Brynmawr Economic Impact Study

Wales Rural Development Programme

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Brynmawr – Economic Impact Study

The following document provides an assessment of the economic benefits of developing a new walking and cycling route in Blaenau Gwent from Brynmawr to Garnlydan, a distance of 2.8 km.

The new route will contribute to National Cycle Network (NCN) route 46, which will run from Neath, across the Heads of the Valleys and then, via Abergavenny and Hereford, to Birmingham. The missing link will also connect NCN routes 465 and 466. The route will provide walking and cycling in the area for the daily commute as well as for tourism and leisure purposes.

This document provides economic evidence to accompany a wider feasibility study of the proposed developments that is being undertaken by Sustrans Cymru as part of the Wales Rural Development Programme.

1 Executive Summary

1.1 Economic benefits of the Brynmawr scheme

The economic benefits of the Brynmawr scheme have been appraised based on expected annual cyclist and pedestrian usage on the proposed route after construction is completed. The economic benefits of this annual usage have been appraised as if observed for the next 20 years (i.e. a 20-year appraisal period has been used)[1].

This analysis estimates a baseline level of annual cycling and walking usage by local users before estimating usage on the constructed route based on uplift seen in previous infrastructure projects. The post-construction usage estimates are derived from Sustrans Infrastructure Impact Tool [IIT, see Section 3 for more details on tools], local data from past schemes in the surrounding area and other comparable sites. The post-construction usage scenarios include an estimated annual number of trips and are presented as low, middle and high scenarios.

Current annual usage estimate

Current usage on the route is estimated using automatic counter data that has been collected in the local area. The estimated Annual Usage Estimates (AUEs) are:

- 21,231 cycling AUE
- 23,884 walking AUE

Forecasted/future annual usage estimate (cyclists)

These estimated values are based on scenarios that have been developed around the cyclist Infrastructure Impact Tool (IIT) output.

Table 1: Cyclist usage scenarios (Executive Summary)

Baseline AUE	Percentage increase in cyclist usage	Post-scenario AUE
21,231	153%	53,714
	173%	57,961
	193%	62,207

[1] A 20 year appraisal time period is recommended for walking and cycling schemes in WebTAG Section 3.1.2, as a reasonable time period over which economic benefits can be appraised given uncertainty over the longevity of impact.

Forecasted/future annual usage estimate (pedestrians)

These estimated values are based on scenarios that have been developed around the pedestrian Infrastructure Impact Tool (IIT) output.

Table 2: Pedestrian usage scenarios (Executive Summary)

Baseline AUE	Percentage increase in pedestrian usage	Post-scenario AUE
23,884	141%	57,560
	161%	62,337
	181%	67,114

Estimated economic benefits (including health)

The following economic benefits have been estimated using the Benefit-Cost Ratio tool, and using the usage information in the previous tables as inputs.

Table 3: Estimated economic benefits (Executive Summary)

	Post-scenario AUE (cycling)	Post-scenario AUE (pedestrian)	Economic benefits	Benefit-Cost Ratio
Low usage change	53,714	57,560	£2,729,661	4.5
Medium usage change	57,961	62,337	£3,059,312	4.0
High usage change	62,207	67,114	£3,388,595	4.2

The following illustrates the estimated economic benefits (including those as a result of health benefits) of the middle usage scenario in greater detail. A full breakdown of the estimated benefits for all scenarios is provided in Section 5 of the report.

