

# Outcomes of the Cycling Demonstration Towns programme: monitoring project report

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## Data collection and analytical methodologies

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Report authors:           Andy Cope, Research and Monitoring Unit, Sustrans  
                                  Angela Kennedy, Research and Monitoring Unit, Sustrans  
                                  Fiona Crawford, Research and Monitoring Unit, Sustrans  
                                  Nick Cavill, Cavill Associates  
                                  John Parkin, University of the West of England, Bristol  
                                  Lynn Sloman, Transport for Quality of Life

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Head Office  
Sustrans  
2 Cathedral Square  
College Green  
Bristol  
BS1 5DD

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VAT Registration No. 416740656

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# 1 Project process and rationale

The programme of monitoring delivered between 2008 and 2011 built on expertise gained through the monitoring of the first phase of the Cycling Demonstration Towns. A programme of data collection was designed in consultation with the towns, but rather than applying a 'one-size-fits-all' approach which stipulated a common set of data collection activities, a more project-focussed approach was applied. This was based primarily around a selection of core data sources common to all towns, complemented by additional data sources reflective of delivery in each location. This approach ensured sufficient commonality between the six towns involved to generate an overall expression of the impact of the programme whilst retaining sufficient flexibility around the individual emphasis of the towns. The underpinning concept was to develop an approach that generated multiple indicators, and to avoid reliance on a single data source - each of the data sources used have their own deficiencies and their own strengths (detailed in the following text), and the use of a broader set of indicators is preferred as a more suitable mechanism for providing sound insight. The following sections outline the approach taken in establishing the monitoring regime, before going on to detail the data collected and analytical tools applied.

## 2 Engaging with the projects for the purposes of monitoring

Essential to the process of seeking to ensure that appropriate data was gathered was the process of working with the funded projects. At the beginning of each phase of the monitoring programme meetings were held between the monitoring team and representatives of each of the towns involved. The purpose of these meetings was to:

- For the towns to provide an overview of existing cycle monitoring and available data to the monitoring team
- for the monitoring team to discuss with the towns the emphasis of their proposed work plans
- for the monitoring team to present to the towns broad plans for establishing programme monitoring, and to discuss with them the problems and opportunities that this approach presented
- inform the writing of a detailed monitoring plan by the monitoring team.

In most instances the funded projects were found to already be collecting some data that could be used in relation to the project. Following the introductory meetings, a review was undertaken of the existing data collection mechanisms operating in each town. This review, in part underpinning site selection for new monitoring, considered:

- The geographic location of existing monitoring in relation to planned intervention delivery
- the temporal continuity of the data, particularly in relation to automatic cycle count data
- the frequency of and consistency between iterations of data collection
- the reliability and robustness of each data source.

A crucial part of the approach to monitoring that was applied was to assure continuity of data collection, and to build on current practise (where possible) rather than to dismantle existing practise, thereby risking cessation of existing longer term data sets.

An equally important stage was for the monitoring team to disentangle the anticipated effects of the interventions in each location, in order to be able to reinterpret the monitoring plan for each town accordingly. In discussion the monitoring team sought to generate on the one hand a map of areas where geographically defined interventions were planned (e.g. new routes, interventions at specific destinations, events, etc), and on the other hand an expectation of the scope of impact of

interventions that did not have a specific geographical focus (typically marketing and promotional activities). In each case some notion of the scale of impact was also sought. Although in each case this was difficult to detail, and plenty of subjectivity was implicit, these outset-perceptions were crucial to the construct of the monitoring proposition.

Following the initial meetings between the monitoring team and the towns, and using the review of existing data collection activity and the commentary on anticipated impacts, a plan detailing recommendations for data collection for the purposes of monitoring was prepared for discussion. The plans detailed: exactly what data the monitoring team considered needed to be collected by the project teams; the precise locations for each element of data collection (where geographically specific); the timings for each element of data collection (where temporally specific, in relation to timings of interventions); methodological details concerning how to collect the data; the frequency and format of data submission by the local authorities to the monitoring team; and time frames for the implementation of specific data collection measures. The plan also detailed specific activities on monitoring to be undertaken by both the monitoring team and the town, and outlined the analysis that the monitoring team anticipated undertaking with the data provided.

