

Tunnels of South East Wales

Scoping Study for the Rhondda Tunnel

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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. This report sets out to provide information with regards to the Rhondda Tunnel which, if opened, would form the second longest walking and cycling tunnel in the world.

1.2 Scope of work

The brief for the commission was as follows:

To provide technical expertise and support to the Rhondda Tunnel Society to enable the organisation to develop a high level plan for taking forward their project. This plan will help establish the business case for their project and help identify potential funding sources.

The work will include:

- Arrange meetings and liaise with Rhondda Tunnels Society and key stakeholders to establish basis of a high level plan for reopening the Rhondda tunnel and linking to the wider strategic walking and cycling network
- Discuss the scope of the high level plan with the Society, obtaining their input, and reviewing the deliverables accordingly, in discussion with Welsh Government's project manager
- Develop a Business Case that can be used by the Rhondda Tunnels Society to support their funding applications for the project, including a basic economic impact assessment
- Provide a stage gate analysis of key activities required to achieve technical delivery of the project from feasibility to post construction stages
- Develop outline scheme costs
- Identify key opportunities and constraints for delivery process
- Provide an overview of possible funding sources and options for the project.

Sustrans undertook the commission over a four month period, July to end October 2015.

This is a practical report providing support and information to enable the Rhondda Tunnel Society to pursue their ambitions in a planned and structured way, informed by Sustrans' twenty years of experience of developing the National Cycle Network.

The Society already has detailed knowledge and understanding of the tunnel's location, size, condition etc. and so to this effect our report does not include scene setting or background information.

2 Network fit - Connections to the National Cycle Network

Former railway tunnels exist within many sections of the National Cycle Network (NCN) across the UK. Tunnels are renovated and opened to the public as part of the strategic route planning of the Network where they provide connectivity for utility journeys or recreation. A former railway tunnel can become a visitor destination in its own right, as witnessed by the Bath Two Tunnels, but none-the-less excellent links are required to centres of population and the public transport network to enable visitors to access the tunnel and plan their wider visit to the area.

At present the Rhondda tunnel is isolated from the National Cycle Network (NCN). However it would be possible to connect it to the Network at Blaengwynfi (about 200m of new path). This would give traffic free access to the Afan Valley and would connect to the main east west route NCN route 4, the Celtic Trail at Port Talbot. A major undertaking would be required on the Rhondda Fawr side because no NCN presently exists in this valley. As part of the tunnel development it would be essential to develop a new high quality route from the tunnel entrance to Porth or at a minimum to Treherbert Station. Route development appraisals and feasibility studies were outside of the scope for this report but are identified as requirements in the planning milestones.

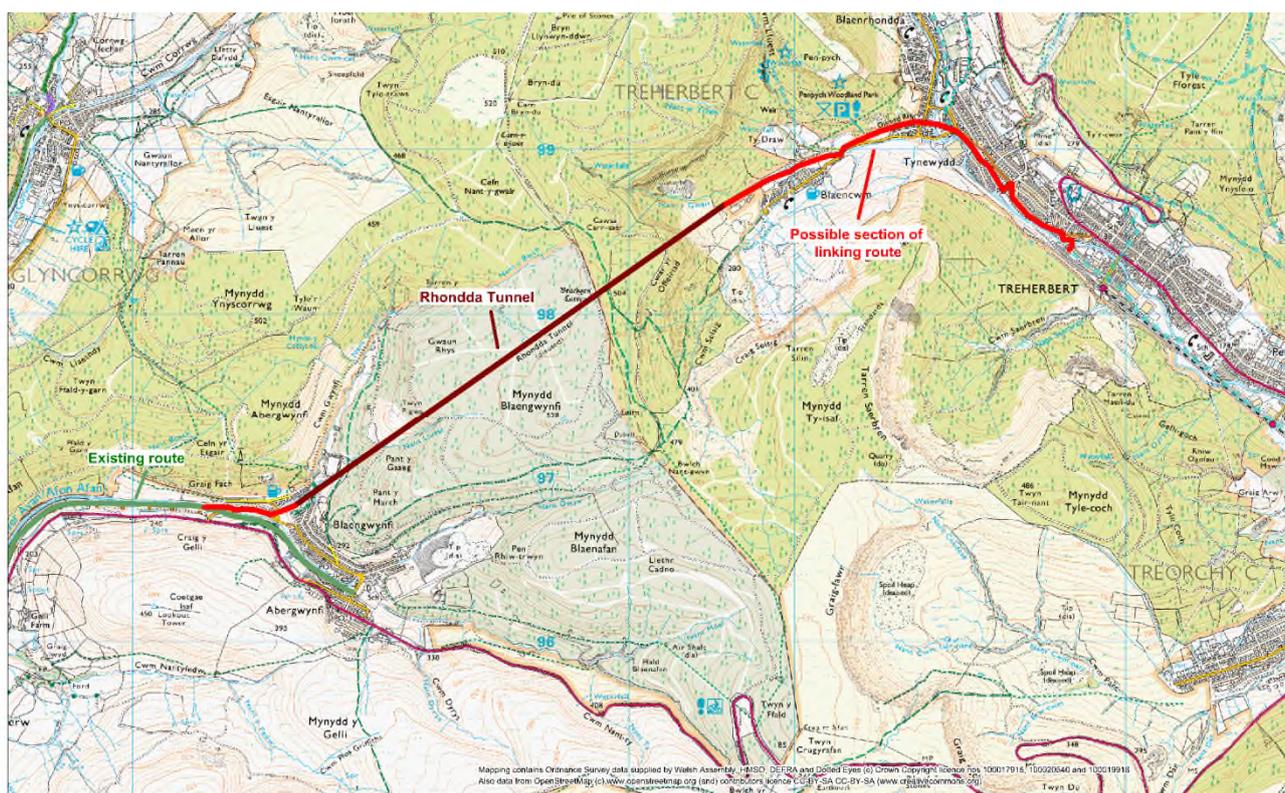


Figure 1 Rhondda tunnel in relation to the walking and cycling network

If the 3148m long tunnel was opened to walking and cycling it would provide an easy, almost level, connection between Blaengwynfi in the Afan Valley to Blaencwm and Treherbert in the Rhondda. The journey, via the tunnel to the station at Treherbert, is 6.2km (3.85miles) and would take about 20 minutes to cycle. The present alternative is via the A4107, a journey of

15.4km (9.6 miles) involving a climb of about 370m. Undertaking this journey by car is estimated to take 22 minutes. By bike, assuming an average speed of 8mph, would take around an hour and a half, including a considerable climb. Providing a direct, level link between the valleys would bring journey time by bike into parity with the car.