Under the middle scenario, where the shared use route sees a 173% increase in cycling trips above baseline, the benefits are:

- 36,730 additional cycling trips and 38,453 additional walking trips on the route each year
- Total economic benefits of £ 3,059,801
- Health benefits of £ 1,820,134
- Recreational expenditure of £ 69,137 by leisure cyclists and £550,827 by leisure walkers

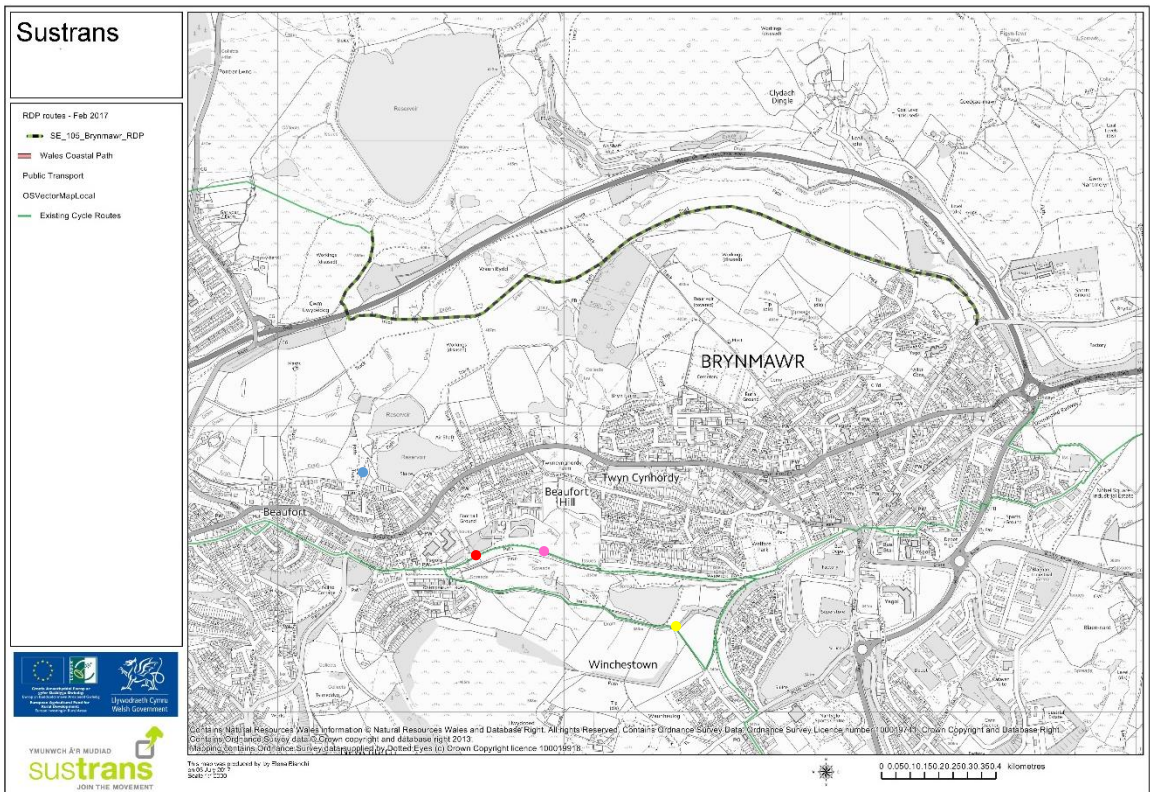
2 Background

Sustrans' Research and Monitoring Unit (RMU) have undertaken economic analysis for three scenarios for the proposed development of a route between Brynmawr and Garnlydan.

This document outlines the economic benefits of the proposed route for three usage scenarios.

2.1 Study Area

Figure 1: Map overview of proposed route



Counter Key

- BW01 – 9,189 Annual Usage Estimate (AUE)
- PYN03 – 53,689 AUE
- PYN05 – 42,331 AUE
- PYN04 – 75,250 AUE

The proposed new route will run for 2.8 km from Brynmawr to Garnlydan, forming part of NCN 46 which will run from Neath, across the Heads of the Valleys and then, via Abergavenny and Hereford, to Birmingham. The missing link will connect NCN routes 465 and 466. The route will also improve the links to the Brecon Beacons National Park and to existing walking trails in the area. The route will encourage walking and cycling in the area for the daily commute as well as for tourism and leisure purposes. The route would follow existing tracks in the area, thus avoiding any ecological issues associated with construction of routes though green field sites.