Data collection mechanisms common to all towns included:

- Continuous automated counts of cycles
- occasional manual counts of cycles
- online intervention diary record of infrastructure, soft measures and other factors influencing cycling
- household level surveys of physical activity.

Other data collection mechanisms included:

- Counts of parked cycles
- route user intercept surveys
- behaviour and attitude surveys
- workplace travel surveys
- Bike It monitoring data
- cycle hire scheme monitoring data
- higher and further education site travel surveys.

Other national data sources drawn upon in support of the monitoring project include:

- Pupil Level Annual School Census data on mode of travel to school (Department for Education)
- STATS19 accident record (Department for Transport)
- Active People Survey data (Sport England).

In order to ensure regular and ongoing communication with the towns, and to inform the client group about progress to date, reports were prepared by the monitoring team at the end of each quarter throughout the programme. Arguably the most important function of these reports was the fact that they were a stimulus necessitating engagement between the towns and the monitoring team, and for supply of data from the towns to the monitoring team on a near continuous basis. The fact of the continued engagement, and the support function provided by the monitoring team, also ensured that the monitoring team was kept reasonably well updated about developments in the delivery programmes of the towns. The quarterly reports:

- Summarised progress towards meeting the commitments agreed to in the monitoring plan
- presented automatic cycle counter data for selected sites in each of the towns
- presented manual count and other data sources submitted by the towns to the monitoring team
- summarised entries made to the online intervention diary.

Quarterly reports were provided to the towns, to Cycling England, and to the Department for Transport.

Following the cessation of data collection pertaining to the Cycling Demonstration Town programme in September 2011, face-to-face were held with each of the towns to discuss the details of the monitoring work. The purpose of these meetings was to:

- Confirm with the towns the delivery that was undertaken by the towns, and to revisit original plans, checking for disparities
- present initial analyses of data collected during the monitoring programme to the towns, and to seek input from the towns on these preliminary indications of impact
- confirm with the towns that all monitoring data had been shared with the monitoring team
- identify any further data not necessarily generated in direct response to the agreed monitoring plan but which may be considered relevant by the towns and the monitoring team.

## 3 Methodology

In the following section we summarise the various data collection tools employed in the towns and the analytical methodologies applied.

### 3.1 Automatic cycle counters

Data are collected from a network of automatic cycle counters in each of the towns, located predominantly but not exclusively on traffic-free routes. Counters are typically inductive loop based mechanisms, collecting continuous counts of cyclists on an hourly basis. Automatic cycle counter data are particularly valuable in that they provide a continuous record of volumes of cyclists passing a particular point and as such reflect actual rather than self reported activity. Counter data provide information regarding fluctuations in the number of cyclists recorded both on weekdays compared to weekend days and at different times of year.

#### 3.1.1 Counter location and data collection

In the majority of towns, recommendations were made for the installation of a number of new cycle counters at the beginning of the programmes. The locations of proposed sites were suggested on the basis of the existing network of counters in each location.

The number and geographic distribution of counters recommended was based in each case on an analysis of the layout of each town to construct, as appropriate, the following:

- Partial cordons around central areas – coverage of key traffic-free routes into town centres to give a measure of the flux of cyclists to and from these areas. Automatic counters on cordons were sited to complement the location of any manual counts providing coverage of trafficked routes towards town centres
- screenlines – coverage of traffic-free routes crossing barriers including but not limited to rivers, railways lines, major roads. Automatic counters were recommended to provide as complete coverage as possible of screenline crossing points, complemented by manual counts on associated trafficked routes
- routes to and from key destinations – coverage of traffic-free routes to key destinations, generally although not limited to those expected to be impacted by Cycling Demonstration Towns interventions
- lateral movement on key routes – coverage of key lateral traffic-free routes, for example, coastal promenades, greenways and other key corridors.

Recommendations were made taking into full consideration the location of existing count sites and the quality of data from these, weighing up the data requirements against costs. The location of new

count sites was confirmed following discussion with the towns. Towns committed to supply automatic cycle count data quarterly to the monitoring team.

