Planning for Cycling

Executive Summary

18/12/08

SQWconsulting

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Introduction

1. This is an important time for cycling. While there is a growing recognition of the contribution that cycling can make to some of the greatest challenges facing society; climate change, increasing levels of obesity and transport congestion, it is less clear whether and how this wider contribution is reflected in priorities for investment in infrastructure and activities to encourage cycling.

2. The report argues that unless these benefits are taken into account we will systematically under-invest in cycling. There are a number of factors that mean that there is now a major opportunity to develop the role of cycling, but competing with investment in other modes requires robust evidence on the performance and benefits of cycling investments. Addressing this will help improve its influence in the planning process and strengthen the political will to deliver successful cycling projects. The report starts to address this by valuing the benefits of attracting additional cyclists and using examples to demonstrate the number of cyclists needed to justify specific levels of investment.

3. The aim is to encourage local authorities to treat cycling investments alongside mainstream transport projects, balancing the full costs and benefits for each case before making rational decisions. The report finds that despite good intentions, the challenges of understanding and applying the full benefits, and a lack of evidence on the performance of cycling investments, remain obstacles to achieving this aim.

Cycling and planning

4. Current guidance raises the profile of cycling (and walking) and supports its consideration in planning. Local authorities are now encouraged to incorporate cycling in the new Local Transport Plans (LPT2s) and are required to include target figures for levels of cycling. The vast majority of local authorities now have cycling as part of their plans (76%) and are setting targets, although these are less ambitious than in the previous round. There is certainly a growing interest and commitment to delivering support for cycling and there are many good examples of new projects.

5. The evidence on the treatment of cycling within the Local Transport Planning system suggests that although there have been improvements in the last couple of years, in the period 2001/02 to 2005/06 delivery has fallen short of the expected targets and outcomes. A report by Atkins and PWC in 2007 found that only 25% of local authorities were considered to be 'on track' to achieve core cycling targets in 2005/06, well below the progress made against other transport targets. The report also suggested that one of the causes was that there has been less political will to deliver measures to increase cycling, than for more traditional transport investments.

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external factors and public attitudes can have a strong impact on the success of a scheme in bringing about travel behaviour". In part the weak performance was attributed to inconsistencies in the data which meant that changes in the levels of cycling locally could not be accurately determined.

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> *As transport planners we're… being absolutely bombarded with all this helpful advice and information. But it's how we can actually make best use of that to help us to achieve our aims. If you're telling us that you've got statistical evidence that will tell us that it will encourage, I don't know, so many thousands more people to walk or to cycle…then it might have a bit more weight. (Transport planner; NICE focus group).*

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- by demonstrating how the values of the benefits can be adopted
- using case studies to demonstrate how specific investments will generate additional cycling activity and particularly new cyclists

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the same time the contribution that cycling can make to healthy lifestyles as well as the success of the British cycling team in the Olympics has generated more interest in cycling generally. The number of bicycles sold is reported to have increased sharply over the past year. As the Economist reported in relation to bike manufacturer Giant, "after a slow 2006, sales took off last year in Europe and America as fuel prices shot up. Suddenly a bicycle seems like the remedy for many modern ills, from petrol prices to pollution and obesity"[2]. In the UK, the industry is upbeat about its prospects despite the recession.

12. According to national data[3], the majority of adults agree that everyone should be encouraged to cycle to assist their health (87%), help the environment (79%) and ease congestion (73%). Around 37% of people agree that that they could easily walk or cycle on journeys they currently make by car. Further there is public support for taking measures to improve conditions for cyclists. Just over two-thirds (68%) of respondents agree that *'cyclists should be given more priority*', while only 11% felt that *'cycle lanes on roads simply reduce space'*

13. Taken together these factors present a strong case for cycling and for investment in improving infrastructure, designing new facilities and for marketing and training. This is an opportunity to embed cycling's popularity through good investment, ensuring that it is not temporary. In effect it requires that cycling shifts from being perceived as a peripheral mode of transport that attracts largely ad-hoc investment, into the mainstream.

Valuing the benefits

14. This section of the report sets out a summary of the monetary values that have been estimated for one new cyclist, cycling regularly for a year. A model was developed with four different scenarios: urban on-road, urban off-road, rural on-road and rural off-road. The values for these scenarios are shown in Table 1.

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16. These values are higher than those reported in the SQW's Valuing the Benefits of Cycling report because of the use of the WHO estimates of health benefits per cycle trip and because of the inclusion of "ambience" values that relate to the improvements in the journey quality as a result of the new cycling infrastructure.

17. While the differences between the scenarios are reasonably significant, it is important to note that the greatest impact that cycling has is on the health benefits of *additional cyclists*. These health benefits are universal. If people can be convinced to cycle, around two-thirds of the economic benefit generated does not depend on the location or type of facility. This is important from a planning perspective. The greatest difference that new facilities can make is *on their ability to generate additional cyclists*. In this respect one might argue that attractive off-road facilities are of particular value because they are more likely to attract new cyclists, by overcoming concerns about safety.

Cycling Planning Model

18. The report develops a simple model which uses the monetised values of the "wider benefits" to produce estimates of the number of additional cyclists needed to justify a particular level of investment.

19. For example, an investment of £100,000 requires an overall increase of 11 more people cycling regularly for the life of the project. An investment of £1 million would require 109 new cyclists. This means that there must be 109 additional cyclists cycling at least 3 times a week throughout the full life of the project (assumed to be 30 years). This does not mean that the same people must continue to cycle, but that on average, there should be 109 more cyclists each year than would be the case were the investment not made.

Table 2 Number of cyclists needed to achieve a benefit to cost ratio of 1:1

Cost of Project	Urban		Rural		Average
	On Road	Off Road	On Road	Off Road	
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20. These figures provide a simple and straightforward way to assess whether a cycling project is likely to generate a positive return on investment. As a rule of thumb, every £10,000 invested would need to generate at least one extra cyclist, each year, over a 30 year period in order to break even. Where the effect of the intervention is likely to be shorter, the number of extra cyclists will need to be higher.

21. It is also important to bear in mind that the investment will frequently contribute to other objectives, such as increasing walking or may be part of a wider set of public realm improvements which are intended to improve amenity. Where this is the case only an appropriate proportion of the costs of the investment should be attributed to cycling.

Building in demand

22. A further complicating factor is that over the period of the intervention the underlying *demand* for cycling is likely to change. It is difficult to anticipate this pattern, but it is not unusual for appraisals to build in some growth. As we noted earlier, there is some limited evidence of this from for example the Lancaster Millennium Bridge (average year on year growth of 5% over the seven years after construction) and from discussions with Sustran's Research and Monitoring group who have experience of tracking changes in usage.

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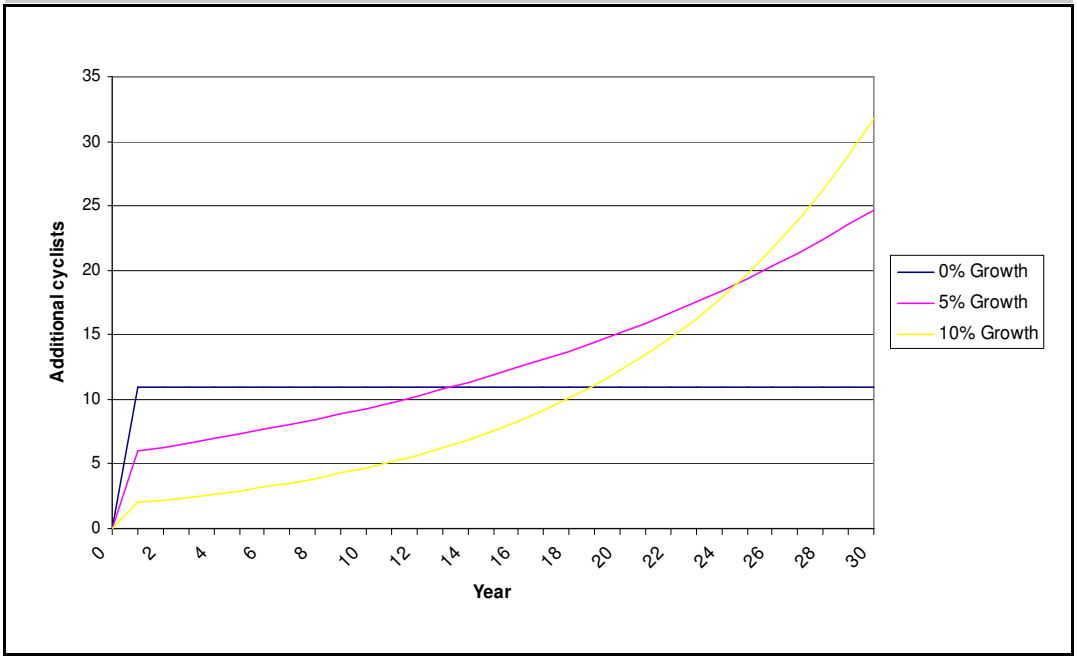
effects over time. For example, projects which start off with low levels of uptake may see increases in usage as they become embedded into the local transport infrastructure.

25. In Figure 1, the curved line shows that despite generating just six additional cyclists in the first year, an assumption of 5% annual growth would see this increase to 19 by the end of the project, which is sufficient over the project lifetime to breakeven. Although it can be appropriate to use estimates of growth these need to be very carefully justified. This is another area where stronger evidence would help planners understand whether the impact of certain projects is likely to grow, or even reduce, over time and if so on what sort of scale.

Figure 1: Impact of growth in the number of additional cyclists **needed to break-even** on a £100,000 cycling project investment



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very recently been completed. This is particularly true of Priory Vale, Queen Elizabeth Park and Surrey University's Manor Park campus. The average benefit to cost ratio of the five case studies is just under 2:1 excluding the Hull case study which is much higher than the other results. Including this outlier, the average benefit to cost ratio is almost 10:1. It is also worth stressing that these cases were identified independently by the consultants as typical examples.

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Case Study	Cost	Cyclists generated	Benefit to cost ratio	NPV
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29. The economic impact results shown in the case studies highlight the diverse range of values which cycling projects can generate. The retrofitting of seven streets in Hull has proved to be extremely successful, combining low costs with a high number of additional cyclists. The implementation of a 20mph speed limit and other measures also contributed to the growth in cycling. The Lancaster Lune Millennium Bridge was a major investment that improves cycle links and pedestrian access, but the results to date indicate that, on their own, the volume of cycling is not yet sufficient to generate a positive net present value. However, this would change if additional pedestrian activity was also included or perhaps the wider "iconic" impact of the bridge was valued. It is too early to draw conclusions on the economic benefit of the project which will depend on changes in cycling use over the next 30 years.

30. The evidence from the counters adjacent to the Priory Vale project has not shown significant increases since the new housing development and cycle infrastructure were constructed. At Surrey University, the number of students living and studying on the new campus is forecast to increase until final completion of the new campus in 2020. The available evidence at the Queen Elizabeth Park site shows that cycling is increasing year on year but there is insufficient data to accurately forecast likely future increases.

31. There is very little evidence that the cycling investments which were implemented in the case studies were subject to any sort of analysis of the costs and likely benefits of the cycling infrastructure. It is unlikely that new roads or other forms of transport investment would go ahead without an assessment of their usefulness and value for money.

Conclusions

32. The report argues that despite a growing recognition of the contribution that cycling can make to a number of important policy areas, it still proves difficult to ensure that these benefits are taken into account in decisions about transport investment. The challenges in incorporating these benefits and the relative lack of evidence on the performance of cycling investment has made it difficult to make strong cases and may contribute to a lack of political will to take more radical action.

33. The report argues that better understanding of the wider benefits of cycling and the collection of more evidence that investment in cycling encourages more people to cycle, will go a long way towards integrating cycling more fully into transport and planning processes.

34. Unless planners and developers are aware of the full economic benefits it is difficult to ensure that the costs and benefits of cycling investment will be considered fairly. Only if this becomes common practice will cycling investment approach levels that its economic (and social) contribution justifies. In effect, we under invest in cycling because we fail to explicitly, and systematically, recognise these wider economic benefits.

35. With increased Government funding, supportive guidance and growing public interest, there is an opportunity for cycling to shift from the transport periphery into the mainstream, but achieving this requires a clearer demonstration of the value and success of investment.

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Report to Cycling England

18/12/08

SQWconsulting

Contents

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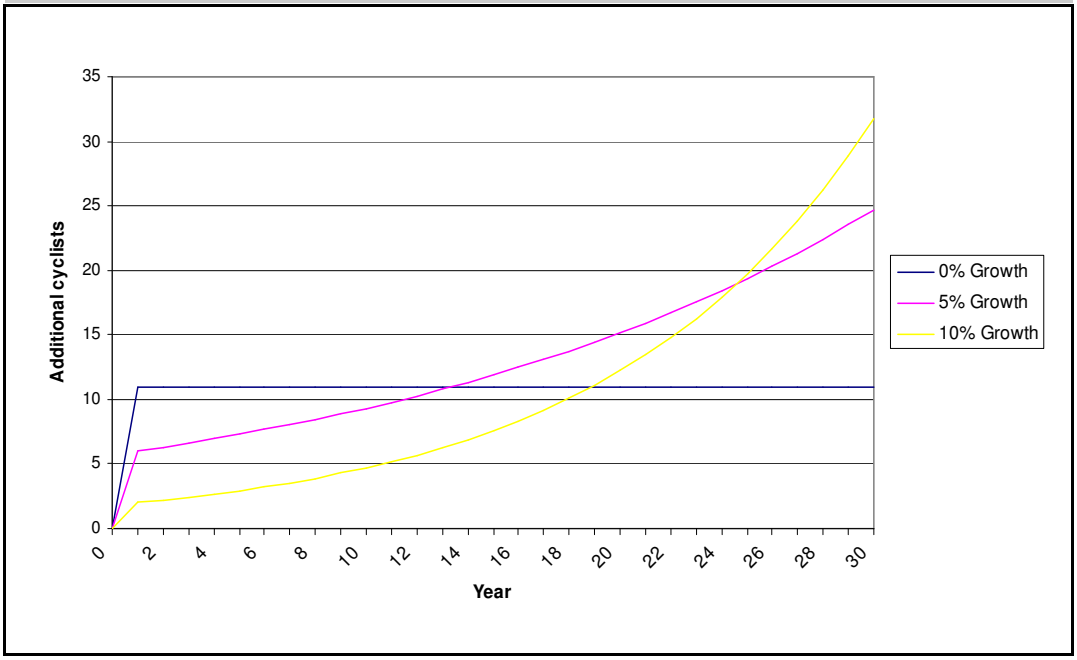

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Source: SQW

29. The economic impact results shown in the case studies highlight the diverse range of values which cycling projects can generate. The retrofitting of seven streets in Hull has proved to be extremely successful, combining low costs with a high number of additional cyclists. The implementation of a 20mph speed limit and other measures also contributed to the growth in cycling. The Lancaster Lune Millennium Bridge was a major investment that improves cycle links and pedestrian access, but the results to date indicate that, on their own, the volume of cycling is not yet sufficient to generate a positive net present value. However, this would change if additional pedestrian activity was also included or perhaps the wider "iconic" impact of the bridge was valued. It is too early to draw conclusions on the economic benefit of the project which will depend on changes in cycling use over the next 30 years.