The economic benefits of this route have been evaluated based on cycling usage estimates from local counter data and Route User Intercept Survey (RUIS) data from comparable sites. This usage data was appraised using the Infrastructure Investment Tool (IIT) for cyclists, the BCR tool and the Leisure Cycling Expenditure Model (LCEM) to determine the economic benefits for cyclists.

3 Methodology

3.1 Economic Appraisal Tools

Infrastructure Investment Tools (IIT)

The Cycling Infrastructure Impact Tool (CIIT) and the Pedestrian Infrastructure Impact Tool (PIIT) are based on a database of past infrastructure scheme interventions delivered across the UK. This approach adopts a forecasting approach based on comparable schemes, as recommended by the Department for Transport (DfT) in their WebTAG Unit A5.1 for Active Mode Appraisal[2]. This approach is also consistent with the Welsh government Transport Appraisal Guidance (WelTAG). This approach assumes that infrastructure developments are likely to perform similar to what was observed in the past. This approach is not specific to the local context evaluated here and may not fully integrate all of the unique aspects of the proposed development. It is a generalised approach based on evidence from past schemes and as such should not be considered a definitive calculation of the expected outcomes of a scheme.

The IIT's are used to estimate a potential increase in usage from any currently observed usage (i.e. a baseline estimate) to any change that results after a scheme has been constructed. This post-construction estimate is based on evidence of observed cyclist and pedestrian usage pre- and post-infrastructure delivery in the past. The PIIT is a newer tool, based on the CIIT. The data that the PIIT references is less extensive as the number of schemes which feed into the CIIT. The tools do not give estimates in reference to a specific time period over which this usage change is observed or occurs. All outputs from the IIT's are in the form of an annual number of cyclist or walking trips.

Benefit-cost ratio (BCR) Tool

Sustrans RMU have developed an economic appraisal tool which is used to estimate the economic benefits of capital investments in walking and cycling based on information provided about the location and usage of the investment. The tool was initially developed to comply with the Department for Transport (DfT)'s guidance, WebTAG (Web-based Transport Appraisal Guidance). In Wales, the Welsh government's Transport Appraisal Guidance (WelTAG) is used, as this is adapted to Welsh-specific objectives and the outcomes and strategic priorities of the Wales Transport Strategy. There are no specific adaptations to the Sustrans RMU BCR tool mandated in the latest version of WelTAG, therefore the BCR tool developed in accordance with WebTAG is compatible for the Welsh context.

The BCR tool requires the following inputs:

- Annual Usage Estimate
- Trip frequency

[2] WebTAG Unit A5.1 for Active Mode Appraisal. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427098/webtag-tag-unit-a5-1-active-mode-appraisal.pdf

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

The BCR tool provides an estimate of the monetised economic benefits for the following impact areas related to cycling and walking:

- Health (using the WHO HEAT tool)
- Absenteeism
- Amenity
- Greenhouse Gas Emissions Reduction
- Accidents Savings
- Decongestion
- Air Quality Improvement
- Noise Pollution Reduction
- Infrastructure Development
- Indirect Taxation (disbenefit)

All economic benefits appraised through the BCR tool are based on a 20 year appraisal time period. This provides an estimate of the economic benefits of a specific level of scheme usage being observed over the next 20 years. All benefits are discounted over the 20-year time period to provide a present-day value.

Health Economic Assessment Tool (HEAT)

The World Health Organisation (WHO) Health Economic Assessment Tool (HEAT) is used to evaluate the health-related economic benefits of walking and cycling. The benefits calculated through HEAT are the value of the reduced mortality generated through a specific number of walking and cycling trips (i.e. physical activity). All health-related economic benefits are calculated over a 20 year appraisal time period, to maintain compatibility with the WebTAG-generated economic outputs.

The World Health Organisation issued HEAT 4.0 in November 2017 as an update to the previous tool. HEAT 4.0 is currently under review by the WHO and likely to be reissued with further amends.