### 3.1.2 Counter validation and data cleaning

We have little evidence of counter validation for the towns, although in some cases we have been made aware of problems with counter loops not completely covering the path and other issues of detection. In the absence of robust validation, we acknowledge that count data may not be a truly accurate representation of the numbers of cyclists using a route at a given location.

Prior to analysis, all counter data were visually checked for anomalies in the time series. Periods of unusually low or high daily counts were identified. The cause of these anomalies was investigated firstly through cross reference to the intervention diary and secondly through consultation with the towns. Data considered misrepresentative of the level of cycling at a given location (for example, long periods of zero counts resulting from route closure or counter malfunction, erratic counts linked to interference with the counter) were removed prior to analysis.

### 3.1.3 Analysis

The change in the count of cycles over the project period was estimated using methods appropriate to gain both an adequate level of detail at a specific site but also an overall expression of change, while being suitably robust towards seasonal fluctuations. Two distinct sets of analysis have been applied to the automatic cycle counter data: analysis using data from individual count sites, and analysis using data aggregated across all counters in each town. Data from January 2005 to September 2011 were included in the analysis.

### 3.1.4 Analysis of data from individual cycle counters

Data from individual sites were analysed to provide:

- an average daily count of cyclists
- an expression of average annual change in the volume of cyclists counted at each location across the programme period

These expressions are valuable in identifying concentrations both of use and change in cycle trips within an individual town.

Count data were used to calculate the average daily count of cycles recorded at each counter location in each month of each year of the time series. Three expressions of average have been used: the median daily count (based on all days of the week), the week day median daily count and the weekend day median daily count.

To express the change at each counter the seasonal slope estimator<sup>1</sup>, a non-parametric method for time series displaying strong seasonality and missing data, was used for each month. This change was then expressed as a percentage of the average daily count across the months' time series. In order to perform this analysis, typically a minimum of three years data in each month is required. Where a small number of months have data for fewer than three years but the majority of months have data for a greater number of years sensitivity testing was performed in order to assess the impact of having fewer than three months of data available for those months. In locations where sufficient data were available the median of these monthly values has been reported as the average annual change which refers to the typical percentage change in the average daily count over a typical year.

For counters where at least three years of data were available for each month, the number of months for which counts changed significantly over time was calculated. None of the counters included in the analysis recorded a significant change over time for 12 months.

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<sup>1</sup> Hirsch RM, Slack JR, Smith RA (1982), Technique of trend analysis for monthly water quality data. *Water Resources Research* vol.19, no. 1, pp107-121

### 3.1.5 Analysis of aggregated automatic counter data

Data from multiple counters were analysed using a regression model to provide an estimate of year to year change:

- In cycle trips at town level compared to a baseline year
- in cycle trips recorded by subsets of counters in towns identified as monitoring specific interventions, key destinations or lateral routes
- in cycle trips in the years prior to the Cycling Demonstration Towns programme for a subset of counters in a subset of towns
- in cycle trips in towns without Cycling Demonstration Towns but otherwise similar to towns involved in the Cycling Demonstration Towns programme for a subset of towns.

These expressions are valuable in providing an overview both of the overall rate of change in cycle trips as recorded by a group of counters, and year to year fluctuations in the trajectory of change which can in turn be linked to the timing of intervention delivery.

Data for all counters were aggregated for each town, regardless of the duration and completeness of the time series for each individual site. This aggregated dataset was then modelled using negative binomial multiple regression. In the first instance, the year, time of year, day of week, calendar effects (for example, bank holidays) and the counter site reference were included as explanatory variables. A secondary analysis included within the regression a factor to represent the dates of severe weather conditions experienced nationwide in late 2009, early 2010 and late 2010. Including this factor mitigates the impact of the poor weather on levels of cycling and thus allows a more direct comparison to be made between years across the time series.

This model was then used to estimate counts, based on days with recorded counts in 2010<sup>2</sup>, for the remainder of the time series to enable an expression of change over the entire project period.

The output from the analysis is a percentage change relative to the baseline year for each town. For the Cycling Demonstration Towns, estimated change in 2011 was against a 2005 baseline<sup>3</sup>. The output also includes the estimated total count of cyclists in each year across all counter locations.

