given by WebTAG to give a more holistic picture of the route's economic impact. How these estimated economic impacts look in terms of the return on investment possible can also be explored through simple benefit cost ratio calculations. At this stage, it is not known how much the opening of the Tunnels, and related extension of the NCN routes, will cost. The table below presents a conservative estimate of the BCRs according to several proposed costs, and for three of the AUE scenarios modelled for (representing the smallest, middle and maximum AUE increases).

AUE increase in both cycling and walking	WebTAG outputs	Tourism model output	Combined impact	BCR for £1 million cost	BCR for £2.5 million cost	BCR for £5 million cost	BCR for £7.5 million cost	BCR for £10 million cost
50%	£5,036,350.93	£2,291,145	£7,327,495.93	7.33	2.93	1.47	0.98	0.73
90%	£7,944,162.37	£2,902,117	£10,846,279.37	10.85	4.34	2.17	1.45	1.08
130%	£10,850,563.02	£3,513,089	£14,363,652.02	14.36	5.75	2.87	1.92	1.44

As shown in the table above, positive returns on investment for many of the scenarios modelled can be seen. Considering the location of the tunnels the Abernant and Rhondda (as well as the Tregarth) will act as a tourist attraction and the tourism model output should be applied.

However the Pennar and Usk will not have the tourist effect because of their short length and location and therefore the tourist model output has been set to zero.

AUE increase in both cycling and walking	WebTAG outputs	Tourism model output	Combined impact	BCR for £1 million cost	BCR for £2.5 million cost	BCR for £5 million cost	BCR for £7.5 million cost	BCR for £10 million cost
50%	£5,036,350.93	£0	£5,036,350.93	5.04	2.01	1.01	0.67	0.50
90%	£7,944,162.37	£0	£7,944,162.37	7.94	3.18	1.59	1.06	0.79

130%	£10,850,563.02	£0	£10,850,563.02	10.85	4.34	2.17	1.45	1.09
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6.4.7 Job creation

With the opening of any tunnel, a considerable number of jobs would also be expected to be created.

Based on a number of infrastructure projects (including the Valley Cycle Network), the 2012 Sustrans' Job Creation Study shows that:

- for every £1 million of investment in sustainable transport infrastructure, 12.7 jobs are supported or sustained;
- for every kilometre of route constructed, 1.6 jobs (direct, indirect and induced) are supported or sustained.

Depending on the length of route developed and the overall level of investment required; the Tunnels opening would be expected to create a significant number of jobs for the local area.

6.4.8 Summary

Chapter 6 has presented a number of estimations for the impact of the Tunnel openings on the local area. Modelled against a range of scenarios for the increase in walking and cycling that might be expected, the Department for Transport's WebTAG tool and Sustrans' tourism model have estimated that:

- an economic impact of **£7,327,496** could be expected over 30 years for a very conservative increase in use of 50% in both walking and cycling (including the impact of cycle tourists over the route);
- an economic impact of **£10,846,279** could be expected over 30 years for an increase in use of 90% in both walking and cycling (including the impact of cycle tourists over the route);
- an economic impact of **£14,363,652** could be expected over 30 years for an increase in use of 130% in both walking and cycling (including the impact of cycle tourists over the route).

A significant number of jobs would also be expected from the opening of the route:

- for every £1 million of investment in sustainable transport infrastructure, 12.7 jobs are supported or sustained;
- for every kilometre of route constructed, 1.6 jobs (direct, indirect and induced) are supported or sustained.

Although it is important to consider all impacts presented here as conservative, and only covering a small area over which the full range of benefits might be expected, all such estimations point towards a considerable positive impact of the project. It is hoped that such research helps inform

and support the business case for bringing the Tunnels back into use as a walking and cycling route.

It should be noted that the figures presented are an average for the region and considering the location of each tunnel in relation to the NCN this data is considered the best available for the Rhondda (both WebTAG and Tourist outputs) and the Pennar and Usk (WebTAG only). However considering the close proximity of the Abernant tunnel to the Taff and Cynon Trails it would be possible to obtain further data from these routes so that the AUE estimate is more site specific.

7 Stage gate analysis of key activities

To successfully implement a walking and cycling route scheme, including tunnels, three areas need to be considered. They are:

1. Engineering – All aspects of the scheme from technical survey of the tunnels structure, construction and maintenance.
2. Ecology – carrying out surveys (including bats), complying with legislation and implementing mitigation measures.
3. Social and Management – How will the community react to opening the tunnel, will they support the scheme and will they help to promote it and maintain it.

This section of the report will look at an overview of the engineering and ecological issues. The social and management issue are dealt with in chapter 9, community engagement.

Introduction

The stage gate process from feasibility to post construction consists of 8 stages, each being discussed in more detail below. The following diagram sets out a suggested programme:

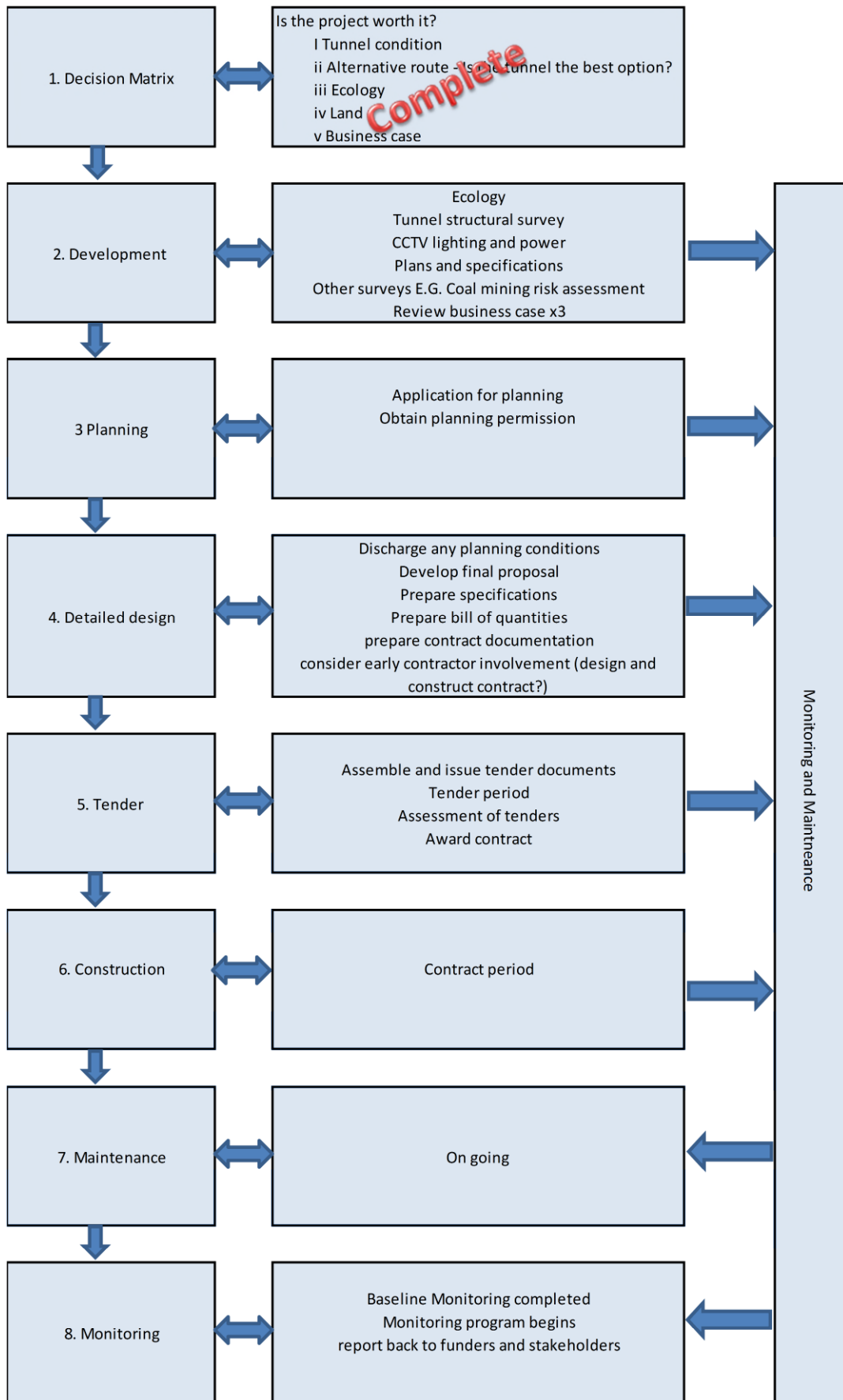


Figure 8 Stage gates

During the project two issues need to be addressed at every stage. They are:

- Maintenance and management – maintenance should be considered as part of the route development process long before work to build it starts. A high standard of design and construction will mean less maintenance in the future.
- Monitoring and evaluation – Project monitoring is essential in measuring the impacts of the work proposed and making the case for future investment. It should be considered at every stage of the project. The cost of the monitoring regime will need to be considered stemming from an assessment of what needs to be monitored and the methodology (e.g. automatic counters, intercept user surveys, etc.), and to accurately measure the impact of the project will require data from before and after completion.

The eight stage recommended process for developing tunnels as walking and cycling routes has been applied in detail to the Rhondda Tunnel. This is issued as a separate report and the information is therefore not duplicated here.

8 Estimated Costs

8.1 Stage 1 decision matrix

No further costs anticipated as the decision matrix methodology has been applied as part of the process of producing this report.

8.2 Stage 2 Development

Development costs for each of the tunnels has been estimated based on evaluations gathered for the Rhondda tunnel. Each tunnel has its own unique issues and it is therefore recommended that prior to further work being carried out cost estimates are reviewed. (Development costs for the Tregarth Tunnel have already been expended). A more detail cost breakdown is given in Appendix 7

Development Costs				
Abernant	Rhondda	Pennar	Tregarth	Usk
£231,732	£305,500 (Includes costs to clear one of the tunnel entrances estimated at £50,000)	£96,250	£0	£91,250

8.3 Stage 3 Planning

For compiling all documentation, submitting the application and confirming validation. This does not include the planning fee charged by the planning authority.

Planning Costs				
Abernant	Rhondda	Pennar	Tregarth	Usk
£1055	£1055	£1055	0	£1055

8.4 Stage 4, 5 and 6 Detailed Design, Tender and Construction

For both the Abernant and Rhondda tunnels there is insufficient information to estimate a cost for works required to the tunnels structure. However the Pennar, Tregarth and Usk tunnels are similar and construction costs have been derived from the estimate given for the Tregarth tunnel of £550,000. Costs have also been included for the construction of the linking paths based on an

estimate of £110,000 per Km plus any additional works that may be required such as bridges or major earthworks.

Main item	Construction Cost				
	Abernant	Rhondda	Pennar	Tregarth	Usk
Tunnel structure	?	?	£807,749	£550,000	£474,908
Route links	£421,190	£374,000	£295,000	£0	£102,000
Construction Total	?	?	£1,102,749	£550,000	£576,908

8.5 Overall scheme cost estimates

These calculations cover the estimated cost from project inception to completed construction, as itemised above. It should be noted that this cost covers both tunnel and any linking path required. There is an incomplete cost picture because of the scale of investigation still required for the Abernant and Rhondda tunnels.

Cost				
Abernant	Rhondda	Pennar	Tregarth	Usk
2283 metres	3148 metres	398 metres	271 metres	234 metres
?	?	£1,200,054	£550,000	£669,213

8.6 Stage 7 – Maintenance

Note these costs are based on limited data. An in depth study is recommend establishing more robust figures and who and how this cost is paid.

The costs set out below cover the running costs (electricity, inspections maintenance) of the tunnel and its linking paths per year. For a breakdown of possible maintenance costs see appendix 8

	Abernant	Rhondda	Pennar	Tregarth	Usk
Total cost per year	£30,473	£37,158	£7,580	£4,790	£5,098

8.7 Stage 8 Monitoring

The costs below should be absorbed into the construction scheme stage 6. The costs would be the same for each tunnel.

Item	Cost	Includes
One walking and cycling counter	£5,000	Automatic data collection for 2 years

Route user survey	£5,000	Survey over 4 days, face to face. One week day during term time, one weekday during school holidays, one weekend day during term time, one weekend day during school holidays
Route user Survey analysis	£500	Data analysis by Sustrans RMU
Other surveys as agreed with funders	?	

Total Monitoring costs	£10,500
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9 Community engagement

Stakeholder and community engagement is a crucial part of the delivery process. Successful community engagement leads to successful schemes that address the needs of users, stakeholders and the local community. Opening disused railway tunnels can create a great deal of interest and the anticipation of the tunnel being opened in the very near future need to be managed. By successfully engaging with the stakeholders and the people of the community promoters of reopening the tunnel will be able to manage expectations effectively.