As a result, the version of HEAT used in this appraisal is the previous version of HEAT, available at: http://old.heatwalkingcycling.org

Leisure Expenditure Model Tools: Cycling and Walking

Sustrans RMU has developed two models which calculate the economic benefit to an area from recreational cycling and walking in terms of 'spend per head' and the job roles these activities create.

The **Leisure Cycling Expenditure Model**[3] was originally developed in 2007 in association with the University of Central Lancashire (UCLAN) to estimate the impact of cycle tourism. It has been iteratively updated, most recently in 2017.

The model was developed based on an extensive data collection exercise undertaken between 2001 and 2006 on long-distance routes in the North of England, using user surveys, automatic counter data and travel diaries. The model can be used to estimate the economic impact of cycle tourism based on an estimate of annual 'spend per head' for all recreational cyclist users on the route. This estimate of cycle tourism-related expenditure is differentiated according to home-based and recreational tourist users. The outputs are indicative, rather than precise, estimates of the potential direct economic impact of investing in recreational cycling and give an estimate of the annual tourism-related economic benefits of recreational cycling usage on a proposed route. This is in terms of tourism expenditure and the social value of tourism per year.

The **Leisure Walking Expenditure Model** (LWEM) is a tool for estimating the economic benefit of leisure walking in terms of the expenditure it contributes to the local economy. This model originated from the Recreational Expenditure Model (now the LCEM) and builds on expenditure data collected from route users over a number of years. The LWEM has not been used as part of this study.

It is based on data collected from Route User Intercept Surveys (RUIS) across the UK (though mainly in Wales and Scotland). The model estimates the total annual spend for all home- and holiday-based based leisure walkers. It also calculates the number of full time equivalent (FTE) roles this spend would support. In order to further understand the effect of the expenditure, spend and FTE roles are split by sector.

4 Brynmawr RUIS data

Baseline AUE

An Annual Usage Estimate (AUE) is required to calculate the expected economic benefits from the proposed route construction. This shows the potential number of trips that we would expect to be using the route if it were approved and constructed.

5 Assessment of Economic Benefits

This section outlines the economic benefits of the proposed Brynmawr route, including:

- The economic value of congestion, greenhouse gas (GHG) emissions, noise pollution and amenity benefits accrued through mode shift encouraged by the route
- Health-related benefits of increased walking and cycling on the proposed routes

[3] Previously titled the Recreational Expenditure Model (REM)

- Direct and indirect job creation from infrastructure works and increased recreational walking on the routes
- Overall positive return on investment

5.1 Annual Usage Estimate

An Annual Usage Estimate (AUE)[4] is required to calculate the expected economic benefits from a proposed route development. This came from local area automatic counter data from four counters near to the proposed route (Figure 1).

The AUE was calculated by taking an average of the four counters near to the proposed route. The four counters did not record the modality of users, therefore the proportion of cyclists to pedestrians was estimated using the average ratio of three proxy RUIS carried out at sites in Wales: Garw Valley, Conwy and Narberth. The baseline pedestrian and cyclist AUEs for Brynmawr are as follows:

Table 4: RUIS Annual Usage Estimate (AUE) data

Site	Region	Year	Cycling AUE	Pedestrian AUE
Brynmawr	Wales	2015/16	21,231	23,884

The baseline is an estimation of 'current usage' relevant to the proposed route i.e. usage that exists but is not currently facilitated due to the route not existing. Therefore it is an estimation of the current number of journeys which may be occurring in the local area that could be using the proposed route.

5.2 AUE increase scenarios

To forecast the expected economic benefits of the route, a range of post-intervention scenarios where usage has increased above the baseline are set.

These scenarios are based on outputs from the **Infrastructure Investment Tools (IIT)** for cyclists and pedestrians which provide an estimate of the expected cycling usage increase based on a database of past schemes where infrastructure of a similar type has been delivered. The IIT models were run using the baseline AUE and the infrastructure category 'Cycle and pedestrian tracks' for the urban rural classification of 'All rural'.

