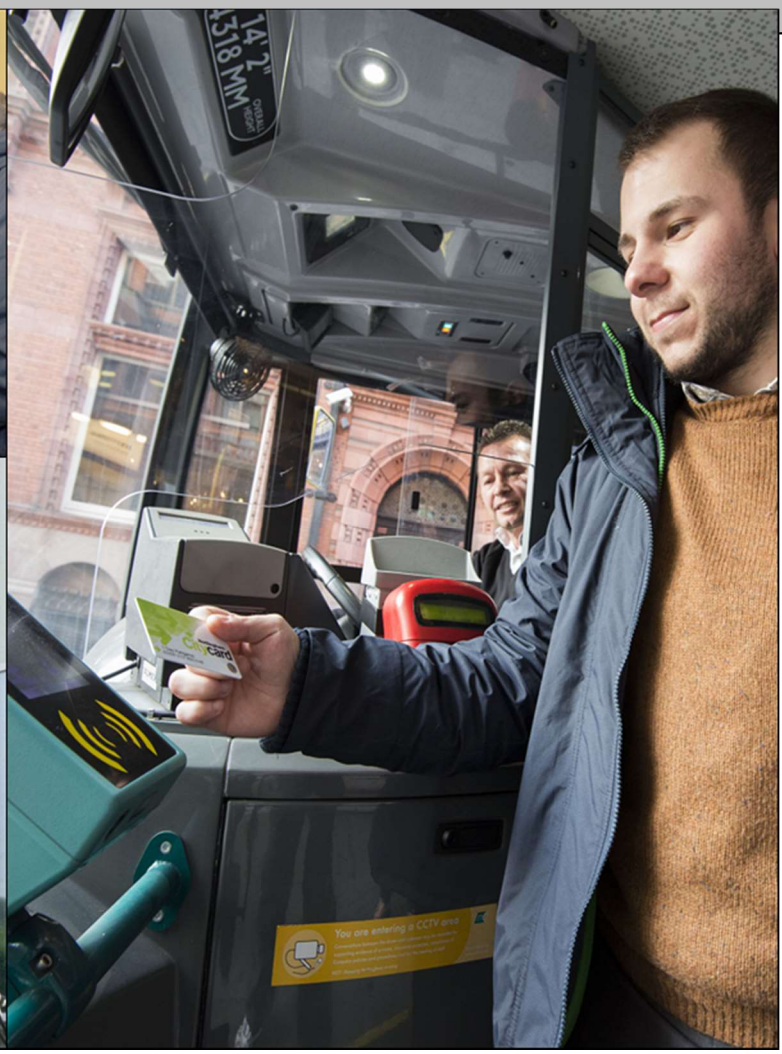
Meta-analysis of Outcomes of Investment in the 12 Local Sustainable Transport Fund Large Projects:

Final Report



Report to the Department for Transport

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Executive Summary

Background

The Local Sustainable Transport Fund supported investment in 96 local sustainable transport projects between July 2011 and March 2015[1]. Twelve of these were 'Large Projects', defined as projects that received a Department for Transport grant of more than £5 million.

The Fund was designed to support projects that met two core policy objectives: to support the local economy, and to reduce carbon emissions. Four secondary objectives were also identified: to deliver wider social benefits (e.g. accessibility and inclusion); to improve safety; to improve air quality; and to increase physical activity.

All 12 Large Projects were required as part of the LSTF Monitoring and Evaluation Framework to monitor the outcomes of their interventions, and to publish the outcome data in Annual Outcomes Reports. In addition, all LSTF-supported projects, including the 12 Large Projects, were required to report the activities (or outputs) that had been delivered in each year of the programme, through an online Annual Outputs Survey[2].

This final meta-analysis of the 12 LSTF Large Projects was commissioned by the Department for Transport to assess the effect of the LSTF programme and the extent to which it had achieved the high-level objectives that were set for it. It updates evidence previously presented in an interim report. It draws on the findings set out in Annual Outcomes Reports and Annual Outputs Surveys, and analysis of a range of secondary datasets.

Overall approach

The Large Projects differed in their approaches in terms of the detail, but there were some common themes. Several Large Projects adopted a 'corridor' approach, in which investment in infrastructure and travel behaviour change measures was concentrated along a limited number of main routes. There was substantial effort to develop services aimed at job-seekers (especially in BDRS, CENTRO, Merseyside, Nottingham and TfGM) *(S 9.2[3]).* There were significant successes in pump-priming new bus services to employment sites (e.g. in BDRS, Hertfordshire, WEST and elsewhere) *(S 6.6).* There was quite intensive support for cycling, with seven Large Projects implementing many schemes *(S 7.1).* A number of Large Projects developed innovative approaches to travel

1 Some LSTF projects received a further year of funding, although this activity was out of scope for this evaluation work.
2 By 'outcomes', we mean the effects of the programme, for example on traffic levels, bus use, cycling etc. By 'outputs', we mean the schemes, activities and other interventions that took place, for example installation of bus or cycle lanes, provision of new bus services, cycle training etc.
3 Throughout the Executive Summary, key findings are cross-referenced to the relevant section (S) of the main report, to assist readers wishing for more detail.

behaviour change, and implemented these on a fairly large scale: for example, workplace personalised travel planning, bus ticket promotions along key corridors, and virtual 'community smarter travel hubs'.

By March 2015, all but one Large Project had spent their full DfT grant, or very nearly so. This was in contrast to the situation a year earlier (as reported in the interim meta-analysis), when most projects were about 50% complete in terms of expenditure *(S 3.2).* This 'back-end loading' of expenditure to the final year of the programme was mainly due to large capital schemes, which required a lengthy planning phase incurring relatively little expenditure, with the main 'spend' occurring near the end. This had implications for the evaluation, because it meant that some infrastructure schemes were delivered at a late stage in the programme, and were unlikely to have had their full effect at the point when the 12 Large Projects were collecting final monitoring data.

Changes in traffic

The general picture in the Large Project local authority areas was one of **absolute traffic volumes and *per capita* traffic volumes declining relative to a comparator group (and, for *per capita* traffic, also declining in absolute terms), with an increasing difference during the post-LSTF period as compared to the pre-LSTF period** *(S 4.3, S 4.5)***.**

Evidence from National Road Traffic Estimates shows that for the group of 10 Large Projects for which data were available, there was a fall in car traffic between a 2009-11 baseline and 2013, followed by an increase over the period to 2015. A broadly similar 'U'-shaped trend was also seen in a comparator group of local authorities (all other English local authorities excluding London), reflecting wider economic trends of recession followed by economic recovery. However, the rate of decrease from 2009-11 to 2013 was greater for the Large Projects as a group than for the comparator group, and the rate of increase after 2013 was lower.

This meant that between 2009-11 and 2015, total volumes of car traffic in the comparator group increased by 2.9%, whereas car traffic in the group of 10 Large Projects only increased by 1.2% (a statistically significant difference of -1.7 percentage points[4]).

This difference between the Large Projects trend and the comparator group trend was more marked *after* 2009-11 than it was *before* 2009-11: in the period before LSTF, from 2005-07 to 2009-11, car traffic in the Large Projects group fell by 0.7%, while in the comparator group it fell by 0.2% (a difference of -0.5 percentage points, i.e. three times smaller than the -1.7 percentage point difference observed after 2009-2011).

4 Here and subsequently, all percentage differences are absolute percentage point differences rather than relative percentage differences.

The better performance (i.e. smaller increase in traffic than in the comparator group) in the Large Project local authority areas occurred despite a more rapid rise in population in the Large Project areas than in the comparator group *(S 4.4)*.

Adjusting for population growth, the 10 Large Projects as a group, and all of them individually, showed a fall in *per capita* car traffic between 2009-11 and 2015 which was greater than the fall in the comparator group (Large Projects group -2.6%; comparator group -0.3%: a statistically significant difference of -2.3 percentage points). Again, the difference between the Large Projects trend and the comparator group trend was more marked *after* 2009-11 than it was *before* 2009-11: in the period from 2005-07 to 2009-11, *per capita* car traffic in the Large Projects as a group fell by 2.6%, while in the comparator group it fell by 2.2%, a difference of -0.4 percentage points.

The superior performance of the Large Projects, relative to the comparator group, after 2009-11, is likely to have been due to multiple factors. From analysis of the scale and 'effect size' of multiple individual LSTF schemes, it is implausible that they could account for the entirety of the overall change in traffic volumes *(S 4.8).* Nevertheless, we judge that LSTF schemes may have made a non-trivial contribution to the overall change *(S 4.9)*. The most likely conclusion is that an ongoing programme of sustainable transport interventions, taking place over a number of years, and of which the LSTF programme formed one of the most recent manifestations, was a primary cause of the observed traffic changes. However, other factors are also likely to have played a significant role. In particular, the declining trend in per capita car use ('peak car'), evident nationally and internationally, may have had a bigger effect in the Large Project areas than elsewhere, as they included large urban areas which tend to have a younger 'trend-leading' population profile. Changing patterns of land use may also have had a bigger effect in the Large Project areas than elsewhere, as the Large Project local authorities may have been more committed to sustainable transport and therefore more concerned to ensure that land use planning strategies were supportive of sustainable transport patterns *(S 14.3)*.

Changes in bus use

Bus trip data showed a general decline since before the start of the LSTF programme, both when measured in absolute terms and when measured per capita, for the group of 10 Large Projects for which data were available. This downward trend was also shown by the comparator group *(S 6.3)*.

However, **the *pre-LSTF trend* was for bus use to decline faster in the group of 10 Large Projects than in the comparator group, whereas the trend *after the start of LSTF* was for bus use to decline more slowly in the group of 10 Large Projects than in the comparator group.** (Pre-LSTF period from 2009/10 to 2011/12[5]: per capita change in

5 For bus patronage data, the baseline year was *a priori* chosen to be slightly later than the years used for other analyses, and a shorter period was used to compare pre-intervention trends, because the data series in question is only available from 2009/10 onwards.

Large Projects = -6.1% and per capita change in comparator group = -2.4%. Period after start of LSTF, from 2011/12 to 2015/16: per capita change in Large Projects = -3.3% and per capita change in comparator group = -8.5%, a statistically significant difference).

The better performance of the group of 10 Large Projects was strongly influenced by exceptional rises in bus patronage in Reading and WEST, and to a lesser extent in Bournemouth and Solent. Most other Large Projects tracked close to the comparator group, although there were signs that some of the metropolitan areas had arrested or slowed the historic decline of bus use in their areas.

It is improbable that the strong performance in Reading is primarily attributable to LSTF schemes, since the LSTF bus measures in Reading were not of a scale or intensity likely to have caused area-wide patronage increases. Other factors, perhaps related to other work by the local authority and the main (municipal) bus company in Reading, are likely to have been more important. The strong patronage increase in WEST could partly represent the influence of LSTF schemes, of which there were many. However, it may also be partly attributable to Bristol's earlier investment in bus priority measures and bus infrastructure, its recent Better Bus Areas project, and significant investment in new buses by commercial bus companies, partly due to the public investment programme. Better Bus Areas funding, as well as LSTF, could have contributed to the patronage rises in Bournemouth and Solent *(S 6.3)*.

At a finer scale, detailed examination of 28 sets of bus routes that were new or had higher service levels as a result of LSTF funding found that in 21 cases, an uplift in patronage was attributable to the LSTF intervention and the patronage benefit was likely to be maintained once funding ceased (in most cases because the new service level had reached commercial viability) *(S 6.5)*. **These 21 routes had together resulted in an estimated annual patronage uplift of 2.5 million trips, replacing an estimated 12 million car kilometres per year, and avoiding an estimated 2,300 tonnes CO_2e per year**.

Changes in cycling

The general picture was of a significant amount of activity to encourage cycling, but rather limited evidence to assess the effect of this activity on overall cycling levels. Nevertheless, accepting the limitations of the data, **all seven Large Projects that had implemented many cycling interventions showed some indications of increases in cycling since the start of the LSTF programme**, measured either by automatic counts or manual cordon counts. There was also some evidence from the Active People Survey of an area-wide uplift in cycling, both in absolute terms and relative to the background national trend.

Cycling uplift as recorded by data from multiple automatic counter sites was +46% in Merseyside and +28% in Greater Nottingham (pre / post comparison, both between 2010/11 and 2015/16), and +23% in WEST excluding the City of Bristol (pre / post comparison between 2010/11 and 2014/15) *(S 7.5).* These figures do not necessarily

imply an *overall* cycling uplift of 20-50% in these cities, as cycle counters are likely to have been preferentially located in places where improvements to cycle infrastructure were made, but they are suggestive of some increase in cycling activity. For CENTRO, data from 50 automatic counters close to LSTF intervention corridors also showed signs of increased cycling between 2012 and 2015: 31 sites showed a year on year increase, 15 showed an increase in comparison with the baseline and just 4 sites showed a decrease. Area-wide cycling uplift as recorded by manual cordon counts was +2% in Reading (between 2009-11 and 2014-16) and +9% in TfGM across all 10 district centres (between 2012 and 2015). In BDRS, manual cordon counts suggested cycling had increased for trips into two out of four urban centres, Sheffield and Rotherham (pre / post comparison between 2010 and 2015, +5% and +34% respectively) *(S 7.6)*.

In some cases, area-wide increases in cycling were a continuation of a pre-LSTF trend, suggesting that although LSTF schemes may have contributed to the uplift in cycling, other factors, including cycling investment prior to LSTF, were also likely to have played a part.

Evidence from the Active People Survey indicated a modest but significant increase in the proportion of adults who had cycled in the past month in the 12 Large Projects between 2010-12 and 2013-15 (from 14.1% to 14.5%, p=0.04 for difference). By contrast, the proportion of cyclists in the national comparator group decreased somewhat over this same time period, meaning that the change the Large Projects was more favourable than the background national trend (p=0.02 for difference between the Large Projects and the national comparator group). There was no evidence that the amount of cycling done by cyclists changed in the Large Projects, either in absolute terms or relative to the background trend. This provides an indirect suggestion that any increase in cycling in the Large Projects may have been driven by widening participation in cycling, rather than encouraging existing cyclists to do more *(S 7.3).*

There was a large amount of evidence of specific interventions leading to increases in cycling (and also some evidence of specific interventions having unsuccessful outcomes). This evidence came from pre- and post-scheme counts at sites where cycle lanes had been built or secure cycle parking installed; from post-intervention surveys of people who had received cycle training, a bicycle loan, or cycle maintenance classes; and from pre- and post-intervention surveys at sites such as schools and colleges which had participated in cycling promotional programmes *(S 7.7)*.

Changes in walking

There was **some activity to encourage walking, but with a less strong focus than for cycling.** A few Large Projects had made significant public realm improvements – for example, Telford redesigned part of its town centre Box Road as a shared space. Other interventions included 20mph zones, pedestrian route improvements, and behaviour change measures such as led walks.

At the local authority level, data from the Active People Survey on the average number of days when adults had done any walking in the previous four weeks showed similar trends in the group of 12 Large Projects and in the comparator group, both before and during the course of the LSTF programme. However, one Large Project, Nottingham, showed an increase in walking relative to the comparator group between 2012 and 2014/15 that was statistically significant *(S 8.3, S 8.4)*.

Data from area-wide manual counts (and in one case a large-scale mode share survey) in six Large Projects showed mixed evidence. Three Large Projects showed an increase in walking between 2009-11 and the most recent period (either 2013-15 or 2014-16), while three showed a decrease *(S 8.5)*.

Intervention-level monitoring data demonstrated that some schemes had resulted in increased levels of walking. Six Large Projects reported pre and post-scheme manual counts at locations where footways had been widened, new paths built, or (in one case) a new pedestrian / cycle bridge installed. In all, results were reported for 17 schemes: eight of these showed increasing pedestrian flows, six showed mixed results, and three showed a fall in pedestrian flows. There were also examples of reported increases in walking from post-intervention surveys of people who had participated in walking promotional programmes and personal travel planning *(S 8.6; S 10.7)*.

Modal shift from travel behaviour change programmes

All the Large Projects delivered a range of travel behaviour change programmes. Workplace-based interventions were a significant focus for nine Large Projects, with more than 2,400 organisations receiving some form of support. Household personalised travel planning projects were implemented on a fairly large scale by five Large Projects, and on a medium scale by two, and reached more than 100,000 households in total. Nine Large Projects delivered large- or medium-scale projects to provide personalised travel information or incentives to individuals in other contexts (at workplaces and other locations), with nearly 100,000 adults receiving this. Eight Large Projects had significant programmes of engagement with schools, and over 750 schools became involved *(S 10.2).*

A random effects meta-analysis of changes in car use at 93 workplaces with useable baseline and follow-up employee surveys found that car driver modal share decreased on average in absolute terms by 2.7 percentage points, equivalent to a 4.1% relative decrease, a statistically significant change *(S 10.5).* This **reduction in car use from workplace travel planning was small compared to previous evidence of the effects that can be achieved under ideal conditions**. This may be because Large Projects focussed on relatively easy 'pull' initiatives, such as providing encouragement and information, rather than more challenging, but more effective, 'push' initiatives such as reducing or restraining parking, which may have been more common amongst the businesses involved in previous workplace travel planning programmes.

Economic effects: support for job-seekers

About **91,000 job-seekers in Large Project areas received some form of travel support** *(S 9.2).* This was equivalent to 10% of the number of unemployed adults in the 12 Large Project areas during 2013/14 and 2014/15 *(S 9.2)*. Support included free travel passes; personalised journey plans; loan of a moped; and provision of a bicycle. Surveys suggest that this support helped people in their job search, for example by enabling travel to work placements that subsequently resulted in a job offer, or by enabling travel to interviews or training that would not otherwise have been feasible *(S 9.5).* There is some evidence that support programmes broadened people's travel horizons, and hence widened the number of possible jobs that were within scope. Support programmes that provided access to hard-to-reach employment sites (e.g. through community transport services, free public transport travel in the early days of a new job, or loan of a moped) resulted in people taking up job offers that they would not otherwise have considered. And finally, having accepted a job offer, these services enabled people to stay in work and encouraged sustainable travel patterns in future.

Three Large Projects calculated the economic value of their job-seeker support programmes, and concluded that this was high relative to the cost of their programmes

Economic effects: reducing congestion

Three Large Projects undertook many congestion-relief interventions, and two undertook some interventions. The main interventions were traffic signal upgrades; upgrade of traffic monitoring and control technology; changes in road and junction layouts; and park and ride schemes.

At the end of the programme, **rush-hour congestion at the local authority level for the Large Projects as a whole had slightly worsened relative to the comparator group** *(S 5.3).* This worsening in rush-hour congestion can be attributed, at least in part, to increases in the population and growth in jobs in the Large Project areas.

However, there were also local factors at play that could have significantly worsened rush-hour congestion over the LSTF period *(S 5.4).* These included both factors *unrelated* to LSTF (e.g. disruptions due to utility roadworks, or disruptions due to major transport schemes involving roadworks at motorway junctions or highway maintenance programmes); and factors *related* to LSTF (temporary roadworks due to LSTF schemes; permanent reallocation of road or junction capacity; speed limit reductions). There were also cases where new development had been expected to cause localised increases in traffic and worsen congestion, and where the Large Project officers judged that LSTF interventions had lessened the adverse impact.

Although rush-hour congestion for general traffic did not improve, there was **evidence of improvements in bus punctuality** *(S 5.5).* Some of this was attributable to specific road network modifications funded by LSTF.

Reducing carbon emissions

Carbon dioxide emissions from transport fell in all 12 Large Projects, and some but not all of this reduction in emissions was attributable to LSTF schemes.

Carbon dioxide emissions from transport fell both in absolute terms and per capita, between a 2009-11 baseline and 2014 *(S 11.3).* The overall change in absolute emissions of CO_2 for the Large Projects was a reduction of 4.1% compared to a reduction in the comparator group of 2.3%. Per capita transport emissions of CO_2 in the Large Projects fell by 6.9%, compared to a reduction in the comparator group of 4.7%.

Eight Large Projects made estimates of the carbon impacts of individual schemes including car sharing; public transport substituting for car journeys; promotion of cycling; workplace travel planning; personalised travel planning; ECO Stars fleet management and driver efficiency scheme; eco-driver training; promotion of ultra-low emission vehicles; and a freight consolidation centre *(S 11.5).* For those Large Projects that estimated the carbon savings attributable to multiple initiatives, quoted annual emissions savings were in the order of 1,000 – 50,000 tonnes CO_2 per Large Project, equivalent to between 0.03% and 1.6% of total carbon dioxide emissions from transport in the respective local authorities *(S 14.10).* The schemes for which estimates of carbon impacts had been made represented an incomplete and unknown proportion of total LSTF investment, and it would therefore be expected that overall carbon savings would be greater than these figures.

Road safety

Large Projects carried out a range of interventions that might be expected to offer road safety benefits, such as 20 mph speed limits, cycle infrastructure, cycle training, child pedestrian training and road safety training. However, in most Large Projects the scale of road safety interventions was modest.

Road casualty data (STATS19) showed that the trend in KSI (killed and seriously injured) casualties per capita[6] in the group of Large Projects closely tracked the trend in the comparator group, both before and during the LSTF period *(S 12.3).*

Two Large Projects reported evidence suggestive of safety benefits from introduction of 20 mph zones. Telford reported fewer casualties in the Box Road area around its town centre, where a key aim had been to improve safety for pedestrians and cyclists. Elsewhere, evidence of road safety effects was inconclusive or mixed, with some areas within Large Projects showing rises in casualties while other areas showed drops, and it was not possible to draw conclusions about overall effects *(S 12.5).*

6 It was not possible to assess changes in KSI casualties relative to exposure (e.g. relative to distance walked / cycled).

Value for money

Taken together, the schemes delivered by the Large Projects represented very high value for money. Ex-post cost-benefit analysis produced a 'best estimate' BCR of 5.2 – 6.1 (depending on which assumptions were applied) *(S 13.4).* Sensitivity tests, varying the rate at which changes in traffic, bus use and cycling were assumed to decay after the end of the programme, and varying the assumptions about what proportion of change was attributable to the LSTF programme, suggested a lower-bound programme-level BCR of more than 4, and an upper-bound programme-level BCR of more than 14.

These BCRs did not include all benefits of the LSTF programme. Benefits that were not captured, due to lack of data, included public realm enhancements; health benefits from increased walking (other than that associated with bus travel); and benefits associated with rail and station enhancements.

Journey quality benefits arising from interventions such as simplified (smartcard) ticketing, real-time passenger information, and new cycle infrastructure, formed a significant proportion of the overall benefits (around 49% of the total benefit at the programme level). Benefits arising from lower traffic levels were the next most-significant benefit (around 38% of the total benefit at the programme level, mainly comprising decongestion benefits[7], fewer accidents and lower greenhouse gas emissions, offset by drops in indirect taxation). Health benefits due to increased cycling and increased walking as part of bus trips represented around 8% of the total benefit at the programme level *(S 13.4).*

The cost of the programme per car km removed from the network was estimated to be 4.8p per car km. This was broadly comparable with estimates from previous sustainable transport investment programmes.

7 These benefits relate to congestion-relief that would have occurred if nothing except traffic levels had changed. However, the benefit might be taken in other ways: e.g. by reallocating road capacity to longer pedestrian phases at traffic signals. If this happened, 'on the ground' congestion (as measured by average traffic speeds) might stay the same but there would still be a 'decongestion benefit'.

PART I: CONTEXT, INPUTS AND OUTPUTS

1 Introduction

1.1 Background to the research

The Local Sustainable Transport Fund supported investment in 96 local sustainable transport projects between July 2011 and March 2015[8]. Twelve of these were 'Large Projects', defined as projects that received a Department for Transport grant of more than £5 million. These Large Projects are the focus of this report.

Funding for the Large Projects during the core LSTF programme up to March 2015 (which was the focus of this evaluation) covered a period of either four or three years. Eight of the Large Projects received 'Key Component' funding during 2011/12 followed by 'Large Project' funding in 2012/13 – 2014/15. Four of the Large Projects did not apply for Key Component funding, and so their grant covered only the period from 2012/13 to 2014/15.

All 12 Large Projects were required to monitor the outcomes of their interventions, and to publish the outcome data in Annual Outcomes Reports. In addition, all LSTF-supported projects, including the 12 Large Projects, were required to report the activities (or outputs) that had been delivered in each year of the programme, through an online Annual Outputs Survey.

This meta-analysis of the 12 LSTF Large Projects has been commissioned by the Department for Transport to assess the effect of the LSTF programme and the extent to which it achieved the high-level objectives that were set for it. It builds on an interim report, which assessed the evidence up to a point roughly two-thirds of the way through the programme[9]. It draws on the findings set out in the Annual Outcomes Reports and Annual Outputs Surveys; extensive follow-up contact with the 12 Large Projects; and analysis of a range of secondary datasets.

1.2 Objectives of the Local Sustainable Transport Fund

The Fund supported projects that were designed to meet two core policy objectives[10]:

- To support the local economy and facilitate economic development, for example by reducing congestion, improving the reliability and predictability of journey times, or enhancing access to employment and other essential services.
- To reduce carbon emissions, for example by bringing about an increase in the volume and proportion of journeys made by low carbon sustainable modes including walking and cycling.

Four secondary objectives were also identified:

- To help to deliver wider social and economic benefits (e.g. accessibility and inclusion).
- To improve safety.
- To bring about improvements in air quality and increased compliance with air quality standards, and wider environmental benefits such as noise reduction.
- To actively promote increased levels of physical activity and the health benefits this can be expected to deliver.

8 Extended by a further year, to March 2016, for some local authorities.
9 Sloman L, Cairns S, Goodman A, Hopkin J and Taylor I (2015) *Meta-analysis of outcomes of investment in the 12 Local Sustainable Transport Fund Large Projects: Interim Report* to Department for Transport
10 Department for Transport (2011) *Local Sustainable Transport Fund – Guidance on the Application Process*

1.3 Focus of the meta-analysis

The meta-analysis focused on eight research questions, as follows:

RQ1: What were the main strands of each Large Project's approach, and how did they relate to the objectives of the Fund? How did the Large Projects try to intervene to achieve these objectives, in terms of expenditure and outputs? How similar or different are the Large Projects in their approaches and outputs?

RQ2: In each Large Project separately, and across the 12 Large Projects as a whole, did traffic volume / levels of car use improve (pre-post comparison)? Can any changes in traffic volume be attributed to LSTF interventions?

RQ3: In each Large Project separately, and across the 12 Large Projects as a whole, did carbon emissions reduce (pre-post comparison)? Can any changes in carbon emissions be attributed to LSTF interventions?

RQ4: In each Large Project separately, and across the 12 Large Projects as a whole, did public transport use increase (pre-post comparison)? Can any changes in public transport use be attributed to LSTF interventions?

RQ5: In each Large Project separately, and across the 12 Large Projects as a whole, did active travel increase (pre-post comparison)? Can any changes in active travel be attributed to LSTF interventions?

RQ6: In each Large Project separately, and across the 12 Large Projects as a whole, what were the economic impacts, particularly in relation to congestion relief and support for job-seekers? Can any economic effects be attributed to LSTF interventions?

RQ7: In each Large Project separately, and across the 12 Large Projects as a whole, did road traffic casualties (KSIs) go down (pre-post comparison)? Can any changes in the number of casualties be attributed to LSTF interventions?

RQ8: What lessons can be learnt for the design and monitoring of future programmes?

1.4 Methodology for the meta-analysis

Following completion of the interim meta-analysis, a seminar was held with the Large Projects in June 2015 to discuss the interim findings and to consider how the evidence base could be strengthened for the final meta-analysis. Further phone discussions with each Large Project took place in January 2016. These discussions resulted in some changes to the way in which evidence was presented in some Outcomes Reports, although not all of the recommended changes to data collection and data presentation were feasible for all Large Projects. The primary aim in making these recommendations was to ensure, so far as feasible, that the 12 Outcomes Reports presented data in a way that was consistent and enabled comparison and aggregation of results across Large Projects[11]. The final (2014/15) Outcomes Reports were completed by Large Projects in March 2016.

The analytical phase involved the following activities:

11 Although officers responsible for all the Large Projects were very helpful and did what they could to ensure the Outcomes Reports provided the information required for the meta-analysis, it was in practice extremely difficult to achieve a consistency of approach across Outcomes Reports and this made the task of meta-analysis considerably more complex.

- Analysis of findings as reported in the 2014/15 Outcomes Reports, together with other relevant documents including in particular the Annual Outputs Surveys.
- Analysis of secondary datasets: the Active People Survey, National Travel Survey, National Road Traffic Estimates, DfT congestion statistics and other relevant datasets.
- Three rounds of detailed clarification queries with Large Projects to resolve inconsistencies or points that were not clear from Annual Outcomes Reports.
- Obtaining and analysing additional data from the Large Projects, including traffic counts, cycle counts, bus patronage and travel surveys.

In analysing and comparing findings from Outcomes Reports, we focused on evidence that related directly to our eight research questions, and on datasets that had been reported in a comparable way by most Large Projects.

In analysing secondary datasets, we looked both at trends at the programme level (i.e. aggregated across all 12 Large Projects), and trends for each Large Project individually. Each Large Project was represented by those local authorities in which activities had been concentrated. This involved excluding a few local authorities in which only very limited activity took place. The local authorities included in the secondary dataset analysis are listed in Appendix 1.1 at the end of this chapter.

Trends at the programme level were compared with trends for all other English local authorities outside London. This means that our national comparator group includes a mix of local areas that have received LSTF funding as Small Projects and areas that have not received such funding. That is, the comparator group is not a 'no intervention' group, but is probably a 'lower level of intervention' group[12]. A further limitation is that the Large Projects were not a 'representative' sub-sample of local authorities, being skewed towards the largest urban centres outside London. It is also likely that the Large Projects were to some extent atypical in having a stronger orientation towards sustainable transport initiatives. We considered whether it was feasible to make comparisons at programme level with a matched set of local authorities, using the National Statistics 2011 Area Classification for Local Authorities, which measures the similarity of pairs of local authorities in terms of a range of demographic, socio-economic, employment and industry characteristics. However, this approach was not used because so many of the 'close match' local authorities had also received LSTF funding as Small Projects.

Three Large Projects (Bournemouth, Hertfordshire and Solent) specified control areas or corridors for the purpose of monitoring the outcomes of their interventions. In all three cases, there are reasons why direct comparison between target and control data was problematic, but we have reported this evidence, with caveats, where it exists.

Both in analysis of the secondary datasets and in analysis of data reported by the Large Projects, we sought to present measures of uncertainty (e.g. confidence intervals) where feasible and to conduct statistical testing where feasible and appropriate. Unfortunately such calculations were often not feasible because we lacked access to raw data. For example, we could calculate confidence intervals when analysing the Active People Survey because we had access to individual-level data, but could not do so for carbon emissions because we only had access to estimated mean values at the local authority level, without any straightforward measure of estimated variance. In other cases, statistical testing was not judged appropriate because of insufficient sample sizes: for example, the

12 Of course, even local authorities that did not receive LSTF funding are likely to have been carrying out some sustainable transport projects during the period of interest.

number of 'pre-' and 'post-' intervention counts from cycle count readers was far below the required number of 50 or so observations needed to fit time-series models in a robust manner.

Finally, we were not able to independently verify all results reported in Outcomes Reports. Where reported results seemed clearly not to be credible, we questioned them with the relevant Large Project, but we have not undertaken an audit of all results.

1.5 Naming convention for Large Projects

Most of the Large Projects were delivered by a formal or informal partnership of a number of local authorities (and, in some cases, Passenger Transport Executives), who in turn contracted specific activities to a wide range of partner organisations including commercial consultancies, voluntary organisations, and public transport operators. Throughout this report, we refer to 'Large Projects', by which we mean the group of local authorities with budgetary responsibility for delivering the LSTF programme in their area.

When referring to individual Large Projects, we have used either an abbreviated version of the name of the lead local transport authority, or of the LSTF project name. These are listed in Table 1.1. In three cases (BDRS, Merseyside and Solent), it should be noted that the name of the lead local transport authority changed during the course of the LSTF programme.

It should also be noted that the Large Project name is inevitably a shortening of the actual areas involved. For example, the Bournemouth Large Project includes the towns (and local authority areas) of Poole and Christchurch (Hampshire) as well as the town of Bournemouth; and the Nottingham Large Project includes the whole Nottingham urban area, parts of which are in the administrative area of Nottinghamshire County Council.

The main activities undertaken by each of the Large Projects are summarised in section 3.7.

