

Derby City Council

Derwent Valley Cycleway - Value for Money Analysis

21 December 2017



LIVERPOOL Winslow House • Rumford Court • 16 Rumford Place • Liverpool L3 9DG T: 0151 227 5563 LONDON 78 York Street • London W1H 1DP T: 0207 183 6790 www.amion.co.uk AMION Consulting is the trading name of AMION Consulting Limited. Registered Office: Langtons, The Plaza, 100 Old Hall Street, Liverpool L3 9QJ. Company No: 3909897



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Reviewed and approved by: Signature(s):	S.P.Resell
Name(s):	Graham Russell
Job Title(s):	Chief Executive
Date:	21 December 2017

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1 Introduction

1.1 Scope and structure

AMION Consulting and Thomas Lister were appointed to conduct a value for money assessment of the proposed Derwent Valley Cycleway. This report sets out an analysis of the expected costs and benefits of the project, informing an assessment of value for money using established appraisal techniques.

This report continues in four sections as follows:

- Section 2 provides an overview of the Derwent Valley Cycleway project;
- Section 3 sets out a summary assessment of the proposals, using a Department of Transport's (DFT's) WebTAG compliant appraisal;
- Section 4 assesses the economic impact of the project; and
- Section 5 summarises the findings.

1.2 Overview

The Derwent Valley Cycleway ("Cycleway" or "DVC") is an ambitious project to create a 19.5 mile off-road cycleway between Derby and Matlock following the course of the River Derwent as closely as possible. The whole of the cycleway falls within the Derwent Valley World Heritage Site and links a number of significant population centres including Derby, Duffield, Belper, Cromford and Matlock.

A DfT WebTAG¹ compliant approach has been adopted in the assessment of the Cycleway to measure the transport benefits. There has also been an assessment of the more economic-focused benefits of the Cycleway, which principally centre on the employment generation from tourism.

The separate analyses for each element underpin a consolidated assessment of the value for money of the proposed DVC. Overall, it clearly demonstrates that the benefits delivered through the Cycleway support a strong case for investment.

¹ WebTAG provides government guidance on transport modelling and appraisal



2 Derwent Valley Cycleway

2.1 Overview

This section provides a description of the Derwent Valley Cycleway, the fit with existing local cycling policy and the rationale for investment.

2.2 Project description

The Derwent Valley Cycleway is an ambitious project to create an off-road cycleway between Derby and Matlock following the course of the River Derwent as closely as possible. The proposed route is outlined in Figure 2.1





At present there is a 'gap' in the National Cycle Network that the proposed route will address. Commuting into Derby from the north by cycle is not currently attractive and it is expected that the planned cycleway will encourage increased cycle commuting.



2.2.1 Alternative route into Derby

The DVC will provide another route to the currently heavily-used A6 which, in many places, is not suitable for cycling and is particularly unattractive for family and less confident cyclists. The design goal for the cycleway is for it to be suitable for use by an 8-year-old. Providing such a route, it is hoped, would greatly increase cycling as well as taking the existing traffic away from the busy roads and thus reducing injuries and fatalities.

The Derbyshire Cycling Plan² has the ambition that 'By 2030, Derbyshire will be the most connected and integrated county for cycling in England, recognised as a world class cycling destination for all. More people of all ages and abilities will be cycling regularly for leisure, active travel, commuting and sport.' The development of the Derwent Valley route is a key factor in achieving this aim.

The DVC project also links to Derby's "Our City Our River" (OCOR) Strategy,³ the strategic flood defence project that facilitates the unlocking of housing and employment sites. OCOR will make a significant contribution to the future competitiveness and long-term resilience of the whole City. It will be complemented by sustainable connectivity interventions and growth of the visitor economy through the Connected Cycle City project (see below) along the Derwent Valley World Heritage site. The route offers the potential for cyclists to access other cycle routes in the Peak District such as the White Peak loop that incorporates the Monsal Trail, building on previous improvements and extensions to the leisure cycling network in Derbyshire. There is also good potential for commuter cycling for access to employment in the growth areas of Derby along the sections between Belper, Derby and Shardlow.

The Derwent Valley Trust is a registered charity and has been in existence since 1996, and was responsible for the designation of the Derwent Valley as a World Heritage Site in 2001, and for the creation of the Derwent Valley Heritage Way – a walking route from Ladybower to Shardlow. The focus of the Trust is now on providing a complementary cycle route following the course of the river.