The IIT provides an indication of usage increase that is likely to be expected from construction of the route. This is the estimate of annual usage once the scheme has been constructed, accounting for mode shift and growth in cycling and walking usage that is encouraged through the route development. To account for potential uncertainty and the possibility that usage change may be higher or lower than what was observed in the past, a range of three post-usage scenarios are used.

[4] An Annual Usage Estimate (AUE) refers to the number of individual cycling trips made annually on a route

The three scenarios for cycling and walking uplift are shown in **Table 2** and **Table 3**. The upper scenario is set above the IIT percentage increase and the lower scenario is set below the IIT percentage increase scenario. The IIT scenario is represented in green.

Table 5: Post-scenario cycling AUE scenarios

Baseline AUE	Percentage increase in cyclist usage	Post-scenario AUE
21,231	153%	53,714
21,231	173%	57,961
21,231	193%	62,201

Table 3: Post-scenario walking AUE scenarios

Baseline AUE	Percentage increase in walking usage	Post-scenario AUE
23,884	141%	57,560
23,884	161%	62,337
23,884	181%	67,114

Together, the post-scenario cycling calculations represent the three scenarios that are appraised.

5.3 WelTAG and monetised economic benefits

The BCR tool provides an appraisal of the economic benefits of an infrastructure development and requires specific inputs in order to provide a monetised value for the expected benefits under the three post-construction usage scenarios.

For this route, the BCR appraisal tool has been used to calculate the expected economic benefits based on the post-scenarios for cyclists. All economic benefits presented have been calculated using the WelTAG appraisal tool over a 20-year time period.

In addition to the baseline and post-scenario AUEs, all necessary BCR tool inputs were taken from three proxy RUIS carried out at sites in Wales, Garw Valley, Conwy and Narberth. These proxy sites were used as no RUIS was carried out in Brynmawr. No variation in these additional inputs has been made between the baseline and post-scenario cases as it is not possible to predict how these might change as a result of the development.

Depending on what occurs in practice and how these variables change in reality, the valuations obtained through WelTAG using these fixed inputs may reflect an economic value that is either higher or lower than the reality.

5.4 Health-related economic benefits

The health-related economic benefits of the proposed route at Brynmawr have been estimated using the World Health Organisation's (WHO's) Health Economic Appraisal Tool (HEAT)[5]. All health-related economic benefits are calculated over a 20 year appraisal period.

The BCR tool includes health-related economic benefits that have been generated using HEAT. The HEAT outputs that have been calculated are outlined in Table 4: HEAT outputs.

Table 4: HEAT outputs

	Post-scenario cycling AUE	Post-scenario walking AUE	HEAT output (cyclists)	HEAT output (pedestrians)	HEAT output (combined)
Post-scenario 1: Low cyclist and Low pedestrian usage	53,714	57,560	£1,011,300	£565,988	£1,577,288
Post-scenario 2: Middle cyclist and middle pedestrian usage	57,961	62,337	£1,161,681	£658,453	£1,820,134
Post-scenario 3: High cyclist and high pedestrian usage	62,207	67,114	£1,311,935	£750,835	£2,062,771

5.5 Overall economic benefits

The overall economic benefits of the proposed route include both the BCR tool and HEAT outputs.

The economic benefits can be displayed as three scenarios: a low usage change scenario, a middle usage change scenario and a high usage change scenario. The three scenarios, and their respective economic benefits, are outlined in **Table 5** below.

The Analysis of Monetised Costs and Benefits (AMCB) displayed in **Table 5** include the following: Physical Activity (using WHO HEAT), Absenteeism, Journey Quality, Decongestion, Infrastructure, Accidents, Local Air Quality, Noise, Greenhouse Gases and Indirect Taxation. Indirect Taxation is classed as a disbenefit.