Successful community and stakeholder engagement will make sure:

- The scheme meets local needs, addressing the real issues of the community and stakeholders
- The views of people affected by the scheme are taken into account during the design stage and can help reduce objections to scheme, ensuring a smoother formal consultation and delivery through the planning system
- The local community feels ownership of the scheme, maximising usage of the scheme and volunteers may be more eager to help maintain and promote the route in the future
- Reputational risk is managed, as all stakeholders are invested in the process and understand the benefits of delivery
- Promotional opportunities are realised during the planning and opening stages
- There are opportunities provided to promote sustainable travel to the local community to improve health and well being

9.1 Identifying the community and stakeholders, who are they?

The first step when planning community and stakeholder engagement is to identify who you want to engage with. For an infrastructure project the community is anyone who will be affected by the project.

Stakeholders are key people and organisations who will have an impact on the success of the project. This could be:

- Statutory stakeholders, people and organisations that need to be involved by law such as the Local Authority
- Local organisations including people in voluntary roles
- Special interest groups who represent specific groups such as a people with a disability or local preservation groups
- Individuals with specific experience or knowledge that could contribute to the programme

When identifying community stakeholders it is important to be aware of how they represent sections of the community. Working only with established community leaders is not always an adequate substitute for engaging the wider community.

9.2 Planning community engagement

When planning public engagement it is vital to be clear what the purpose of the engagement is, what has potential to change, how you will use the information you collect and the available budget/resources.

9.2.1 Checklist for engagement

Before you engage the community make sure you can answer the following questions:

- Is there clear agreement about what the engagement is for, what can be changed as a result of consultation and what is fixed?
- Are you clear about what information you will collect and how it will be used?
- Are you going to explain to participants why they are being consulted and what their answers will be used for?
- Do you know how you will feed back to the community?
- Do you have the time money and resources to properly engage?
- Do you need outside resources or specialists in engagement to run this part of your process for you?

9.3 Correct level of engagement

It is vital to select the most effective level of engagement for any project, both in terms of the intensity of the engagement and the role that the local community have in decision making. Factors to take into account include:

- Is the project is likely to be controversial?
- Will the scheme affect lots of people? (A limited number of people will be living close to the potential works but the scheme can have a positive impact on jobs and businesses in the local area)
- Is there flexibility in the design and can local stakeholders be involved in the design process? (In this case, they should be able to and this can help manage expectation and give people a say in the important aspects of safety and security)

Community engagement stages

The typical stages involved in a community engagement process, and questions to consider at each stage, are summarised below.

Stage	Things to think about	Suggestion for engagement
1 Decision Matrix - Pre-design	What is the local support for the project?	Ask the community and potential stakeholders
	Can we work with communities to develop support?	
	What are the needs, requirements and aspirations of the local community/ is there a community or neighbourhood plan?	Get involved in other programs to support the tunnel project. E.G. support for Afan Forest park centre, NRW's Area based approach to natural resource management Brainstorm, ask the community, advertise, ask other organisations
	Who are the stakeholders? List them	
2 -5 Development, Planning, detailed design, tender - Design and planning	How can we involve the community in the design?	On street pop-up events, design workshops, community mapping, flyers inviting feedback
	What engagement is required for the planning?	Encourage letters of support
	How to engage with negative feedback?	Reply to concerns quickly. Is their points valid, can design changes be made?
6. Construction - Build	How to make sure the community are informed?	Newsletters, website, social media, U-tube, TV and Radio
	How do we keep the community involved?	Construction site visits, talks and presentations by construction staff, telling the stories of local people working on the site
	How will you manage negative impacts and delays during build?	Try to anticipate delays and announce them. Deal quickly and efficiently with real issues, listen to peoples complaints
OPENING!	How to involve the wider community?	Led walks and rides, Party! BBQ!
7 & 8 Maintenance and Monitoring	keep people informed about the project through effective communication: it is vital to let people know what happened as a result of their engagement.	Route inspection, minor maintenance, visitor guides, resource developments for schools
	What is the ongoing role for volunteers and ambassadors	
	How will volunteers and champions be supported	Though Sustrans volunteer program

9.4 Steering/planning group

Interested members of the community and local stakeholders may wish to form a steering/planning group to advise upon and support the delivery of a scheme.

It is sometimes advisable to consider forming sub-groups to focus on specific work areas such as technical and design, and community engagement or public relations which may help to optimise members' time and capabilities.

The project may also want to seek other experts and make formal partnerships. This will reassure funders that it has the necessary skills to manage such a large project.

9.5 Recording, measuring and reporting engagement

It is important to record and review the engagement process. This allows you to know which methods have worked or not worked. Recording the process also allows you to show to the community and funders what you've done and how the information you have gathered has been used.

It is important to think about how you will monitor and record engagement at the planning stage.

Potential methods of recording projects include:

- Recording the numbers of engagement activities held and number of people engaged
- Documenting the project using photographs, video and capturing social media engagement
- Feedback from participants

9.6 Feedback to the community

It is vital to feedback to the community what happened as a result of the engagement process. This should include what was done, how many people were engaged, what information was gathered, what will happen as a result of the engagement and what the next steps are. This should form part of the ongoing communication with the community throughout the project.

9.7 Feedback to the funder and partners

Keeping the funder and partners informed about the engagement process is essential. The report should include the number and type of events run, attendance figures and the key feedback from participants. Photographs, video and online comment can help to make feedback lively and interesting.

10 Funding sources

A full analysis of the required funding stages and potential funding sources has been provided within the Rhondda Tunnel report and therefore is not duplicated here but a summary table with options for different funding stages is provided in the table below.

Welsh Government may consider that in taking forward a programme-wide approach to developing tunnels as Active Travel Routes further funding opportunities may exist, for example within the Metro programme or Rural Development programme. The advantage of a more holistic approach rather than individual schemes is that it allows incremental development of the tunnels and associated networks, from quick wins to more problematic longer terms projects in a co-ordinated way, taking advantage of funding as it becomes available and ensuring consistency across locations and synergy with regional initiatives.