Table 1.1: Large Project names, lead local transport authorities, and LSTF project names

Large Project	Lead Local Transport Authority^	LSTF project name*
BDRS	Barnsley, Doncaster, Rotherham and Sheffield Combined Authority (formerly South Yorkshire Integrated Transport Authority)	A Sustainable Journey to Work
Bournemouth	Bournemouth Borough Council	SE Dorset Sustainable Travel Package – the Three Towns Corridor
CENTRO	CENTRO (became TfWM shortly after the end of the LSTF programme period)	Smart Network, Smarter Choices
Hertfordshire	Hertfordshire County Council	BigHertsBigIdeas
Merseyside	Liverpool City Region Combined Authority (formerly Merseytravel, Liverpool City Council, St Helens Council, Wirral Council, Sefton Council and Knowsley Council)	Supporting Sustainable Access to Opportunity in Merseyside
Nottingham	Nottingham City Council	Nottingham Urban Area LSTF Programme
Reading	Reading Borough Council	Targeting Travel Choice Transitions
Solent	Solent Transport (formerly Transport for South Hampshire & Isle of Wight)	A Better Connected South Hampshire

Surrey	Surrey County Council	Travel SMART
Telford	Telford and Wrekin Council	Telford Future – Local Action for Sustainable Growth
TfGM	Transport for Greater Manchester	Sustainable Travel in Greater Manchester (Large Project); Greater Manchester Commuter Cycle Project (Key Component)
WEST	West of England (Bristol City Council co-ordinating)	West of England Sustainable Travel (WEST)

^ As given in Question 2 of 2013/14 Outputs Survey; * as given in Question 3 of 2013/14 Outputs Survey

1.6 Structure of this report

The report is organised in three sections:

Part I: Context, Inputs and Outputs

Following this introduction, Chapter 2 sets the context for LSTF investment in the 12 Large Projects, briefly describing the geographical areas covered, and changes in population and number of jobs during the period covered by the LSTF programme.

Chapter 3 gives an overview of the inputs (expenditure) in each Large Project, and how that was split between different outputs (types of activity). It also reports on the scale of activity in each Large Project. It includes four case studies of typical intervention packages undertaken by different Large Projects, with the aim of giving a sense of what the LSTF programme 'looked like' at a fine grained level. Finally, it provides a one-page summary of the approach adopted by each Large Project.

Part II: Evidence on Outcomes

Chapters 4-10 report on analysis of national data sources and evidence from each Large Project, looking in turn at traffic and car use (as a proxy for carbon emissions); congestion (as a measure of economic efficiency); bus use; cycling; walking; support for job-seekers; and modal shift from behaviour change initiatives. In each case, we begin by looking at the extent to which the topic in question has been a major or a minor focus for each Large Project; then report on the main metrics used to monitor outcomes; and briefly review national trends. We then report on 'high-level' changes – that is, at the level of the entire local authority (or group of local authorities); on 'project-level' changes – that is, at the level of the area covered by the Large Project; and on 'intervention-level' changes – that is, for individual schemes or activities delivered by the Large Project. Different metrics and datasets are relevant at each level. Each chapter concludes with a summary Table setting out the direction of change since the start of the LSTF programme, and the extent to which any outcomes are clearly attributable to the LSTF investment.

Part III: Evidence on Impacts and Cost-Benefit Analysis

Chapters 11 and 12 present analysis of national data sources and evidence from each Large Project in relation to carbon emissions and road safety.

Chapter 13 examines the value for money of the LSTF programme, based on a simple ex-post cost-benefit analysis.

Chapter 14 sets out our conclusions, including main findings and lessons for similar programmes.

Appendix 1.1: Local authority areas included in analysis of secondary datasets

Large Project	Local authorities	Active People Survey ; Carbon; Injuries; Unemployment	Road Traffic; Congestion; Bus Use
BDRS	Barnsley	Y	Y
	Doncaster	Y	Y
	Rotherham	Y	Y
	Sheffield	Y	Y
Bournemouth	Bournemouth	Y	Y
	Poole	Y	Y
	Christchurch	Y	Excluded*
CENTRO	Wolverhampton	Y	Y
	Walsall	Y	Y
	Sandwell	Y	Y
	Dudley	Y	Y
	Birmingham	Y	Y
	Solihull	Y	Y
	Coventry	Y	Y
Hertfordshire	Watford	Y	Excluded*
	St Albans	Y	
	Dacorum	Y	
Merseyside	Knowsley	Y	Y
	Liverpool	Y	Y
	St Helens	Y	Y
	Sefton	Y	Y
	Wirral	Y	Y
Nottingham	City of Nottingham	Y	Y
	Broxtowe	Y	Excluded*
	Gedling	Y	
	Rushcliffe	Y	
	Erewash	Y	
	Amber Valley	Y	
Reading	Reading	Y	Y
Solent	Portsmouth	Y	Y
	Southampton	Y	Y
	Eastleigh	Y	Excluded*
	Fareham	Y	
	Gosport	Y	
	Havant	Y	
Surrey	Guildford	Y	Excluded*
	Reigate and Banstead	Y	
	Woking	Y	
Telford	Telford & Wrekin	Y	Y
TfGM	Bolton	Y	Y
	Bury	Y	Y
	Manchester	Y	Y
	Oldham	Y	Y
	Rochdale	Y	Y
	Salford	Y	Y
	Stockport	Y	Y
	Tameside	Y	Y
	Trafford	Y	Y
	Wigan	Y	Y
WEST	Bristol	Y	Y
	Bath & NE Somerset	Y	Y
	North Somerset	Y	Y
	South Gloucestershire	Y	Y

District local authorities that were judged to have received a very small proportion of Large Project LSTF investment are not listed here and have been excluded when undertaking analysis of secondary datasets.

* District local authorities were excluded from the analysis where only pooled county-level data were available, although in the case of bus use, county-level data for Hertfordshire and Surrey is also presented for information.

2 Context for LSTF investment

2.1 Geographical areas covered by the Large Projects

The 12 Large Projects varied considerably in their size and circumstances, and included polycentric conurbations made up of a number of local authorities, freestanding towns, and groups of towns.

The geographical areas covered by each of the Large Projects are summarised in Table 2.1. More detail on the geographical areas is given in Chapter 3.

Table 2.1: Summary of geographical areas covered by the Large Projects

Large Project	Geographical area	Type of area*
BDRS	Four broad corridors within the South Yorkshire metropolitan area	P
Bournemouth	Corridor connecting Bournemouth, Poole and Christchurch	G
CENTRO	Ten corridors within the West Midlands metropolitan area	P
Hertfordshire	Three towns of Hemel Hempstead, St Albans and Watford	G
Merseyside	Eight sub-areas within the Merseyside metropolitan area	P
Nottingham	Greater Nottingham built-up area	F
Reading	Reading built-up area	F
Solent	Nine corridors into and near Portsmouth and Southampton	G
Surrey	Three towns of Guildford, Redhill / Reigate and Woking	G
Telford	Town of Telford	F
TfGM	All ten districts of Greater Manchester	P
WEST	Bristol, Bath, Weston-super-Mare and surrounding areas	P

* P = polycentric conurbation made up of a number of local authorities; F = freestanding town; G = groups of towns

2.2 Population and employment in the Large Projects

Figure 2.1 illustrates the range in size of the 12 Large Projects in terms of their borough or district population, and also shows the extent to which the projects were focused on just part of that population.

The *total* borough / district populations varied substantially in size. At the small end of the range were Reading and Telford, which covered areas with a population of around 160-170,000 people; at the large end were TfGM and CENTRO, which covered areas with a population of around 2.8 million.

For five Large Projects the *targeted* population was substantially less than the total borough or district population. Thus, the targeted population ranged from 112,000 (Bournemouth) to 1.1 million (WEST), with the exception that TfGM's project covered the whole of Greater Manchester (2.8 million). The difference between the targeted population and the total population should be kept in mind when interpreting findings from secondary datasets based on borough or district-level figures.

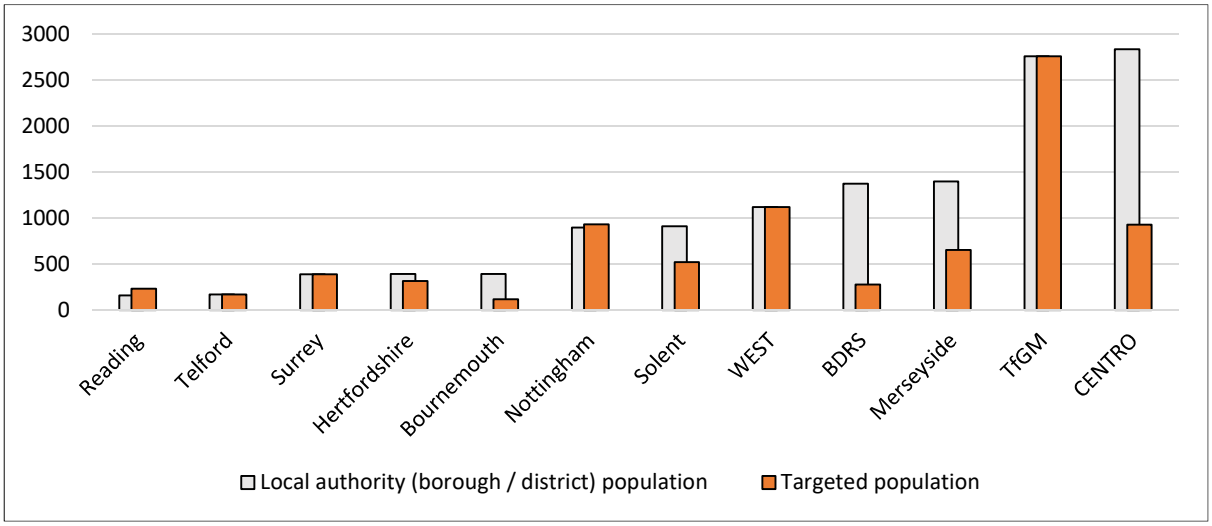
Table 2.2 gives figures for the population of the local authority areas covered by the 12 Large Projects, and for the number of jobs in those local authority areas, and shows how these figures changed over the course of the LSTF programme. Changes in population and employment over the course of the LSTF programme are also shown in Figures 2.2 – 2.5.

From these graphs it is evident that:

- All 12 Large Projects were located in areas where total population was increasing. In nine of the Large Projects the rate of population growth was greater than in the comparator group of 'all other English local authorities excluding London'.

- All 12 Large Projects also saw an increase in employment during the course of the LSTF programme. However, this was only greater than the increase in the comparator group of local authorities for five Large Projects (Bournemouth, CENTRO, Hertfordshire, Reading and Surrey).

Figure 2.1: Population of Large Project areas in 2015 (000's)



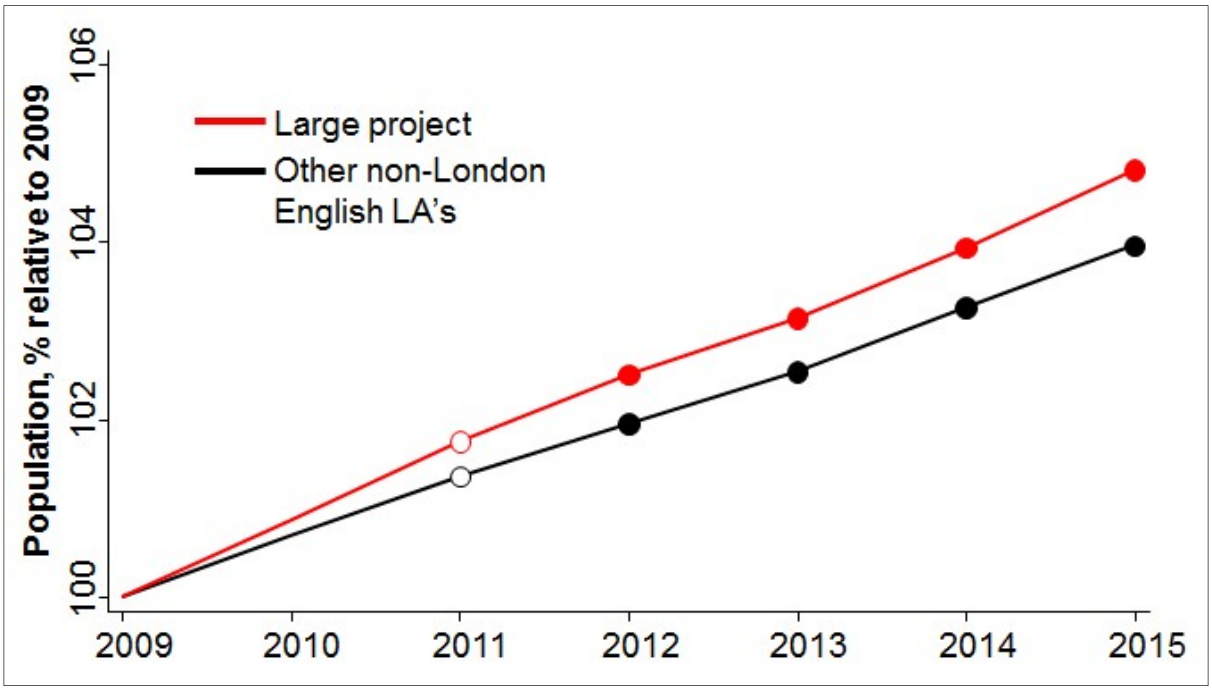
Figures for targeted population are from Outcomes Reports, Outputs Surveys, Monitoring Plans, Large Project Initial Proposals or Large Project Business Cases, with correction factor applied to allow for population growth. For Nottingham and Reading, the targeted population is larger than the local authority population because the LSTF project covered the whole urban area, including small parts of Nottinghamshire and West Berkshire and Wokingham respectively. For WEST, the targeted population for the first year of funding (Key Component, 2011/12) was the 550,000 people living along 11 Key Commuter Routes, but this was expanded to the whole population of the four local authority areas in subsequent years.

Table 2.2: Population and employment in Large Project local authorities in 2015, and change relative to 2009-2011 baseline

	Population		Number of jobs	
	2015 (1000's)	**Relative change vs. 2009-2011**	**2015 (1000's)**	**Relative change vs. 2009-2011**
BDRS	1375	+3.1%	556	+4.2%
Bournemouth	394	+5.6%	182	+5.2%
CENTRO	2834	+4.4%	1222	+5.4%
Hertfordshire	394	+5.8%	228	+16.9%
Merseyside	1398	+1.6%	555	+2.4%
Nottingham	900	+3.9%	415	+5.0%
Reading	162	+5.0%	102	+7.4%
Solent	913	+4.5%	399	+3.3%
Surrey	390	+5.2%	196	+5.7%
Telford	171	+3.2%	82	+4.6%
TfGM	2756	+3.5%	1239	+4.8%
WEST	1119	+5.4%	569	+2.7%
Large Project average		+3.9%		+4.8%
Other English LAs excluding London	*33,308*	*+3.3%*	*14,615*	*+5.1%*

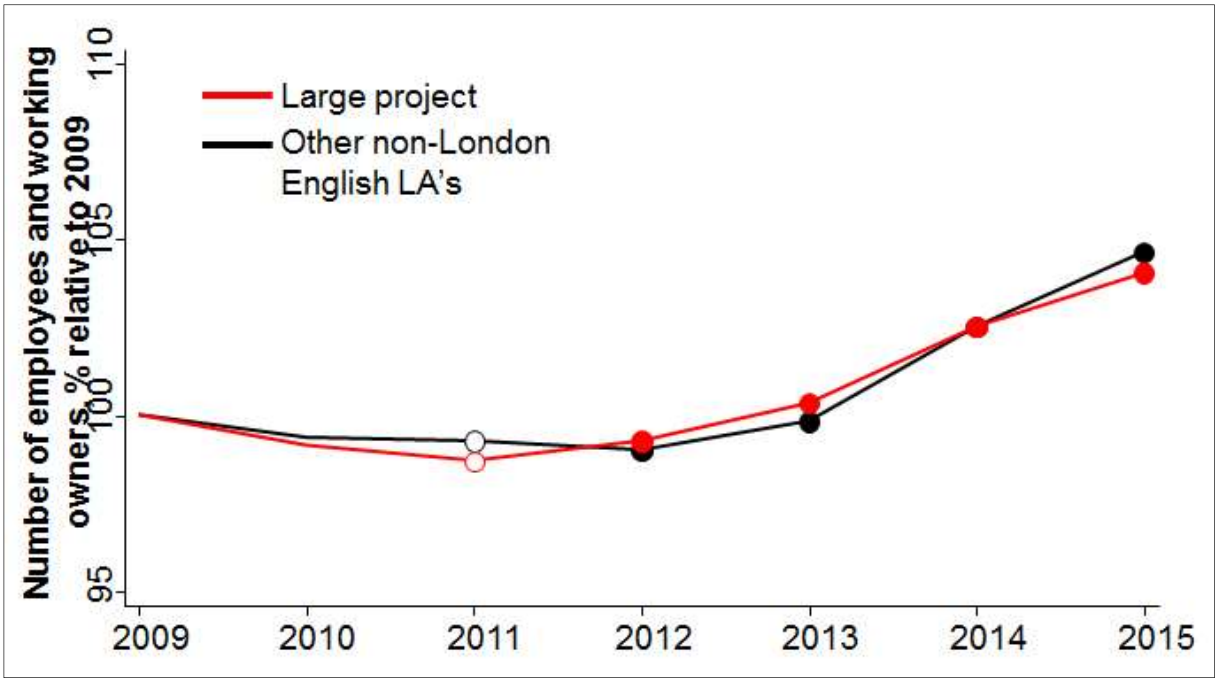
Red indicates growth in population and employment which was greater than that occurring in the comparator group of authorities. Figures are for population and number of jobs in most relevant boroughs / districts, not for population and jobs within LSTF target area. LSTF target area is usually smaller but in two cases (Nottingham and Reading) slightly larger. Large Project boroughs / districts included in these totals are listed in Appendix 1.1. Population source: ONS mid-year population estimates. Employment source: Business Register and Employment Survey (BRES).

Figure 2.2: Change in population during the LSTF period



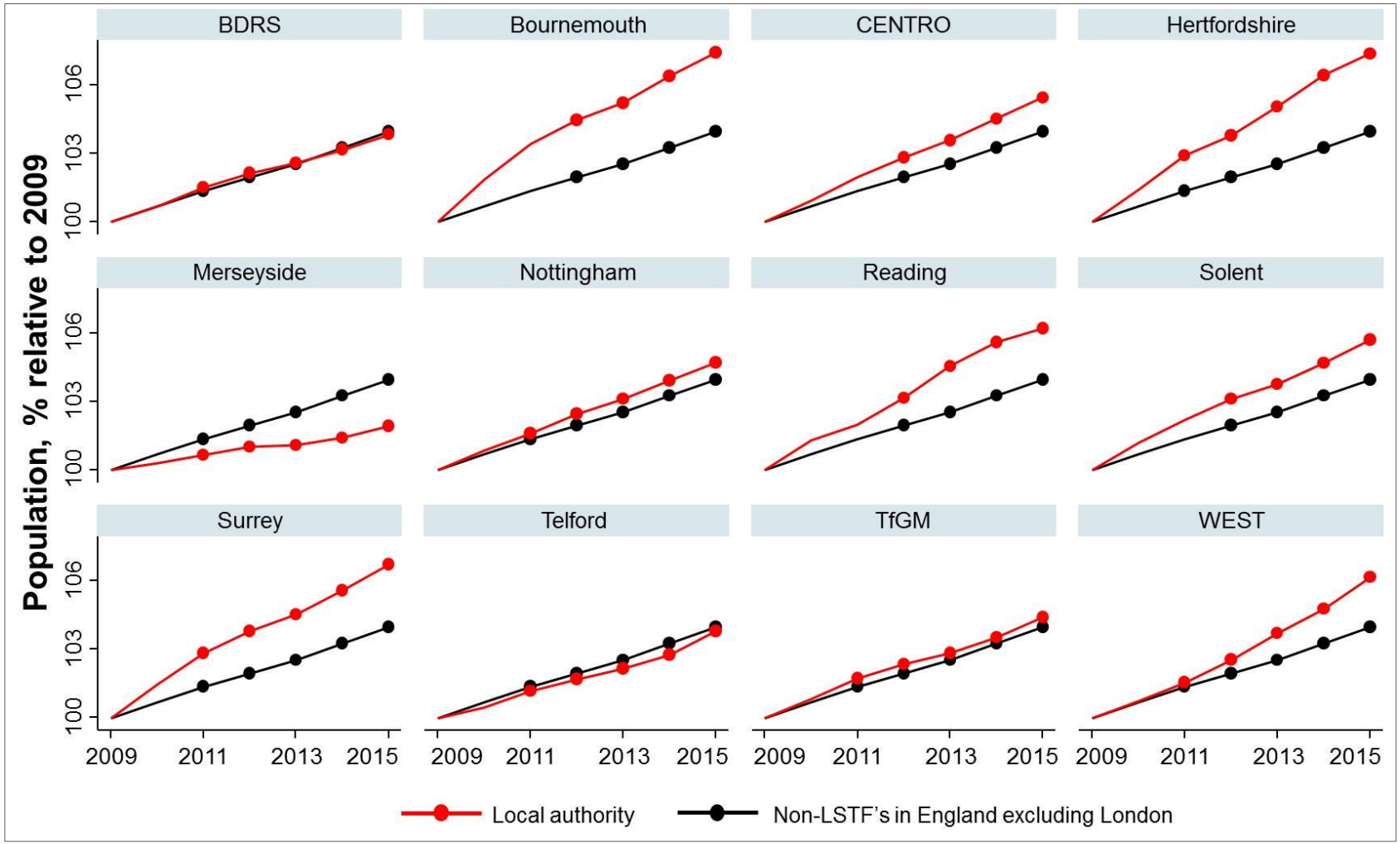
Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

Figure 2.3: Change in employment during the LSTF period



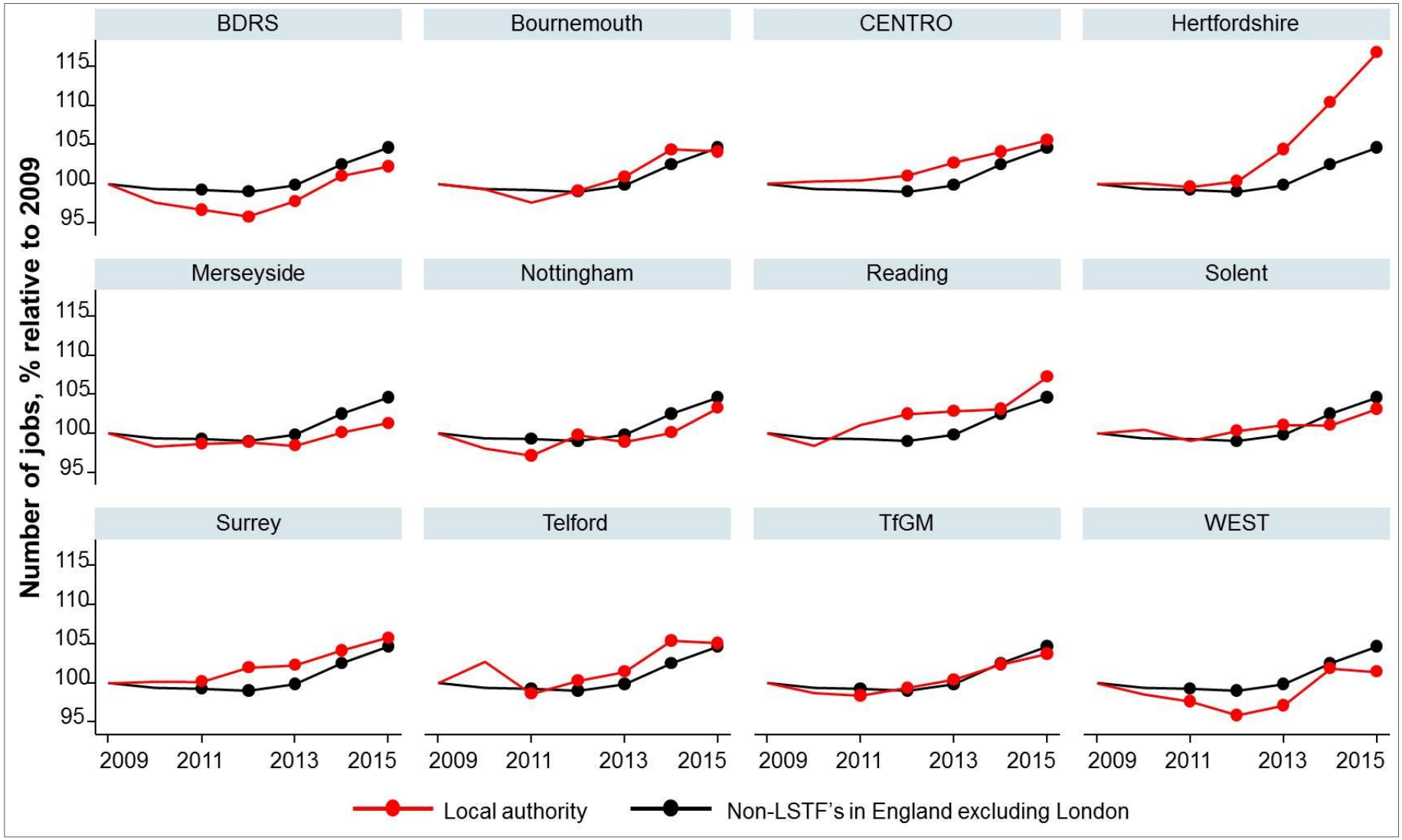
Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

Figure 2.4: Population by year for 12 Large Projects and nationally, relative to 2009



Filled circles show years when Large Projects were receiving funding.

Figure 2.5: Employment by year across 12 Large Projects and nationally, relative to 2009



Filled circles show years when Large Projects were receiving funding.

3 Overview of inputs and outputs

3.1 Inputs according to capital or revenue expenditure

Figure 3.1 illustrates how expenditure in the 12 Large Projects changed over the course of the programme, and how it was split between capital and revenue schemes. The figures include both the DfT grant and local contribution.

Capital expenditure was generally somewhat more than revenue expenditure, although there were exceptions to this in some places and years. Nevertheless, it is notable that revenue expenditure represented a significant proportion of the total, ranging from 12% (Telford) to 56% (Nottingham).

3.2 Inputs: proportion of project completed

Table 3.1 summarises how far each of the Large Projects was towards 'project completion' by the end of 2014/15, compared with the end of the previous year. The interim meta-analysis reported that most projects were about 50% complete by the end of 2013/14, although Hertfordshire and Nottingham were three-quarters complete, and TfGM was only one-quarter complete. Substantial expenditure in the final year of the programme (2014/15) meant that by the end of that year all but one Large Project had spent their full DfT grant (or very nearly so).

Table 3.1: Progress towards project completion: proportion of DfT grant spent

Large Project	…by end 2013/14	… by end 2014/15
BDRS	54%	99%
Bournemouth	62%	100%
CENTRO	46%	87%*
Hertfordshire	77%	98%
Merseyside	48%	100%
Nottingham	70%	100%
Reading	56%	96%
Solent	48%	100%
Surrey	63%	99%
Telford	42%	100%
TfGM	23%	55%~
WEST	61%	99%
Unweighted average	*54%*	

Source: Annual Outputs Surveys for 2011/12 – 2014/15; detailed outturn cost breakdowns provided by BDRS and Bournemouth. Note that some Large Projects had claimed their full grant from DfT but had not completed all their LSTF projects, with 'local contribution' i.e. matched funding being carried forward to 2015/16.

* CENTRO used their remaining grant during 2015/16 and 2016/17 to continue with LSTF revenue interventions and for payment of employer grants agreed before March 2015 but where works were completed after that date. A small amount of capital works were also completed in early 2015/16.

~ TfGM was only able to claim somewhat over half of its full grant from DfT by March 2015, due to delays with procurement of some complex projects. By March 2016, it had spent 73% of the DfT grant, according to figures in Appendix 6 of the TfGM 2014/15 Outcomes Report.

Figure 3.1: Inputs: capital and revenue expenditure on LSTF programmes 2011/12 – 2014/15, including DfT grant and local contribution (£000s)

This 'back-end loading' of expenditure to the final year of the programme was sometimes due to large capital schemes, which required a lengthy planning phase incurring relatively little expenditure, with the main 'spend' occurring near the end. An example of this was the Telford Town Centre Transport Scheme, a major public realm and traffic management project. There was also evidence from Annual Outputs Surveys of recruitment or procurement taking longer than expected, so that expenditure had to be re-profiled, with more activity taking place in the final year of the programme than originally planned.

3.3 Inputs according to project activity

The Large Projects reported their expenditure against up to seven 'scheme elements'. Approaches to defining scheme elements varied between the Projects: in some cases they related to the type of intervention, in some cases to the modes of transport affected, and in other cases to geographical location. This makes it difficult to disaggregate overall expenditure in a consistent way across the 12 Large Projects. However, by examination of the principal activities and achievements in each scheme element, as given in Annual Outputs Surveys, it is possible to subdivide expenditure into the following broad categories:

- **CW:** cycling and walking infrastructure and services (including cycle / pedestrian routes, crossings and signage, cycle loan schemes, cycle training, 20mph zones[13]).
- **B:** bus infrastructure and services (including bus priority measures, real time information, bus stop upgrades, new bus services, smart ticketing schemes).
- **TM:** traffic management (including changes to road layout or signalling in congestion hotspots, traffic signal control technology, variable message signs aimed at drivers, streetworks management, parking enforcement).
- **SC:** smarter choice measures (including workplace, school and personalised travel planning, travel awareness campaigns, travel information websites, advice and services for job-seekers)
- **O:** other measures (including new access roads to development sites, electric vehicle charging points, park and ride[14], monitoring, programme management).

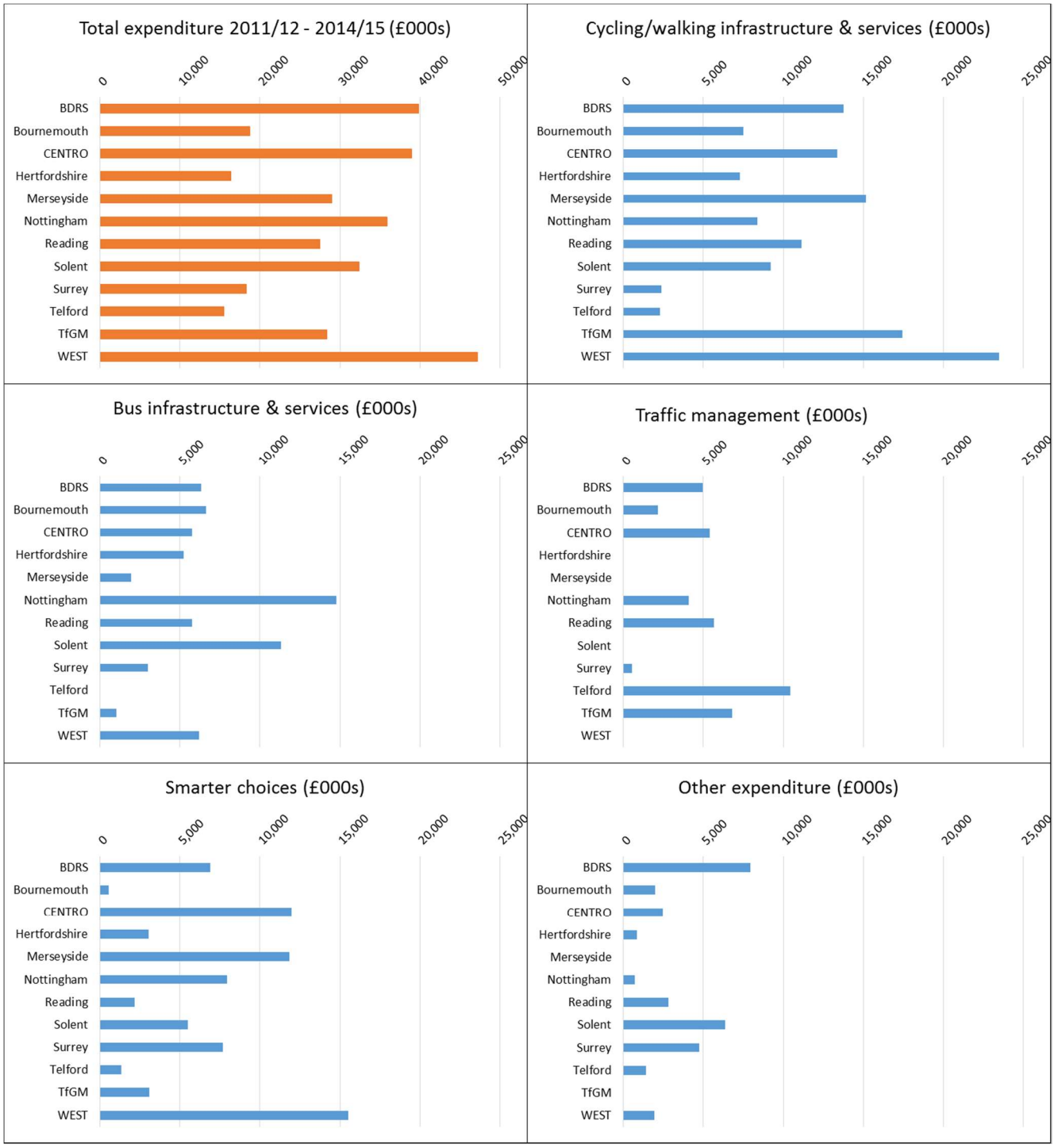
Expenditure figures in each of these categories were estimated from the scheme element financial data provided in Annual Outputs Surveys, and where there were uncertainties because of the way that scheme elements were defined, these were checked with the project manager.