3 Opportunities and constraints

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

Examples of these infrastructure projects from recent years, including bridges, tunnels, boardwalks and traffic free paths 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 Tunnel.

Some of the opportunities and constraints to reopening the Rhondda Tunnel and a walking and cycling network around it are set out below.

3.1 Constraints

3.1.1 Engineering - Both tunnel and network links

Engineering issues can be solved at a cost. At present we know from the recent Historic Estate inspection of the tunnel that its condition is similar to inspections conducted in the 1960's and the surrounding land appears to have stabilised, probably due to the ceasing of coal mining activity in 1983. The tunnel has not collapsed or flooded and therefore has the potential to be reopened without excessive costs of major structural work. However the Historic Estates report also references that the potential for falling masonry, timber and supporting metal work is high and would need to be addressed.

In order to assess the condition of the tunnel more closely and to confidently estimate the cost to reopen the tunnel, a detailed survey is required. As both tunnel portals have been in-filled and carrying out this survey is very likely to require access using a vehicle (such as a Land Rover), it is clear this will be a major operation in itself, requiring a number of technical consents and possibly planning permission.

As outlined in section 2 above, links to the cycle network do not exist at present. The Afan Valley is already served by an excellent cycle route and connecting to this is straightforward. The Rhondda Fawr valley by contrast has no existing cycle route and is one of the few valleys in south east Wales that is not on the NCN. To encourage visitors to the area and the tunnel a new high quality route will be needed in the Rhondda Fawr.

With walking and cycling routes being linear in nature they can, and often are, delivered in phases as funding becomes available. However this scheme will have to be delivered in its entirety to realise the benefit of the tunnel.

3.1.2 Ecology

The tunnel portals and potential linking routes all lie outside of sites with a designated ecological interest and there are no known bat surveys available. This suggests that currently there are no known barriers from an ecology perspective. However studies to confirm this should be carried out as early as possible. Some ecological studies are time / season dependant and can set back scheme programmes by over a year if not carried out correctly. Further outline guidance is outlined in Section 5 of this report.

3.1.3 Social and management factors including community support

Convincing local residents, politicians and potential users that opening a disused railway tunnel for walking and cycling are viable and worthwhile can only be achieved by effective community engagement. Stakeholder and community engagement will be a crucial part of the delivery process and successful community engagement will lead to successful schemes that address the needs of users, stakeholders and the local community.

This project, during each stage of its development (design, construction and maintenance), will be subject to the scrutiny of a broad range of stakeholders and interested parties and usually involve legal processes. All have the potential to significantly affect the design quality, budget and programme of a scheme if not planned and managed carefully. It is therefore important to identify all of the relevant stakeholders and legal processes at the outset of the design phase. As a general rule, it is better to approach stakeholders and involve them in the design development as early as possible to achieve a final design that meets all needs and is likely to be successful in obtaining any permissions and consents required.

The Rhondda Tunnel Society is well advanced in securing community engagement and support. Identifying keys stages during the development of the scheme where community involvement can be channelled will further assist the development of the project. It should not be assumed that because of the significant volume of public interest in the scheme there are fewer risk factors associated with opening such a major structure.

3.1.4 Running and maintenance costs

It will be vital to show how the running and maintenance costs of the tunnel can be met in the future. This will be a key question that funders will ask because they will want to know how their investment will be sustained in the future. An unconvincing answer to the question is likely to lead to funding application failure.

3.1.5 Partnership working

Achieving the objective of reopening the tunnel will rely on significant involvement of partners who can assist RTS with the professional skills and resources required to manage a project of this size. For example, this project will need to attract funding in millions of pounds and funds often have to be claimed retrospectively after the work has been completed. A major partner will be needed to control the finances of such large sums and manage cash flow with delivery agents.

3.1.6 Land ownership

All land required to develop the scheme needs to be secured. This will include the tunnel and its air and shafts and land required to construct linking routes. This will be a key factor in information that will be needed to make grant applications. Funders will require guarantees that their investment is secure and if the land is not held freehold are likely to want a minimum of a 25 year lease. Historic Railway Estates are known to be amenable to selling off disused railway structures, but only to organisations that they are confident have the capacity to look after them well into the future.

Due to scale of liabilities and these financial considerations it is suggested that a public body should take on the ownership of the tunnel itself. Discussion with Welsh Government is required.

The land required for the linking routes is in local authority ownership and following initial discussions with between Sustrans and relevant parties there are no known barriers to the land being made available for the scheme.

3.2 Opportunities

This section gives a brief overview of the key opportunities which could be realised from development of the tunnel and its associated route network. The Business Case outlined in Section 4 provides a more focussed basis for potential benefits and outcomes which might accrue from development of the project and subsequent development of opportunities linked to these. Most of the initiatives indicated will require considerable planning and ongoing management to ensure they are realised and consideration should be given at an early stage into how this might best be affected. Sub-groups within the Rhondda Tunnel Society (RTS) could consider leading on different aspects such that these processes can be run in parallel.

3.2.1 Modal Shift

Opening the tunnel would encourage modal shift because it provides a convenient alternative to a longer distance route by road and therefore helps achieve a shift to more active and sustainable modes of transport. The route will provide new physical links with other transport services, including bus and rail (Treherbert Station), and provided links to workplaces, education establishments and other key trip generators. Further information analysis is provided within the business case.

3.2.2 Tourism

Being the second longest walking and cycling tunnel in the world it has marvellous tourism appeal. 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). Using this same methodology indicates the significant potential for the Rhondda Tunnel to bring considerable economic benefits to the local area. Further information is provided within the business case.

3.2.3 Support and community

The Rhondda Tunnel Society's first objective was to recover the commemorative tunnel portal stone, restore it and return it to a suitable location near the tunnel entrance. They have used this to create tremendous public interest and support for the re-opening of the tunnel. RTS have the strength and resolve to keep this interest and support going to achieve their goal of re-opening the tunnel. However, it will be important to maintain this momentum throughout the project development to ensure community buy-in, particularly in supporting post development activity to sustain interest.

3.2.4 Political and local business support

Local politicians and business have also demonstrated their support and have provided prizes for competitions and advertising in the annual calendar. Maintaining political support and developing local business opportunities to enhance the project will be beneficial in providing longer term sustainability.