Stage	Steps	Funding required	Funding source
1. Decision Matrix	Is the project worth it? i Tunnel condition ii Alternative route iii Ecology iv Land v Business case	Completed	
1a Tunnel access	A project within a project	£50,000	LTF,
2. Development	Ecology Tunnel structural survey CCTV lighting and power Plans, surveys and specifications Safety & CDM Review business case x3	£11,500 £86,500 £40,000 £92,000 £25,500 Total = £255,500	Rural development Fund LTF NRW (Area based natural resource management) HLF Start Up HLF Sharing Heritage
3 Planning	Application for planning Obtain planning permission	£1,055	Local Authority
4. Detailed design	Discharge any planning conditions Develop final proposal Prepare specifications Prepare bill of quantities prepare contract documentation consider early contractor involvement (design and construct contract?)	????	HLF Pen y Cymoedd Wind Farm Community Fund
5. Tender	Assemble and issue tender documents Tender period Assessment of tenders Award contract	????	
6. Construction	Contract period	Probaly £millions	HLF Pen y Cymoedd Wind Farm Community Fund Railway Heritage Trust
7. Maintenance	On going	£37,000	HRE Dowry LA's Pen y Cymoedd Wind Farm Community Fund Sustrans via volunteer program Income from utilities
8. Monitoring	Baseline Monitoring completed Monitoring program begins report back to funders and stakeholders	In construction costs	

11 Conclusions

Twenty one disused railway tunnels in south east Wales have been identified as possible candidates for future use as walking and cycle route as well as the Tregarth, Bethesda Tunnel in North Wales. The Tregarth tunnel was included because it is a shovel ready scheme so offers good comparison.

Using the decision matrix, twelve of the tunnels were discounted because of very poor tunnel condition, a better alternative route was available or land to provide linking routes was not available. A further five have been designated as “worth further study” because of their favourable location or possibilities for alternative use.

This leaves five tunnels that could be feasibly developed for walking and cycling as a first priority. Using Sustrans Route Assessment and Transport Evaluation (RATE) tool the following tunnels, in prioritised order, could be developed:

1. Abernant Tunnel – Cross valley link between Aberdare and Merthyr Tydfil
2. Rhondda Tunnel – Cross valley link between the Afan and Rhondda Valleys,
3. Pennar Tunnel – Cross valley link between Pontllanfraith and Newbridge
4. (Tregarth Tunnel – Shovel ready scheme on NCN 82.
5. Usk Tunnel – Disused railway line avoiding busy road

Going forward it is recommended that:

- A further study is carried out into tunnel maintenance and running costs and sources of income assigned to each item. Investigate ways to accumulate a fund to maintain the tunnel after reopening. (required for funding applications)
- If any tunnel is to be developed carry out ecology studies, especially bats, as soon as possible
- If any tunnel are to be developed land required for linking routes and tunnel ownership must be secured as soon as possible
- Support should be given to interest groups and local authorities to develop community support for reopening a tunnel. Without good community support the scheme will be unsuccessful

- Agree on an acceptable Benefit Cost Ratio (BCR) for each scheme. As the scheme is developed the BCR needs to be reviewed and development abandoned if the BCR becomes unacceptable
- The business case uses Annual Usage Estimates (AUE) based on average data collected from schemes from recent Valley Cycle Network (VCN) work. In most cases this is the best data that can be generated. However with the Abernant tunnel being close to the Taff and Cynon Trails more work is recommended to obtain an AUE specific to this tunnels location.
- Further discussion needs to take place in to deciding the tunnel priorities. Each one has its own strengths that it could be argued would make it the number one priority.
- Consider using one of the smaller tunnels, especially Tregarth (because the scheme is shovel ready) as a pilot scheme to be used for developing the longer tunnels of the Rhondda and Abernant.
- Carry out further investigation into the Cymer tunnel and its suitability for walking and cycling use because of its high score in the RATE process (issues with land and blocked entrance).
- Look at other funding options to develop tunnels for other uses such as adventure activities and research facilities.
- Develop a prioritised program of new routes that will compare schemes in the Tunnels, Trunk Road and NCN gaps programs.

12 References

National Transport Finance Plan, Welsh Government (2015)

Celtic and Taff trails Economic Impact Study, University of central Lancashire/Sustrans (2008)

Ecology note 06: Ecology in the planning system;

<http://www.sustrans.org.uk/sites/default/files/images/files/migrated-pdfs/Ecology%20Note%2006%20-%20Ecology%20in%20the%20Planning%20System.pdf>

Sustrans handbook for cycle-friendly design

http://www.sustrans.org.uk/sites/default/files/images/files/Route-Design-Resources/Sustrans_handbook_for_cycle-friendly_design_11_04_14.pdf

Active travel design elements

<http://gov.wales/docs/det/consultation/140430-active-travel-appendix-a-design-elements.pdf>

Forgotten relics

<http://www.forgottenrelics.co.uk/tunnels/gallery/rhondda.html>

Re-opening the Rhondda Tunnel: The Challenges. By David Newton

Sustrans Design manual Chapter 8 Bridges and other structures

Sustrans Design manual Chapter 13 Community and stakeholder engagement

Sustrans Design manual Chapter 14 Land legal and planning

Sustrans Design manual Chapter 15 Maintenance and management of routes

Sustrans Design manual Chapter 16 Monitoring and evaluation of walking and cycling

<http://www.sustrans.org.uk/our-services/infrastructure/route-design-resources/documents-and-drawings/key-reference-documents>

13 Appendix

Appendix 1 – List of Stakeholders

List of stakeholders contacted.

- Brecon Beacons National Park
- Bridgend County Bough Council
- Caerphilly County Bough Council
- Cardiff City Council
- Historic Railway Estate
- Merthyr Tydfil County Bough Council
- Monmouthshire Bat Group
- Monmouthshire County Council
- Natural Resources Wales
- Neath Port Talbot County Bough Council
- Railway Paths Limited
- Rhondda Cynon Taff County Bough Council
- Rhondda Tunnel Society
- South Wales Outdoor Activity Providers Group
- Usk Trail Action Group
- Vale of Glamorgan County Bough Council
- Vincent Trust
- Welsh Water

Appendix 2 – Applying the decision matrix, findings.

The following table shows an outline of our findings for each tunnel. The chart has been colour coded:

- Red – A possible tunnel scheme fails badly on condition, alternative route, ecology or land.
- Amber – A scheme where it is recommended that more research is carried out
- Green – A scheme worth looking at the business case and possibly taking on to the development stage.

