Investment in Cycle Facilities at Rail Stations

Developing a Business Case Framework

Report

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1 Introduction

Study Context

1.1 The cycle-rail taskforce, comprised of representatives from the Association of Train Companies (ATOC), Network Rail, Passenger Focus and Cycling England, has a key objective to facilitate growth in the number and proportion of people cycling to rail stations through the targeted installation of cycle facilities at rail stations.

1.2 The provision of improved cycle infrastructure is an essential element in supporting future growth. However, there is to date limited empirical evidence on the demand impacts of providing improved facilities at rail stations, and therefore a limited evidence base upon which to develop a business case for investment in cycle facilities.

1.3 The purpose of this study was essentially twofold:

- To develop an economic model, that forms the framework for developing business cases that can help justify expenditure in new / improved cycle facilities at rail stations.
- To establish an evidence base of impacts of cycle investment on cycle demand and other transport users which underpins an economic analysis.
- To help construct a robust economic and commercial case for cycle investment in a variety different circumstances.

Study Remit

1.4 Steer Davies Gleave was commissioned to undertake the study, which has four key strands. These are:

- Developing an **economic model** framework to support the economic appraisal of cycle investment;
- To undertake a **literature review**, to pull together the existing evidence base on the impact of cycle investment at rail stations;
- To undertake **primary revealed preference research** at three stations, specifically focussing on the response of rail users (and cyclists in particular) to the implementation of cycle facilities; and
- The development of a **cycle demand forecasting model** that provides a forecast of potential cycle demand at rail stations, which can be used to identify those stations with the greatest latent demand and greatest potential from the introduction of new facilities.

Structure of Report

1.5 The report covers the various components of the study providing an overview, background to the economic study, cycle demand estimation surveys and conclusions.

1.6 The report is comprised of the following chapters:

- Study Overview – outlines the different parts of the study as they were conducted and how the varying components link together;
- Literature review – summarises the key findings from the literature review conducted as part of this study and notes how the findings informed later work;
- Primary research – notes the way in which the primary research / at station surveys – were conducted and the results from the surveys;
- Cycle demand forecasting – explains the methodology which underpinned the development of the cycle demand estimation tool as well as the results from its application;
- Economic model – explains the development of and assumptions underpinning the economic model;
- Station scenarios – presents the application of varying scenarios in the economic model to demonstrate different outcomes given varying case inputs;
- Discussion – presents an analysis of both the case studies from the economic analysis as well as other findings from the study and brings them together; and
- Conclusions – presents the findings from the study.

2 Study Overview

2.1 The study is comprised of a number of distinct, but interrelated strands of research and work. The different strands of work all inform one another to build a better understanding of cycle demand and cycle facility improvements at rail stations.

2.2 A core challenge of the study is building a better understanding of the behavioural response to station improvements. The response to improvements is an important determinant to the benefits that underpin the economic model along with the benefits which accrue to existing cyclists.

Building a Knowledge Base – Literature Review and Surveys

2.3 The first strand of work involves the primary research and literature review components of the study. The **literature review** strand built an information base on which the study was able to proceed. The existing literature on cycling and its benefits helped to outline the issues which would be faced and need to be addressed by the primary research. In addition to the standard literature review, Department for Transport guidance was considered as a way to further build upon existing literature with regard to outstanding questions for the primary research.

2.4 The **primary research** – at station surveys – worked to fill the gaps in information identified during the literature review and review of DfT appraisal guidance. The surveys were designed to gather information needed to calibrate the cycle demand estimation tool as well as inform the economic model. The surveys captured data which allowed estimates of cycle demand and access mode share to be made for the three stations surveyed. With access mode share, demand and current facility utilisation the demand estimation tool and economic model work to help answer questions about both the need for additional facilities as well as the economic benefits from additional facilities.

2.5 The primary research and literature review form the base strand of the study from which the cycle demand forecasting model and the economic model are constructed. The literature review and surveys strand of work helped develop an understanding of the perceptions of cycle facility improvements and the subsequent behaviour response, to help inform parameters that could be used in forecasting.

Cycle Demand Estimation Model

2.6 The demand estimation model forecasts cycle demand at stations from a ‘top down’ perspective, i.e. applying a common methodology to forecast the potential market for cycling demand at all stations. The model provides an estimate of potential cycle usage at all English stations (except London), which could be achieved if a high standard and sufficient quantity of cycle provision were implemented.

2.7 The information collected in part from the literature review, and particularly from the station surveys, were used to test and calibrate the Cycle Demand Estimation Model. The demand estimation tool takes no consideration of the actual station facilities.

2.8 Potential uses of the model are:

- To identify stations which have the maximum potential cycle usage (whether realised or not);

- To identify stations where the ‘gap’ between cycle demand potential and actual usage is greatest, and hence those where the greatest benefit could be obtained through improving facilities; and
- To provide forecasts of cycle usage for specific stations that could underpin an economic appraisal. This would be most appropriate where no current facilities exist, where an incremental approach (i.e. forecasting an uplift based on existing usage) is not possible.

Economic Model

2.9 There are two essential elements of the **economic model**:

- The development of a fully compliant economic appraisal tool, capable of demonstrating the economic performance of any cycle investment scheme, on the basis of a given set of inputs (demand, costs and benefits).
- To draw together the evidence from the other strands of the study to help inform the demand and benefit inputs to the appraisal.

2.10 The economic model is therefore based on DfT guidance in terms of its mechanics (parameter values, discounting and so on) and the potential inputs to the model are informed by the literature review, cycle demand forecasting and station surveys.

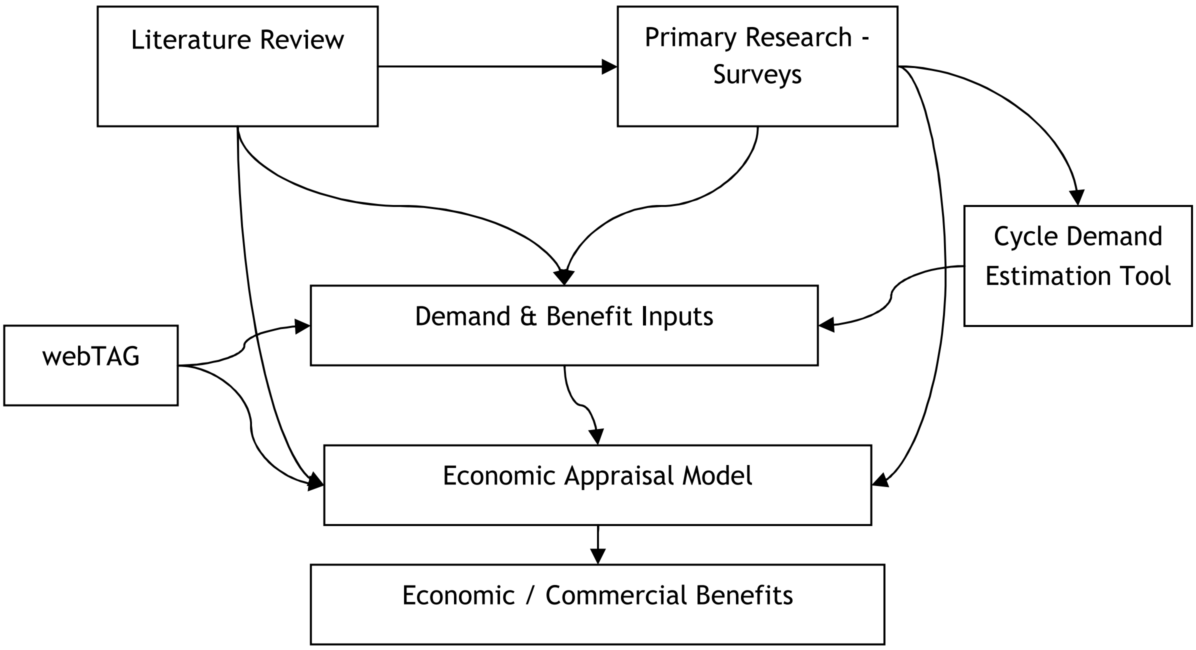
2.11 The key demand inputs into the economic model, that we sought to understand through the other strands of the study include:

- Station access mode share;
- Mode shift between access modes resulting from facility improvements; and
- The demand generated (new users) to the station from the improvements.

Linking the Strands

2.12 The flow chart below captures the various strands described above and shows how they informed one another and the results they produced.

FIGURE 2.1 STUDY OVERVIEW



3 Literature Review – Key Findings

Purpose

3.1 The literature review was designed to review the existing evidence on the impact of (or rather response to) cycle facility provision or improvement at rail stations with the aim of identifying robust inputs to inform the economic appraisal model.

Scope

3.2 There was a significant body of government guidance on appraisal of transport schemes. Whilst this documentation provided direction on how to evaluate new initiatives (the value of a new parking facility to an existing cyclist, for example), it gave little steer as to how to estimate the response to new facilities – that is; the likely demand for cycle facilities of different quality (securing, layout, location etc) and the flow on effects to mode share, rail and car park demand and so forth both across the network and at particular stations.

3.3 Additional data was therefore required to provide a nuanced evaluation of cycle schemes at stations and a more robust business case.

3.4 The literature review was designed to review inputs for the economic and demand estimation tools at the centre of this study. During the course of the literature review the researchers conducting this study worked to source information including but not be limited to:

- cycle demand at rail stations;
- rail demand from cyclists;
- cycle mode share for station access trips;
- car park utilisation;
- elasticities of demand for cycling, rail and other modes;
- elasticities of service quality (i.e. how demand would vary with the quality of cycle parking facilities including security, layout and location etc);
- patterns of cycle parking at stations (including fly-parking); and
- the relationship between cycle provision, demand and station / TOC revenue.

Key Sources Reviewed

3.5 During the course of the literature review numerous sources were reviewed and a limited number of interviews were conducted to review the health benefits of cycling. We reviewed sources which were suggested by the Cycle Rail Task Force. These sources were then supplemented by interviews suggested by the Cycle Rail Task Force. In addition, we performed a review of relevant UK government guidance on the appraisal of cycle schemes as well as conducting an internet based search of relevant literature.

3.6 Key work with regard to the impact of improved cycle facilities on cycle demand was established in four reports, two published by Transport for London[12], one by Steer Davies Gleave[3] and one by Accent Marketing and Research[4] (see Appendix A). In addition, phone interviews with Nick Cavill and Allison Hill provided insight into scheme appraisal.

3.7 A full list of sources from the literature review, along with finding relevant to the study is available in Appendix A.

Key Findings

3.8 During the course of the literature review we found evidence which helps to underpin some of the important assumptions made within the Cycle Demand Estimation Tool, the Economic Model as well as the change in demand which is estimated from new cycle facilities.

3.9 Four studies analysed the impact of new or improved cycle facilities and their subsequent impact on demand. These studies gave a range of forecasts for the demand uplift from 3% increase in demand in the Steer Davies Gleave study to a 26% increase in cycle demand in one of the Transport for London studies. Three of the four studies, however, cite a range of demand uplift of 20-26% leaving some confidence this is the correct range with the 3% figure as somewhat of an outlier. There is, however, little evidence to relate the degree of uplift to the quality or scale of improvements, nor the context in which improvements were implemented (e.g. whether parking was at capacity prior to the improvement).

3.10 With regard to forecasting the uplift in cycle demand the Department for Transport has published two methods which are applicable in the case of cycle facilities at rail stations. The first is using a comparison to a similar improvement in a similar situation and using the change in demand there as a proxy for the expected change in demand in other places. The second method is a utility based approach which uses the potential cycle catchment of the station and the change in the quality of cycle facilities to estimate the change in cycling as a proportion of the number of potential cyclists.

3.11 The literature also provided evidence from a number of studies to support assumptions employed within the Cycle Demand Estimation Tool. Three different studies suggested that the spatial area around a station in which people will consider cycling takes the form of a “doughnut.” People in close proximity to the station will walk while those whom are slightly further away would consider cycling and those even further away would again either drive or take public transport.

3.12 Additional research supplied a range of findings, from high benefit to cost ratios and large variations in cycle mode share. Additionally, one study noted the potential of increased cycle parking supply to increase cycle demand.

[1] Transport for London. Business Case and Evaluation of the Impacts of Cycling in London.

[2] Transport for London. Impact of New Cycling Infrastructure Scheme – Customer Feedback.

[3] Steer Davies Gleave. Cycling in London.

[4] Accent Marketing and Research. Cycle Parking Facilities at Surbiton Station.

3.13 Interviews were also conducted with Dr. Allison Hill and Dr. Nick Cavill regarding the health benefits of cycling. Both Dr. Hill and Dr. Cavill are experts in the field of appraising the health benefits of cycling and have played a large part in developing the HEAT tool for the World Health Organisation which has subsequently been adopted by the UK Department for Transport as a part of its appraisal guidance. Dr. Hill and Dr. Cavill noted there are limitations to the approach used. Despite the limitations the methodology currently used in appraising the health benefits in conservative, robust in nature and fully applicable to cycling.

Applicability to the Study

3.14 Overall the literature review and interviews are informative, but provide limited evidence on the impact of improved cycle facilities on cycle demand. There is evidence to support an increase in cycle demand from improved facilities, but the circumstances of the change in demand vary on a scheme by scheme basis making comparisons difficult.

3.15 The key areas where the research was directly applicable are:

- Evidence supporting the cycle catchment of stations which provides key support for assumptions underpinning the Cycle Demand Estimation Tool.
- An indication of the uplift resulting from the implementation of cycle improvements, though the uplifts showed a broad range of between 3% and 26%.
- Research published within the DfT Walking and Cycling Guidance that provides a method for forecasting the uplift in cycle usage, and also of the 'quality related' benefits that accrue to cycle users as a result of improvements.
- A better understanding of the health benefits of cycling, and of the particular issues in valuing health benefits within economic appraisal.

3.16 The information that has been gathered in the course of the literature review helped to inform the specification of, and to a lesser extent the interpretation of, the revealed preference surveys.

3.17 While providing a number of useful individual findings, the literature review overall did not provide a robust evidence base upon which the impact of cycle improvements could be forecast. The revealed preference surveys were subsequently designed to help fill some of the key gaps identified in the literature.

4 Primary Research - ‘At-Station’ Revealed Preference Surveys

Introduction

4.1 The scope of the revealed preference surveys was to undertake primary research at three stations where cycle improvements had recently been implemented.

4.2 A programme of surveys was conducted at the three following railway stations:

- Leighton Buzzard (Bedfordshire)
- St. Albans (Hertfordshire)
- Ashford International (in Kent).

4.3 The above stations were selected from a sample of stations identified by ATOC and Cycling England as having had recent substantial improvements in cycle facilities.

Leighton Buzzard

4.4 Prior to the improvements to cycle parking facilities in July 2008 there were 46 spaces, and it was estimated that demand was for 50 spaces.

4.5 The improvements brought the total number of spaces provided to 110, and in December ’08 there was an average of 55 cycles parked. The improvements also covered installing new shelters, and relocating the cycle parking to outside the ticket office.

4.6 The whole station area was already covered by CCTV, so no new CCTV had to be installed as part of the programme.

4.7 It is not clear but enquiries made at the station seem to confirm that the 46 original spaces were most likely installed when the station was rebuilt in the 1980s.

St Albans

4.8 At this station there are currently 456 in total, across two sites. All are partially sheltered and overlooked by CCTV.

4.9 The 116 new cycle spaces were installed in December 2008 - on the station forecourt and in front of the old multi-storey car park. Additionally, a number of racks that were moved from other parts of the station were re-used. These were re-sited in the new taxi area. There are approx 20 spaces in this area.

4.10 All of the old cycle areas (one in the Ridgemont Road car park and another at the station front under the foot bridge) remained in place. The only area that has been 'lost' at the station was at the front of the station in the old 'bike shed' which was knocked down to make space for the station redevelopment and the new lifts.

Ashford International

4.11 We have not been able to find out full information about the change in quality / scale of provision at this station. However, at the site inspection we were able to gather some information.

4.12 The station offers cycle parking facilities for a total of 352 spaces.

4.13 This includes a recently opened secure cycle shelter facility with 67 spaces. This new facility opened to the public on the 24th of March 2009 and the entry is via an electronic key fob which can be purchased from Ashford Ticket office for 3, 6 or 12 months, at a cost of £15, £25 or £40, respectively

4.14 It was reported by some respondents that while some new outdoor stands were implemented, there was a loss of some covered facilities (people complained of their bikes now getting wet). This suggests that there may have been a loss in uncharged covered facilities in conjunction with the introduction of the new shelter which is a paid for facility. We have not been able to verify this definitively.

FIGURE 4.1 SECURE CYCLE SHELTER AT ASHFORD

Survey Methodology

4.15 Prior to the fieldwork, site visits were conducted to all three stations. These were very useful in informing the survey program and the associated logistics.

4.16 The site visits were conducted on the 11th March 2009.

Fieldwork methodology

4.17 The survey program included the following:

- Face – to – face interviews with on-platform waiting passengers;
- Gate line count of departing passengers;
- Count of available cycle parking spaces; and
- Hourly count of cycle parking usage.

4.18 Each station was surveyed twice: on a week day and on a Saturday. This is in order to capture the widest representation of station users (commuters and other users).

4.19 The weekday survey started at 6.30am to finish by 12noon – 12.30pm.

4.20 The Saturday survey started at 9am finish at 3pm (Leighton Buzzard start at 10am finish at 4pm).

4.21 At Leighton Buzzard, the surveys took place respectively on:

- Saturday, 21st March; and
- Tuesday, 24th March.

4.22 At St. Albans, the surveys took place respectively on:

- Tuesday, 31st March; and
- Saturday, 4th of April.

4.23 At Ashford International, the surveys took place respectively on:

- Saturday, 18th April; and
- Wednesday, 22nd April.

4.24 All surveys were conducted in dry weather conditions, with temperatures varying from windy / chilly to pleasantly sunny and warm.

4.25 The survey team was composed of experienced interviewers and enumerators, all wearing the high visibility yellow jacket and the Steer Davies Gleave ID badge (see picture below).

FIGURE 4.2 INTERVIEWER ON PLATFORM

4.26 The questionnaire used for the face – to – face interviews with passengers can be found in Appendix B and aimed to collect the following information:

- Mode of travelling to station;
- Origin and post code;
- Journey time to the station;
- Purpose of travelling;
- Whether going to London; and
- Whether travelling with a season ticket.

4.27 If non-cyclist, respondents were then asked:

- Frequency of cycling (if at all);
- Likelihood of cycling to that station; and
- Why not cycling to that station.

4.28 If cyclists take their bike on the train, respondents were then asked:

- Why not leaving the bike at the station;
- How the cycle parking facilities at the station were rated; and
- Whether they had noticed any change at the station's cycle parking facilities.

4.29 If cyclists leave their bike at the station, respondents were then asked:

- How long they expected to leave the bike there;
- Frequency of using the station cycling parking facilities;
- How long have they been using the station's cycle parking facilities for;
- What they did beforehand;
- Why did they start to cycle to the station;
- How the cycle parking facilities at the station were rated;
- Whether they had noticed any change at the station's cycle parking facilities;
- If improved or deteriorated, in what way; and
- Whether they would pay £1.50 to park their bike securely at the station.

4.30 Finally, from all respondents the following was recorded:

- Age group;
- Whether travelling alone or in group;
- Gender; and
- Whether available and willing to take part to further research on the subject.

Sample sizes

4.31 The fieldwork successfully managed to exceed the set target for the minimum number of completed interviews at each station. This had been set at around 250, plus at least 10 interviews with cyclists in order to obtain access mode share and awareness information for the general population of station users and to obtain additional profile and attitudinal information from them.

4.32 A total of 2,003 interviews were completed with passengers; of these, 227 were cyclists.

4.33 The breakdown per stations can be found in Table 4.1 below.

TABLE 4.1 NUMBER OF COMPLETED INTERVIEWS

	Leighton Buzzard		**St Albans**		**Ashford International**		**TOTAL**
	Total interviews	*Cyclists*	Total interviews	*Cyclists*	Total interviews	*Cyclists*	
Weekday	398	*39*	409	*108*	363	*60*	
Saturday	259	*4*	299	*10*	275	*6*	
Total	657	*43*	708	*118*	638	*66*	2,003

Data Cleaning

4.34 Rigorous data checking and cleaning was undertaken to improve the robustness of the survey results. All entries were checked for consistency.