3.2.5 Business and event potential

There is potential to create business opportunities from visitors to the area (Cafés, B & B, guided tours, outdoor adventure activities) and could provide a unique feature to sporting events such as cycling sports and running events. This element is essential if the full economic potential of the project is to be realised and become self-sustaining.

3.2.6 Engaging with schools and developing educational resources

The tunnel can also become an educational resource (especially for local schools) and has the potential to become the focal point for a number of subjects including history, geography and sustainable transport. The society has already engaged with local schools by running a competition to design their logo.

4 The business case

This section of the report has been produced by Sustrans' Research and Monitoring Unit who have pioneered the development of monitoring and evaluation techniques for sustainable and active modes of transport. They have over 15 years of experience in monitoring and evaluating walking and cycling interventions. This includes monitoring outputs and assessing outcomes and impacts of Sustrans projects, as well as working for and in partnership with a range of organisations across the UK.

4.1 Estimating the impact of the Rhondda Tunnel

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

- 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.

4.2 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 WeITAG rather than WebTAG tool is typically used in the appraisal of transport initiatives. WeITAG 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.

4.3 Estimating the Annual Usage

Currently, no Annual Usage Estimate (AUE) data for the Rhondda Tunnel and connecting NCN routes (NCN881 and NCN885) exists. Instead a proxy value has been used as the best estimate,

taken from the average AUE 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
Brynmawr	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 Rhondda Tunnel. From this baseline level of use, the economic impact of different scenarios of increased use resulting from the tunnel opening can be modelled.

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. Sustrans acknowledges that the length of the tunnel in itself may be a restricting factor in the number of pedestrians using the route for regular journeys.

4.3.1 AUE increase scenarios

The Bath Two Tunnels project has been used as the maximum increase in AUE on which the impact of the Rhondda Tunnel opening will be modelled. This is an appropriate maximum benchmark because the Bath Two Tunnels is the first Sustrans project of its kind which distinctly promotes the tunnels in their own right and has lots of momentum through events and promotional activity. It opened up a route between two popular cities, and thereby encourages and enables a

significant increase in active travel between two destinations with dense populations. After the tunnel had opened, annual overall usage on the route increased by 130%.

On opening, Rhondda Tunnel would become the second longest walking/cycling tunnel in the world, thereby harnessing the potential to become a popular tourist attraction in its own right. This increases the potential for AUE increases compared to routes that include tunnels that are not promoted as destinations in themselves, however the tunnel’s location is not in such a dense area of population compared to Bath Two Tunnels.

WebTAG was 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 was also 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 AUEs 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 Rhondda tunnel 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

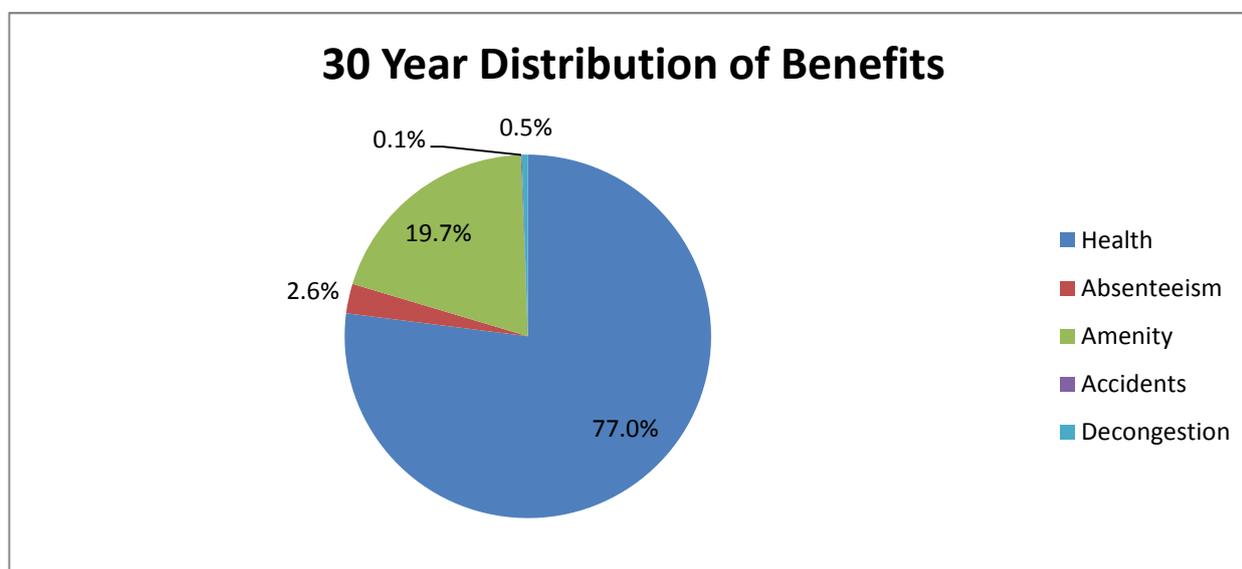
considered conservative, as they are not considering the likely positive impact of these other variables changing between baseline and follow-up.

4.3.2 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	£5,347,563	£5,637,613	£5,927,664	£6,238,876
	70%	£6,189,625	£6,500,837	£6,790,888	£7,080,938	£7,392,151
	90%	£7,342,899	£7,654,111	£7,944,162	£8,234,212.	£8,545,425
	110%	£8,494,762	£8,805,975	£9,096,025	£9,386,076	£9,697,288
	130%	£9,648,037	£9,959,249	£10,249,300	£10,539,350	£10,850,563

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):



4.4 Tourist impact

The impact of the Rhondda Tunnel opening extends beyond what can be measured through WebTAG. We have therefore applied Sustrans tourism modelling 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, including the basis for the Economic Impact of the Celtic and Taff Trails Study in 2008 and 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 cyclists. A table showing the breakdown of all spending levels by cycling tourists and home-based cyclists is included in the Appendix.

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.

4.5 Combined tourist and WebTAG impact

To give a more holistic estimation for the economic impact of opening the Rhondda Tunnel 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.

4.5.1 Return on Investment

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 Rhondda Tunnel, and related extension of the NCN routes, will cost. The table below presents a conservative estimate of the BCRs according to three proposed cost scenarios, £5 million, £7.5 million and £10 million, 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 £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	1.47	0.98	0.73

90%	£7,944,162.37	£2,902,117	£10,846,279.37	2.17	1.45	1.08
130%	£10,850,563.02	£3,513,089	£14,363,652.02	2.87	1.92	1.44

As shown in the table above, positive returns on investment for many of the scenarios modelled for can be seen.