30. The evidence from the counters adjacent to the Priory Vale project has not shown significant increases since the new housing development and cycle infrastructure were constructed. At Surrey University, the number of students living and studying on the new campus is forecast to increase until final completion of the new campus in 2020. The available evidence at the Queen Elizabeth Park site shows that cycling is increasing year on year but there is insufficient data to accurately forecast likely future increases.

31. There is very little evidence that the cycling investments which were implemented in the case studies were subject to any sort of analysis of the costs and likely benefits of the cycling infrastructure. It is unlikely that new roads or other forms of transport investment would go ahead without an assessment of their usefulness and value for money.

Conclusions

32. The report argues that despite a growing recognition of the contribution that cycling can make to a number of important policy areas, it still proves difficult to ensure that these benefits are taken into account in decisions about transport investment. The challenges in incorporating these benefits and the relative lack of evidence on the performance of cycling investment has made it difficult to make strong cases and may contribute to a lack of political will to take more radical action.

33. The report argues that better understanding of the wider benefits of cycling and the collection of more evidence that investment in cycling encourages more people to cycle, will go a long way towards integrating cycling more fully into transport and planning processes.

34. Unless planners and developers are aware of the full economic benefits it is difficult to ensure that the costs and benefits of cycling investment will be considered fairly. Only if this becomes common practice will cycling investment approach levels that its economic (and social) contribution justifies. In effect, we under invest in cycling because we fail to explicitly, and systematically, recognise these wider economic benefits.

35. With increased Government funding, supportive guidance and growing public interest, there is an opportunity for cycling to shift from the transport periphery into the mainstream, but achieving this requires a clearer demonstration of the value and success of investment.

1: Introduction

1.1 This report sets out the case for planning for cycling. Specifically, it argues that the potential range of benefits to society that could be achieved through an increase in the number of people cycling regularly is not well understood and, as a result, it is likely that we under-invest in infrastructure and activities that encourage cycling.

1.2 The report argues that recent increases in fuel prices, longer term issues about security of energy supply and the approaching recession make car transport more expensive in both absolute and relative terms. At the same time the contribution that cycling can make to healthy lifestyles as well as the success of the British cycling team in the Olympics has generated more interest in cycling generally. According to national data[4], the majority of adults agree that everyone should be encouraged to cycle to assist their health (87%), help the environment (79%) and ease congestion (73%). Around 37% of people agree that that they could easily walk or cycle on journeys they currently make by car.

1.3 There is now an opportunity to embed cycling's popularity through sound investment. Doing this requires good robust analysis to support decision making based on the collection and presentation of evidence. This is likely to produce a better allocation of resources; encouraging the support of projects which are likely to cost effectively generate more cycling and dissuade investment in projects which are less effective. Cycling is now benefitting from increased Government spending and this makes the need to demonstrate value for money even more pressing.

1.4 The report is not suggesting that more investment should be made to encourage more cycling *in all cases*, but rather the full costs and benefits should be assessed rigorously as part of the process of planning for new developments such as housing, commercial areas, schools and transport projects. This is more subtle, and hopefully more specific, than much of the existing guidance which suggests that cycling (and walking) should be prioritised.

1.5 A short review of progress towards to Local Transport Planning targets suggests that the outcomes have been below expectations and targets. According to the Atkins research this is in part a result of overly optimistic target setting but also that authorities were less likely to have the political will to deliver measures to increase cycling, tackle congestion, improve air quality and in particular combat climate change.

1.6 We suggest that stronger evidence would address both of these barriers and that this requires two things:

- a better understanding of how the values of the benefits can be adopted
- demonstration that specific investments will generate additional cycling activity and particularly new cyclists

[4] Cycling. Personal Travel Fact Sheet. Department for Transport (January 2007).

1.7 The report attempts to do both, demonstrating the performance of a number of case studies and simplifying the valuation of benefits through the presentation of a set of ratios. Together these start to set out the tools and evidence that are needed to ensure that cycling receives the level of consideration and investment that its contribution to the economy merits. While there is growing awareness of these tools the use of this type of analysis is not widespread.

1.8 Not only does this report make the case for better assessment of potential cycling investments, it also provides a series of case examples to demonstrate some typical results. Using previous research carried out in SQW's previous analysis of the Economic Benefits of Cycling[5] supplemented by more recent research by others, it introduces a table of ratios that can be used as a guide to help quantify the number of new cyclists that need to be generated by cycling investments of different scales. As part of this, the report also includes discussion of some of the challenges in assembling this evidence and the importance of determining demand.

The case for cycling

1.9 The SQW report, The Economic Benefits of Cycling, completed in 2007, set out the argument for investment in cycling and the value of the benefits that it generates. The overall value accrues from the unique combination of the benefits that cycling offers, primairly:

- improvement in general health and fitness
- reduced pollution and the emission of CO2
- help in tackling congestion

1.10 These challenges represent three of the most pressing problems faced by Government and society. The relevance of cycling is shown by its potential to contribute to the policy priorities of six Government departments, embracing seven Public Service Agreements. The study calculated that if, by 2015, the number of cycle trips returned to the level of 1995, the savings in health, pollution and congestion would be around £500 million. An increase of 50% in the level of cycling – far below the original 1996 target of quadrupling trips by 2012 – would create total savings of more than £1.3 billion.

1.11 These are conservative values, comprising only (by definition) those benefits which can be quantified. No account is taken of the further benefits of cycling to:

- protecting children against obesity
- improvement in physical development
- quality of life in communities
- wealth generation through tourism and leisure pursuits
- potential for a reduction in the rate of road accidents

[5] The Economic Benefits of Cycling, 2006, prepared for Cycling England by SQW

1.12 Despite these omissions, the economic analysis made a compelling case for sustained investment in cycling.

1.13 Finally, there is often an assumption that increasing the amount of cycling will increase the number of accidents and it is often perceptions about safety that discourage cycling. This must be considered in context. Data for London over the past ten years show that as the number of cycle trips has grown, the number of cyclists killed or injured has fallen. Similar results have been found in other countries suggesting that increased cycling does not necessarily increase the number of fatal or serious injuries and may contribute to a reduction.

And there is growing public interest and support

1.14 With higher fuel prices and the current economic downturn, there is a growing recognition of the savings that can be made by cycling, alongside the contribution that it makes to healthy lifestyles. The British cycling team in the Olympics has generated more interest and the number of bicycles sold is reported to have increased sharply over the past year. As the Economist reported in relation to bike manufacturer Giant, "after a slow 2006, sales took off last year in Europe and America as fuel prices shot up. Suddenly a bicycle seems like the remedy for many modern ills, from petrol prices to pollution and obesity"[6]. In the UK, the industry is upbeat about its prospects despite the recession.

1.15 These factors are reflected in the Cycling - Personal Travel Fact Sheet produced by the Department for Transport which reported that 87% of adults agree that everyone should be encouraged to cycle to assist their health, help the environment (79%) and ease congestion (73%). Around 37% of people agree that that they could easily walk or cycle on journeys they currently make by car.

1.16 The survey also found that around 3 in 10 car users say they would reduce their car use 'if there were more cycle tracks away from roads ' (31%), 'if there were more cycle lanes on roads' (27%) or 'better parking facilities for cycles' (30%). Further there is public support for taking measures to improve conditions for cyclists. Just over two-thirds (68%) of respondents agree that *'cyclists should be given more priority*', while only 11% felt that *'cycle lanes on roads simply reduce space'*.

1.17 Despite the relatively low numbers currently cycling, 43% of people aged 5 and over own a bicycle. While there is a latent demand, addressing concerns about safety, lack of infrastructure and better training could all help encourage more cycling with benefits for both individuals and society.

1.18 Taken together these factors present a strong case for cycling and for investment in improving infrastructure, designing new facilities and for marketing and training. This is an opportunity to build on cycling's popularity through good investment, ensuring that it is not temporary. In effect it requires that cycling shifts from being perceived as a peripheral mode of transport that attracts largely ad-hoc investment, into the mainstream.

1.19 The report is divided into the following sections:

[6] The Economist October 2008 "Obesity and high oil prices are good news for the world's biggest bikemaker"

- The next chapter takes a high level view of the current planning obligations and guidance and feedback on the Local Transport Plans
- Chapter three uses SQW's previous research and updates it to produce a series of values that can be used as part of cost benefit analysis.
- Chapter five uses these values to produce some ratios of the number of *new* cyclists that are needed to justify different amounts of investment.
- Chapter six summarises the results of five case studies and their economic impacts. The full case studies are presented in Annex A.
- The final chapter sets out some of the conclusions of the work.

2: Current planning for cycling

2.1 The rationale for investing in cycling set out in the previous chapter is based on improving measurement of the costs and benefits, particularly through the inclusion of values that reflect better health, reduced congestion and lower pollution benefits. However, this is a complex process and it is helpful to consider how cycling currently fares within the current planning process.

2.2 Government policy on integrating transport and planning at the national, regional and local level are set out in *Planning Policy Guidance 13: Transport*[7] (PPG 13). PPG 13 includes government policy on including cycling as part of the planning process. The three key aims of this guidance are to integrate transport and planning in order to:

- Promote more sustainable transport choices for both people and for moving freight.
- Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling.
- Reduce the need to travel, especially by car.

2.3 PPG 13 discusses how cycling ***should*** be integrated into the planning process. In determining planning applications, local authorities ***should***:

- Review existing provision for cyclists, in order to identify networks and routes, including those to transport interchanges, along which the needs and safety of cyclists will be given priority, and set out the specific measures which will be taken to support this objective.
- Influence the design, location and access arrangements of development, including restrictions on parking, to ensure it promotes cycling.
- Seek the provision of convenient, safe and secure cycle parking and changing facilities in developments and the provision of cycle storage facilities at transport interchanges, including park and ride sites.
- Seek the provision of convenient, safe and secure cycle parking in town centres.
- Seek the provision of cycle routes and cycle priority measures in major new developments. As with pedestrian routes, cycle routes should not be isolated from other activity so as to promote personal safety.
- Where appropriate, assist in the completion of the national cycle network, and additional key links to and from the network, as well as promoting local networks.

2.4 Local authorities are therefore encouraged to ensure that planning applications incorporate cycling from an early stage. The key objective of PPG 13 is to reduce the need for car

[7] http://www.communities.gov.uk/documents/planningandbuilding/pdf/155634.pdf

journeys, meaning that cycling is simply one of a raft of alternative measures. While this is sensible, the additional benefits to society of cycling over, for example, public transport, are not taken into consideration and there is therefore little weighting for cycling over other alternatives to the car. It is important that planning policy recognises the relative merits of each alternative to the car, and ensures that policy supports each alternative in relation to the social benefits which it can generate.

How is planning for cycling enforced/ implemented?

2.5 PPG 13 outlines a number of options which are designed to ensure that cycling is included as an integral element of new developments. The three options open to local authorities are planning conditions, planning obligations and travel plans.

- ***Planning conditions*** may be used to require on-site transport measures and facilities as part of a new development or to prohibit development on the application site until an event occurs, for example the provision of secure cycle parking and changing facilities and safe pedestrian and cycle routes.

- ***Planning Obligations*****,** commonly known as Section 106 agreements, allow a local planning authority to enter into a legally-binding planning obligation with a land developer over a related issue. Planning obligations may be used to achieve improvements to the level and/or quality of cycling infrastructure, where such measures would be likely to influence travel patterns to the site involved, either on their own or as part of a package of measures. Examples might include improvements to a cycle route which goes near to the development.

- ***Travel Plans*** are designed to help raise awareness of the impacts of travel decisions and promote the widespread use of travel plans amongst businesses, schools, hospitals and other organisations. Local authorities are expected to consider setting local targets for the adoption of travel plans by local businesses and other organisations and to set an example by adopting their own plans. There is no standard format or content for travel plans. However, their relevance to planning lies in the delivery of sustainable transport objectives, including:

  - Reductions in car usage (particularly single occupancy journeys) and increased use of public transport, walking and cycling.

  - Reduced traffic speeds and improved road safety and personal security particularly for pedestrians and cyclists.

  - The Government considers that travel plans should be submitted alongside planning applications which are likely to have significant transport implications.

2.6 In addition to the three methods outlined in PPG 13, local authorities can also promote cycling through their local transport plan (LTP). The Transport Act 2000 requires most local transport authorities in England to produce and maintain a LTP. LTPs are used to set out the authority's local transport strategies and policies, and an implementation programme.

How effective is the Local Transport Planning process for cycling

2.7 There is no doubt great variation in how different local authorities integrate cycling into their transport planning and it is hard to generalise. There are many good examples and there is no doubt that there is now a much stronger interest in investing in cycling, partly driven by Government processes and partly by local demand.

2.8 Perhaps the most authoritative assessment of cycling within the local transport plans was carried out by Atkins in association with PWC and Warwick Business School[8] in 2007. This was mainly concerned with reviewing the first round LTPs running from 2001/02 to 2005/06. **This found that there were a number of areas including cycling where outcomes have been below targets or expectations.**

2.9 It also found that the "inconsistencies in data mean that changes in levels of cycling locally cannot be accurately determined". Some authorities have struggled to demonstrate an increase in cycling levels and others have had difficulties in collecting reliable and consistent data. While over two-thirds of authorities reported greater levels of cycling over the LTP period, this was not easily demonstrated. The percentage of authorities that were considered to be 'on track' to achieve core cycling targets in 2005/06 was 25% based on independent assessment, well below the percentages on track to deliver against other targets.

2.10 Local authorities identified a range of specific schemes in their delivery reports, which have encouraged an increase in cycling through schemes giving increased priority to cyclists; integrating cycling and public transport use; running promotional activities; training; and joint initiatives with schools, workplaces, and other stakeholders. Cycling was identified as an area of expenditure given a 'high' or 'very high' priority by 57% of the local authorities. Fifty out of 73 authorities (68%) set targets relating to cycle trips on specific routes, in specific geographical areas, or to specific destinations.

2.11 The analysis of expenditure for LTP1 found that the *proportion of expenditure on cycling* had fallen from 7% in 2001/02 to 5% in 2005/06 (although the absolute amount remained at around the same level). **On average this equates to around £4 per head of the population compared with £84 per head spent on highway maintenance**.

2.12 Following the difficulties of accurately ascertaining cycling levels in their areas in the first round LTPs, many authorities are now implementing or proposing significant improvements to the monitoring of cycling activity during LTP2. Across England and Wales authorities are predicting **an average increase of 7% in cycling trips**, between 2005/06 and 2010/11, based on targets presented in their second Local Transport Plans.

2.13 These targets are now much less ambitious than was the case in the first round, when many Plans reflected the National Cycling Strategy target of tripling cycling levels between 2000 and 2010. In LPT2, 40% of authorities are aiming for targets of an 11-20% increase in cycling growth by 2010/11, 25% are aiming for cycling growth of between 20% and 100%, and 12% are still aiming to double or triple cycling levels. A substantial minority (15%) of the LTP2s examined plan for no cycling growth at all.