Figure 3.2 shows estimated expenditure in each category (in £000s) for the 12 Large Projects; Figure 3.3 shows the estimated proportions of expenditure in each category; and Figure 3.4 shows the estimated expenditure per head of population in the targeted area.

13 But note that in some cases, revenue measures related to cycling and walking may be categorised as 'smarter choice measures', because they are grouped by the Large Project in a scheme element with multi-mode smarter choice measures.

14 Park and ride is considered as a 'bus' measure by some Large Projects.

Figure 3.2: Estimated expenditure according to type of activity, including DfT grant and local contribution



'Other' expenditure includes new access roads to development sites, electric charging points, park and ride infrastructure, monitoring and programme management.

Figure 3.3: Estimated expenditure proportions according to type of activity, including DfT grant and local contribution

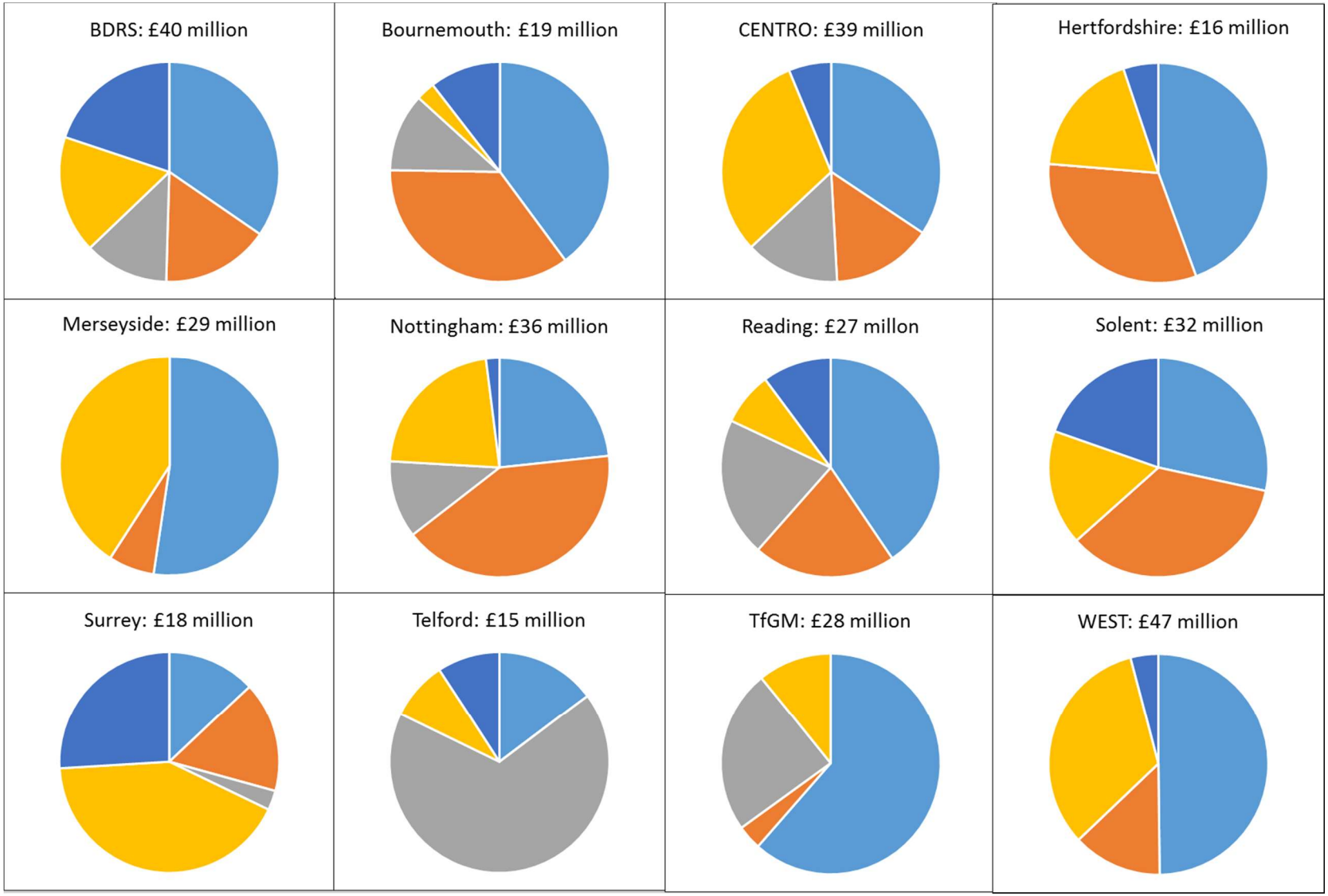
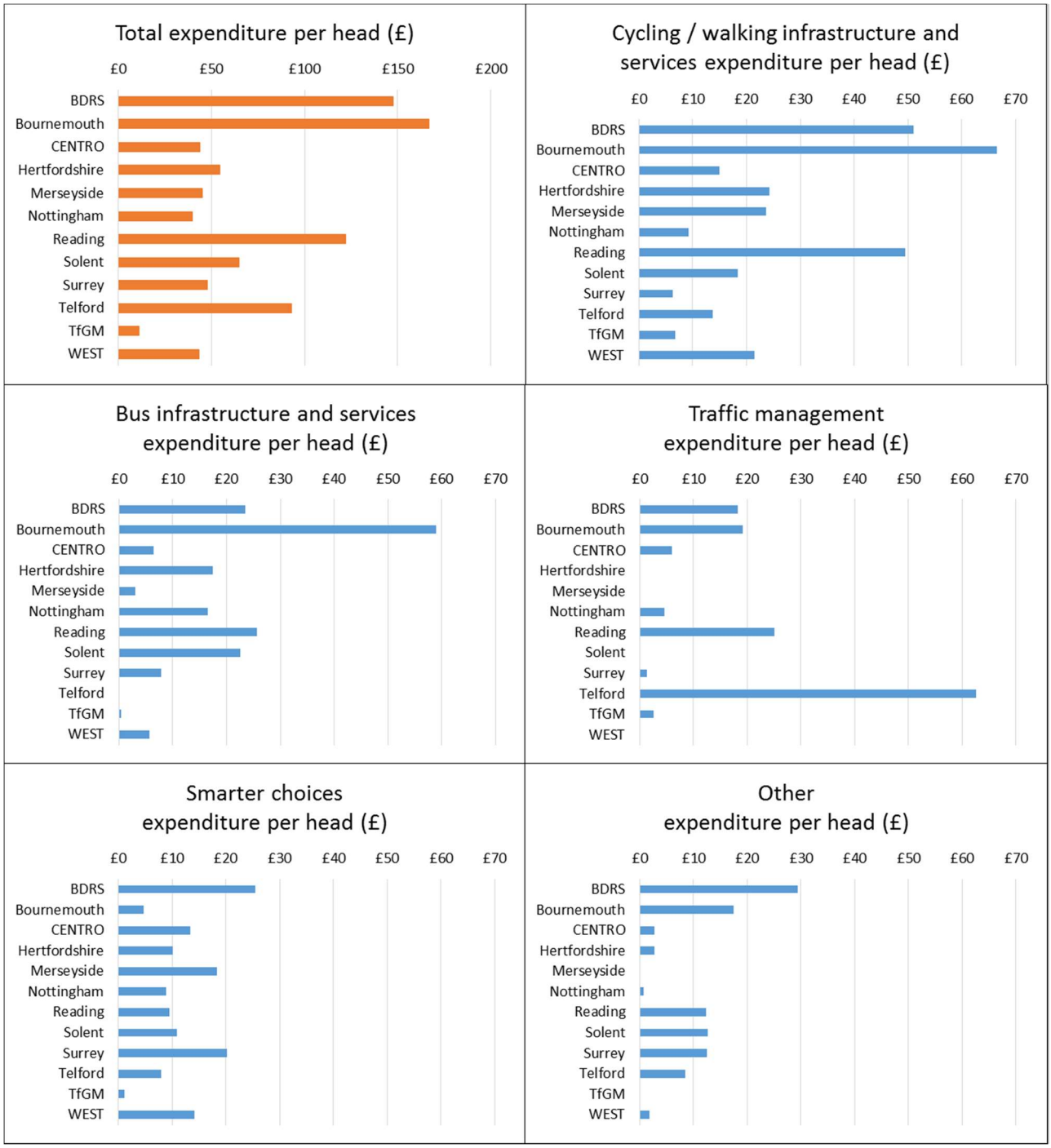


Figure 3.4: Estimated expenditure per head of population in targeted area (including DfT grant and local contribution), according to type of activity



Note that denominator is the population in the LSTF targeted area, as summarised in Table 3.2 (*not* the population of the relevant boroughs).

From these plots we can see how the Large Projects differed in terms of their emphasis:

- **Cycling and walking** were a significant focus (accounting for at least a fifth of all expenditure) for all the Large Projects apart from Surrey and Telford. The highest investment in absolute terms was in BDRS, CENTRO, Merseyside, Reading, TfGM and WEST, which all spent more than £10 million on cycling and walking over the whole LSTF period. The highest investment per head of population (>£40 per head) was in BDRS, Bournemouth and Reading.
- **Bus infrastructure and services** were a significant focus (accounting for at least a fifth of all expenditure) for Bournemouth, Hertfordshire, Nottingham, Reading and Solent. The highest investment in absolute terms was in Nottingham and Solent, which both spent more than £10 million on bus improvements over the whole LSTF period. The highest investment per head of population (>£20 per head) was in BDRS, Bournemouth, Reading and Solent.
- **Traffic management** was a significant focus (accounting for at least a fifth of all expenditure) for Reading, Telford and TfGM. The highest investment in absolute terms was in Telford, which was the only Large Project to spend more than £10 million on traffic management measures over the LSTF period (involving complete redesign of the road layout around the town centre). The highest investment per head of population (>£20 per head) was in Reading and Telford.
- **Smarter choices** was a significant focus (accounting for at least a fifth of all expenditure) for CENTRO, Merseyside, Nottingham, Surrey and WEST. The highest investment in absolute terms was in CENTRO, Merseyside and WEST, which all spent more than £10 million on smarter choice measures over the whole LSTF period. The highest investment per head of population (>£20 per head) was in BDRS and Surrey.
- There were significant '**other**' items of expenditure in three Large Projects (accounting for at least a fifth of expenditure). These included access roads to development sites (BDRS, Surrey); construction of a car park for park and ride (Surrey); and public realm enhancement at a main station (Solent).

Table 3.2 summarises the estimated expenditure figures (absolute amount and per head of population) in each category and overall. From these figures it is apparent that some Large Projects were tightly focused on a limited geographical population, while others chose to spread their investment more thinly. At one extreme, with over £120 expenditure per head of population, are BDRS, Bournemouth and Reading. At the other extreme, with just £11 expenditure per head of population, is TfGM. Expenditure by other Large Projects lay in the range £40 - £93 per head of population over the whole LSTF period.

Table 3.2: Estimated expenditure according to type of activity, including DfT grant and local contribution, 2011/12 – 2014/15

Large Project	Population of target area	Expenditure (£000s)						Expenditure per head (£)					
		CW	B	TM	SC	O	TOTAL	CW	B	TM	SC	O	TOTAL
BDRS	270000	13,789	6,330	4,948	6,889	7,925	39,880	£51	£23	£18	£26	£29	£148
Bournemouth	112500	7,481	6,638	2,157	523	1,965	18,764	£67	£59	£19	£5	£17	£167
CENTRO	892000	13,387	5,763	5,403	11,974	2,440	38,967	£15	£6	£6	£13	£3	£44
Hertfordshire	300000	7,267	5,217	0	3,031	844	16,359	£24	£17	£0	£10	£3	£55
Merseyside	643620	15,172	1,954	0	11,852	0	28,978	£24	£3	£0	£18	£0	£45
Nottingham	899000	8,363	14,788	4,095	7,930	715	35,891	£9	£16	£5	£9	£1	£40
Reading	225000	11,145	5,763	5,639	2,153	2,793	27,494	£50	£26	£25	£10	£12	£122
Solent	501000	9,209	11,328	0	5,498	6,360	32,395	£18	£23	£0	£11	£13	£65
Surrey	382000	2,390	2,971	522	7,693	4,757	18,333	£6	£8	£1	£20	£12	£48
Telford	167000	2,292	0	10,437	1,339	1,426	15,494	£14	£0	£62	£8	£9	£93
TfGM	2600000	17,434	1,020	6,808	3,080	0	28,342	£7	£0	£3	£1	£0	£11
WEST	1093000	23,502	6,204	0	15,540	1,934	47,180	£22	£6	£0	£14	£2	£43

CW = cycling and walking infrastructure and services; B = bus infrastructure and services; TM = traffic management; SC = smarter choice measures; O = other measures

3.4 Outputs: cycling and walking

The 2014/15 Outputs Surveys asked all LSTF authorities to provide figures for some key outputs from all years of the programme, so as to enable estimates to be made of the overall outputs from the Fund. These do not capture every aspect of the activity undertaken by LSTF projects, but they can be used to give an indication of the intensity of activity in the different categories listed in section 3.3.

For CW (cycling and walking infrastructure and services) the indicators for which data were collected were:

- Distance in km of new on-road cycle lanes, off-road cycle paths, off-road shared pedestrian / cycle routes and pedestrian only routes; and distance in km of existing cycle and pedestrian paths that had been re-signed and/or re-surfaced.
- Number of cycle parking spaces introduced or upgraded.
- Number of new pedestrian or cyclist road crossings.
- Number of adults taking up various services to encourage cycling or walking: bike maintenance services or classes; cycle training; led walks; led cycle rides; free 'try-out' loan of a bike for between one week and six months.
- Number of children receiving pedestrian training or scooter training.

Figure 3.5 summarises selected cycling and walking output indicators for which most Large Projects reported activity. The Large Projects with the most comprehensive and significant cycling-related outputs were BDRS, CENTRO, Merseyside, Nottingham, TfGM and WEST (matching fairly well to the Large Projects with high expenditure on cycling and walking).

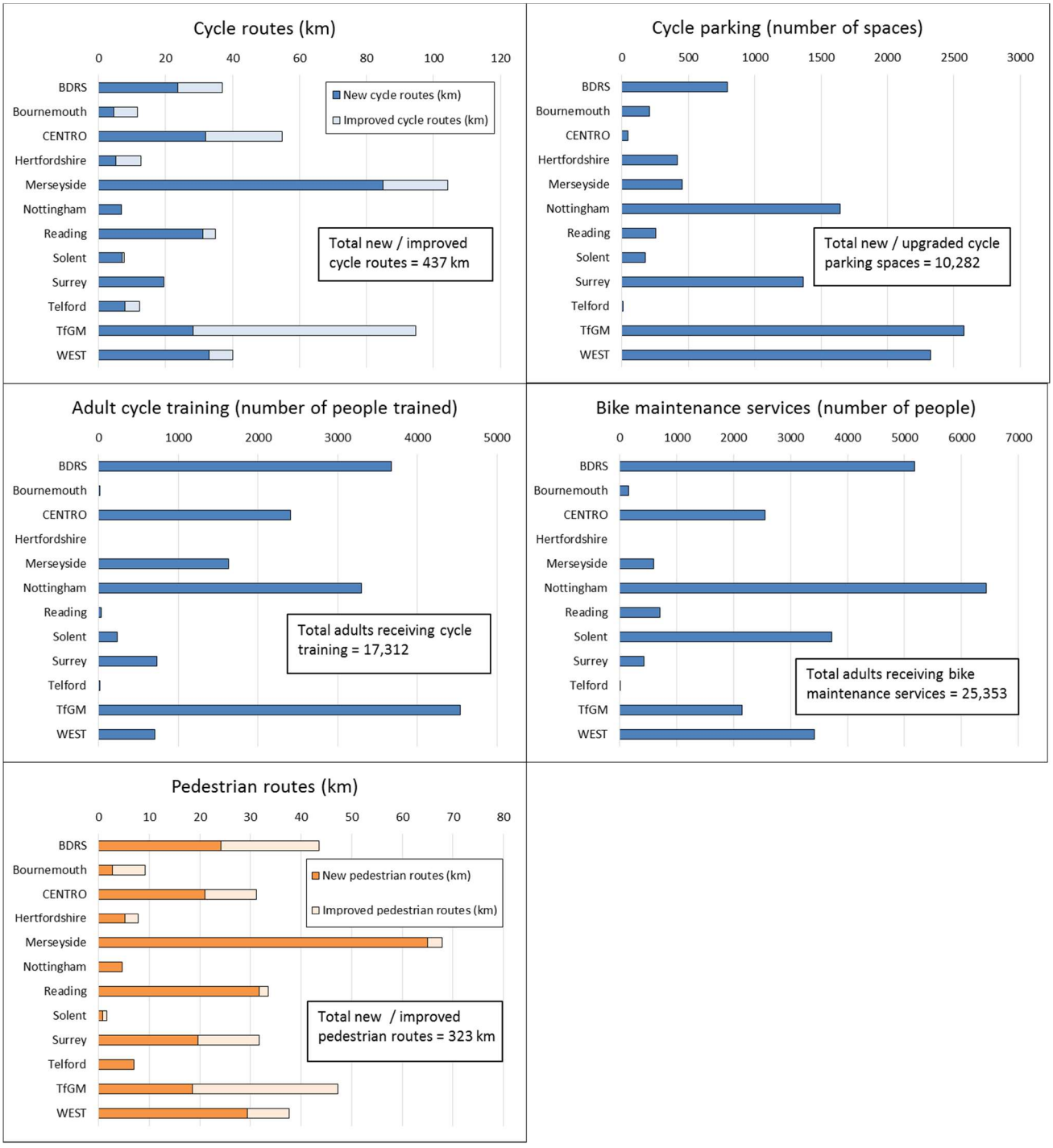
3.5 Outputs: buses and other public transport

Indicators collected in 2014/15 Outputs Surveys in relation to buses and other public transport included:

- Number of bus services that were new / more frequent / with extended hours or route; and number of bus services improved in other ways such as on-board WiFi or information screens, or better vehicles.
- Number of bus stops with major improvements (real time information, new shelters, or accessibility improvements such as raised kerbs); and number with more modest improvements such as better timetable cases or printed information.
- Number of locations that received bus priority measures: either highway alterations, including bus lanes; or traffic signal bus-priority technology.
- Number of rail stations where physical measures or new public transport services were provided to increase walk/cycle/public transport mode share for the trip to/from the station.

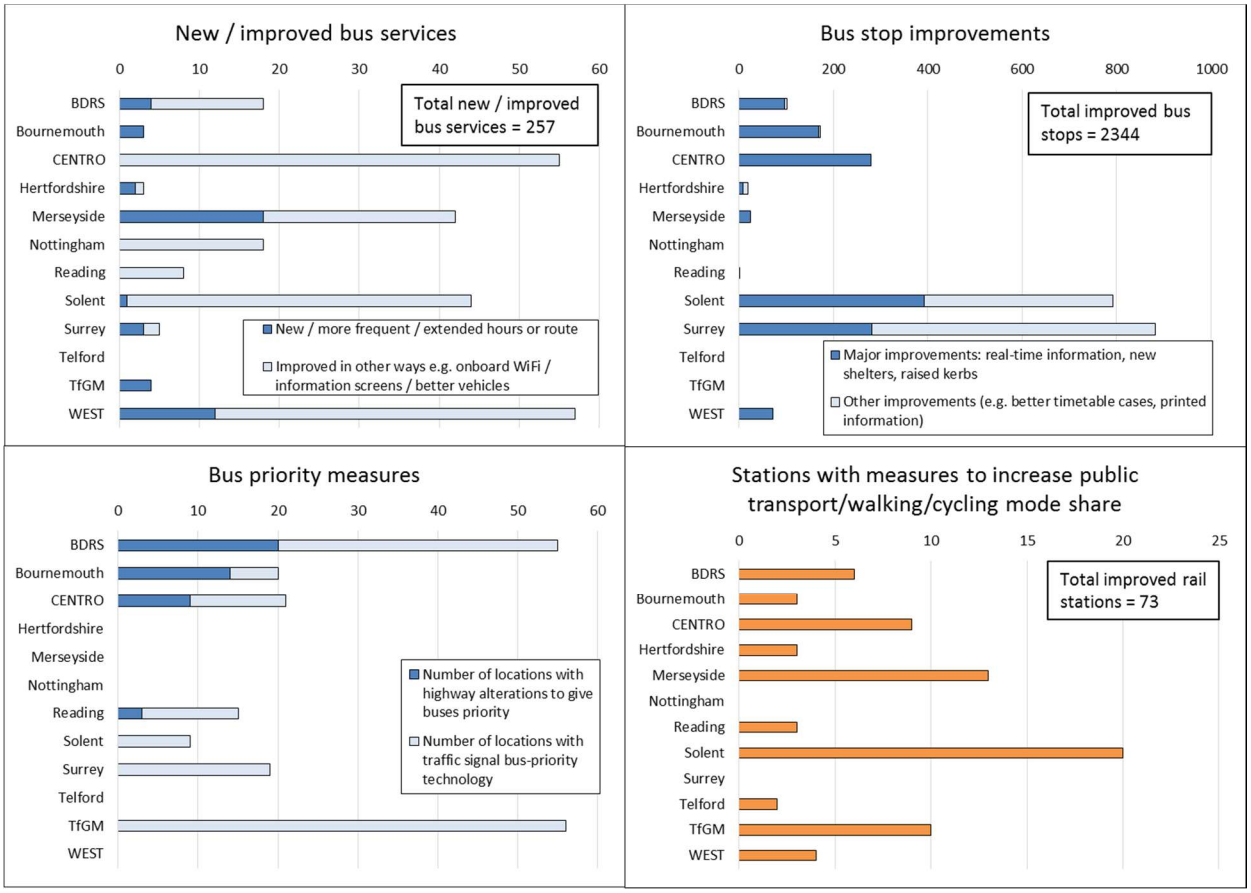
Figure 3.6 summarises these indicators. The Large Projects with the most significant bus outputs were BDRS, CENTRO and Solent.

Figure 3.5: Outputs: cycling and walking infrastructure and services



Note that there is overlap between cycle routes (km) and pedestrian routes (km) as shared cycle / pedestrian routes are included in both.

Figure 3.6: Outputs: bus and rail infrastructure and services



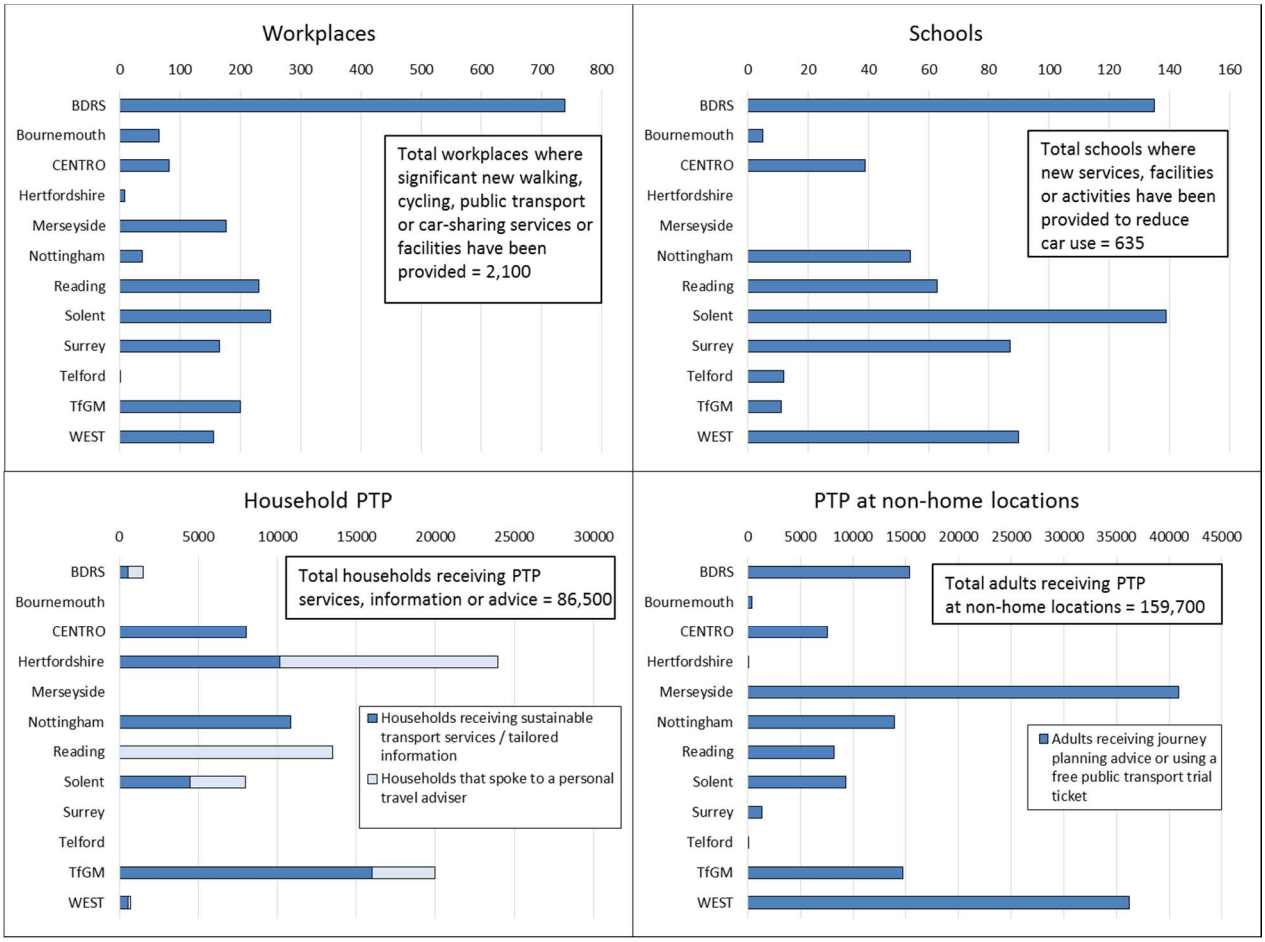
3.6 Outputs: smarter choices

Indicators collected in the 2014/15 Outputs Surveys in relation to smarter choice measures included:

- Number of workplaces where significant new walking, cycling, public transport or car-sharing services or facilities were provided to reduce single-occupancy car use.
- Number of schools where new services, facilities or activities were provided to reduce car use for the 'school run'.
- Number of households that had a conversation with a personal travel adviser as part of a household PTP programme; and number that opted to receive sustainable transport services or tailored information as a result of this.
- Number of adults receiving journey planning advice (personal to them), or receiving and then redeeming a free public transport trial ticket, following contact at a non-home location (workplace, station, or event/stall elsewhere).

Figure 3.7 summarises these indicators. All Large Projects apart from Bournemouth and Telford delivered some form of smarter choice activity on a significant scale, although the type of activity varied between Large Projects.

Figure 3.7: Outputs: smarter choice measures



3.7 Qualitative summary of project activities

This section begins with four case studies to show how interventions were combined by the Large Projects. It focuses on 'packages' of interventions that were typical of the programme:

- Improving bus travel to employment sites (example from BDRS).
- Achieving modal shift along a main road corridor (example from CENTRO).
- Providing support for active travel (example from Nottingham).
- Working with businesses to reduce car commuting (example from WEST).

We then give an overview of the Large Projects in turn, focussing on the main strands of their activity and how these activities related to the objectives of the Fund. Information on the main activities is principally drawn from responses to Annual Outputs Surveys, which report schemes and projects that were delivered during the financial years 2012/13, 2013/14 and 2014/15. Key activities are described in the form used by the Large Projects to report their main scheme elements, except where scheme element names would give a misleading impression of the actual activity.

CASE STUDY 1: BDRS: Bus travel to employment sites

Overview

BDRS used some of its LSTF funding to support five bus services to employment sites, with a particular focus on out-of-town sites that were otherwise hard to reach by public transport.

Inputs

The investment was £1.4 million (revenue) and £8,000 capital (excluding X20 service)

Outputs

The bus services that received funding were:

- ASOS Jobconnector: A new service to a major new employment site. ASOS, an on-line clothing retailer, opened a distribution warehouse on the outskirts of Barnsley in 2011, providing jobs for more than 2,000 semi-skilled staff. Jobcentre Plus reported that when ASOS started to recruit, 75% of potential applicants had no access to a car to reach the site, and were therefore unable to apply. The ASOS bus service began in June 2011 (initially with local funding); it received LSTF funding from September 2011 enabling provision of more services during the daytime, evening and at weekends.
- S74 Jobconnector: A new peak-hour 'micro-bus' (10-seater) commuter service to a new employment site (Shortwood, on A6195 dual carriageway close to M1) and an established employment site (Platts Common, on A6195).
- A1 Jobconnector: A pre-existing route between Sheffield and Rotherham, serving Sheffield Business Park and the adjacent Advanced Manufacturing Park. The commercially-run service was overloaded at peak times, so LSTF funding was used to 'double-up' peak time buses for six months while bus network changes to meet demand were negotiated with the operator.
- X19 Jobconnector: A doubling of frequency (from hourly to half-hourly) on an existing service between Barnsley and Doncaster via the northern Dearne Valley.
- X20 Jobconnector: A new hourly service between Barnsley and Doncaster via the southern Dearne Valley, using LSTF extension funding from January 2015.

Outcomes

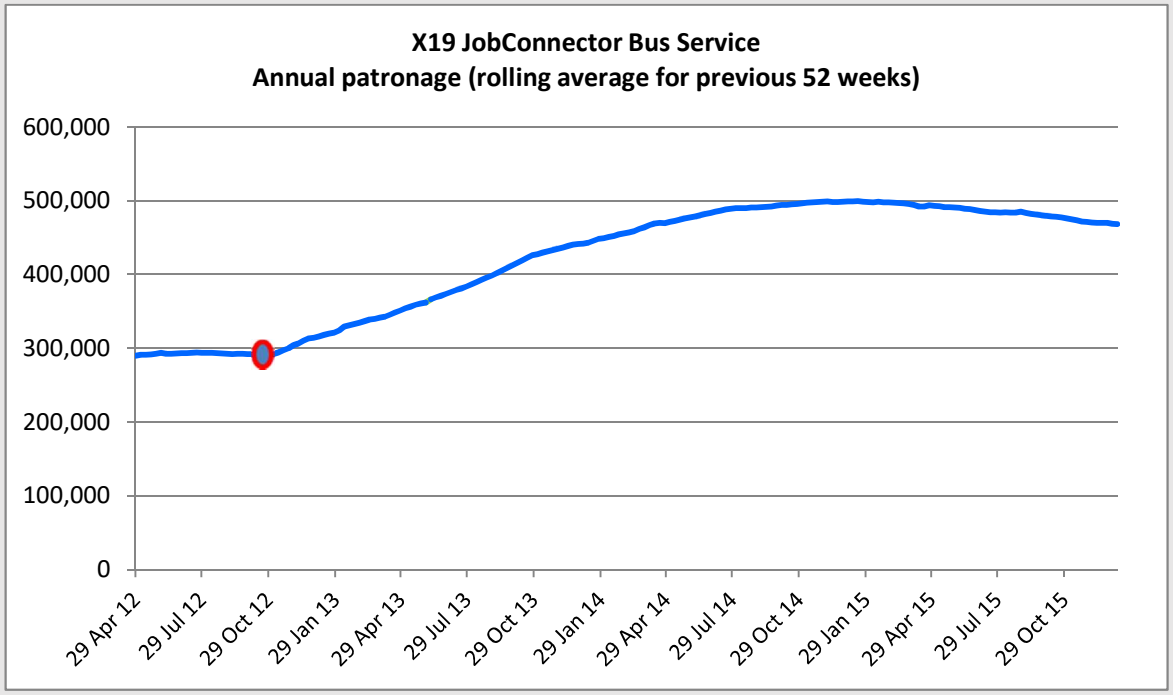
Patronage on the **ASOS Jobconnector** grew from zero to over 16,000 trips per month by the end of 2015. The increasing patronage was due to growth in the number of people working at the site during this period.

The **S74** was less successful than anticipated, with patronage of ~200 trips per month*, of which more than half were pensioners rather than the commuter target group. The service was therefore withdrawn after a year, and funding switched to the A1 Jobconnector.

Patronage on the **A1** grew from a monthly average of ~27,000 to ~38,000# before the redesign of the bus network. Only a small part of this growth can be attributed to LSTF funding, because the LSTF support occurred alongside a larger longer-term revenue investment programme to improve bus services to employment sites in this area.

Patronage on the **X19** rose sharply after the service frequency doubled, from ~24,000 trips per month in 2012, to a new higher level of ~39-42,000 trips per month in 2015+.

Patronage on the new **X20** grew from zero to ~15,000 trips per month^ in the twelve months from January 2015 to January 2016.