Tunnel name	1. Tunnel condition	2. Alternative route.	3. Ecology.	4. Land.
Abernant, Merthyr	DfT (Department for Transport) engineers describe the tunnel as poor, however the view of Hammond who recently carried out maintenance work in the tunnel is that it is in reasonable condition. Sustrans inspection report of 2009 described the tunnel "The basic structure is in very good condition and no defects were observed which would indicate that the tunnel was unstable or unsafe in any way. Most defects relate to relatively superficial items and are readily repairable at modest cost.	There are two possible alternative routes from the centre of Aberdare to the centre of Merthyr. The first is via route 46 which has not yet been completed because of land issues. It would also be 3.4 miles longer and has an extra climb of 110m. The majority of this alternative route is also on road and is unlikely to encourage modal shift. The second alternative is via the Cynon Trail (NCN 478) and Taff Trail (NCN 8) and is 10.7 miles longer	No designated sites	The approach to the tunnel on the west side is owned by Rhondda Cynon Taff Council. The Tunnel is owned by DfT and the land on the east side is in private ownership. Merthyr Tydfil Council have a good working relationship with the owners and are of the view that private ownership would not stop the development of the tunnel and a linking cycle route to the Taff Trail
Barry Island	Tunnel condition is described by DfT as fair. The tunnel in the past has been used as a shooting range	The tunnel leads from a live railway to the docks area which already has alternative access. This would not be a worthwhile addition to the network	No designated sites	The land on the east approach is privately owned and the tunnel is in the ownership of the DfT
Tregarth, Bethesda	Tunnel condition – very good	Alternative route – up and over steep hill via roads (one busy) This route is unlikely to encourage modal shift. Therefore tunnel presents the best route	Ecology. Evidence of Bats found however this has been mitigated by good design	All in the ownership of Gwynedd County Council
Clydach	The tunnel is in good condition and has open access to the public. It is often used by outdoor pursuits organisations	There is an alternative route already in place	Designated site but site already open to the public	No issues land owned/leased by RPL or Sustrans

Tunnel name	1. Tunnel condition	2. Alternative route.	3. Ecology.	4. Land.
Cwm Cerwin	The tunnel condition is described as bad by the DfT. The condition of the tunnel's lining is distorted in places. Around 330 yards from the west end, four strengthening ribs have been inserted, supported on timber footings. Water leaches through the brickwork at many locations, forming substantial calcite deposits on the walls. Failure of the drainage system has resulted in thick mud accumulating, particularly through the level eastern half.	Alternative routes could be developed either via forestry tracks to the south or alongside the existing B4282. However both these routes would involve significant gradients. Therefore the tunnel route would be the route most likely to promote modal shift.	No designated sites	The land to the east of the tunnel is owned by the local authority, Tunnel owned by DfT, land to the west of the tunnel is a mixture of private and local authority
Cymer	The tunnel condition is described by DfT as fair. It should be noted that the tunnel at its northern end is blocked North Portal buried in 1976 as part of a road/bus turning area scheme.	An alternative route is in place (NCN 885) but this involves a climb of over 120m and part of the route is on the busy A4063. This route is not up to current active travel act standards and would not encourage modal shift. The tunnel route could provide a relatively flat direct route and could be easily used by everyone	No designated sites	Land to the south of the tunnel is in private ownership. The tunnel is owned by DfT and to the north it is owned by the local authority.
Gelli	The tunnel is fully open to access. The tunnel is reported to be wet throughout and has one section of collapsed lining	An alternative route is already in place and follows an acceptable alignment and gradient.	No designated sites	The tunnel and surrounding land is owned by the local authority
Gellifelin	The tunnel is in good condition	An acceptable alternative route is in place (NCN 46)	The tunnel lies in the Cwm Clydach SSSI	Land to the east is in private ownership the tunnel and the land to the west is owned by Railway Paths Limited

Tunnel name	1. Tunnel condition	2. Alternative route.	3. Ecology.	4. Land.
Graig, Treforest	The DfT describe the tunnel condition as bad and sealed in the centre	An alternative route is in place but requires the use of traffic calmed roads and paths than can be convoluted. With key destinations either side of the tunnel (South Wales University and Dewi Sant Hospital) are well serviced by the stations at Treforest and Pontypridd and its unlikely that there is much travel between these 2 destinations	No designated sites	Land to the south owned by South Wales University Tunnel owned by DfT, land to the north NHS Estates
Gyfychi	This tunnel is blocked at its northern end because of a landslide in 1947. The tunnel is now approximately 50% flooded	An alternative route from Tonmawr could be constructed to join the Richard Burton Trail at Efail Fach, just north of Pontrhydyfen. The trail would require some straight forward upgrades (vegetation cut back and new surface)	No designated sites	Owned by Welsh Government
Hafodyrynys	Tunnel and cuttings either side are completely filled	An alternative route is in place (NCN466). This route is steep (Lewis Street) in places and uses traffic calmed and the 30mph B4471. An alternative traffic free route could be constructed over the tunnel site because of the cuttings infill an acceptable gradient could be obtained for a traffic free route.	No designated sites	Caerphilly County Bough Council, private land owners and/or NRW depending on route alignment
Monmouth	Tunnel is reported to be in good condition	Alternative route is not available and the tunnel route would not be suitable because it currently ends in the Highways Depot of Monmouthshire County Council. The route would then be stuck between a the busy B4293 and the A40 Trunk Road and the river Trothy. Therefore from a network perspective this tunnel is not suitable	No designated sites	Monmouthshire County Council