[8] Atkins, Pwc and Warwick Business School, The Long Term Process and Impact Evaluation of the Local Transport Plan Policy, 2007 (DfT)

2.14 So although cycling features significantly in most local transport plans, there seem to be challenges in setting and meeting targets, partly because these may have been too optimistic, but also because of difficulties in effectively monitoring levels of cycling. This was picked up in the Atkins research which found that *"There would appear to be a poor understanding of the links between interventions and outcomes, particularly for public transport, walking, cycling etc., where external factors and public attitudes can have a strong impact on the success of a scheme in bringing about travel behaviour."*

2.15 So although the plans and targets have been set, there appear to be some concerns or potential barriers that will impact on delivery. The Atkins research, using a survey of local authorities, found that, in general, local authorities have "*a stronger political will to deliver measures to improve road safety, highway condition, public transport, and measures to improve accessibility to jobs and services, but are less likely to have the political will to deliver measures to increase cycling, tackle congestion, improve air quality and in particular combat climate change"*. This conclusion was broadly consistent with evidence from their regional workshops.

2.16 The research also highlighted the elements that were considered positive and negative drivers to delivering cycling interventions through planning in local authorities Table 2-1/

Table 2-1 Positive and negative drivers in planning for cycling

Positive drivers	Negative drivers for cycling in planning
• Member and chief officer support for cycling policy, dedicated staff resources and support, sufficient capital and revenue funding to promote infrastructure improvements and promote cycling more generally. • Measures to increase priority for cyclists. Extent of cycle network is large enough to allow a range of different and longer journeys to be made. • Linkage of capital measures with a range of revenue based activity including child and adult cycle training, incorporation of cycling into travel planning and support for promotional events. • Growing public concerns about health, fitness and environment. Opportunities to promote leisure cycling.	• Absence of member or chief officer recognition of cycling as a key element of the LTP strategy with resulting limits on commitment and resources. • Lack of a dedicated cycling officer to raise the profile of cycling at the corporate level and to champion the delivery of schemes and address issues arising from • consultation or land ownership issues. • Absence of strong engagement and lobbying from local cycling user groups. • Limited public awareness of the health and environmental benefits of cycling, related to socioeconomic groups.

Source: Reproduced from table in The Long Term Process and Impact Evaluation of the Local Transport Plan Policy, 2007 (DfT)

2.17 One of the threads that run throughout this analysis is the difficulty in demonstrating the benefits of cycling. This is perhaps at the heart of the difficulties in setting targets, making the right investments and providing evidence of progress. A criticism of the LTP process has been the disappointing amount of modelling and value for money analysis undertaken and that this limits the extent to which plans can be based on evidence. This is particularly true in planning for cycling.

2.18 Finally, the analysis of local transport planning also comments on insufficient before and after surveys to fully understand the advantages and disadvantages of particular scheme types, and lack of resources to follow up impacts in sufficient detail and a lack of resources to undertake wider research, and learn from others.

Conclusions

2.19 The current guidance raises the profile of cycling (and walking) and encourages its consideration in planning. Local authorities are encouraged to incorporate cycling in their plans and the new Local Transport Plans (LPT 2) now require target figures for cycling levels. The vast majority of local authorities now have cycling as part of these plans (76%) and are setting targets, although these are less ambitious than in the previous round. There is certainly a growing interest and commitment to delivering support for cycling and there are many good examples of new projects.

2.20 However, the results from the past five years indicate that progress towards cycling objectives have tended to fall short. In part this is because of over-ambitious target setting, and also because the difficulties in measuring performance make it hard to demonstrate that investment in cycling has delivered value for money. The Atkin's review of the LTPs also suggested that there is less political will to deliver measures to increase cycling than for more traditional transport investments.

2.21 Although there is now better guidance on the inclusion of cycling within planning, there still needs to be stronger evidence to show that interventions will deliver changes in the level of cycling and in understanding the associated benefits. This will provide a platform on which cycling officers and others can base sound cases for new investment. We can say with confidence that without this evidence it is unlikely that the right decisions about investment in cycling will be made.

2.22 The need for evidence rather than guidance is summed up in the comments of one transport planner, reported in the NICE evidence in its report on environment and physical activity[9]

> *As transport planners we're… being absolutely bombarded with all this helpful advice and information. But it's how we can actually make best use of that to help us to achieve our aims. If you're telling us that you've got statistical evidence that will tell us that it will encourage, I don't know, so many thousands more people to walk or to cycle…then it might have a bit more weight. (Transport planner; NICE focus group).*

2.23 Addressing both stronger planning and the strength of political will depends on the availability of evidence. The remainder of this report aims to do this in two ways:

- by demonstrating how the values of the benefits can be adopted
- using case studies to demonstrate how specific investments will generate additional cycling activity and particularly new cyclists

[9] NICE,

3: Providing the evidence

3.1 The previous chapter concluded that strengthening the case for cycling requires better evidence in order to improve planning and also to strengthen political will. It goes without saying that it is essential that rigorous assessment of costs and benefits is at the heart of decisions about public investment. This is not always easy, particularly where the benefits include a number of "externalities" (costs or benefits that are not captured within market mechanisms).

3.2 If these are not included it is unlikely that the right level of investment will be made or that the "best" projects will be supported. If the full costs and benefits are not understood, policymaking will be seriously hampered. Investment will be piecemeal, driven by a general sense of what should and can be done rather than seeking best value.

3.3 Effective monitoring is vital. Of all the potential case studies identified (and discussed later), there were no examples that had tried to assess future demand. Nor, in the majority of cases, was there analysis of the current level of cycling in the area. Unless, this type of analysis is done, it is impossible to identify whether a project is likely to be, or has been successful.

3.4 In order to either appraise whether an investment should go ahead or evaluate whether it has been a success, cost-benefit analysis is often undertaken. Although not common there are examples of cost benefit analysis for cycling projects. These include work by the Cycling Centre of Excellence (2004), Saelensminde (2004), Temanord (2006) and Sustrans (2006)).

3.5 The lack of evidence around the ex-ante appraisal of projects in relation to cycling and around impact on cycling levels post-investment, suggests that the types of appraisal techniques undertaken for mainstream transport investments are not widely used for cycling. Because the benefits of cycling are harder to measure, it is likely that they are undervalued and, as a result there will be under-investment. This will not always be the case. There will also be examples of over-investment in measures, where for example, infrastructure has been constructed that will not generate the additional demand required for the benefits to exceed the costs. Both types of examples represent a misallocation of resources.

Valuing the benefits

3.6 This chapter sets out values proposed in SQW's previous work. These have been adapted to take into account the "health" values endorsed by the World Health Organisation's health economic assessment tool (HEAT) for cycling.

3.7 The HEAT model gives a value per kilometre cycled per individual adult cyclist of €0.81. Based on each trip averaging 3.9km and each cyclist undertaking 160 trips annually[10], this gives a figure of €505.44 or £408.67 (at October 2008 rates of exchange).

[10] London Area Travel Survey 2001

3.8 The HEAT model is based on the findings of a longitudinal study of adult commuter cyclists in Copenhagen and has been developed by academics in the UK[11]. The values assume regular commuting cyclists rather than casual or leisure cycling. The values from the SQW report and the "value of loss of life" used by the WHO model are shown in Table 3-1.

Table 3-1 Summary of values

Health benefit	**Comment**	**Values (per cyclist assuming a full year of cycling, 3 times a week)**
Value of loss of life	Taken from the World Health Organisation *HEAT* model	£408.67
NHS savings	SQW estimate	£28.30 for all cyclists
Productivity gains	Based on conservative assumption and on lost GVA	£47.68 all cyclists
Total health benefits		£679.96
Pollution reductions	Pence per kilometre	Estimate for 160 trips of 3.9 kms
Agglomeration	5.8 (petrol) & 32.2 (diesel)	£69.14
Rural	2.1 (petrol) & 2.0 (diesel)	£12.98
Congestion savings	Congestion saving per km	Estimate for 160 trips of 3.9 kms
Urban area	22.0 pence	£137.28
Rural area	11.0 pence	£68.64
Journey Ambience	Pence per trip (2006 values)	Estimate for 160 trips
On road	16.5 pence	£26.40
Off Road	67.0 pence	£107.20

Health Benefits

3.9 In addition to the value of preventing the loss of life, increased cycling can also generate savings for the NHS. Those cyclists who move up an activity level (for example from sedentary to light exercise or light exercise to moderate exercise) will lower their likelihood of suffering from diseases such as coronary heart disease or stroke. The cost of treating these diseases is significant and each additional cyclist is estimated to save the health service £28.30 annually because by increasing their exercise levels, these cyclists lower their chance of suffering from these diseases and lower the subsequent cost of treatment.

3.10 The final health benefit is derived from increased productivity. There is an empirical link between increased physical activity and reduced absenteeism[12].The average employee has 6.8 sick days per year in the UK[13]. A conservative estimate is that increased exercise can lower this sick leave by 6%. The value of lowering sick leave by this 6% is equal to £47.68 per working age adult across England based on an annual GVA per employee of £37,000.

[11] Analysis of the Copenhagen study carried out by Harry Rutter and xxxx
[12] Shore et al, 1989
[13] Confederation of British Industry, *Absence and labour turnover*, 2003

Pollution

3.11 If the provision of cycle infrastructure can convince people to replace car trips with cycle trips, there are benefits through a reduction in pollution. These include the value of the reduction in carbon emitted and the health benefits of improved air cleanliness. The pollution values given in Table 2-1 show that reductions in urban car usage yield higher benefits than rural car usage. This is because a much higher number of people per unit of road traffic emission are affected in more densely populated urban areas than rural ones. We have assumed that half of any additional cycling replaces car trips in determining the model values in the next chapter. This means that the pollution benefits are only generated by 50% of additional cyclists.

Congestion

3.12 Congestion is estimated to cost the UK economy around £20 billion[14]. The main element of this value is the high opportunity cost of employees suffering delays during the working day. Time spent stuck in traffic jams could be used much more efficiently. Cycling provides an opportunity to lower the levels of congestion by lowering the number of cars which are on the road. It is estimated that every kilometre of car usage which can be removed saves 22 pence in urban areas and 11 pence in rural areas[15]. This is equal to an annual economic benefit of £137.28 in urban areas and £368.64 in rural areas for each car that is replaced by a bicycle (assuming that the average trip is 3.9km and each cyclist undertakes 160 trips per year). Again it is assumed that half of any additional cyclists replace car trips so only 50% of the additional cyclists generate congestion benefits.

Journey Ambience

3.13 Improvements to cycle facilities have an inherent value to those who use them. Cyclists valuation of facilities will depend on a number of considerations; the level of noise and air pollution, comfort and safety and so on. The journey ambience values shown in Table 3-1 are based on Hopkinson and Wardman (1996) and have been updated to 2006 values. This study gives two options which can be termed 'on road' improvements to the cycling infrastructure (widening the road and cycling in bus lanes). A further two options (segregated path and free cycleway) can be termed 'off-road' cycle infrastructure improvements.

3.14 Table 3-1 shows that cyclists value the ambience of *off-road cycling* a lot more than *on-road cycling* facilities. The average of the two on-road options is 16.5 pence compared to the off-road average of 67 pence per trip. This is unsurprising, particularly for new or inexperienced cyclists who may feel intimidated by fast moving vehicular traffic even when cycling on on-road cycle lanes. The off-road facilities are valued more as they provide a greater level of perceived safety and lower levels of air and noise pollution.

3.15 As per WebTag guidance, the ambiance values for new cyclists are "subject to the "rule of a half" - that is the benefits for new cyclists/walkers should be divided by two. Current users of the route will experience the full benefit of any improvements to ambience." [16] Therefore, the

[14] Goodwin, *Utilities street works and the cost of traffic congestion*, 2005
[15] Sansom, Nash, Mackie, Shires and Watkiss, *Surface transport costs & charges Great Britain 1998*, 2001
[16] http://www.webtag.org.uk/webdocuments/3_Expert/14_Walking_Cycling/3.14.1.htm#019

actual values attributed to additional cyclists per trip are £13.20 for on-road routes and £53.60 for off-road routes while existing cyclists receive the full ambience values.

Accidents

3.16 The most contentious of the unvalued benefits of cycling is the potential reduction in accidents. There is mixed evidence on the impact of on-road cycle lanes and off-road paths on the numbers of injuries and deaths.

3.17 The impact on the number of traffic accidents of increasing cycling is another factor. A number of studies have shown that as the number of cyclists increase, the number of cyclists injured or killed falls (for example Sloman (2006) for London, Krag (2005) for Copenhagen and Pucher (1997) for Germany). These reports only include the number of accidents which occur on the road network. For the UK, this means that accidents which occur on the growing number of off-road cycle routes are not included. Scottish Executive (2005)[17] research investigated the level of cycle accidents based on hospital admissions rather than road accident statistics. This research showed that 41% of all accidents occurred off road, with 51% of these off-road accidents occurring on cycle tracks.

3.18 A further difficulty in determining whether provision of greater levels of cycle infrastructure will make cyclists safer is identifying how this can change cyclists' behaviour. Wardlaw (2002) reports that the provision of new infrastructure may increase the perception of safety for cyclists who in turn will 'risk compensate' away the extra safety benefits by cycling in a more dangerous fashion, increasing the risk of accidents.

3.19 The conflicting arguments and evidence make it impossible to accurately determine the value of increased cycling infrastructure in terms of accidents prevented (or caused). Therefore, it is assumed that the number of accidents remains unchanged despite the new cycle facilities.

Existence and Option Values

3.20 Another source of unmeasured benefit arises from the existence value and option value of cycling infrastructure. Facilities such as cycling infrastructure may be valued by residents of an area because they appreciate the inherent value of cycle routes or because they value the contribution which cycling facilities can make to the attractiveness of an area. Thomson and Green (1998) describe this existence value as "an input to the general public good of 'civic pride'". This can be seen in flagship projects such as the Gateshead Millennium Bridge; even those local residents who do not cycle or walk on the bridge are likely to value it. Connected to this existence value of cycling infrastructure is an "option" value. This acknowledges that people can value facilities which they plan to use, rather than facilities which they actually use. In this case the existence value is the willingness to pay for the opportunity of cycling at some time in the future. These non-market values are frequently overlooked because they require detailed survey work, but they should be recognised.

[17] http://www.scotland.gov.uk/Resource/Doc/55971/0015829.pdf

Variations

3.21 The benefits of cycling increase with age because older people are more at risk from the diseases which being active (including cycling) can help to prevent. Although this is an important finding, it is unlikely that "planning for cycling" can be done with particular age groups in mind (unlike soft initiatives such as marketing, support and advice). Therefore, it is difficult to justify differentiating between different ages of cyclists when showing the economic benefits of additional cyclists.

3.22 The benefits of cycling also vary with location. This can be taken into account in planning. For example, the pollution reduction and congestion savings are much higher in more densely populated urban areas.