Table 5: BCR Tool – Analysis of Monetised Costs and Benefits

	Cycling AUE increase	Post-scenario AUE (cycling)	Walking AUE increase	Post-scenario AUE (walking)	Economic benefits
1: Low usage change	153%	53,714	141%	57,560	£2,730,085
2: Medium usage change	173%	57,961	161%	62,337	£3,059,801
3: High usage change	193%	62,201	181%	67,114	£3,389,148

[5] The WHO HEAT tool is available at: http://old.heatwalkingcycling.org/

5.6 Benefit-cost ratios

The first option is estimated to cost £480,920. The second option is estimated to cost £608,760 and the third option £640,030. Annual (routine) maintenance costs for the route length of 2.8km are estimated to be £1,847 per year. The Total Present Value of Costs (PVC) represents the total cost of building the route, appraised over a 20-year time period **(Table 6)**. This includes the construction costs and annual maintenance costs, discounted to the present value.

Table 6: Brynmawr scheme cost options

Cost option	Scheme construction cost (total)	Maintenance costs (£ per year)	Total Present-Value of Costs (PVC)
1: Low	£480,920	£1,847	£613,144
2: Middle	£608,760		£767,740
3: High	£640,030		£805,506

Table 7 below shows the estimated economic impact, including health benefits from HEAT, for each of the different increase scenarios over a 20 year appraisal period. The benefit to cost ratio for each scenario is included under the 'BCR' column.

Table 7: Estimated benefit-cost ratios

	Low-usage change (153% cycling; 141% walking)	Mid-usage change (173% cycling; 161% walking)	High-usage change (193% cycling; 181% walking)	Cost (inc. maintenance over 20 years)
Low-cost option	4.5	5.0	5.5	£613,079
Mid-cost option	3.6	4.0	4.4	£767,740
High-cost option	3.4	3.8	4.2	£805,570
Economic benefits (£)	£2,730,085	£3,059,801	£3,389,148	

A BCR above 1 signifies that the economic benefits of constructing the route are equal or greater than the provided cost. All three cost options for the proposed construction of the Brynmawr route have positive BCRs for each usage scenario, signifying strongly that under these levels of estimated post-construction usage, the economic benefits are such that they outweigh the costs. It is not possible to select any one scenario as the most likely to materialise. The range of scenarios is intended to provide an indication of potential outcomes.

5.7 Tourism-related economic benefits

The Leisure Cycling Expenditure Model (LCEM) and Leisure Walking Expenditure Model (LWEM) tools have been used to generate an estimate of the combined tourism-related economic benefits of the proposed Brynmawr route.

The LCEM and LWEM tools have been run using the recreational usage inputs from three RUIS carried out at proxy sites in 2017, Garw Valley, Conwy and Narberth. The recreational usage inputs from the proxy RUIS were aggregated and averaged to give the inputs to the Brynmawr LCEM and LWEM tools. The economic benefits captured are excluded from appraisals of cycling and walking usage according to WebTAG and therefore, can be considered to be additional to those benefits outlined in Table 7. These tourism-related economic benefits are derived from a different approach to the economic benefits generated through the RMU WebTAG tool and therefore, should not be combined.

The LCEM and LWEM tools provide an estimate of the annual recreational spend by both home-based and tourist leisure cyclists and walkers on accommodation, food and drink, retail, car costs, cycle costs and public transport. This provides an estimate of the direct contribution that leisure cycling and walking generated through the proposed route developments will make on the local economy on a yearly basis.

The tools also provide an estimate of the annual social value of recreational trips made by home-based or tourist leisure users on the proposed route at Brynmawr. This is a measure of the 'public good' or value placed on the route by leisure users that is not captured in their expenditure.

Table 8 and Table 9 display the outputs of the LCEM and LWEM tools.