2.2.2 Derby's Connected Cycle City

Connected Cycle City (CCC) is a key strategic project of Derby City Council focusing on establishing shared cycling routes across the City Centre. It builds on the City Centre Masterplan which includes priorities of improving public spaces and connectivity. It identifies gateways, nodes and connectors with a holistic approach to public realm improvements.

The proposals are designed to expand upon and make better use of the existing cycle network and allow use of shared space through the city centre. A Local Growth Fund project, CCC's primary target is to attract new and retain existing cycling commuters. This will not only increase cycling's mode share but also help to alleviate congestion and reduce journey times for essential journeys by private car.

² https://www.activederbyshire.org.uk/uploads/the-derbyshire-cycling-plan-2016---2030.pdf

³ http://www.derby.gov.uk/environment-and-planning/flooding-land-drainage/our%20city%20our%20river/



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Figure 2.2 illustrates how routes will be created linking retail, leisure, housing and, importantly for this initiative, to the Derwent Valley Mills World Heritage Site.



Figure 2.2 – Connected Cycle City proposals

2.3 Rationale for investment

The DVC project will seek to provide an attractive environment that encourages visitors and users, and stimulates investment by the private sector in the proposed route and its environs.⁴ The rationale for public sector investment to provide transport infrastructure and enhance the public realm environment is based upon the correction of the following market failures:

- public goods pure public goods are 'non-rival' (consumption of a good by one individual does not reduce the amount of the good available for consumption by others) and 'non-excludable' (it is not possible to exclude individuals from the good's consumption). As public cycleways are not "traded" in markets and it is difficult to exclude individuals from the benefits of investment, without public sector intervention the market is unlikely to provide a sufficient supply i.e. no DVC without government support; and
- **positive externalities** a further cause of market failure is provided by the existence of positive externalities, that is external benefits that would not be fully retained by a private developer or landowner. The development and enhancement of the public realm along the route will result in significant positive externalities, including the benefits derived from improving the image of the cycle corridor, as well as potential wider social (including health) and environmental benefits. However, these benefits are not fully taken into account by private developers or land owners when making investment decision.

⁴ Mainly in auxiliary functions, such as cafes – see Section 4



3 Transport Benefits

3.1 Overview

An assessment of the Derwent Valley Cycleway proposals using the DFT's WebTAG compliant appraisal approach is now presented in the following sub-sections.

3.2 Methodology and assumptions

3.2.1 Overview

This section presents the approach used to quantify the transport benefits and costs associated with the DVC project and to bring them together in a Cost Benefit Appraisal (CBA). The analysis considers the active travel and cycling benefits only. The benefits have been calculated using DFT's Active Mode Appraisal Toolkit⁵, in line with latest WebTAG guidance. The process undertaken in this analysis consists of two stages:

- the generation of existing and future cycle trips⁶; and
- benefits associated with each scenario calculated using the DfT's Active travel toolkit, in line with WebTAG guidance.⁷

In accordance with the DfT guidance, two scenarios have been modelled:

- "Do-something" 2019 to 2034 (15-year period) i.e. Derwent Valley Cycleway is completed; and
- "Do-nothing" assuming no funding and thus no Cycleway.

3.2.2 Demand Forecasting

The first step in assessing the potential benefits of the Cycleway is to calculate the likely number of users once the route is complete. The expected users are projected to fall into three main categories, all of which must be treated separately:

- (i) **Commuters** cycling to work;
- (ii) Leisure using the route as part of a leisure cycle ride; and
- (iii) **Derwent Valley World Heritage Site visitors** using the cycleway as a method of visiting the attraction.

The derivation of these user classes is now looked at individually.