3.23 A third important variable which can be influenced by planning is the journey ambience. When retrofitting cycling into existing infrastructure, planners are likely to face a number of constraints which affect the level of ambience and which the retrofitted infrastructure can generate. For example, there may be constraints in terms of the amount of road or pedestrian space which can be given over to cyclists when trying to fit cycling facilities into existing transport infrastructure. However, if cycling facilities are planned into new infrastructure projects at an early enough stage, such constraints may be eased. For example, new roads can be designed with cars, pedestrians *and* cyclists in mind.

3.24 Given that planning for cycling can influence the type of infrastructure which is built and where it is built, we developed a model giving four different scenarios: urban on-road, urban off-road, rural on-road and rural off-road. The values for these scenarios are shown in Table 3-2.

Table 3-2 Annual values attributed to each additional cyclist, cycling regularly for one year – the figures assume that 50% of cycle trips replace a car trip

Benefits (annual per average additional cyclist)	**Urban**		**Rural**	
Health Benefits	On Road	Off Road	On Road	Off Road
Value of loss of life	£408.67	£408.67	£408.67	£408.67
NHS Savings	£28.30	£28.30	£28.30	£28.30
Productivity gains	£47.69	£47.69	£47.69	£47.69
Pollution	£34.57	£34.57	£6.49	£6.49
Congestion	£68.64	£68.64	£34.32	£34.32
Ambience	£13.20	£53.60	£13.20	£53.60
Total Benefits	**£601.06**	**£641.46**	**£538.66**	**£579.06**

Source: SQW

3.25 These values are higher than those reported in the SQW's Economic Benefits Report because of the use of the WHO estimates of health benefits per cycle trip and because of the inclusion of "ambience" values that relate to the improvements in the journey quality as a result of the new cycling infrastructure.

3.26 While the differences between the scenarios are reasonably significant, it is important to note that the greatest impact that cycling has is on the health benefits of those additional cyclists. These health benefits are universal. If people can be convinced to cycle, around two-thirds the economic benefit which this extra cycling generates does not depend on the location or type of facility. This is important from a planning perspective. The greatest difference that new facilities can make does not depend on their location but *on their ability to generate additional cyclists*. In this respect one might argue that attractive off-road facilities are of particular value because they are more likely to attract new cyclists, by overcoming concerns about safety.

Growth and demand

Why might costs and benefits not be fully assessed?

3.27 There are a number of reasons. Several relate to the availability of data or the challenges of collecting it. Others may be more cultural, for example, an understanding of the importance of robust appraisal, monitoring and evaluation, or political, the importance of being seen to do something. For small scale projects, the size of the investment itself may not merit the expense of time and effort to carry out a detailed analysis. Some of these challenges can be addressed directly, others will take longer, but most importantly the principle of making sound investments is key. There are two reasons why this approach is often undermined.

- The first is that while the costs of the investment can be readily measured, the full benefits of cycling are not well known and as a result investment will either not be made at all or, possibly worse, bad investments are made.
- The second factor which undermines the model is that where demand is assessed (and this in itself is rare) it will be based on current rather than on anticipated future levels of cycling. As a result, there will be underinvestment or poor allocation of resources. As the economic/fiscal climate and costs of transport change, so will the incentives to cycle. Financial, cultural and even legislative changes may well impact in favour of cycling, and this should be factored into the analysis of transport options as early as possible.

3.28 The failure to address the twin challenges of accounting for the full economic benefits of cycling and the forward looking demand projections means that there is either too little or poorly targeted investment. As this continues, poor decision making will become apparent and is likely to undermine the wider case for cycling. There is a danger that without sound analysis, resources are wasted and as a result governments will become less willing to support future investment.

Measuring demand

3.29 Even if the values of costs and benefits were fully understood, appraisal would still need to form an estimate of the level of use and number of new cyclists that could be expected. This barrier to effective planning has become more apparent in the research for this work. We

struggled to find cases where the level of demand had been estimated before investment. It tended to be a leap of faith or based on what was considered common sense.

3.30 Perhaps the biggest problem here is the lack of available evidence from existing projects. This makes it harder to anticipate what a similar project might expect to achieve. More evaluation evidence of existing investments would help greatly. Sustrans are one of the few sources of evidence about changes in the number of cyclists as a result of new or improved infrastructure, but even then it is difficult to know how many of these are new cyclists.

3.31 Even with knowledge about the performance of past projects, it is also important to anticipate how this might change in the future. Demand assessment should extend over the next 20 – 30 years. Unless this forward view is taken into account, investment will be based on existing travel patterns and the challenges faced today will become tougher. The case studies developed in Annex A help to highlight the difference in economic impact of projects depending on the growth of cycling.

Growth of Cycling

3.32 It is important to acknowledge that usage is unlikely to stay at the same constant level over the lifetime of the new facility. There is a lack of modelling of likely future growth of cycling compared to other forms of transport. The Department for Transport's (Dft) National Road Traffic Forecasts 1997 did not include cycling and its replacement, the Trip End Model Presentation Programme (TEMPRO) has only included cycling from Version Five. TEMPRO estimates of future usage are based on demographic changes in population, housing and employment in order to predict changes in uptake of various modes of transport. Using the TEMPRO model, it is estimated that cycling usage in Great Britain will increase by an average of 0.3% year on year between 2008 and 2038. This is an increase of 8.25% over that 30 year period.

3.33 However, these estimates are at a national level and any new cycling infrastructure is likely to boost the number of cyclists by more than the national trend average. From the evidence of those case studies which included historical usage data of new facilities (for example, the Lancaster Millennium Bridge showed average year on year growth of 5% over the seven years after construction) and discussions with Sustran's Research and Monitoring group who have experience of tracking changes in usage, it is reasonable to assume that the majority of new infrastructure projects lead to a 'spike' in additional usage which then slows. However, usage tends to continue to build up steadily from the large initial boost.

3.34 Growth of cyclists is an important consideration given the current and potential economic and cultural changes which are likely to generate greater awareness of the costs of car travel and the benefits of cycling. If there is an opportunity to build high quality new cycle facilities now in the anticipation of future usage, this potential future usage should be taken into account at an early stage. This allows projects which may currently have a low level of usage and therefore a low economic return to be seen more favourably. It also allows planners to build in cycling at an early stage rather than being forced to retrofit poorer quality facilities at a later date.

Availability and collection of data

3.35 Another barrier to effective planning is the availability of data. At a national level, information on the number of cyclists and cycle trips is captured through the National Transport Survey but may underestimate the numbers because it is limited to on-road cycling. Sustrans is one of the best sources of cycle data with a large number of case studies and analysis of the number of cyclists using routes that they have supported. In many examples these include survey data that provides profiles of those using the routes. The analyses of some of these cases are published.[18] Transport for London also have good cycling monitoring data which they use to support investment in infrastructure and other projects. Even so London is often considered around the rest of the country as a different case given the Congestion Charge and the threat of terrorism, and it would be helpful to develop other examples. The Cycling Demonstration Towns present the best opportunity to show the impact of a range of interventions on the population's level of cycling. The range of interventions and the size of the population makes this complex but producing detailed evidence will be very important if other towns are to be encouraged to follow suit.

3.36 However, we have found it very difficult to find good examples, beyond the Sustrans ones, of individual cycling investments in specific new developments such as housing, commercial, transport hubs (bus and railway stations), or other transport infrastructure, that have produced estimates of changes in the number of cyclists generated. In part this is because it is frequently difficult to attribute changes to just one investment. There is often a combination of factors that confuse the analysis. There are also challenges in estimating "displacement" effects where the number of cyclists using a facility or route are not new to cycling but have switched from other facilities or routes. Unpicking this will usually require survey work which can be expensive.

3.37 The challenges of data collection and its availability mean that there is less on which to build a robust case for new investment and to argue for cycling infrastructure to be included in new housing, business or transport development. Increasing the number of examples and providing access to them would provide a powerful resource for those advocating greater and better investment.

Conclusions

3.38 Whatever the project, consideration of cycling should be based on a true assessment of the economic benefits which should include the values set in his chapter. This is as applicable at a planning stage for new housing developments as it is for traffic management design. There is plenty of guidance on good practice[19].

3.39 Unless planners and developers are aware of the full economic benefits it is difficult to ensure that the costs and benefits of cycling investment will be considered fairly. Only if this becomes common practice will cycling investment approach levels that its economic (and

[18] For example through Sustran's annual *Route Monitoring Reports*
[19] Manual of the Streets is perhaps the most comprehensive and well known guidance on the integration of cycling and walking infrastructure in planning

social) contribution justifies. In effect, we under invest in cycling because we fail to explicitly, and systematically, recognise the wider economic benefits.

4: Using the values

4.1 The most practical way to demonstrate the use of the values is through case examples. These have been chosen because they have data on the number of cyclists before and after an investment. The values set out in the previous chapter are then used to provide an estimate of the cost to benefit ratio.

The case examples

Priory Vale, Swindon

4.2 Priory Vale is a 260 hectare greenfield site on the northern edge of Swindon where a major mixed use development has almost reached completion. The Priory Vale scheme includes more than 5,500 new homes, four primary schools, a secondary school and a district and village centre on the site.

4.3 The site has been designed to include a network of public open spaces, together with road, cycle and pedestrian routes, which will provide a high level of accessibility throughout Priory Vale and link the area to the rest of Swindon. Importantly, this project has considered cycling from an early stage. Swindon Borough Council negotiated cycling infrastructure as compulsory elements of the project.

4.4 The primary rationale for considering cycling at an early stage of the development was to try and implement a degree of modal shift, with reductions in car usage and increases in cycling and walking. In order to increase the likelihood of such modal shift occurring, the new cycleways were designed to link into the existing network in order to maximise their usefulness to existing and potential users.

4.5 The project included 18 km of cycleway at a cost of £207.50 per linear metre, a total cost of £3,735,000. Significantly, it was reported that if the infrastructure had to be retrofitted once the site had been completed the costs would increase by an additional 35% to 100% depending on the specific site conditions and site access problems.

4.6 Swindon Borough Council undertakes monitoring of cycle usage using a number of techniques; electronic and manual counts, cycle parking monitoring and cycling to school data. Together the available automatic cycle counter data and the manual cycle parking counts suggest that there are an estimated **additional 129 daily commuting cyclists** using the cycling facilities in the area on a regular basis. However, these observations may underestimate the level of cycling in the area for a number of reasons.

Lancaster Millennium Bridge, Lancaster

4.7 This is an example of an urban, off-road project which has been planned from an early stage. In the mid 1990s the Morecambe to Lancaster off-road cycle route network was surfaced, but it terminated on the north-western bank of the River Lune, where cyclists had to defer to busy road bridges. The development of the Lune Millennium Bridge was designed to complete the

5km off-road cycle route between Morecambe and Lancaster. It was completed in February 2001.

4.8 One of the key drivers behind the development of the pedestrian and cycle bridge was the availability of Lottery Millennium funding. The total cost of constructing the bridge was estimated to be £1.8 million[20].

4.9 Available cycle count data was used to calculate the annual average number of cyclists who regularly cycle across the bridge. This showed that there was a large increase in the number of regular cyclists using the bridge in each year since it opened, relative to the baseline level. It is reasonable to believe that the reason that these additional cyclists decided to cycle regularly was the introduction of the off-road bridge which provided a safer alternative to cycling on-road and a quicker alternative to driving or using public transport for many journeys. From the data we estimated **an additional 138 cyclists**.

Reallocation of road space for cyclists, Hull

4.10 This is an example of an urban on-road project where cycling facilities have been retrofitted into the existing cycling infrastructure. The project involved reallocating road space on seven busy roads within the city through the introduction of cycle lanes. This was achieved by removing one lane of traffic in each direction which was then replaced by a cycle lane and parking bays.

4.11 The explicit aim of the project was two-fold; to lower the number of accidents on the roads and to increase the levels of cycling. These are two of the key aims of Hull City Council's Cycling Strategy (2003), along with the reduction of cycle thefts, encouraging life long cycling and improving health through cycling. It is likely that if the first two aims are achieved, there will be noticeable increases in both life-long cycling and improved health of cyclists. Underlying these aims is the recognition that cycle levels were dropping and that measures were needed to re-dress this trend.

4.12 Although no specific demand assessment was undertaken, there were requests from both the general public and also cycling groups to introduce improved facilities on the routes which were upgraded. This has cost significantly less than the previous examples and the scale of work on the Hull project is much less than the Millennium bridge or the Priory Vale projects. Per metre, the cost was only £6.20 compared to the new build cost at Priory Vale of more than £200 per metre.

Queen Elizabeth Park, Guildford

4.13 Queen Elizabeth Park (QEP) has been developed on the site of the former Guildford Barracks, 2.5km to the north of Guildford town centre. The site is located within the existing residential area of Stoughton. The development includes 525 residential units, , 9,000 square metres of office and light industry space, a crèche, health and fitness centre, nursing home and a community core with a number a shops.

[20] http://www.rambollwhitbybird.com/projects/project.asp

4.14 Cycle facilities have been included as part of this development, driven by the overarching aim of the Guildford Borough Cycling Strategy, which is to "increase cycle use and to promote the benefits of cycling in Guildford Borough"[21].

4.15 Cycling was deemed an important element of the design for a number of reasons. It was important to ensure that traffic coming and going to Queen Elizabeth Park was dispersed evenly throughout the surrounding areas in order to avoid the creation of traffic 'hotspots'. The second important rationale for integrating cycling into the project was to minimise additional car usage generated by the development.

4.16 According to the Section 106 agreements which were put in place, a range of different cycle related infrastructure was to be put in place before residents could move into the new houses. In addition to the Section 106 improvements, Guildford Borough Council spent £16,000 on the provision of on-road advisory cycle lanes that will reduce the effective width of the carriageway on Worplesdon, thus making motorists more aware of the presence of cyclists. Together, this brings the total cost of the cycling element of the Queen Elizabeth Park development to an estimated £157,564.

4.17 The original travel plan document stated that "multi-modal traffic surveys at all points of entry to the proposed development"[22] would be carried out and would "measure the number of persons travelling by car (single occupant), car (occupancy 2+), public bus service, school bus, cycle, walk and taxi. These surveys to be carried out annually". However, there is no evidence that these surveys have been undertaken yet.

4.18 Without direct measurement of the level of cycling into and out of the development, the most relevant source of usage data is from an automatic counter on Worplesdon Road, on the Western boundary of the development, which measures cycle traffic moving south east bound toward the centre of Guildford. This counter has been in operation since 2004 and can provide both before and after cycle usage estimates. Data are available which show the average weekday flows between January 2004 and July 2008. **It is estimated that the new facilities generated 16 additional cyclists**.

Surrey University, Manor Park campus

4.19 The University of Surrey's main campus is located at Stag Hill in Guildford. The campus is characterised by a mix of academic and residential buildings. However, there is little room for further expansion. As a result of this, the University's Manor Park site has been developed to extend the campus. It is expected that the Manor Park development will ultimately be home to around an additional 4,700 students and 300 university employees. It is clear that such an increase in student numbers will put pressure on the surrounding transport infrastructure.