Table 8: Combined Leisure Cycling Expenditure Model (LCEM) outputs

	Annual recreational spend - HOME	Annual recreational spend - HOLIDAY	Overall tourism economic benefits
1: Low usage change	£26,921	£37,151	£64,072
2: Medium usage change	£29,049	£40,088	£69,137
3: High usage change	£31,177	£43,025	£74,202

Table 9: Combined Leisure Walking Expenditure Model (LWEM) outputs

	Annual recreational spend - HOME	Annual recreational spend - HOLIDAY	Overall tourism economic benefits
1: Low usage change	£195,108	£313,510	£508,618
2: Medium usage change	£211,300	£339,527	£550,827
3: High usage change	£227,491	£365,545	£593,036

The LCEM and LWEM tools also provide an estimate of the direct and indirect full-time equivalent (FTE) jobs supported in the local economy through recreational cycling and walking. Details of this are provided in Table 10 and Table 11.

Table 10: Leisure cycling usage and employment support

	Direct employment (FTEs)	Indirect employment (FTEs)	Total employment (FTEs)
1: Low usage change	0.9	0.5	1.4
2: Medium usage change	1.0	0.6	1.5
3: High usage change	1.0	0.6	1.6

Table 11: Leisure walking usage and employment support

	Direct employment (FTEs)	Indirect employment (FTEs)	Total employment (FTEs)
1: Low usage change	7.0	11.3	18.4
2: Medium usage change	7.6	12.2	19.8
3: High usage change	8.2	13.1	21.3

Considerations

There are a number of considerations relevant to the assessment of economic benefits that has been carried out for Brynmawr.

Baseline AUE Data Selection

- The baseline AUE was calculated using four counters near to the proposed route. As the counters are not on the proposed new route, there is a possibility that usage used in the appraisal is higher or lower than what would take place on the constructed route.
- The four counter locations are bi-modal i.e. they count pedestrians and cyclists. However, it is not known what the split of walkers to cyclists is in the counter data. In order to estimate the split of cyclists to walkers in the Brynmawr data an average ratio of 0.47 was calculated from the three RUIS carried out at proxy sites in 2017: Garw Valley, Conwy and Narberth. Other options for estimating the ratio of cyclists to walkers included using the NCN ratio of 1:3 and looking for ratios in other data sources, however the proxy sites were used as they were also used to estimate the BCR inputs. An average of the three ratios was calculated to ensure a balance of sites was represented.
- The most recent counter data was from 2015/16. A decision was taken not to apply a growth factor to this data, as it is relatively recent and exploration of the National Travel Survey and Wales National Survey revealed little consistency on active travel figures between the two

sources. In addition, anecdotal evidence suggests that National Travel Survey data can be very jumpy year-to-year and may under-represent the cycling modal share.

BCR, LCEM and LWEM tool inputs

- The LCEM, LWEM and BCR tools were run using the recreational usage inputs from three RUIS carried out at proxy sites in 2017, Garw Valley, Conwy and Narberth. These sites were used as no RUIS has been conducted at the Brynmawr site. The proxy sites were all part of the Wales Rural Development Programme, and as such have similar characteristics to the proposed Brynmawr route in that they are shorter, strategic links between the existing NCN and rural tourism destinations.
- For the proxy sites, the responses to the trip frequency categories 'daily' to 'monthly' only were used only in the BCR tool. Responses to the other trip frequency categories were excluded as the BCR tool does not support other trip frequency categories.
- The same proportions of trip frequency and trip purpose in the pre and post scenarios in the BCR tool were used as in the absence of any evidence to suggest otherwise i.e. actual data we have to assume the trip purpose and frequency would not change.
- The high and low usage scenarios were calculated as +/- 20% of the mid usage scenario of a 173% increase calculated by the cyclist IIT and 161% increase calculated by the pedestrian IIT. 20% was used as there is no other evidence to suggest you should vary substantially from the IIT output but there is a need to illustrate that a range of scenarios is possible.
- The LCEM and LWEM tool inputs were taken from three proxy RUIS sites: Garw Valley, Conwy and Narberth. For the LCEM model, tourist cyclists were only observed at the Narberth site; therefore all inputs related to the tourism-related cycling (i.e. not home-based recreational trips) are drawn from one site only. All other inputs are taken as an average across the three sites.