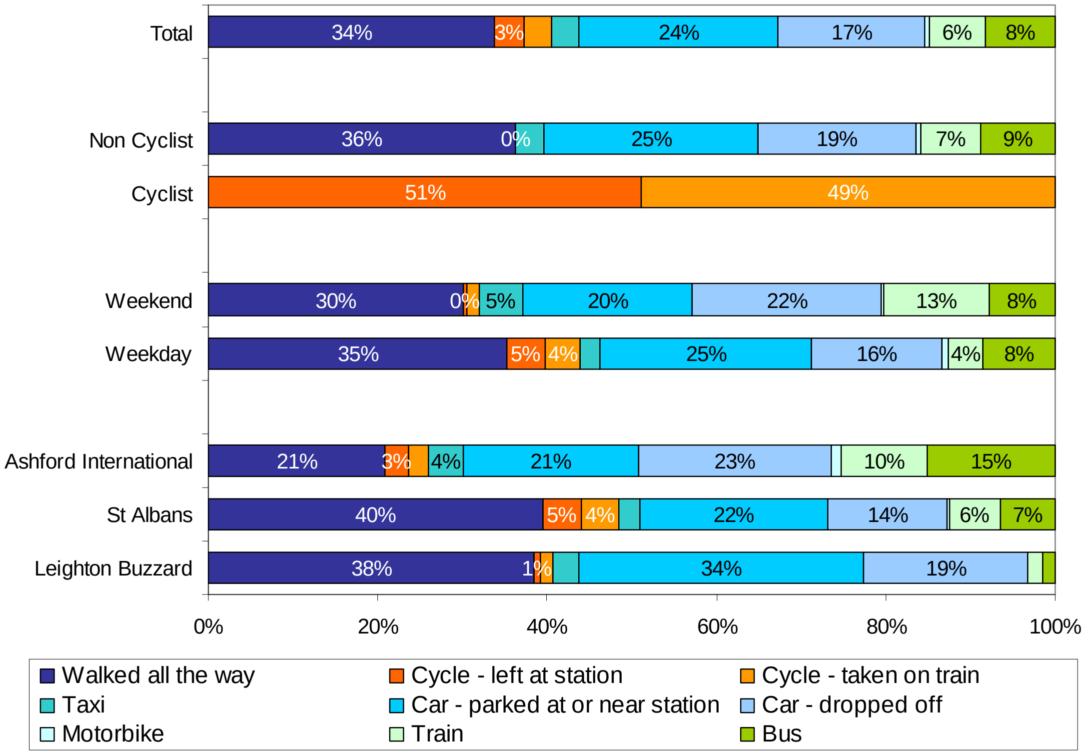
Key results

4.35 The survey results are presented in an accompanying Cycle Parking Station Survey report (Appendix C), but a few key findings are provided here.

4.36 Overall, 3% of passengers cycled & parked at the three survey stations, with another 3% cycling then taking their bicycle in the train. The access modes used for each of the three stations is shown in Figure 4.3 Cycle access mode share was highest at St Albans (5%) and lowest at Leighton Buzzard (1%).

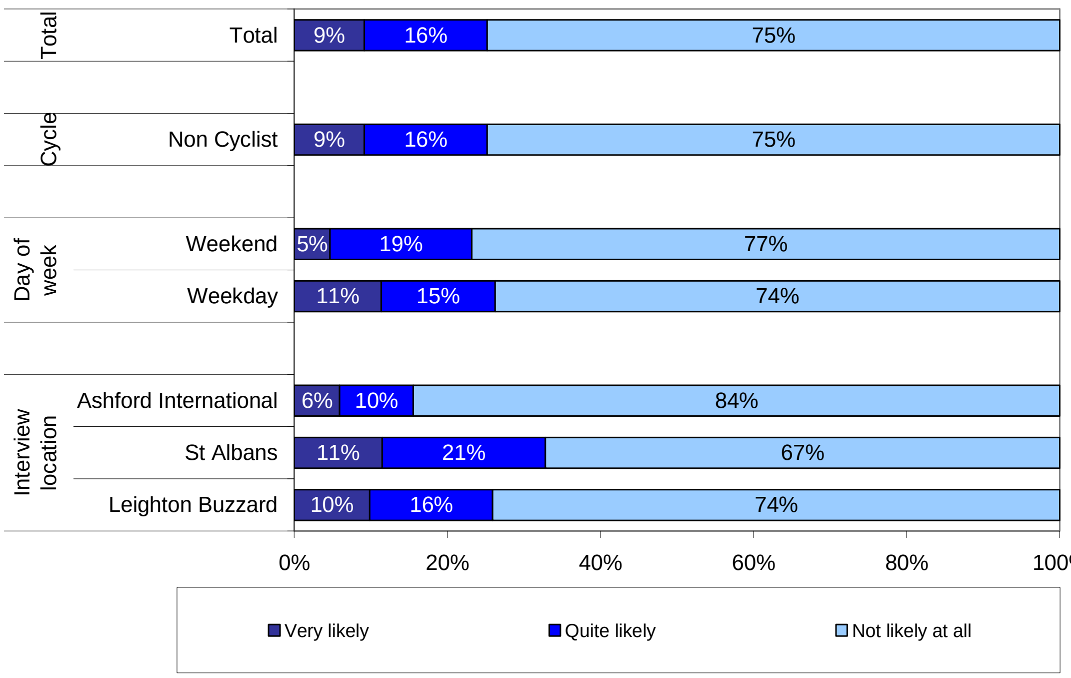
4.37 Note that there was very little cycle parking on Saturday (less than 1% share).

FIGURE 4.3 ACCESS MODE SHARE



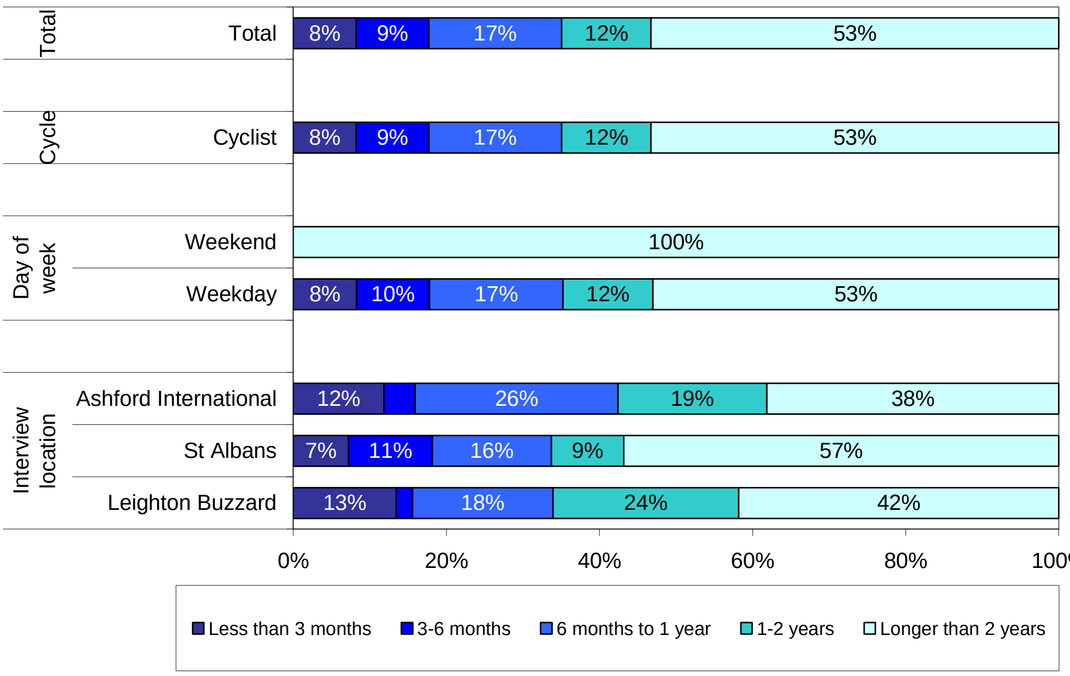
4.38 Despite the excellent provision of cycle facilities at the stations surveyed some 9% of respondents who were not currently cycling to the station expressed an interest in doing so as show in Figure 4.4.

FIGURE 4.4 HOW LIKELY ARE YOU TO CYCLE TO THIS STATION?



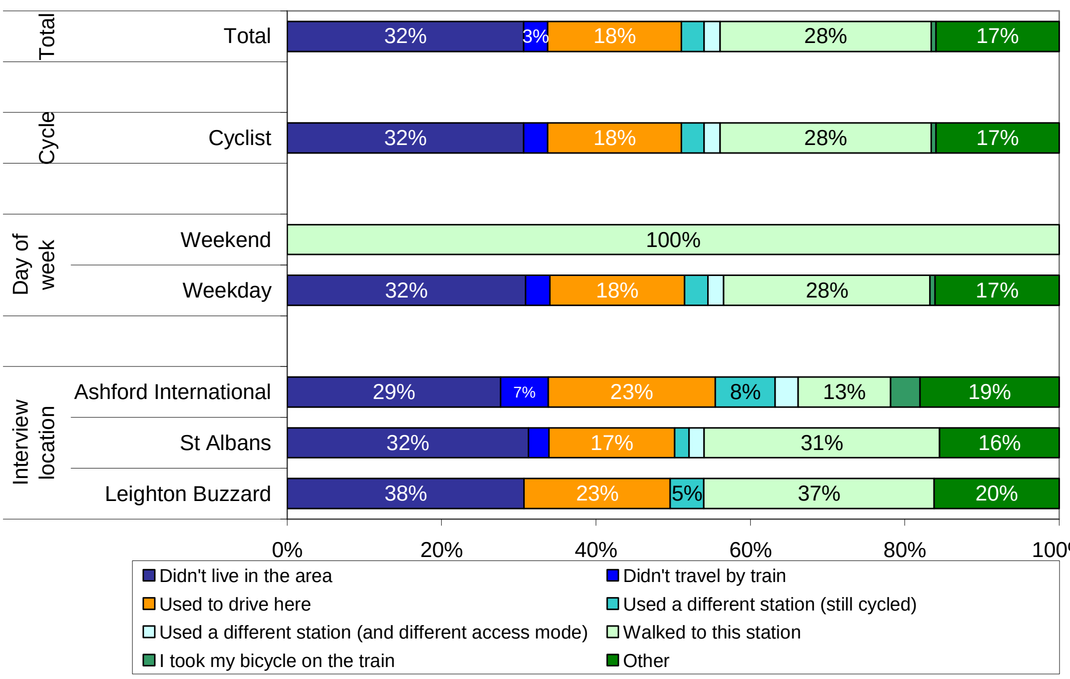
4.39 Of those that were using the cycle parking facilities, around half had been doing so for less than 2 years and half for more than two years. In total, 17% had started using them within the last 6 months as shown in Figure 4.5.

FIGURE 4.5 LENGTH OF TIME BEEN USING CYCLE PARKING FACILITIES



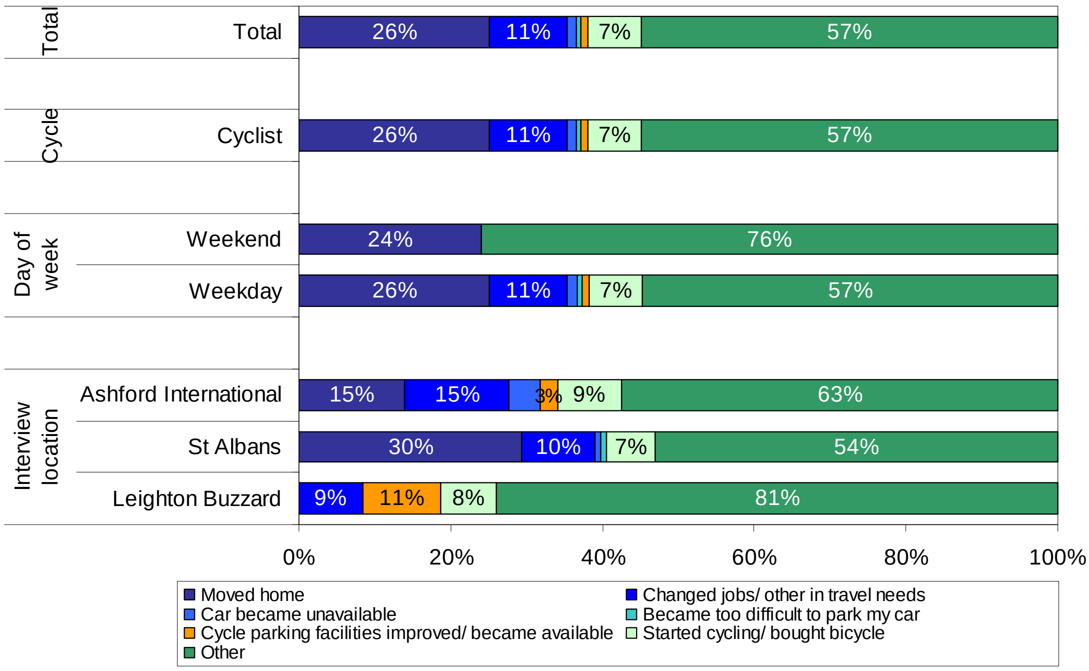
4.40 In terms of what cyclists did before they started parking their bike at the station, 18% used to drive while 28% used to walk as shown in Figure 4.6.

FIGURE 4.6 WHAT DID PREVIOUSLY



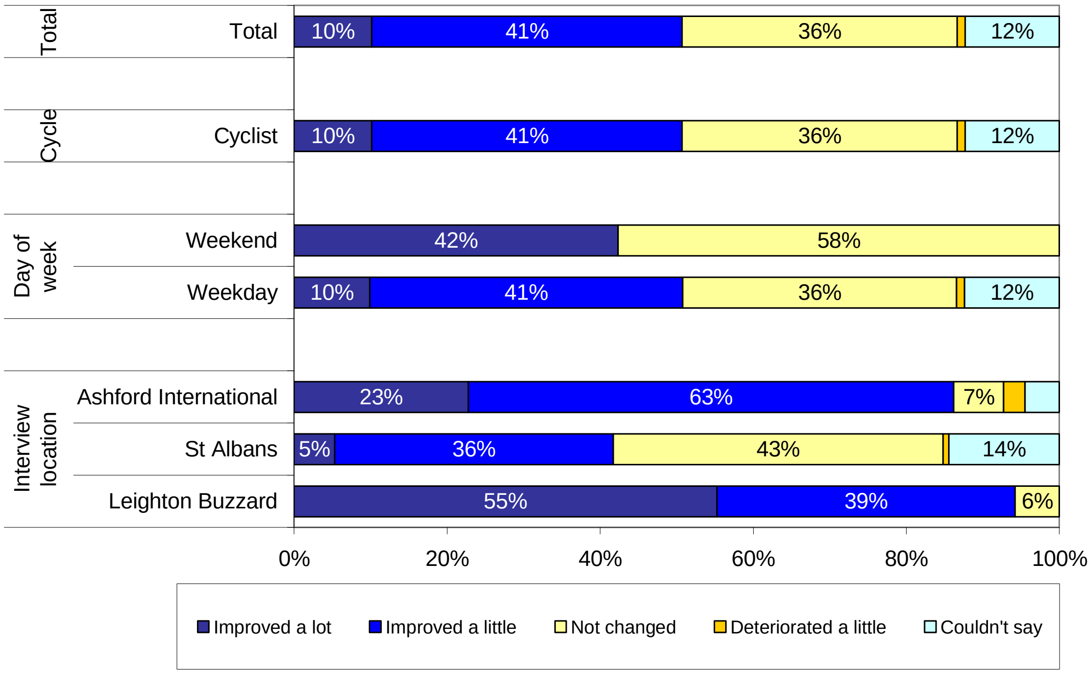
4.41 The main reason stated for starting to cycle to the station was 'other' which included it being cheaper, for health reasons, speed and convenience. Moving home was the next most frequently stated reason. Very few mentioned improved cycle facilities, although a larger proportion did so at Leighton Buzzard than at the other two stations. This potentially supports the notion that improved provision at Leighton Buzzard enabled the relief of a capacity constraint, which may have put off potential users previously.

FIGURE 4.7 WHY DID YOU START CYCLING TO THIS STATION?



4.42 Amongst cyclists there was quite widespread recognition of the improvements to the cycle parking facilities, though this did vary between the three stations and was noticeably lower at St Albans, as illustrated in Figure 4.8.

FIGURE 4.8 HAVE THE CYCLE PARKING FACILITIES CHANGED OVER THE LAST FEW MONTHS?



Summary of Key Findings – Application for Study

4.43 The key findings of the surveys are:

- The existing market for cycle facilities at the survey stations is dominated by the week-day, commuting, market (91% of cyclists at the three stations were commuters).
- A large number of cyclists have started cycling relatively recently – 35% in the last year and 17% in the last 6 months. Not much of this demand can be directly attributable to cycle improvements – only a negligible proportion overall (but 11% in Leighton Buzzard) specifically cited cycle improvements as the reason for them starting to cycle.
- Among new cyclists, a significant proportion had changed their access mode -18% used to drive and 28% used to walk to the station. This supports the case the availability of cycle facilities can cause modal shift (though we cannot deduce the marginal impact of improvements on modal shares).
- The high proportion of recent cyclists cannot be used to infer the overall increase in cycle usage before and after implementation of cycle facilities (as the surveys will not have 'captured' those that previously cycled but no longer do so – the overall increase being the net of the two).
- Cycle respondents had a positive perception of the cycle improvements at surveyed stations (86% at Ashford thought facilities had improved, and 94% in Leighton Buzzard), which suggests a high degree of awareness of the scheme, and also that the improved provision will yield benefits to users (there is a gain in utility from using the improved facilities). The surveys cannot, however, directly provide a monetary 'value' for that improvement.

Implications for Study

4.44 The implications for the study are:

- There is clear evidence that existing cycle users recognise and implicitly place a value on cycle improvements.
- There is evidence that there have been a large number of new cyclists in the last year, but we cannot attribute this increase to the improved facilities. In particular, the absence of an audit of the 'before' usage, means we cannot estimate the 'demand uplift' from the improvement.
- The high rate of churn, evidenced both by the high number of recent cycle users, suggests that the presence of improved facilities could be a key factor that people will take into account in deciding whether to cycle to the station.
- The surveys, by definition, focus on existing users of the station, and there is a potential market for cycle access / rail users who could be attracted through improved awareness and marketing of cycle facilities.

5 Cycle Demand Forecasting Model

Purpose of Model

5.1 The aim of the model is to provide an indicative forecast for the ***potential*** demand for cycle parking at every station in England outside of London. That is, the usage of cycle parking facilities that could be expected given sufficient availability of cycle parking spaces.

5.2 The concept behind this is that the information can be used to inform choices about which stations to prioritise for investment in cycle parking, and how much cycle parking it is appropriate to provide. Ultimately, by comparing estimated usage with actual usage (derived from our model) an indication of which stations are 'under-performing' and 'over-performing' can be calculated. This provides some insights as to whether any under-performance is due to a lack of suitable high quality at station cycle parking.

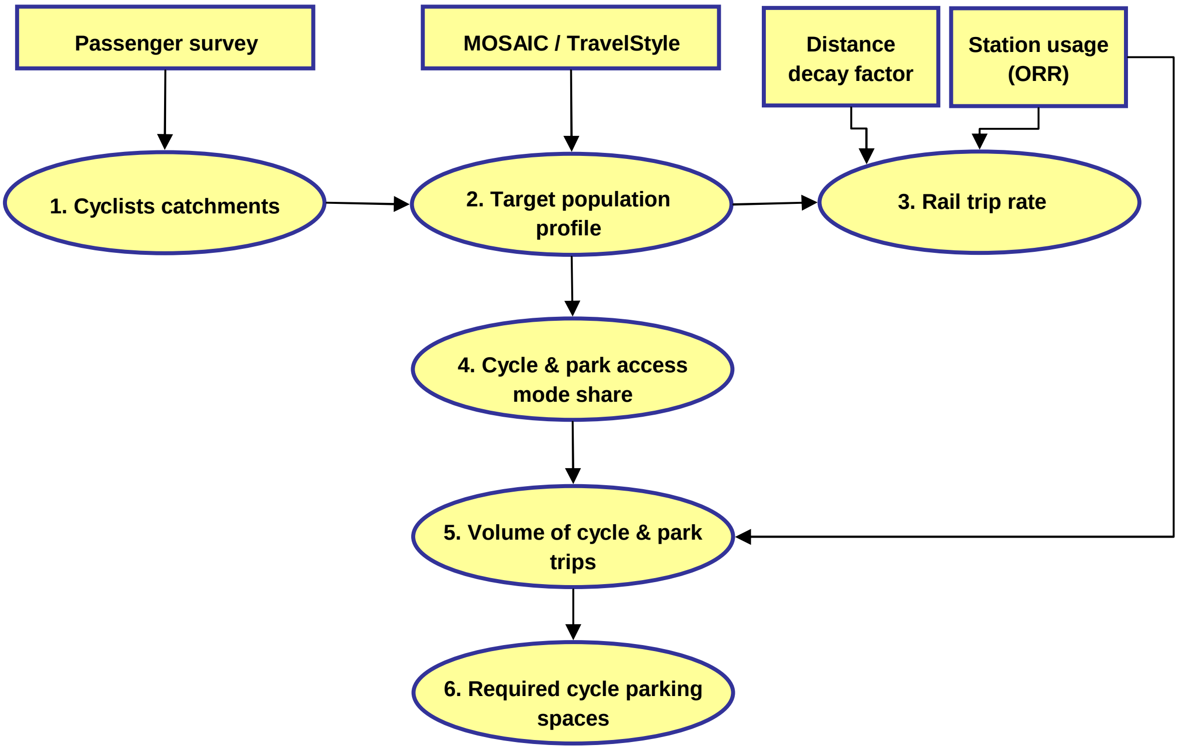
5.3 It should be appreciated that the model is designed to provide a quick 'first-cut' estimate, and that it does not take into account any station-specific factors that may influence cycle usage, other than the nature and distribution of the station's catchment population. It is hoped that as more 'revealed preference' data becomes available on actual cycle parking behaviour the model can be fine-tuned to produce increasingly precise forecasts.