4.20 There are a number of factors which have meant that cycling has had to be considered from the outset. The key external factor is the lack of capacity on Guildford's roads to accommodate additional vehicles. In recognition of this constraint, a Section 106 agreement has been put in place which ensures that cycle infrastructure is put in on the site. The university has been keen to integrate cycling into the development of the Manor Park campus

[21] Guildford City Council, Cycling
[22] Colin Buchanan and Partners, *Guildford Barracks Development Travel Plan Report*, 2001

because of the on-site space limitations and the high financial and opportunity cost of installing large amounts of car parking on campus.

4.21 The key investment which has been made to improve the level of cycling infrastructure is the development of a cycle route between Manor Park and Stag Hill. The costs of this cycle route are estimated at a total of £300,000.

4.22 The university employs an independent transport consultant to undertaken both automatic and manual transport counts annually. Survey data for 2005, prior to students moving to the new Manor Park campus and 2007, when some of the new campuses facilities opened is available.

4.23 By taking the average of the trips in and out for both 2005 and 2007 and then calculating the number of cyclists from these trips using the same assumptions as in the other case studies, it is estimated that there were 265 cyclists in 2005. In 2007/08, the number of students cycling is an estimated 388, equivalent to 3.2% of the student population. **This is an absolute increase in cycling of 123**.

Economic Impact of the case studies

4.24 A brief description of the economic impact of each case study is outlined in Table 4-1. The projects are extremely varied in terms of the infrastructure types and costs. The benefit to cost ratios also vary considerably, ranging from 34 pence to over £40 of benefit for every one pound of investment. However, this range of values is understandable given that some of the projects have only very recently been completed and so usage is likely to grow, improving the benefit to cost ratios. This is particularly true of Priory Vale, Queen Elizabeth Park and Surrey Universities Manor Park campus. The average benefit to cost ratio of the five case studies is just under 2:1 excluding the Hull case study as this is much higher than the other results. Including this outlier, the average benefit to cost ratio is almost 10:1.

Table 4-1 Estimated impacts of five cycling infrastructure projects

Case Study	Cost	Cyclists generated	Benefit to cost ratio	NPV
Priory Vale, Swindon	£3,735,000	129	0.34:1	-£2,801,963
Lancaster Millennium Bridge	£1,800,000	138	0.77:1	-£466,395
Queen Elizabeth Park, Guildford	£157,564	16	1.07:1	£12,708
Surrey University, Manor Park Campus	£300,000	123	5.56:1	£1,563,700
Reallocation of road space, Hull	£148,303	585	42:1	£7,038,270

Source: SQW

4.25 The economic impact results shown in the case studies highlight the diverse range of values which cycling projects can generate. The retrofitting of seven streets in Hull has proved to be extremely successful, combining low costs with high additional cyclists, although the implementation of a 20mph speed limit and other measures will also have contributed to the growth in cycling. The Lancaster Lune Millennium Bridge was a major investment that

improves cycle links and pedestrian access, but the results to date indicate that, on their own the volume of cycling is as yet not sufficient to generate a positive net present value. However, this would change if additional pedestrian activity was also included or perhaps the wider "iconic" impact of the bridge. It is too early to draw conclusions on the economic benefit of the project which will depend on changes in cycling use over the next 30 years. The evidence from the counters adjacent to the Priory Vale project has not shown significant increases since the new housing development and cycle infrastructure was constructed. Again there may well be problems with the location of counters and it remains too early to assess the impact.

4.26 Two other cases, closer to model, have also been included. These are in Guildford and on the campus at. Both the Priory Vale and Surrey University campus have built-in cycling infrastructure and there is data on cycling use. Both of these examples have generated a positive economic return. It is likely that both will generate greater returns than estimated because of their high potential for increased growth of cycling. At Surrey University, the number of students living and studying on the new campus is forecast to increase until final completion of the new campus in 2020. The available evidence at the Queen Elizabeth Park site shows that cycling is increasing year on year but there is insufficient data to accurately forecast likely future increases.

4.27 One of the key lessons from all the case studies is the importance of ex ante and ex post cycle monitoring. None of the case studies used any formal demand assessment as part of the decision to go ahead with the project. Without estimates of future demand it is very difficult to identify the potential levels of benefits of a particular development. The reasons for local authorities ensuring that cycling was included in developments were fairly uniform across the different case studies; the key reason was to implement shift transport away from cars. Other reasons included the desire to build in 'green infrastructure', 'lower cycling accidents' and "because the funding was available".

4.28 There is very little evidence that the cycling investments which were implemented in the case studies were subject to any sort of analysis of the costs and likely benefits of the cycling infrastructure. It is unlikely that new roads or other forms of transport investment would go ahead without an assessment of their usefulness and value for money. It is important that local authorities treat cycling projects as transport projects, balancing the benefits and costs before making a rational decision on a case by case basis rather than treating cycling as an 'add on' to larger projects.

5: Simplifying the model

5.1 The results summarised in the previous chapters can be developed further to demonstrate the number of new or "additional" cyclists that need to be generated as a result of a specific investment or intervention. Because we can calculate the economic benefit of each cyclist, we can show the number required to ensure that an investment will at least break-even over a period of time. In this case we have assumed a thirty year life for the investment. In practice, some physical investments would be expected to last longer, while "softer" measures such as marketing or training would last less time.

5.2 In this way it becomes possible to consider, in rather more straightforward terms, whether an investment is likely to generate a positive return. Rather than use actual cases, a matrix has been developed which shows *the number of additional cyclists which are needed in order to justify a given spend on a cycling infrastructure* project. This is shown in Table 5-1.

5.3 On average, a £1 million cycling infrastructure project will generate positive economic results if it generates more than 109 additional cyclists. It is important to realise that this means that at least 109 additional cyclists must cycle 3 times a week, travelling an average of almost 4km per trip and that this increased level of cycling must be maintained for the full life of the cycle facility (assumed to be 30 years). This does not mean that the same people must continue to cycle, but that throughout that period, on average, there should be 109 more cyclists each year than would be the case where the investment had not been made.

Table 5-1 Number of cyclists needed to achieve a benefit to cost ratio of 1:1

Cost of Project	Urban		Rural		Average
	On Road	Off Road	On Road	Off Road	
£2,000,000	214	201	239	222	218
£1,750,000	187	176	209	195	191
£1,500,000	161	151	179	167	164
£1,250,000	134	125	149	139	136
£1,000,000	107	100	120	111	109
£750,000	80	75	90	83	82
£500,000	54	50	60	56	55
£250,000	27	25	30	28	27
£100,000	11	10	12	11	11
£25,000	3	3	3	3	3
£10,000	1	1	1	1	1

Source: SQW

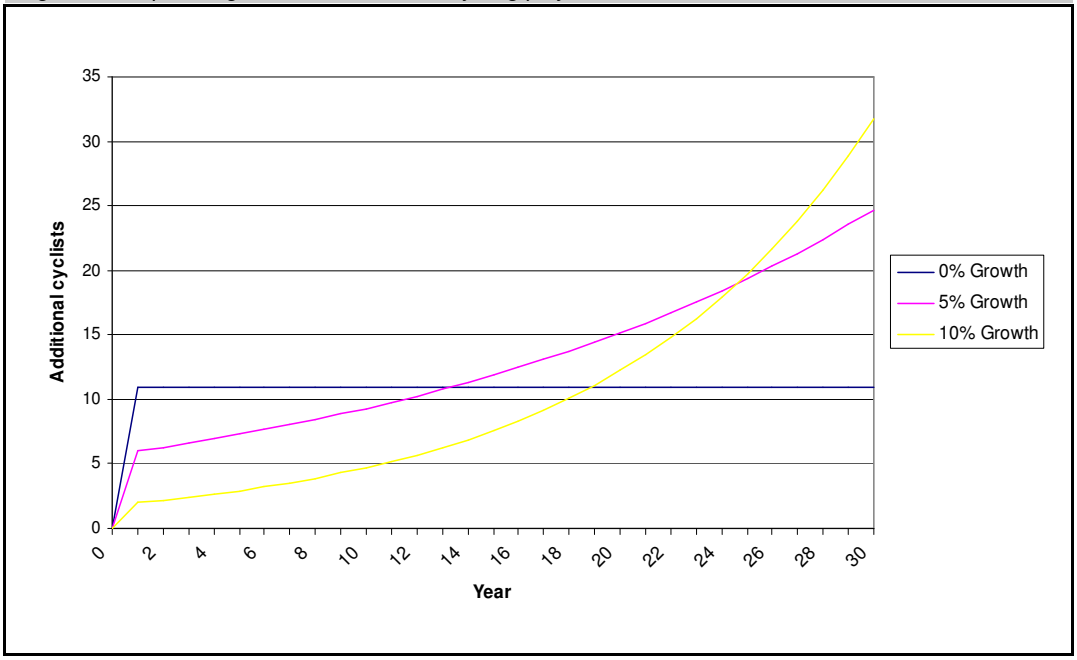
5.4 If the life of the cycle facility is lower than 30 years because of, for example, the use of lesser quality materials, then the number of cyclists using the infrastructure must be higher in order to justify the expense. For example, a £1 million cycling investment which has only a 10 year life expectancy needs to generate an additional 221 cyclists using the infrastructure every year to break-even.

5.5 This is of significance when comparing the merits of different types of routes. For example, a cycle lane on a busy road will see a much greater degree of 'wear and tear' than an off road route used exclusively by cyclists and will therefore have a shorter expected lifetime.

5.6 A further complicating factor is that over the period of the intervention the number of cyclists is likely to change. It is difficult to anticipate this pattern, but it is not unusual for appraisals to build in some growth. As we noted earlier, there is some limited evidence of this from for example the Lancaster Millennium Bridge (average year on year growth of 5% over the seven years after construction) and from discussions with Sustran's Research and Monitoring group who have experience of tracking changes in usage.

5.7 The impact which growth of additional cyclists can have on the economic impact of a cycling infrastructure project is shown in Figure 5-1. This is based on the example of a typical cycling project costing £100,000. In order to break even, this project needs to generate at least 11 additional cyclists each year. Alternatively, if we build in a growth assumption that it led to only two additional cyclists in the first year, growth of 10% a year would be needed over 30 years to achieve the same effect. This rate of growth would equate to one additional cyclist per year up to a maximum of additional 32 cyclists in the last year. Similarly for a £100,000 project which generates an initial increase of six additional cyclists, the number of cyclists would have to increase to just 19 by the end of the project lifetime, a growth rate of only 5% in order for the project to break even.

Figure 5-1 Impact of growth on a £100,000 cycling project



Source: SQW

5.8 These examples show that projects which would be deemed economically unviable if judged on the assumption of static growth can generate positive returns if future growth is factored into the analysis. Even projects which start off with low levels of uptake may see increases in usage as they become embedded into the local transport infrastructure and that relatively low levels of growth can ensure that projects become viable over the long-term.

5.9 Growth in cycling demand is an important consideration given the current and potential economic and cultural changes which are likely to generate greater awareness of the costs of car travel and the health and financial benefits of cycling. If there is an opportunity to build high quality new cycle facilities now in the anticipation of future usage, this potential future usage should be taken into account at an early stage. This allows projects which may currently have a low level of usage and therefore a low economic return to be considered more favourably. It also allows planners to build in cycling at an early stage rather than being forced to retrofit poorer quality facilities at a later date.

5.10 It is impossible to predict future levels of cycling with any certainty and the latent demand for facilities will vary according to the project and its location. Our view is that in planning for cycling a view should be formed on how demand for cycling is likely to change over the lifetime of the project rather than use a static assumption. These assumptions should be realistic and defensible in the context of the project. Making these assumptions would be greatly aided by the availability of stronger case study and monitoring data which would help demonstrate how specific activities change the pattern of cycling over time.

Ex ante appraisal

5.11 This sort of model can allow planners, cycling officers and others involved in the development of new cycle infrastructure (whether it be planned in or retrofitted) to determine whether or not the project is likely to be viable. If a demand assessment is undertaken before embarking on a project, the projected level of costs can be compared against the projected number of cyclists to determine whether there is a net economic benefit. If the demand assessment shows that the necessary numbers of additional cyclists are unlikely to be generated, then the resources can be redirected to projects with more positive returns.

Ex post evaluation

5.12 Similarly for ex-post evaluations of cycle infrastructure, the investment-cycle matrix can shed light on whether the investment has been successful. By monitoring the level of cycling which has been generated by the creation of the new infrastructure, a figure for the additional level of cyclists can be calculated. This can then be compared with the target number to see whether it is likely to generate a positive economic return. A bi-product of the matrix is that it helps to reinforce the importance of ensuring that effective monitoring of cycling usage is undertaken.

6: Conclusions

6.1 The argument advanced in this report can be summarised as follows and builds on the work carried out by SQW in 2007 to develop estimates of the wider economic benefits of increasing cycling.

6.2 In our previous work for Cycling England we highlighted the role that cycling can play in relation to three of the greatest challenges facing society; climate change, increasing levels of obesity and transport congestion. Each of these has been the subject of a major review over the past few years; by Stern on the costs of climate change, by Eddington on transport, by the Chief Medical Officer on declining levels of physical activity and by the Health Committee on Obesity. Cycling is uniquely placed to address the objectives of all these.

6.3 Most transport appraisal will focus on the benefits of reducing travel time. This can be valued and set against the costs of the investment that is proposed. Cycling is subtly different in that it also generates "wider benefits" for society (benefits which the individual cyclist is not fully compensated for). If these wider benefits are not taken into account we will under-invest in cycling. These benefits include savings for the health service as a result of increased physical activity, increased productivity through a healthier workforce and reductions in pollution and traffic congestion where cycling replaces car trips. Although there is guidance that can be used to help ensure these benefits are taken into account when investment in cycling is appraised, it is rarely used and is rarely justified for small scale projects.

Opportunity

6.4 For a number of reasons there is now a real opportunity to promote cycling. High fuel prices and the economic recession make cycling more attractive for individuals seeking to save money on transport costs, while recent cycling success at the Olympics has given sporting cycling a boost. Increasing interest in healthier lifestyles and environmental awareness are also encouraging more people to consider cycling as are rising public transport prices and overcrowding. Recent increases in Government funding are also helping to deliver more training and infrastructure.

6.5 Taken together these factors present an even stronger case for cycling and for investment in improving infrastructure, designing new facilities and for marketing and training. This is an opportunity to embed cycling's popularity through good investment ensuring that it is not temporary. It requires cycling to shift from being perceived as a peripheral mode of transport that attracts largely ad-hoc investment, into the mainstream.

Challenges

6.6 A review of Local Transport Plans suggests that despite a lot of recent development, over the past five years, cycling has not fared well against the targets that were set by local authorities. Part of this is the result of unrealistic target setting, but also a lack of political will. Neither of these is helped by a lack of analysis, so that it is hard to be confident in reporting what has or

has not been achieved as a result of investment. The experience of identifying suitable case studies for this work suggests that there is little analysis of demand or the costs and benefits of the investment. If planners are increasingly being asked to consider cycling and walking, they need to understand its value. Without this there is no basis on which to identify the appropriate projects or scale that can be justified.