Should uplift in AUE of 130% be achieved, positive BCRs of 2.87, 1.92 and 1.44 can be seen for all proposed project costs (£5 million, £7.5 million and £10 million respectively).

Should uplift in AUE of 90% be seen, positive BCRs of 2.17, 1.45 and 1.08 can also be seen for all proposed project costs (£5 million, £7.5 million and £10 million respectively).

Even for the most conservative estimation of AUE uplift (50%), a positive BCR of 1.47 is seen for a £5 million project cost.

4.6 Job creation

With the opening of the Rhondda 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.

4.7 Summary of the business case

The above data has presented a number of estimations for the impact of the Rhondda Tunnel opening 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 good 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 Rhondda Tunnel with associated path links into use as a walking and cycling route.

5 Stage gate analysis of key activities required to achieve technical delivery

5.1 Introduction

In identifying a suggested methodology for the advancement of the Rhondda Tunnel project, Sustrans has identified a stage gate process from feasibility to post-construction. This process consists of 8 stages, each being discussed in more detail below with many tasks fitting within each stage.

Figure 2 sets out the suggested sequence:

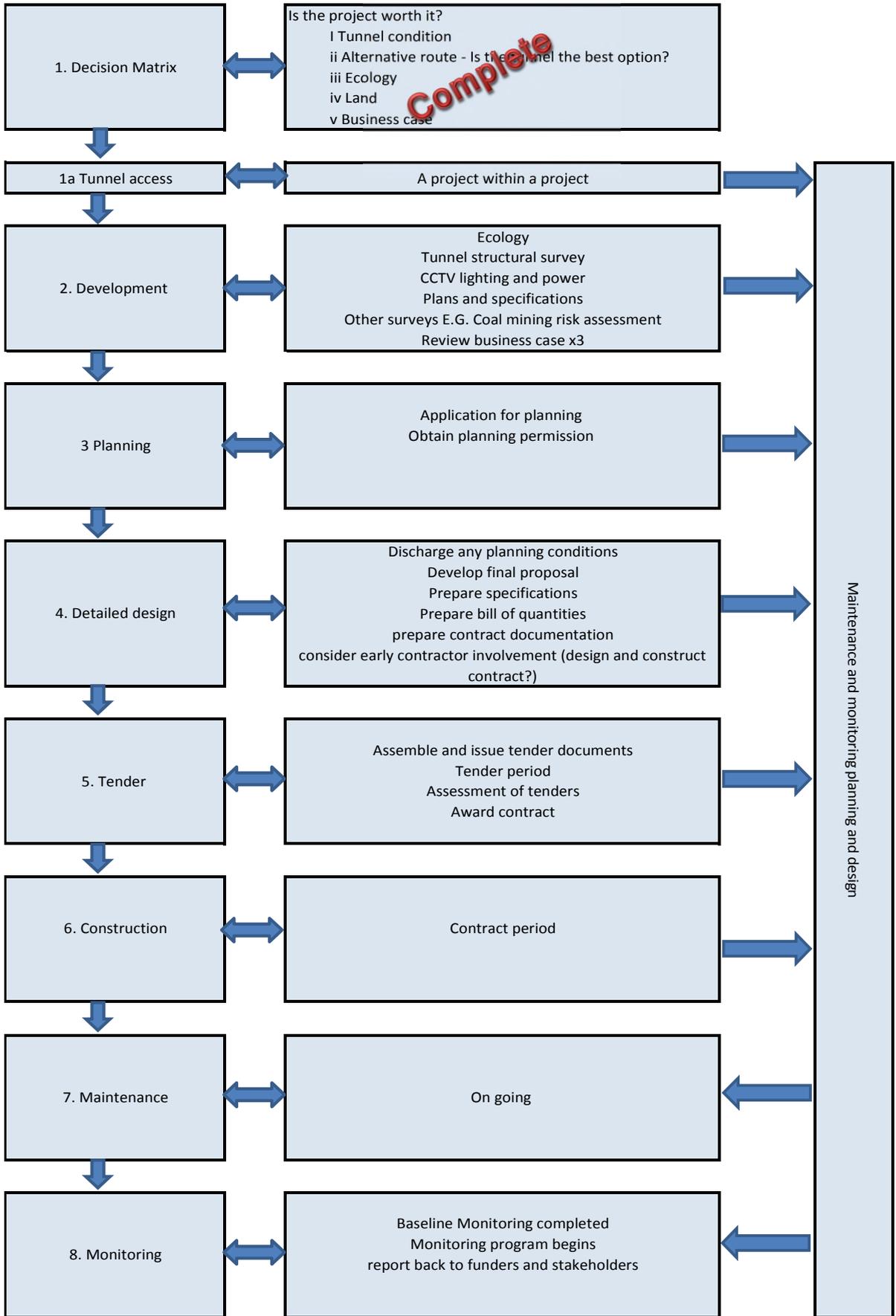


Figure 2 Stage gates

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.

A stage has been inserted between Stage 1 (decision matrix) and Stage 2 (development) identifying that access to the tunnel needs to be planned and gained in order for Stage 2 to get underway. During the production of this report Sustrans has reviewed how planning permission for previous tunnel schemes was undertaken. Following this review it has not been possible to arrive at what a typical scheme looks like as a baseline approach to follow. The schemes reviewed vary a great deal and all have their own unique issues. The large number of unknowns associated with the Rhondda Tunnel and its approaches need to be reduced and until this information becomes available no detailed advice can be given on detailed design and costings.

5.2 Stage 1 – Decision matrix

In order to objectively assess whether a tunnel scheme can be taken forward to the development stage, Sustrans have identified four key issues that need to be satisfied if a tunnels project is to be taken on to the development stage, based on our experience of the key constraints associated with funding and delivering major infrastructure projects. They are:

1. Is the physical condition of the tunnel such that restoration for the intended use is practical?
2. Can an alternative nearby route can be constructed on the ground surface to Active Travel Act standards, thus reducing the need to utilise the tunnel?
3. The site is not of Special ecological interest (such as a bat roost of very high importance or identified as having specific restrictions as part of a SSSI or SAC)
4. Is it practically possible to obtain ownership or secure a legal agreement of effective access to the tunnel and land required to join the path to a meaningful walking and cycling network?
5. Can a good economic case to support opening the tunnel be presented? (This would cover the points of potential users levels, potential cost of repair, potential for job creation...)