Model Development

5.4 The model development was based on the following steps:

- Define the cyclists' catchment areas for each station;
- Analyse catchment populations;
- Calculate rail trip rates;
- Calculate potential cycle mode shares;
- Estimate annual volume of cycle trips; and
- Convert cycle trips to cycle parking spaces.

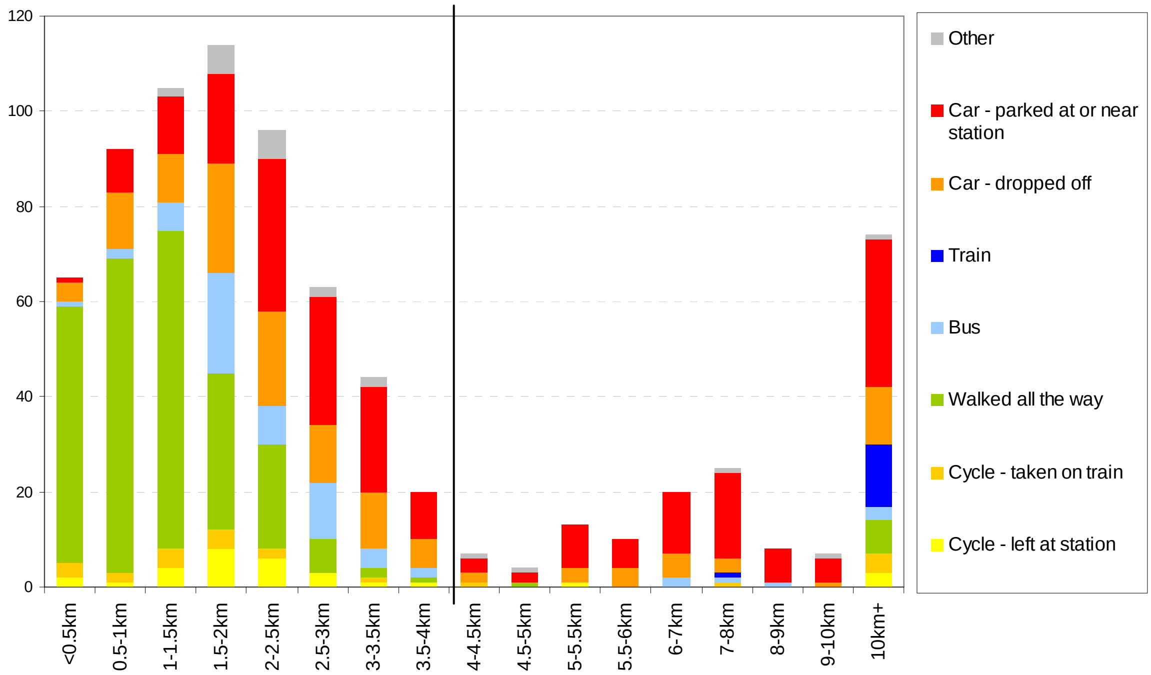
5.5 The steps are outlined in the flow chart below:



Cyclist catchments

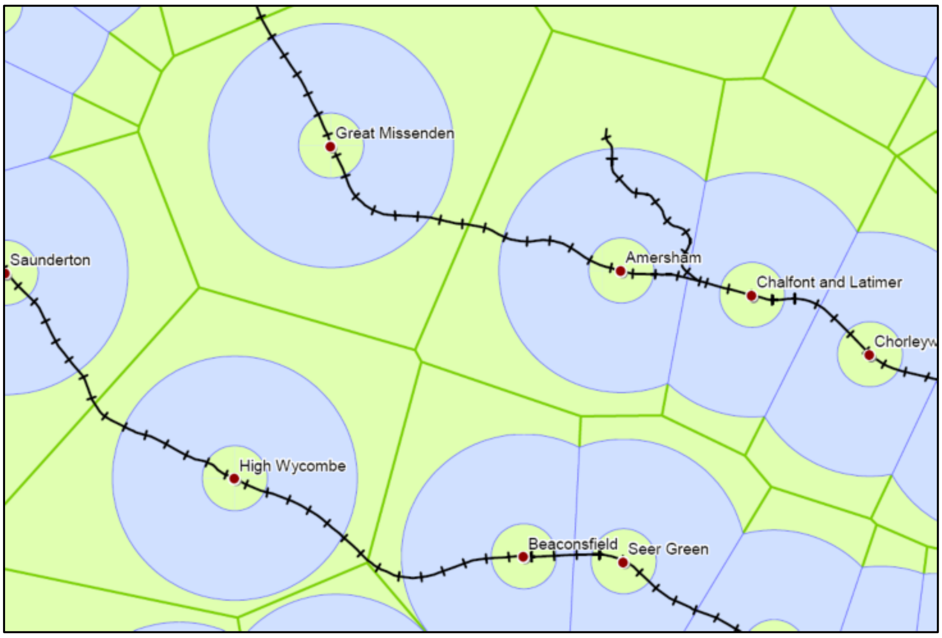
5.6 The first step was to establish the cyclists' catchment area for each station from where the majority of cyclists would be expected to cycle to the station. The parameters for defining the cyclists' catchment area were obtained from the station surveys conducted at St Albans, Ashford International and Leighton Buzzard stations. These surveys revealed that the great majority (76%) of cyclists travel to the station (and park) from between 1 and 4 km, as seen in Figure 5.1. Figure 5.1 also illustrates the disadvantage of taking a larger catchment area, namely that cycling then becomes a very small proportion of access journeys.

FIGURE 5.1 VOLUMES OF PASSENGERS SURVEYED BY MAIN MODE AND DISTANCE TRAVELLED TO STATION (STATION SURVEYS, ALL STATIONS COMBINED)



5.7 On the basis of this analysis we created a series of cyclist catchments for each station in England (excluding London). People living under 1km from a station are assumed not to cycle to the station. People living from 1km to 4km from the station are defined as within the cyclist catchment. People living more than 4km from the station are assumed not to cycle to the station. These ‘doughnut shaped’ cyclists’ catchment areas were created for every station in England using MapInfo GIS software. Where two or more stations were in close proximity to one another (i.e. less than 8km apart), the catchments were divided to ensure that they did not overlap and potential cyclists were not double-counted. This is illustrated in Figure 5.2 which follows.

FIGURE 5.2 EXAMPLE OF NON-OVERLAPPING CYCLISTS' STATION CATCHMENTS



Catchment populations

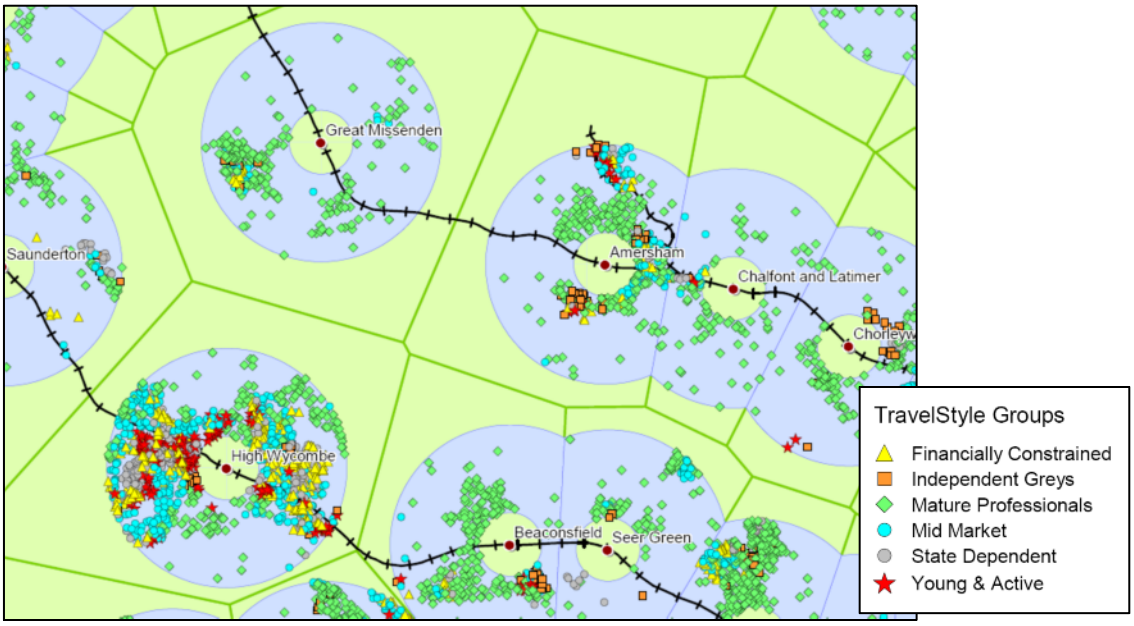
5.8 The next step was to derive the population within these station catchments for each station. The source for this population data was postcode level population data for 2007 provided by Experian.

5.9 As well as providing a total population within each station cyclists' catchment, the population was broken down by TravelStyle segment. TravelStyle is Steer Davies Gleave's geodemographic profiling tool based on travel behaviour data and Experian's MOSAIC. TravelStyle allows postcodes to be allocated to one of six segments based on their demographic, lifestyle and travel behaviour characteristics (particularly in connection with rail travel). A summary of the six segments is provided in Figure 5.3 below, while Figure 5.4 shows a plot of these segments along with some cyclists' catchment areas (in this map, each symbol represents a Postcode – roughly 15 addresses).

FIGURE 5.3 TRAVELSTYLE PROFILES

	Key characteristics (compared to general population)	Rail travel	Bus travel
Mature Professionals	Above average purchasing power and car ownership. Less children at home.	Very high	Very low
Young & Active	Mid-range purchasing power, lower car ownership and fewer children at home.	High	High
Mid Market	Mid-range purchasing power, higher car ownership and more children at home.	Medium	Low
Financial Constrained	Lower than average purchasing power and car ownership, more children at home.	Low	Medium
Independent Greys	Mid-range purchasing power, lower car ownership and fewer children at home.	Medium	Very high
State Dependent	Lower than average purchasing power and car ownership. Children at home reflects general population.	Very low	High

FIGURE 5.4 EXAMPLE OF POSTCODE DATA WITHIN STATION CATCHMENTS BY TRAVELSTYLE GROUP



Rail trip rates

5.10 The initial task here was to estimate the total number of rail trips generated by the population within each cyclist catchment area. To do this, we first calculated the average number of rail trips for each person in the total station catchment (the green areas in the map examples). The total number of annual rail trips from each station (data from the Office of Rail Regulation) was then divided by the total station catchment population to give an average number of rail trips for each person in the total station catchment (the station's rail trip rate).

5.11 This trip rate then needed to be adjusted to reflect the trip rate from those people living within the cyclists catchment (1-4km from the station). Two factors were used to adjust this trip rate: the distance from the station, and the population profile.

5.12 In terms of distance from the station, we know from analysis of rail passenger data that the closer people live to a station the more likely they are to travel by rail. We have developed in previous research a 'distance decay' function, where we can calculate based on proximity to the station the propensity to use rail. Using this data we can adjust our cyclist catchment population to reflect the fact that those living within this catchment will tend to use rail more than those living outside this catchment, but less than those living within the inner ring (less than 1km away).

5.13 For the population adjustment we used our TravelStyle tool which identifies different propensities to use rail amongst different types of people (TravelStyle segments). Thus, this process has the effect of increasing the trip rate where the population has a high proportion of key rail traveller segments, or decreasing it if the population has a below average propensity to use rail. For example, for St Albans the weight applied was 1.2, compared with 0.9 for Ashford International. This reflects the dominance of Mature Professionals and Mid Market segments in the St Albans catchment, but also the presence of significant numbers of State Dependent and Financially Constrained in the Ashford International catchment.

5.14 Having weighted the cyclist catchment population by the ‘distance decay’ function and TravelStyle rail propensity we multiply this population by the average rail trip rate for the station to calculate an estimate of total annual rail trips made by the cyclist catchment population.

Cycle mode shares

5.15 A proportion of all journeys to stations will be made by cycle (and park). From the at-station surveys the cycle mode share for a station with ‘unconstrained’ cycle parking (i.e. cycle parking that is not fully utilised, as is the case at the three survey stations) has been calculated, based on the weekday data.

5.16 Each survey respondent was also allocated to one of the TravelStyle population segments using their home Postcode. This enables us to calculate the cycle mode share for each TravelStyle segment across the survey stations. This then enables us to estimate the cycle mode share for each station taking into account the different mixes of people in each station catchment area, and their differing propensities to cycle and park. The differences in cycle mode share by TravelStyle group can be seen in the table below. Note that since this is cycle and park mode share, it does not reflect the propensity to travel by rail (see Figure 5.3), nor, indeed the propensity to cycle and take the bicycle on the train (which is concentrated on the Mid Market and Mature Professionals segments).

TravelStyle segment	Cycle & park mode share
Financially Constrained	6%
Independent Greys	9%
Mature Professionals	6%
Mid Market	3%
State Dependent	7%
Young & Active	5%
Total	5%

Cycle trips

5.17 The different TravelStyle based cycle mode shares were then applied to the number of rail trips estimated to originate from the cyclists’ catchment areas. This gives an estimate of the annual numbers of cycle and park trips to each station, per year, on an average (non holiday period) weekday, and given the availability of sufficient cycle parking.

Cycle parking

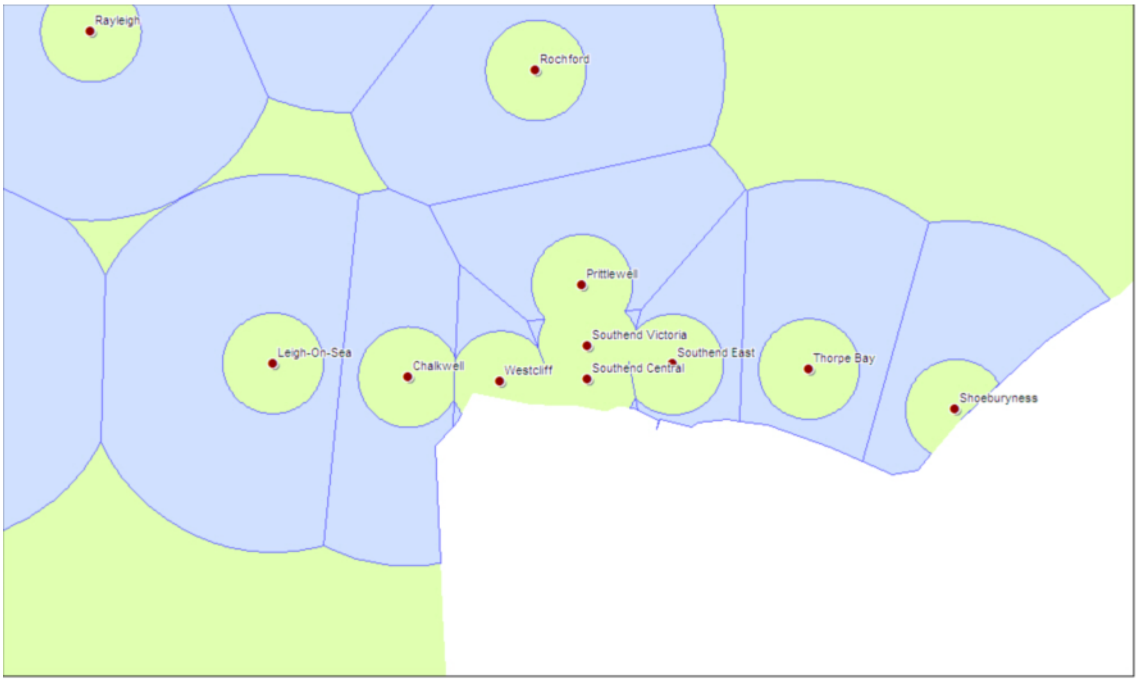
5.18 To calculate the number of cycle spaces required we have divided the annual number of estimated cycle trips to derive a daily number of cycle spaces required. We have used the number of 250 for this calculation, to reflect a working day in a non-holiday period. This is based on the survey finding concerning very low levels of usage at the weekend.

Model limitations

5.19 There are a couple of key limitations of the model, the first being stations which are in close proximity to each other. Stations which are within 1km of another station will have severely reduced catchment areas. The example shows Southend Central and Southend Victoria, in close proximity to other local stations. In this example it can be seen that Southend Victoria has other stations around it which are within 2km, leaving no significant population living within the 1-4km cycle catchment of the station.

5.20 This reflects a simplification within the model which treats all stations as equal. More accurate results would require a more sophisticated local model which prioritises stations and reflects station choices. This is usually done by using Generalised Journey Time data as an indicator of the quality of services from a station.

FIGURE 5.5 CATCHMENTS AROUND SOUTHEND



5.21 The second limitation is regarding stations which experience large volumes of trips which are not made by the local population. This is includes “hub” stations such as Birmingham New Street which have significant interchange trips and trips as a destination. For both these types of trips, cycle parking will largely be irrelevant, so ideally base usage data would be limited to use of the station by local people.

5.22 To limit the impact of this, a ceiling to the trip rate (60 rail trips per person per year) has been applied to stations based on the levels seen across stations known to be primarily serving the local population.

Model Outputs and validation

5.23 An example of the model’s outputs is provided in the table below. This shows information concerning 28 stations involved in the Station Travel Plan pilot project. This includes the model’s estimates of potential cycle & park mode share and number of cycle parking spaces this implies. It also shows the current cycle mode share as obtained from the Station Travel Plan (STP) monitoring survey, along with the number of cycle parking spaces this implies are currently used.

5.24 Taking the figures for the current spaces used from the spaces needed (if all potential demand is satisfied) then gives an estimate of the unmet potential, or additional number of spaces that would be required to satisfy the demand. Where the "unmet potential" is negative (St Denys, for example) it implies that this potential is already being met and even exceeded. This could reflect imprecision in some of the data (including actual usage levels), some mis-allocation of demand between nearby stations (the model is based on a much simplified mechanism for this which does not take account of the relative service levels at neighbouring stations), or conservatism in the forecasts.

FIGURE 5.6 EXAMPLE MODEL OUTPUTS

Station	Entries pa (ORR)	Potential cycle share	Spaces needed	Current share (STP)	Current spaces used	Unmet potential (spaces)
Leeds	9039907	1%	450	1%	240	**210**
Colchester	2255234	3%	310	2%	190	**120**
Darlington	1049840	1%	60	0%	0	**60**
Stoke-on-Trent	848139	2%	70	1%	30	**40**
Durham	935616	1%	50	0%	10	**40**
Derby	1501128	3%	180	3%	150	**30**
Leamington Spa	702468	2%	50	1%	20	**30**
Hebden Bridge	216937	2%	20	0%	0	20
Kings Norton	241775	2%	20	0%	0	20
Truro	465414	2%	30	1%	20	10
Hazel Grove	196350	2%	20	1%	0	20
Hatfield	879268	3%	100	3%	90	10
Chapeltown	93093	2%	10	0%	0	10
Accrington	127436	1%	-	0%	0	-
Middlesbrough	658580	2%	70	2%	60	10
Ashford International	1416533	3%	160	3%	160	-
Digby and Sowton	125299	2%	10	3%	10	-
St Denys	103769	3%	10	5%	20	-10
St Albans City	3142112	3%	410	3%	420	-10
Bristol Parkway	950479	2%	80	2%	90	-10
Milton Keynes Central	2339425	3%	290	3%	310	-20
Leighton Buzzard	721012	2%	70	3%	80	-10
Thornaby	226651	2%	20	4%	40	-20
Chandlers Ford	104938	4%	20	10%	40	-20
St Albans Abbey	113489	2%	10	8%	40	-30
Loughborough	682431	2%	50	3%	90	-40
Eastleigh	684837	2%	60	4%	110	-50
Romsey	197757	2%	20	11%	90	-70

Note: outputs from the model have been rounded to the nearest 10 spaces

5.25 Looking at the three survey locations, at St Albans there are around 400 users a day (on a weekday, based on cycle parking occupancy counts), while there are 456 spaces available. The model is estimating weekday demand of 410 spaces, which are within 3% of actual demand.

5.26 For Ashford International both the model predictions and the actual usage are considerably lower than currently provided for (148 used and 160 predicted spaces required compared with 352 provided).

5.27 In the case of Leighton Buzzard the model forecasts somewhat higher demand than is actually witnessed (70 spaces estimated versus 50 used), both of these being below the current parking provision (110 spaces).

5.28 A common factor to all three stations is therefore the over-provision of cycle parking. However, it is important to recognise that it is possible that the potential demand has not yet been fully captured because of low awareness of the facilities amongst those not already using the station. Our understanding is that there has been very little (if any) pro-active marketing of the cycling facilities aimed at the potential rail travellers living within the catchment population. Without such marketing it can be expected to take a considerable amount of time for the local population to become aware of the facilities.

5.29 Note that one piece of evidence in support of the theory that awareness is a constraint on usage is from the at-station surveys which showed that comparatively few cyclists had started using the station parking facilities in the last few years. This implies that the effects of improving the facilities may not yet have worked its way through to encouraging local people to use the station and travel there by bicycle. This would require the existence of “suppressed demand” for rail travel with potential users put off by the difficulty of accessing the station, but there is evidence from elsewhere that this can be the case (for example, work undertaken in connection with the East Anglia Route Utilisation Strategy).