6.7 There are two elements to this:

- that the real benefits of cycling are not well understood, and
- secondly that there remains a lack of evidence on the ways in which investment can generate increased cycling.

6.8 The Cycle Demonstration towns are the key to this. If they can collect and present convincing evidence of the difference that investment has made it will give confidence to local authorities throughout the country to develop their own programmes. They will be able to think more seriously about integrating cycling effectively within their planning processes.

Valuing the benefits

6.9 Part of this report highlights the values calculated for the different types of benefit, produced in SQW's previous study. The health benefits have been further strengthened by the publication of the World Health Organisation's HEAT model. Using these values the report develops a simple model which translates the values into the number of additional cyclists that would need to be generated by a particular level of investment.

6.10 For example, an investment of £100,000 requires an overall increase of 11 more people cycling regularly and that this increase in the number cycling continues for 30 years. An investment of £1 million would require 109 new cyclists.

6.11 Although there are significant benefits in reducing congestion and pollution, the health element has the biggest impact. This highlights the importance of attracting new people to cycling as a contribution to increasing physical activity. Consequently, it is the number of new cyclists that an investment generates that should be the main measure against which the success or otherwise of investment is measured.

6.12 Providing these types of examples gives a sense of what new investment is expected to generate. It needs evidence of the potential demand in order to assess how likely it is that additional cyclists can be attracted, but using this type of measure provides a rough benchmark. Further evidence of the effectiveness of different types of investment would then help show what can be achieved.

Does investment generate sufficient new cyclists?

6.13 The report identified five different projects that were able to provide evidence of the number of cyclists before and after the investment. Across these the picture was fairly evenly divided. Priory Vale had not achieved the number of cyclists required, but it is still very early in the development ad there are issues about how cyclists are counted. The Millennium Bridge has also generated an increase in cycling and if the wider benefits of walking and the "iconic

value" of the bridge itself was included the return on investment would improve significantly. The other investments have all encouraged sufficient cycling to justify their costs.

6.14 These figures are indicative; they exclude the value of a number of other benefits such as improving the quality of the route for existing cyclists which can generate significant amenity benefits.

Table 6-1 : Results of estimates of new cyclists with the numbers required to

Case Study	Cost	Estimated additional cyclists annually	Approximate numbers required to match investment
Priory Vale, Swindon	£3,735,000	129	375
Lancaster Millennium Bridge	£1,800,000	138	224
Queen Elizabeth Park, Swindon	£157,564	16	17
Surrey University, Manor Park Campus	£300,000	123	30
Reallocation of road space, Hull	£148,303	585	16

Source: SQW

6.15 Even where it is not feasible to carry out the level of analysis that would be required to demonstrate value for money, simply having good examples from elsewhere would go a long way toward convincing policy makers. Building up an evidence base would then give sufficient confidence for planners to prioritise cycling in certain circumstances.

6.16 This report takes the process forward, demonstrating how values can be used and by describing a number of case examples. With increased Government funding, supportive guidance and growing public interest, there is an opportunity for cycling to shift from the transport periphery into the mainstream.

Annex A: Case Studies

A.1 Against the benchmark figures developed in Chapter three, a number of different case studies were investigated, identifying the costs and additional cyclists involved in each as well as a detailed background study. These case studies can then be compared to the benchmark number of cyclists that it is calculated are needed to cover a certain level of expenditure.

A.2 It was hypothesised that well planned examples will cost less and generate greater numbers of additional cyclists, resulting in much stronger ratios of benefits to costs than poorly planned examples or retrofitted examples. This chapter discusses the findings of a number of case studies which were identified and gives an indication of their suitability in terms of supporting this hypothesis.

A.3 The case studies discussed are those for which we have obtained sufficient data to develop a model and which we believe are useful in the context of this study. We propose following up the three examples, getting more information, and also continuing to try and develop further case studies similar to the Priory Vale development in Swindon. Our suggestions are set out at the end of this chapter.

Priory Vale, Swindon

A.4 Priory Vale is a 260 hectare greenfield site on the northern edge of Swindon where a major mixed use development has almost reached completion. Construction started in 2001 with the first residents moving in 2002. Priory Vale is an extension of the Northern Development Area, which has seen rapid housing growth since construction started in 1994.

A.5 The Priory Vale scheme includes more than 5,500 new homes, four primary schools, a secondary school and a district and village centre on the site. It has been developed by the North Swindon Development Company (NSDC), a consortium comprising Crest Estates, Wimpey homes, Westbury homes, Bryant homes, Bloor homes and Asda and is project managed by Trench Farrow.

A.6 The site has been designed to include a network of public open spaces, together with road, cycle and pedestrian routes, which will provide a high level of accessibility throughout Priory Vale and link the area to the rest of Swindon. Importantly, this project has considered cycling from an early stage. **Swindon Borough Council negotiated cycling infrastructure as compulsory elements of the project**. The cycleway and footpaths for the new development was developed from the inception of the project. The cycle network was included from the 'masterplan' stage through to outline and detailed planning stages through to the construction stage.

A.7 The rationale behind this emphasis on cycling infrastructure is based on the council's cycling strategy, the objectives of which are to:

- maximise the role of cycling as a transport mode, in order to reduce the use of private cars

- develop a safe, convenient, efficient and attractive transport infrastructure which encourages and facilitates the use of walking, cycling and public transport and which minimises reliance on, and discourages unnecessary use of, private cars

- ensure that policies to increase cycling and meet the needs of cyclists are fully integrated into all council policies and strategies including complementary strategies relating to environment, education, health and leisure.

A.8 Swindon Borough Council's principal planner for major projects confirmed that the primary rationale for considering cycling at an early stage of the development was to try and implement a degree of modal shift, with reductions in car usage and increases in cycling and walking. In order to increase the likelihood of such modal shift occurring, the new cycleways were designed to link into the existing network in order to maximise their usefulness to existing and potential users.

A.9 The Council Landscape Officer, reports that a further rationale for ensuring that cycle routes are put in place in new build projects is to maintain a degree of 'green infrastructure' throughout the site, ensuring the permeability of the site and maintaining a high degree of access for all residents. This is important from a social inclusion perspective as it enables people who cannot afford other forms of private transport such as a car to travel independently.

A.10 A secondary benefit of planning in cycling on greenfield sites is that it gives an opportunity to run cycle routes alongside existing vegetation such as hedgerows or established trees which is likely to increase the amenity value of cycling along the routes. On a green field site such as this, it is much more likely that 'planning for cycling' will generate this amenity benefit because the likelihood is that significant vegetation would be lost for housing and so on if cycle routes were not put in place at the start. Retrofitting of cycle facilities would be possible but the opportunity to retain greenery on the site would be lost.

Investment

A.11 The costs of implementing the cycling infrastructure on the Priory Vale site were significant. According to the North Swindon Development Company, the costs for the 3 metre wide tarmac surfaced cycleways used on the site were £207.50 per linear metre in 2006 prices. This is a conservative estimate with Gavin Payne of NPA Consulting estimating that the cost per metre was £265. The project included 18 km of cycleway, giving a total cost of £3,735,000, based on the more conservative cost per metre.

A.12 Significantly, NPA Consulting reported that if the infrastructure had to be retrofitted once the site had been completed the costs would increase by an additional 35% to 100% depending on the specific site conditions and site access problems. The best case scenario for retrofitting the Priory Vale site with the same level of cycling infrastructure would have cost more than £5 million, an increase of over £1.3 million.

Usage

A.13 In order to determine whether this investment has led to economic benefits, it was necessary to identify the 'target' number of cyclists which were needed to ensure a positive return on

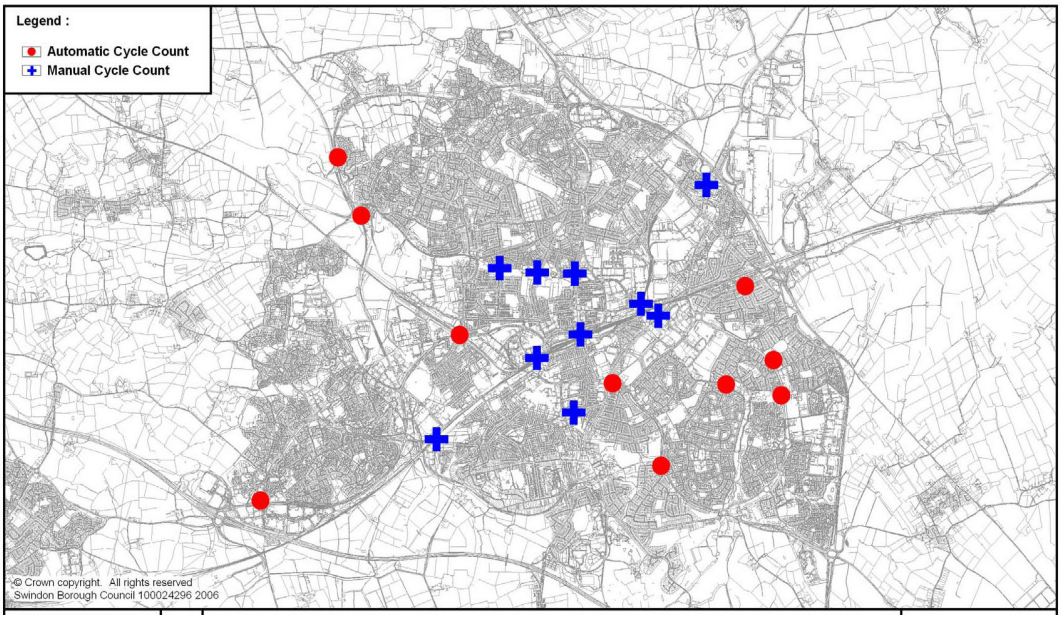
the cycling element of the project and secondly to identify the actual increase in usage as a result of the new infrastructure. Using the investment-cycling usage matrix model, the project has to generate around 340 additional cyclists. In this case it was assumed that there were no existing cyclists because of the lack of baseline data of pre-construction cycle usage. This is understandable because the Priory Vale project was a greenfield site with no housing or amenities prior to construction. In order to identify the baseline level of cycling, it would be necessary to undertake survey data to investigate the level of cycling among the new residents before their move to Priory Vale.

A.14 Swindon Borough Council undertakes monitoring of cycle usage using a number of techniques; electronic and manual counts, cycle parking monitoring and cycling to school data.

Automatic Counters

A.15 The most relevant automatic cycle count data is located on Thamesdown Road, the most north easterly of the counters in Figure A.1.

Figure A-1: Swindon cycle monitoring sites



A.16 This data only provides 26 weeks of monitoring over a period of 180 weeks between March 2005 and August 2008. Therefore, a number of assumptions were made in order to construct data in terms of cyclist numbers per year. The weekly data was summed together to develop seasonal daily trip averages. However, there were a number of gaps in the seasonal figures. For example, no weekly automatic data was provided for any of the summer months of 2007. With an average of 58 daily trips for spring 2007 and assuming an average increase between spring and summer usage of 40%, it was estimated that there were 82 trips per day throughout summer 2007. The spring to summer increase of 40% was based on the average increase between spring and summer in other years. For example, the increase in cycling between spring 2005 and summer 2005 was 52%, between spring 2006 and summer 2006 the increase

was also 52% and between spring 2008 and summer 2008 it was 16%, giving an average jump of 40% between spring and summer.

A.17 As with SQW's previous cycling work, it was assumed that all trips were return and that commuters would cycle 3 times a week throughout the year, giving an annual number of trips per cyclist of approximately 160. Based on the available weekday counter data and these assumptions, it is calculated that the number of daily commuter cyclists in 2005 was 69, in 2006 was 46, in 2007 was 42 and in the first half of 2008 was 62.

Cycle Parking

A.18 The Council also undertakes surveys of the level of usage of cycling parking facilities. The most relevant cycle parking facilities are those located in the Orbital shopping centre. The cycle parking survey is done over a 4 hour period, from 11:00 to 15:00. Therefore, it is assumed that the actual number of cycles is double the observed levels since people will cycle to the shopping centre throughout the day and that a four hour survey is unlikely to observe all cyclists.

Table A-1 Cycle Parking at the Orbital Centre

Location	Number of Spaces	Number of Cycles on…		
		22/04/2008	24/06/2008	15/08/2008
Pizza Hut	24	9	11	9
Connells Estate Agents	24	8	5	8
Asda (front)	24	2	1	5
Asda (rear)	24	5	7	7

Source: SQW

A.19 Assuming that this level of usage is observed every working day and that individuals cycle 160 times a year, this is equivalent to at estimated 74 cyclists per working day.

A.20 It is unlikely that the combination of the automatic cycle count data and the observed level of use of cycle parking facilities at the orbital shopping centre will lead to double counting of cyclists because they are geographically separate and not on the same route from the vast majority of houses in the area.

A.21 Together the automatic cycle counter data and the manual cycle parking counts suggest that there are an estimated 129 daily commuting cyclists using the cycling facilities in the area on a regular basis. This level of cycling is clearly lower than the target figure needed to deliver the scale of economic benefit to breakeven. However, these observations may underestimate the level of cycling in the area for a number of reasons:

- They are only based on two static points, the Thamesdown Road automatic cycle counter and cycles parked at the shopping centre. This means that there is no observed level of on-road cycling in the area or on other off-road routes other than the Thamesdown Drive cycle track. This is important given that the Thamesdown Drive cycle track is on the periphery of the Priory Vale area.

- The data which has been observed is scant. There are observations for less than 15% of the days between March 2005 and August 2008 and so there may be higher levels of cycling than have actually been observed.

School Cyclists

A.22 As well as commuter cyclists, there are other important cyclist groups such as children cycling to school. The Swindon Borough Council School Travel Advisor has provided school transport mode data for both the primary and secondary schools in Priory Vale and the average for Swindon Borough.

Table A-2: Mode of travel to school - January 2008

School	Walk	Cycle	Car Share	Car	Public Bus	Taxi	Not Known	Total
Primary average	56%	2%	4%	28%	2%	1%	7%	100%
Orchid Vale	32%	1%	1%	23%	0%	0%	43%	100%
Red Oaks	48%	11%	15%	26%	0%	0%	0%	100%
Bridlewood Primary	51%	4%	2%	42%	0%	0%	0%	100%
St Francis CE Primary	48%	13%	0%	39%	0%	0%	0%	100%
Secondary average	50%	7%	1%	15%	0%	0%	9%	100%
Isambard Community	14%	57%	4%	17%	1%	1%	7%	100%

Source: SQW

A.23 According to this data, **57% of the secondary pupils cycle to school compared to a Swindon average of just under 7%.** There is only one secondary, Isambard Community School, in Priory Vale. According to the Sustrans Bike It Officer responsible for Swindon, there is covered cycle storage for around 150 bikes. However, the school has only had an intake of year 7 students this year and is set to expand the number of pupils who will be attending until the school has its full complement of 1200 students in 2011. This clearly limits the growth of cycling as an attractive means of travelling to school as the capacity has almost been reached with only one year currently attending the school. The officer emphasised the importance of ensuring that there is integration between the school and the surrounding cycle infrastructure alongside soft measures such as education and promotion in order to achieve the levels of cycling observed at Isambard Community School. However, the modal shift compared to the average of all secondary schools in Swindon seems to have drawn pupils away from walking and onto their bikes while the proportion travelling to school by car is actually higher.