Collectively, these questions and their answers comprise the initial decision matrix that should be applied for projects of this type and only if the requirements of the matrix are satisfied should a scheme proceed to the development stage.

In the case of the Rhondda Tunnel, the results of applying the decision matrix outcomes are as follows:

- The tunnel condition – From recent reports, the tunnel appears to be in a condition that will allow it to be refurbished and reopened
- Alternative route – there is no other acceptable alternative route for walking and cycling
- Ecology – There are no apparent ecological issues that would stop tunnel development but survey work is required
- Land – The tunnel (owned by Historic Railway Estates) and land ownership (Local Authorities) means access is attainable for the project
- The business case, as set out in section 4 above is positive.

Each of the five questions has been answered positively therefore it is our assessment that the project can be moved onwards from stage 1 towards the development stage.

5.3 Stage 1a – Rhondda Tunnel Access

To fully assess the condition of the tunnel structure and check ecology good access is required. This work has the potential to be significant and can be considered as a project in its own right.

The only access available at present is at the Blaencwm end of the tunnel via a shaft 10.5m deep and then a crawl 5m long 600mm pipe as shown below. Access to carry out a bat survey is possible, however a full structural survey will require equipment too large to fit down the shaft and through the pipe. Based on existing information, excavating a roadway into the tunnel entrance at Blaencwm appears to be the best option. To create a roadway down to the existing track bed is in the region of 11m thus involving the removal of a significant amount of material as well as breaking through a retaining wall.

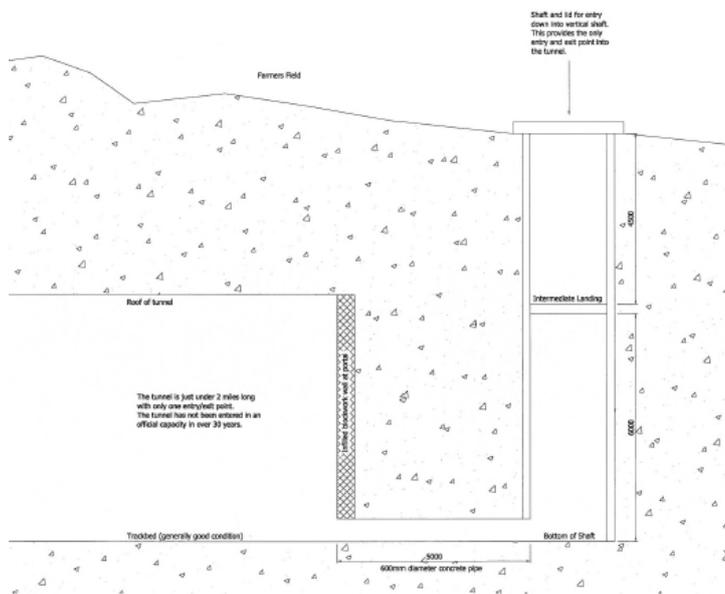


Figure 3 Extract of drawing for Rhondda tunnel access

It has been established with Rhondda Cynon Taff Council (RCT) that this access work would require planning permission and would involve, as part of the application, a Phase 1 habitat survey, bat surveys, land contamination report, and design and access statement and associated documents among others things. It is recommended that as part of this stage of the project development the planning department at RCT are consulted. Early contractor involvement should also be considered because this can help to reduce costs.

5.4 Stage 2 – Development

At this point in the project the decision matrix has been satisfied and suitable access has been provided allowing the project to be in the position of drawing together all the information required to:

- Form a robust cost estimate
- Gather all the information required to make a successful planning application.

Collecting this information is expensive and it is suggested that this should be carried out in a series of steps. At the end of each step the final cost of the project can be estimated based on the information gained and used in the business case model to ensure that an acceptable benefit cost ratio (BCR) is obtainable. A frequent assessment of the BCR as costs become known through survey work allows stage gate decisions to be made before additional costs are committed if the BCR is likely to fall below an acceptable limit for the project to be economically viable. Figure 4 represents this process.