FIGURE 5.7 VALIDATION OF MODEL OUTPUTS

Station	Entries pa (ORR)	Potential cycle share	Spaces to satisfy potential	Current share	Spaces currently available	Implied shortfall of spaces	Cycle parking occupancy	Current spaces used	Unmet potential (spaces)
Leighton Buzzard	721012	2%	70	2%	110	- 40	45%	49	**21**
Ashford International	1416533	3%	160	3%	352	- 192	42%	148	12
St Albans City	3142112	3%	410	3%	456	- 46	88%	399	11

5.30 Figure 5.8 illustrates further outputs from the model in terms of the number of stations predicted to have differing levels of potential demand for cycle parking. For example, there are 744 stations where there is virtually no requirement for cycle parking, while at the other extreme there are 36 (shown in Figure 5.9) with potential demand for over 200 spaces.

FIGURE 5.8 DISTRIBUTION OF ESTIMATES OF CYCLE PARKING POTENTIAL

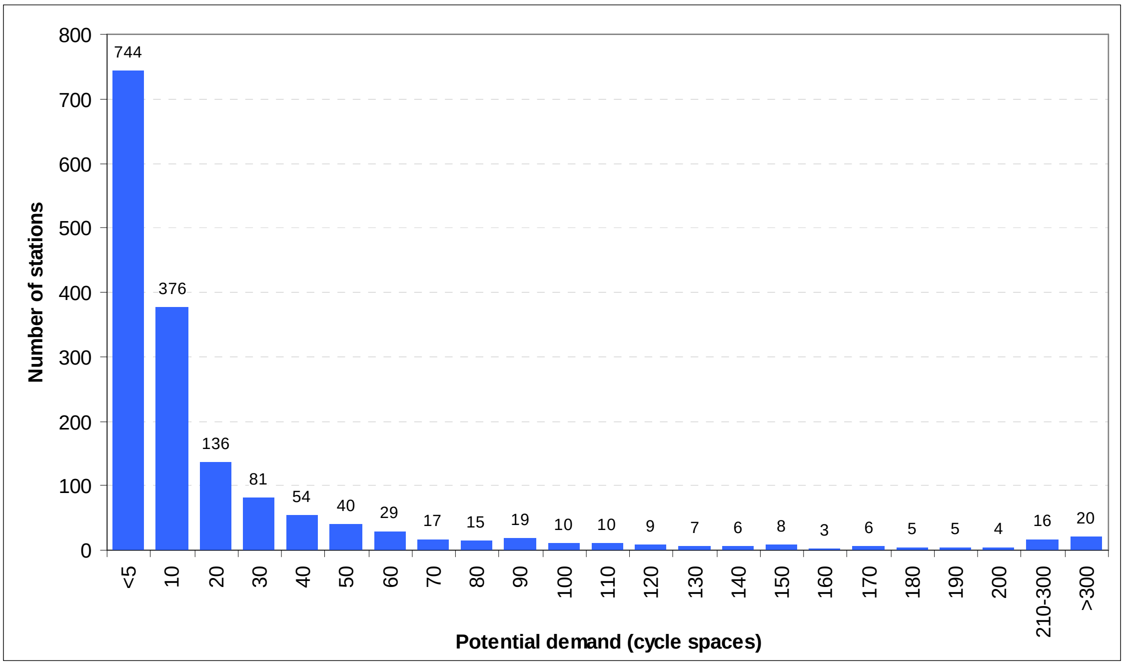


FIGURE 5.9 STATIONS WITH POTENTIAL DEMAND IF 200+ SPACES

Reading	Woking	Haywards Heath
Leeds	York	Slough
Nottingham	Colchester	Newcastle
Cambridge	Guildford	Stevenage
Chelmsford	Milton Keynes Central	Tunbridge Wells
Brighton	Oxford	Basingstoke
St Albans City	Bath Spa	Leicester
Sheffield	Maidenhead	Harpenden
Winchester		

5.31 Figure 5.10 shows the relationship between the scale of demand for cycle parking and station category. For example, Very Small stations, not surprisingly, tend to have very little or no requirement for cycle parking, whereas medium and large mixed use, and medium commuter are quite likely to have demand in excess of 50 spaces. Large commuter stations have demand almost exclusively for over 100 cycle parking spaces.

FIGURE 5.10 DEMAND FOR POTENTIAL CYCLING BY STATION CATEGORY

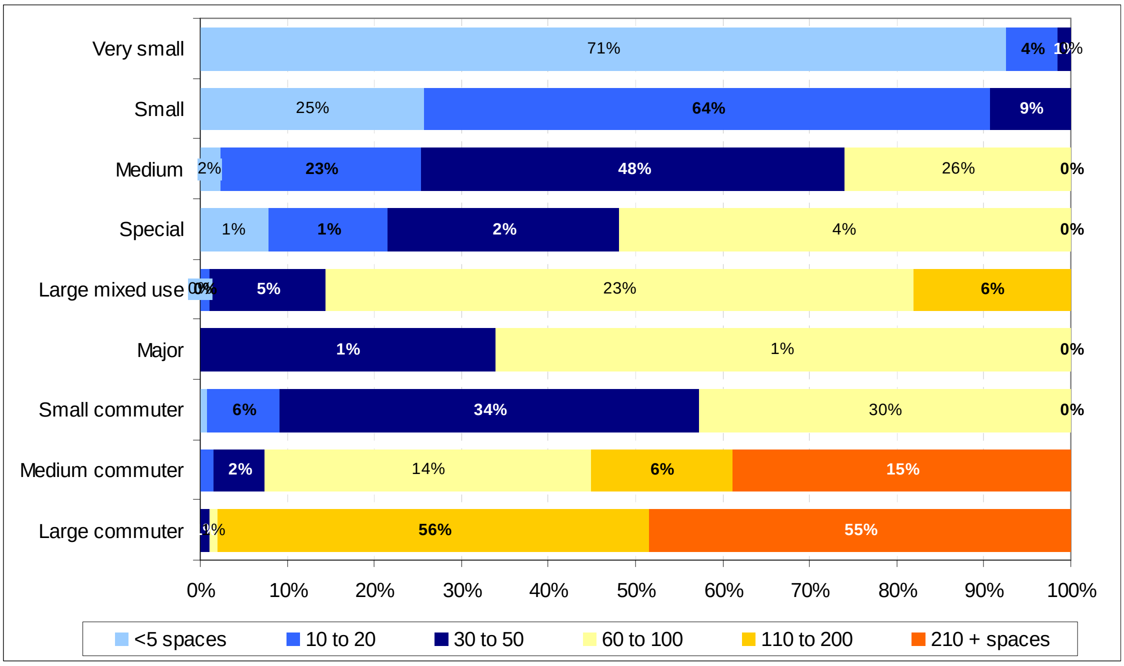


FIGURE 5.11 STATION CATEGORY DEFINITIONS

Class	Total throughput	Minimum non-seasons throughput	Minimum Seasons proportion
Major station	n/a	over 5m	n/a
Large mixed use station	n/a	over 1m	n/a
Large commuter station	over 2m	n/a	over 50%
Medium commuter station	over 1m	n/a	over 40%
Small commuter station	over 50k	n/a	over 40%
Medium station	over 250k	n/a	n/a
Small station	over 50k	n/a	n/a
Very small station	less than 50k	n/a	n/a
Special	n/a	n/a	n/a

Overall evaluation

5.32 The Cycle Demand Forecasting Tool has been successful in providing plausible estimates for the potential for cycle and ride at stations across England (with the ability to do the same for Wales and Scotland). The estimates are designed to be a 'first cut' and they fulfil this function, while there still is room for further refinement and validation.

5.33 The model estimates for each of the three stations surveyed are within 21 spaces of the actual usage. For the 28 stations modelled with a Station Travel Plan:

- 17 of the estimates are within +/- 20 spaces of the actual usage;

- 7 stations are estimated to have more potential by at least 20 spaces than is currently provided: this could either be because of suppressed demand, or over-estimation by the model; and
- 4 stations are estimated to have less demand (by more than 20 spaces) than currently achieved. Of particular note are Romsey and Eastleigh which could be worth further investigation.

5.34 There are some limitations to note, all of which are capable of being addressed with further work / more data:

- The effect of awareness of cycle parking facilities amongst potential rail travellers is not quantified, and lack of awareness could be leading to systematic under-estimation of potential demand if the three survey stations used to calibrate the model are affected. We believe this is possible, given that there does not appear to have been effective communication concerning the cycle parking facilities with non-station users living within the station catchment areas;
- where there are stations within 1 km of each other, manual intervention is required to divide the population between them (this has not been done at this stage, but could be by giving priority to stations with better rail services);
- the model is based on demand generated by the local population, so currently works much less well for stations which are primarily used as a destination rather than an origin; and
- the TravelStyle tool appears reasonably effective as a way of accounting for demographic differences but was primarily designed to account for rail and car travel behaviour – it would be possible (and beneficial) to identify sub-segments which are more or less likely to cycle & ride (and to take a bicycle on the train).

5.35 The suggested overall approach to further development and application of the model is to adopt a process of continual improvement. Crucially, this should include using data from actual experience of, for example, implementing Station Travel Plans. The result of such a process would be a model which is sufficiently robust for the planning and funding of cycle parking facilities, which could include specification of minimum cycle parking provision within franchise commitments.

6 Developing an Economic Model Framework

6.1 A central element of the study was to create an economic appraisal framework that could be used to support the development of business cases for investment in cycle facilities at rail stations.

Overview of Model

6.2 The spreadsheet based model has been developed such that it provides a core structure based on Department for Transport webTAG guidance, around which cycle investment business cases can be constructed.

6.3 The model therefore has 'standard' elements (e.g. economic appraisal parameters and economic performance metrics) that are common to all economic appraisals, and then 'scheme specific' elements that will vary on a case by case basis (e.g. scheme cost, demand, opening date etc.).

6.4 These 'standard' elements have been developed to be fully consistent with current webTAG guidance. These would need to be updated periodically to reflect changes in guidance as they occur.

6.5 The research into the behavioural responses to the introduction of cycle investment (literature review and at-station surveys) has been used to inform the benefit forecasting elements of the model, such as in developing a 'typical' demand uplift that could be expected from a given level of improvement in facilities. The model is populated with 'default' assumptions around key areas such as demand uplift and benefit inputs. These would need to be reviewed in the context of the particular business case being developed.

Potential Uses of Model

6.6 The economic model has been developed such that it could be readily employed to support a range of different uses. For example:

- The model could employ different scales of investment. The model could, for example, be employed to assess the value of cycle investment at a single station, or could equally support an economic assessment of the case for cycle investment across a franchise, network, route or a number of individual stations. Essentially the model can be employed to reflect (or to inform) the Funding source from which the Promoter is seeking to secure investment.

- Commercial or Public Sector Funding Appraisal. Public sector funding is based on the full range of welfare impacts of a scheme (including externality benefits such as reduced emissions and congestion), and this forms the basis for the development of the economic model. The model has also, however, been specified so that it can also look at the case for cycle investment from a purely commercial perspective (e.g. it would be beneficial for a TOC to implement facilities where additional revenue generated was in excess of the costs). The model could also be used to help inform a potential funding mix for investment e.g. where additional revenues to the TOC covered some of the scheme costs, but where there remained a 'funding gap' that the public sector could meet in order to realise to scheme benefits.

Key Benefits of Improved Cycle Provision

6.7 There are a number of potential economic benefits from improved cycle provision. In broad terms these accrue to three sets of people; existing cyclists who gain from an improvement in the quality of provision; new cyclists who are attracted to cycle and who gain a benefit from doing so; and non-users – those who are indirectly affected as a result of 'externality' impacts stemming from a change in transport demand and network costs. These potential benefits are set out in Table 6.1.

TABLE 6.1 POTENTIAL ECONOMIC BENEFITS FROM AT STATION CYCLE IMPROVEMENTS

User group	Description	Example impacts of cycle schemes
Existing cyclists	People who already cycled to the station who either utilised existing (old) facilities or used off station facilities (e.g. securing bicycle to fences).	*Quality improvements* will flow to cyclists from improved features such as heightened security. *Time savings* are unlikely to be significant unless routes are upgraded. *User charge impacts* will be relevant if a charge is to be levied for use of cycle facilities.
New cyclists	New passengers arriving by bicycle and those switching to cycle from another mode as a result of new facilities. New users only get half of the benefit experienced by existing users. The 'rule of half' is based on the assumption that new users' willingness to pay is equal to that of the average existing user.	*Absenteeism benefits* would accrue to employers (through reduced sick days), as research shows that regular cyclists have fewer days absent. *Health benefits* – regular exercise reduces the overall risk of serious illness and mortality, which in turn reduces the associated costs to the economy in terms of health care costs and lost productivity. *Transfer revenue (access mode)* – if people cycle rather than take the bus, the impact on revenue should be considered as part of overall assessment, both in terms of behavioural perspective (people choose to cycle and maybe pay to park, rather than pay for the bus), and economic perspective (where revenue loss to bus operators may be a consideration).
Non-Users	Non-users are those who do not change their behaviour directly as a result of the scheme (excluding existing cyclists who	*Benefits from a reduction in car trips either to the station or all the way to one's end destination*. The latter will occur where spare

	do not change their behaviour), but who are nevertheless affected in some way as additional people cycling/using rail have 'second order' impacts on the transport network	capacity on other access mode (e.g. bus and car) is created when new users switching to cycling enable more people to access the station (new passengers). The benefits from reduced car trips include reduced accident and emissions costs. *Crowding impacts* will occur if cycle provision leads to a net increase in rail passengers which creates crowding dis-benefits for existing rail travellers.

Description of Model

6.8 The economic model is underpinned by two sets of assumptions and estimates. The first set of assumptions and estimates will be specific to the project and station. These inputs need to be developed and are the responsibility of the person(s) developing the business case. The model includes some 'default' assumptions that are based on best evidence, professional experience and judgement.

6.9 The second set of assumptions is 'standard' values used in the monetary appraisal of transport schemes. These are largely taken from webTAG, the Department for Transport's guidance on scheme appraisal.

6.10 Each is described, in turn, below.

Project Specific Inputs and Assumptions

6.11 The project specific assumptions include a number of different areas and are outlined below:

Project Timing

6.12 The economic appraisal is undertaken over 30-years from the year of opening[5]. The economic model therefore requires the following inputs

- Scheme Opening Year; and
- Construction Start / End Year – in order to profile the costs.

Demand inputs

6.13 The demand inputs used by the model are:

- Existing cycle usage (one-way trips per annum e.g. station entries)

[5] WebTAG is not prescriptive on the selection of the appraisal period for walking and cycling schemes. Major infrastructure projects are appraised over 60-years. We have selected a shorter appraisal period as the asset life is likely to be shorter, and we have also included allowance for ongoing renewal costs within the economic model. The selection of a 30-year appraisal period will give lower overall benefits, and a lower BCR, as compared to being appraised over a longer period.

- An assumed / forecast demand uplift from improvement, with secondary assumptions on
  - The modal transfer to cycle (the default being that transfer reflects existing mode share)
  - The proportion that is assumed to be wholly 'new' generated trips.

Mode Transfer Assumptions

6.14 Assumptions on mode transfer are important as the broader societal externality benefits depend on the mode from which people are abstracted. Essentially, transfer from car provides more 'externality' benefits than transfer from other modes.

6.15 Table 6.2 illustrates the impact that a scheme may have on the demand inputs for the model. The table illustrates the way in which an increase in demand for cycling impacts the mode share of, for example, car demand. A core component of the benefits which are derived from the scheme come not from cyclists, but rather from the car trips which are avoided.

TABLE 6.2 DEMAND INPUTS – MODAL TRANSFER (BASIC EXAMPLE)

	Do Minimum	Do Min mode share	Do Something	DS mode share	Comment
Rail Trips (station entries)	100		100		Overall trips remain constant – only access mode changes
Access mode:					
Car	35	35%	31	31%	Car users stop driving and begin cycling after improvements
Bus	20	20%	19	19%	Some bus users will switch to cycle
Walk	25	25%	21	21%	People who previously walked to station will switch to cycle
Cycle	20	20%	29	29%	Increase in cycling (net increase equivalent to net loss of other access modes)

6.16 The demand inputs for the model are the full annual entries to the station as well as the full annual station access by mode. Only station entries are used for the analysis as the station parking can only provide a benefit on one leg of the journey. Therefore to ensure that benefits are not double counted only journey to the station are analysed within the economic model.

6.17 Only station entries are used because the benefit for the use of the cycle facilities is only gained once per return trip. With regard to ticket sales revenue the assumption on revenue so that of a return trip and therefore, again, there is no need to adjust from station entries to return trips. Similarly, throughout the model appropriate assumptions are made to adjust for the data used to estimate the benefits from the scheme.

6.18 Generated / induced demand (additional trips using rail as a result of cycle improvements) can also be input into the model. Again, the rate of generated demand will be affected by the scale of quality improvement provided (where the attractiveness of the cycle access journey encourages more travel) and /or by a capacity constraint (where suppressed demand is induced back onto the network).

6.19 The way which these demand figures change with the scheme drives many of the benefit calculations in the economic model. The approaches to forecasting the demand uplift are discussed in Chapter 4.

Cycle Scheme Provision Input

6.20 In many cases cycle improvements will be incremental to existing provision, so that with the scheme there is a mixture of 'old' and 'new' facilities. The 'quality' benefits of the scheme are clearly 'capped' by the number of people who are able to use the improved facilities.

Cycle benefits / values

6.21 The benefits of cycling are derived from the utility which users derive from new and / or improved facilities. Utility is a term, generally used by economists and social scientists, to quantify the benefit which a person receives from an activity. Utility values are generally stated in monetary terms and are therefore easily applied to an economic model. The full benefit can then be monetised.

6.22 According to webTAG a user of secure cycle parking facilities receives £0.66 of benefit per use and users of changing and shower facilities receive £0.14 of benefit per use. The benefits cited according to webTAG are presented in Table 6.3.

6.23 The applicability of these values in the context of station cycle parking is discussed later in this report.

TABLE 6.3 WEBTAG JOURNEY AMBIENCE BENEFITS

Scheme Type	Value	Source
Off-road segregated cycle track	4.73p/min	Hopkinson & Wardman (1996)
On-road segregated cycle lane	2.01p/min	Hopkinson & Wardman (1996)

On-road non-segregated cycle lane	2p/min	Wardman et al (1997)
Wider lane	1.22p/min	Hopkinson & Wardman (1996)
Shared bus lane	0.52p/min	Hopkinson & Wardman (1996)
Secure cycle parking facilities	66p per use	Wardman et al (2005)
Changing and shower facilities	14p per use	Wardman et al (2005)

Costs inputs

6.24 The project costs are project specific and are not standard within the economic model. The project costs (capital, operation and renewal) are entered and then automatically discounted to the appraisal price base of 2002 using a discount rate of 2.5%.

6.25 The costs are discounted to 2002 price levels to ensure they are consistent and comparable with the benefits. The values for the benefits stated on webTAG are generally in a 2002 price base.

6.26 Once discounted to the standard base year costs are then inflated by real cost growth to the year in which they occur. Capital costs are spread evenly over the year(s) of construction. The operating costs occur annually. Renewal costs occur at an interval specified in a bespoke manner. All costs grow in real terms through the life of the appraisal at rates noted below.

Economic Appraisal Parameters and Assumptions

Values of Time and Growth in VoT

6.27 The values of time employed within the model are the market values reported in webTAG with a 2002 price base. The values used are:

TABLE 6.4 VALUES OF TIME

Working Person	£26.73 per hour
Commuting	£5.04 per hour
Other	£4.46 per hour

6.28 The values of time which are given in 2002 values are then grown at a rate consistent with forecast GDP growth per person over time to derive the VoT in any given year during the life of the appraisal. The forecast levels of GDP growth follow trend GDP of approximately 2.5 per cent per annum. These growth figures are sourced from webTAG.

Discount Rate

6.29 The discount rate applied to all benefits calculated in the appraisal is 3.50% per annum for the first 30 years and 3.00% thereafter. A discount rate of 2.5% is applied to costs to rebase them into 2002 prices for consistency.

Absenteeism Assumptions

6.30 Absenteeism benefits are calculated based on the reduction in working days taken off as sick. The number of hours per day is assumed to be 7.5. The number of hours per days is used with the market price value of time for a working day (based on £26.73 per hour) to determine the value of a day's work. In line with webTAG guidance we have applied a saving of 0.4 day salary per additional cyclist per year. No assumptions are made regarding journey purpose as the model is based on commuter journeys.

Demand Growth Assumptions

6.31 Growth in demand of access modes is assumed to be the same demand growth of rail and therefore we do not assume any endogenous changes in mode splits. We do not forecast or assume any change in access mode shares outside of the initial impact of the cycle infrastructure improvements. This means that we have assumed all access mode demand to grow at the same rate as overall rail demand. We have assumed this growth rate to be 2% per annum as a default assumption.

Real Cost Growth Assumptions

6.32 Within the economic model costs are assumed to grow at real rates, that is, rates which account for inflation. The default assumptions employed in the model are that all costs (capital expenditure, operating and renewal costs) increase at a real growth rate of 1% (e.g. 1% after taking out inflation).