A.24 For the four primary schools in Priory Vale (Orchid Vale, Red Oaks, Bridlewood and St Francis), 85 pupils cycle to school out of a total student number of 1052. This 8% average compares favourably to the 2.42% average for primary school students travelling by bicycle in Swindon as a whole.

Economic Analysis

A.25 Priory Vale is an example of a large scale mixed use development which has integrated cycling from the outset. It is estimated that 340 cyclists would be needed to ensure that the cycling element of the project could be justified on an economic basis. From the data available it is not clear that this number of cyclists has been generated yet, although it is obviously at an early stage.

A.26 Applying nationally observed levels of cycling to the Priory Vale site shows that the project would expected to generate far more cycling. There are 5,500 houses and an adult population estimated to be 9,900[23]. According to the Department for Transport's National Travel Survey 2006, 8% of the population cycle at least 3 times a week[24]. If this were true of Priory Vale, the number of regular cyclists would be expected to be around 792. Another estimate of average cycle usage comes from the London Area Travel Survey which states that 5% of respondents travel by bike at least 3 days per week. Using this estimate, it is expected that there should be 495 regular cyclists in Priory Vale. The contrast with London is obvious, but with the size of population it would be surprising if the figures recorded are accurate.

A.27 If growth of 5% year on year was anticipated, this would result in just over 5% of the estimated population cycling regularly after a period of 30 years. This is not an unrealistic target given the national figures shown above. With year on year increases in cycling of 5% a negative NPV is still recorded. Only with an annual growth of 7% does this project show benefits which outweigh the costs. In this case, the proportion of the population cycling regularly after a period of 30 years would be just over 9%, just 1% greater than the current UK average according to the Department for Transport's National Travel Survey 2006.

A.28 One important finding of this case study was that retrofitting the cycling infrastructure would have cost between 35% and 100% more than the cost of building in cycling infrastructure at an early stage. Assuming the conservative estimate of a 35% increase, the cost of the cycling elements of the site would have increased to slightly over £5 million. This would have meant that a further 119 additional cyclists would have had to use the facilities in order to ensure that there was a positive economic return.

A.29 The problem of this is the assumption that the retrofitting of facilities would have been to the same level of quality as planning in the facilities at an early stage. This may prove impossible and a lower quality is likely to impact upon the number of cyclists and the benefit. For example, the opportunity to run routes alongside established greenery such as hedgerows would be lost, lowering the amenity value. Taking quality into consideration, the retrofitting of cycle infrastructure is likely to lower the total benefits per additional cyclist and therefore mean that a greater number of cyclists are needed to ensure that projects are economically justifiable.

[23] ONS estimate of 1.8 adults per household
http://www.statistics.gov.uk/StatBase/Expodata/Spreadsheets/D9622.xls
[24] http://www.dft.gov.uk/172974/173025/221412/221531/223963/322727/NTS2006DATATABSPTb#'5.6a'!Print_Area

Lancaster Millennium Bridge, Lancaster

A.30 This is an example of an urban, off-road project which has been planned from an early stage. In the mid 1990s the Morecambe to Lancaster off-road cycle route network was surfaced, but it terminated on the north-western bank of the River Lune, where cyclists had to defer to busy road bridges. This was compounded by the fact that the two road bridges formed part of a one way system; Going South, the A6 goes over the Skerton Bridge and going North from Lancaster to Morecambe, the A683 goes over the Greyhound Bridge. Using the road bridges involves a diversion away from the cycle path of approximately 1 mile.

A.31 The development of the Lune Millennium Bridge was designed to complete the 5km off-road cycle route between Morecambe and Lancaster. It was completed in February 2001. The bridge attracts both commuter cyclists and leisure cyclists. For commuters, it is estimated that using the cycle route is twice as quick as driving between Morecambe and Lancaster.

Investment

A.32 One of the key drivers behind the development of the pedestrian and cycle bridge was the availability of Lottery Millennium funding. The total cost of constructing the bridge was estimated to be £1.8 million[25].

A.33 Prior to construction of the Millennium bridge, the potential of retrofitting of the Greyhound bridge with a 'bolt-on' cycle path along one side was investigated. Although there is a lack of information on this proposal as it was put forward in the early nineties, Richard Tulej, previously of City Engineers department of Lancashire county council, confirmed that retrofitting would likely to be more expensive than building a new bridge. He also suggested that integrating a 'bolt on' cycle lane along one of the bridges may have been difficult because both bridges are one way only.

Usage

A.34 For this case study, it was again important to determine the 'target' number of cyclists which were needed to ensure a positive return on the cycling element of the project as well as the actual level of usage.

A.35 Using the matrix developed in Chapter 2, we estimated that 163 additional cyclists would have to use the bridge regularly each year in order to justify the cost involved in the project. Prior to construction, cyclists had predominantly used the Greyhound road bridge, which saw an average of 346 cyclists each day during weekdays in May 1998 according to the Lancaster District cycling strategy. In July 2001, this figure was down to less than 25 cyclists per day. The reason for this was that cyclists were switching away from the on-road route to the off-road Lune Millennium bridge. The figure of 346 cyclists was used as a baseline number for the level of existing cyclists who would have been expected to use the new bridge.

A.36 The Lancaster City Council Cycling Co-ordinator provided automatic counter data for a counter located beside the Millennium bridge which gave monthly averages of the 24 hour cycle flow per day, Monday to Friday. This data showed the number of cycle trips across the

[25] http://www.rambollwhitbybird.com/projects/project.asp

bridge in both directions. The data was used to calculate the annual average number of cyclists who regularly cycle across the bridge. This showed that there was a large increase in the number of regular cyclists using the bridge in each year since it opened, relative to the baseline level. The difference between the baseline number of cyclists and the actual number of cyclists was the number of additional cyclists using the bridge each year. It is reasonable to believe that the reason that these additional cyclists decided to cycle regularly was the introduction of the off-road bridge which provided a safer alternative to cycling on-road and a quicker alternative to driving or using public transport for many journeys.

Table A-3: Number of cyclists using Lune Millennium Bridge

Year	2001	2002	2003	2004	2005	2006	2007
Number of Cyclists	383	481	508	441	489	463	484
Number of additional cyclists	37	135	162	101	144	118	138

Source: Lancaster City Council

Economic Analysis

A.37 In terms of the number of cyclists needed to ensure that the project was successful, it is clear to see that for the majority of years so far, there have been less than 163 cyclists regularly using the bridge. In order to calculate the benefits of the bridge, it was assumed that after 2007, there was no further growth of cyclists so that the additional number of cyclists remained constant after 2007 at 138. The assumption that the growth of additional cyclists after 2007 is zero reflects the assumption that it is unlikely that the existence of the bridge itself will generate additional cyclists after the initial boost in interest. However, this assumption could change in line with increasing use of soft measures such as education or promotion of the bridge.

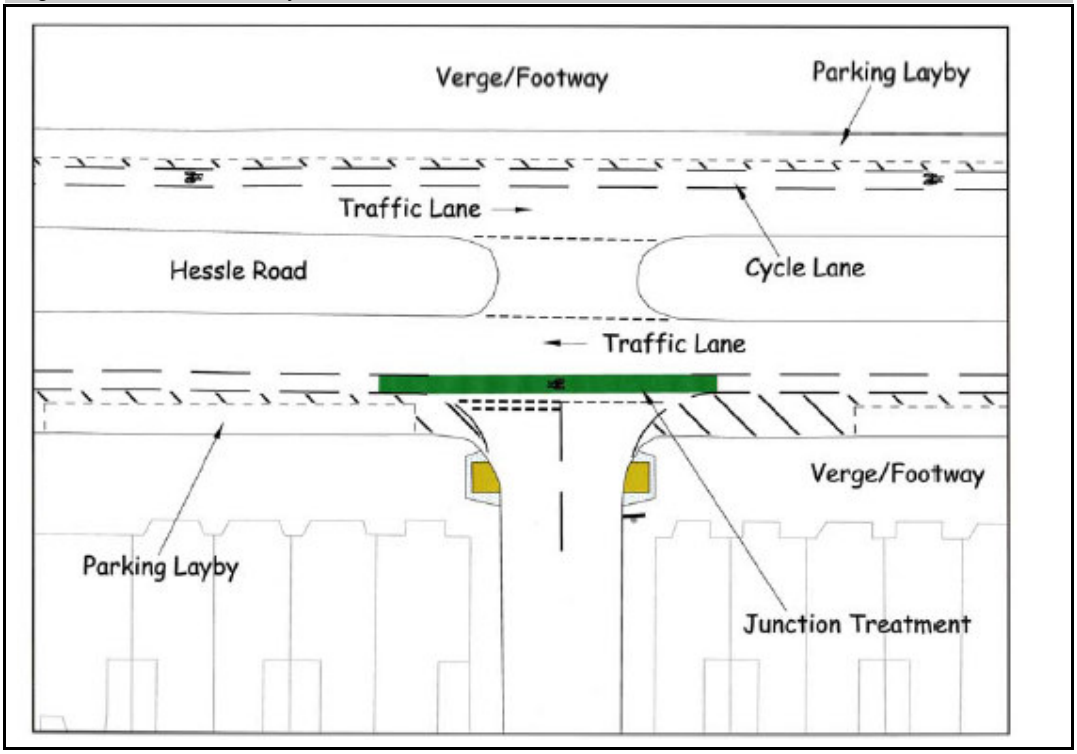
A.38 If the growth of additional cyclists after 2007 is zero, the project is proving economically unviable, with a net present value of negative £225,495. This result shows the importance of following up hard measures such as the construction of cycling facilities with soft measures which can encourage people to use the cycle infrastructure.

A.39 If growth of additional cyclists followed the initial average growth of 5% year on year between 2001 and 2007 for the rest of the bridges projected 30 year lifetime, the project would display a positive NPV of £648,303 and a benefit to cost ratio of 1.31:1. Even if growth was much lower, at only 2% annually, the benefits of the bridge still outweigh the costs.

Reallocation of road space for cyclists, Hull

A.40 This is an example of an urban on-road project where cycling facilities have been retrofitted into the existing cycling infrastructure. The project involved reallocating road space on seven busy roads within the city through the introduction of cycle lanes. This was achieved by removing one lane of traffic in each direction which was then replaced by a cycle lane and parking bays. An example of this work is shown in Figure A.2, which shows the work undertaken on one of the streets involved in the project, Hessle Road.

Figure A-2: Hessle Road Cycle Lane



Source: Hull City Council

A.41 The explicit aim of the project was two-fold; to lower the number of accidents on the roads and to increase the levels of cycling. These are two of the key aims of Hull City Council's Cycling Strategy (2003), along with the reduction of cycle thefts, encouraging life long cycling and improving health through cycling. It is likely that if the first two aims are achieved, there will be noticeable increases in both life-long cycling and improved health of cyclists. Underlying these aims is the recognition that cycle levels were dropping and that measures were needed to re-dress this trend.

A.42 Although no specific demand assessment was undertaken, there were requests from both the general public and also cycling groups to introduce improved facilities on the routes which were upgraded.

Investment

A.43 The total costs involved in this project are shown in Table 3-4. This case study has cost significantly less than the previous examples and the scale of work on the Hull project is

much less than the Millennium bridge or the Priory Vale projects. Per metre, the cost was only £6.20 compared to the new build cost at Priory Vale of more than £200 per metre.

Figure A-3: Cost of Hull schemes

Scheme	Costs (2006 prices)	Length of cycle lane (km)
Alfred Gelder Road	£30,540	2.0
Hessle Road	£32,085	6.2
Clough Road	£13,072	3.2
Bricknell Avenue	£21,390	2.6
Cottingham Road	£15,448	5.2
Chanterlands Avenue	£6,060	2.5
Freetown way	£29,708	2.2
Total	£148,303	23.9

Source: Hull City Council

Usage

A.44 There is strong evidence that the retrofitting of these roads with cycling facilities has led to much higher levels of cycling. The before and after usage statistics shown in Table 3- show that there have been increases on all but two of the routes.

Figure A-4: Impact of schemes on number of cycling trips

Scheme	Cycle trips before	Cycle trips after	Additional trips	Additional cyclists
Alfred Gelder Road	868	888	20	14
Hessle Road	355	845	490	352
Clough Road	453	541	88	63
Bricknell Avenue	575	546	-29	-21
Cottingham Road	755	918	163	117
Chanterlands Avenue	373	484	111	80
Freetown way	657	625	-32	-23

Source: Hull City Council , SQW calculations

A.45 The level of additional cyclists is again calculated using the assumption that all trips are return and that each cyclist travels 160 times per year. As a whole, the Hull project has lead to an additional 585 cyclists from a baseline number of 2,091.

Economic Analysis

A.46 Using the investment-cycling matrix, it is estimated that for an investment of £148,303 on an urban on-road project to be justified, an additional 14 cyclists have to take up cycling on a regular basis. For Hull, the investments made to upgrade the cycling facilities can actually be justified without generating any extra cyclists. Since the seven routes all had significant cycling numbers prior to the upgrading of the routes, the amenity value alone of improving

the route for the 2,091 existing cyclists was sufficient to create a positive NPV and generate a benefit to cost ratio of almost 6:1.

A.47 Once the additional cyclists are taken into account, this benefit to cost ratio increases to almost 50:1. Although this seems an extremely high ratio compared to the other case studies, it is important to acknowledge that Hull has introduced a raft of city-wide initiatives including 116 20 miles per hour zones and a network of cycle routes to make the city more cycle friendly and that some of the increases monitored on the new routes will be a result of these related interventions.

A.48 According to Hull City Council's Streetscene team, there is further potential for increasing the number of cyclists using these facilities as the costs of motoring rises and the high profile coverage of cycling during the Beijing Olympics.

Queen Elizabeth Park, Guildford

A.49 Queen Elizabeth Park (QEP) has been developed on the site of the former Guildford Barracks, 2.5km to the north of Guildford town centre. The site is 23 hectares and is located within the existing residential area of Stoughton. The main developers involved in the project are Laing homes and Linden homes. This case study is an example of an urban on-road development.

A.50 The development includes 525 residential units, of which 35% which are affordable, 9,000 square metres of office and light industry space, a crèche, health and fitness centre, nursing home and a community core with a number a shops. All of the housing is completed and occupied and the majority of the other elements of the development have been completed.

A.51 Cycle facilities have been included as part of this development, driven by the overarching aim of the Guildford Borough Cycling Strategy, which is to "increase cycle use and to promote the benefits of cycling in Guildford Borough"[26]. In order to achieve this aim, a number of objectives have been put in place. These are set out in Table A.4.