⁵ DfT 'Investing in Cycling and Walking: The Economic Case for Action' (2015)

⁶ Existing and future cycle trips have been based on discussions with cycling specialists at the Derwent Valley Trust (30/11/17)

⁷ WebTAG Unit A5.1



(i) Commuters

For those cycling to work, the likely demand profile for the Cycleway has been based on using the DfT approved Propensity to Cycle Tool (PCT) for Derwent Valley.⁸ PCT is a widely-used tool that uses "origin-destination" data on travel to work areas from Census data. The dataset reports the number of people travelling by different modes from Middle Layer Super Output Area (MSOA) zones. It estimates there were 114,048 daily commuters living in Derwent Valley recorded in the 2011 Census. From that figure, the proportion of people who cycled as their main mode of travel to work in Derwent Valley was 2.9% i.e. 3,307 = 114,048 x 2.9%

Following the construction of the Derwent Valley Cycleway, it is a reasonable assumption to make that a sizable proportion of these existing commuting cyclists will make use of the new Cycleway. Specialist advice indicates that 50% of these existing commuting cyclists will make use of the DVC i.e. **1,654** = $3,307 \times 50\%$.⁹

Furthermore, commuters currently using other modes of transport – mainly car – are likely to switch to the DVC. The PCT tool assesses the expected change in commuting proportions based on a number of scenarios. These include a scenario of growing the cycling proportion to match government targets taking account of existing rates and local topology.¹⁰ Applying this scenario would lead to 5.6% of commuters using cycles. To be conservative, it is reasonable to assume that some of this uplift will arise due to other city-wide initiatives – such as CCC – and as such we have modelled a prudent 4.8% (a 15% reduction). This means **2,166** new cyclists i.e. $4.8\% - 2.9\% = 1.9\% \times 114,048$

This equates to 3,820 daily commuter users on the new route i.e. 1,654 + 2,166

(ii) Leisure

Leisure use is best estimated by considering the change when constructing a similar route, and "before" and "after" figures are collected. User counters on the Tissington Trail¹¹ and the Monsal Trail¹² provide information on daily numbers of cycles passing the counters. We understand that recent data from these counters is not available. However, data from 2013 suggests 290 cycles per day. It is expected that the DVC will provide a leisure resource comparable to the Monsal Trail and, with a much greater population living close to the DVC, a comparable or higher number of daily trips would be expected for leisure purposes.

Conservatively, we have assumed 290 daily leisure cyclists for DVC.

(iii) World Heritage Site

We know that there are approximately 586,000 visitors to the Derwent Valley World Heritage Site per annum.¹³ We also know that cycling as a tourism activity has boomed in recent years in the UK, and currently contributes £650 million to the UK economy each year.

⁸ The Propensity to Cycle Tool (PCT) is an open source tool for transport planning

⁹ Derwent Trust – Ian Dent (2/12/17)

¹⁰ In PCT terminology this category is "Government Target", and reflects a modest uplift in cycling usage

¹¹ http://www.derbyshire-peakdistrict.co.uk/tissingtontrail.htm

¹² http://www.peakdistrict.gov.uk/visiting/trails/monsaltrail

¹³ http://www.derwentvalleymills.org/derwent-valley-mills-world-heritagestatus/

statement-of-outstanding-universal-value/annual-report-and-key-performance-indicators/



No data is collected on how visitors arrive at the World Heritage Site. But assuming that the split of transport modes for commuting also applies to visitors then it is assumed that 16,994 arrive by cycle i.e. $586,000 \times 2.9\%$. Over the year this is equivalent to 47 per day.¹⁴

With the creation of the DVC, it is again assumed that a much greater proportion of visitors will use cycles to reach the World Heritage Site Once more, applying the PCT scenario of "government target" suggests that the proportion would increase from 2.9% to 5.6%. This means **90 daily World Heritage Site** users i.e. $(586,000 \times 5.6\%) / 365$ days

Existing users – baseline

In terms of estimating the *existing* baseline demand, the route is currently inaccessible by bicycle so direct comparisons are difficult. To be prudent, we have included those cyclists that currently commute within the Derwent Valley MSOA Zone in the baseline. In all likelihood, they are using the A6 which is not suitable for cycling and is heavily used by motor vehicles. This equate to 3,307 users (i.e. 114.048 x 2.9%). Likewise, for World Heritage Site users we have included in the baseline those 47 users that are currently estimated to travel there by bicycle i.e. ((586,000 x 2.9%)/365). For leisure use we have assumed no usage. Again, adding commuter and World Heritage Site users together gives an indication of the overall baseline daily of usage **3,354** (i.e. 3,307 + 47).

Baseline and future user

The estimated baseline and the future daily cycle trips are summarised in Table 3.1.

Table 3.1: Demand (baseline and future)		
	Daily cycle trips	
Baseline	3,354	
Future users ¹⁵	4,200	

3.2.3 Appraisal Method

As noted in Section 3.2.1, the transport benefits have been assessed using the DfT's Active travel toolkit in line with WebTAG guidance. Table 3.2 describes the key indicators that govern most of the costs and benefits that need to be measured to undertake the appraisal.