Externality Benefits

Carbon

6.33 Standard webTAG values have been used for calculating the value of carbon emissions avoided as a result of mode shift away from cars. The assumptions employed include the shadow price of carbon, average emissions per litre of fuel burned, the vehicle fleet split between petrol and diesel as well as standard calculations of fuel consumed based on distance and speed driven. The changes in carbon emissions are only for car and do not take account of any changes in emissions which may result form busses.

Accidents

6.34 Accident reduction rates per kilometre driven are taken from the Design Manual for Roads and Bridges. The rates stated in the DMRB give a monetary cost of accidents per million car kilometres based on national averages. The rates are not assumed to change, but with reduced car kilometres as a result of mode shift there will be fewer accidents. The cost per million car kilometres of accidents is then assumed to be avoided for car kilometres avoided as a result of the scheme. The accident costs avoided as a result of the reduced car kilometres is then presented as the benefit from a reduction in car accidents.

Congestion

6.35 Decongestion benefits also result from the removal of cars from the road. The benefit depends on the existing level of congestion as the benefit is only marginal. The removal of a car on an extremely congested road will yield a greater benefit than the removal of a car from an uncongested road. The level of congestion is not a standard assumption in the model. We have included some options for valuing congestion benefits associated with the removal of a vehicle kilometre. These are outlined below in Table 6.5.

TABLE 6.5 DECONGESTION BENEFIT

Level of Congestion	Value of Benefit – per vehicle km removed (2002 prices)
Low	£0.00
Medium	£0.07
High	£0.14

6.36 Where more detailed localised congestion rates can be calculated (e.g. from a highway network model) the above ‘default’ values van be over-written.

6.37 Changes in bus revenue are also calculated in the economic model. Users who switch modes from bus to cycle will cause a loss of revenue to bus operators, creating a dis-benefit. For the purpose of calculating the change in bus revenue an average yield of £0.75 per trip has been assumed within the economic model.

Health Benefits

6.38 Health benefits are based on the increase in physical activity which results from users taking up cycling. The economic model employs standard economic assumptions in this regard based on webTAG guidance. The method applied for estimating health benefits only takes into consideration those users who are new to physical activity – walkers who switch to cycling as a result of the scheme are not given a health benefit. The monetary value of the health benefits derived from a user becoming more physically active using this methodology is consistent with the range of values per transfer kilometre presented in a case study example as part of the NATA refresh documentation.[6]

[6] NATA Refresh: Appraisal for a Sustainable Transport System, Department for Transport, April 2009. Cycling example presented on page 34 cites health benefit in range of 26 to 40 pence per transfer kilometre.

Economic Model Outputs

Economic Model Outputs

6.39 The outputs of the model take the form of a benefit to cost ratio and net present value for the public sector. The costs and benefits are treated according to the webTAG guidance and produce a public sector BCR.

6.40 The private sector accounts look only at the costs incurred by the TOC. The period over which this is examined can either be over the course of the remaining franchise life (i.e. whether it is commercially viable within an existing franchise), or over a longer period (e.g. where the Government would look to recoup the financial benefit over more than one franchise period, but would need to subsidise the initial investment). Within the model the franchise period (in number of years) is defined by the user. Should one want to assess the impact of a scheme over more than one franchise period this can be done to help with a public sector funding case.

6.41 A similar approach is also applied to revenue impacts on car parking as well as ticket sales. The values are then discounted at the commercial discount rate and the net present value of the scheme to the TOC is presented.

Transport Economic Efficiency, Public Accounts and Analysis of Monetised Costs and Benefits

6.42 WebTAG economic appraisal guidance requires economic appraisals to be presented in the form of three related tables: the Transport Economic Efficiency, Public Accounts and Analysis of Monetised Costs and Benefits. The purpose of the tables is to show not just the overall economic impact of a scheme (or investment), but also to show the distributional impacts in terms of ‘modes’ and economic actors: consumers (people not travelling on business), businesses (business travellers), transport providers (operators) etc. The public accounts look at the implications on public expenditure in terms of investment costs, operating costs and any subsidy requirements, split by Central and Local Government.

6.43 The precise construction of the TEE table may vary for different schemes (as, for example, different funding assumptions may apply), but the general format of the Table is very helpful is showing how the various impacts of cycle investment affect different users.

6.44 The economic model produces a Transport Economic Efficiency Table. The TEE table shows the allocation of both costs and benefits in monetised terms and allows for the calculation of a benefit to cost ratio. A basic example of a TEE, the Public Accounts and the Analysis of Monetised Costs and Benefits are presented below in Figure 6.1, Figure 6.2 and Figure 6.3, respectively.

FIGURE 6.1 ECONOMIC EFFICIENCY OF THE TRANSPORT SYSTEM

Consumers	**ALL MODES**		**ROAD**		**Bus & Coach**	**RAIL**	
User benefits	**TOTAL**		**Private Cars and LGVs**		**Passengers**	Cycle access	Other
Travel time	£2,000		£2,000				
Quality / Ambience Benefit	£27,000					£27,000	
Vehicle operating costs	£0						
User charges	£16,000					£16,000	
During Construction & Maintenance	£0						
NET CONSUMER BENEFITS	£45,000	*-1*	£2,000		£0	£43,000	£0
Business						**RAIL**	
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	Cycle access	Other
Travel time	£4,500					£4,500	
Vehicle operating costs	£0						
User charges	£0						
During Construction & Maintenance	£0						
Subtotal	£4,500	*-2*	£0	£0	£0	£4,500	£0
Private sector provider impacts						Cycle access	Car Park Revenue
Revenue	£6,000				-£3,000	£22,000	-£13,000
Operating costs	-£4,000					-£4,000	
Investment costs	-£10,000					-£10,000	
Grant/subsidy	£10,000					£10,000	
Subtotal	£2,000	*-3*			-£3,000	£18,000	-£13,000
Other business impacts							
Developer contributions	£0	*-4*					
NET BUSINESS IMPACT	£6,500	*(5) = (2) + (3) + (4)*					
TOTAL							
Present Value of Transport Economic Efficiency Benefits	£51,500	*(6) = (1) + (5)*					

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2002 prices and values

6.45 Figure 6.1 shows illustrative benefits from and costs of the scheme in the do-something scenario. In this case the costs and benefits are fictitious, but the table illustrates where the key benefits for cycle investment will accrue.

6.46 The TEE table is designed to show how economic benefits are distributed by categories of benefit (journey time, ambiance, health), and the mode affected (rail, bus, car), and by the public or private sector organisation (e.g. a TOC, or Government) that are affected financially by the intervention.

6.47 In particular, the table shows not just benefits, but also transfers of expenditure / impact that are neutral in net terms (i.e. that cancel out) but represent a gain to one economic actor and a corresponding loss to another. The table can therefore show 'winners' and 'losers', as well as the net overall impact of a scheme.

6.48 Therefore, in the illustrative example presented:

- Captured in Figure 6.1 is £27,000 of quality improvements. This benefit represents the benefit which all cyclists realise over the life of the improvement. The quality improvement is monetised using values from webTAG which are discussed in more detail in the Discussion chapter.

- The revenue impact from additional cycle users represents a transfer in economic terms. In this case new users benefit by no longer paying parking charges / bus fares (which total £16,000), but this is equivalent to the 'loss' experienced by the car park operators (-£13,000) and the bus operator (-£3,000). Clearly, the loss in parking revenue is critical for the commercial case but in economic terms represents a transfer.

- Scheme costs are represented under private sector provider impacts – in this case the investment cost of £10,000 is incurred by the provider (i.e. TOC), but is funded through a subsidy from Government in the cell below. The cost to Government is shown in the Public Accounts Table (Figure 6.2).

6.49 Figure 6.1also captures the important transfers which occur as a result of the hypothetical scheme. The transfers come from fares or fees which users no longer have to pay. For example, when a driver changes to cycling they no longer have to pay charges to park their car. While the transfer is a loss to the TOC it is a gain to the former driver. In the public sector case the transfers do not have a net impact on the case.

6.50 Additional benefits as well as costs are also noted in Figure 6.1 including:

- Travel time benefits;
- Absenteeism;
- Revenue implications;
- Operating costs;
- Investment costs; and
- Government subsidy.
  - The revenue implications refer to the change in ticket sales revenue net of car park charges and bus revenue. Operating costs include both renewal and yearly maintenance. Investment costs are the upfront capital required to build the improvements and the government is assumed to fund this.

FIGURE 6.2 PUBLIC ACCOUNTS

Local Government Funding	ALL MODES TOTAL		ROAD Infrastructure	Bus and Coach	RAIL	Other
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*-7*	0			
Central Government Funding						
Revenue	0					
Operating costs	0					
Investment Costs	10,000				£10,000	
Developer and Other Contributions	-					
Grant/Subsidy Payments	-					
Indirect Tax Revenues	-					
NET IMPACT	20,000	*-8*	0 0	0 0 10000	10000 0	0 0
TOTAL Present Value of Costs (PVC)	20,000	*(9) = (7) + (8)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values, in 2002 prices and values

6.51 Figure 6.2 shows the cost to government of the scheme – the cost of the grant or subsidy. The cost outlined in Figure 6.2 is not the cost to the TOC or to bus operators, but only to government which is used to calculate the BCR.

FIGURE 6.3 ANALYSIS OF MONETISED COSTS AND BENEFITS

Noise		
Local Air Quality		
Greenhouse Gases	£2,300	
Journey Ambience		
Health	£6,000	
Accidents	£2,000	
Consumer Users		
Business Users and Providers		
Reliability		
Option Values		
Present Value of Benefits (see notes) (PVB)	£61,800.00	
Public Accounts	£10,000	
Present Value of Costs (see notes) (PVC)	£10,000	
Overall Impacts		
Net Present Value (NPV)	£51,800	*NPV=PVB-PVC*
Benefit to Cost Ratio (BCR)	6	*BCR=PVB/PVC*

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

6.52 The overall impact of the scheme is summarised in the Analysis of Monetised Costs and Benefits (AMCB) Table.

6.53 Figure 6.3 brings together the costs and benefits from the tables shown in Figure 6.1 and Figure 6.2. The analysis of monetised costs and benefits sets out important externalities which are not captured in the first table. Importantly the reduction in greenhouse gas emissions, health benefits and the reduction in accidents are included. The benefits added here result not directly from the scheme, but rather from changes in behaviour and the resultant benefit derived by society from these changes.

6.54 For example, driving produces greenhouse gases. These gases cause harm to the environment and there is an economic cost associated with that harm. The cost of the harm, however, is not fully captured in the cost of the fuel for which the driver must pay. This negative externality is offset when a driver begins to cycle and the emissions are avoided. The benefit of this is captured in this example at a value of £2,300.

6.55 The additional externality benefits in Figure 6.3 are added to the net present value of the benefits of the scheme from Figure 6.1 resulting in a total benefit of £61,800.

The present value costs of £10,000 are then taken from the impact on the public accounts in Figure 6.2 and used to calculate the BCR, which in this example is 6:1.

7 Economic Model – Station Scenarios

Model Scenarios

7.1 In order to demonstrate the functioning of the model, we have applied it to three case study scenarios. The three illustrative scenarios are based on data obtained during the survey of St. Albans station.

7.2 The assumptions used in the case study are:

- New facilities — 100 new cycle parking spaces
- Capital cost — £20,000
- Operating Cost — £1,000 p.a.
- Base demand — 100,000 cycle parking events p.a. (about 400 per day)
- Benefit per trip — 10p (capped at 100 users daily – circa 25% of demand)
- Decongestion — benefit of 7p per vehicle kilometre removed.

7.3 The assumptions we have made for this scenario are based on information which we collected during the literature review. The costs are estimated based on what we have collected with regard to cost for indoor cycle parking and are not specific to any particular scheme, but rather are for illustrative purposes.

7.4 The benefit per cycle parking event of 10p is a conservative estimate and is significantly lower than those cited on webTAG. When applying the model to a scheme the benefit from the cycle facilities should be calculated on a scheme specific basis. Further, the benefit is only applied to users who are able to use the new facilities rather than all users. Given that approximately 400 cyclists access the station per day in this scenario and only 100 will be able to use the new facilities the benefits are capped at around 25% of demand.

7.5 These scheme specific assumptions have been applied to three different scenarios to illustrate the impacts on the funding cases. The three cases are:

- Scenario 1 – No additional demand – all benefits accrue to existing cyclists.
- Scenario 2 – 10% new cycle parking demand (all transfer from other access modes – walking, car and bus). This implies an increase of around 40 cycle parkers per day, but all of whom were already travelling by train.
- Scenario 3 – 10% new demand, of plus 10% of which generated. This also implies an increase of 40 cycle parking trips per day, but assumes that 4 of these are associated with new trips to rail.

7.6 In scenario 2 and 3 the do minimum demand is assumed to be approximately 90,000 per annum – a 10% uplift based on the additional capacity and quality then achieves the ‘current’ level of approximately 100,000.

7.7 These scenarios show how ostensibly the same scheme can produce a different overall case depending upon the context in which it is implemented. The results from these scenarios are presented in Table 7.1.

TABLE 7.1 EXAMPLE CASE STUDIES - ST. ALBANS (ILLUSTRATIVE)[7]

	Scenario 1	Scenario 2	Scenario 3
Costs			
Capital	£18,039	£18,039	£18,039
Operating	£23,195	£23,195	£23,195
Non-Monetary Benefits			
Ambience	£50,184	£47,903	£47,903
De-congestion	£0	£17,363	£17,363
Absenteeism	£0	£110,936	£110,936
Carbon Emissions	£0	£1,314	£1,314
Accidents	£0	£5,652	£5,652
Health	£0	£156,810	£156,810
TOC Benefits (£)			
Car Park Revenue	£0	-£181,599	-£181,599
Fare Revenue	£0	£0	£365,158
User Charge	£0	-£181,599	-£181,599
Public Sector BCR	C 1.5 : 1	C 17 : 1	C 39 : 1
Public Sector NPV	£8,950	£298,744	£693,902

7.8 Under scenario 1 there is a positive economic case with 'ambience' benefits accruing to existing users of the station cycle facilities. The case is sensitive to the assumption of 10p per trip of benefit from the improved cycle facilities, however. The case has no revenue impact on the TOC.

7.9 Under the second scenario there are a number of different impacts. The 'ambience' benefit to existing users is similar to Scenario 1[8]. The main difference is that modal transfer from, in particular, car underpins a reduction in negative 'externalities' (less congestion, fewer accidents, less emissions), plus the addition

[7] All sums are net present value over 30 years.

[8] The only difference is the result of the Rule of a Half being applied to 'new' cycle parking trips (this is an economic appraisal convention that means the benefit to new trips is half that to existing users).

of new cyclists also leads to benefits in the form of health and absenteeism. The economic case under this illustrative scenario is therefore strong. However, while the economic case is strong, there is a clear negative impact on the TOC with a large loss of car park revenue as users switch access mode to cycling (with no counter-balancing increase in fare revenue, as under this scenario only the access mode is assumed to change, not the net number of rail trips).

7.10 In scenario 3 the addition of cycle users who are wholly new to rail generates new revenue for the TOC as they purchase rail tickets. The new TOC revenue, in this scenario, offsets the loss from car park revenue and generates a healthy surplus for the TOC. Under this scenario the scheme would produce a positive NPV for the TOC even without a subsidy. There are no other differences from scenario 2 as the only change is the addition of new passengers who previously did not use rail and now cycle to the station. Therefore there are no additional impacts on top of scenario 2 outside of ticket sales revenue.

Conclusions

7.11 In each of these illustrative scenarios there is a public sector funding case. In some instances, however, the commercial case will not match a robust public sector case. An instance of this will be demonstrated and analysed in the following chapter.

7.12 An important note, however, is the impact that variations in demand can have on the same scheme. In essence, any additional cycle parking trips that result from a change in access mode from car have the potential to generate substantial economic benefits, but paradoxically could also result in a loss of parking revenue to the TOC, and hence a poor commercial case. Where wholly new trips take place (i.e. new to rail overall), the scheme has the potential for additional fare revenue to offset any loss in parking revenue.

7.13 It should be noted that these examples are illustrative, and the results for any particular scheme will be sensitive to assumed levels of benefit, new cycle demand and parking charge / fare assumptions.

7.14 The examples do, however, suggest that comparatively small shifts in cycle demand have the potential to deliver a very good public sector case, while the commercial case is dependent upon the balance between any 'loss' in car parking revenue and the potential 'gain' in TOC fare revenue.

7.15 Another key influence on the economic and commercial case is whether either cycle parking or car parking is at capacity. In particular, where the car park is at capacity it is likely there will be limited if any loss to the TOC from mode shift away from car. This scenario is further explored in the following chapter.

8 Discussion

8.1 This section summarises the key issues that need to be understood in order to develop a business case for cycle investment. These primarily revolve around the need to produce estimates of demand and benefits which are inputs to the economic model, but also around some of the issues surrounding potential trade-offs between the commercial and public sector case for investment.

8.2 This study has provided a robust and compliant economic model that enables an economic assessment to be prepared based on a given set of inputs (costs, demand and benefits). It also provides valuable further insight into perceptions of cycle facilities.

8.3 However, a number of uncertainties remain both at a general (non-station specific) level, and at a station specific level. Further understanding of these issues / local context is required in order to further develop our understanding of economic justification for cycle investment generally, and that should be borne in mind when developing the case for a specific scheme. These are discussed below.

The Scale of Benefits

8.4 A key determinant of the overall benefits of the scheme is the 'value' of improvements to cycle users. The majority of scheme benefits will be made up of the number of existing users multiplied by the benefit per trip.

Evidence within webTAG

8.5 The economic model reflects the guidance published by DfT to value the benefits of improved cycle infrastructure.

8.6 The guidance on webTAG provides a large scale and range of benefits per trip, but based on a large degree of improvement in facilities. Based on webTAG guidance, indoor cycle facilities generate a benefit of 66 pence per trip and shower facilities generate a benefit of 14 pence per trip. The benefits are not specific to facilities at stations, where different attributes might be important to users compared to, say, on-street parking.

Nature of Existing Facilities and Measuring Utility

8.7 The benefits users derive from cycle facilities at rail stations depends on the type of facility. Rarely would a station have only one type of facility. Further, when improvements are implemented it would be unlikely that all of the old facilities would be removed. The result may be that some cyclists use older outdoor parking while some users use new indoor parking.

Application of Benefit

8.8 The model works on the basis that the new facilities represent an improvement over the existing facilities, and hence users will derive a benefit from this. Nevertheless, the benefits from improved facilities do not accrue to all cyclists. Only cyclists who are able to use the improved facilities will receive a benefit.

8.9 Within the economic model the benefits are capped in such a way which ensures only users of the new facilities receive a benefit. The scale of this benefit is 'capped' at the level of the new provision (e.g. 30 new spaces = a maximum of 30 people can benefit), and is not applied to all station cycle users.

Scale of Benefit

8.10 While assessing which facilities users are deriving a benefit from is difficult so too is assessing the level of benefit which would be derived from a facility. The webTAG guidance provides some information on the quality of provision, but makes only very crude distinctions in terms of 'quality uplift' – ranging from a benefit for provision of facilities (compared to none), and a value associated with the provision of shower facilities. No 'attribute' values are available for other aspects of 'quality' (e.g. type of rack, whether covered or uncovered), security, location (e.g. station forecourt compared to a more peripheral site) or availability, and the values are generic rather than relating to station parking facilities per se.

8.11 These differences are clearly very location specific, and it is beyond the scope of the model to 'capture' these impacts in a systematic way. These are areas that need to be considered when developing a business case for a specific scheme. While we have not attempted to capture the way in which changes in cycle facility quality should be monetised, what we have done as part of this study is to identify the potentially differing magnitude of these impacts through the station scenarios presented in Chapter 7.

Recommended Approach

8.12 Only in a few examples (e.g. going from no provision to outdoor provision, or wholly outdoor to wholly indoor provision) does webTAG provide a definitive value (although the value itself is acknowledged to be uncertain and based on limited research).

8.13 In our view, the nature of the schemes at stations we surveyed is not consistent with the definition of attributes valued within webTAG, and therefore provided little basis upon which to estimate the benefit per user. It is, however, clear that there is a benefit to users where improved and/ or expanded facilities are put in place. The issue is that the overall case is highly sensitive to the value determined for of this benefit. The range which is suggested in webTAG, results in a large allocation of benefits to users of improved cycle facilities. The scale of the benefit is difficult to capture and it is recommended that the scale of benefit from improved facilities is based on a scheme specific analysis of the improvement and monetised benefits from that improvement.

8.14 There is no easy answer to this issue, but possible approaches going forward could be:

- To undertake stated preference research into this area.
- To gain better understanding of the demand impact of improvements, so the implied perceived benefit can be estimated (as the demand change should be broadly related to the improvement in quality).
- To monitor research in this area, to supplement our understanding of the benefits of different attributes of cycle improvements.

8.15 In developing a business case, we advise that a prudent approach be adopted to estimate the scale of quality benefits, and that sensitivity tests are undertaken to understand how robust the case is to these assumptions.

Demand Impacts

8.16 The impact of a change in cycle facilities on demand remains an area of uncertainty. The literature review provided some evidence that demand could increase in the range of 3-26%, but the reasons behind the increase are not clear.