In cases where individual sites display particularly high growth or substantial decline over time, sensitivity testing was undertaken to examine the impact of these sites on the overall change in cycle trips recorded across a given town. Details of sensitivity testing are included in the individual town sections of this report.

In addition to all counters across a particular town, this analytical approach was applied to subsets of counters within towns, for example, groups of counters close to schools or workplaces, or on routes where specific interventions have been delivered. Full details of these analyses are included in the individual town sections of this report.

### 3.1.6 Analysis of pre-programme data

For a subset of towns for which sufficient data were available, an exploratory analysis was performed using data collected prior to the onset of interventions linked to the Cycling Demonstration Towns programme. The purpose of this analysis was to examine pre-programme growth in comparison to growth within the programme period. Data were cleaned and analysed as described above for a subset of counters with pre-programme data.

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<sup>2</sup>2010 was used as this was the year with the most complete dataset across the towns. Due to limitations in data availability for Derby, 2009 was used.

<sup>3</sup>A 2006 baseline was used for Brighton and Hove

### 3.1.7 Analysis of automatic cycle counter data from matched areas

For a subset of towns, counter data were available for a comparable matched local authority area<sup>4</sup>. Analyses were performed to compare rates of change cycle trips (as recorded by automatic cycle counters) in areas otherwise similar to Cycling Demonstration Towns but without programme interventions. Data from matched town areas were cleaned and analysed as described above.

This matching exercise is hazardous for two reasons. The first reason is that the number of count sites in the matched towns was small (three and six per town, except for the town matched to Darlington), compared to between 19 and 26 in the Cycling Demonstration Towns. This means that we cannot be confident that the results from the counters in the matched towns are representative of changes in cycling in each town as a whole.

The second reason is that towns which are a good match in terms of the ONS Area Classification may not be a good match in terms of a variety of other variables which could have a bearing on cycle use. These include the following: patterns of cycling and different starting points in volume of use; geography including, particularly, hilliness and climate; and impacts and changes in capacity and level of service offered by both cycling and other transport networks.

Further, and particularly in relation to the objective of assessing the impact of investment in cycling, the level of interest in cycling displayed by the political and technical leadership within an area is likely to be relevant in terms of manifest investment in cycling, and any consequential effects of that investment. It may be presumed that only areas with a leadership interested in promoting cycling took part in the Cycling Demonstration Town programme. The effect of this is that the counterfactual being considered is a mix of areas: none of them is taking part in the scheme, but some of them will have leaders who may be interested in cycling investment, and others of them will not. This then means that the comparison we are making is between scheme areas with 'pro-cycling' leaderships, and non-scheme areas with a 'mixed' leadership. This weakens the comparisons we are able to make, particularly in view of the objective of assessing the impact of investment.

We recognise that regression modelling to control for the various measurable attributes as discussed above may be appropriate. Dichotomous variables to represent Cycling Demonstration Town areas would then provide a measure of the effect of the scheme. There will inevitably be complications with such a model for area based analysis, but most of these should be able to be controlled. It does however, remain an open question as to how such a model may be constructed specifically to address the rather less tangible issues of the degree of leadership interest in cycling.

### 3.1.8 A note on the distinction between the seasonal slope estimator and regression analysis of automatic cycle counter data

In the overall and town specific sections of this report results from the seasonal slope estimator method (for individual counters) are reported together with results from regression analysis of data (from multiple count sites).

The rationale for applying the regression approach alongside the seasonal slope estimator method previously described is outlined below:

- The seasonal slope estimator method cannot account for factors other than the month in which the count was made; the regression model includes additional variables anticipated to impact on cycle trips and thus accounts for these in estimating change over time
- the seasonal slope estimator method provides an annual average expression of change over the entire programme period; the regression model provides information on change relative to the baseline for each year individually

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<sup>4</sup> The National Statistics 2001 Area Classification gives for each local authority up to four other corresponding local authorities classified as being extremely similar; very similar; similar or somewhat similar.