Tunnel name	1. Tunnel condition	2. Alternative route.	3. Ecology.	4. Land.
Morlais, Merthyr	Tunnel is reported to be in good condition. The Ventilation Shaft to the Tunnel is listed as one of an exceptional group of distinctive railway structures from the industrial history of the area.	An alternative route is available via the residential roads in and around Pant. Could provide an alternative route to the existing NCN route 46	No designated sites	Merthyr County Borough Council
Pennar, Pontllanfraith	Tunnel is reported to be in a fair condition	The alternative route is via the steep busy B4251 and is not acceptable. The tunnel route would be the best option	No designated sites	Tunnel and land Owned by DfT
Pont Walby	The tunnels is in poor condition and is filled in at its eastern end after the creation of the A465 dual carriageway	The alternative route is currently via the Rhigos Road. To provide an alternative traffic free route would be very expensive and its usage is likely to be low.	No designated sites	Tunnels owned by DfT, land required either side is private and/or Welsh Government (Trunk Road)
Quakers yard	The tunnels appear to be in good condition (completely open at either end). No inspection information has been located because ownership of the tunnel is unknown	An alternative route is possible via the Cynon and Taff trail. However a user coming from the Cynon Valley and then going north towards Merthyr would welcome the short cut	No designated sites	The land to the west is Owned by Rhondda Cynon Taff Council, Tunnel unknown ownership, land to the east Merthyr Council, land to the north for Taff Trail link, Dwr Cymru
Redbrook	The tunnel is fair condition	No routes have been developed in this area and would lead directly into England. Not part of planned network	No designated sites	Land both side of the tunnel in private ownership. Tunnel owned by DfT
Rhondda	The tunnel is in stable condition, but a more in depth study is required to determine if full condition	No alternative route available	No designated sites	Land owned by Neath Port Talbot Council on west side, tunnel owned by DfT, land owned by Rhondda Cynon Taff council on east side

Tunnel name	1. Tunnel condition	2. Alternative route.	3. Ecology.	4. Land.
Torpantau	The tunnel appears to be in good condition (completely open at either end). No inspection information has been located because ownership of the tunnel is unknown. It is understood that a number of outdoor pursuits companies use the tunnel as part of the adventures they offer. The tunnel portals are listed as a good example of C19 railway engineering and a surviving feature of the Brecon and Merthyr Railway.	An alternative route is available via the Taff Trail. The tunnel route would make a more acceptable route from a gradient perspective however users would miss out on the views provided by the present Taff trail	No designated sites	Land to the south in private ownership, tunnel unknown, land to the north Natural Resources Wales
Usk	The tunnel is in good condition and open to the public	An alternative route is not available because of the Usk bridge	No designated sites	Monmouthshire county council
Walnut Tree	Tunnel has been destroyed by quarrying operation	Not part of the planned network	No designated sites	Private Ownership
Wenvoe Tunnel	Tunnel appears to be good condition, however drainage is a major issue and affects the land either side of the tunnel. The tunnel carries services on its eastern side	Not currently part of a planned network. It does allow for the extremely busy Culverhouse Cross Junction on the A4232 to be avoided but it will not allow access to the jobs and retail sites around the junction	No designated sites	Land to the north and south in private ownership. Tunnel owned by DfT

Appendix 3 - RATE scoring for all tunnel schemes

The Route Assessment and Transport Evaluation 'RATE' tool has been developed by Sustrans as a way to assess cycling/walking schemes and analyse areas for infrastructure development across the United Kingdom. Assessing schemes is a key attribute of the RATE tool which is achieved by providing each scheme with an overall rating and ranking. Each scheme is run through the 'RATE process' using 13 set criteria.

Each criterion is based on a rating system scored between 1-5 which identifies schemes which have the greatest potential to make an impact to cycling and walking usage. The tool also highlights the particular strengths of schemes i.e. links to employment, housing, schools and schemes which address safety concerns. Filtering schemes by criteria can help to identify potential funders and specific funding streams. The data can be viewed by LA authorities as the GIS system is viewable through a web based browser, and it is also possible to upload local and regional data such as local development areas, growth zones and major employment sites. Specific data for Wales has been included in the version used in this report.

Comparing all the possible tunnels schemes the following ranking was arrived at.

Red – Not suitable

Amber – Recommend further study

Green – Tunnels that could be developed into walking and cycling schemes

Additional scheme variants have been entered for both the Rhondda and Pennar tunnels to assess the effect on the scheme of adding additional linking routes. This can result in considerable differences in scores as more extended NCN routes will link to more amenities and therefore score higher. For example, if the Rhondda Tunnel was to be developed as a scheme just developing the tunnel itself, it would score considerably lower (and fail to be a priority) when compared to a scheme linking the tunnel to Treherbert station or the wider Rhondda Valley.

Name	Description	Usage Potential
T - Rhondda tunnel 3	The scheme will use the Rhondda tunnel as well as a 16km route in the Rhondda Fawr Valley	2
T - Rhondda tunnel 2	Rhondda Tunnel and link to cycle path in Blaengwynfi and Treherbert station	2
T - Pennar tunnel 3	Pennar Tunnel and extended route to Sirhowy river and Crosskeys part of the Halls Tram Road	2
T - Pennar tunnel 2	Pennar Tunnel and extended route to Sirhowy river and Abercarn, part of the Halls Tram Road route	2
T - Pennar tunnel 1	Pennar Tunnel part of the Halls Tram Road route	2
T - Cymer Tunnel	The Cymer tunnel will provide a cross valley route between the Lynfi and Afan valleys	2
T - Graig (Treforest)	Tunnel in Treforest coming out in University grounds	1
T - Cwm Cerwin	Route linking Bryn to Maesteg Via the Cwm Cerwin tunnel	1
T - Abernant Tunnel	Route linking Aberdare to Merthyr via the Abernant tunnel. This will complete a missing link in route 46 Heads of the Valleys	3

Name	Description	Usage Potential
T - Morlais Tunnel	Tunnel running from Pant and route 46 giving a direct traffic free link to the Taff trail	2
T - Bethesda	Alternative route via tunnel to avoid road and steep climb	2
T - Wenvoe	Tunnel scheme running under Culverhouse Cross Road junction	1
T - Quakers Yard Tunnel	The Quakers Yard tunnel could provide a link between the Cynon Trail NCN 478 and the Taff Trail NCN 8	2
T - Usk Tunnel	Cycle Scheme using Usk tunnel to by-pass the town and give direct access into school	2
T - Rhondda tunnel 1	Rhondda Tunnel and link to cycle path in Blaengwynfi	1
T - Barry Island	Barry Island link to the sea	1
T - Gyfychi	Gyfychi tunnel provides a cross valley link. The tunnel is blocked at its western end by a land slip in 1947 and is now flooded.	1
T - Hafodyrynys	Hafodyrynys Tunnels and approach cuttings were completely filled in in the 1970's	1
T - Monmouth	Short tunnel leading from an Abandoned C2 scheme in to MCC highways depo	1
T - Torpantau	Torpantau tunnel, alternative route the Taff Trail at its highest point	1
T - Gelli Tunnel	Tunnel running parallel to existing cycle route	1
T - Clydach	Tunnel at Gellifellin	1
T - Pont Walby Tunnel	Disused tunnel running parallel to the A465. Tunnel is filled at eastern end	1

Appendix 4 – Examples of new infrastructure to overcome barriers and link communities

Connect2 - Ottery St Mary

The hospital, sports centre and secondary school in Ottery St Mary are located on the west side of the River Otter and were only accessible to most of the local community by a busy main road. Sustrans developed a new walking and cycling route to create a direct link between Ottery St Mary town centre and the local schools and hospital. The centrepiece of the project is a 90 metre-long bridge over the River Otter, which connects directly to the Land of Canaan park.