8.17 The surveys conducted as a part of this study indicated that some 33% of the respondents had begun to cycle within the past year and this demonstrates a very dynamic market (if not incontrovertible evidence of growth, in that we lack information concerning those who may have stopped cycling). Despite the seemingly large move towards cycling, very few interviewees indicated that they began to cycle as a result of the improved provision. This is not surprising: the decision to cycle to the station will be a complex one and, whilst good parking infrastructure may be a factor (an essential ingredient, even), it is unlikely to be critical. The inconclusive nature of our findings regarding reasons for starting to cycle prevents us from arriving at firm inferences concerning the impact new infrastructure has on cycling demand. A more extensive programme of "before and after" surveys, complemented by a control sample, may enable this quantity to be gauged accurately.

8.18 The scale of the change in demand plays an important role, particularly in the commercial case, where changes in demand have a direct bearing on the revenues from fares and parking.

8.19 The Study has identified several potential alternative approaches to forecasting the change in demand.

Incremental Demand Uplift

8.20 This method is suggested as a potential approach in DfT Cycling guidance. This method essentially comprises:

- Taking existing cycle demand as the 'base demand'.
- Using benchmarking to apply 'uplift' rates (e.g. that improvements are likely to generate a 20% increase in cycle demand) based on evidence from elsewhere for corresponding facilities.
- Secondary assumptions would then need to be made about the modal shift of new cycle users, and of those that are 'generated' (i.e. wholly new to rail).

8.21 A key benefit of this method is that it uses observed demand (existing usage) as the basis for the forecasts. The key issue, however, is that the evidence for a 'typical' demand uplift is limited owing to the need for comparability.

Utility Based Approach

8.22 This approach is also reported in DfT guidance. The premise here is that the demand for facilities is a function of the value (utility) which people attach to different qualities. The driver of the demand change is therefore the change in their utility (for a given improvement in provision as outlined above).

8.23 The utility approach is, at present, limited by the problem of identifying which facilities users actually gain a benefit from and gradations of quality within a particular type of facility as defined by webTAG (described earlier in this section).

8.24 A second variable is the degree of cycle demand that remains unmet. The unmet demand is measured using two inputs. The first input is the total potential demand which is an estimate from the cycle demand estimation tool. The second input is current observed demand. These two inputs are used to calculate the potential increase in cycle demand.

8.25 The greater the potential demand that remains untapped, the greater the demand uplift will be from the improvement. Simply put, if there are two stations, one with 5% cycle demand as a portion of the maximum demand and one with 90% and they implement the same improvement the one with a lower rate of cycling is likely to see a larger increase in cycle demand.

8.26 The benefits of this approach are:

- That there is internal consistency between the demand and benefit forecasting, whereby the scale of improvement underpinning the benefits also drives the scale of demand uplift. This is similar to 'conventional' transport modelling.
- That the Cycle Demand Forecasting Model provides an estimate of the maximum potential cycle market for any station, and therefore the scale of unmet demand can be calculated.

8.27 This method is, in conceptual terms, the most attractive due to the internal consistency between demand and benefits. However, the uncertainty around the scale of quality improvement outlined earlier in this section, means that use of this method for station cycle parking should not be applied as the sole basis for forecasting demand.

Cycle Demand Forecasting Model

8.28 The cycle demand forecasting model provides an estimate of potential cycle demand at English Rail Stations (excluding London).

8.29 The model is not intended to be used for individual station forecasting for the purposes of developing a business case, as it is based on the demographic profile of station users but does not allow for station specific issues.

8.30 However, it does provide a useful supplement to, in particular, the incremental demand approach. The existing usage can be compared to the notional maximum demand (as set out in Figure 5.6) to gauge the 'gap' between the current and potential demand. This can help in justifying or sense-checking the demand uplift that should be used.

8.31 The cycle demand forecasting model is also useful in the instance where no cycle facilities exist at a station, and therefore demand cannot be estimated based on existing cycle usage.

Recommended Approach to Forecasting

8.32 We have outlined alternative approach to forecasting. No method is 'right', and all face the underlying problem that the evidence base for cycle improvements remains limited, despite the further understanding offered by this study.

8.33 However, each approach is relatively easy to implement and a combination of these approaches would provide a good overall understanding of a reasonable range of expected demand outcomes, and hence a basis for putting forward a 'central' estimate for a business case.

8.34 The uncertainties around demand forecasting should be recognised, and sensitivity testing undertaken accordingly. This was highlighted in the illustrative scenarios described in Chapter 7 in the way varying assumptions with regard to changes in demand impacted the economic case.

8.35 The forecasting of impacts also needs to take into account the context in which the scheme is being introduced, which is described in more detail below.

Forecasting Cycle Benefits – Scheme Specific Issues

8.36 It is important to understand that the provision of ostensibly the same improvement in cycle provision can have markedly different impacts depending upon the localised environment into which it is introduced. This is best understood through a couple of theoretical examples.

Example 1 - Relieving Overall Capacity Constraint

8.37 The likely impacts of implementing additional (and improved) cycle parking at a station which was 'at-capacity' in terms of both car parking and cycle parking would be to increase overall usage of car and cycle parking facilities as previously suppressed demand was attracted to use the new cycle facilities. In this instance, some of the demand is likely to be wholly new demand to the TOC which will increase ticket sales revenue while some of the demand will come from those who previously walked or took the bus to the station.

8.38 An indicative example of this is explored in Table 8.1 below:

TABLE 8.1 CAPACITY RELIEF

	Base Scheme	With Scheme
Rail Demand	100	102
Car Park Demand	80	80
Cycle Park Demand	20	22

8.39 Table 8.1 illustrates the potential impact of expanding cycle parking where both car park and cycle park facilities are currently at capacity. When at capacity it is likely there is 'suppressed demand.' This 'suppressed demand' avoids station use as a result of inability to access the station by car or cycle. When cycle parking is expanded some users will switch from car to cycle. This switch will free spaces in the car park. Those additional spaces will then be used by people who were previously unable to park at the station, but would have if there had been space available.

8.40 The ultimate result will be an increase in cycle use and no decrease in car park use. This scenario would result in a slightly less beneficial public benefit case as there would be no reduction in car trips than if some car trips had been avoided. The commercial case, however, would improve over a scenario where there was no suppressed demand as there would be no decrease in car park revenue and only an increase in rail passengers.

Example 2 - Relieving Cycle Capacity Constraint

8.41 Building on the example above, if the cycle parking was 'at capacity' whereas the station car park had spare capacity, the potential response could be quite different. An increase in cycle use would be expected, but some of this would probably come from people who formerly parked their car at the station. In this instance the revenue gain from additional fares revenue could be partially or wholly offset by any decrease in car parking revenues.

Example 3 - No Capacity Constraint

8.42 A similar position could hold where there was no capacity constraint, and any improvement in the quality of cycle provision would be likely to alter the relative attractiveness of cycle compared to other access modes, where the dominant effect could be 'modal shift' in transfer mode (rather than increased overall usage), and any transfers to cycle from car would result in a direct loss of car parking revenue.

8.43 In this example the tension between the potential 'economic' and 'commercial' case is clear. From a commercial perspective the provision of improved facilities would be unattractive (it could result in a net reduction in revenue, as lost parking revenue would exceed 'new' fares revenue). However, the scheme could be beneficial from an economic perspective, as all cycle users would benefit from improved provision, and car transfer demand would yield 'externality' benefits from decongestions, reduced accidents, emissions etc.

Example 4 – Existing Access Mode Shares and Congestion Levels

8.44 A given increase in cycle demand from a given improvement would deliver a different scale of economic benefit depending on:

- Existing Access Mode Shares – where the existing access mode share of car is greater then the expected proportion of additional cyclists who previously used car would be expected to be correspondingly higher. The benefits from someone transferring from car would be higher than someone transferring from public transport (or walking), as the 'externality' benefits would be greater.
- Existing level of congestion level. The 'value' removing a car trip from the roads will be higher where the road network is more congested, as the associated decongestion benefit from removing that trip will be greater (due to the position on the speed-flow curve). Attracting car transfers to cycle will therefore be of greater economic benefit when this is achieved in more congested areas.

Willingness to Pay

8.45 The model does not estimate revenue from or impact on demand of charging for the use of cycle facilities. The data obtained in the surveys was not sufficient to infer a relationship between demand and willingness to pay and therefore it has not been included here.

Potential for New Cycle Demand through Improved Marketing

8.46 The economic model development and research strands of this study have focused on forecasting cycle usage based on the 'existing' rail station demand.

8.47 This, however, ignores the possibility that the potential demand has not yet been fully captured because of low awareness of the facilities amongst those not already using the station. For any station, there would be a comparatively large potential local catchment that would not be aware that cycle improvements have been implemented, and therefore possibly not aware of the new or enhanced journey opportunities this provides.

8.48 Our understanding is that there has been very little (if any) pro-active marketing of a station's cycling facilities aimed at the potential rail travellers living within the station's catchment population. Without such marketing it can be expected to take a considerable amount of time for the local population to become aware of the facilities.

8.49 The potential to capture some of this market could significantly enhance the economic performance of a scheme, and in particular improve the commercial case as any capture of these trips would represent additional revenue to the TOC.

9 Conclusions

9.1 As part of this study we have developed an economic model, capable of estimating the benefits of cycle investment in a manner fully compliant with webTAG guidance. The model represents the full range of established benefits from cycle provision, including benefits to users, and wider societal benefits in the form of reduced emissions, absenteeism, congestion and health benefits. The model also forecasts the financial impacts of the intervention. Additionally, the model can separately consider the commercial case looking at TOC impacts, and employ bespoke assumptions for discount rates and the investment period (e.g. length of franchise)

9.2 We have also reviewed the evidence of the demand and benefit impacts of improved cycle provision, and undertaken primary revealed preference research to supplement our understanding of this. The evidence around both the demand ‘uplift’ and the scale of benefits remains relatively weak, and is acknowledged as such in the DfT’s webTAG guidance. The revealed preference research did, however, show high levels of awareness of cycle improvements, and also a large number of new cyclists following the introduction of new facilities, though only a small fraction of this increase reported improved cycle provision as the reason for starting to cycle.

9.3 We have set out alternative approach to the forecasting of demand and benefits and, in the absence of a solid evidence base and single accepted forecasting approach, recommend each should be considered in developing a business case for a specific scheme. The use of alternative approaches would help in understanding the potential range of expected impacts, and provide a useful sense-check on forecasts.

9.4 The cycle demand forecasting model represents a new addition to the available forecasting tools. This provides a notional maximum cycle demand based on current station usage and the socio-demographic profile of the population within the geographic catchment (1-4 km from stations) where the potential for cycling use is greatest. This can help identify the gap between current provision and potential demand, and therefore help prioritise those stations with the greatest potential benefit from improved cycle parking provision.

9.5 We have applied the economic model to 3 illustrative scenarios (based on the St. Albans survey information), using what we consider to be reasonable assumptions. These indicate, in each case, that the public sector case for investment is strong (driven by benefits to cycle users and positive externality impacts) but that the commercial case is less clear. The discussion section of the report provides a commentary on the instances in which the commercial case for investment is likely to be strong; namely where the provision of new facilities helps overcome a capacity constraint (either car parking or cycle parking), and therefore likely results in some additional rail usage and minimises revenue ‘loss’ from car parking charges foregone.

APPENDIX

A

LITERATURE REVIEW

No.	Title	Author(s)	Description	Responsibility for sourcing	Sourced	Initial Notes on Paper	Details	KEY STUDIES / POINTS	NOTES
1	Travel planning at railway stations: an examination of the potential for bike rail integration	Sherwin, H.	This paper looks at what bike rail integration has to offer and explores some of the theories of behaviour change and how these might apply to cycling. It looks at the context of travel planning and the different forms of bike rail integration that could be promoted.	SDG	Yes	Includes figures for cycling to stations nationally and survey of how cycle parking is used at Bristol Temple Meads station, such as the duration of stay of parked cycles.	2% of trips to stations are by bike (nationally). Amsterdam region, 22 stations, access mode share by bike varies from 10-45%. Bristol Temple Meads, cycle parking at capacity but many bikes are inactive i.e. they have been left there and not used on a daily basis - 184 parked bikes monitored: 49 bikes not moved in a week, 29 bikes not moved in 6 weeks.	Share of station access by bike varies widely	
2	Cycle parking facilities at Surbiton station	Accent Marketing and Research	Survey of cyclists and visitors using the station following the introduction of two types of cycle parking at the station (covered and double-deck). Objective was to find out whether the new facilities had resulted in more people cycling to the station.	SDG	Yes	Surveys undertaken among people cycling to Surbiton station following introduction of additional and improved cycle parking facilities at the station. Of some relevance to this study.	Journey length to station among cyclists 1-3 miles. 78% of cyclists interviewed at the station said they cycled to the station 5 times or more each week. Of those travelling to Surbiton station 3-4 times per week, 68% said they always do so by bicycle. 31% of cyclists interviewed said they would be unlikely to access the station by bike if the parking had not been installed. 45% said they would still be very likely to cycle to the station even without the cycle parking. 25% of respondents had only started cycling to station following introduction of cycle parking, 17% cycled to station more (but note that this is possibly impact of seasonality). Increase in cycle use the result of people transferring from walking (73%), private car as passenger (54%) or driver (43%) - note some people may have previously travelled by car or walking so the figures add to more than 100%.	Distance supports 'doughnut' assumption. Evidence for importance of facilities in capturing potential demand. 25% demand uplift following implementation.	
3	Cycling in London	Steer Davies Gleave	Review of the literature relating to all aspects of cycling in London. Short section on impact of cycle parking.	SDG	Yes	Little of relevance to the study.	3% of station users [respondents] had started to cycle to the station following introduction of new cycle parking [at Surbiton] and 22% would consider cycling.	3% demand uplift.	
4	Business Case and Evaluation of the Impacts of Cycling in London	Transport for London	Anticipated costs and benefits associated with introduction of adequate cycle facilities and promotion. Includes section on cycle parking.	SDG	Yes	Includes indicative costings for cycling parking at London stations. Based on the concept of 'cycle parking stations' i.e. secure covered parking that customers pay to use. Range of costs presented for varying standards of parking quality.	Munster, Germany - 26% of users had not cycled to station before introduction of new facilities. Cost of 5,000 new stands between £0.5m and £2m depending on whether stands are covered or not. Appendix 5 gives full range of costing options for varying scales of cycle parking stations.	26% demand uplift.	
5	Impact of New Cycling Infrastructure Schemes – Customer Feedback	Transport for London	Study to investigate whether facilities resulted in more cycling. Cyclists filled-in self completion questionnaires that were handed out at five locations across London. Small focus on parking.	SDG	Yes	Results from survey into satisfaction with new cycle parking facilities at Twickenham station.	20% of cycle parking users started cycling to station as a result of the installation of new cycle parking facilities.12% of all respondents across all survey areas indicated that they were highly unlikely to have used a bicycle if the changes had not been made [note - this is not specific to cycle parking]. 45% of users of Twickenham's new cycle parking facilities park their bicycles at the new stands at least five days a week.	20% demand uplift.	
6	Estimating Demand for New Cycle Parking Facilities in New Zealand	Land Transport New Zealand	Development of tool for estimating demand for new cycle facility (not cycle parking).	SDG	Yes	Possible little relevance to this study given focus on predicting demand on cycle lanes. Methodology could be applicable.			
7	Factors influencing the propensity to cycle to work	Wardman, M., Tight, M. and Page, M.	Development of mode choice model for journey to work with emphasis on propensity to cycle. Based on RP and SP data. What measures are most likely to result in more cycling.	SDG	Yes	Little of relevance to the study.			
8	Collection of Cycle Concepts	Denmark Road Directorate	Principles underlying infrastructure that generates cycling. Chapter on parking and approach to estimating extent of cycle parking required.	SDG	Yes	Little of relevance to the study. Guidance for implementation of physical measures.	Experience has shown that in areas of high demand (public transport terminals), fewer bicycles are parked if there are not enough spaces to meet demand. Conversley, when the capacity is expanded, more bicycles appear.		
9	Bike for the Future II	Cycling England	Funding strategy for central government to 2012.	SDG	Yes	Little relevance to study, though does include general BCR for cycling investment	The value of cycling investment has also been established by an independent economic review carried out for Cycling England, which indicates that, even on a most conservative basis, the cost/benefit ratio of cycling schemes is between 1:3 and 1:4.5, delivering results across 7 current Public Service Agreement objectives including transport, health, education and the environment.		
10	Valuing the benefits of cycling	SQW/Cycling England	Research on the positive externalities associated with cycling.	SDG	Yes	Calculation of value of adult switching from car to bike to 3.9km journey (£137 annually, resulting from reduced congestion).		Supports doughnut assumption. £137 value useful to benchmark SDG economic model.	
11	Safety in numbers: more walkers and bicyclists, safer walking and bicycling	P L Jacobsen		Nick Cavill	Yes	Examines the relationship between the numbers of people walking or bicycling and the frequency of collisions between motorists and walkers or bicyclists. There is data for UK though it is not particularly statistically robust or recent. Data from Californian and European studies is also provided.			

No.	Title	Author(s)	Description	Responsibility for sourcing	Sourced	Initial Notes on Paper	Details	KEY STUDIES / POINTS	NOTES
12		National Passenger Survey	Tracking question on mode access in spring wave.	ATOC	No	Data on passenger satisfaction with cycle facilities at station and the proportion of travellers who take bicycles on train may be of use. The client group is asked to advise whether we could access the original datasets.			
13		Passenger Focus	In-depth research to inform new south-central franchise.	ATOC	Yes	Anecdotal evidence of significant suppressed demand for cycle parking in the south east of England. Newly installed facilities are used both by existing cyclists who previously parked their bicycles informally (e.g. hand rails) and new cyclists. No comment on whether these 'new cyclists' were existing or new train passengers. We could investigate further to determine whether the assertions noted in the PF report are backed by empirical evidence. We have sourced the summaries, but not the dataset.	9% of respondents considered bicycle parking to be one of the most important facilities to have at a station (respondents could choose up to 4 categories). 2% of respondents cycle to station, with 1% parking the bicycle at the station and 1% taking it on the train. Anecdotal evidence of supply generating demand - Surrey - 'At locations such as Ashtead and Dorking, putting in new shelters...provided spaces for the same number of bicycles as were usually found across the station sites. However, within 12 months, both facilities were full and were subsequently expanded, with the new capacity being increasingly well-used ever since. Even at smaller stations with a less obvious demand for cycling, the installation of more modest facilities has usually led to the regular appearance of parked cycles where previously these were rarely seen.'	Evidence that cycle parking supply generated demand	
14		UWE/FGW	In-depth research on cycle-rail integrators.	ATOC	Yes	Motivations for bike-rail integration (time saving). Average distance cycled to station 3.7km. Research undertaken at Bristol Temple Meads. Figures for split between bike-rail for access or egress or both access and egress.	The decision to bike-rail integrate influenced by level of security of cycle parking; relative ease of taking bike on train; journey frequency; perceived safety of route to station.	Supports doughnut assumption.	
15	The access journey to the railway station and its role in passengers' satisfaction with rail travel	Givoni, M., Oxford	Research into the role of cycle facilities in customer satisfaction.	ATOC	Yes	Data for study drawn from Dutch railways passenger satisfaction surveys. Differences between stations used primarily for access and those used primarily for egress i.e. 'destination' stations need less extensive facilities for cars (and bikes). Passengers place importance on the quality of the station and its level accessibility (and quality of egress). Those who use rail relatively infrequently will be more affected by improvements in access/egress.			
16	Passenger Demand Forecasting Handbook	Passenger Demand Forecasting Council (PDFC)	Passenger Demand Forecasting Handbook	SDG	Yes	Summarises the factors that may affect rail demand and provides a review of existing studies. We are currently reviewing this document to isolate relevant studies.			
17		ARUP	Evaluation report of the Cycling Facilities at Rail Stations project carried out for the SRA.	ATOC	Yes	Little of relevance. Details process of allocating funding for cycle facilities to TOCs.			
18		Equipment Suppliers	List of facilities installed to date and views on which are most attractive to cyclists.	ATOC	No	Forthcoming from ATOC			
19		Network Rail	The National Stations Improvement Programme will include cycle improvements at various stations.	ATOC	No	Unable to source details on planned works at this stage.			
20		Station Travel Plan pilot stations	Cycle mode share for trips to / from station – passengers surveys (Oct 08). Some cycle parking occupancy data may have been collected through station site audit. Note survey method for site audits will be unique to each station. Note: The 31 participating stations may also good sites for future surveys if required.	SDG holds the passengers survey data. ATOC may be able to access cycle facilities data	Yes/No	ATOC are asked to advise whether this cycle parking occupancy data is available, particularly if any of the station travel plan pilot stations are selected as surveys sites for this initiative.			
21		Transport for London	Cycling Centre of Excellence have experience in a range of sectors. TfL Rail project currently underway to install cycle facilities at London stations – survey research is available.	ATOC	No	Forthcoming from ATOC			
22		Various – other sectors	Evidence of take-up of cycle facilities in other areas such as town centres.	ATOC	No	Forthcoming from ATOC			

No.	Title	Author(s)	Description	Responsibility for sourcing	Sourced	Initial Notes on Paper	Details	KEY STUDIES / POINTS	NOTES
23	Economic analyses of transport infrastructure and policies including health effects related to cycling and walking: A systematic review	N Cavill, S Kahlmeier, H Rutter, F Racioppi, P Oja	This paper provides a critique of economic appraisal studies with particular reference to assessments of the health impacts of transport valuations.	Nick Cavill	Yes	Could be applicable to valuation of health benefits. Further analysis on how this paper may be applied against standard DfT guidance needs to be considered.			
24	An economic analysis of environmental interventions that promote physical activity	S Beale, M Bending, P Trueman - NICE	Looks at the economic appraisal of health benefits under different methods.	Nick Cavill	Yes	Could be applicable to valuation of health benefits. Further analysis on how these benefits can be accounted for in the economic model is required.	Economic model used in research estimates a standardised cost benefit ratio of 1:11 for a cycling infrastructure intervention (this includes cycle lanes, paths and storage).	High BCR	
25	Workplace Health Promotion: How to Encourage Employees to be Physically Active	S Beale, M Bending, P Trueman - NICE	Literature review to assess the economic benefits of introducing physical activity counselling and programmes in the workplace.	Nick Cavill	Yes	Little of relevance to the study.			
26	Choosing Health in the South East: Road Transport and Health	Nick Cavill	SEPHO transport report which contains an overview of links between transport and health - including air quality	Nick Cavill	Yes	May include innovative techniques to value health benefits of cycling - including improved air quality. More consideration for application to model needed.			
27	Estimating the Economic Benefits of Bicycling and Bicycle Facilities: An Interpretive Review and Proposed Methods	Kevin J. Krizek	Suggests method for estimating the value of the economic benefits derived from bicycle facilities.	SDG	Yes	Not of particular relevance to model.			
28	Quantifying the Benefits of Non-Motorized Transport for Achieving TDM Objectives	Todd Litman (Victoria Transport Policy Institute (Canada))	Quantifies (values in Canadian dollars) for contribution of cycling to achievement of transport objective such as congestion reduction, road and parking facility cost savings, consumer cost savings, and various environmental and social benefits.	SDG	Yes	This paper may help to inform the economic model. Application could be difficult in terms of valuing exchange rates.	Survey data referenced indicates that 17% of adults would sometimes commute by bike if secure storage and changing facilities were available. (Data from 1991, US)	Mode share could reach 17% if secure storage were available	
29	Two Approaches to Valuing Some of Bicycle Facilities' Presumed Benefits	Kevin J. Krizek	Describes a stated-preference approach to measuring how much bicycle commuters value various facility characteristics, and a revealed-preference approach to measuring how much homeowners value proximity to bicycle facilities.	SDG	Yes	Not relevant to the model.			