Table A-4: Guildford Borough Cycle Strategy

1. Network	
Objective 1a	**To develop a network of safe, convenient and well-designed cycle routes in the Borough.**
Objective 1b	**To make sure that cycling is made safe and convenient on other roads and routes**
2. Parking	To improve the quantity, quality and security of cycle parking facilities in the borough, both public and private
3. Promotion	To promote and publicise the benefits of cycling
4. Monitoring	To monitor the effect of the Strategy and the changes in cycle use

Source: Guildford Borough Council

A.52 According to the Surrey County Council planning case officer with responsibility for the Queen Elizabeth Park development, cycling was deemed an important element of the design for a number of reasons. Queen Elizabeth Park is a brownfield site surrounded by established residential areas. Therefore it was important to ensure that traffic coming and going to Queen Elizabeth Park was dispersed evenly throughout the surrounding areas in order to avoid the creation of traffic 'hotspots'. The second important rationale for integrating cycling into the project was to try to encourage different options to minimise the impact that the extra housing would have on car usage in the area. This is a particular problem for Surrey because the road network in the region is less developed than the national average, with only 5.1km of road per 1,000 population compared to a national average of 6.6km per 1,000 population[27]. The infrastructure in Surrey is therefore less able to accommodate additional motor vehicular traffic than the rest of the country.

[26] Guildford City Council, Cycling
[27] Surrey County Council, *2nd Local Transport Plan 2006-7 – 2010-11,* Chapter 3

Investment

A.53 More than £4 million in contributions from the developers were agreed with Guildford Borough Council and Surrey County Council through Section 106 agreements. To put this into context, the approximate total cost of the development was £54 million. The Section 106 agreement covered a wide range of new facilities including community spaces, improved public transport facilities such as bus lanes and funding for a park and ride facility, environmental improvements such as landscaping and improvements to the cycling and pedestrian infrastructure.

A.54 According to the Section 106 agreements which were put in place, a range of different cycle related infrastructure was to be put in place before residents could move into the new houses. Table A.5 shows the cycling infrastructure which was actually build as a result of the Section 106 agreement. It proved difficult to find the costs involved in the cycling elements of the Section 106 agreement and so the cost of these facilities are estimated from an analysis of road safety schemes and updated to 2006 prices[28].

Table A-5: Section 106 Cycling infrastructure

Facility	Location	Cost (2006 prices)
New junction	Salt Box Road and Grange Road	£22,402
New junction	Worplesdon Road and Johnston Walk	£22,402
Pedestrian/cycle crossing	• Worplesdon Road south of its junction with Johnston Walk	£13,380
Pedestrian/cycle crossing	Worplesdon Road between its junctions with Byrefield Road and Sheepfold Road	£13,380
Pedestrian/cycle links	From Fairborne Way	£70,000
Total		£141,564

Source: Guildford Borough Council TMS Consulting and SQW calculations

A.55 Part of the environmental improvements which were agreed under the Section 106 agreement included £130,000 for greening, planting, paving and street furniture on Worplesdon Road, south of Stoughton Road down to Ardmore Way. In addition to this, Guildford Borough Council spent £16,000 on the provision of on-road advisory cycle lanes that will reduce the effective width of the carriageway, thus making motorists more aware of the presence of cyclists.

A.56 This cycle route is linked into existing cycle routes in the surrounding area, linking with the University via Aldershot Road and routes into the town centre via the proposed Woodbridge Road bus lane, which cyclists can also use. This cycle facility is 740 metres in length with 1.2m wide lanes, running in both directions along the length of Worplesdon Road between Stoughton Road until the junction with Aldershot Road.

A.57 Together, this brings the total cost of the cycling element of the Queen Elizabeth Park development to an estimated £157,564.

[28] http://www.tmsconsultancy.co.uk/res/Cost%20of%20saving%20an%20accident.doc

Usage

A.58 According to Guildford County Council's cycling officer, there is no monitoring evidence undertaken in the Queen Elizabeth Park area. The original travel plan document stated that "multi-modal traffic surveys at all points of entry to the proposed development"[29] would be carried out and would "measure the number of persons travelling by car (single occupant), car (occupancy 2+), public bus service, school bus, cycle, walk and taxi. These surveys to be carried out annually". However, there is no evidence that these surveys have been undertaken.

A.59 Without direct measurement of the level of cycling into and out of the development, the most relevant source of usage data is from an automatic counter on Worplesdon Road, on the Western boundary of the development, which measures cycle traffic moving south east bound toward the centre of Guildford. This counter has been in operation since 2004 and can provide both before and after cycle usage estimates. Data are available which show the average daily flows, Monday to Friday for the 55 months between January 2004 and July 2008. Unfortunately, for over a third of these months, there are no data. This is due to equipment malfunction.

A.60 Table A.6 shows the level of usage on Worplesdon Road in 2004, the year before the cycle lane was build and in 2007.

A.61 The cycle lane was built in Spring 2005. Data for 2005 and 2006 is too incomplete to accurately determine the level of additional cycling so 2007 is used as the data is much more complete for this year.

Table A-6: Daily cycle trips on Worplesdon Road, 2004 and 2007

Cycle trips before	Cycle trips after	Additional trips	Additional cyclists
33	44	11	16

Source: Guildford County Council and SQW calculations

Economic Analysis

A.62 Using the investment-cycling matrix, it is estimated that for an investment of £157,564 on an urban on-road project to be justified, 15 new cyclists have to take up cycling on a regular basis.

A.63 The Queen Elizabeth Park development is estimated to have generated 16 additional cyclists, a sufficient amount to justify the expense involved but not generating significantly high levels of benefits. When the amenity value of the upgraded facilities to those already cycling in the area is taken into account alongside the 16 additional cyclists, the project is estimated to generate a positive NPV of £42,053 and a benefit to cost ratio of 1.23:1.

A.64 It is important to consider growth of usage in developments such as Queen Elizabeth Park, which have only recently been opened. If year on year growth of 5% is allowed for, the benefit to cost ratio increases to 2.3:1 and the NPV generated is £233,621. Growth of 5% seems to be a conservative estimate, with the number of daily flows observed along Worplesdon Road in the first six months of 2008 being 13% greater than the equivalent period in 2007.

[29] Colin Buchanan and Partners, *Guildford Barracks Development Travel Plan Report*, 2001

Surrey University, Manor Park campus

A.65 The University of Surrey's main campus is located at Stag Hill in Guildford. The campus is characterised by a mix of academic and residential buildings. However, there is little room for further expansion. As a result of this, the University's Manor Park site has been developed to extend the campus. A mix of residential buildings and academic, research and ancillary buildings will be located on the site, as well as improving the existing sports facilities at Manor Park.

A.66 It is expected that the Manor Park development will ultimately be home to around an additional 4,700 students and 300 university employees. It is clear that such an increase in student numbers will put pressure on the surrounding transport infrastructure. There are a number of internal and external factors which have meant that cycling has had to be considered from the outset.

A.67 External factors include the lack of capacity on Guildford's road. The A3 Guildford bypass which runs in between the two campuses is at full capacity and more generally Surrey's road network is less developed than the national average, with only 5.1km of road per 1,000 population compared to a national average of 6.6km per 1,000 population[30]. The infrastructure in Surrey is therefore less able to accommodate additional motor vehicular traffic than the rest of the country. These external constraints have limited the amount of on-site car parking spaces, with permit schemes in place for both staff and students. In recognition of these constraints, a Section 106 agreement has been put in place. The elements of this agreement relevant to cycling are shown in Table A.7.

Table A-7: Cycling relevant elements of Section 106 agreement

Requirement	Description
Off-site highway improvements	Provision of footpath and cycle way improvements to ensure a safe corridor linking Stag Hill and Manor Park that may be reasonable required by the County Council To provide two pedestrian/cycle crossings in Egerton Road
Green travel plan	To obtain agreement to a green travel plan in connection with Manor Park, Stag Hill and Surrey Research Park, which will be monitored and reviewed To pay towards monitoring costs
Traffic Generation levels	If the development traffic level, as recorded by annual traffic surveys, exceeds the base traffic level by more than the agreed 5%, then the University will not be able to construct any further phase of the development which is still awaiting reserved matters approval until it has been demonstrated to the satisfaction of both the Borough and County that traffic levels have been reduced to the permitted increase.

Source: Guildford City Council 2004

A.68 According to the University of Surrey's head of planning, internal factors which have encouraged the integration of cycling into the development of the Manor Park campus include the on-site space limitations and the high financial and opportunity cost of installing car parking on campus.

[30] Surrey County Council, *2nd Local Transport Plan 2006-7 – 2010-11,* Chapter 3

A.69 Cycling is seen as an integral part of achieving all of the objectives of the University's travel plan, as seen in Table A.8. Without considering cycling from an early stage of the new development, achieving these objectives would prove a much harder challenge.

Table A-8: University of Surrey's Travel Plan objectives

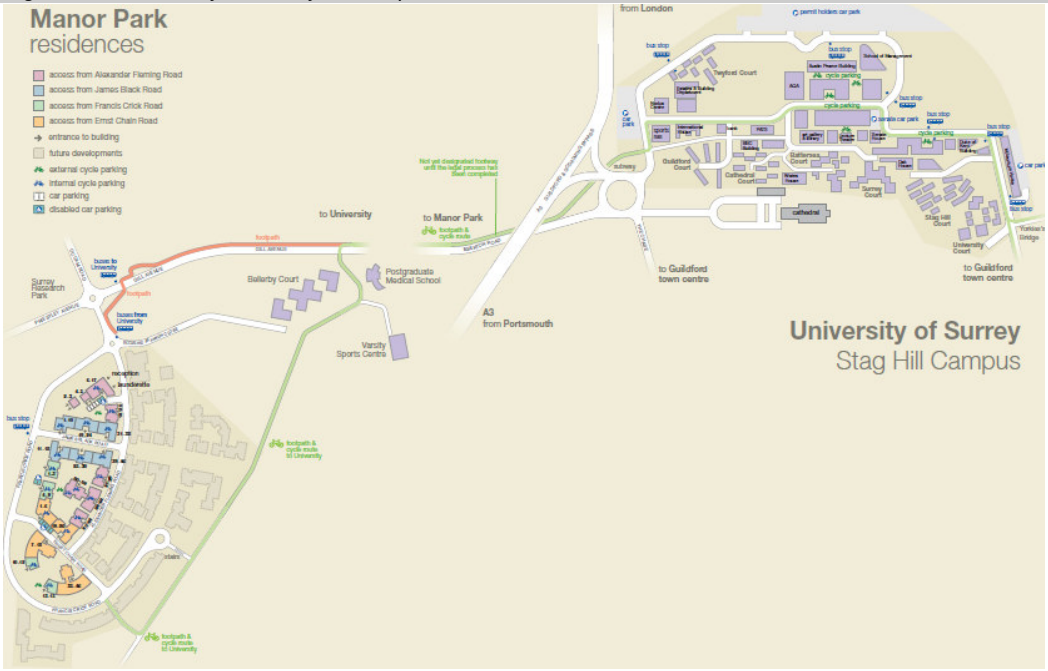
Objective A	Ensure that the University's Section 106 obligations are met
Objective B	Ensure that the University's transport policies facilitate the smooth operation of the University
Objective C	To provide a foundation for continued transfer from single occupancy car travel to alternative travel modes.

Source: University of Surrey

Investment

A.70 The key investment which has been made to improve the level of cycling infrastructure is the development of a cycle route between Manor Park and Stag Hill. The costs of this cycle route are estimated at a total of £300,000, with £100,000 being spent on the cycle route on Egerton Road and £200,000 for the part of the route between Egerton Road and Manor Park campus. Initially there were legal issues with ensuring that this route can legally be used by cyclists but these have now been resolved and cyclists are able to use the route. The cycle route between the two campuses is shown in Figure A.5 in green.

Figure A-5: University of Surrey site map



Source: University of Surrey

Usage

A.71 The university employs an independent transport consultant to undertaken both automatic and manual transport counts annually. The sort of data collected include the following:

- Manual Traffic Counts
- Vehicle Occupancy Counts
- Pedestrian and Cyclist Counts
- Bus Usage Surveys
- Traffic surveys were also undertaken at the following locations:
  - Stag Hill main access
  - Stag Hill Eastern access
  - Manor Park Sports Centre.

A.72 Survey data for 2005, prior to students moving to the new Manor Park campus and 2007, when some of the new campuses facilities opened is available. This survey data is shown in Table A.9.

Table A-9: Cycling movements into and out of Stag Hill campus

Time	2005 IN	2007 IN	2005 OUT	2007 OUT
07:00	13	19	4	10
08:00	38	52	2	5
09:00	43	50	2	7
10:00	52	36	10	9
11:00	30	17	16	9
12:00	14	30	8	20
13:00	12	40	11	23
14:00	14	16	14	23
15:00	11	15	12	30
16:00	5	11	20	49
17:00	3	13	34	55
Total	235	299	133	240

Source: WSP 2008

A.73 By taking the average of the trips in and out for both 2005 and 2007 and then calculating the number of cyclists from these trips using the same assumptions as in the other case studies, it is estimated that there were 265 cyclists in 2005. This is equal to 2.2% of the student population. This provides a baseline level of regular cycle usage for the university before significant levels of students were accommodated at the new Manor Park campus.

A.74 Between the academic year 2005/06 and 2007/08, the student population grew by 4%.[31] Assuming that the number of students cycling remained at 2.3% of the total population, it is estimated that in 2007/08, there would be 275 students cycling regularly, an additional ten cyclists compared to 2005.

A.75 However, the actual number of students cycling in 2007/08 is an estimated 388, equivalent to 3.2% of the student population. This is an absolute increase in cycling of 46% compared to a 4% increase in student numbers.

Economic Impact

A.76 With an estimated spent of £300,000 on the cycle route linking the two campuses, it approximately 27 additional cyclists are needed to ensure the cycling element of the development generates a positive economic impact.

A.77 If the modal split remained at 2.3% in 2007/08, an additional 10 people would be cycling regularly compared to 2005/06, which together with the 265 cyclists who previously cycled on road but now enjoy the safety and amenity of the new cycle route, generate a benefit to cost ratio of 2:1. This is a good return on the investment, with a net present value of £343,402.

A.78 However, the actual additional usage of the cycle route in 2007/08 is much greater, with an additional 123 cyclists compared to 2005/06. With this level of cycling, the cycle route between the two campuses has generated a net present value of £1,789,288 and a benefit to cost ratio of more than 6:1.

A.79 Future growth based on projected extra students up until 2020 suggest that the number of students living on the new campus in student halls will increase, lowering the number of students commuting to the university from further away. This will increase the likelihood of greater levels of cycling on campus. Although it is difficult to quantify the likely increase in cycling without a detailed breakdown of cycling among those students living both on and off site, it is presumed that the growth of cycling will outstrip the growth of student numbers as the new campus develops.

[31] University of Surrey
http://portal.surrey.ac.uk/pls/portal/docs/PAGE/REGISTRY/SRAD/SSTATS/STATS/NUMBER_BY_STUDY_METHOD.DOC