Table 3.2: Indicators used in Active Travel toolkit		
Indicator	Used to appraise	
Cycling users	Journey quality	
New individuals cycling	Physical activity; Journey quality	
Car kilometres saved	Accidents; emissions, air quality/noise; Indirect tax revenue; decongestion	
Commuter trips	Absenteeism	

¹⁴ Note that this rate has been calculated across the entire year i.e. 16,994 / 365 days. In practice, there will be many more visitors on weekends and during the summer and less on winter weekdays.

¹⁵ Commuters (3,820) + Leisure (290) + WHS (90) = 4,200 future users



Looking at these categories in a little more detail:

- **journey quality** is an important consideration in scheme appraisal for cyclists. It includes fear of potential accidents and therefore the majority of concerns are about safety (for example, this is particularly relevant for this initiative, given the A6 as an alternative);
- **physical activity** impacts typically form a significant proportion of benefits for active mode schemes. The method for calculating these impacts is taken from 'Quantifying the health effects of cycling and walking' (WHO, 2007) and its accompanying model, the Health Economic Assessment Tool (HEAT);
- **accident benefits** are calculated from changes in the usage of different types of infrastructure by different modes and the accident rates associated with those modes on those types of infrastructure;
- **environmental benefits** from a cycling scheme are achieved through a reduction in motorised traffic and hence a reduction in the associated externalities. The assessment of disbenefits such as noise, air pollution and greenhouse gases;
- mode switch from car to active modes will benefit those who continue to use the highways and impact on **indirect tax** revenue;
- **decongestion** (e.g. reduction in congestion, accident savings, local air quality) resulting from a shift in mode and calculated using standard WebTAG marginal external costs; and
- improved health from increased physical activity (such as walking or cycling) can also lead to reductions in short term **absenteeism** from work.

The values and calculations associated with these benefits are fully explained in DfT guidance.¹⁶

3.2.4 Other assumptions used

Other assumptions used in the analysis are:

- 10km average journey (taken from PCT modelling).¹⁷ For simplicity, it is assumed that the length and speed of journeys is largely unaffected by the intervention (standard DfT modelling assumption);
- for journey quality, assumption of 7.03 pence per minute and 10% decay function over 30year period;¹⁸
- Optimism Bias is set at 15%;¹⁹ and
- 3.5% discount rate, in accordance with HM Treasury Green Book.

¹⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427098/webtag-tag-unit-a5-1-active-mode-appraisal.pdf

¹⁷ https://derwentvalley.shinyapps.io/dvcpct/

¹⁸ Evaluating the Demand for New Cycle Facilities, Hopkinson, P. and Wardman, M. (1996)

¹⁹ https://www.gov.uk/government/publications/green-book-supplementary-guidance-optimism-bias



3.3 Scheme costs

Table 3.3 presents the projected capital costs input to complete the whole Derwent Valley Cycleway and profiled by year. It should be noted that these costs are early estimates, and are based on 19.5 miles including the need for four new bridges.²⁰

Table 3.3: Capital costs				
2017/18	2018/19	2019/20	2020/21	TOTAL
£1 million	£2 million	£2 million	£2 million	£7 million

Derby City Council confirms that the ongoing maintenance costs have been capitalised and are therefore reflected within the costs above. No further ongoing annual costs have been included in the appraisal.

3.4 Analysis of monetised costs and benefits

Table 3.4 summarises the constituent cost and benefits factors that have been monetised for the Derwent Cycleway using the modelling assumptions in Section 3.2. The Net Present Value (NPV) is the difference between the PV of benefits and costs. For this initiative, it is forecast that the NPV is £23.3 million.

Table 3.4: Monetised costs and benefits		
Indicators	£'000	
Noise	3	
Greenhouse Gases	23	
Journey Quality	24,119	
Physical Activity (incl. absenteeism)	5,229	
Accidents	29	
Decongestion	177	
Indirect taxation	(128)	
Present Value of Benefits (PVB)	29,453	
Present Value of Costs (PVC)	6,136	
Net Present Value (PVB – PVC)	23,317	

Figure 3.1 takes the benefits results from Table 3.4 and displays them graphically. This illustrates that the main drivers behind the benefits for the Derwent Cycleway are "Journey Quality" and "Physical Activity".