- the seasonal slope estimator method can be applied to one counter at a time; the regression model allows analysis of data across multiple count sites
- the seasonal slope estimator method requires a minimum period of data; the regression model can deal with predictions for large amounts of missing data and make a more robust estimation of cycle trips across the entire programme period for all counters in all towns without requiring a consistent quantity of data between all counters included in the analysis.

The results from the two approaches, whilst complementary, may not completely align and should not be directly compared. The following factors restrict the extent to which the two expressions corroborate:

- In many cases the regression modelled estimate of change over the programme is based on data from more sites than it is possible to calculate change over time using the seasonal slope estimator
- as an expression of average annual change, year to year fluctuations in change are not apparent in the seasonal slope estimator
- the regression model calculates the percentage change based on the total counts for each town and therefore the counters with higher volumes of counts are likely to have a greater impact on the model outputs than counters counting lower volumes
- the regression model uses all of the data available whereas the seasonal slope estimator calculates change based on median counts in each month of each year for each counter.

## 3.2 Manual counts of cyclists

Twelve-hour manual counts of cyclists have been performed in all of the towns, predominantly although not exclusively on trafficked routes. Manual counts can be performed in locations not suitable for the installation of automatic cycle counters and as such can provide a more complete picture of movement to and from central areas.

### 3.2.1 Count location and data collection

Where towns had already in place programmes of manual counts, recommendations were made to continue these either in the same format or with increased frequency. Where no programme of manual counting was established, recommendations were made for count locations. These typically form partial cordons around central areas, or screenlines across towns. Locations were selected where appropriate to complement the network of automatic cycle counters on traffic-free routes.

Arrangements for data collection were made by the towns, with data submitted to the monitoring team quarterly or shortly after data collection.

### 3.2.2 Data cleaning

Count data recorded by direction were combined where appropriate. Data were reviewed for anomalous counts. The cause of anomalies was investigated by cross referencing to the intervention diary and through consultation with the towns.

### 3.2.3 Analysis

The change in manual counts recorded over the course of the programme was estimated using the non-parametric seasonal slope estimator. This was performed as described in the previous section for the automatic counter data, using the quarterly rather than daily counts. Changes between pairs of counts in each town (or cordon for Exeter) recorded in the same quarter in different years were assessed for statistical significance. For each town, the number of pairs where a significant increase or decrease is observed ( $p < 0.05$ ) has been reported, together with the number of significant increases and decreases.

Where generally shorter time series of manual count data were available, manual counts recorded in the earlier stages of the programme were compared to manual counts recorded in a comparable

period at some time later in the programme. Significant changes in counts recorded ( $p < 0.05$ ) were identified by calculating the confidence limits for the change between the two periods compared.

### 3.3 Intervention diary

The use of an intervention diary was introduced because of the observation from previous studies that where one could observe 'impacts' in (usually continuous) data sets (e.g. peaks, troughs, etc), one could not always readily assign them to particular 'events', whether deliberate local delivery activities (e.g. new routes opening, guided rides, etc) or incidental circumstances (e.g. media coverage of crime suppressing usage, entirely unrelated visitor-attracting events that might generate visits by cycle, etc). Simply having a record of intrinsic and extrinsic factors assists in the attribution of data events to real events.

#### 3.3.1 Data collection

Each of the six towns were provided with access to an online intervention diary. The diary was used to record infrastructure, smarter measures or other factors anticipated to have any impact, positive or negative, on cycling activity.

#### 3.3.2 Analysis

Material collected via the intervention diary was not studied in isolation, but was used as a means of corroborating patterns observed in the automatic cycle count data and other data sources.

### 3.4 Household level survey of physical activity

ICM was commissioned to conduct household level surveys in the Cycling Demonstration Towns in 2006, 2009 and 2011. The function of the exercise was to investigate the impact of the interventions on physical activity at a population level.

#### 3.4.1 Data collection

In each town, a representative quota sample of residents was interviewed by telephone. The surveys were conducted in March/early April in each year. 1,500 residents were interviewed in each town in each wave of research, giving a total sample size approximately 9,000 residents interviewed per wave. The sample size (chosen to provide the smallest possible confidence intervals around the data, for the resources available) means that estimates for all the towns combined are correct to within  $\pm 1.03\%$ . Data at town level are correct to within  $\pm 2.53\%$  at the 95% confidence level. Data were weighted to the profile of all adults in each town.