Marker shows date of service frequency increase (October 2012)

Future plans

By the end of the LSTF funding period, the ASOS service was commercially viable (at least for weekday services serving shift changeovers) and therefore expected to continue. The X19 was also expected to remain commercially viable at the new half-hourly frequency.

Taken together, funding for the ASOS and X19 services therefore achieved a long-term increase in bus passenger trips of around 32,000 per month.

The A1 intervention (mostly funded by sources other than LSTF) resulted in substantially better coverage of worksites by commercial routes, which should also continue to be viable.

The X20 had not reached commercial viability by the end of the LSTF funding period, and may therefore be discontinued.

Note: BDRS reports patronage figures for different services on a weekly, monthly, or annual basis. Figures in this Table are rounded and re-based as monthly patronage for ease of comparison; figures as given by BDRS are as follows:

* Reported as 46 trips per week

Reported as annual figures of 321,000 and 455,000 for the last two years of operation of the A1, based on estimates from passenger survey data

+ Shown graphically as rolling annual figures of 291,000 in year to October 2012; 443,000 in year to January 2014; 499,000 in year to January 2015; and 468,000 in year to January 2016.

^ Reported as almost 3,500 per week.

CASE STUDY 2: CENTRO: Package of measures along a major corridor

Overview

CENTRO's LSTF programme involved a package of infrastructure improvements, behaviour change measures and new technology on 11 corridors in the West Midlands metropolitan area. 'Corridor 2' between Walsall and Merry Hill shopping centre had traffic flows of 8-10,000 vehicles per day and suffered regular congestion, which affected bus reliability.

Inputs

Corridor 2 received capital investment of £2.9 million, of which £1.9 million was for bus infrastructure improvements, £748,000 for cycling and walking infrastructure improvements, and £280,000 for improvements at rail stations.

There was also revenue investment in personalised travel planning, and workplace and school travel planning^.

Outputs

- Junction improvements at 16 locations along the corridor to improve bus journey times and reliability (signalling equipment, bus priority and traffic signal upgrades).
- MOVA traffic signal control at four junctions to improve network efficiency.
- Installation of Automatic Vehicle Location (AVL) equipment on buses, to feed into real-time information at bus stops and to help bus operators track how services are running.
- Installation of 17 real-time information screens at bus stops.
- Improved pedestrian and cycle links on the corridor and in the surrounding area, plus dropped kerbs / tactile paving at side roads, upgraded signalised crossing facilities, cycle parking on Quarry Bank High Street, new cycle / pedestrian crossings and wider paths.
- Station travel plans at Wednesbury Parkway metro stop and at Rowley Regis and Cradley Heath stations (both 'soft' information / marketing measures and small infrastructure improvements e.g. pedestrian signage, cycle parking, improvements to waiting areas and information displays).
- Over 5,000 households at the southern end of the corridor participated in a personalised travel planning project (i.e. had face-to-face doorstep conversations with a travel adviser; received travel resources such as bus timetables, a public transport map, or a CarWise guide to reducing motoring costs; and (in some cases) received cycle training, cycle maintenance training, one-day travel passes, pedometers etc.).
- Workplace travel plans were produced for about 23 employment sites on the corridor (in Walsall, Dudley, and part of Sandwell)*.
- Six schools and two further education sites on the corridor were supported to develop travel plans~.

Outcomes

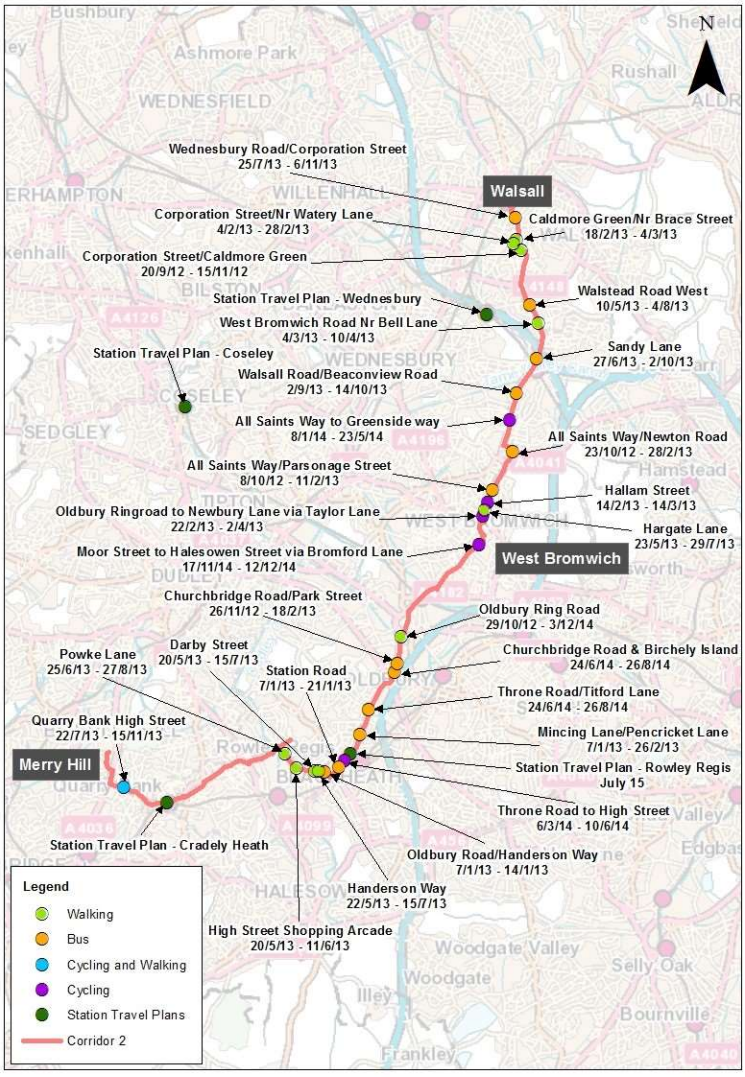
Between 2012 or 2012/13 (before the infrastructure interventions) and 2014 or 2014/15 (afterwards), there was:

- A small improvement in bus reliability along the corridor (from 97.7% to 98.5% operation of scheduled mileage).
- An improvement in the excess wait time (from 1.24 minutes to 1.03 minutes, a fall of 17%) but a slight fall in punctuality (proportion of buses 'on time' fell from 86.5% to 84.2%).
- An increase in residents' satisfaction with the bus service on the corridor (from 54% satisfied / very satisfied in 2013 to 64% in 2015, residents' panel survey, N=220/221).

Bus patronage increased on the corridor. Between 2012/13 and 2014/15, patronage on all services in the corridor rose by 4%, while on the service 4 (a frequent service, operating every six minutes), patronage rose by 15%.

Surveys of PTP recipients suggested a reduction in car driver trip mode share from 42% to 35%, accompanied by an increase in mode share for car passengers, bus, train, walking and cycling (baseline survey N=5,045; post-intervention survey N=665)+

Infrastructure improvements on Corridor 2



Future plans

No specific plans for further investment at the corridor level are reported in the 2014/15 Outcomes Report.

^ Revenue expenditure figures are not disaggregated by corridor in CENTRO reports, but average expenditure per corridor on behaviour change measures was about £900 million

* Estimated from comparison of data in JMP (2015) Business and employer travel plan report and map of Corridor 2 in 2014/15 Outcomes Report

~ Mott MacDonald (2014) Education Travel Plan Report

+ Estimated from 2014/15 Outcomes Report p116; survey response numbers from SDG (2015) Tranche 3 PTP Final Report p2

CASE STUDY 3: Nottingham: Support for active travel

Overview

Nottingham's LSTF programme included four strands, of which three included interventions to encourage active travel (walking and cycling). There were many activities at schools and higher / further education institutions, and a neighbourhood-based programme in five areas of the city. Secure cycle parking was installed at a number of locations, and an on-street cycle hire scheme was set up. 20mph limits were brought in on residential roads.

Inputs

Expenditure data was not disaggregated in a way that enables costs to be exactly reported. From discussion with Nottingham officers, it is estimated that the expenditure on cycling and walking was £8.4 million, which was just under a quarter of the total expenditure.

Outputs

A city-wide cycle hire scheme was set up, with 500 bikes available for hire at 28 on-street locations. The scheme was accessed via a 'Citycard' smart card that was also used for a number of other transport and non-transport services.

Fourteen secure cycle parking hubs were installed at various locations including the railway station and the bus station. These were also accessed via the Citycard.

Five virtual 'Community Smarter Travel Hubs' were set up, working at a neighbourhood level to encourage sustainable travel, including cycling. Eight 'Cycle Centres' were also set up. These services provided:

- Personalised travel information (including information about cycling where relevant) to 11,970 people, plus travel advice to 9,725 job-seekers.
- A programme of led walks and cycle rides.
- Adult cycle training aimed at 'beginners', 'improvers' and 'commuters', which was taken up by 1,775 residents.
- Bike servicing and maintenance classes, taken up by over 6,440 residents.

The 'Active Travel Solutions' strand of Nottingham's project mainly worked with schools and HE/FE institutions. It involved the following:

- Ucycle: nearly 1,190 staff and students at five HE/FE institutions and Nottingham University Hospitals NHS Trust were loaned a bicycle + equipment (lights, lock, rack) for a term or year at a low cost (£35 per term/semester; £49 per academic year). Nearly 990 cycle parking spaces were provided on campuses, and there were 460 Ucycle events to promote cycling.
- Schools: a Bike It officer worked with six secondary schools and one primary school to encourage cycling. Bikeability cycle training was offered at 44 primary schools, and nearly 840 pupils received Level 2 training. In addition, 64 primary schools took part in a curriculum-based road safety and sustainable transport initiative called Lifecycle, which acted as preparation for Bikeability.
- Free 'all ability' sessions provided cycle training to 610 people on spring / summer Sundays. There was also a substantial active travel marketing and events programme, including four annual Cycle Live weekends.

20mph limits were introduced on 58km of residential roads, covering a resident population of nearly 138,000. There were small extensions to the existing cycle network (2km of on-road cycle lanes and 5km of shared cycle/pedestrian paths).

Outcomes

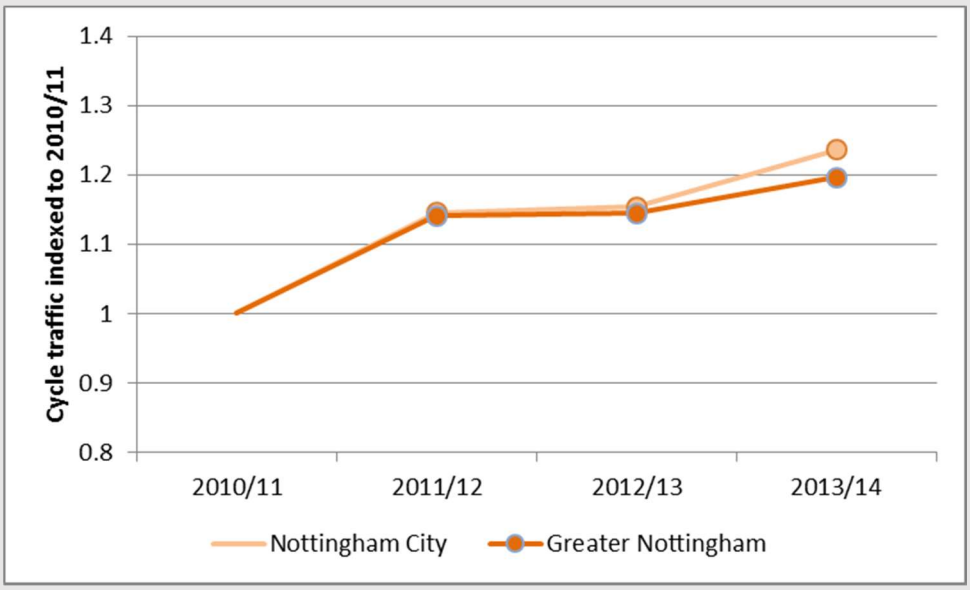
Nottingham collected comprehensive output data for the various activities, and also undertook surveys to establish the 'effect size' of interventions. Surveys suggested that:

- In the first 2.5 years of the on-street cycle hire scheme, bicycles were hired 6,000 times, by 1,800 different users.
- The 14 secure cycle parking hubs were used nearly 29,000 times in 1.5 years, by 1,200 different users. More than half of cycle hub users used the hubs at least four times a week, mainly for commuting. Survey data suggested the cycle hubs had encouraged almost 38,500 additional cycle trips and more than 2,000 cycle + public transport trips, reducing car travel by 92,000km.
- Personalised travel information provided by the Community Smarter Travel Hubs led to a 9% increase in walking and a 30% increase in cycling by beneficiaries, according to survey data collected at two of the hubs.
- Surveys of beneficiaries of adult cycle training and Ucycle bicycle loan found that people who received cycle training cycled an average of an extra 16 minutes per day afterwards; people who took advantage of the Ucycle bicycle loan scheme cycled an extra 26 minutes per day.
- 91 of the pupils who received Bikeability training reported cycling to school on a more regular basis. Bike It resulted in cycle mode share for trips to school increasing from 5.5% to 9.5%.

Automatic cycle counter data suggested that cycling grew by around 28% in Greater Nottingham between 2010 and 2015.

An impact evaluation undertaken by ITP for Nottingham using data on scale and estimated effect size of each intervention concluded that there had been an overall increase in cycle km (across all years of the programme) of 12.5m km. Assuming that the effect of the programme grew over time, and using Census data and other assumptions about average cycle trip length and the proportion of cycling that is for commuter / non-commuter travel, the meta-analysis concluded that this suggested the LSTF interventions were plausibly responsible for around a third of the uplift in cycling in Nottingham recorded by cycle counters.

Indexed change in cycling in Nottingham



Outputs and outcome survey data from ITP (2016) *Nottingham Urban Area LSTF Programme 2011-2015 Impact Evaluation* report for Nottingham City Council.

CASE STUDY 4: WEST: Business engagement programme

Overview

The WEST LSTF programme included engagement with employment sites to reduce single occupancy car commuting and to reduce vehicle use for business travel and deliveries.

Inputs

The business engagement programme involved revenue expenditure of £3.2 million and capital expenditure of £1.0 million.

Outputs

The project worked with employees and employment sites across the whole LSTF area to reduce single occupancy car commuting. There was a particular focus on three 'growth areas': Portside, Bristol North Fringe and Bristol Airport. By 2014/15, a total of 376 employers were involved to some degree, of which 125 were considered to be 'intensively engaged' (65 in Bristol, 11 in North Somerset, 12 in Bath and NE Somerset (BANES) and 37 in South Gloucestershire)^.

The project provided:

- Grants to employers for on-site sustainable transport measures: principally cycle parking, cycle shelters, showers, lockers, changing / drying facilities and pool bike schemes (including electric bikes). Over the course of the project, 129 grants were made.
- Off-site bus service enhancements: new semi-express commuter bus services from Weston-super-Mare and from Portishead into Bristol city centre; new peak-hours-only, peak-direction-only bus services from Weston and from east Bristol to the Bristol North Fringe; new services to the University of the West of England (UWE); and an 'A2 Airport Link Bus'. These new services were funded through a separate part of the LSTF programme.
- Off-site cycle route enhancements. These were again funded through a separate part of the programme, but some were designed to improve commuter routes to key employment sites. Schemes included new signage and completion of missing links for a continuous mainly off-carriageway cycle route between Portishead, Portbury Dock and Bristol; and connections between existing cycling routes and Weston Hospital, Weston College University Campus, and industrial estates.
- Support services: a Sustainable Travel Field Team held over 550 roadshows at employment sites over the course of the project. The roadshows had contact with over 13,500 people of whom nearly 4,400 received detailed information or support. As well as information about sustainable travel options, the roadshows offered a variety of services: Dr Bike cycle maintenance sessions (assisting nearly 2,300 people over the project period); help with route planning (over 1,100 people); loan bikes (nearly 670 loans); cycle training (410 people); bus taster tickets (970); and bike / motorcycle accompanied rides and car-share matchmaking.
- 68 electric vehicle charging points (with 104 sockets), which were installed across 56 sites. These were used more than 3,000 times over the course of the project.

In the Bristol North Fringe, the project worked with business network Suscom to run initiatives including a commuter sustainable travel challenge and a liftshare week, and produced an Area Travel Plan for businesses in the North Fringe. An Area Travel Plan was also produced for Bristol Airport.

To **reduce business car use**, the project supported expansion of a car-pool scheme operated by Co-Wheels. By 2014/15, the car-pool scheme provided 22 low emission vehicles and 13 bikes (including electric bikes) for use by employees. It worked with employment sites covering 76,000 employees; vehicles / bikes were typically used around 20-60 times per month.

To **reduce vehicle use for deliveries**, the project funded the expansion of a freight consolidation centre operated by DHL near junction 18 of the M5. The centre consolidates deliveries to city centre retailers, and delivers them by electric lorry. In 2014/15, the final year of the project, the freight consolidation centre served 133 retailers across Bristol and Bath. Over the course of the project, it prevented over 6,800 delivery trips to the two city centres.

Outcomes

Random effects meta-analysis of pre/post intervention change in commute mode share for trips to 15 employment sites (reported in chapter 10) found only a small reduction in car mode share, with a pooled effect size of -0.5% (95% CI -2.8%, 1.8%) that was not statistically significant. However, analysis in the 2014/15 Outcomes Report suggested that car mode share for trips to Bristol North Fringe employment area had fallen from 62% in 2013 to 56% in 2015*.

A one-month post-intervention survey of people who had received services or information from a roadshow [N=482] found that 35% had changed the way they travelled since their conversation with a travel adviser; 77% of these respondents attributed the change to the conversation they had, or the support they had received~. If representative of all those employees who had received information / support, this would suggest that around 1,200 people changed the way they travelled as a result of the roadshows. Other evidence, from a small survey in 2013/14, suggests that the main changes were to reduce car use and to increase cycling, but that there were also increases in walking, bus travel and car-sharing.

Patronage data for new commuter bus services showed substantial uplift in bus ridership (reported in chapter 6).

Future plans

All the new commuter bus services had become commercially viable by the end of the LSTF programme, or were shortly expected to become so.

^ Figures for the number of employers engaged are from 2014/15 Outcomes Report. According to the 2015 Outputs Survey, 156 workplaces received significant walking, cycling, public transport or car-sharing services or facilities to reduce single occupancy car use.

* Figures for car (alone) + 0.5* car share; N=3353 in 2013 and 2526 in 2015; this analysis may not be reliable as there were changes in the employers that participated in different years.

~ These figures are for the 2014/15 survey. In 2013/14, a different question was used in Q1-Q3; the question in Q4 was the same as in 2014/15 and suggested that 24% had changed their travel choices [N=68].

BDRS

Area covered by the project

The Barnsley, Doncaster, Rotherham and Sheffield (BDRS) Combined Authority Large Project covered the South Yorkshire metropolitan area, which has a total population of 1.3 million. However, within this area, activity was concentrated in four broad corridors, described below, with a combined population of 270,000 people^. The project was delivered by a partnership of the four local authorities of Barnsley, Doncaster, Rotherham and Sheffield and the South Yorkshire Passenger Transport Executive (SYPTE).

Main strands of activity

BDRS Combined Authority's LSTF activity took place in four corridors between Barnsley, Doncaster, Rotherham and Sheffield. The main activities in each corridor were as follows:

- **'**Barnsley Accessibility Improvement Corridor' (12km stretch of main road between Barnsley and Doncaster): cycle paths, traffic management measures, and a more frequent 'Job Connector' express bus service to provide better access to out of town employment sites.
- 'Dearne Valley Enterprise Corridor' (area south of Barnsley): cycle routes, bus priority, traffic management, and a 'park and ride' car park next to a rural railway station.
- 'Don Valley Enterprise Corridor' (central Sheffield, Rotherham, and the area between them): bus priority, traffic management, tram stop upgrades, cycle paths and a feeder bus service to a tram terminus on the outskirts of Sheffield.
- 'Doncaster Regeneration Corridor' (Doncaster and an area extending about 8km north-west): highway improvements to support regeneration of the Waterfront area and congestion-relief measures.

In addition, the local authorities developed various interventions intended to encourage sustainable travel, which were described as a 'Business and Employer Sustainability Toolbox'. These included ECO Academy (training driving instructors so that they could teach eco-driving techniques); eco-driver training for company drivers and novice drivers; Busboost (free public transport trial tickets for employees and job-seekers); Walkboost (information and activities to encourage people to walk to work, school and local shops, including guided walks, challenges, walks leaflets and reward cards for shopping at local shops); and Cycleboost (adult cycle training; Dr Bike cycle maintenance sessions at employment sites; 'try-out' loans of bikes and cycle equipment to employees for up to six weeks; and cycle parking grants for businesses). There was also support for a Wheels to Work service providing short-term loan of a motor scooter to enable people to get to work, education or training.

How activities related to objectives of the Fund

The four corridors were chosen on the basis of local need and their high potential for economic growth. The project aimed to widen access to the labour market through a combination of 'Job Connector' bus services, loan of motor scooters and bicycles, and travel training and free bus tickets for people seeking work.

Most of the interventions were designed to encourage modal shift towards lower-carbon modes of travel. The ECO Academy interventions were intended to reduce carbon emissions by teaching eco-driving techniques to new drivers and company drivers.

^BDRS (2014) LSTF Output Survey Q40iv

Bournemouth

Area covered by the project

The Bournemouth 'Three Towns' Large Project focused on an east-west 16km transport corridor connecting Poole, Bournemouth and Christchurch. The corridor includes the A35 (an important bus corridor) and the parallel London to Weymouth mainline railway which calls at six stations along this section of its route. The SE Dorset conurbation has a population of almost 450,000, and it is estimated that about a quarter of the total population is within the Large Project area^. The project was delivered jointly by the three local authorities of Bournemouth Borough Council, Borough of Poole and Dorset County Council.

Main strands of activity

The main activities in the Poole – Bournemouth – Christchurch corridor were as follows:

- A substantial programme of changes to road layout and public realm: replacement of on-street parking with parking bays in order to reduce traffic congestion; cycle lanes (mostly on-road and not segregated, but some sections of segregated cycle lane); removal of street clutter and provision of new street furniture in shopping areas; pedestrian crossings; a new 'bus hub' at Royal Bournemouth Hospital.
- Upgrade of bus stops, including installation of raised bus kerbs to improve access for people with mobility difficulties; new bus shelters and seating; real-time information displays at the busiest stops.
- Managing traffic more efficiently through traffic signal control improvements, CCTV and number plate recognition technology; variable message signs to inform drivers of alternative routes to avoid congestion, and to provide information about which car parks have vacant spaces.
- Review of parking and loading restrictions to ensure efficient traffic movement; increased parking enforcement.
- A small smarter choices programme, including launch of a Business Travel Network and grants for sustainable transport infrastructure at employment sites.

The Large Project also included work to negotiate a bus quality agreement with the two main bus operators on the corridor, intended to lead to a coordinated bus timetable and a multi-operator smart ticket, and to improve vehicle standards and driver training. However, this proved challenging and it was not possible to reach agreement with the two operators on coordination of timetables.

How activities related to objectives of the Fund

Traffic management activities and changes to road layout were designed to reduce congestion in the corridor and improve traffic flow and bus reliability. Some public realm improvements improved the attractiveness of local shopping centres.

Improvements to bus waiting facilities helped to make bus travel more attractive, and if other complementary bus improvements are implemented in future, this has the potential to stimulate mode shift from car to bus, hence reducing carbon emissions.

^ Bournemouth Borough Council (2011) LSTF Large Project Initial Proposal

CENTRO

Area covered by the project

The CENTRO Large Project was focused on ten corridors radiating from urban centres in the West Midlands metropolitan area, between Birmingham, Wolverhampton, Walsall, Dudley, Solihull and Coventry. Monitoring of the CENTRO Large Project also included a corridor in South Coventry where LSTF small project funding was secured for a Cycle Coventry project. Around 892,000 people live within 800m of one of the eleven corridors^. CENTRO was the coordinating authority for the project, with the involvement of Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton councils.

Main strands of activity

The main activities in the corridors were as follows*:

- Changes to road layout on the targeted corridors, including cycle paths and lanes, pedestrian / cycle crossings, footway widening, pavement build-outs at bus stops, bus shelters, traffic signal priority schemes for buses, bus lanes, changes to traffic signals to optimise vehicle flow, pedestrian and cycle access improvements to stations, pedestrian direction signage to metro stops.
- Smarter choice measures including Workwise (providing a free travel pass for the first one-two months in a new job for job-seekers); workplace travel planning; sustainable travel grants to employment and education sites; school / college / university travel planning; household personalised travel planning projects in six residential areas along the targeted corridors; cycle services including bike maintenance and cycle training; marketing activities at stations to encourage people to access them by foot, cycle or car-share.
- Technology 'showcase' including real time information displays at bus stops and roll-out of smart cards.

Most corridors received all types of intervention. However, three corridors where there had recently been significant infrastructure improvements mainly received smarter choice and technology showcase interventions.

How activities related to objectives of the Fund

The activities were intended to encourage modal shift to sustainable transport, hence reducing congestion and improving journey reliability for all road users, and reducing carbon emissions#. By helping the transport network to function more efficiently, the project aimed to improve access to employment. This Large Project also had one of the best-developed programmes of free public transport for the first month in a new job, enabling job-seekers to take up offers of employment.

^ CENTRO (2013) Smart Network, Smarter Choices Outcome Monitoring Plan
* CENTRO (2013, 2014, 2015) LSTF Output Surveys
# CENTRO (2011) LSTF Large Project Initial Proposal

Hertfordshire

Area covered by the project

The Hertfordshire Large Project covered the three towns of Hemel Hempstead, St Albans and Watford and their travel to work areas. This is an area of about 10 miles east-west by 10 miles north-south, including the whole of the Watford and St Albans districts and large parts of Dacorum and Three Rivers districts. There is a population of about 300,000 people within the project area^.

Main strands of activity

The main activities were as follows*:

- Walking and cycling infrastructure, including a pedestrian / cycle route from a major business park (Maylands) to Hemel Hempstead town centre, public realm enhancements on a 1km route in the business park, completion of a St Albans 'Green Ring' pedestrian / cycle path, a cycle route in Watford, and cycle parking at rail stations and two hospitals.
- Better public transport services, including a new high frequency bus service in Watford, new buses for routes between Watford and Hemel Hempstead, real time passenger information, bus stop upgrades in Maylands Business Park, and a Maylands Link dedicated bus service to Hemel Hempstead rail station.
- Independent travel training to enable pupils with special education needs to use public transport, and loan of scooters to help people gain access to work.
- Smarter choice measures, including personalised travel planning in St Albans and Hemel Hempstead, promotion of multi-operator bus tickets, workplace travel planning at Maylands Business Park and elsewhere, school travel planning, and cycle challenges and led cycle rides.
- Technology to improve bus services, including a smart ticketing app for mobile phones and equipment to support real time passenger information.

How activities related to objectives of the Fund

The activities were intended to encourage modal shift to sustainable transport, hence reducing both congestion and carbon emissions. The Project was particularly focused on encouraging modal shift for travel to work at major employment sites such as Maylands Business Park, which is next to the M1 and has 700 businesses and 20,000 employees.

Air quality is a significant issue in the Large Project area: there are six Air Quality Management Areas in Watford, three in St Albans, and one in Three Rivers#.

^ Hertfordshire CC (2011) LSTF Large Project Initial Proposal
* Hertfordshire CC (2014, 2015) LSTF Output Survey
# Hertfordshire CC (2011) LSTF Large Project Initial Proposal

Merseyside

Area covered by the project

The Liverpool City Region Combined Authority (Merseyside) Large Project included projects in all five local authority areas (Knowsley, Liverpool City, Sefton, St Helens and Wirral). Activity was focused on eight sub-areas within these local authorities: Kirkby, North Liverpool, South Liverpool, South Sefton, St Helens, Lea Green, Haydock and East Wirral. The population within the eight targeted areas is 643,620^.

Main strands of activity

The main activities were as follows*:

- Working with employers: travel planning support and grants for businesses; personal travel planning and free travel passes for people living along public transport corridors; an 'Employment in the Transport Sector' programme supporting young job-seekers in securing transport-related jobs.
- Travel solutions: personalised support to people who find it difficult to access work by public transport, including travel training / journey planning, free one-month travel passes, free bicycles, cycle training, cycle maintenance training, scooter loan, and 'how to get to…' guides for major employment sites.
- Sustainable transport infrastructure: cycle and pedestrian paths to and near employment sites, 20mph zones, safe crossings, and a 24-hour on-street bike hire scheme in Liverpool.
- Bus services: extensions to hours of operation and route to improve access to key employment sites; new bus control centre for Liverpool.

How activities related to objectives of the Fund

A major focus of the Merseyside project was on increasing the opportunity for people to access employment by broadening travel horizons. This was achieved through personalised travel support, coupled with a range of services such as cycle training and free travel, particularly aimed at young adults and people who were not in employment, education or training (NEETs). Extensions to bus services to major employment sites, new cycle paths to these sites, and workplace travel planning assistance to employers also made it easier for people to get to work.

^ Liverpool CRCA (2014, 2015) LSTF Output Survey

* Merseyside ITA (2013) and Liverpool CRCA (2014) LSTF Output Surveys

Nottingham

Area covered by the project

The Nottingham Urban Area Large Project covered the whole of the Nottingham City Council administrative area and the built up areas of the Nottingham conurbation within the boroughs of Broxtowe, Gedling, Rushcliffe and the Hucknall town part of Ashfield district in Nottinghamshire, and the boroughs of Erewash and Amber Valley in Derbyshire. This area has a population of 899,000^.

Main strands of activity

The main activities were as follows*:

- Smart card development: the project developed a Citycard smart card offering day/season tickets valid for travel on all bus, tram and local train services in the urban area. This was extended to offer an Oyster-style e-purse, launched after the end of the LSTF funding period. Job-seekers were offered discounted travel on public transport. The Citycard also gave access cycle hire, secure cycle parking, a car club, and a range of non-transport services.
- Liveable neighbourhoods and community smarter travel hubs: five virtual 'community hubs' were established for different areas of the city. These provided discounted travel for people with a new offer of employment; journey planning support; community activities such as led cycle rides and walks; cycle training; cycle maintenance and other services. 20mph zones were introduced in nine residential areas.
- 'Worksmart' business support and low carbon transport network: travel planning with businesses; ECO Stars fleet management and driver efficiency scheme; a mobile travel centre 'Infobus' providing personalised journey planning and other services; provision of 45 electric buses on 18 routes linking key employment sites, hospital sites, residential areas and the city centre; cycle paths.
- Active travel: a public hire network of 500 Citycard cycles; longer-term cycle hire to commuters, job-seekers and new starters; a 'Ucycle' scheme with FE/HE institutions including a bike loan scheme for staff and students; cycling promotional events; cycle training and Bike It support to schools.

How activities related to objectives of the Fund

The LSTF programme took place in the context of a major £750 million transport investment programme in Nottingham, including expansion of the tram network, redevelopment of the station, and improvements to the Link Bus network of services. Resources invested through LSTF were intended to complement these large-scale capital schemes, increasing economic competitiveness, creating capacity for growth, and attracting inward investment. At the same time, the programme was designed to make low carbon travel options more attractive, link people to jobs, and support active travel.

^ Nottingham City Council (2011) LSTF Large Project Initial Proposal

* Nottingham City Council (2013, 2014, 2015) LSTF Output Surveys

Reading

Area covered by the project

The Reading Large Project covered the whole of the Reading built-up area, including parts of West Berkshire and Wokingham unitary authorities. The total population of the wider urban area is about 225,000^. The project was coordinated by Reading Borough Council with West Berkshire and Wokingham councils.

Main strands of activity

The main activities were as follows*:

- Personalised travel planning: offered to households, via workplaces and via roadshows at retail centres, job centre and community events.
- Fares and information for drivers / travellers: fares discounts on selected bus routes; an improved travel information website; changes to traffic signals to optimise vehicle flow; variable message signs to provide information to drivers about congestion, journey times and car park status; development of a journey time monitoring system.
- Public cycle hire: 200 bikes available for hire from 29 docking stations across the urban area.
- Active travel: a new pedestrian and cycle bridge over the River Thames (completed after the end of the LSTF funding period), cycle parking, lighting and signing of pedestrian / cycle routes, pedestrian crossings, cycle route improvements, redesign of some junctions. These infrastructure improvements were accompanied by a workplace cycle challenge, 'Beat the Streets' community walking challenge, and Bike It cycling promotion at primary schools.
- Park and ride: two new park and ride sites and a park and rail scheme at one station.

How activities related to objectives of the Fund

Reading has seen strong economic growth and low unemployment in the recent past and planned developments will add about 400,000 additional daily trips to the transport network over the next 15 years#. There is insufficient highway capacity to accommodate significant traffic growth, and limited scope to increase highway capacity. The LSTF programme was intended to encourage more use of sustainable modes of travel, so as to enable local economic growth without unacceptable increases in congestion.