The route is very well used, especially by the hundreds of schoolchildren going to and from the King's School. It offers a more convenient and safer way to get to essential amenities, such as the local supermarket. It also provides the chance for walkers and cyclists to enjoy the tranquillity and peacefulness of the riverbank and nearby water meadows.

- Schools benefiting from scheme: The King's School, Ottery St Mary Primary School;
- Workplaces benefiting from scheme: Finnimore Industrial Estate, Ottery St Mary Hospital, town centre shops and businesses;
- 48% increase in total route usage after the opening of the route – 48% increase in cycling, and 48% increase in walking;

- Estimated economic benefits over 30 years – £2,279,876 (with 63% of these benefits coming to health), giving a BCR of 3.7.

Connect2 – Pont y Werin Bridge, Cardiff

This bridge, delivered by the Connect2 programme, connects Cardiff and Penarth and carries over 1,300 journeys every day, with a growth in trips across the whole scheme network of 86% following the opening of the bridge. From our monitoring on the scheme, 85% of route users said the scheme had helped them to increase their levels of physical activity. The health benefits arising from the intervention are also substantial, equating to over £4 million (calculated using the WHO HEAT tool), contributing to a benefit cost ratio of 3.0.

Linking Communities – Hockley Viaduct, Winchester

This 4.3km route was delivered by the Department for Transport's Linking Communities 2012–13 programmes. The scheme provided a new shared use path from Winchester city centre to South Winchester Park and Ride. The route now carries over 50,000 cycle trips per year, compared to just over 4,000 previously. This had led to the equivalent of over 17,000 car trips being taken off the road and a benefit cost ratio of 3.9. The route also attracts a high number of recreational cyclists, with an estimated £382,500 being spent per year by tourists and day-visitors, supporting 5.8 direct and 3.9 indirect jobs.

Appendix 5 – ecology and bat surveys

- Policy and Legislation

A variety of policies and legislation relating to ecology are in place from European legislation to local policy. These relate to specific sites, to particular species and habitats and also to conservation on a landscape level. Whilst policies are implemented through the planning process, the legislation is statutory and applies at all times. Ecological assessments should be undertaken for all construction projects regardless of whether planning permission is required and this process should always be followed as best practice and to prevent breaches of statutory legislation.

- What is required?

It is easy to forget that despite the environmental benefits of creating a walking and cycling route their construction can take out a significant area of habitat, often in important locations and if done insensitively can negatively impact nature conservation. Any planning application should include the following information and it is recommended that advice is sought from the local authority planning department and/or the county ecologist:

- A survey of the current ecological interest of the route;
- An assessment of the impacts of the proposal on protected sites, notable and protected species and habitats and on landscape considerations (such as habitat fragmentation);
- Measures proposed to minimise any identified ecological impacts (to avoid and mitigate impacts and compensate for residual impacts); and,
- Measures proposed to enhance ecology.

Without this information councils can refuse planning permission on the basis of insufficient evidence.

- Surveys

The first step in an ecological investigation is likely to be an Extended Phase 1 Habitat Survey. This survey can be conducted at any time of the year as it identifies basic habitat types only but spring and summer are the optimal survey times.

The Extended Phase 1 Habitat Survey report comprises;

- A walkover survey to identify habitats along the route;
- A desk study to identify designated nature conservation sites and records of protected and notable species in the area;
- An assessment of whether notable or protected species may occur on site;
- An assessment of potential impacts of the proposed works on habitats/species; and,
- A list of recommendations to ensure no breaches in legislation or policy will occur.

The recommendations made in this report may include requirements for consultation with relevant authorities, measures to avoid/mitigate/compensate predicted impacts or may include the need for further species specific surveys.

Further surveys are required when a protected species is considered likely to occur on site and could be negatively impacted by the proposal. Additional specific surveys may be expensive or could take a long time to complete. It is therefore important to get the Extended Phase 1 Habitat Survey done as early as possible in order to plan these into the project budget and timeframe and whilst your plans are still flexible.

- Bats

With any tunnel project there is a high probability that bats will be involved. The development of the tunnel should be seen as an opportunity to improve bat habitat and promote ecology to the wider public

Suggested bats surveys are

- A preliminary roost assessment preferably combined with the first other survey visit.
- A dusk exit count and swarming activity survey continuing to four hours after sunset in one visit in August.
- A dawn re-entry survey in August.
- A dusk exit count and swarming activity survey continuing to four hours after sunset in one visit in early September.
- A hibernation inspection in mid-January with static detector left in place if no evidence of hibernation is found.
- A hibernation inspection in February and removing the static detector.

- Mitigation and Compensation

Once you have avoided impacts where possible you must propose measures to mitigate the remaining impacts. This involves reducing the impact and compensating for it. How you go about this will vary on a site by site basis. There is rarely a set solution to any issue and there will usually be a unique set of issues at each site that interact.

- Ecological Enhancement

This is a requirement of planning and is best practice for any route creation programmes. The measures proposed should be above and beyond the compensation measures. Compensation makes up for impacts; enhancement makes the site better than it was. The most valuable thing that could be done is the creation of a long-term management plan

Appendix 6 – Planning requirements

The following list shows all possible studies, reports and plans that will be required for a successful planning application.