The core of the questionnaire was the physical activity measure taken from the European Prospective Investigation into Cancer (EPIC) study.<sup>5</sup> This assesses habitual physical activity using two questions referring to activity during the past year at work and during leisure time. The responses to these questions are used to create four categories: inactive, moderately active, moderately inactive and active.

Respondents reporting to have done some cycling in the past year were asked more detailed questions about their cycling frequency, duration and purpose. In the 2009 survey, some additional questions were added asking about awareness of publicity about cycling in general (unprompted awareness) and the Cycling Demonstration Towns programme in particular (prompted recall).

Each wave of research was undertaken in the same way with the same core questions, apart from the additional publicity awareness questions in 2009 and 2011.

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<sup>5</sup> Wareham NJ, Jakes RW, Rennie KL, Schuit J, Mitchell J, Hennings S and Day NE. Validity and repeatability of a simple index derived from the short physical activity questionnaire used in the European Prospective Investigation into Cancer and Nutrition (EPIC) study. Public Health Nutr. 2003 Jun;6(4):407-13.

### 3.4.2 Analysis

Analysis of data collected via the household level survey of physical activity used traditional significance testing. We acknowledge that this may not be directly applicable to the quota sampling method used in this survey. Reported significance tests (p values) should therefore be treated as indicative of a difference between reported data.

## 3.5 Sport England's Active People Survey

A secondary analysis of Sport England's Active People Survey (APS) was conducted, to compare levels of cycling in local authorities containing a Cycling Demonstration Town, with local authorities without intervention towns.

### 3.5.1 Analysis

A general sample of non-intervention authorities, and a sample of non-intervention authorities matched by demographics were compared to local authorities with Cycling Demonstration Towns. The measures compared were the proportion of respondents cycling for at least 30 minutes or more once or more a month, and the proportion of respondents cycling for at least 30 minutes or more 12 times a month or more.

Due to the exclusion of cycle journeys of less than 30 minutes from the Active People Survey<sup>6</sup>, this measure may under represent overall cycling in the towns as shorter journeys are not included. The findings of the ICM survey, which indicate approximately two thirds of those cycling in the week prior to the survey did so for less than 30 minutes a day, support this assertion.

Significance testing was applied in comparing change over time in the cycling measures included within the Active People Survey and in comparing these measures in the intervention areas to non-intervention and matched areas.

## 3.6 School travel data

Three sources of data on travel to school are considered: the Pupil Level Annual School Census (PLASC), Bike It hands-up surveys; and local authority hands-up surveys.

### 3.7 Pupil Level Annual School Census

The Pupil Level Annual School Census, collected by the Department of Education, included a question on mode of travel to school from 2007 onwards.

#### 3.7.1 Data collection

The monitoring team were provided with a collated database prepared by AECOM containing the data relating to the PLASC question on mode of travel to school collected between 2007 and 2010. The format of this data set allowed for filtering by schools located in Cycling Demonstration Towns and schools in areas matched to the Cycling Demonstration Towns areas. The data set also contained a flag against schools where Bike It (an intensive school-based intervention over the course of one academic year to encourage cycling) had been delivered since 2007.<sup>7</sup> The following amendments were made to this collated data set by the monitoring team:

- 2011 PLASC data received from the Department for Education were matched into the collated data set
- the data suppression rules applied to the 2011 PLASC data set by the Department for Education were applied to the earlier data within the collated data set prior to analysis

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<sup>6</sup> APS will in future be collecting data on cycle journeys of any length, but as this data is only available for 2010/11 onwards it was not possible to use it in this analysis.

<sup>7</sup> The monitoring also explored with Department for Transport whether it was possible to identify in a similar ways schools receiving interventions other than Bike It (for example, cycle parking, cycle, Go Ride cycle clubs) but this did not prove to be feasible

- the data set was amended to allow filtering by schools in Cycling Demonstration Towns and schools in areas matched to the Cycling Demonstration Towns
- the data set was amended to include the first year in which schools were engaged with Bike It.