^ Reading Borough Council (2011) LSTF Large Project Partnership Business Case

* Reading Borough Council (2013, 2014, 2015) LSTF Output Surveys

Reading Borough Council (2011) LSTF Large Project Partnership Business Case

Solent

Area covered by the project

The Solent Transport Large Project was mainly focused on nine corridors, six of which radiate from Southampton, two from Portsmouth, and one along the Gosport peninsula. Some of the interventions (described below) were in the wider South Hampshire area. The population in the area affected by the corridor schemes was 501,000^. The project was delivered jointly by the three local authorities of Hampshire County Council, Southampton City Council and Portsmouth City Council.

Main strands of activity

The main activities were as follows*:

- Real time information screens: over 300 installed at bus stops along the nine corridors and in Southampton and Portsmouth.
- Legible Cities: pedestrian wayfinding signs installed across Southampton, Portsmouth and six South Hampshire towns.
- Physical infrastructure improvements, mainly on the nine corridors, including bus station and bus stop improvements, bus priority at traffic lights, public realm improvements around Southampton station and Eastleigh station, pedestrian and cycle crossing facilities and cycle paths.
- Public transport smart card accepted by all bus and ferry operators in Southampton, Portsmouth, and nearby towns.
- Behavioural change measures: personal travel planning, commuter challenge, Bike It initiatives with schools, and free public transport for job-seekers.

How activities related to objectives of the Fund

The South Hampshire economy is less prosperous than the wider south-east. Employment growth has tended to be concentrated around the M27 corridor, which limits opportunities for sustainable travel. The LSTF initiatives were intended to improve access by sustainable modes to the main city centres, supporting the creation of new jobs in these locations#.

^ Transport for South Hampshire (2013) LSTF Baseline Monitoring and Evaluation Report Table 2

* Transport for South Hampshire (2013) and Solent Transport (2014, 2015) LSTF Output Surveys

Transport for South Hampshire (2011) LSTF Large Project Initial Proposal

Surrey

Area covered by the project

The Surrey Large Project covered Woking, Guildford and Redhill / Reigate. These three areas have between them a population of 382,000^.

Main strands of activity

The main activities were as follows*:

- Bus priority and corridor improvements: RTPI (real time passenger information) 'back office' systems upgraded; bus priority at traffic signals in Woking; bus stop upgrades on routes serving Guildford, Woking and Redhill; bus corridor improvements in all three towns.
- Walking and cycling: new cycle routes and cycle crossings in Woking and Guildford; 216-space cycle parking hub at Woking railway station.
- Traffic management: Audit of the Urban Traffic Control / traffic signal control system and review of traffic management approach.
- Travel planning: New journey planner / travel information website; development of pedestrian wayfinding signage in the three town centres; cycle training, Go Ride and Bike It projects with schools; cycling festivals in all three towns; business grants scheme and community grants scheme for small-scale sustainable travel infrastructure and projects.
- Large schemes: new park and ride site in west Guildford; new access road to business parks in Woking.

How activities related to objectives of the Fund

Woking, Guildford and Redhill / Reigate are Surrey's busiest towns and suffer significant congestion, unreliable journey times and severance caused by busy roads, railway lines and rivers which makes it difficult for people to walk or cycle. The projects were intended to reduce town centre congestion, encourage mode shift to buses and cycling, and manage traffic more effectively.

^ Surrey County Council (2011) LSTF Large Project Strategic Case lists the populations of the towns i.e. 67,000 (Guildford), 93,100 (Woking), Reigate / Redhill not specified. However, Surrey (2013) LSTF Output Survey quotes higher figures, which are for the relevant boroughs / districts i.e. 140,000 (Guildford), 100,000 (Woking), 140,000 (Reigate / Redhill). Figure quoted here is based on un-rounded 2013 borough / district population estimates for the three areas.
* Surrey County Council (2013, 2014 and 2015) LSTF Output Surveys

Telford

Area covered by the project

The Telford Large Project covered the unitary authority of Telford and Wrekin, which has a population of 167,000^. A substantial part of the activity was focused on a major public realm scheme in the town centre, described below.

Main strands of activity

The main activities were as follows*:

- Telford town centre Box Road scheme: public realm enhancements on one side of the road surrounding the town centre (shared space, 20mph limit); changes to make other sides of the box road two-way for vehicles.
- Telford Central Interchange: improved walking and cycling route from station to town centre.
- Silkin Way multi-user route: re-surfacing and widening of existing off-road cycle path.
- Telford-Newport-Stafford national cycle network route: upgrade of existing off-road cycle path.
- Ironbridge Gorge park and ride: a new car park / park and ride site for visitors to the network of museums in Ironbridge Gorge.
- Travel planning: walking buses at schools, child pedestrian and cycle training, car-sharing scheme, Wheels to Work service providing short-term loan of a motor scooter to enable people to get to work, education or training.

How activities related to objectives of the Fund

Telford is a sub-regional shopping centre, but its main shopping area was surrounded by a high speed, three lane, one way circulatory system (the Box Road) that acted as a collar preventing expansion. The LSTF project was intended to make the town centre more attractive for shoppers, ensuring that businesses and shops remained viable; and also to facilitate the expansion of the shopping area into a development site on the other side of the Box Road.

^ Telford and Wrekin Council (2013) LSTF Outputs Survey

* Telford and Wrekin Council (2013, 2014 and 2015) LSTF Output Surveys

TfGM

Area covered by the project

The Transport for Greater Manchester Large Project covered all ten districts of Greater Manchester. This area has a population of almost 2.6 million people^.

Main strands of activity

The main activities were as follows*:

- Local walking and cycling access: better pedestrian access to Metrolink stops; cycle / pedestrian routes to key centres of activity such as town centres and employment sites.
- Travel choices: support for job-seekers, including provision of refurbished bikes, free bus tickets, and personal travel planning; work with businesses including sustainable travel grants, car-sharing scheme, personal travel planning and sustainable travel events at businesses; and residential personal travel planning.
- Traffic management technology: project development work that will ultimately enable better management of traffic signals to optimise vehicle flow; variable message signs to alert drivers to congestion ahead; bus priority at traffic signals.
- Local Link demand responsive bus services to four employment sites, matching journey needs of shift workers; 'Train, Learn, Drive and Earn' project training unemployed people to become drivers with community transport organisations and bus operators.
- Commuter cycle project: city centre cycle hubs with parking, lockers etc. in Manchester and other district centres; adult cycle training; workplace cycle maintenance workshops; work with businesses to promote cycling to employees; cycle challenge.

How activities related to objectives of the Fund

The project was focused on commuter trips and support for job-seekers. It aimed to make it easier for people to commute into town and city centres by cycling or public transport, hence reducing congestion and carbon. By improving connectivity, it also aimed to stimulate economic growth#.

^ Transport for Greater Manchester (2011) LSTF Large Project Initial Proposal
* Transport for Greater Manchester (2013, 2014 and 2015) LSTF Outputs Survey
# Transport for Greater Manchester (2011) LSTF Large Project Initial Proposal

WEST

Area covered by the project

The West of England Sustainable Travel (WEST) Large Project covered the city of Bristol plus Bath and NE Somerset, North Somerset and South Gloucestershire Councils. This area has a population of almost 1.1 million people. Projects were particularly focused on 11 commuter routes, three city / town centres (Bristol, Bath and Weston-super-Mare), three employment clusters (Portbury Docks / Severnside, Bristol Airport and the Bristol North Fringe), four universities and 90 schools.

Main strands of activity

The main activities were as follows^:

- Business engagement: sustainable travel grants, sustainable travel events at workplaces, commuter challenge, cycle loan scheme, Co-wheels business travel scheme offering businesses use of electric cars and bikes.
- Cycling and walking infrastructure: cycle / pedestrian crossings, cycle / pedestrian routes, lighting of cycle routes, signage, 20mph area-wide schemes, cycle parking.
- Bus service improvements: new or more frequent express / commuter bus services, bus stop improvements, junction treatments to improve bus punctuality, 'next stop' display screens and audio on buses.
- Community engagement: sustainable transport community grants programme supporting cycle maintenance, engagement of ethnic minority groups in cycling, all-ability adapted bikes; sustainable travel advice and information via community festivals / events; buggy walking groups.
- Behaviour change at life transitions: personalised journey planning and information packs for residents of five new housing developments; work with universities, including university bus services, bike loan, bike hire scheme, cycle hub; school-based projects including Bike It, cycle training, cycle parking, infrastructure improvements such as 20mph zones around schools, schools travel challenge; support for job-seekers including bike and scooter loan and free bus tickets for travel to work / training.
- Information and marketing: development of next-bus mobile phone app and travel information website; car-share, public transport and cycling promotions.

How activities related to objectives of the Fund

The primary aim of the WEST project was to reduce road traffic and hence carbon emissions. The project was also intended to improve business efficiency by relieving congestion and increase labour market efficiency by improving access to key employment sites*.

^ WEST (2013, 2014 and 2015) LSTF Outputs Survey

* WEST (2011) LSTF Large Project Initial Proposal

PART II: EVIDENCE ON OUTCOMES

4 Traffic and car use

Key points:

All ten Large Projects for which data were available showed a decrease in ***per capita car traffic*** in 2015 relative to a 2009-2011 baseline, according to National Road Traffic Estimates (NRTE). The overall change in these ten Large Projects was a reduction of -2.6%. Traffic also decreased slightly in non-Large Project English local authorities outside London over this period, but by a statistically significantly smaller amount (-0.3% reduction, p< 0 .001 for difference).

The greatest reduction in per capita car traffic levels for this period, for the whole of England (excluding London) was in Nottingham, and the top six authorities with the greatest reductions in per capita traffic levels were all LSTF areas.

Averaged across all 12 Large Projects, population grew faster than in the national comparator authorities (3.9% compared with 3.3%), and employment growth was almost as strong (4.8% compared with 5.1%).

In terms of changes in ***absolute traffic***, data from the NRTE and/or from the Large Projects own monitoring suggested:

- Stable or reducing traffic levels in the LSTF areas within six of the Large Projects (BDRS, Bournemouth, Merseyside, Nottingham, Reading, TfGM).
- A lower rate of traffic growth in the LSTF areas compared with other areas in three Large Projects (CENTRO, Solent, Surrey).

Of the three remaining Large Projects, Telford data suggested a reduction in traffic in the morning peak; data for WEST suggested reductions in particular locations; whilst data for Hertfordshire indicated growth below that occurring in the national comparator group of authorities.

Eight Large Projects (BDRS, Bournemouth, CENTRO, Hertfordshire, Nottingham, Reading, Solent, TfGM) had modal share surveys into local town centres which showed a stable or reducing car or light vehicle mode share to at least some of those centres.

Eight Large Projects (BDRS, CENTRO, Merseyside, Nottingham, Solent, Telford, TfGM and WEST) had used evidence on the scale and effect size of all or some of their interventions to estimate car mileage savings achieved. These were non trivial in all cases.

4.1 Overview of objectives targeting traffic

Table 4.1 provides an overview of the objectives listed in the Annual Outcomes Reports that were most relevant to traffic and car use. In most cases, explicit mention of reducing traffic or car use was rare – the only three authorities to mention this were Bournemouth (which had an objective to reduce car trips and total vehicle kilometres); Solent (which aimed to reduce vehicle kilometres) and Nottingham (which was aiming for 'no increase in traffic levels'). Most of the other authorities had indirect objectives, relating to reducing congestion (discussed in Chapter 5) and encouraging greater transport efficiency; encouraging modal shift; encouraging active travel; and/or reducing carbon emissions and carbon intensive transport.

Table 4.1: Summary of objectives relating to traffic or car use*

BDRS#	• To facilitate and encourage sustainable commuting.
Bourne-mouth	• Deliver modal shift to low carbon alternatives to the car, particularly for shorter distance commuting and school car trips. • Reduce car dependency, with an associated reduction in car trips and total vehicle kilometres.
CENTRO	• Facilitate greater network efficiency within the LSTF corridors. • Increase active travel (with separate objectives given for short trips by residents; for trips to secondary schools and further education colleges; and for journeys to workplaces).
Hertford-shire	• To ensure the area is an exemplar in reducing carbon emissions from transport. • To ensure businesses can access the labour force, suppliers and customers by sustainable means.
Mersey-side#	• Improve the efficiency of the transport system. • Achieve an overall reduction in carbon emissions.
Notting-ham	[Objectives are accompanied by specific targets to:] • Increase sustainable travel modal share by 10% from 2011/12 levels by 2014/15. • No increase in traffic levels contributing to a reduction in carbon emissions from transport by 10% over three years by 2014/15.

Reading	• …reduce carbon emissions by achieving the following against the estimated future 2026 forecast:
	  ○ An additional 7,200 daily bus trips
	  ○ An additional 12,050 daily walk trips
	  ○ An additional 2,300 daily cycle trips
	  ○ An approximate 10% reduction in congestion (compared to that which would have otherwise been present); and
	  ○ A 29,000 tonne reduction in CO_2

Solent	• Enhance business performance, particularly at the international gateways, by increasing the efficiency of the transport network and managing congestion. • Improve sustainable access linking people to jobs and key facilities in our cities and towns. • Reduce emissions (particularly carbon) from the transport sector by reducing highway vehicle kilometres. • Improve levels of physical activity, health and wellbeing through increased active travel.
Surrey	• To provide an integrated transport system that protects the environment, keeps people healthy and provides for lower carbon transport choices.
Telford	• Achieve a 10% shift to sustainable modes such as walking, cycling and public transport. • Reduce congestion and improve journey time reliability to attract new investment. • To reduce the dominance of the car through a shift to sustainable modes.
TfGM	• A focus on promoting low carbon commuting options.
WEST	• Improved sustainable transport links / access for employment, training, retail, education and leisure. • Increased physical activity and improved health through greater use of walking/cycling for local journeys. • Increased use of sustainable transport among students and reduced congestion in adjacent points in the network.

* Excluding those relating to congestion, which are given in Chapter 5, or specific to other modes, which are included in the relevant chapters. # Indicates objectives stated in reports prior to the latest Outcomes Report.

4.2 Metrics used to monitor traffic and car use

Traffic flows were usually measured in two ways – either a direct measure of traffic flow (often aggregated from a number of automatic counters), or a measure of vehicle kilometres, calculated from traffic flow and road network data. Data were often drawn from both the Department for Transport's NRTE data collection process[15], and/or from the authorities' own network(s) of counters. As well as area-wide estimates, Large Projects also often reported on data for sub-areas, cordons or screenlines[16] that were of particular significance. Large Projects varied as to whether they reported 12 hour or 24 hour flows; weekday or 7 day flows; and annual or 'representative month' data. Large Projects also reported on results for different road types, including all roads, roads under the jurisdiction of the local authority, and all roads excluding minor roads (due to issues with data collection). It was also common to quote data for all motor traffic, for light vehicles, or for cars only. Trends often varied depending on areas, time periods, road types and traffic types.

The period immediately prior to the LSTF work was one of considerable volatility in traffic levels, given a sharp decline to 2009/10, followed by subsequent changes in trend. This leads to some issues for evaluation, since it means that the choice of baseline dates makes a non-trivial difference to the calculated outcomes. 2009-11 was used as a baseline throughout (with the three-year average aimed at evening out some of the variation). However, several authorities noted that they felt use of a different baseline would give a better indication of their work (notably Telford, Solent and Hertfordshire) – alternative calculations are reported in context. Using a three-year *post*-intervention average was not possible: this was because LSTF work continued until 2015/16 and insufficient time had elapsed between the end of LSTF and the completion of this evaluation.

It should be noted that three local authorities commented on concerns about the NRTE data reported in the TRA890X series, feeling that their own data were more reliable. TfGM commented that they believe flows on minor roads to be overestimated. (They have not included data for minor roads in their own calculations due to difficulties with estimations.) For Hertfordshire (as a whole), NRTE figures suggest a 6.3% increase in traffic between 2009-11 and 2014 (Table TRA8904), whilst the local authority estimate that it was only in the order of 0.9-1.6% for that period, and considers their figures to be more reliable than DfT figures, due to a greater number of count sites. Nottingham also argued that the NRTE figures for minor roads are based on a relatively small number of sites, and require significant interpolation, making them unreliable at local authority level.

In terms of car use, it was also relatively common for Large Projects to report on the mode share of travel inbound to particular urban centres. Again, Large Projects varied as to whether they reported on the share for cars; private vehicles; light vehicles; and whether motorbikes were included or excluded. They also varied as to whether they undertook vehicle occupancy surveys in association with vehicle counts, which determined whether their mode share figures reflected vehicle split or person split.

[15] The Department for Transport produced a series of national road traffic estimates (referred to here as NRTE data). Annual estimates of traffic flows are derived from data generated by a combination of 180 automatic traffic counters and around 10,000 manual counts. Data at local authority level is available here: https://www.gov.uk/government/statistical-data-sets/tra89-traffic-by-local-authority. Technical details of the dataset are available here: https://www.gov.uk/government/publications/road-traffic-statistics-guidance.

[16] Cordons and screenlines consist of a series of traffic counters, which are used to capture traffic flows on all roads around a city centre, or all routes between two locations of interest (for example, all routes between Bath and Bristol).

A variety of other types of survey were also undertaken on modal split – usually either general household surveys, or surveys associated with personalised travel planning, workplace or school travel activity. Most of these results are analysed in Chapter 10.

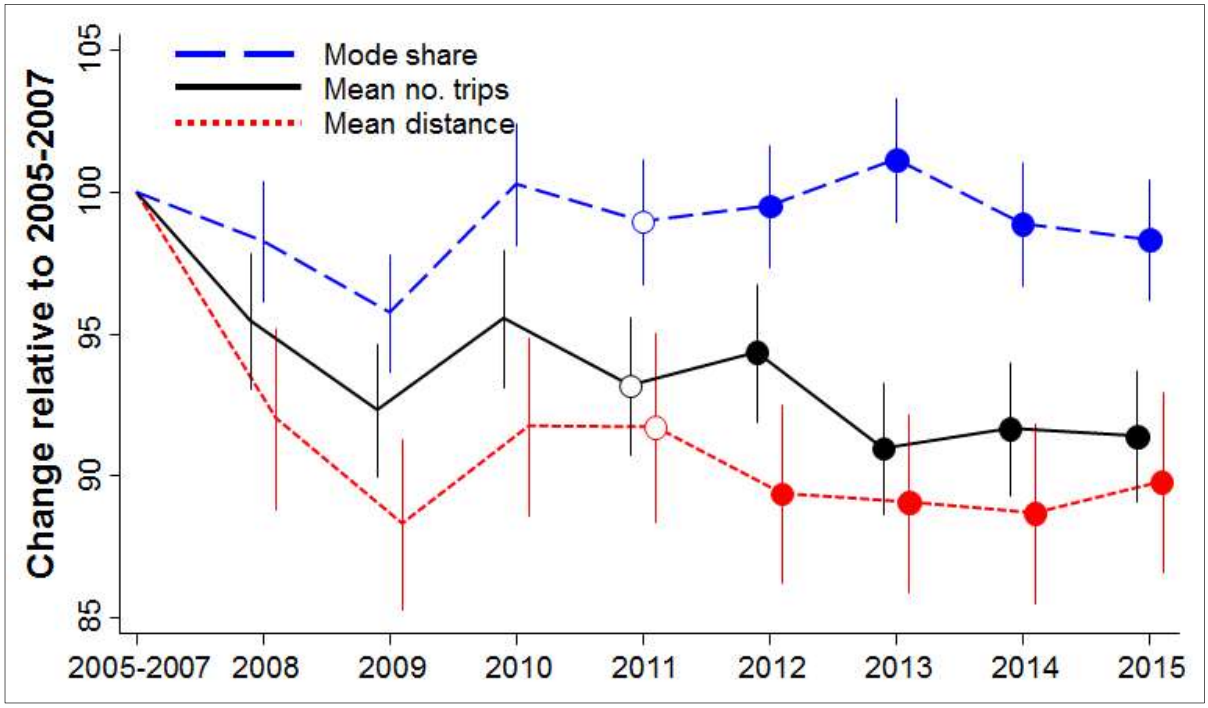
4.3 National data and high level outcomes for traffic and car use

At the **national level**, there are two sources of data about changes in car use and traffic levels – the National Travel Survey (NTS), and the National Road Traffic Estimates (NRTE)[17].

NTS data

NTS trends in 'urban areas of England excluding London' are given in Figure 4.1.

Figure 4.1: Average car driver travel in urban areas in England excluding London, for people of all ages (National Travel Survey)



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding. 2015 point estimates derived from data provided by DfT; 2015 confidence intervals are approximate, based on the assumption that uncertainty around the estimates in 2015 is the same as in 2014.

NRTE data

NRTE data for car vehicle traffic has been used in this project.

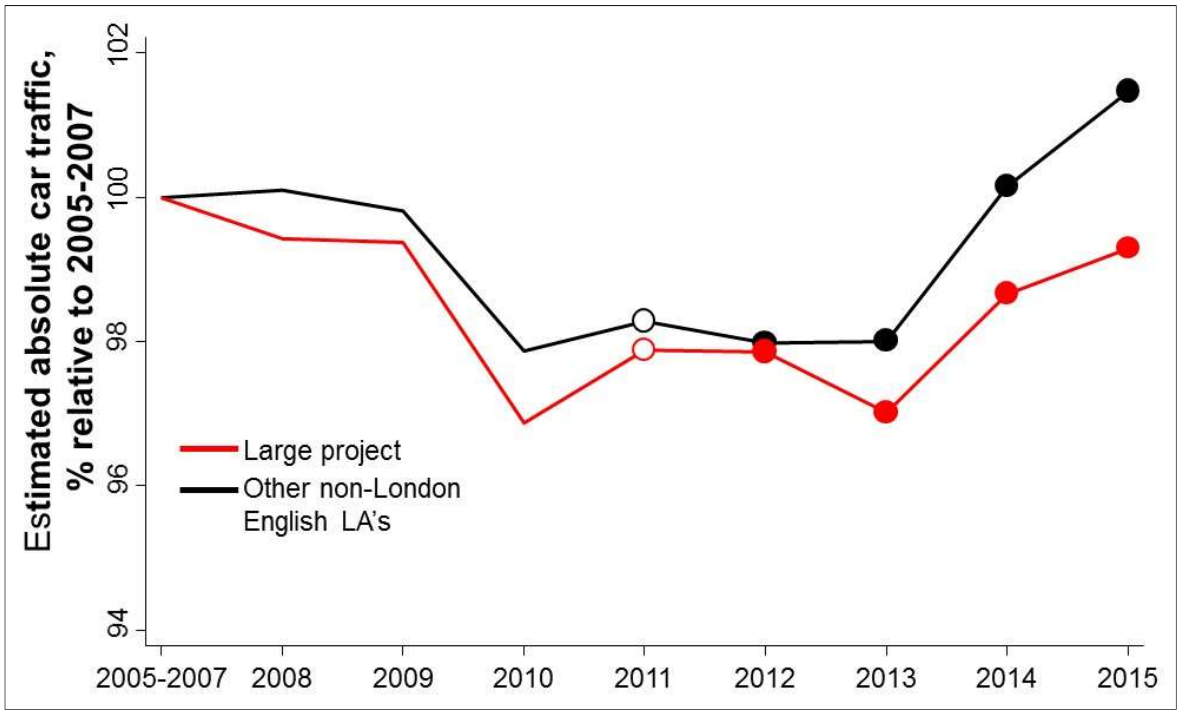
For the **Large Projects taken together**, NRTE trends are shown in Figures 4.2a and 4.2b (in absolute terms and per capita[18], respectively).

NRTE trends for **individual Large Projects** are given in Tables 4.2a and 4.2b (in absolute terms and per capita respectively) and in Figure 4.3 (in per capita terms).

17 https://www.gov.uk/government/statistical-data-sets/tra89-traffic-by-local-authority

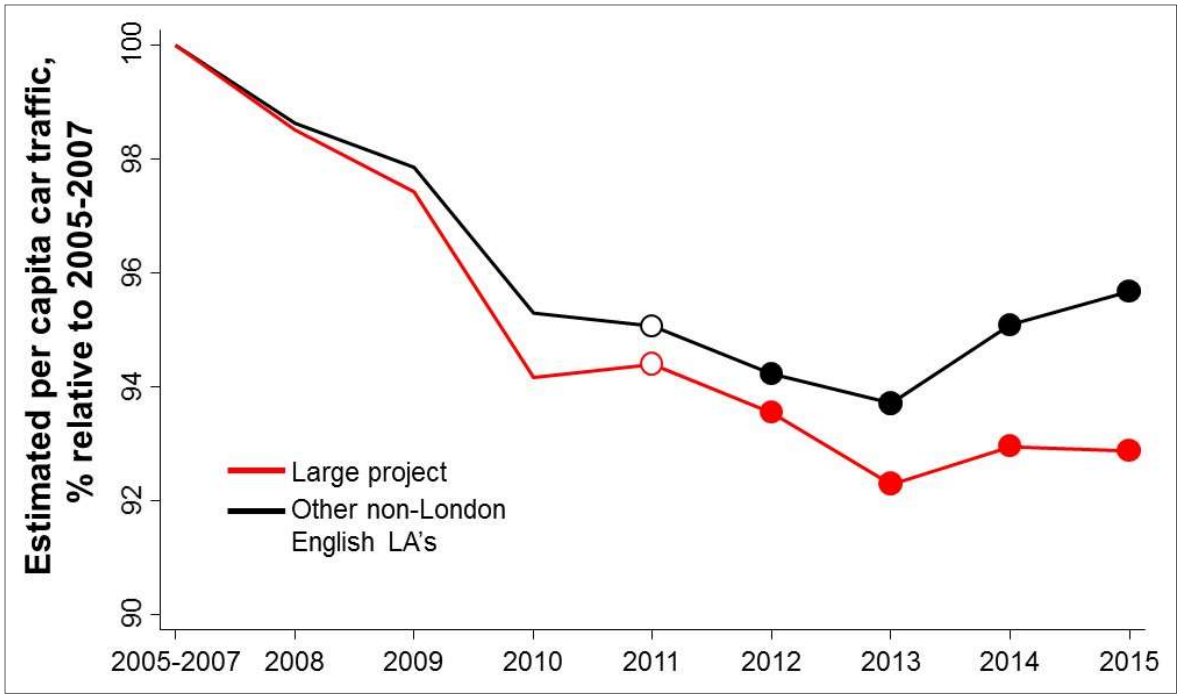
18 NRTE data have been converted into per capita figures using the ONS mid-year population estimates.

Figure 4.2a: Estimated total car traffic at the grouped local authority level (NRTE)



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding. Note: both Large Projects and non-London English local authorities exclude Hampshire, Hertfordshire, Nottinghamshire and Surrey, as these include some Large Project local authorities and some non-Large Project local authorities.

Figure 4.2b: Estimated per capita car traffic at the grouped local authority level (NRTE)



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding. Note: both Large Projects and non-London English local authorities exclude Hampshire, Hertfordshire, Nottinghamshire and Surrey, as these include some Large Project local authorities and some non-Large Project local authorities.

Table 4.2a: NRTE data on absolute levels of traffic in the Large Project areas

	% change between 2005-2007 and 2009-2011	Greater traffic reduction than national trend?	2009-2011 baseline (million car km)	2015 value (million car km)	% change between 2009-2011 baseline, and 2015	Average percentile of change (range)*, relative to all non-London LAs
BDRS	-0.5%	Yes	7550	7688	1.8%	43 (9 - 93)
Bournemouth	-1.3%	Yes	1351	1350	-0.1%	13 (12 - 16)
CENTRO	-1.5%	Yes	12933	13185	1.9%	53 (17 - 83)
Hertfordshire	n/a	n/a	n/a	n/a	n/a	n/a
Merseyside	-0.2%	Similar	6196	6267	1.1%	44 (6 - 71)
Nottingham	-0.3%	Similar	1227	1199	-2.3%	3
Reading	-1.8%	Yes	438	439	0.2%	16
Solent	-4.3%	Yes	1870	1886	0.9%	30 (24 - 35)
Surrey	n/a	n/a	n/a	n/a	n/a	n/a
Telford	-0.4%	Yes	1046	1065	1.8%	48
TfGM	-0.1%	Similar	14296	14317	0.1%	27 (4 - 61)
WEST	0.6%	No	7598	7805	2.7%	57 (36 - 82)
Large Project average	0.7%	Yes			1.2%	n/a
Other English LAs excl London	*-0.2%*	*n/a*	*212369*	*218510*	*2.9%*	*n/a*

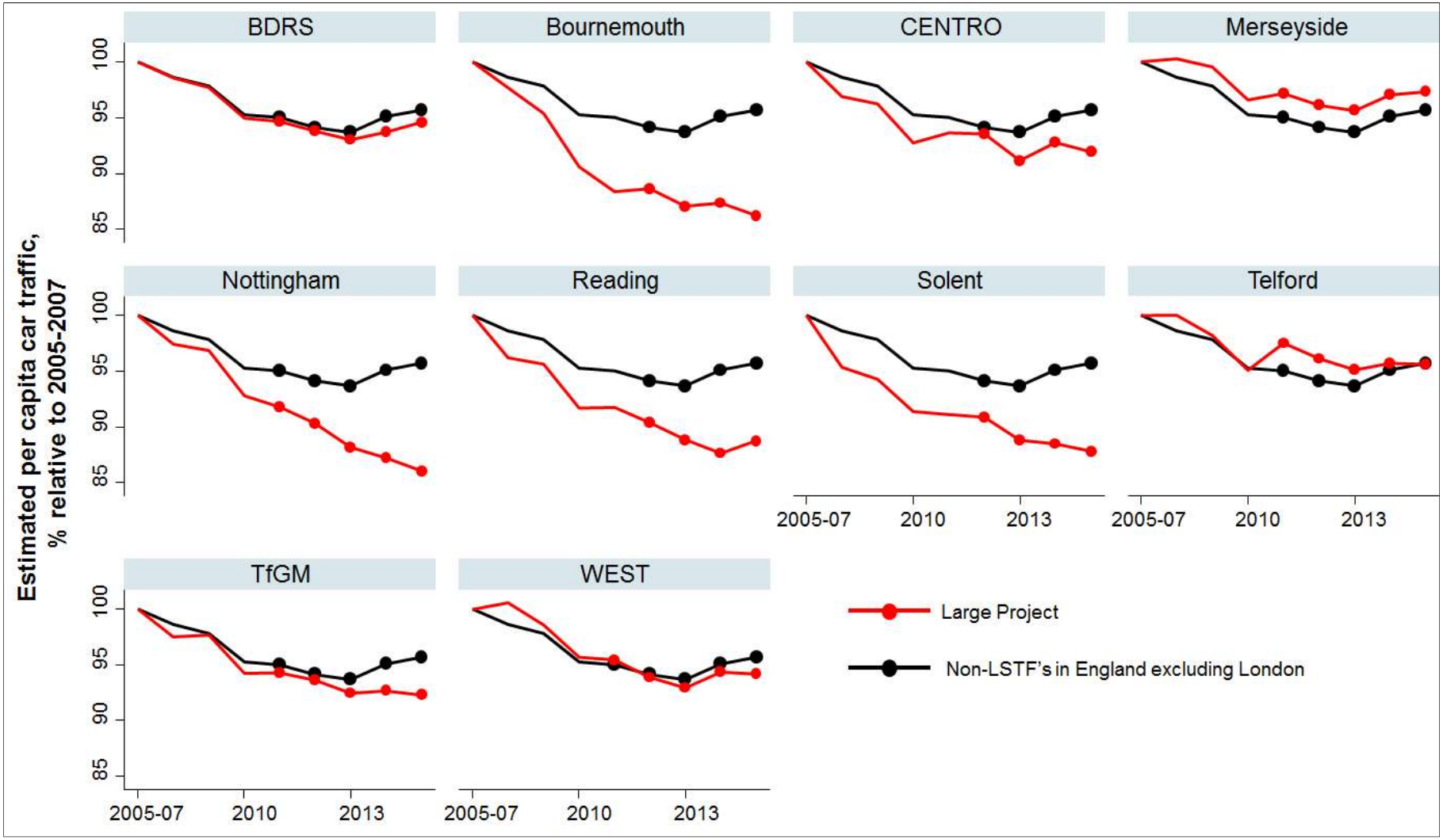
* Range only presented if there was more than one local authority included in the Large Project area. Authorities ranked, with ranks then converted to percentiles. The lowest percentile authority experienced the greatest decrease in traffic, whilst the highest percentile authority experienced the greatest increase. n/a=not available. 'Similar' defined as +/- 0.1%.