- Location Plan
- Network fit – A plan showing how the proposal fits into the National Cycle Network and/or other walking and cycling routes
- Site Plan
- Design and Access Statement
- Details of the proposed path including width and surface material details (including a section) outside of the tunnel
- Details of the proposed path including width and surface material details (including a section) inside of the tunnel
- Contaminated Land Report both inside and outside the tunnel
- Details of repairs to tunnel lining
- Details of cleaning of tunnel lining
- lighting plan both inside and outside tunnel including ecological effects and connection to power supply
- Details of other proposed additions to the tunnel such as access gates
- Safety Audit, to include fire and ventilation
- Details of how the path links to Public Right of Way
- Drainage details
- Flood risk assessment leading to Drainage/flood consent
- Is the proposal within any designated sites (SSSI etc..)
- Phase 1 ecological survey
- Further ecological survey as recommended by phase 1 survey which may include.
- Bat Survey (it should be assumed that all tunnels have the potential to contain bats)
- Badger Survey
- Reptile Survey

- Trees, Tree Preservation Orders, management plan
- Invasive species identification and management plan
- Habitat compensation
- Habitats Regulations Assessment (HRA) – which the LPA will conduct as a ‘competent authority’. The developer will need to provide information to support the Assessment and could opt to submit a ‘statement to inform’ to assist the LPA in the preparation of the HRA.
- Signage plan
- Artwork (If included in scheme)
- Listed building consent (The Rhondda Tunnel is not listed at present so should not be required)
- Heritage report
- Archaeological report
- visual impact
- landscape management plan
- Coal mining risk assessment
- Land ownership including vertical shafts
- Route opening plan, is the proposal to be completed in sections over a number of years
- Car parking plan and transport assessment

Appendix 7 – Cost estimates

Main item	Cost					Includes
	Rhondda 3148	Pennar	Abernant 2283	Tregarth 271	Usk	
ECOLOGY	£11,500	£11,500	£11,500		£11,500	Extended Phase 1 ecology survey
						Bats
Tunnel structural survey	£86,500	£16,000	£62,732		£16,000	Details of repairs required to tunnel lining
						Details of repairs to air and construction shafts
						Details of areas required to be cleaned
						Details of track bed construction
						Contamination report
						refuges, how many and dimensions
						Existing drainage system layout and repairs required
						Inspection of Portal and wing walls
						Inspection of surrounding land above the portal and cuttings or embankments leading to tunnel entrances
CCTV, lights	£40,000	£20,000	£40,000		£15,000	CCTV DESIGN
						LIGHTING AND POWER SUPPLY SCHEME FOR INSIDE TUNNEL
Plans specifications and studies required for planning application	£92,000	£46,000	£92,000		£46,000	Location
						Transport Assessment
						Full NMU Audit
						Network fit / Active Travel Report
						Planned route alignment
						Path specification
						Land ownership
						Links to Rights of way
						Signage plan
						Design and access statement
						Contaminated land report
						Ground Investigation Report (following site investigation)
						Flood risk assessment

Main item	Cost					Includes
	Rhondda 3148	Pennar	Abernant 2283	Tregarth 271	Usk	
						Visual impact assessment
						Listed building consent
						Heritage
						Archaeological Survey
						Landscape management plan
						Coal risk assessment
						Route opening plan if phased project
						Safety Audit (Stage 1)
						Design of safety and security features
						Utilities
safety review fire and ventilation	£20,000	£0	£20,000		£0	For fire and ventilation
CDM	£5,500	£2,750	£5,500		£2,750	CDM

Development Total	£255,500	£96,250	£231,732	£0	£91,250	
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Planning Total	£1,055	£1,055	£1,055	£0	£1,055	
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construction	?	£807,749	?	£550,000	£474,908	Tunnel
	£374,000	£295,000	£421,190	£0	£102,000	Link paths

Construction Total	?	£1,102,749	?	£550,000	£576,908	
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Total scheme cost	?	£1,200,054		£550,000	£669,213	Development + Planning + Construction
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Maintenance	£37,158	£7,580	£30,473	£4,790	£5,098	Annual running costs
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Appendix 8 – Maintenance costs

Item	Rhondda 3148 m	Pennar 398	Abernant 2283	Tregarth 271	Usk 234	Notes
Lighting (including emergency)	£10,302.55	£1,302.55	£7,471.64	£886.91	£765.82	Based on Bath two tunnels, annual cost £7200 for 2200m of tunnel. It should be noted that this is low level lighting
Electrical testing (including emergency)	£1,752.86	£221.61	£1,271.22	£150.90	£130.30	Based on Bath Two Tunnels cost £2450 split over 2 years
Annual inspection	£2,500.00	£316.07	£1,813.06	£215.22	£185.83	Rhondda tunnel estimate £3000/year or £15,000 over 6 years
Principal inspection every 6 years	£1,333.33	£168.57	£966.96	£114.78	£99.11	Rhondda tunnel estimate £8000 every 6 years
Maintenance of safety systems						Are there any? Lighting, ventilation, fire
Testing of safety systems						If there are any
Emergency access maintenance						Ensure any access gates are clear and emergency services have keys!
Path cleansing (litter sweeping etc.)						Litter could be covered by volunteers. Path sweeping inside tunnel? What kind of vehicle can be used?
Lighting replacement	£0.00					Possible put into scheme costs by purchasing equipment with longer guarantee?
Drainage maintenance	£1,000.00	£500.00	£1,000.00	£500.00	£500.00	Nominal sum - Periodic inspection is key to keeping the drainage system working well. Removing small items before they become a huge problem is good practice
Management costs	£3,240.00	£1,000.00	£3,240.00	£1,000.00	£1,000.00	For bath estimated at 1 day per month. Based on 4 area manager type inspections per year (0.5 days each), enquiries, press and media, conflict resolution. Probably more to do in first year
Ecology mitigation (bats)	£0.00	£200.00	£400.00	£400.00	£600.00	Bath costs are estimated at £200. Build into scheme costs
Project monitoring and evaluation	£0.00	£0.00	£0.00	£0.00	£0.00	Build into scheme costs
On-going maintenance (vegetation, drain clearance, repairs and pointing)	£15,362.24	£1,942.24	£11,141.04	£1,322.48	£1,141.92	Based on the Devonshire tunnel of 410m length. That's a cost of 10,000/5=£2000 per year equivalent to £4.88/m. At 3148m the on the same scale we should estimate the Rhondda tunnel at £15,356 per year.
Grass cutting	£967.50	£1,729.89	£2,469.71	£0.00	£475.37	Based on Bedwas to Machen £600 for 2800m, high use site would need 3 cuts @ £0.215/m.
Portal vegetation clearance	£200.00	£200.00	£200.00	£200.00	£200.00	Nominal sum £200 per year
Volunteer/ ambassador training	£500.00	£0.00	£500.00	£0.00	£0.00	Nominal sum £500 per year
Total Cost per year	£37,158.48	£7,580.94	£30,473.62	£4,790.28	£5,098.34	