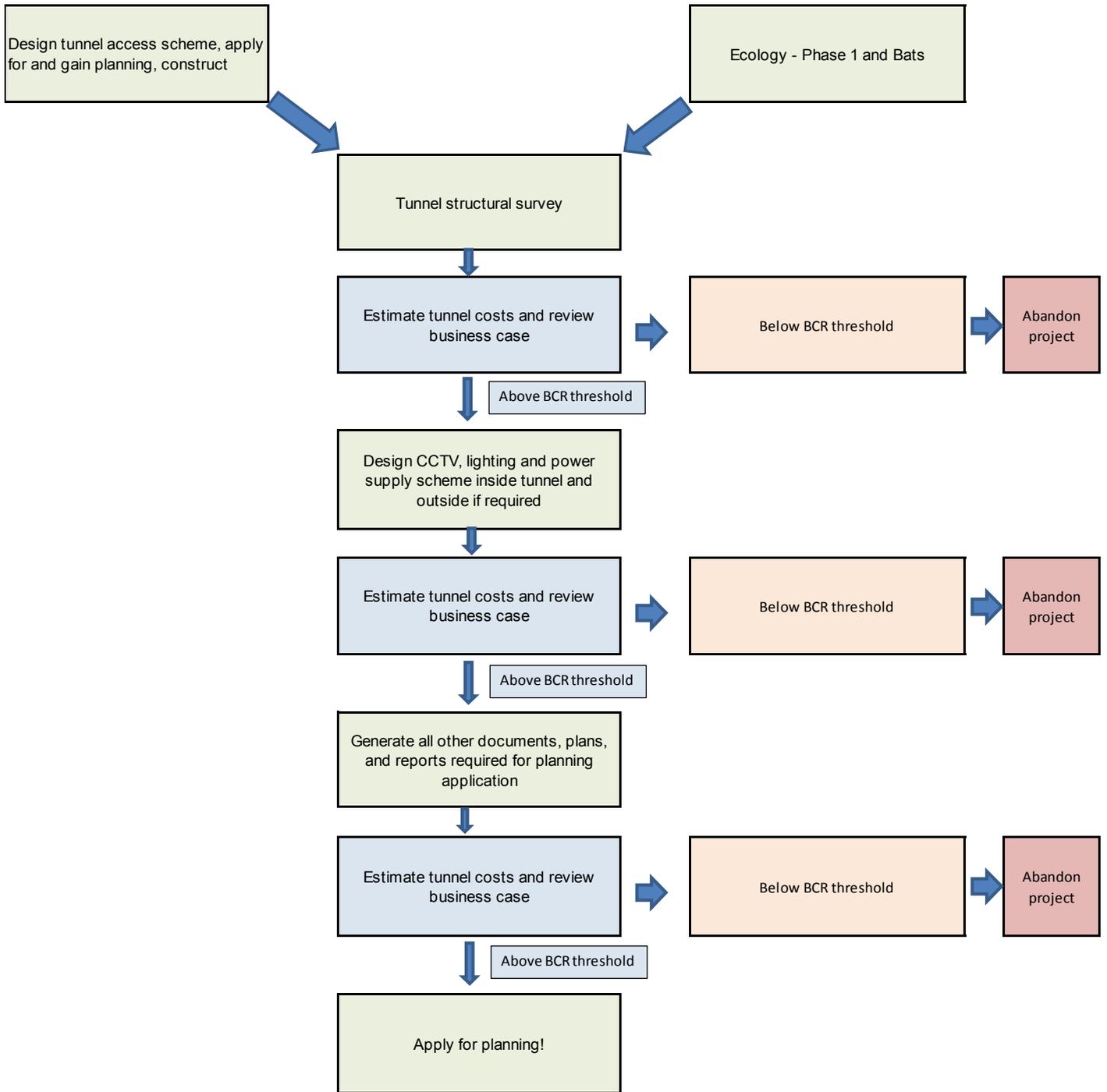


Figure 4 Development steps

5.4.1 Ecology

Ecology and its legislation are often over looked on construction projects and it cannot be emphasized enough that any required ecology studies are carried out as soon as possible and strictly to guidelines.

Some surveys that may be required are time sensitive and can delay projects by up to a year if they are not carried out at the correct time. For this particular project there are likely to be bats and recommendations for bat surveys are set out below.

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 avoidable impacts have been addressed where possible, the project must propose measures to mitigate the remaining impacts. This involves reducing the impact and compensating for it. How this

is undertaken 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

5.4.2 Tunnel structural survey

This will represent possibly the largest single cost in the development work. Ground penetrating Radar (GPR) and the more conventional hammer and probing are two methods that can be used to establish the condition of the tunnel and from this information repair costs can be established. Both have different requirements in terms of tunnel access which will affect the survey cost. Specialist advice and/or competitive tendering will need to be taken to establish which the best, most cost effective method is.

With the structural survey complete more robust costs can now be estimated for the scheme and a review of the business case should take place.

5.4.3 CCTV, lighting and power,

Specialist help will be required to design an acceptable scheme. This design will be crucial to the environment inside the tunnel and will be a major factor in future tunnel running costs. Can enough power be supplied from existing networks? Will new networks be required driving up costs? Review business case after CCTV and lighting costs are established.

5.4.4 Plans, specifications and other studies required for planning

A number of other studies will be required for planning but these are less likely to have a huge impact on the final cost estimate.

These studies could include, design and access statement, coal mining risk assessment, flood risk assessment etc. A full list is provided in the next section.

5.5 Stage 3 – Planning application

Below is a list of possible reports that the planning department of the local authority may require. It is for guidance and not exhaustive. Therefore, it is recommended that contact is made with the planning department at the earliest possible time to clarify what they will be expecting to see in a planning application to ensure that the process is made as simple as possible. It should be noted

that it is possible that not all of the items listed below will be required and this should be confirmed at a pre-planning meeting.

Items possibly required for an application to reopen the Rhondda tunnel and construct linking walking and cycling routes are:

- 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

5.6 Stage 4 – Detailed design

At this stage the final proposal is completed so that specifications can be prepared along with a bill of quantities. Contract documentation is then generated in preparation for the tender process. Early contractor involvement should be considered. It is crucial at this stage that maintenance is considered as part of the route development process long before construction starts. A thoughtful design will mean less maintenance in the future.

5.7 Stage 5 – Tender stage

Once the tender documents are completed the work invitations to tender can be issued. It is crucial at this stage that the tender process is completed correctly and that funders rules on procurement are followed to the letter. If these rules are not followed it can result in significant delays, or even loss of funding!

5.8 Stage 6 - Construction

The contract period has three phases: below is listed some of the activity that may take place

Before work starts contracts are signed and staff resources are assigned in particular to CDM (Construction Design Management) and ecology. Pre-start meetings are held and all required information need to plan and manage the work should be made available. A risk register is prepared to manage risk to the budget and progress

When construction work is underway this is when the local community will get very interested and the site and it will need to be managed to keep both contractors and residence safe. During this time any concerns need to be dealt with in a timely manner. Construction works will be closely monitored for progress and quality and any changes documented.

When works are nearing completion employer and contractor undertake a joint site inspection to identify and record any defects ('snagging list') and agree how they will be addressed. Health and safety file is completed and contains the "as built" drawings.

5.9 Stage 7 – Route maintenance

A route that is kept in good condition will be more useful, attractive and popular than one allowed to deteriorate. Maintenance can sometimes seem like an afterthought compared to the exciting world of designing and building new routes, but having invested time and money by building the route, it is important that it remains attractive to users.

Maintenance should be considered as part of the route development process long before construction starts. A thoughtful design will mean less maintenance in the future. For example a path surfaced with tarmac will have a long life needing little maintenance other than litter picking and keeping it clear of vegetation, whereas a stone dust path will quickly become worn and rutted if left uncared for on a busy route.

Think about who will use the route – will horses ride along it, will tractors cross it, how will maintenance vehicles access the path (and turn)? Pedestrians and cyclists don't normally cause a great deal of wear and tear. It is often other users and the weather that have more of an impact on the condition of the path. Designing with maintenance in mind is good design.

It is particularly important to think about maintenance at the start of the development process if the project has capital funding available but maintenance will have to come from existing budgets that may have to be stretched in the future. A question often asked by funders is how will you maintain the investment they are making? Sometimes money can be put aside from the capital source into a separate fund for future maintenance. Irrespective of what the ultimate arrangement will be, it is essential that the project team has agreed the future maintenance arrangements early in the project's development.

5.10 Stage 8 – Monitoring

Monitoring, like maintenance, must be established right at the beginning of a project. The monitoring scheme must collect suitable data to establish a baseline from which, once the scheme has been completed, progress can be measured. It is therefore important to put the correct measures in place to collect the data you require.