Table 4.2b: NRTE data on car traffic per capita in Large Project areas

	% change between 2005-2007 and 2009-2011	Greater traffic reduction than national trend?	% change between 2009-2011 baseline, and 2015	Average percentile of change (range)*, relative to all non-London LAs
BDRS	-2.3%	Similar	-1.2%	49 (12 - 97)
Bournemouth	-4.6%	Yes	-5.7%	15 (2 - 27)
CENTRO	-3.8%	Yes	-2.4%	41 (4 - 86)
Hertfordshire	n/a	n/a	n/a	n/a
Merseyside	-0.5%	No	-0.4%	65 (12 - 81)
Nottingham	-3.2%	Yes	-8.2%	1
Reading	-4.4%	Yes	-4.6%	15
Solent	-5.7%	Yes	-4.8%	14 (5 - 22)
Surrey	n/a	n/a	n/a	n/a
Telford	-1.8%	No	-1.4%	44
TfGM	-2.3%	Similar	-3.3%	33 (3 - 55)
WEST	-1.4%	No	-2.5%	33 (14 - 58)
Large Project average	2.6%	Yes	2.6%	n/a
Other English LAs excl London	*-2.2%*	*n/a*	*-0.3%*	*n/a*

* Range only presented if there was more than one local authority included in the Large Project area. Authorities ranked, with ranks then converted to percentiles. The lowest percentile authority experienced the greatest decrease in traffic, whilst the highest percentile authority experienced the greatest increase. n/a=not available. 'Similar' defined as +/- 0.1%.

Figure 4.3: Estimated per capita car traffic, relative to 2005-2007, by Large Project, according to National Road Traffic Estimates



Filled circles show years when Large Projects were receiving funding.

4.4 Comparing changes in traffic with changes in population and employment

The LSTF period was a time of growth in population and employment, as discussed in section 2.2 and as shown in Table 4.3 (repeated from Table 2.2 for ease of reference) and Figures 2.2 – 2.5. Population grew faster in the Large Project areas than in the national comparator group of authorities, and employment growth was almost as strong. Interpretation of traffic trends in the Large Project local authority areas in section 4.5 below takes these changes into account.

Table 4.3: Population and employment in Large Project local authorities in 2015, and change relative to 2009-2011 baseline

	Population		Number of jobs	
	2015 ('000s)	**Relative change vs. 2009-2011**	**2015 ('000s)**	**Relative change vs. 2009-2011**
BDRS	1375	+3.1%	556	+4.2%
Bournemouth	394	+5.6%	182	+5.2%
CENTRO	2834	+4.4%	1222	+5.4%
Hertfordshire	394	+5.8%	228	+16.9%
Merseyside	1398	+1.6%	555	+2.4%
Nottingham	900	+3.9%	415	+5.0%
Reading	162	+5.0%	102	+7.4%
Solent	913	+4.5%	399	+3.3%
Surrey	390	+5.2%	196	+5.7%
Telford	171	+3.2%	82	+4.6%
TfGM	2756	+3.5%	1239	+4.8%
WEST	1119	+5.4%	569	+2.7%
Large Project average		+3.9%		+4.8%
Other English LAs excluding London	*33,308*	*+3.3%*	*14,615*	*+5.1%*

Red indicates growth in population and employment which was greater than that occurring in the comparator group of authorities. Population source: ONS mid-year population estimates. Employment source: Business Register and Employment Survey (BRES).

4.5 Interpretation of national and high level traffic data

At the **national level**, both NTS and NRTE data sets show a substantial reduction in car use between 2005-2007 and 2009 or 2010, associated with the recession. Since then, there have been further reductions in car driver trip numbers and per capita traffic levels to 2013, but at a lower rate and with an upturn since 2013 (Figure 4.1, Figures 4.2a and 4.2b).

The NRTE data suggests that trends in the **Large Project areas** followed the national pattern, but with a divergence, which increased over time. Taken together, Figures 4.2a, 4.2b and 4.3 and Tables 4.2a and 4.2b suggest that:

- During the LSTF period (between a 2009-11 baseline and 2015), absolute traffic increased by 2.9% in the national comparator group, whilst the overall change in the 10 Large Projects was an increase of 1.2%. The difference between the Large Project local authorities and the national comparator local authorities was statistically significant (p=0.002 in a T-test). (This analysis was undertaken using a total of 37 local authorities in the Large Projects and 76[19] in other parts of England excluding London).
- During the LSTF period (between a 2009-11 baseline and 2015), there was a small decrease in per capita traffic (-0.3%) in the national comparator group, whilst the overall change in the 10 Large

19 Isles of Scilly were excluded, as this is such a small local authority that values may not be reliable.

Projects was a reduction of -2.6%. The difference between the Large Project local authorities and the national comparator local authorities was highly statistically significant ($p<0.001$ in a T-test). (This analysis was undertaken using a total of 37 local authorities in the Large Projects and 76 in other parts of England excluding London).

- Prior to LSTF funding (comparing average data for 2005-2007 with 2009-2011), the overall reduction in traffic levels in the LSTF areas was greater than elsewhere, albeit that the difference was relatively modest (-0.7% vs. -0.2% for absolute reductions, -2.6% compared with -2.2% for per capita reductions). In particular, this was the case in Bournemouth, CENTRO, Nottingham, Reading and Solent, implying that, in those areas, pre-LSTF measures may have provided some contribution to the trends seen during the LSTF period.
- For each of the 10 Large Project areas for which there were available data, between a 2009-11 baseline and 2015, looked at individually, changes in both absolute and per capita traffic were better than the average for the national comparator group of authorities – i.e. rates of growth have been slower, or traffic reduction has occurred.
- In all 10 Large Projects, individually, per capita traffic levels have reduced over the period. In Bournemouth, Nottingham, Reading and Solent, levels of per capita traffic reduction have been particularly substantial.

Tables 4.2a and 4.2b also show the percentile rankings of the local authorities comprising the Large Project areas in terms of their change in traffic. For the 37 local authorities from the Large Projects, 26 are ranked in the top 50% (i.e. they performed better than average) for absolute traffic levels, and 24 are ranked in the top 50% for per capita traffic levels[20]. Nottingham City has experienced the largest decline in car traffic per person in the country (excluding consideration of London), followed by the LSTF local authorities of Bournemouth, Salford, Manchester, Coventry and Southampton.

Comparing Tables 4.2a and 4.2b and Table 4.3:

- Three Large Projects – notably Reading, and, to a lesser extent, Bournemouth and CENTRO – achieved an above-average reduction in per capita traffic levels over a period when they also experienced an above-average increase in jobs. These places appear to be doing better than other urban areas at reducing traffic, despite their increase in economic activity.
- Two other Large Projects – Nottingham and TfGM – show an increase in jobs which is similar to that in other areas of England, but also in the context of above-average reductions in per capita traffic levels.

4.6 Project level outcomes for traffic

Available traffic data from the Large Projects is given in Table 4.4, with more details given in Table 4.5. Figure 4.4 provides an illustration of the 'headline' figures relating to the Large Projects overall.

It was common for projects to provide more than one measure for traffic flows, relating to different data series, different geographical areas or different time periods, and for data from particular individual locations to show stronger evidence of LSTF effects that might be evident in overall project results. For example, BDRS, CENTRO, Nottingham, Reading, Solent, Surrey and WEST all provided data indicating differential traffic impacts for different areas, including reductions in traffic in a particular part of the Large Project area that were greater than those for the whole Large Project area.

There were six Large Projects where traffic levels along a corridor had been measured in relation to a control or comparator area. Merseyside and Solent LSTF areas were both performing better than

20 In total, ranking was done on 113 local authority districts.

their control areas, with LSTF officers feeling that the difference could at least in part be attributed to LSTF work. This was not the case in Bournemouth, Hertfordshire and Surrey, although, in all three cases there were issues with the control location, in terms of a limited number of monitoring sites, non-comparable locations and/or the risk of spill-over effects. In Telford, there were some indications of positive impacts during the morning peak in the LSTF area, relative to the rest of the borough. More details are as follows:

- Bournemouth's results for the LSTF corridor (from 29 sites) were compared to results from three sites on a control corridor[21]. Both data sets suggest a small reduction in traffic, although the reduction on the control corridor was greater. The control corridor was chosen as it was one of the few locations where few schemes were to be implemented. However, those involved in the project felt that the small number of sites on the control corridor made results vulnerable to fluctuation.
- Hertfordshire had collected data for the three LSTF towns and from a control area. As indicated by the data in Table 4.4, data from traffic counts and vehicle kilometre estimates suggested mixed results. Roads under HCC control in LSTF areas performed better than those in the control area according to traffic counts, but this distinction was lost if including data for motorways and trunk roads and/or looking at estimates of vehicle kilometres. In correspondence with the Large Project, it was noted that comparisons were variable by road type and by base year chosen. It was also noted that there could have been spill-over effects into the control area, and that an alternative control area, further from the LSTF towns, might have been a better choice.
- Merseyside provided data from 415 sites, of which 255 were located within the LSTF area and 160 outside the LSTF area. These two groups of sites showed different trends, with divergence notable from about 2010, with traffic increasing in the non-LSTF areas, whilst traffic in the LSTF areas initially reduced, followed by a return to 2009-11 levels in 2014. (However, it should be noted that trends prior to 2008 were also different for the two sequences). Merseyside commented that traffic reduction was not an intended aim of the programme, and that factors like petrol price potentially had a greater impact on traffic levels in the region than the LSTF work. However, they think it is possible that the effects of their work with employers may have led to some differential performance in the LSTF areas.
- For Solent, data from a control corridor in Fareham were presented. Whilst traffic flow along the three LSTF corridors rose by 1.4% compared to the 2009-2011 baseline, traffic rose on the control corridor by 4.6%. Solent's own work used 2012 as a baseline (rather than 2009-11), given that this year had less disruption on the network. Between 2012 and 2014, traffic on the three corridors was stable (+0.1%), whereas traffic on the control corridor rose by 3.3%. Differences in trend were particularly notable between 2012 and 2013, when AADT flows fell on all three sets of LSTF corridors, but rose on the control corridor. The control corridor in Fareham was chosen because the authority was not doing any physical improvements or direct engagement with schools, colleges or businesses in the area. Based on initial results from personalised journey planning surveys, and consideration of evidence from the sub-regional traffic model, LSTF project officers felt that at least some of the difference between trends in the control corridor and trends on the target corridor could be attributable to LSTF work.
- Surrey provided data from a number of counters, however, due to problems with some of the counters (damage, removal due to road resurfacing etc.) the number on which it was possible to base calculations was limited – with nearly complete traffic data for 3 counters in Woking, 2 in Redhill, 4 in Guildford, and a control counter in Ashtead, near Epsom. The data showed a larger

21 There were four sites on the control corridor, although data from one of these sites were not available for 2015, and results from this site were therefore excluded from calculations.

reduction in traffic flows at the control counter, than for the three LSTF areas. However, officers noted that the control counter was only chosen because it was the closest counter to a non-LSTF town that was available at the start of the monitoring period, and was not considered a particularly good indicator of what happened elsewhere. It should also be noted that none of the Guildford counters would have picked up on traffic reductions due to the new Park and Ride service, as they were too far away and/or would have been distorted by other traffic flows. Between 2009-11 and 2015, general traffic flows in Surrey increased by 4.5% (according to DfT Table TRA8907), a greater rate than that calculated for any of the three LSTF towns.

- Telford provided results for both an inner and outer cordon. At both cordons, 24 hour traffic levels rose but morning peak flows fell. The fall in AM peak flows was greater at the inner cordon than the outer cordon. Looking at the change in 24 hour flows – when 2009-2012 is used as a baseline, the increase at the inner cordon was slightly greater. However, if only 2012 is used as a baseline, it is notable that the increase in traffic at the inner cordon was smaller than the increase at the outer cordon. The Outcomes Report concludes that the *"Large Project somewhat contributed to reduced congestion and increased attractiveness for businesses through reduced morning peak flows and through a slower rate of increase in traffic flows than in the rest of the borough"*.

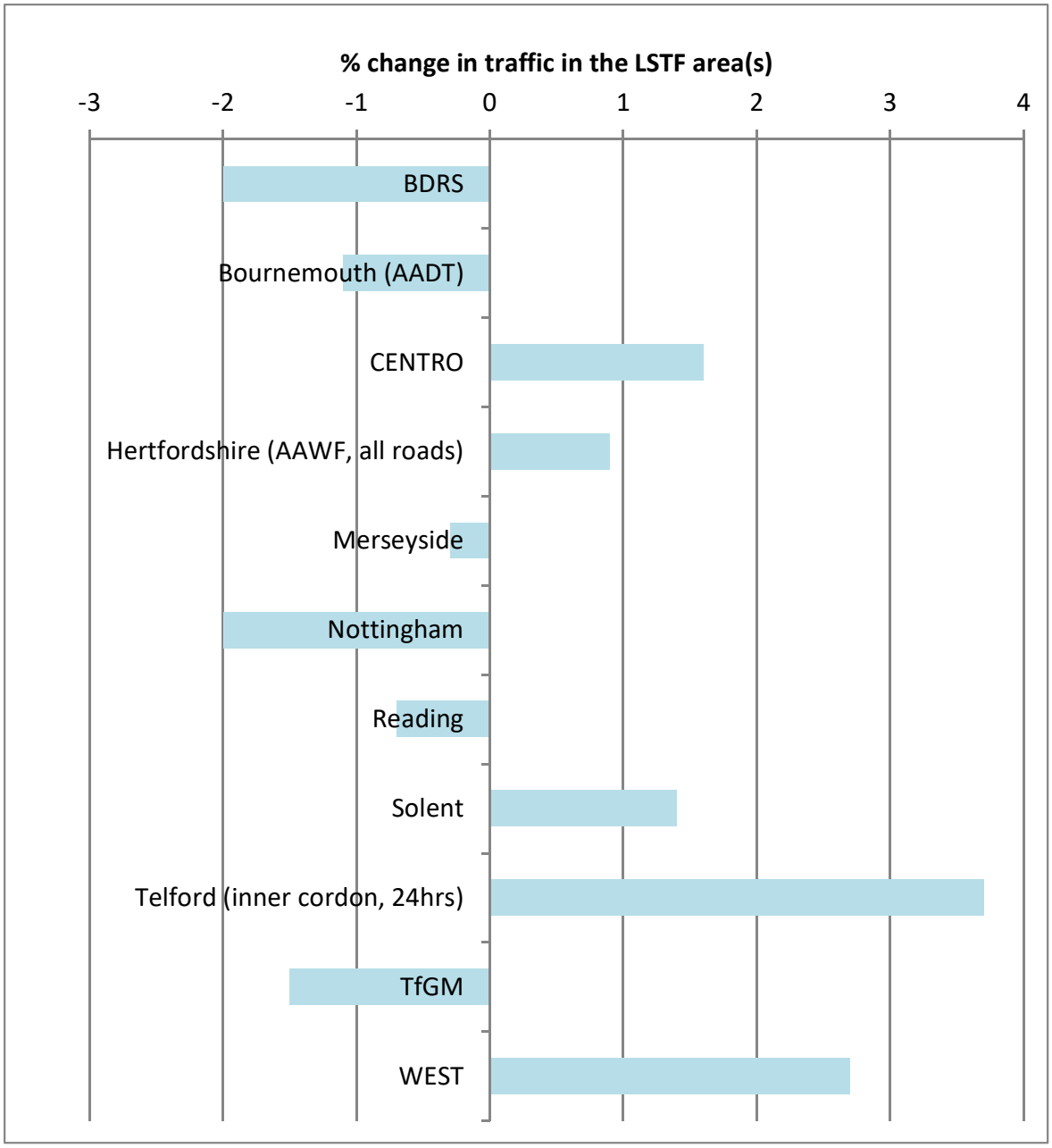
Table 4.4: Traffic data from 2005 for the Large Projects

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2009-11 average	%-change between 09-11 and latest available data
BDRS (AADF)		318,405	315,419	305,145	309,265	302,572	300,494	296,377	298,608	298,040		**304110.3**	**-2.0**
Barnsley	70,582	69,870	68,965	66,302	72,445	68,839	66,047	65,175	65,713	66,604		**69110.3**	**-3.6**
Doncaster	78,240	78,554	75,298	73,793	72,478	70,050	69,417	66,747	66,291	66,513		**70648.3**	**-5.9**
Rotherham	30,759	30,632	30,793	30,180	30,054	31,749	31,609	31,366	30,136	30,133		**31137.3**	**-3.2**
Sheffield		139,349	140,363	134,870	134,288	131,934	133,421	133,089	136,468	134,790		**133214.3**	**1.2**
Bournemouth (AADT)			710,100	699,500	700,400	682,950	671,450	677,400	670,650	686,050	677,600	**684933.3**	**-1.1**
Bournemouth (m veh kms)		234.3	236.1	233.6	239.7	230.0	231.7	230.9	230.2	232.0	228.4	**233.8**	**-2.3**
Bournemouth (control - AADT)	73900	74300	72400		71400	68800		67000	65400	68100	67300	69600.0	**-3.3**
CENTRO (AADF)							249,616	243,494	246,688	253,671		**249616.4**	**1.6**
Corridor 1 A4123							23,669	23,576	23,779	24,196		**23668.7**	**2.2**
Corridor 1 A459							13,971	13,839	13,825	14,352		**13970.5**	**2.7**
Corridor 2 Route 4							13,366	13,221	13,303	13,709		**13366.1**	**2.6**
Corridor 3 A41							23,024	22,909	22,782	23,240		**23024.3**	**0.9**
Corridor 4 A457							16,070	16,018	15,861	16,173		**16070.1**	**0.6**
Corridor 5 A34							16,626	16,718	16,539	17,137		**16626.2**	**3.1**
Corridor 6 A41							21,417	21,664	21,623	21,777		**21417.0**	**1.7**
Corridor 7 A452							17,487	17,248	17,343	17,943		**17486.7**	**2.6**
Corridor 8 A45							41,041	37,006	38,744	40,240		**41040.7**	**-2.0**
Corridor 9 A38							43,081	41,489	43,480	45,095		**43080.7**	**4.7**
Corridor 9 A441							19,865	19,807	19,410	19,812		**19865.4**	**-0.3**
Hertfordshire													
LSTF traffic flows (HCC roads)	80,005	81,913	81,931	81,034	78,814	79,323	78,361	77,897	77,664	76,784		**78832.9**	**-2.6**
LSTF traffic flows (all roads)	26,218	26,402	26,163	25,702	25,726	26,083	25,699	25,790	26,046	26,072		**25835.9**	**0.9**
Control traffic flows (HCC roads)	66,346	68,759	68,610	67,521	66,522	65,475	65,419	64,995	66,478	64,995		**65805.5**	**-1.2**
Control traffic flows (all roads)	19,421	20,034	20,326	19,966	19,627	19,398	19,293	18,944	19,577	19,578		**19439.1**	**0.7**
LSTF mvkm/day (HCC roads)	15.1	15.6	15.8	15.5	14.9	15.1	14.8	14.9	14.9	14.5		**14.9**	**-3.1**
LSTF mvkm/day (all roads)	23.7	23.8	23.8	23.2	23.3	23.7	23.2	23.7	24.1	23.8		**23.4**	**2.0**
Control mvkm/day (HCC roads)	3.4	3.5	3.6	3.5	3.5	3.5	3.4	3.5	3.5	3.4		**3.5**	**-3.3**
Control mvkm/day (all roads)	5.1	5.2	5.4	5.3	5.2	5.2	5.1	5.0	5.2	5.1		**5.2**	**-1.5**
Merseyside (AADF)	4,401,569	4,372,521	4,313,848	4,262,251	4,299,352	4,258,214	4,254,098	4,184,109	4,188,112	4,256,875		**4270554.7**	**-0.3**
Merseyside (control - AADF)	4,237,400	4,302,004	4,285,000	4,319,415	4,320,450	4,275,517	4,352,466	4,341,271	4,361,757	4,441,908		**4316144.3**	**2.9**

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2009-11 average	%-change between 09-11 and latest available data
Nottingham (m veh kms)	2,921	2,921	2,918	2,852	2,869	2,857	2,799	2,771	2,805	2,786		**2841.7**	**-2.0**
Nottingham City (m veh kms)	966	969	961	941	954	953	937	925	919	901		**948.0**	
Reading (av daily flow)			331,458	328,372	322,387	315,916	316,696	314,466	322,740	308,362	315,968	**318333.0**	**-0.7**
Reading inner screenline (24 hr daily flow)			130,153	129,195	127,134	124,515	124,069	121,847	125,731	118,772	121,546	**125239.3**	**-2.9**
Solent (AADT)				78,221	77,528	76,601	78,247	78,453	77,476	78,536		**77458.7**	**1.4**
Corridors 1-3				29,673	28,722	28,515	29,330	29,232	28,844	29,211		**28855.7**	**1.2**
Corridors 4-6				17,973	17,995	17,736	17,676	17,532	17,411	17,707		**17802.3**	**-0.5**
Corridors 7-9				30,575	30,811	30,350	31,241	31,689	31,221	31,618		**30800.7**	**2.7**
W Fareham (control)				25,711	25,906	25,502	25,849	26,076	26,268	26,945		**25752.3**	**4.6**
Telford (vehicle flow)													
Box Road approaches (24hr)					47,484			49,628	49,729	41,133	51,031	**48556.0**	**5.1**
Inner cordon (24hrs)					103,211			108,529			109,836	**105870.0**	**3.7**
Inner cordon (weekday am peak)					9,606			9,522			9,087	**9564.0**	**-5.0**
Outer cordon (24hrs)								170,649		175,204	175,363	**170649.0**	**2.8**
Outer cordon (weekday am peak)								18,493		18,082	18,182	**18493.0**	**-1.7**
TfGM (m veh kms)	6,301	6,293	6,324	6,256	6,241	6,134	6,000	5,961	5,995	6,032		**6125.0**	**-1.5**
WEST (m veh kms)	7,530	7,644	7,774	7,804	7,700	7,528	7,567	7,513	7,523	7,699	7,805	**7598.3**	**2.7**
North Bristol screenline (AADT)	124,722	123,627	114,849	121,658	122,334	122,640	123,959	123,815	119,102	120,583		**122977.7**	**-1.9**
Bath cordon (AADT)						29,032	28,541	28,425	29,180	27,657		**28786.5**	**-3.9**
Bristol-Bath screenline (AADT)	50,364	51,205	51,457	47,919	42,227	48,610	48,177	48,410	48,531	44,474		**46338.0**	**-4.0**
Clevedon screenline (AADT)	54,959	56,571	59,047	55,557	55,178	53,701	54,897	49,862	53,538	55,071		**54592.0**	**0.9**
W-s-Mare screenline (AADT)					36,152	36,100	36,516	36,372	n/a	41,767		**36256.0**	**15.2**
Portishead route (AADT)	55,270	55,649	56,627	55,782	57,330	55,904	56,512	54,162	58,645	63,884		**56582.0**	**12.9**
A370 route (AADT)					48,196	45,152	42,795	45,220	42,705	42,675		**45381.0**	**-6.0**
Surrey (12 hour vehicle counts)													
Surrey - Woking				13044	13305	12175	14366	12613	12339	12565	13323	**13281.7**	**0.3**
Surrey - Redhill				18468	19144	18850	19435	19287	18454	19042	n/a	**19142.7**	**-0.5**
Surrey - Guildford				12080	12089	11919	12123	n/a	11899	n/a	12254	**12043.7**	**1.7**
Surrey - Epsom (control)				19143	19334	19092	19053	19031	18824	17735	18859	**19159.7**	**-1.6**

Blue shading indicates where data relates to the LSTF project area as a whole. Orange shading indicates where data are available for a control area.

Figure 4.4 Changes in traffic for the LSTF areas, as estimated in Table 4.4



Note: In a number of cases, alternative measures of LSTF wide effects could have been chosen.

Table 4.5: Notes on traffic data

Large Project	Notes
BDRS	Appendix 7 of the Outcomes Report described data available from 21 traffic count locations falling on, or close to, the LSTF corridors, of annual average daily flows. Data were obtained from the DfT. It was possible to use data for cars/taxis from 18 of these sites (6 in Barnsley, 4 in Doncaster, 2 in Rotherham and 6 in Sheffield) to produce the sequences given in Table 4.4. The Large Project estimated that about 40% of car miles in the area were driven in the broad LSTF corridors.
Bourne-mouth	24 hour annual average daily traffic flows from 50 automatic traffic counters (ATCs) were reported, including several sites on a control corridor. In addition, estimates of annual vehicle kilometres were given for the corridor. Following correspondence with the project team, a total of 29 sites on the LSTF corridor, and 3 sites on the LSTF corridor were used to construct the series given in Table 4.4, with vehicle kilometres revised accordingly.
CENTRO	Annual average daily flow (AADF) data were provided for routes on 9 of the 10 corridors for the period 2011-2014. (Corridor 10 was not monitored by traffic counters.) Summing this together gave an increase of 1.6%, which was slightly lower than the increase of 1.9% for the region as a whole. CENTRO noted that there was no natural boundary to the area in which LSTF work may have had an effect. Given the need to make assumptions for cost-benefit analysis, they estimated that the total population on or near the corridors was 880,594 people (i.e. about a third of the area's population). Using two different estimates of their average distance driven (regionally-specific National Travel Survey data, and, separately, PRISM average trip lengths and WebTAG average vehicle occupancies) produced an estimate of total traffic generated by these people of 1,928-2,600 million miles p.a. – implying a mid-range estimate of about 3,500m km p.a..
Hertford-shire	Data on Average Annual Weekday Daily traffic flows (AAWD - 16 hour (6am-10pm), 5-days-a-week) were taken from a number of count sites in the 3 LSTF towns. Similar data were collated for a control area. In addition, vehicle kilometrage data was calculated for the LSTF towns and control area (reported as vehicle km *per day*). Both data sets were calculated for all road types, and are given in Table 4.4 for both all roads, and for kilometres undertaken on the county roads (i.e. excluding traffic on the motorways and trunk roads). In iterations of the calculations spreadsheet that were received, the data changed considerably. (For example, estimations of vehicle km on LSTF HCC roads in 2013 increased from 8.8mvkm/day to 14.9mvkm/day). We believe that the data given in Table 4.4 provides latest information. This would imply that annual vehicle km on the LSTF roads (under the jurisdiction of the county) changed from 5,446 to 5,278 million vehicle kms between a 2009-11 baseline and 2014.
Mersey-side	Merseyside provided AADF flows from 415 sites, of which 255 fell within the LSTF areas and 160 were outside the area. Figures for the two sets of sites were summed to produce the two series in Table 4.4. Merseyside are reluctant to attribute the differential trends entirely to the LSTF work, although comment that their workplace activities may have made some contribution. However, in their own economic evaluation, they included all traffic km in the region, on the basis that initiatives like their workplace travel programme could have had an effect over a wide area.

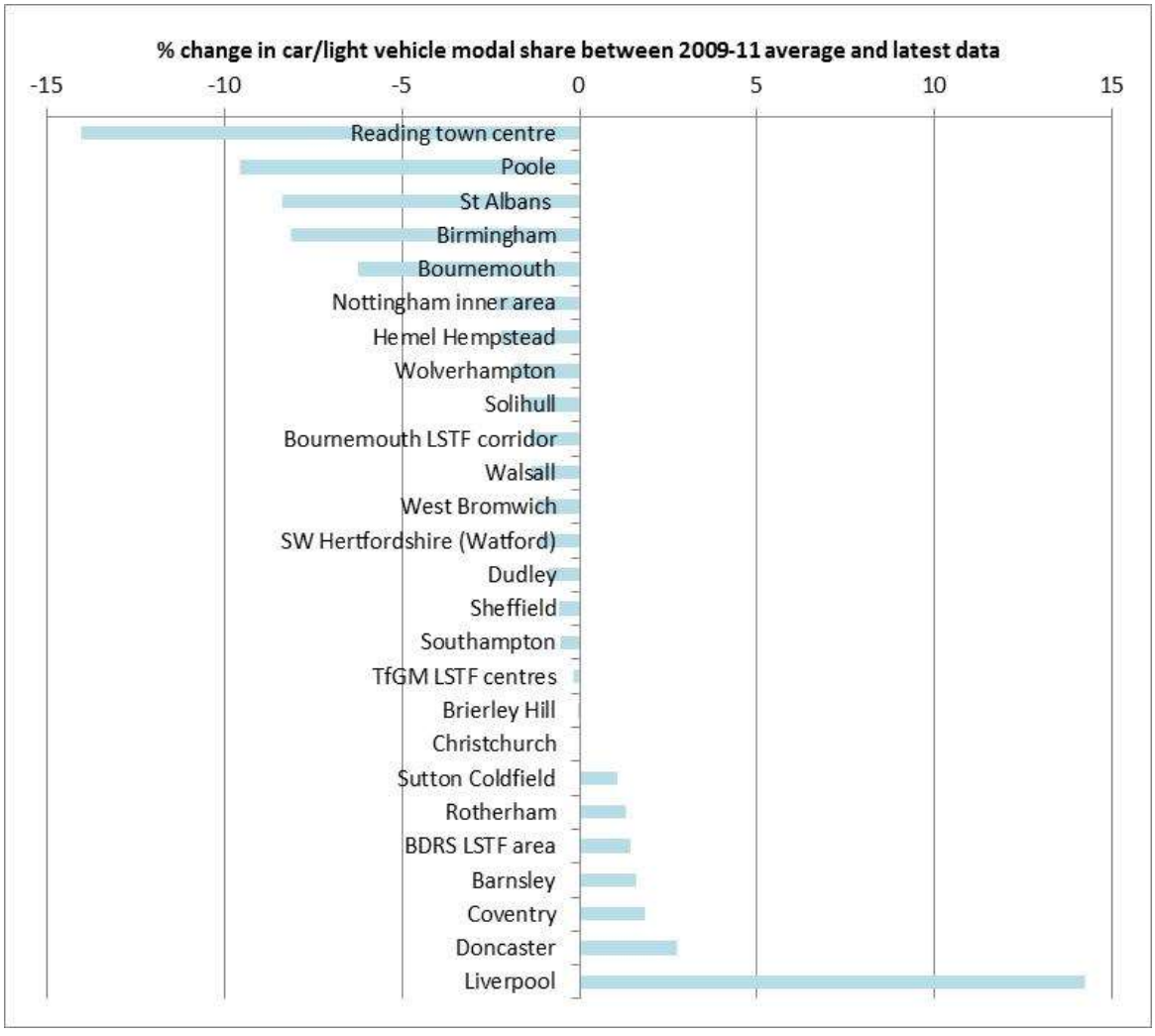
Large Project	Notes
Notting-ham	Area-wide traffic mileages (in million vehicle kms) were reported, both for Greater Nottingham, and for Nottingham, from 2003 to 2014 (excluding flows on trunk roads).
Reading	24 hour October term-time weekday traffic flows were reported from 18 sites, between 2007 and 2015, grouped into 4 screenlines, comprising an inner and outer cordon. In terms of total traffic flows that might have been affected by LSTF, the Large Project team felt that borough-wide traffic data from DfT was the most appropriate to use.
Solent	Data from existing ATCs and DfT data for major routes were used to generate estimates of annual average daily two-way flows between 2008 and 2014, on three sets of corridors. Comparing 2014 data with a 2009-11 baseline suggests that traffic on the LSTF corridors increased by 1.4%, compared with a 4.6% increase on the control corridor. Solent's own calculations used 2012 as a baseline, as there was less disruption on the network in that year. This gave a change of 0.1% on the LSTF corridors, and +3.3% on the control corridor, by 2014. The general picture – that traffic has risen more on the control corridor – is consistent in both cases. Those involved in the Large Project estimated that around 560 million traffic miles take place on the corridor roads (generated by using estimated AADT per corridor * Length of corridor * 365, and ensuring no lengths of road are counted twice).
Surrey	12 hour and AM peak two-way weekday traffic-flow data in March were available for a number of sites between 2008 and 2015. Following clarification queries, the data were revised, and, to avoid bias from missing values, new averaged 12-hour data was calculated, based on the A3046, A324 and A320 for Woking; the A23 (2 sites) for Redhill; and the A31, A320, A322 and A323 for Guildford. Data were also available for a 'control' counter near Epsom. These data are given in Table 4.4. The difference between the control counter and the other counters is discussed in the text above. Separate data provided by Surrey suggested that, in 2014, there were 208mvkm in Woking, 650.7mvkm in Guildford and 399.9mvkm in Reigate and Banstead, comprising a total of 1258.6mvkm (million motor vehicle kilometres). Applying the percentage changes given in Table 4.4 to the three areas implies that, in 2009-11, there were 1243.674mvkm. (This figure was subsequently used in the cost-benefit calculations.)
Telford	Data for Telford were provided for the immediate approaches to the Box Road, an inner cordon and an outer cordon, for both two-way 24hr 7 day flows, and two-way weekday AM peak flows. A 2009-2012 average has been used instead of 2009-11, given the available data.
TfGM	Area-wide traffic mileages, in million vehicle kms, were reported for all motor vehicles and all roads, or subsets of vehicle types and road types, for the period 1993 to 2014. Data for car traffic on A and B roads (i.e. excluding motorways) is given in Table 4.4. (It should be noted that TfGM does not provide estimates of travel on C and U roads – for this reason, the overall car kms figures reported in their spreadsheet are lower than DfT figures.)
WEST	NRTE data for the four local authorities were presented in the Outcomes Report for all motor vehicle kms, car vehicle kms, and motor vehicle kms not on trunk roads. Car vehicle kms are presented in Table 4.4 for consistency with other data sources. Data for a variety of screenlines were also given. The A370 route and Bath-Bristol screenline data showed the greatest decline. The Bath cordon and North Bristol screenline also showed reductions.