The data on mode of travel to school collected via PLASC is gathered from all school pupils, and in that regard is a very comprehensive data set. However, a number of concerns have been raised about the data, with respect to variable modes of completion (input material can be collected from pupils or parents, and by different means); the possibility of 'carrying' a response to a question from year-to-year; the timing of data collection; and the fact of the use of the 'usual mode' question, as distinct from asking how pupils travel on the day of the survey. Nevertheless, the data represents a very valuable resource to the current study (although it is worth noting that data collection as a mandatory part of PLASC ceased in 2012).

### 3.7.2 Analysis

The proportions of pupils reporting to cycle to primary, secondary and all schools are reported for each town individually. The change in proportions of children cycling to school between 2007 and 2011 were tested for significance using the chi squared test. Levels of cycling to school in the Cycling Demonstration Towns were compared to similar areas without these interventions using PLASC data for matched areas.<sup>4</sup> Levels of cycling (as recorded by PLASC) were compared between schools within the Cycling Demonstration Towns receiving Bike It, schools without Bike It and all schools.

## 3.8 Bike It hands-up surveys

Hands-up surveys have been performed over the course of the programme by Bike It officers active in schools. All six of the Cycling Demonstration Towns had a Bike It officer for the duration of the project.

### 3.8.1 Data collection

In any given year, Bike It hands-up pre-surveys are usually performed during September, prior to intervention. Post-surveys are performed in July at the end of the summer term. In some cases, a further survey is performed at the end of the summer term of the second year of engagement. Bike It officers may survey the whole school, or the target age group. In either case, the same group of children are surveyed at the beginning and end of the first academic year of engagement.

In the surveys children are asked about their actual and preferred modes of travel to school, and their frequency of cycling. We acknowledge that there are limitations in comparing pre-survey data collected in September with post-survey data collected in July, where some seasonal influence on levels of cycling may be expected.

### 3.8.2 Analysis

Data from schools beginning Bike It in the academic years from 2006/07 to 2010/11 are reported herein. Data are included for all schools with at least a pre- and post-survey during the first year of engagement. Pre- and post-survey data are pooled across towns in aggregated analysis of Bike It data. The proportions of children never cycling to school, cycling to school everyday and on the day of the survey are reported in the individual town sections. The change in proportions of children cycling to school everyday between pre and the first post Bike It survey and 2011 were tested for significance using the chi squared test. Further analysis was performed for a subset of schools for which survey data were collected at the end of the first and second academic years following initial engagement with Bike It.

## 3.9 Local authority hands-up surveys and other data sources pertaining to travel to school

### 3.9.1 Data collection

Data collection via annual local authority hands up surveys (as distinct from PLASC) continued throughout the programme in a small number of towns. Exeter also provided data collected via the 'Fit to Succeed' programme relating to levels of cycling among children and young people.

### 3.9.2 Analysis

Proportions of children cycling to schools as recorded in hands up surveys performed by local authorities (distinct from PLASC) are reported without further detailed analysis.

## 3.10 Counts of parked bikes

### 3.10.1 Data collection

A 'beat' based approach, the most frequently applied approach in towns collecting parked bikes data, follows the model for counts of parked cars. This involves regular counts across groups of sites over the course of the day. Counts of bikes parked at specific locations, including schools and railway stations, were performed in some towns.

### 3.10.2 Analysis

The data collected from counts on beats were analysed to determine the number of bikes parked throughout the day – the concentration of parking, and the length of time parked – the duration. Summary data are presented for each town where relevant alongside a qualitative statement on any trends apparent in the data over time.

## 3.11 Accident data

### 3.11.1 Data collection

Data concerning accident rates in the Cycling Demonstration Towns were obtained via the Department for Transport for all towns. Data available up to 2010 were included in the analysis. These data are recorded by the police when road traffic accidents are reported to them. There is under-reporting of damage only and injury accidents because the police are not always called to the scene, or indeed contacted at all (as there is no legal requirement to do so). Even when the police have reported an injury accident, the reporting of the level of seriousness of the injury is of doubtful validity. The police differentiate between slight and serious injuries (broadly a serious injury requires an overnight stay in hospital)<sup>8</sup>. It is not always the case that a police officer's assessment (often at the roadside) of injury severity is the same as the triage assessment and subsequent treatment at hospital. Studies have been undertaken to compare hospital accident and emergency 'episode' statistics (HES) with STATS19 data and suggest some under-reporting of injury accidents, and differences in the reporting of the level of severity of the injury. In addition to this, the evidence suggests that under-reporting is greater where the accident involves pedestrian or cyclist injury, particularly where there is no other vehicle involved.