²⁰ The costs have been provided by The Derwent Valley Trust and have <u>not</u> been independently verified as part of this process. Construction of a tarmac surfaced track is assumed at £200,000 per mile. In addition, legal, drainage and other services is expected to add 30% this basic cost. Each bridge is assumed to cost £500,000.



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Figure 3.1 – Derwent Cycleway benefits



3.5 Value for money

Using the same figures from Table 3.4, the summary appraisal outputs from the cost benefit analysis from Active Mode Appraisal Toolkit are provided below in present values in Table 3.5.

Table 3.5: Value for money assessment			
Scheme	Present Value Benefits ('000s)	Present Value Costs ('000s)	Benefit Cost Ratio (BCR)
Derwent Cycleway	£29,453	£6,136	4.80:1

Broadly speaking, this means for every £1 of investment in the Cycleway it is estimated there are $\pounds 4.80$ of benefits are being generating. This represents "Very High" value for money.²¹

As a comparative, a similar exercise for D2N2 recently approved the value for money case for the D2N2 Sustainable Transport Package. This identified BCR's for cycling improvements across the four transport authorities – the midpoint BCR was 4.56:1



4 Economic Benefits

4.1 Overview

The previous section provided an assessment of the transport benefits associated with the Derwent Cycleway. This section focuses on the economic benefits, principally those related to tourism activity.

4.2 Methodology

4.2.1 Recreational Expenditure Model

The analysis in this section has been prepared using Sustrans²² Recreational Expenditure Model (REM).²³ The REM is a widely-used tool for estimating the economic benefit of recreational cycling in terms of the expenditure it contributes to the local economy. As Sustrans note, *'REM is typically used in areas with high levels of recreational or tourist cycling and produces highest quality results when used to monitor an identifiable route such as a <u>riverside path</u>'. This clearly fits well the Derwent Valley proposals. REM estimates the total annual spend and a 'spend per head' for all home-based recreational cyclists and all cycle tourists. It also calculates the number of full time equivalent (FTE) jobs this investment would be expected to support.*

4.2.2 Temporary construction jobs

The total capital expenditure associated with the proposed works has been used to calculate the number of temporary construction jobs generated. This has been derived on the basis that £75,000 of construction expenditure will support one-person year of employment. This benchmark ratio is based on labour coefficients for infrastructure projects set out within cost per job guidance published by the Homes and Communities Agency (HCA).²⁴

4.2.3 Net additional jobs

In determining the net additional impact, the key issue to be addressed is the additionality – the extent to which activity takes place at all, on a larger scale, earlier or within a specific designated area or target group as a result of the intervention. In order to assess the additionality of the proposals, the following factors need to be considered:

 leakage – the proportion of outputs that benefit those outside of the project's target area or group. For this analysis, reference has been made to Census UK origin destination statistics, which indicates that approximately 90.6% of those who work in Derby reside within the D2N2 LEP area. As such, leakage for both the estimates of permanent jobs and construction employment has been assumed to be approximately 9%;

²² Sustrans is a charity that promotes cycling and walking

²³ The Recreational Expenditure Model, Sustrans (2017)

²⁴ Calculating Cost per Job: Best Practice Note, HCA (2015)



- displacement the proportion of project outputs accounted for by reduced outputs elsewhere in the target area. Displacement may occur in both the factor and product markets. In order to calculate the expected level of displacement associated with the permanent job creation effects, reference has been made to sub-regional benchmarks for public realm projects set out within additionality guidance produced for BIS²⁵. On this basis, a displacement rate of 39% has been applied. In the construction phase, a lower rate of 25% has been applied (with reference to guidance published by the HCA²⁶);
- multiplier effects further economic activity associated with additional local income and local supplier purchases. A composite multiplier of 1.26 has been applied in both the construction and permanent phases, reflecting BIS guidance for public realm projects.
- deadweight outputs which would have occurred without the project. This has been assessed through the reference case.

The approach to assessing the net additional impact of a project, taking into account the above adjustments, is shown diagrammatically in Figure 4.1.



Figure 4.1: Net additional impact

²⁵ BIS (2009), Research to improve the assessment of additionality.

²⁶ HCA (2008): Additionality Guide: A standard approach to assessing the additional impact of interventions.