4.7 Project level outcomes for mode share

Mode share data for travel into relevant urban centres in Large Project LSTF areas are shown in Figure 4.5 and Tables 4.6 and 4.7. Nine of the Large Projects provided data of this nature. Although Telford provided some data in their report, they did not believe it to be informative (as discussed in Table 4.8). Meanwhile, WEST provided data about the frequency with which residents were making car trips, which showed a reduction in 3 of the 4 unitary authorities, but was not of a similar form, and is therefore only included in Table 4.8.

For the three Large Projects with data on project level modal share (drawn from cordon data on travel into a range of centres), two (TfGM and Bournemouth) showed a reduction in car mode share at the project level, when comparing latest data with a 2009-11 average. Data were also provided for 23 individual locations within the Large Project areas. Of these, 14 had seen a reduction in car mode share (when comparing latest data with a 2009-11 average, or, in the case of Hemel Hempstead, on the basis of available data) (Table 4.6). However, in some cases (specifically, Nottingham inner area, Reading, Watford and Southampton) it should be noted that recent trends did not represent an improvement on previous trends (in terms of the change in car modal share between a 2005-7 average and a 2009-11 average). Reductions of more than 5% were recorded for Bournemouth, Poole, Birmingham, St Albans and Reading town centre (when comparing latest data with a 2009-11 average).

Figure 4.5: Trends in car / light vehicle modal share (both at project level and for individual locations)



Note that data for Hemel Hempstead are for the change between 2012 and 2013.

Table 4.6: Car or light vehicle mode share (per cent)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2009-11 average	% change	Pre LSTF change
BDRS LSTF area			**70.5**	**69.1**	**69.9**	**69.5**	**70**	**70.2**	**69.6**	**70.8**	**70.8**		**69.8**	**1.4**	**-1.0**
Barnsley	77.9	78	80	77.8	77.6	76.3	75.8	77.2	76.7	77.8	77.8		76.6	1.6	-2.6
Doncaster	70.8	69	69.7	69.6	71.3	70.9	72.1	72	72.6	73.6	73.4		71.4	2.8	2.3
Rotherham	75	75.1	77.2	73.4	75.2	74.3	74.7	74.4	72.9	73.5	75.7		74.7	1.3	-1.4
Sheffield	57.5	57.3	55.1	55.5	55.6	56.1	57.6	57.2	56.4	58.2	56.1		56.4	-0.6	-0.4
Bournemouth LSTF corridor					**83.5**	**83.5**	**83**	**84**	**82.9**	**82.1**	**82.1**		**83.3**	**-1.4**	
Poole						76	81	80	78	75	71		78.5	-9.6	
Christchurch						49	51	53	54	46	50		50.0	0.0	
Bournemouth							80	77	72	72	75		80.0	-6.3	
CENTRO															
Birmingham							40.3	42.3		37.0			40.3	-8.2	
Coventry							75.9	75.8		77.3			75.9	1.8	
Dudley							85.7	85.7		85.0			85.7	-0.9	
Brierley Hill							89.0	88.6		88.9			89.0	0.0	
Solihull							78.5	78.8		77.3			78.5	-1.6	
Sutton Coldfield							77.9	77.9		78.7			77.9	1.1	
Walsall							67.1	67.9		66.1			67.1	-1.4	
West Bromwich							65.8	65.8		65.0			65.8	-1.2	
Wolverhampton							71.8	71.8		70.5			71.8	-1.9	
Hertfordshire															
St Albans			68.9	69	69.2	69.3	67.1	64.9	62.8				68.5	-8.4	-0.5
SW Hertfordshire (Watford)			83.9	83.3	82.7	82.1	81.8	81.6	81.3				82.2	-1.1	-2.0
St Albans (Travelsmart results)								42	37						
Hemel Hempstead (Travelsmart results)								46	45						
Harpenden (control - Travelsmart results)								42	42						
Merseyside									**46**	**48**	**49**				
Liverpool	41.1	39.8	39.4	37.4	37.8	33.2	31.7	34.1	33.3	36.8	39.1		34.2	14.2	-14.6
Nottingham															
Nottingham inner area	65.2	64.1	64	64.9	65.4	62.1	61.2	61.6	63	61.4			62.9	-2.4	-2.4
Reading															
Reading town centre			25.8	21.1	23.7	20.9	19.6	20.9	20.5	18.2	17.1	18.4	21.4	-14.0	-17.1
Solent															
Southampton		61.6	60.4	59.2	58.1	57.5	57.8	58.6	58.6	57.5			57.8	-0.5	-5.2
TfGM					**43.9**	**44.4**	**42.7**	**43.6**	**42.2**				**43.7**	**-0.2**	

Note: Figures in bold in grey shaded cells are for data reported to be representative of the whole Large Project area. Figures not in bold, in white cells, are for part of the Large Project area. Basis for mode share calculations differed between Large Projects – details of how figures are generated for each Large Project are given in Table 4.8. % change refers to the change between the 2009-11 average and latest available data. Pre LSTF change refers to the change between the 2009-11 average and a 2005-2007 average.

Table 4.7: Notes on modal share data

Large Project	Notes
BDRS	BDRS presented data on light vehicle (car/LGV/motorcycle) mode share to urban centres in the Large Project area, based on data from four areas. Data were based on vehicle occupancy counts, not just vehicle counts.
Bournemouth	Bournemouth provided a measure of car mode share along the corridor and, separately, for each of the three main towns in the project area – Poole, Christchurch and Bournemouth. The corridor data were from 12 hour manual vehicle counts at 53 sites undertaken during a neutral month (April/May/June/September/October). The town centre counts were based on people movements into the town centres between 7am and 10am.
CENTRO	CENTRO provided modal share data from two sources: • Biennial cordon surveys, carried out as part of Local Transport Plan monitoring in 2011/12, 2012/13 and 2014/15, for travel into 9 centres. Trips by bus, rail, metro and car were used in the calculations. • Residents' Panel Surveys carried out in 2012/13 and 2014/15, looking at residents travel into their local centre by all modes, for each LSTF corridor. This data was analysed for this evaluation, but is not included in Table 4.7. Although there was some variation in the car driver mode share, those responsible for the data felt that it was broadly indicative of a stable car mode share, given that sample sizes were relatively small (100-250 respondents per corridor). They advised that the cordon counts provided a more reliable measure of changes in travel to the town centres.
Hertfordshire	Hertfordshire's triennial 'Travelwise cordon count' provided a measure of the proportion of car occupants travelling inbound to St Albans, and SW Hertfordshire (Watford), based on one day neutral-day counts. The TravelSmart surveys provided an alternative measure of car driver mode share. Modal split data was also available from the 2015 Hertfordshire household travel survey. This showed lower car driver mode share in the LSTF area, compared to the control areas (44.3% compared to 48.1%).
Merseyside	Indicator 03 gave a measure of the private vehicle AM peak mode share from cordon surveys undertaken around Liverpool. Mode share was based on counts of vehicle occupants (not just vehicles). Indicator A6 gave the share of total persons by car in the AM peak travelling inbound to Merseyside's 6 urban centres (Birkenhead, Bootle, Huyton, Liverpool, St Helens and Southport). However, data were only available for a limited time period for indicator A6[22]. In interpreting results, the local authority highlighted that data for the AM peak may differ from all-day trends, and, second, that each of the city underground rail stations was refurbished between 2012 and 2016 (including Liverpool in 2012), leading to some transfer from rail to car.
Nottingham	For an inner area traffic cordon, Nottingham provided a measure of the car/motorcycle mode share, compared to the public transport mode share, based on people numbers (not just vehicle numbers).
Reading	Reading provided a measure of the car/motorcycle mode share at a cordon around the town centre, based on 12 hour counts conducted on a neutral weekday in May. (Car occupancy was not measured as part of the cordon counts – so car mode share was based on vehicle numbers.)

22 Indicator A6 on car mode share was generated specifically for the LSTF work, from data relating to private vehicle mode share.

Large Project	Notes
Solent	Solent provided the light vehicle share entering Southampton, based on vehicle occupancy (not just vehicles). Data given were a 3 year rolling average – the LSTF project team felt that an annual figure would not be reliable given natural fluctuation (although equally, the three year average makes it harder to detect any immediate impacts of the work).
Telford	Modal share was calculated for the town centre, as part of the LSTF town centre case study evaluation (conducted to explore economic vitality and viability issues). This suggested an increase in car mode share, although those reporting results stated that the difference in composition between before and after population samples made the comparisons relatively uninformative (not least as there was separate evidence that more people were travelling as a group), and therefore the data have not been included in the table.
TfGM	TfGM provided cordon count data, averaged from 10 locations. 2008 and 2014 figures were provided but have been excluded from this analysis since they only represented a subsample of the areas surveyed in other years. Average values have been weighted by the size of the 10 locations surveyed. Modal share was generated from a combination of vehicle and people counts (but private vehicle occupancies were not measured). The measure given in the Table is the modal share for cars.
WEST	WEST did not report cordon counts. However, results were reported on the frequency of using different modes, from the National Highways and Transport survey, conducted by Ipsos Mori, via postal questionnaires in the four unitary authorities (sample sizes of 780+ per authority). Between 2013 and 2015 (the period for which data were available), the proportion of people reporting that they used a car daily and 2-3 times per week had fallen in three of the four authorities (Bristol, South Gloucestershire and North Somerset).

4.8 'Bottom-up' calculations of traffic impacts

Eight of the Large Projects provided estimates of mileage savings from 'bottom-up' calculations, based on the scale and 'effect size' of individual interventions. In some cases, these were designed to reflect the programme as a whole; in others, they were calculations for particular programme elements. These are given in Table 4.8.

Table 4.8: Further insights on traffic changes

Large Project	Notes
BDRS	As reported in more detail in the carbon chapter, BDRS undertook a number of 'bottom-up' calculations of mileage savings achieved via their initiatives. These included the following: • ASOS services – 2.18 million car miles p.a. • X19 bus service – 0.58 million car miles p.a. • X20 bus service – 0.41 million car miles removed in 2015 • Elsecar Park & Ride – 0.234 million car miles p.a. • Adwick Park & Ride – 0.777 million car miles p.a. • Busboost – 5.314 million car miles p.a. • Cycleboost – 0.384 million car miles p.a. • Barnsley Digital Media Centre Bike Ride – 0.001 million car miles This implies an annual total of about 10 million car miles, or 16 million car kms.

Large Project	Notes
CENTRO	CENTRO undertook analysis to estimate the carbon benefits of the work, assuming potential impacts on 550,683 people (defined as those on or near the corridor that were in MOSAIC groups thought likely to respond to interventions). This suggested a saving of 306.664mkm in 2015, compared with 2013 (i.e. a direct comparison of the two years, not a cumulative total). This figure was based on scaling up results from a residents panel survey of about 2000 people.
Mersey-side	In their Outcomes Report, Merseyside provided estimates of mileage savings from LSTF activity at 22 workplaces. In clarification questions, Merseyside reported on data for all workplaces, suggesting that 91,961 employees had been affected, achieving a 3-5% reduction in car use, with an average journey length of 14.33km. In the previous calculations, assumptions made were that employees would travel two journeys a day, 231 days a year. Indicator O1 suggested a 69% car mode share for the journey to work (average 2010 and 2013 data). This implies between 1904 and 3173 employees stopped driving to work (i.e. 3% * 69% * 91,961; or 5% * 69% * 91,961), saving 12.6 – 21.0 million car km p.a. (i.e. 1904 * 14.33 * 2 * 231; or 3173 * 14.33 * 2 * 231).
Notting-ham	An impact evaluation of the whole LSTF programme was undertaken for Nottingham by ITP. This estimated that the programme overall resulted in a reduction of 28.4 million car kilometres. The methodology used implies that this was the cumulative impact, building up over the four years of the programme.
Solent	As part of the 'Carbon impacts and congestion relief' case study, some calculations relating to personal journey plans (PJP) work in 2013 in Gosport were undertaken. Surveys suggested a 10% reduction in car driving for commuting and leisure, and a 19% reduction for shopping and personal business. (Impacts on education and business trips were not reported.) Case study travel diaries suggested an average distance driven per adult per week of 38 miles for work, 23 miles for shopping and 27 miles for leisure. The implied reductions would therefore equate to 10.9 miles per week. Given 2,128 participants in the PJP work, this would imply a potential reduction of 1.21 million vehicle miles p.a.. As context for this number, it was noted that AADT count data for Gosport suggested a 2.7% reduction between 2012 and 2013, potentially from a base of 440 million car miles p.a., suggesting that the PJP work might be responsible for about 11% of the observed reduction in traffic flows.
Telford	Telford reported on mileage savings, as part of estimating carbon savings, from two sources – the car share scheme, and the Box Road scheme: • Over the four years between 2013 and 2016, the car share scheme was estimated to have led to a cumulative reduction of 6.4 million miles[23]. 2015 figures implied a 'with the car share scheme' figure of 1,820,875 miles versus a 'without the car share scheme' figure of 3,515,011 miles for the employees involved. • The Box Road scheme was estimated to have reduced carbon from cars from either 22.4KT (2009) or 23.46kT (2012) to 16.17kT in 2015. Using an average of the first two numbers, this implies a reduction of 6.73kT carbon. If achieved only through mileage savings, that were in proportion to the car share savings[24], this would represent a reduction of 24.3 million miles[25]. However, changes in speeds

23 This was estimated by summing together data on page 100 of Telford's 2014/15 Outcomes Report.
24 The car mileage savings from the car sharing scheme - 6,395,962 miles – was estimated to represent 1.7792kT of carbon. This implies that 1 kT of carbon represented 3,594,852 miles saved.
25 P97 of Telford's 2014/15 Outcomes Report reports that the Box Road scheme reduced the distance between each Box Road entry and exit by 3.4km, from 10.1 to 6.7km.

Large Project	Notes
	and traffic composition were also reported to have contributed to the carbon reduction.
TfGM	Survey data on outcomes from Components 1 (cycle/pedestrian schemes), 2a (residential PTP), 2b (workplace PTP), 2c (workplace travel planning) and 'Key Component' (cycle hubs) were used to estimate mileage savings for each of these. (Further savings were expected from Component 3, but estimations were not available at the time of writing the Outcomes Report.) In total, 2.6 million vehicle kilometres were estimated to have been removed in 2015. Workplace PTP was calculated as the biggest contributor to these savings. Separately, results from the carbon and congestion case study were reported. Between 2013 and 2014, comparing treatment areas with control areas, suggested an average saving of 7.8 car driver miles per week. (This would only need to apply to about 4,000 people, to match the 2.6mvehkm estimate generated via the other estimation). However, TfGM commented that overall reductions in car use in the area potentially primarily occurred due to economic decline.
WEST	Clayton and Parkin produced a note on the impact of the express bus services from Portishead, Clevedon and Weston-Super-Mare to Bristol. In 2015, these 'X-corridor' bus services were being used for 1.8 million passenger trips p.a., and on-board surveys suggested that perhaps a third of passengers had a car available for their journey – implying that perhaps 0.6 million trips were replaced. Assuming an average trip length of 15km would imply a saving from these services in the order of 9 million km of car travel.

4.9 Conclusions on outcomes related to traffic and car use

Table 4.9 provides an overview of evidence relating to traffic and car use.

Traffic data suggested stable or reducing traffic levels in LSTF areas in six Large Projects (BDRS, Bournemouth, Merseyside, Nottingham, Reading, TfGM), or a lower rate of traffic growth in the LSTF areas compared with other areas in 3 Large Projects (CENTRO, Solent, Surrey). Of the three remaining Large Projects, Telford data suggested a reduction in traffic in the morning peak; data for WEST suggested reductions in particular locations; and data for Hertfordshire probably shows lower growth in the LSTF areas than comparable areas, though concerns about the control data, and lack of clarity over rates of traffic growth in Hertfordshire as a whole make it difficult to be sure.

In eight Large Projects (BDRS, Bournemouth, CENTRO, Hertfordshire, Nottingham, Reading, Solent, TfGM), traffic data (suggesting stable or reducing traffic levels, or a lower rate of traffic growth) is corroborated by modal share surveys into local town centres which showed a stable or reducing car or light vehicle mode share to at least some of those centres. Data for Liverpool/Merseyside centres did not corroborate the positive traffic data, which was surprising given the large number of traffic counters used to generate the traffic results. Four Large Projects (Hertfordshire, CENTRO, TfGM, WEST) also had other survey data suggesting reductions in car use in the LSTF project areas.

Meanwhile, eight Large Projects (BDRS, CENTRO, Merseyside, Nottingham, Solent, Telford, TfGM and WEST) had undertaken 'bottom-up' calculations of the effects of all or some of their work, drawing on various survey data, to provide estimates of mileage savings achieved – which were non trivial in all cases.

Table 4.9: Overview of outcomes related to traffic and car use~

Large Project	Over-view	Summary of change since start of LSTF project	Attribut-able to LSTF?
BDRS	■	Vehicle counts suggest a 2% decline in traffic in LSTF corridors, but modest traffic growth over the wider area (1.8% according to DfT statistics, compared with a national change of 2.9%). Data on travel into urban centres show the light vehicle mode share fell in Sheffield, Barnsley and Rotherham. Bottom-up calculations suggested a saving of 16 million vehicle kms p.a. from bus and cycle schemes.	Some
Bourne-mouth	■	NRTE data, AADT counts, estimations of vehicle kilometres and modal share cordon counts for the LSTF corridor all suggest traffic and/or car use fell during the LSTF period, although changes were small. AADT counts for 3 sites on a control corridor showed a greater reduction in traffic, but data may be unreliable, given the small number of counters. There were reductions in AM-peak car mode share into Bournemouth and Poole. Between a 2009-11 baseline and 2015, Bournemouth achieved the second greatest reduction in per capita traffic levels of all local authorities in England (excluding London).	Some
CENTRO	■	AADT counts on 9 of the 10 LSTF corridors suggested traffic growth of 1.6%, compared to an increase of 1.9% for the area as a whole according to NRTE data. There were reductions on corridor 8 and part of corridor 9. Cordon surveys suggested a reduction in car mode share into 6 of 9 centres (Birmingham, Dudley, Solihull, West Bromwich, Walsall and Wolverhampton). Extrapolating results from a residents' panel survey [N=2000] to all those living on / near LSTF corridors and thought likely to respond to interventions, suggested mileage reductions as great as 307m car km in 2015, compared with 2013. Coventry achieved the fifth greatest reduction in per capita traffic levels of all local authorities in England (excluding London), although its cordon count suggested a small increase in car modal share.	Some
Hertford-shire	■	Traffic counts and vehicle kilometre estimates suggested mixed results. Locally-managed roads in LSTF areas performed better than those in the control area according to traffic counts, but this distinction was lost if including data for motorways and trunk roads and/or for estimates of vehicle kilometres. The worst figure – growth of 2% in vehicle kms on all road types in the LSTF area – compares favourably with the 2.9% figure for our comparator group of local authorities. (Rates of traffic growth in Hertfordshire as a whole are unclear – NRTE data suggests +6.3%; Hertfordshire's data suggests only +0.9-1.6%, for 2009-11 to 2014.) Data on travel into town centres suggested a reduction in car modal share into St Albans and Watford. Evidence from Travelsmart surveys suggested a reduction in car modal share in Hemel Hempstead and St Albans compared with stable car modal share in Harpenden (outside the LSTF area). 2015 Hertfordshire household travel survey suggested lower car driver mode share in the LSTF area compared with a control area.	-
Mersey-side	■	Traffic data (415 sites) suggested that traffic in the LSTF area fell by 0.3%, whilst increasing by 2.9% elsewhere. However, the morning peak car mode share increased into Liverpool. A bottom-up calculation of savings from work with employers suggested mileage savings of ~13-21 million car miles p.a..	Some
Notting-ham	■	NRTE and Large Project data both suggested a reduction in absolute traffic volume of ~2%, whilst Large Project data specifically for Nottingham City suggested a reduction of 5%. The car mode share at the inner cordon also showed a small decrease. A bottom-up calculation suggested a saving of 28.4 million car kilometres over the four years of the programme. Between a 2009-11 baseline and 2015, Nottingham City achieved the greatest reduction in per capita traffic levels of all local authorities in England (excluding London).	Some

Large Project	Over-view	Summary of change since start of LSTF project	Attribut-able to LSTF?
Reading	■	Data from NRTE and from 18 sites (making up 4 screenlines) suggest traffic in Reading was stable, whilst Reading inner cordon showed a reduction in traffic of 3%. Car/motorcycle mode share for travel into the town centre had reduced over time, and was at only 18%. Two Park and Ride schemes opened in 2015 may have contributed to falling traffic flows into the centre (could account for around 7% of change in flows at Reading inner cordon). Other measures including personalised travel planning may also have contributed.	Some
Solent	■	NRTE data for Solent suggested an increase of 0.9%. Data for the LSTF corridors suggested an increase of 1.4%, whilst data on the control corridor showed a greater increase of 4.6%. Corridors 4-6 showed a decrease of 0.5%. Differences in trend between the LSTF corridors and the control data were particularly noticeable between 2012 and 2013. The light vehicle share entering Southampton declined slightly. (For Southampton, data are a three-year rolling average meaning recent changes may be partially masked). Data for personalised journey work in Gosport suggested that element had potentially achieved a reduction of 1.21 million car driver miles between 2012 and 2013. Southampton achieved the sixth greatest reduction in per capita traffic levels of all local authorities in England (excluding London).	Some
Surrey	■	Data were mixed, with traffic increases of 0.3% in Woking and 1.7% in Guildford, but -0.5% at Redhill, and -1.6% at a control counter near Epsom. Project officers felt that the control counter was not well chosen; and the Guildford counters were not well-located to detect the results of the Park and Ride scheme. (NRTE data for Surrey as a whole suggested an increase in traffic flows of 4.5% over the period.)	-
Telford	■	24 hour traffic flows increased at the Box Road corners, an inner cordon and an outer cordon. However, morning peak flows fell at inner and outer cordons. Using 2012 (only) as the baseline indicates a smaller increase in 24 hour flows at the inner cordon than at the outer cordon. In bottom-up calculations, Telford estimated a car sharing scheme had saved 6.4m miles over the project, and that there had been some mileage reductions due to shorter trip lengths around the Box Road.	Some
TfGM	■	NRTE data for TfGM showed an increase of just 0.1%. TfGM's data for car traffic on A and B roads suggested a reduction of 1.5%. The car modal share into 10 town centres in Greater Manchester reduced by 0.2%. (Data were only available to 2013). A bottom-up calculation of savings from some schemes (cycle and pedestrian schemes, cycle hubs, residential and workplace PTP and workplace travel planning) estimated a saving of 2.6m vehicle km in 2015. Results from the carbon and congestion case study showed a reduction in car driver miles in the LSTF areas compared with control areas. Salford and Manchester achieved the third and fourth greatest reduction in per capita traffic levels of all local authorities in England (excluding London).	Some
WEST	■	NRTE data for WEST, also reported in the 2014/15 Outcomes Report, showed an increase of 2.7% (which compares with the figure of 2.9% for our comparator group of local authorities outside London). Of 7 screenlines across the area designed to pick up impacts of LSTF work, four showed a reduction in vehicle counts. A household survey asking about frequency of car use showed a decline in 3 out of 4 authorities between 2013 and 2015. A bottom-up calculation of impacts of new X-corridor bus routes suggested savings of ~9 million car km in 2015.	Some

■ **increase** in traffic or car use; ■ **no change** in traffic or car use; ■ **decrease** in traffic or car use; ■ **inconclusive data** for assessing changes in traffic or car use.

~% changes quoted compare latest available data with 2009-11 baseline, unless otherwise specified.

5 Economy: congestion

Key points:

Many of the Large Projects have reported improvements in congestion on individual corridors or sections, some of these quite significant, though these effects are often too small to be detected in overall monitoring results.

There was evidence of improvements in bus punctuality on specific routes, or at the network-wide level, for some Large Projects, and this was accompanied by evidence to suggest that the improvements were in part attributable to LSTF interventions.

While congestion in many of the Large Project areas overall appears to have worsened, this is likely to be due to confounding factors masking the benefits of relief measures, such as economic growth and the impacts of the roadworks for the interventions themselves.

5.1 Overview of objectives and outputs targeting congestion

Nine Large Projects explicitly identified congestion relief as one of the objectives of their project (the exceptions being Merseyside, Nottingham and Telford). The scale of the interventions to cut congestion varied from quite modest targeted measures in the case of CENTRO, Reading and WEST, to projects with a large number of road and junction alterations and/or improvements to traffic monitoring and control technology, for example BDRS, Bournemouth, and Surrey. The objectives and main interventions are summarised in Table 5.1.

In the period up to 2014/15 most Large Projects had completed or substantially delivered LSTF interventions that were intended to improve traffic management and reduce congestion, although some were still ongoing. However, there are a number of confounding factors that would be expected to mask the benefits of the relief measures in either the short or medium term:

- Many of the Large Projects with significant infrastructure improvements, such as BDRS, Bournemouth and Surrey, completed these late in the delivery period, so any beneficial medium-term effects would not be apparent from data supplied in the latest Outcomes Reports. Roadworks associated with these improvements were likely to make congestion worse in the short term.
- Some cities / local authorities had a significant number of infrastructure projects or new developments, not always related to LSTF, which would have the effect of increasing congestion in the short term.
- Several of the Large Projects had implemented measures aimed at improving bus reliability and safety of other road users (e.g. bus and cycle lanes, pedestrian crossings, speed restrictions). Such measures might reduce speeds for general traffic on the routes or junctions targeted in the short to medium term, but are part of a longer term objective to reduce congestion through encouraging modal shift.
- The baseline date for LSTF was in a recession when traffic volumes fell in many local authorities in England; since then, general improvements in economic conditions and falling fuel prices will have affected traffic volumes and hence congestion.

Table 5.1: Summary of congestion-relief objectives and interventions

	Congestion objective?	Summary of congestion-relief objectives	Congestion-relief interventions delivered	Congestion-relief interventions
BDRS	Yes	Help businesses through reducing congestion and encouraging more reliable journey times	Many	Upgrading of traffic signals and traffic monitoring and control technology; bus priority measures and other road and junction layout changes to assist bus movements; provision of automated journey time information to road users.
Bournemouth	Yes	Reduce delays to buses and improve bus journey time, punctuality and reliability. Reduce congestion and variability in journey times to smooth traffic flows	Many though some towards the end of delivery period	Intelligent Transport System improvements (giving drivers live information about congestion and car parking availability); active corridor management (e.g. installation of CCTV to improve traffic monitoring and control); a large number of network improvements to junctions, signals and crossings, bus priority measures, cycle facilities and parking restrictions. Two bus priority measures are reported as under review.
CENTRO	Yes	Facilitate greater network efficiency within the LSTF corridors; reduce local congestion at locations targeted for infrastructure improvements; improve journey times / reliability on bus routes within the LSTF corridors	A few	Traffic signal control improvements on one corridor; bus infrastructure improvements including bus priority measures and junction/signal improvements on multiple corridors.
Hertfordshire	Yes	Ensure economic, environmental and social costs of congestion are reduced	A few - ongoing	Intelligent Transport System improvements still to be delivered.
Merseyside	No	-	No	-
Nottingham	No	-	No	-
Reading	Yes	Reduce congestion; improve reliability and predictability of journey times. Reduce congestion by approximately 10% by 2026 compared to that which would have otherwise been present	A few	Upgrading of traffic signals and provision of automated journey sign information to drivers about congestion.
Solent	Yes	Enhancing business performance, particularly at the international gateways, through more efficient transport network and congestion management	Some	Physical improvements along high frequency bus corridors including bus priority measures.

	Congestion objective?	Summary of congestion-relief objectives	Congestion-relief interventions delivered	Congestion-relief interventions
Surrey	Yes	To improve, where possible, the journey time reliability of travel in Surrey. Specific scheme level objectives for congestion.	Many	Bus priority and corridor improvements in each town; Onslow Park and Ride (Guildford); Sheerwater Link Rd (Woking); traffic management (Guildford and Woking).
Telford	No	-	No	-
TfGM	Yes	Targeting congestion for carbon and business efficiency	Some	Bus priority at traffic signals. Preparatory work on major initiative to improve real time traffic management (not yet completed, so no effect expected at this stage).
WEST	Yes	Tackle congestion to get business & economy moving	A few	Interventions mainly aimed at improving bus reliability at specific locations rather than improving general traffic flow.

5.2 Metrics used to monitor congestion

Changes in congestion in the Large Project areas are reported here using three datasets:

- At the *local authority level*, DfT publishes statistics for average vehicle speeds during the weekday morning peak on locally-managed 'A' roads. These provide a high-level measure of overall change in congestion across the Large Project local authority areas. They are reported in section 5.3.
- At a *project level*, most Large Project Outcomes Reports include data on average vehicle speed in the morning peak on roads in their targeted area. This metric was reported in eleven Large Project Outcomes Reports in 2014/15 with further data received from the remaining Large Project. In all but two cases the data covered the period to 2013/14 with six of the projects covering 2014/15 as well. There was some variation in the time periods used (8-9 am, 9-10am or 7-10 am); and the period of reporting (with academic, financial or calendar year all used). Data are reported in section 5.4.
- Five Large Project Outcomes Reports included data on the proportion of buses operating on time. For three of the Large Projects, these data were reported at a network-wide level, while for two other Large Projects data were reported at a corridor or route level. Data are reported in section 5.5.

Various other metrics for congestion were reported in a few Outcomes Reports. Bournemouth reported journey time variability in the morning peak; CENTRO, Merseyside, Solent and Surrey reported average delay, but using non-comparable metrics; Telford and Reading reported journey times for routes or sub-corridors and Solent reported the number and length of links with more than 30 seconds delay. None of these measures were reported in a comparable manner or by enough Large Projects to be useful for meta-analysis.

5.3 High-level outcomes of congestion-relief interventions

At the end of the programme, congestion had not improved at the local authority level across the Large Projects as a whole.

Figure 5.1 shows how rush-hour speeds changed over time (from 2008 to 2015) for ten[26] Large Projects combined, and for the national comparator group of other non-London English local authorities. From 2012 onwards, 'average speeds in the weekday morning peak' fell (i.e. congestion worsened), for the Large Projects combined and also for the comparator group.

Figure 5.2 and Table 5.2 show change at the local authority level for each Large Project. All the Large Projects show a fall in rush-hour speeds since 2012.

It is worth noting that the DfT congestion statistics at the local authority level include many more roads than were targeted by LSTF activity[27]. This means that any effects of LSTF would not necessarily be expected to be evident.

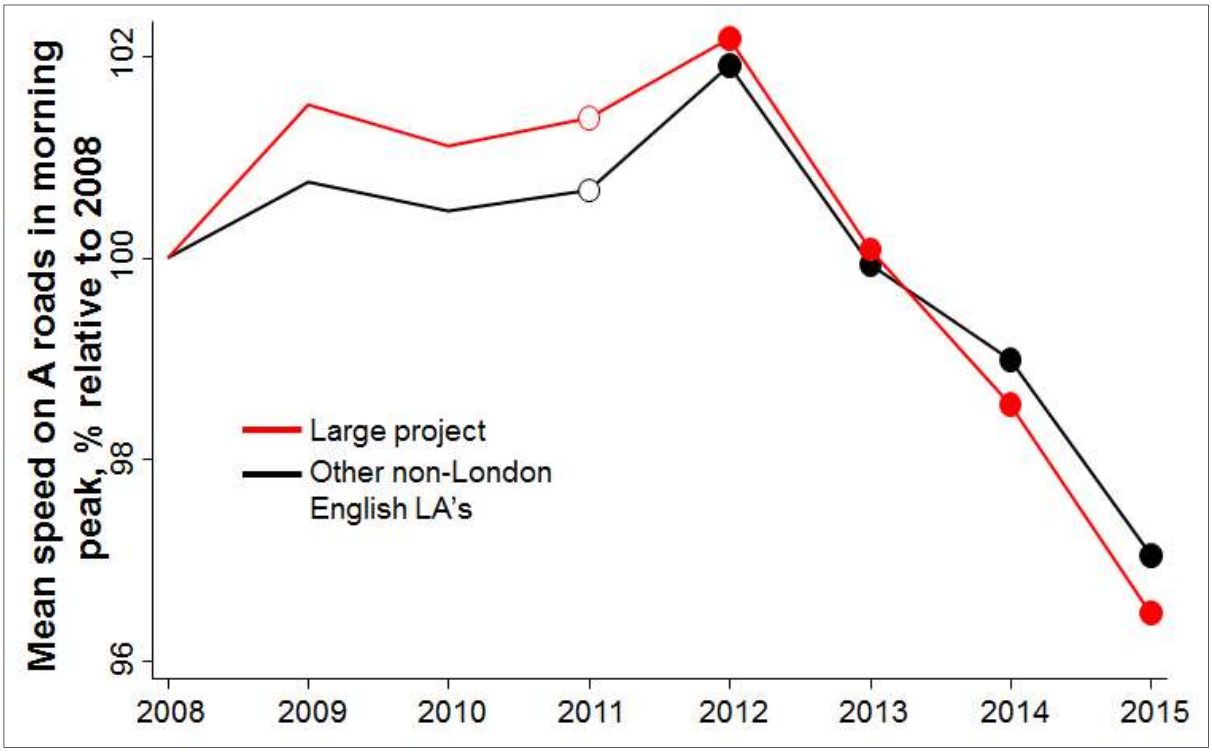
Overall, average vehicle speeds fell by 5.2% in the Large Projects between 2009/11 and 2015, compared to falling by 3.6% in the national comparator. This difference between the Large Project local authorities and the national comparator local authorities was highly statistically significant

26 Data were not available in a sufficiently disaggregated form for Hertfordshire and Surrey.

27 For example, for BDRS, statistics at the local authority level incorporate data from 49 individual 'A' roads (in both directions), of which only eight roads are in the corridors that are the focus of the BDRS Large Project.