The occurrence of accidents is so relatively rare that data is required usually for a five year period before and after an intervention in order to make any statistically significant inferences about the

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<sup>8</sup> Serious injury: An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries, whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident. An injured casualty is recorded as seriously or slightly injured by the police on the basis of information available within a short time of the accident. This generally will not reflect the results of a medical examination, but may be influenced according to whether the casualty is hospitalised or not. Hospitalisation procedures will vary regionally.

Slight injury: An injury of a minor character such as a sprain (including neck whiplash injury, bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.

effect of an intervention. In the case of monitoring for the Cycling Demonstration Towns, this would imply a five year period after the completion of the set of interventions being promoted in each town. This timescale is beyond the timescale of the proposed monitoring. Such an assessment could, however, be separately undertaken at some future point in time. The average number of cyclists killed at the town level is likely to be very small and therefore observing a statistically significant result for this type of casualty is unlikely to happen.

The most recent data included in the analysis is from 2010 and it should be noted that nationally the severe weather conditions in early and late 2010 are thought to have resulted in lower traffic flows and lower levels of road accident fatalities overall due to road users driving more carefully<sup>9</sup>.

### 3.11.2 Analysis

The average number of accidents per year in the pre-programme period (2003-2005) was compared to the average number of accidents per year during the programme (2006-2010). Significant changes in accidents of each severity category recorded ( $p < 0.05$ ) were identified by calculating the confidence limits for the change between the two periods compared.

## 3.12 Route user intercept surveys

Route user intercept surveys were performed in Morecambe as part of the monitoring work relating to a Links to Schools project in the area.

### 3.12.1 Data collection

Surveys were delivered using a dedicated survey company. The surveys comprise a 12 hour manual count of route users performed on four days. A survey is performed alongside the manual count in which route users are asked to answer questions about the characteristics of their journey, demographic and factors influencing their decision to use the route.

### 3.12.2 Analysis

Manual count data are reported alongside key findings from the survey. Where multiple iterations of surveys have been performed at the same location, comparisons are made between these.

## 3.13 Other surveys

The following types of surveys were delivered in several towns.

### 3.13.1 Behaviour and attitude surveys

Surveys concerning levels of cycling and opinions about cycling were performed in several towns. The distribution mechanism used by each town varies, and the approach used in each case is described in the sections of this report relating to individual towns.

Where multiple iterations of a survey were performed during the programme, these are compared in the report. In some cases variability is noted between delivery and format between iterations. We acknowledge that such variations limit the degree to which these surveys contribute to understanding the impact of the programme as a whole. However, behaviour and attitude surveys are locally valuable in understanding levels of cycling during the programme period in the towns where they have been delivered.

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<sup>9</sup> Department for Transport, Reported Road Casualties in Great Britain: 2010 Annual Report, <http://webarchive.nationalarchives.gov.uk/20120926002851/http://www.dft.gov.uk/statistics/releases/road-accidents-and-safety-annual-report-2010/> [Accessed 22 November 2012]

### 3.13.2 Higher and further education site travel surveys

Surveys recording levels of cycling to were performed at colleges in a small number of towns. Where multiple surveys been performed, and these are compared in the report. No additional analysis has been undertaken on higher and further education site travel survey data.

### 3.13.3 Workplace travel surveys

Surveys of workplace travel have been performed in several towns. The format used by each town varies, and the approach used in each case is described in the sections of this report relating to individual towns. Where multiple surveys been performed these are compared in the report. No additional analysis has been undertaken on workplace travel data.

### 3.13.4 Travel Behaviour Surveys

Travel behaviour surveys have been conducted in a small number of towns, either through the programme or through other projects. Where this is the case, and where data have been made available, relevant data are summarised within the report.