As part of this report it has been necessary to estimate the potential usage of the tunnel and its linking walking and cycling routes. This has only been possible because data has been collected from a number of other schemes in the south Wales valleys. Therefore collecting data can be used to strengthen the case for future investment in other tunnel schemes

The correct tools need to be selected to collect the data required, it needs to be analysed and then presented in a readable format. This investment needs to be factored into the scheme costs. Funders and stakeholders will require the scheme to evidence its outputs and hopefully they will demonstrate the outcomes and impacts that the stakeholders and the funders were hoping for.

6 Costs

6.1 Stage 1 decision matrix

Nil costs envisaged as this stage has been completed.

Main item	Cost
Legal costs of land transfer	£5,000 -£10,000

6.2 Stage 1a Tunnel Access

A rough estimate is in the region of £30,000 to £50,000. It is recommended that more work is carried out with regards to access. The best option appears to be excavating the tunnel entrance at the Blaencwm end. This option needs to be weighed up against other possible options as well as establishing requirements for design and planning.

Main item	Cost
Excavation	£50,000 -£30,000

6.3 Stage 2 Development

Main item	Cost	Includes
ECOLOGY	£11,500	Extended Phase 1 ecology survey Bats
Tunnel structural survey	£86,500	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 and power supply	£40,000	CCTV design Lighting and power
Plans specifications and studies required for planning application	£92,000	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 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)

Main item	Cost	Includes
		Design of safety and security features
		Utilities
Safety review	£20,000	For fire and ventilation
CDM	£5,500	

Total	£255,500
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6.4 Stage 3 Planning

Item	Cost	Includes
Planning	£1,055	For compiling all documentation, submitting the application and confirming validation. Does not include the planning fee.

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

Item	Cost
Unable to cost this stage because insufficient information is available until Stage 2 is complete.	?
Link path costs are estimated to be £110,000 per Km plus any specific items such as bridges or major earth works	£374,000

6.6 Stage 7 Maintenance.

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

Item	Cost	Notes
Lighting (including emergency)	£10,302.55	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	cost £2450 split over 2 years
Annual inspection	£2,500.00	3000 per year or 15,000 over 6 years
Principal inspection every 6 years	£1,333.33	8000 every 6 years
Maintenance of safety systems	£0.00	Design dependant. Are there any lighting, ventilation, fire
Testing of safety systems	£0.00	As above
Emergency access maintenance	£0.00	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	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	Estimated at 1 day per month
Ecology mitigation (bats)	£0.00	Bath costs are estimated at £200. Build into scheme costs
Project monitoring and evaluation	£0.00	Build into scheme costs
On-going maintenance (, drain clearance, repairs and pointing)	£15,356.00	Estimated at £4.88 per meter
Grass cutting	£967.50	Estimated at 1.5km (Blaencwm side only) @ £0.215/m. 3 cuts per year
Portal vegetation clearance	£200.00	Nominal sum £200 per year
Volunteer/ ambassador training	£500.00	Nominal sum £500 per year
Total	£37,152.24	

6.7 Stage 8 Monitoring

The costs below should be absorbed into the construction scheme stage 6

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
Other surveys as agreed with funders	?	

Total Monitoring costs	£10,500
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7 Funding

The project will require funding in a number of phases opening opportunities (and restrictions) to obtaining funding from several sources. The stages requiring funding are listed below, together with suggested funding sources:

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 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?)	????	Heritage Lottery Fund 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	Probably £millions	Pen y Cymoedd Wind Farm Community Fund Railway Heritage Trust Heritage Lottery Fund Our Heritage Heritage Grant European Regional Development Fund The Rural Action Cwm Taf LEADER Programme Tourism Investment Support Scheme (TISS) Big Lottery People and Places Visitor Amenity Scheme from the WTB
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	

Development Stage

- Heritage Lottery Fund – Start Up. Grant to support RTS’s work in taking on responsibilities for heritage. Value £3,000–£10,000

- Heritage Lottery Fund – Sharing Heritage, Explore your community’s heritage. Value £3,000–£10,000.
- Local Transport Fund (LTF) – A Welsh Government Fund. This is awarded to local authorities for all modes of transport improvements. Funding could be used to carry out feasibility and development work via the local authorities. Value – dependent on annual allocations. Note: Local Authorities may already have other priorities
- Rural Development Fund – European structural funding, administered by Welsh Government, supporting rural business and economic resilience. Current measure available up to 2018 to cover pipeline development of projects to delivery stage. Value – up to £500,000 but must be part of a wide regional intervention rather than a local project.

Construction

- Heritage Lottery Fund:
 - Our Heritage. Value £10,000 to £100,000
 - Heritage Grant. Value over £100,000
- Pen y Cymoedd Community Fund – The Vision Fund. Value – Unknown
- Railway Heritage trust – The extent of the grant is individually assessed for each project and generally ranges from 10% to 40% of grant-eligible project costs.
- European Regional Development Fund – Under their priority area 4: **Connectivity and sustainable urban development** it states ‘Improve transport connectivity and accessibility by addressing specific bottlenecks and public transport in rural areas.’ This would need to be pitched as having economically benefitting the area. Total pot is over £400,000,000, individual project maximum is unknown and match-funding is required.
- The Rural Action Cwm Taf LEADER Programme, part of the Rural Development Programme. Value unknown.
- Tourism Investment Support Scheme (TISS). Value between £5,000 and £500,000 (maximum of 25% of project costs). Applicant must own the asset.
- Big Lottery People and Places. Value up to £1 million (capital and revenue).
- Visitor Amenity Scheme from the Wales Tourist Board. Small-scale capital funding that improves tourism infrastructure. Value £10,000–£20,000

Maintenance

- Historic Railway Estates dowry – Historic Railway Estate as part of reducing their liabilities have in the past sold off structures and given a dowry to help with future maintenance. This dowry is based on what Historic Railway Estate might save in costs by some else taking over the structure. The Rhondda tunnel at present because it is sealed

at both end costs nothing to maintain and the only likely costs in the future are a principal inspection every six years. So any potential dowry is going to be very low or zero.

- Volunteer support – This can be provided by Sustrans as part of its volunteer program.
- Income from utilities – Gas, Water, Power and Telecoms all have the benefit of statutory powers to acquire the rights they need for their cables if required. Power and telecoms companies tend to negotiate wayleaves, but will rarely (but sometimes do) pay more than the nominal rates agreed annually between the Energy Networks Association and National Farmers Union and Country Landowners Association. The rates can be found here. <http://www.energynetworks.org/modx/assets/files/electricity/regulation/EWF/Owner%20and%20Occupier%20Wayleave%20Compensation%202014-15.pdf>

8 On-going maintenance and running costs

In order to obtain funding one of the questions that will be asked is how the tunnel is maintained once it is re-opened. It has been difficult to find good data on these costs from previous schemes because some aspects of the maintenance are included in other budgets and are not straight forward to obtain. It is therefore recommended that more research is carried out to arrive at a more robust cost estimate.