APPENDIX

B

SURVEY QUESTIONAIRE

Leighton Buzzard ☐ St Albans City ☐ Ashford ☐

Date: ………………… Time: ………………………….

Interviewer: ……………………

At-station survey

Good morning/afternoon/evening, my name is .... from transport company Steer Davies Gleave. The Association of Train Operating Companies is looking, on behalf of the rail industry, to understand how people travel to and from this station and how this might be improved. Can you spare a couple of minutes to answer a few questions? Thank you

Q1 How did you travel to this station today?

Walk	1
Cycle – left at station	**2**
Cycle – taken on train	**3**
Car – parked at / near the station	4
Car – dropped off	5
Train	6
Taxi / cab	7
Motorbike	8
Bus	9
Other (Specify)	10

____

Q2 Did you start this journey from home?

Yes	1
No	2

Q3 What is the (full) Postcode of where you started from today? *(Note this purely so we can analyse where station users are coming from)*

Q4 How long did it take you to get to the station today? ……………… minutes

Q5 What is the main purpose of your journey today? **SINGLE CODE ONLY**

Commuting to / from work	1
Company business	2
Personal business (e.g. dentist)	3
Commuting to / from education	4
Shopping	5
Visiting friends / relatives	6
Leisure (e.g. pub, cinema, sporting activity)	7
Other (Specify)	8

…………………………………………………..

Q6 Which station are you travelling to?

London	1
Other (Specify)	2

…………………………………………………..

Q7	Are you travelling on your own?		
	Yes	1	
	No	2	- ask Q7a

Q7a How many other adults and children are with you?

Adults (16+) ………….

Children (under 16) ………….

QUESTIONS FOR CYCLE LEFT AT STATION ONLY

C1 How long are you expecting to leave your bike parked at the station? …………. hours

C2 How often do you leave your bike parked at this station?

5+ times a week	1
3 or 4 times a week	2
1 or 2 times a week	3
1 to 3 times a month / 1 a fortnight	4
less often	5
this is the first time	6 – skip C3

C3 For how long have you been leaving your bike at this station?

Less than 3 months	1
3 to 6 months	2
6 months to a year	3
1 to 2 years	4
longer than 2 years	5

C4 What did you do beforehand?

didn't live in the area	1
didn't travel by train	2
used a different station (still cycled)	3
used a different station (and different access mode)	4
drove to this station	5
walked to this station	6
I took my bicycle on the train	7
Other (Specify)	8

……………………………………………………..

C5 Why did you start cycling to this station? DO NOT PROMPT, PROBE: ANYTHING ELSE? MULTI-CODE

moved house	1
changed jobs / other change in travel needs	2
became too difficult to park my car	3
car became unavailable	4
cycle parking facilities improved / became available	5
started cycling / bought bicycle	6
Other (Specify)	7

……………………………………………………..

C6	How satisfied are you with the cycle parking facilities at this station?	
	very satisfied	1
	quite satisfied	2
	neither satisfied nor dissatisfied	3
	quite dissatisfied	4
	very dissatisfied	5
C7	Have they changed over the last few months?	
	improved a lot	1
	improved a little	2
	not changed	3
	deteriorated a little	4
	deteriorated a lot	5
	couldn't say	6

C8 IF IMPROVED OR DETERIORATED: In what way have they improved / deteriorated?

improvements

…………………………………………………………………………………………………….

deteriorations

…………………………………………………………………………………………………….

C9	If you had to pay £2 for parking your bike at the station what would you do?	
	park my bike and pay the £2	1
	leave my bike somewhere else but still use the station	2
	use a different station where I could park for free	3
	use car instead of train	4
	use another means of transport instead of train	5
	not make the trip at all	6
	Other (Specify)	7

……………………………………………………..

QUESTIONS FOR THOSE TAKING A BICYCLE ON THE TRAIN

T1	Why do you prefer to take your bicycle on the train rather than leave it at the station? DO NOT PROMPT, PROBE: ANYTHING ELSE? MULTI-CODE	
	need my bike at the other end	1
	my bike isn't safe left at the station	2
	there aren't enough bicycle parking spaces	3
	Other (Specify)	4

……………………………………………………..

T2	How would you rate the cycle parking facilities at this station?	
	very good	1
	quite good	2
	neither good nor poor	3
	quite poor	4

	very poor	5
T3	Have they changed over the last few months?	
	improved a lot	1
	improved a little	2
	not changed	3
	deteriorated a little	4
	deteriorated a lot	5
	couldn't say	6

QUESTIONS FOR NON-CYCLISTS

N1	How often do you cycle?	
	5+ times a week	1
	3 or 4 times a week	2
	1 or 2 times a week	3
	1 to 3 times a month / 1 a fortnight	4
	less often	5
	never	6 - skip to N4
N2	How likely are you to cycle to this station?	
	very likely	1
	quite likely	2
	not at all likely	3
N3	Why would you not cycle to this station? DO NOT PROMPT, PROBE: ANYTHING ELSE? MULTI-CODE	
	live too far away	1
	too dangerous	2
	need to carry too much	3
	couldn't cycle in work clothes	4
	not safe to leave a bicycle here	5
	not enough cycle parking here	6
	Other (Specify)	7
	……………………………………………………..	

ALL NON-CYCLISTS

N4	How would you rate the cycle parking facilities at this station?	
	very good	1
	quite good	2
	neither good nor poor	3
	quite poor	4
	very poor	5
N5	Have they changed over the last few months?	
	improved a lot	1
	improved a little	2
	not changed	3
	deteriorated a little	4
	deteriorated a lot	5

couldn't say	6

- age, working status, home postcode
- contact details for possible further research.

QUESTIONS FOR ALL RESPONDENTS

P1 Which age group do you belong to? **SINGLE CODE ONLY**

16 to 25	1
26 to 34	2
35 to 44	3
45 to 54	4
55 to 64	5
65 to 69	6
70 to 80	7
81+	8

P2 – What is your working status? **SINGLE CODE ONLY**

Working full time	1
Working part time	2
Full time student	3
Not working	4
Refused	5

P3 - Would you be happy to take part in further research about rail travel?

Yes 1 – name and phone no.

………………………………………………………………………………………………

No 2

THANK YOU

APPENDIX

C

CYCLE PARKING SURVEY REPORT

ATOC Cycle parking
Station surveys
Summary report

May 2009

Contents

Background

- The cycle-rail taskforce, comprised of representatives from the Association of Train Companies (ATOC), Network Rail, Passenger Focus and Cycling England, has a key objective to facilitate growth in the number and proportion of people cycling to rail stations through the targeted installation of cycle facilities at rail stations.
- This study was therefore commissioned in order to:
  - to develop an economic model, that forms the framework for developing business cases that can help justify expenditure in new / improved cycle facilities at rail stations;
  - to establish an evidence base of impacts of cycle investment on cycle demand and other transport users that will underpin the economic analysis, in order to help construct a robust economic and commercial case for cycle investment in a variety different circumstances.
- The findings reported in this document are from a new survey which aimed to help address the shortfall in evidence on cycle parking at stations. Specific aims of the survey were to:
  - obtain 'revealed preference' data for access mode choice decisions;
  - determine the maximum (and minimum) distance from the station cyclists are prepared to travel to access the station
  - obtain some qualitative information on attitudes, satisfaction and charging for cycle parking.
- The results of this survey have been used as inputs into an economic model and a cycle demand forecasting model. The details of these and how the survey results support them are provided in the main study report "Investment in Cycle Facilities at Rail Stations: "Developing a Business Case Framework".

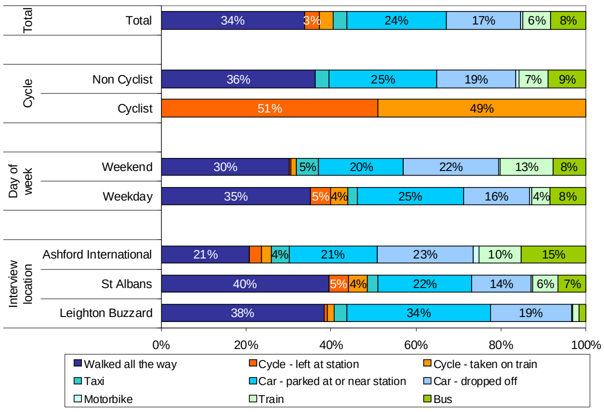
Method

- The survey was undertaken at three stations: St Albans, Ashford International and Leighton Buzzard.
- At each station there was a weekday and a Saturday survey. The week day survey started at 6.30am to finish by 12noon – 12.30pm. The Saturday survey started at 9am (Leighton-Buzzard at 10am).
- At Leighton-Buzzard, the surveys took place on Saturday, 21st March and Tuesday, 24th March.
- At St. Albans, the surveys took place on Tuesday, 31st March and Saturday, 4th of April.
- At Ashford International, the surveys took place on: Saturday, 18th April and Wednesday, 22nd April.
- On each day, there were three elements of survey work undertaken
  - The main element was a short face-to-face survey of passengers.
  - This was accompanied by an entry count (used for weighting the interviews by time of day.
  - A cycle parking facility occupancy count.
- Note that the interview element was primarily conducted on platform. However, some supplementary interviews were conducted at the bicycle racks to boost the number of cyclists in the sample.
- The samples achieved were:
  - St Albans 708 (including 118 who cycled to the station)
  - Ashford International 638 (including 66 who cycled to the station)
  - Leighton Buzzard 657 (including 43 who cycled to the station)

Journey details

Travel to the station

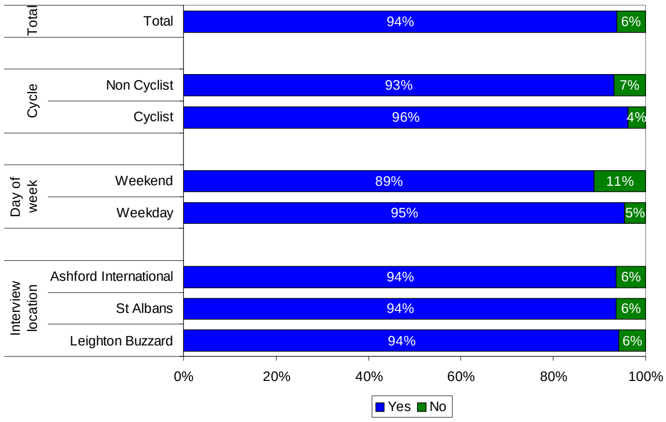
- On average, on a weekday 9% of all journeys to the station are by bike. Around half of these are passengers parking their bicycle at the station and half taking it on the train.
- The use of bicycles is much lower (just 2%) at weekends. Most of these are take on the train.
- There are noticeable differences between the three stations:
  - More cycling at St Albans
  - More use of bus at Ashford
  - More car use at Leighton Buzzard



How did you travel to the station today?
Base: (Respondents interviewed on-platform))

Journey start point

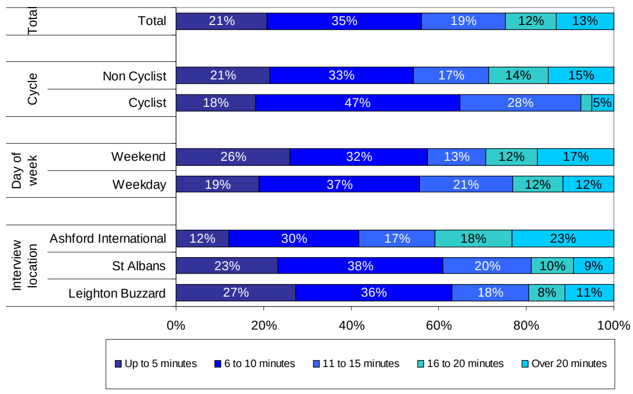
- The vast majority of all journeys start from home (94%).
- At weekends this figure is slightly less, when 89% of journeys start from home.



Did you start your journey from home?
Base: (All Respondents - 1955)

Journey time to station

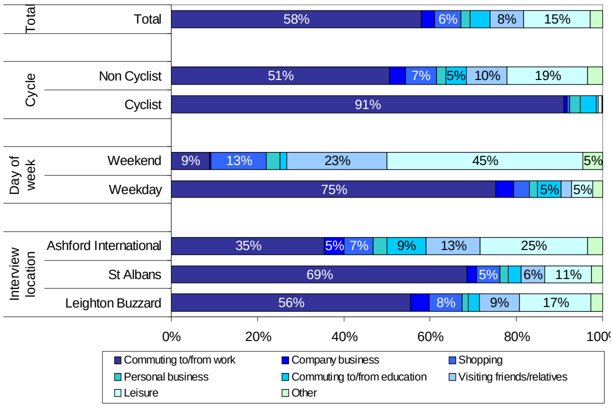
- Just over half of all journeys to the station are less than 10 minutes.
- The journey times to Ashford International are generally longer, with 23% of journeys taking over 20 minutes (compared with 9% and 11% at St Albans and Leighton Buzzard respectively).



How long did it take you to get here today?
Base: (All Respondents - 1935)

Journey purpose

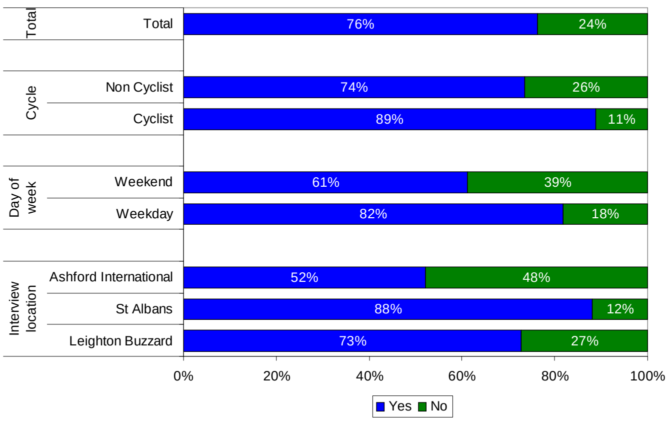
- Three-quarters of all journeys on weekdays at the survey stations are for commuting to and from work. This figure falls to only 9% of all journeys at weekends, where the most common journey purposes are leisure (45%) and visiting friends/relatives (23%).
- A higher than average proportion of trips from Ashford International are for leisure purposes (25%). Fewer journeys from this station are for commuting purposes - 35% compared with a 58% average.
- 91% of all cyclists using the station are commuting to and from work.



What was the main purpose of your journey today?
Base: (All Respondents - 1972)

Journeys to London

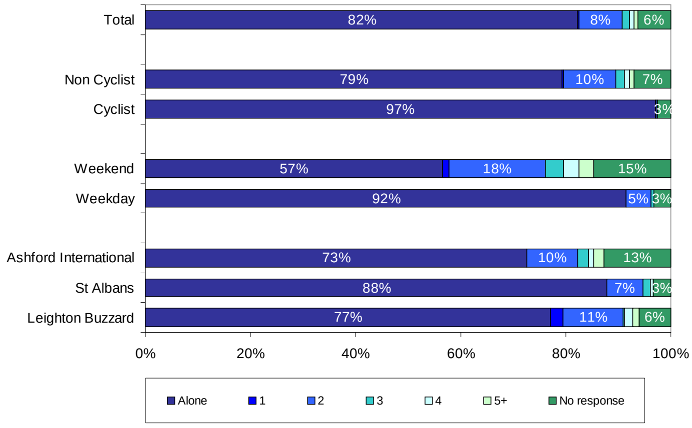
- Three-quarters (76%) of respondents were on their way to London when interviewed.
- Cyclists are slightly more likely to travel to London than non cyclists.
- Trips from Ashford International are less likely to be to London than the other stations.



Are you travelling to London today?
Base: (All Respondents - 1977)

Group size

- The vast majority of travellers are alone, particularly on weekdays, which is unsurprising given the high proportion of commuters.

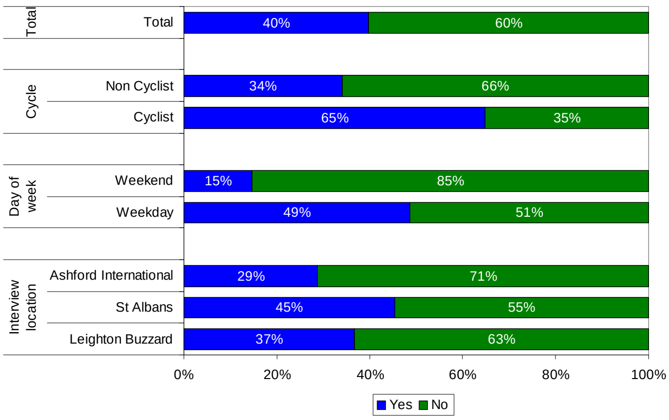


Are you travelling alone? And Number in group
Base: (All respondents – 1965)

Station users

Season ticket ownership

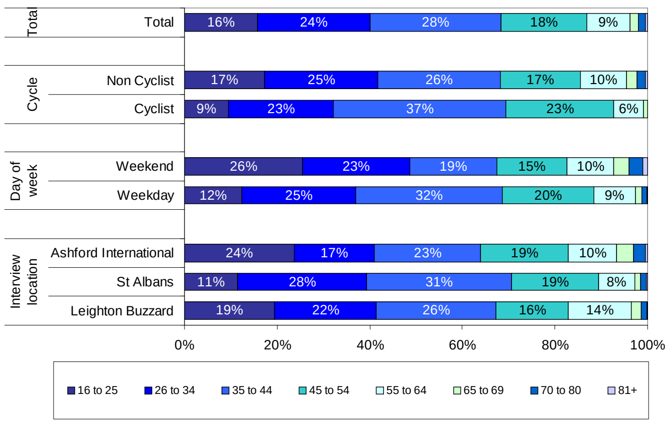
- Overall, two-fifths of passengers have a Season ticket.
- Cyclists are more likely to be Season ticket holders than those who didn't cycle to the station, reflecting their very high incidence of commuting (91%).



Do you have a season ticket?
Base: (All Respondents – 1957)

Station user demographics: age

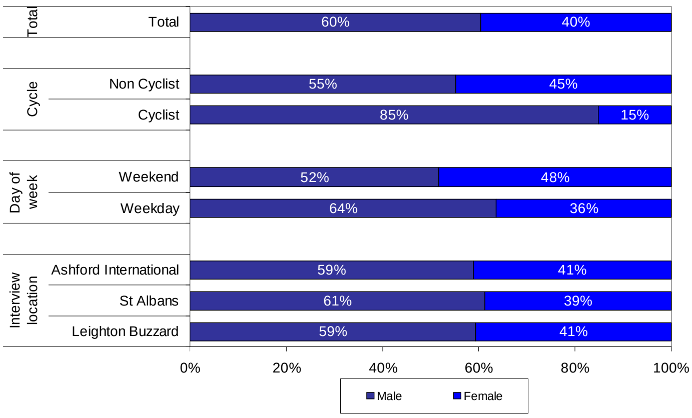
- Those aged 35 to 44 and 45 to 54 are more likely to cycle to the station than other age groups. These two age bands represent 60% of all those cycling to the survey stations.