4.3 Economic benefits

4.3.1 Construction Phase

Table 4.1 summarises the estimated <u>temporary</u> economic benefits in the construction phase of the Cycleway. This analysis show that the investment has the potential to support 80 net additional person years of construction employment.

Table 4.1 Construction phase benefits		
Total capital investment	£7 million	
Gross employment (person years)	93	
Net additional employment (person years)	80	

4.3.2 Operational phase – Permanent benefits

Using the Sustrans REM tool it is possible to assess the anticipated economic benefits associated with the Cycleway. Table 4.2 provides the projected annual recreational spend by cyclists using the new route. This shows that in total nearly £260,000 would be spent each year.

Table 4.2: Operational phase benefits – recreational spend		
Annual recreational spend by sector	£	
Accommodation	28,356	
Food and drink	171,039	
Retail	5,156	
Car costs	24,770	
Cycle costs	7,117	
Public transport	7,734	
Other	13,618	
Total	£257,790	

This expenditure is also expected to support a number of jobs. In Table 4.3, the jobs are spilt between those directly employed (e.g. workers in a riverside cafe) and those indirectly employed (for example, multiplier effects).

Table 4.3: Operational phase benefits – gross jobs		
Gross employment supported by recreational expenditure	FTE	
Direct employment	4	
Indirect employment	2	
Total gross employment	6	



The REM calculates that in total 6 gross FTEs would be supported by the recreational spend associated the DVC. As the projected number of permanent jobs is fairly modest, no additionality assessment has been made.

4.4 Wider benefits

The investment in the DVC is expected to result in a range of other economic, social and environmental benefits. While these benefits have not been quantified within the value for money assessment, they will nevertheless form an important part of the impact of the scheme.

These wider benefits include:

- Image and perception the improvement in the quality of the public realm and the opening up of the River Derwent will play a key role in ensuring that it supports the growth aspirations for the area. More generally, through enhancing the image of the area, it will support initiatives to market the area and wider sub-region to potential visitors and investors. There is significant anecdotal and qualitative evidence that high environmental quality acts as an important factor in determining investment location decisions. It is envisaged that it will also assist key businesses in the recruitment and retention of highly skilled staff; and
- Social value the package of works will deliver a significantly enhanced environment and experience for residents and visitors to the area. The Cycleway has the potential to enhance feelings of civic pride, with consequent benefits in terms of social engagement and inclusion. In addition, there is evidence that through enhancing feelings of pride within the local community, well designed civic spaces attract greater levels of use. Furthermore, through linking within the Connected Cycle City initiative to deliver cycling infrastructure, the scheme has the potential to promote enhanced levels of activity with consequent health benefits.



5 Conclusions

The Derwent Valley Cycleway is an ambitious project to create an off-road cycleway between Derby and Matlock, following the course of the River Derwent as closely as possible. The DVC will provide another route to the currently heavily-used A6 which is not suitable for cycling and is particularly unattractive for family and less confident cyclists. It is anticipated that, providing such a route, would greatly increase cycling as well as taking the existing traffic away from the busy roads and thus reducing injuries and fatalities.

The proposals also link well with Connected Cycle City, which is a key strategic project of Derby City Council focusing on establishing shared cycling routes across the City Centre.

The benefits have been calculated using DFT's Active Mode Appraisal Toolkit, in line with the latest WebTAG guidance. Users of the new DVC were spilt between commuters, leisure and visitors to the World Heritage Site. The analysis produced a Benefit Cost Ratio (BCR) of 4.80:1, which means £1 of investment in the Cycleway is estimated to generate £4.80 of benefits. This represents "Very High" value for money, and fits well with recently-approved D2N2 cycling projects.

In terms of more economics benefits, the construction of the route is forecast to create 80 person years of temporary construction employment. Once complete, DVC is likely to provide an annual recreational spend of £0.3 million, which in turn will support 6 permanent FTE jobs.

Table 5.1: Value for money summary 27		
	Derwent Valley Cycleway	
Present value public sector cost	£6.1 million	
Present value benefits	£29.5 million	
BCR	4.80:1	
Annual recreational spend	£0.3 million	
Total gross permanent employment (FTE)	6	
Net additional construction related employment (person years)	80	

Table 5.1 sets out a summary value for money statistics.

²⁷ Due to rounding, some of the numbers may not total exactly



Appendix A: Derwent Valley Cycleway Route