The following is a list of items that may have to be covered in the long term

- Lighting (including emergency)
- Electrical testing (including emergency)
- Annual inspection
- Principal inspection every 6 years
- Maintenance of safety systems
- Testing of safety systems
- Emergency access maintenance
- Path cleansing (litter sweeping etc.)
- Lighting replacement
- Drainage maintenance
- Management costs
- Ecology mitigation (bats)
- Project monitoring and evaluation
- On-going maintenance (, drain clearance, repairs and pointing)
- Grass cutting
- Portal vegetation clearance
- Volunteer/ ambassador training

Each of the above items will require a guaranteed/under written funding source. Monitoring and ecology mitigation costs could be included in the main construction budget, agreements with local authorities could be made to cover electrical cost and path cleaning (as in Bath) or a sinking fund could be created and invested to cover the costs. However for each cost item above there will be a need for a secure source of funding

9 Conclusions

There are walks, there are sprints, and there are marathons. There are also crippling, tortuous slogs. The journey upon which Bath's 'Two Tunnels Group' embarked in 2006 – to convert part of the Somerset & Dorset's disused track bed into a path for walkers and cyclists – features amongst the latter; it was a sapping test of their resolve. Perhaps it could be likened to a steeplechase through a minefield – unforeseen problems ambushing the group every few yards with increasingly high hurdles to scale.

This is how the Bath Two Tunnel scheme was described in 2012 prior to significant construction works starting. In many ways this project is very similar to the Rhondda Tunnel especially with its great public (and political) support. However Rhondda tunnel is over 1000m longer and only one portal on the bath scheme was covered so access for inspections was more straightforward. The Bath scheme was also fortunate to coincide with Sustrans Big Lottery Connect 2 project which helped to fund a significant part of the works and provided Sustrans programme management support to the community enterprise.

That said, many of the vital ingredients for success are present at this early stage. Following the Sustrans recommended approach the proposal for opening the Rhondda Tunnel answers all the questions raised in the decision matrix favourably, and in Sustrans opinion is therefore in a position to pass on to the development stage.

Our assessment has been estimated that an economic impact of between. £7,327,496 and £14,363,652 could be expected over the next 30 years giving Benefit Cost Ratios (BCRs) set out below. The project would and create or support 12.7 jobs for every £1 million of investment in sustainable transport infrastructure made.

AUE increase in both cycling and walking	WebTAG outputs	Tourism model output	Combined impact	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	1.47	0.98	0.73
90%	£7,944,162.37	£2,902,117	£10,846,279.37	2.17	1.45	1.08
130%	£10,850,563.02	£3,513,089	£14,363,652.02	2.87	1.92	1.44

To take the project to the next major stage of its development would require an investment of approximately £300,000. This is the funding required to obtain planning permission and to

calculate a robust final construction cost. This report has not been able to estimate this final cost because of too many unknowns associated with the condition of the tunnel.

Next steps to take the project forward are:

- A specific study is carried out into the best method to determine the condition of the tunnel from which all necessary repairs will be able to be specified.
- A complementary feasibility study is carried out into constructing a high quality walking and cycling route from Blaencwm to Porth (to include upgrading sections between Porth and Pontypridd)
- Land agreements are put in place to ensure walking and cycling paths can be constructed either side of the tunnel
- Tunnel ownership is agreed
- A further study is carried out into 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)
- RTS to set up partnership agreements with other organisation to bring expertise to managing large value projects and advising on funding streams and applications
- Agree on an acceptable Benefit Cost Ratio (BCR) for the scheme. As the scheme is developed the BCR needs to be reviewed and the development abandoned if the BCR becomes unacceptable
- Carry out ecology studies, especially for bats as soon as possible
- Devise a plan to manage public expectation. Projects of this nature invariably take longer than anticipated
- Seek funding and operate complementary programs such as developing an educational resource for schools based on the Rhondda Tunnel and promoting the Afan Valley walking and cycling route (NCN 887) using Blaengwynfi as a destination

10 References

- National Transport Plan, Welsh Government (2015)
- 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>

11 Appendix

11.1 Appendix 1 Historic estates report on the condition of the Rhondda Tunnel

<https://share.sustrans.org.uk/share/Handlers/AnonymousDownload.ashx?file=62de531c>

Password: tunnel

11.2 Appendix 2 Rhondda Environmental Access development program

<https://share.sustrans.org.uk/share/Handlers/AnonymousDownload.ashx?file=752f6c0b>

Password: tunnel

11.3 Tourism spend by home-based and tourist cyclists for each uplift scenario

Area of benefit		Pre		50%		70%		90%		110%		130%	
		Tourists	Home-based										
Social value of trips	All recreational	£672	£46,642	£1,008	£69,965	£1,142	£79,295	£1,277	£88,622	£1,411	£97,953	£1,546	£107,280
Route spend	Total route spend	£3,091	£77,147	£4,636	£115,723	£5,255	£131,156	£5,873	£146,583	£6,491	£162,016	£7,109	£177,443
Spending by sector	Accommodation	£1,422	£0	£2,133	£0	£2,417	£0	£2,701	£0	£2,986	£0	£3,270	£0
	Food and drink	£1,298	£57,089	£1,947	£85,635	£2,207	£97,055	£2,467	£108,471	£2,726	£119,892	£2,986	£131,308
	Retail	£62	£1,543	£93	£2,314	£105	£2,623	£117	£2,932	£130	£3,240	£142	£3,549
	Car costs	£62	£9,258	£93	£13,887	£105	£15,739	£117	£17,590	£130	£19,442	£142	£21,293
	Cycle costs	£62	£2,314	£93	£3,472	£105	£3,935	£117	£4,397	£130	£4,860	£142	£5,323
	Public transport	£93	£2,314	£139	£3,472	£158	£3,935	£176	£4,397	£195	£4,860	£213	£5,323
	Other	£93	£4,629	£139	£6,943	£158	£7,869	£176	£8,795	£195	£9,721	£213	£10,647
Spend per head	Spend per head	£25.71	£9.25	£25.71	£9.25	£25.71	£9.25	£25.71	£9.25	£25.71	£9.25	£25.71	£9.25
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	