Which age group do you belong to?
Base: (All respondents – 1982)

Station user demographics: gender

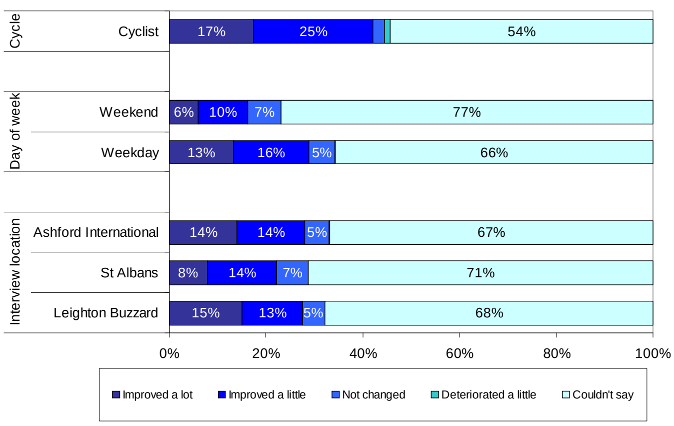
- Those who cycle to the station are predominately male - only 15% of cyclists are female.



Gender
Base: (All respondents – 1963)

Awareness of changes in cycle parking facilities among station users

- Just under a third of all station users are aware of recent changes to the cycle parking facilities at the station.
- Awareness of changes is lowest at St Albans, where 71% of respondents were unable to identify any positive or negative changes.

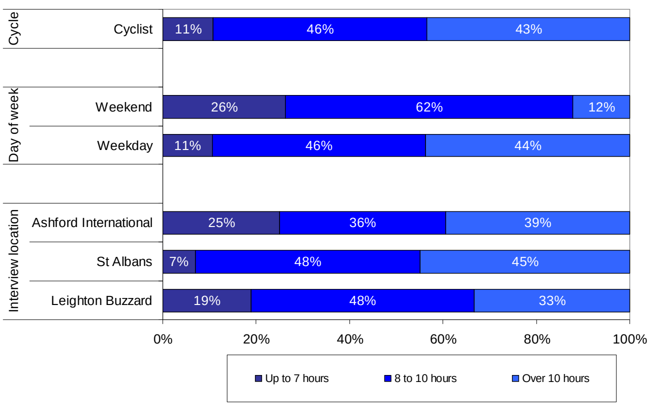


Have the cycle parking facilities changed over the last few months?
Base: (All respondents)

Cyclists who parked their bike at the station

Length of time bicycle left at station

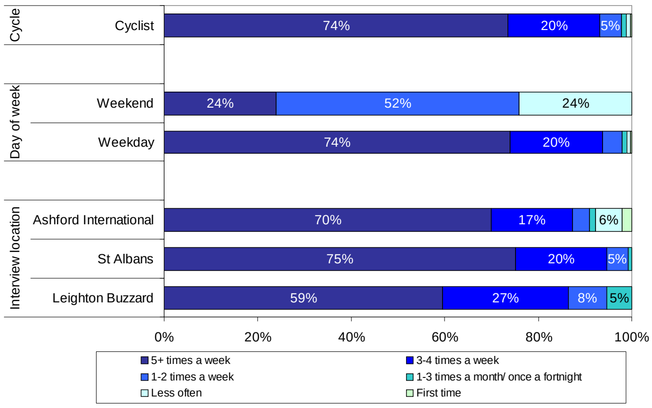
- The majority of cyclists (89%) leave their bicycle at the station over 8 hours. At Ashford International this figure is slightly lower at 75%.
- 30-45% of cyclists across all stations leave their bicycle at the station for over 10 hours.



How long are you expecting to leave your bike at this station?
Base: (Cyclists leaving bike at station - 162)

How often bicycle left at station

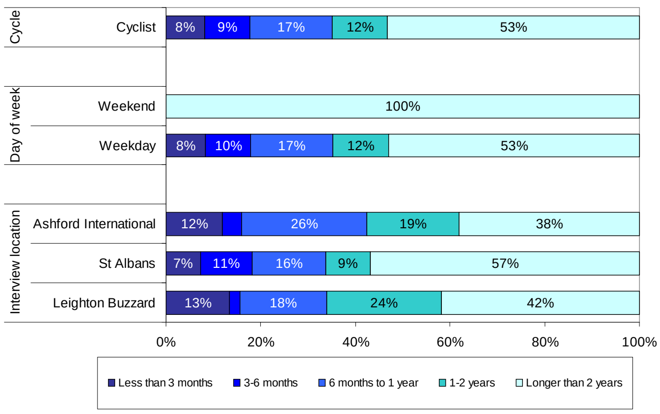
- The majority of cyclists at the survey stations leave their bicycle parked at the station 5+ times per week (reflecting the fact that most of them are making commuting trips).
- 52% of cyclists leaving their bicycle parked at the weekend use the parking facilities 1-2 times per week.



How often do you leave your bike parked at this station?
Base: (Cyclists leaving bike at station – 149)

Length of time cycle parking facilities have been used

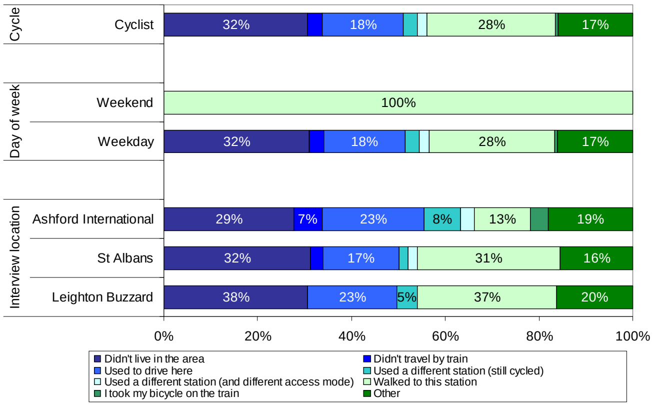
- A third (34%) of all cyclists leaving their bicycle at the station started using the facilities within the last year.
- At Ashford International this figure is slightly higher - 42% of cyclists have started using the cycle parking facilities within the last year, and a further 19% have used the facilities for 1-2 years.



For how long have you been leaving your bike at this station?
Base: (Cyclists leaving bike at station – 146)

Before cycle parking facilities used

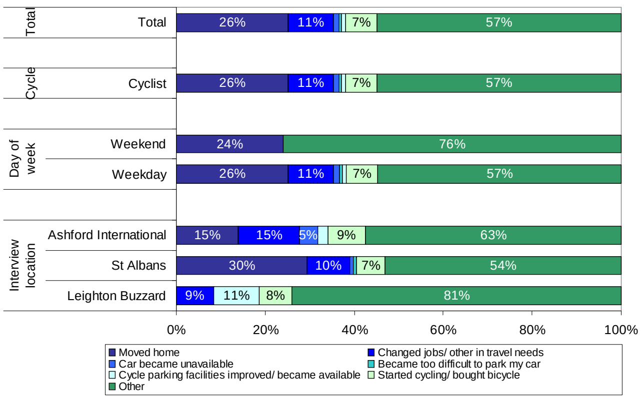
- Across all stations between 17% and 23% of cyclists leaving their bicycles at the station drove to the station prior to using the cycle parking facilities.
- A total of 28% of cyclists who now use the cycle parking facilities at the station used to walk to the station. This figure was noticeably lower at Ashford International.



What did you do before using the cycle parking facilities?
Base: (Cyclists leaving bike at station – 147)

Reasons for starting cycling to station

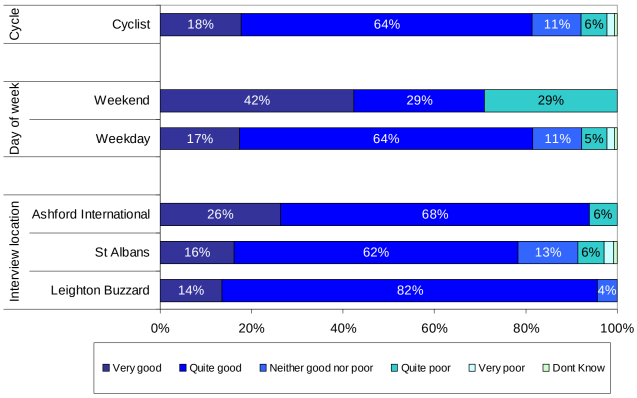
- 11% of cyclists at Leighton Buzzard began leaving their bicycle at the station because of improvements to the cycle parking facilities, but very few gave this answer at the other survey stations.
- A total of 26% of cyclists leaving their bicycle at the station said that they began using the cycle parking facilities because they had moved home. A further 11% changed jobs.
- Only 1% of cyclists began leaving their bicycle at the station because their car was no longer available.



Why did you start cycling to this station?
Base: (Cyclists leaving bike at station – 140)

Perceptions of cycle parking facilities among users

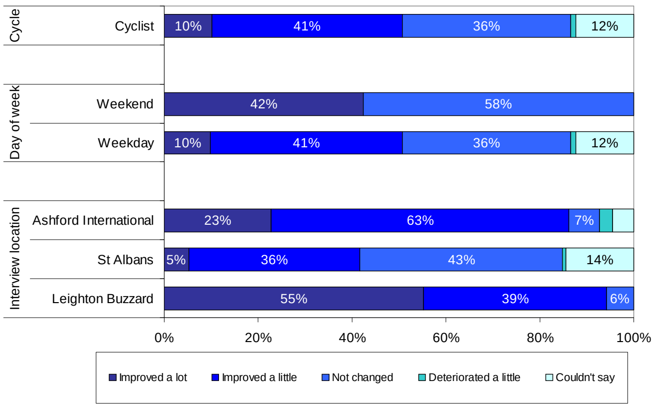
- Overall, the cycle parking facilities are rated highly amongst those who use them. 81% of cyclists say they are 'very' or 'quite good'.
- It appears that cyclists at Ashford are more satisfied, although the base size is relatively low for this group.



How would you rate the cycle parking facilities?
Base: (Cyclists leaving bike at station – 142)

Changes in cycle parking facilities among users

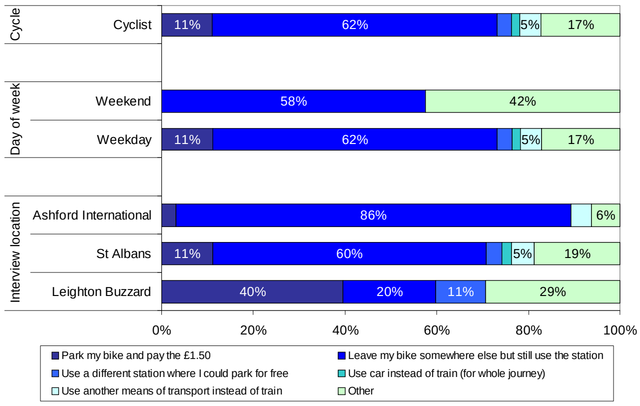
- Half of cyclists say cycle parking facilities have improved in the last few months.
- At both Ashford International and Leighton Buzzard much larger proportions stated that they had seen improvements in cycle parking.



Have they changed over the last few months?
Base: (Cyclists leaving bike at station – 137)

Attitudes to paying for cycle parking

- If charging were to be introduced for cycle parking at the station the majority of cyclists said they would leave their bike somewhere else rather than having to pay for parking, but would still use the station.
- Just one in ten cyclists said they would pay a £1.50 fee for parking their bicycle.
- Other comments included switching to walking to the station or taking their bicycle on the train instead of parking it.

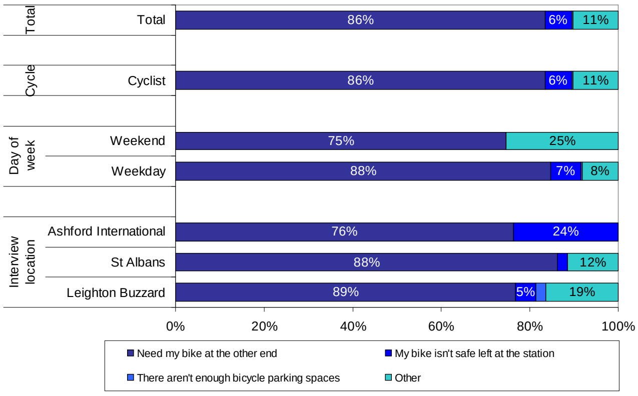


If you had to pay £1.50 for parking your bike at the station what would you do?
Base: (Cyclists leaving bike at station – 129)

Cyclists who take their bike on the train

Reasons for taking bicycle on train

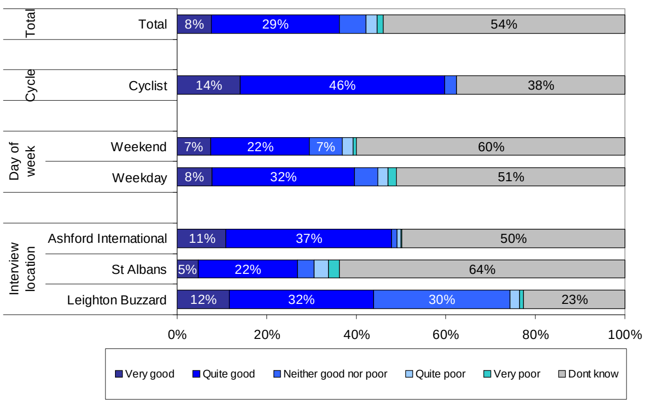
- The majority of cyclists (86%) who take their bicycle on the train do so because it is needed at their destination.
- At Ashford International 76% of cyclists need to use their bicycle at their destination, but 24% state that their bicycle would not be safe if left at the station. At St Albans and Leighton Buzzard this figure is just 2% and 5% respectively.
- 3% of cyclists at Leighton Buzzard take their bicycle on the train because there are not enough cycle parking spaces.



Why do you prefer to take your bicycle on the train rather than leave it at the station?
Base: (All cyclists taking bicycle on train - 52)

Perceptions of cycle parking quality among those taking cycle on the train

- Nearly 40% of all station users rate the cycle parking facilities as either ‘very good’ or ‘good’.
- However over half of users did not give a rating.
- There is variation in the perception of quality between stations. At Ashford International almost half of respondents rate the facilities as good, whilst at Leighton Buzzard this figure is 44% and at St Albans it is 27%.

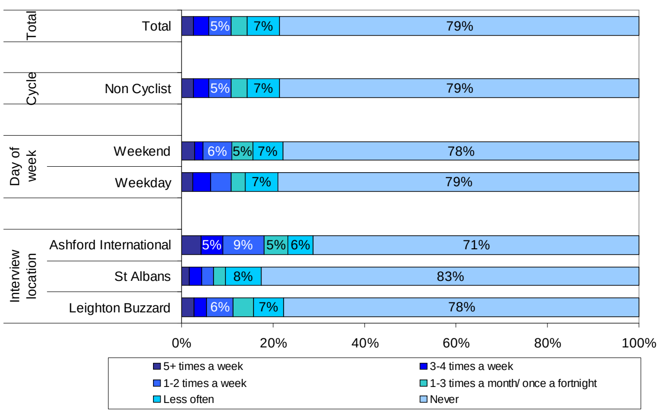


How would you rate the quality of cycle parking at this station?
Base: (All respondents who took cycle on the train – 44)

Non-cyclists

Frequency of cycling trips among non-cyclists

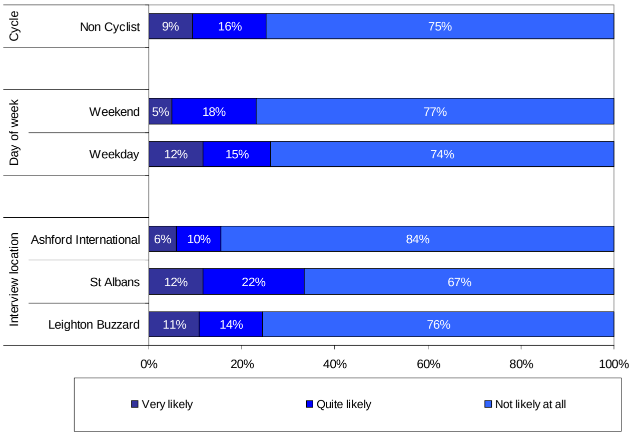
- The majority of people who did not cycle to the station never cycle.
- At Ashford International there are a higher proportion of people who do not cycle to the station but cycle for other purposes. 19% of people who do not cycle to the station cycle elsewhere at least 3 times per week.
- At St Albans this figure is just 5%, and at Leighton Buzzard the figure is 6%.



How often do you cycle?
Base: (Non-Cyclists – 1737)

Propensity to cycle to station among non-cyclists

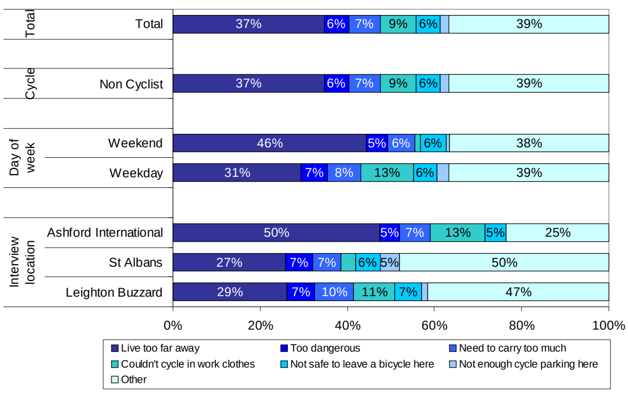
- Of passengers who did not cycle to the station but do at least on occasion cycle at other times, 25% said they are either very likely or quite likely to cycle to the station.
- This figure is higher in St Albans (33%) and lower at Ashford International (16%).



How likely are you to cycle to this station?
Base: (Non-Cyclists, excluding never cycle 403)

Barriers to cycling to station among non-cyclists

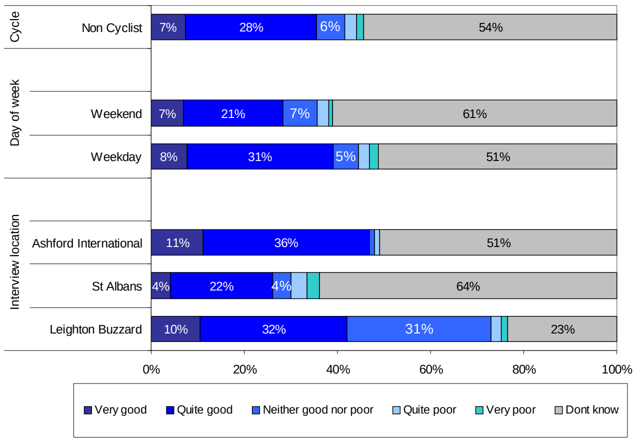
- Over 50% of non-cyclists at Ashford International state that they live too far from the station to cycle. This reflects the journey time information, where 23% of journeys to the station are over 20 minutes.
- Overall, only 6% of respondents believed it was not safe to leave a bicycle at the station, and only 2% stated that there was not enough cycle parking.
- 39% stated that there was an additional barrier to cycling to the station which was not identified in the survey, suggesting that the barriers to cycling are varied and complex.



Why would you not cycle to this station?
Base: (Non-Cyclists, excluding never cycle 419)

Perceptions of cycle parking quality among non cyclists

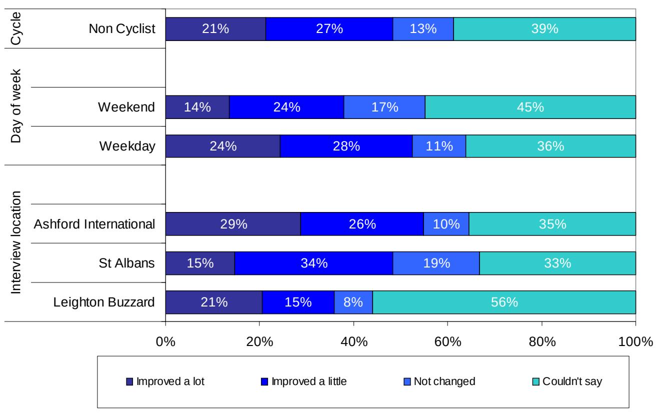
- Over half of all Non Cyclists (54%) weren't able to rate of the cycle parking facilities.
- Of those who were able to rate the facilities, most thought they were 'quite good' with very few giving a poor opinion of them.
- Non Cyclists at Leighton Buzzard were most likely to have a view on the facilities, with a third of them rating the facilities as 'quite Good' and a further third rating the facilities as 'neither good nor poor'.



How would you rate the quality of cycle parking at this station?
Base: (Non Cyclists: 1283)

Changes in cycle parking facilities among non cyclists

- Almost two fifths of non cyclists who were able to rate the parking facilities, were unable to state whether these facilities had changed recently.
- Amongst those that had noticed a change, most of them felt that the facilities had improved and none of them felt that the facilities had deteriorated.



Have the cycle parking facilities changed over the last few months?
Base: Non Cyclists able to rate Cycle Parking Facilities (650)

CONTROL SHEET

Project/Proposal Name	Investment in Cycle Facilities at Rail Stations
Document Title	Developing a Business Case Framework
SDG Project/Proposal No.	22100301

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