(p=0.007 in a T-test). (This analysis was undertaken using a total of 37 local authorities in the Large Projects and 76[28] in other parts of England excluding London).

Figure 5.1: Average speeds in weekday morning peak on locally-managed 'A' roads (10 Large Projects combined)



Source: DfT statistics CGN0209. Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

A number of factors might be expected to influence congestion levels in all local authorities (both the Large Projects and the comparator group). There was a general upturn in economic activity and employment levels from 2012, and this is likely to have resulted in more rush-hour traffic and hence worsening rush-hour congestion. There was also a fall in the fuel cost of driving in 2015 relative to a 2009-11 baseline[29] .

There are six Large Projects where congestion worsened relative to the comparator group: Bournemouth, CENTRO, Nottingham, Reading, Solent and TfGM (shown shaded in Table 5.2). Looking at these Large Projects:

- In Bournemouth and Reading, the pattern shown by Figure 5.2 is that rush-hour speeds rose between 2009 and 2011, probably reflecting an immediate impact of the recession in these towns. Thereafter, rush-hour speeds fell, probably reflecting economic recovery. Table 5.2 shows that for both Bournemouth and Reading, employment levels rose by more than in the national comparator group between the 2009-11 baseline and 2015, supporting the conclusion that worsening congestion is attributable to an improving local economy.
- In CENTRO, Figure 5.2 shows that rush-hour speeds very closely tracked the national comparator group until 2014, but fell below the comparator group in 2015. Table 5.2 shows that employment levels in CENTRO rose by more than in the national comparator group between

28 Isles of Scilly were excluded, as this is such a small local authority that values may not be reliable.
29 DfT TSGB 1308: *Retail prices index: Transport components*. 1987-2015.

2009-11 and 2015. Again, it seems plausible that worsening congestion is attributable to an improving local economy.

- In Nottingham and TfGM, Figure 5.2 shows that rush-hour speeds fairly closely tracked the national comparator group for the entire period from 2008 to 2015. The apparently worse performance than the comparator group (i.e. from comparison of the 2009-11 and 2015 data in Table 5.2) is therefore less significant than it may appear. Both Nottingham and TfGM show changes in employment levels that are similar to the change in the national comparator group.
- In Solent, Figure 5.2 shows that rush-hour speeds fell relative to the national comparator group in 2014 and 2015. However, Table 5.2 shows that Solent saw less employment growth than the national comparator group between 2009-11 and 2015. The worsening congestion probably *cannot* therefore be attributed to an improving local economy.

Thus, it seems plausible that most of the changes in rush-hour speeds can be attributed, at least in part, to improvements in the local economy. The only Large Project where this is not an adequate explanation is Solent.

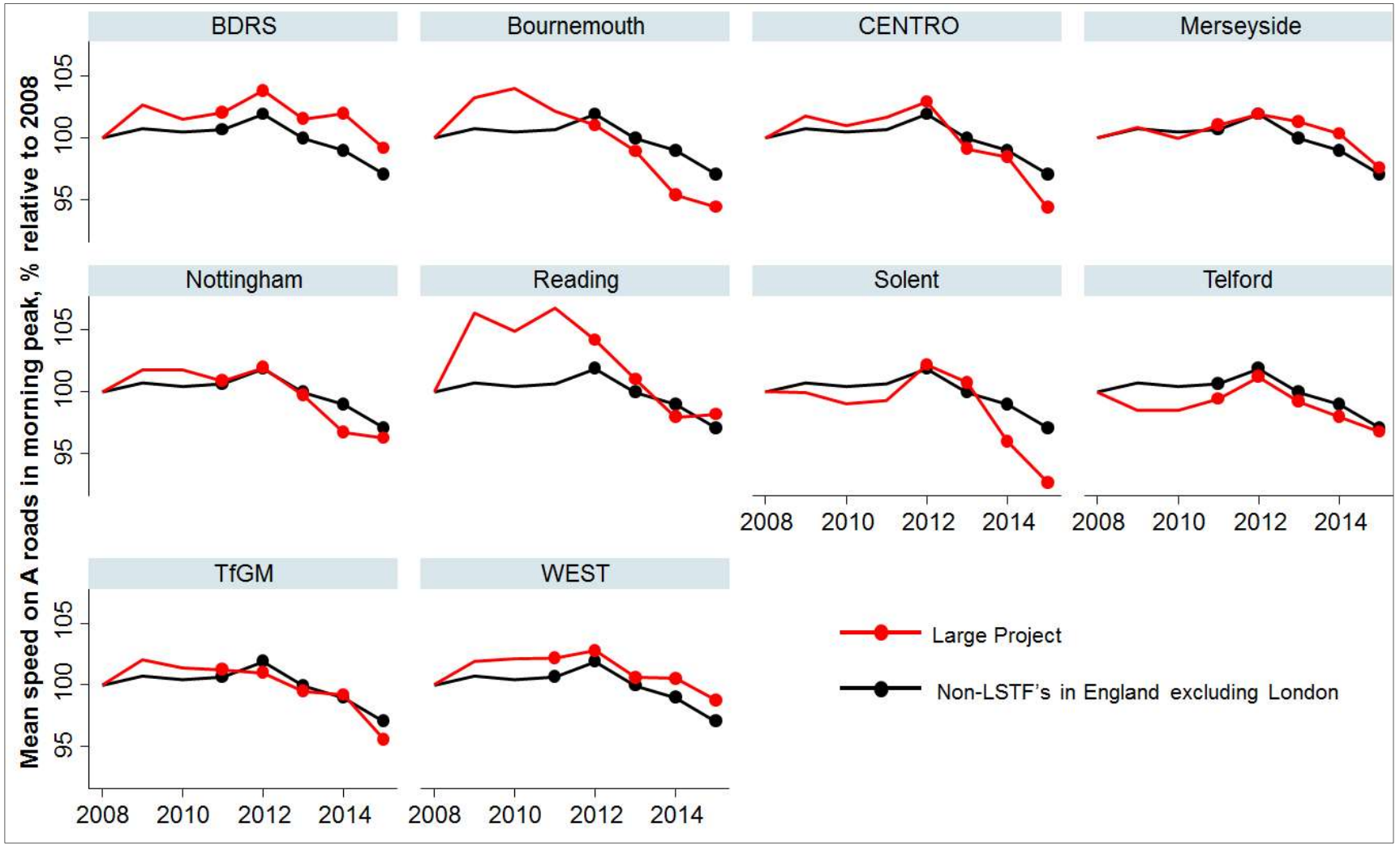
However, despite our conclusion that worsening congestion was attributable, at least in part, to economic factors, Table 5.2 shows that there is a problem: while rush-hour speeds in the Large Projects fell relative to the national comparator group, 24-hour traffic, somewhat counterintuitively, *also* fell. Looking at the 10 Large Projects as a group, rush-hour speeds worsened relative to the comparator group between 2009-11 and 2015 (-5.2% compared to -3.6%), while traffic volumes increased by less (+1.2% compared to +2.9%). And looking at the Large Projects individually, six show rush-hour speeds falling by more than in the comparator group, but none of these six show 24-hour traffic volumes rising by more than in the comparator group.

There are two possible explanations for this contradiction:

- The fall in 24-hour traffic volumes hides a *rise* in peak hour traffic volumes and a larger fall in off-peak traffic volumes.
- The fall in rush-hour speeds is despite a fall in traffic volumes, and is due to a temporary or permanent reduction in road capacity.

We return to these alternative explanations, and the extent to which the LSTF programme may have been a contributing factor, in section 5.4.

Figure 5.2: Mean speeds during AM-peak on locally-managed 'A' roads, 2008 to 2015 relative to 2008, for ten local authority areas (source: DfT)



Filled circles show years when Large Projects were receiving funding.

Table 5.2: Change in average AM-peak speeds on locally managed 'A' roads, absolute traffic levels, population and employment growth 2009-11 baseline to 2015 in LSTF areas.

	% change in average AM-peak speeds between 2009-2011 baseline, and 2015	% change in absolute traffic levels between 2009-2011 baseline, and 2015	Population growth 2009-2011 to 2015	Employment growth 2009-11 to 2015
BDRS	-2.8%	1.8%	3.1%	4.2%
Bournemouth	8.4%	-0.1%	5.6%	5.2%
CENTRO	7.0%	1.9%	4.4%	5.4%
Merseyside	-3.0%	1.1%	1.6%	2.4%
Nottingham	5.2%	-2.3%	3.9%	5.0%
Reading	7.4%	0.2%	5.0%	7.4%
Solent	6.8%	0.9%	4.5%	3.3%
Telford	-2.1%	1.8%	3.2%	4.6%
TfGM	5.9%	0.1%	3.5%	4.8%
WEST	-3.2%	2.7%	5.4%	2.7%
Large Project Average	5.2%	1.2%	3.9% (3.8%)	4.8% (4.3%)
Other LAs in England excl London	***-3.6%***	***2.9%***	***3.3%***	***5.1%***

Data for traffic speeds and levels were not available in a sufficiently disaggregated form for Hertfordshire and Surrey.

Red indicates higher growth in congestion, traffic, population and employment than the national comparator. Large Project Averages are weighted by the population of the constituent local authorities in each Large Project. The Large Project Average values in parentheses for population growth and employment growth are calculated using the same population weights as for speed and traffic levels, i.e. excluding Hertfordshire and Surrey.

5.4 Project-level outcomes: average vehicle speeds from Outcomes Reports

As the LSTF activity often targeted specific areas or corridors, it may be more appropriate to look at average vehicle speeds at a project level rather than for the entire local authority area. Eleven Large Projects reported average vehicle speeds in their 2014/15 Outcome Reports, which are shown in Table 5.3 and in Figure 5.3 (Telford is not shown as data were for a relatively small area within the town centre and therefore not comparable with other Large Projects). Data are generally for selected roads that were the target of LSTF activity, although for Nottingham they are indicative of speeds generally and in three cases (Merseyside, TfGM and WEST) they are for the entire local authority area.

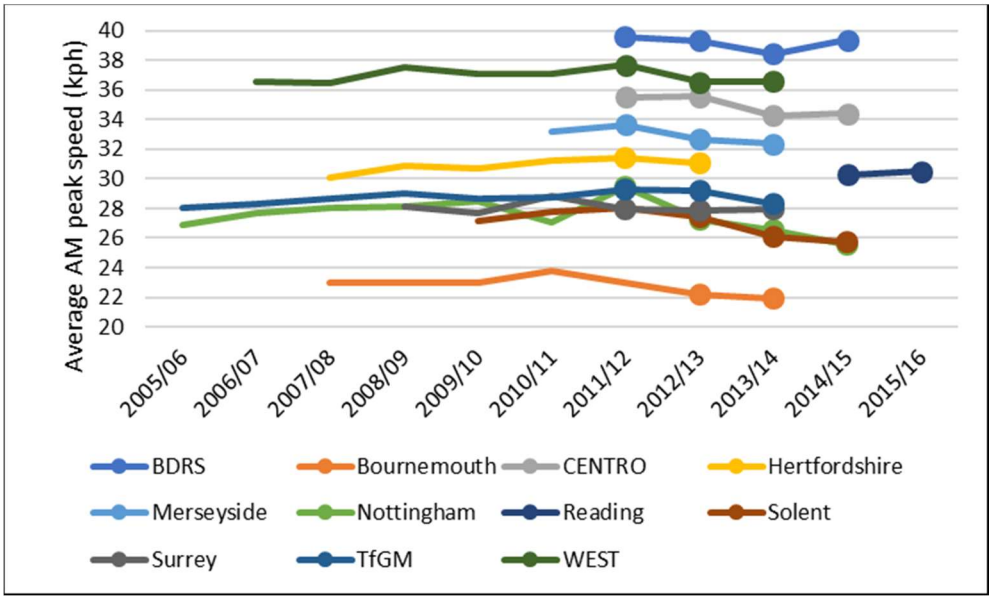
For six Large Projects (BDRS, CENTRO, Nottingham, Reading, Solent and Telford) data were reported or supplied for 2014/15 while Reading and Telford also reported or supplied data for 2015/16.

The results from the Outcomes Reports show little improvement in average journey speeds and in many cases congestion worsened over the delivery period, though the reductions in speed were small, generally less than 1-2kph:

- For BDRS, CENTRO and WEST, peak period speeds in 2014/15 are improved or similar to 2013/14 figures though still lower than the baseline.
- Reading showed a slight increase in peak period speeds averaged over three sub-corridors after traffic signal improvements were implemented. The results were mixed but there were clear benefits on one corridor despite an increase in traffic flow.
- For Surrey there was very little change in peak period speeds.

- For Bournemouth, Nottingham, Solent and TfGM, peak period speeds are lower than the baseline and on a general downward trend.
- The data from Telford is mixed. While the unweighted average speeds over a small area appear to show improvements, average speed decreased at more points than increased and the general picture over the whole area is one of decreasing speeds. Telford also observed that while an increase in speeds is mostly correlated with decreasing traffic flows the opposite correlation between decreasing speed and increasing traffic is less obvious.

Figure 5.3: Average vehicle speeds (kph) during the morning peak period on LSTF-targeted roads



Data are from 2014/15 Outcome Reports; see notes to Table 5.3 for further details. Filled circles show years when Large Projects were receiving funding. Note BDRS, CENTRO, Hertfordshire and WEST data are for a financial year. Merseyside, Solent, Surry and TfGM data are for academic years. Bournemouth and Nottingham data are for a calendar year so that data for 2011 say, is presented as 2011/12 in the table/figure. Telford data is not shown, as methodology different to other Large Projects (see note below Table 5.3).

It should be noted that reducing congestion was not a primary objective for Merseyside, Nottingham and Telford and they had not implemented specific measures intended to reduce congestion as part of their programmes. For CENTRO and WEST, interventions were mainly aimed at improving bus reliability rather than reducing traffic congestion for general traffic.

Moreover the increase in congestion at a project level would not have been uniform and there were many examples cited where rush-hour speeds had increased on individual routes or corridors. In the case of CENTRO and Hertfordshire, congestion on non-LSTF comparator roads had increased by more than on LSTF roads, suggesting the situation might have been worse without the LSTF schemes. The reverse is true in Solent and Surrey, where rush-hour speeds reduced slightly more on LSTF roads than non-LSTF comparators.

Table 5.3: Average vehicle speeds (kph) during AM peak on LSTF-targeted roads or over the project area for the 12 Large Projects

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Location
BDRS							39.6	39.3	38.5	39.4		4 LSTF targeted corridors
Bournemouth			23.0	23.0	23.0	23.8	23.0	22.2	21.9			LSTF targeted corridor
CENTRO							35.5	35.6	34.3	34.4		9 LSTF targeted corridors
Hertfordshire			30.1	30.9	30.7	31.2	31.4	31.1				Hemel H'stead, St Albans & Watford
Merseyside						33.2	33.6	32.7	32.3			Merseyside strategic transport network
Nottingham	26.9	27.7	28.0	28.2	28.5	27.0	29.5	27.2	26.6	25.6		16 radial routes & 1 orbital route
Reading										30.3	30.5	3 LSTF-targeted sub-corridors
Solent					27.1	27.7	28.1	27.4	26.1	25.7		9 LSTF targeted corridors
Surrey				28.1	27.7	28.9	27.9	27.9	27.9			9 routes in Guildford & Woking
Telford					49.8			47.2	45.5	45.1	47.4	10 points in cordon in city centre
TfGM	28.1	28.3	28.6	29.1	28.6	28.7	29.3	29.2	28.3			G. Manchester: all A & B roads
WEST		36.5	36.5	37.5	37.1	37.1	37.7	36.5	36.6			All 4 local authority areas

Highlighted grey cells are for years of LSTF funding, including Key Component funding in 2011/12 where applicable.

BDRS: Weekday morning peak, 7-10am, for period April – March excluding August, bank and school holidays, on four corridors (both directions) in each of the four local authority areas.

Bournemouth: Weekday morning peak, 8-9am, calendar year, over ten route sections.

CENTRO: Our unweighted average of reported average speeds on 9 out of 10 targeted corridors. Data is not available for the remaining corridor due to the nature of this route. Weekday term-time, morning peak, 7-10am, April to March, excluding August and bank holidays.

Hertfordshire: Weekday morning peak, 7-10am, on LSTF corridors overall (not further specified). 2013/14 data was not available due to problems with the data.

Merseyside: Weekday term-time morning peak, 8-9am; for period 1 September - 31 August in each year; for Merseyside Network overall

Nottingham: Weekday morning peak, 7-10am, for 18 radial routes in Greater Nottingham and along the Ring Road Orbital route. Reported for 'calendar' rather than accounting years (so 2005/06 data is for 2005).

Reading: Weekday morning peak, 7-10am in September 2014 (before signal improvements) and November 2015 (after signal improvements). Our unweighted average for 3 sub-corridors.

Solent: Weekday term-time, morning peak, 8-9am, for period September – August in each year, for nine corridors across South Hampshire.

Surrey: Tues – Thurs, term-time, morning peak, 7-10am, September – September each year. Our unweighted average of figures for nine routes (six in Guildford and three in Woking).

Telford: Average weekday morning peak, 9-10am, for 10 sites in inner cordon around town centre. Surveys are annual, carried out in autumn. Our unweighted average. Note that apparent increase in speed in 2015/16 may be misleading, as speeds decreased at six out of 10 sites and on the approaches to the Box Road. Methodology different to other Large Projects, based on very short routes.

TfGM: Morning peak, 7-10am, for period September – August excluding public and school holidays. Figures are for A and B roads in Greater Manchester.

WEST: weekday morning peak, 7-10am, for period April – March excluding August, bank and school holidays. Unweighted average of figures reported for the four local authority areas of BANES, Bristol, South Gloucestershire and North Somerset. Data for 2006/07 to 2010/11 are from 2013/14 Outcomes Report.

Nonetheless, nine of the Large Projects did have an objective to reduce congestion and some had implemented a number of interventions to achieve this end. As well as increased employment, there are a number of other factors that would have the potential to mask the improvements from interventions in the short to medium term, or even worsen congestion in order to meet other objectives. These include:

Temporary factors

(a) Major roadworks related to LSTF (e.g. bus lanes)

(b) Major roadworks related to transport but non-LSTF funded

(c) Major roadworks unrelated to transport (e.g. utilities)

Permanent factors

(d) Reduction in effective road capacity (e.g. reallocation of road space for bus or bike lanes)

(e) Reduction in effective junction capacity (e.g. improved or new pedestrian crossings, signal changes)

(f) Speed reductions e.g. introduction of 20mph zones

Conflating factor

(g) Congestion-relieving interventions may have been targeted at locations where higher traffic growth was anticipated (e.g. because of planned employment, residential or retail development).

To understand which, if any, of these factors could be significant, clarification was sought from the Large Projects. The information received, based on professional judgment of the Large Project officers, is summarised in Table 5.4. Eleven Large Projects indicated that there were local factors that could have significantly worsened congestion over the LSTF period. These were as follows:

- Several Large Projects cited significant disruptions to the road network as a result of utility roadworks (factor c), major roadworks at motorway junctions or highway maintenance programmes (factor b). While such works were independent of LSTF and outside local authority control, similar works could also affect non-LSTF authorities.
- Ten Large Projects also cited as significant one or more of the factors that are directly attributable to the LSTF programme (factors a, d, e and f).
- Five of the Large Projects had expected local increases in traffic and congestion as a result of planned development, so that without the LSTF interventions, congestion would have been likely to become significantly worse (factor g).

Some specific examples from the Large Projects include:

- BDRS had road works and reduced road capacity in the Sheffield corridor (the Sheffield – Rotherham Bus Rapid Transit scheme) and there were significant housing and other developments in the Barnsley and Doncaster corridors, including a distribution warehouse employing 400 people that opened during the LSTF period. In the Rotherham corridor there were reductions in junction capacity to benefit other road users and although traffic speeds reduced it is likely that without the investment the overall reduction in journey speeds would have been greater. The BDRS Outcomes Report observed "*The [congestion-relief] benefits may not be immediately realised for a number of schemes, particularly where competing highway works have negated any LSTF-related benefits in the short term.*"

- In Bournemouth many roadworks took place during the LSTF period, some of them major. A local news article in 2014 listed 20 separate roadworks in the Bournemouth area in one month alone, nine of which would have directly affected the LSTF corridor. This amount of non-LSTF roadworks does appear to be out of the ordinary. In addition, the introduction of bus and cycle lanes and signal changes to favour buses, cyclists and pedestrians, would all have increased congestion for cars.
- CENTRO had major roadworks related to the Metro extension into Birmingham city centre. There would also have been an impact on Metro operations from the amount of 'down time/disruption', compounded by the refurbishment of New Street station. Works on this scale are clearly untypical and would have had a significant impact on congestion levels in the city centre.
- Nottingham had a major ring-road scheme, a widening of a dual carriageway and construction of two new tram lines, all independent of LSTF funding but undertaken during and after the LSTF period. Works on this scale are clearly untypical and would have had a significant impact on congestion levels in the city centre.
- Reading's Outcomes Report noted that more responsive pedestrian crossings were one of the reasons why journey time benefits were not realised on some corridors.
- In Solent there were major roadworks on four of the nine corridors, including at motorway junctions, which reduced speeds substantially and resulted in an overall reduction of speeds across all corridors.
- In Surrey there were LSTF roadworks in Woking until summer 2015 and major non-LSTF roadworks, as well as new development generating additional traffic. A majority of LSTF highway works took place late in the LSTF period, with some rolling over to 2015/16 or even 2016/17. It was considered by the Large Project officers that without the various LSTF interventions, congestion would have become worse over the LSTF period.
- In WEST there were major roadworks unrelated to LSTF as well as the widespread introduction of 20mph limits in Bristol, although it is not clear to what extent this would have affected speeds on 'A' roads.

It is possible that in a few cases congestion itself may have contributed to some reductions in absolute traffic levels relative to national levels, as people chose to avoid travel (e.g. through home working) or shifted to different modes such as walking and cycling.

Table 5.4: Potential confounding factors reducing the impacts of congestion-relief measures in the short to medium term (cross indicates that the Large Projects considered this a potential factor in reduced traffic speeds at peak hours)

Large Project	Major roadworks LSTF related (a)	Major roadworks non-LSTF related (b)	Major roadworks general (c)	Reduction in effective road capacity (d)	Reduction in effective junction capacity (e)	Speed reductions (f)	Traffic growth expected due to planned development (g)	Other factors (h)
BDRS		X		X	X		X	
Bournemouth	X	X	X [A]	X	X			
CENTRO	X	X	X	X	X	X	X	X [B]
Hertfordshire	X	X	X		X	X		X [C]
Merseyside								
Nottingham		X	X	X		X	X	X [D]
Reading	X	X			X			
Solent	X	X		X	X			
Surrey	X	X	X				X	X [E]
Telford						X	X	
TfGM		X [F]						
WEST		X	X			X		

Note: This is a summary of responses to clarification query issued to all Large Projects.

A Roadworks were taking place at nine sites in LSTF corridors in one given month in 2014

B Largest effect from record levels of traffic (increased population, licence-holding by older people, end of the recession, rise in employment and service traffic and recent falls in fuel prices)

C General increase in traffic related to economic recovery

D e.g. six week summer closure of rail line for major resignalling and other works. On the positive side, the Workplace Parking Levy could have improved congestion.

E Many of the LSTF works only completed in 2016

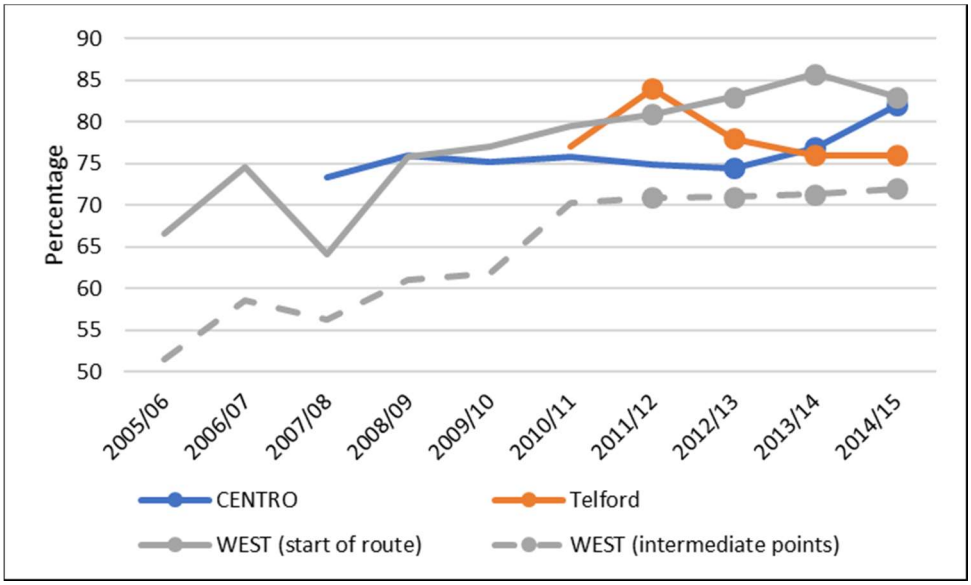
F Most of the factors have contributed but Metrolink Phase 3 and 2nd City Crossing seem the most likely to have contributed to reduced speeds

5.5 Project-level outcomes: proportion of buses operating on time

Five Large Projects reported the proportion of buses operating on time in 2014/15 Outcomes Reports. Data are summarised in Table 5.5 and illustrated in Figures 5.4 – 5.6.

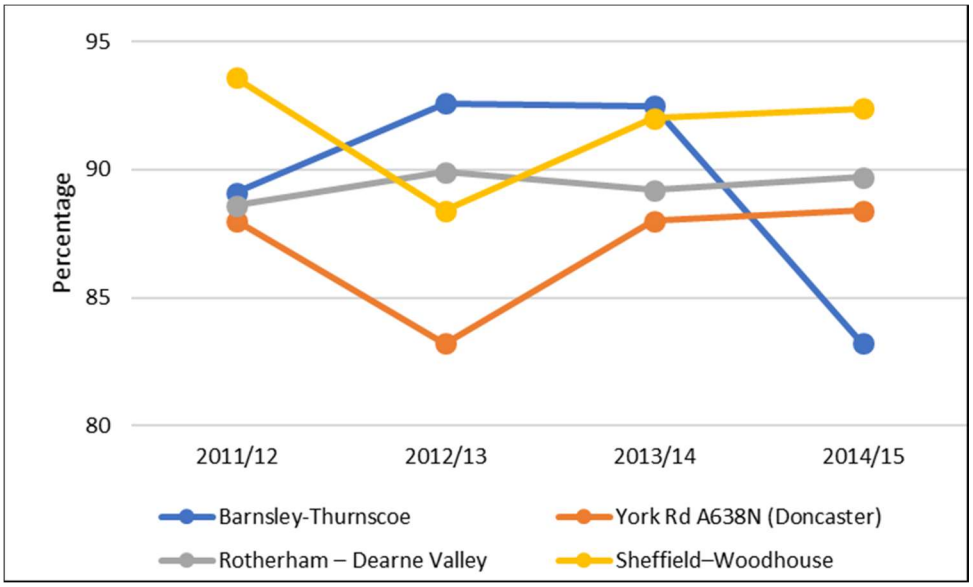
Data for CENTRO, Telford and WEST were reported as a time-series for all buses across the entire network over a period of 5-10 years (Figure 5.4). Data for BDRS were reported for four targeted corridors (split into sub-corridors), giving a total of twelve routes, over a period of four years (Figure 5.5). Data for Bournemouth were reported for a series of 'timing points' along the Three Towns corridor, for four years, with separate data for the start of a route and intermediate points (Figure 5.6).

Figure 5.4 Proportion of buses operating on time at network level in CENTRO, Telford and WEST



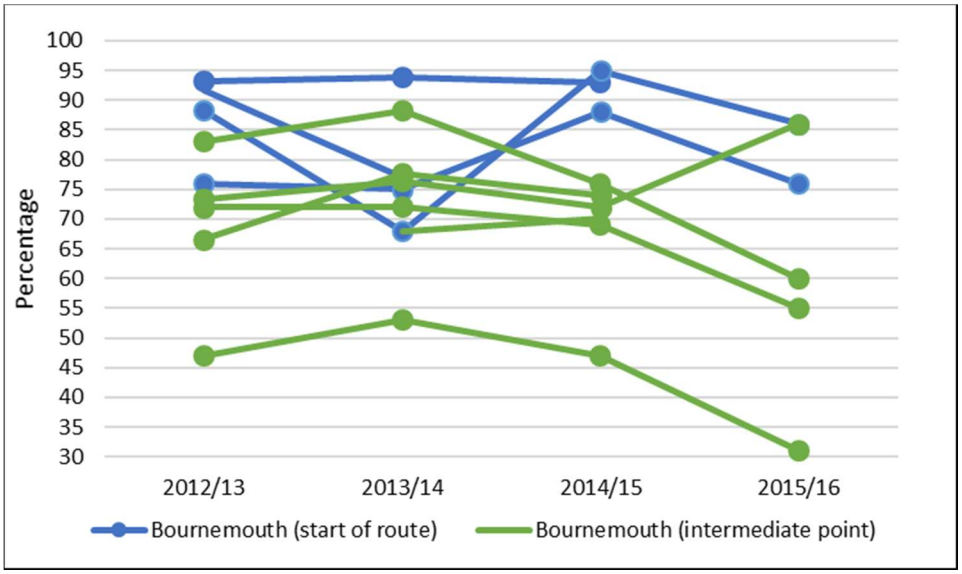
Data from 2014/15 Outcome Reports. Filled circles show years when Large Projects were receiving funding.

Figure 5.5: Proportion of buses operating on time on representative routes in BDRS



Data from 2014/15 Outcome Report. Filled circles show years when Large Project was receiving funding.

Figure 5.6. Proportion of buses operating on time in Bournemouth



Data from 2014/15 Outcomes Report. Filled circles show years when Large Project was receiving funding. Note data represents a calendar year but is presented as a financial year for consistency with other figures, so 2012/13 represents data for the calendar year 2012.

Improvements in bus punctuality could be the result of a range of types of intervention, including general improvements in traffic flow; introduction of bus priority measures at congestion hot-spots; and adjustment of bus schedules by operators as a result of information gained from real-time data about the location of delays.

Table 5.5: Proportion of buses running on time (%) in five Large Projects

		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Network-level changes in bus punctuality												
CENTRO				73	76	75	76	75	74	77	82	
WEST (start of route)		67	75	64	76	77	79	81	83	86	83	
WEST (intermediate points)		52	59	56	61	62	70	71	71	71	72	
Telford							77	84	78	76	76	
Corridor and route-level changes in bus punctuality												
BDRS	Barnsley B6411 (Thurnscoe)							89	93	93	83	
	Barnsley A628 (Dodworth Rd)							94	86	89	86	
	Barnsley A61 (Wakefield Rd)							86	80	87	87	
	Dearne Valley A633 (Whole Dearne)							89	90	89	90	
	Dearne Valley A633 (Wath-Manvers)							89	92	89	87	
	Don Valley A6109							80	92	86	91	
	Don Valley A6178							94	90	91	93	
	Don Valley Sheffield-Woodhouse key bus route							94	88	92	92	
	Don Valley Parkgate key bus route A633							89	90	89	90	
	Doncaster A630 (Balby Rd)							85	85	86	92	
	Doncaster A638N (York Rd)							88	83	88	88	
	Doncaster A638S (Bawtry Rd)							88	86	88	85	
Bournemouth	Poole Bus Station (start of route)								93	94	93	93
	Gervis Place (start of route)								88	68*	95	86
	Boscombe Bus Station (start of route)								92	77*	NA (a)	NA
	Somerford (start of route)								76	75	88	76
	Ashley Road (intermediate point)								67	78	74	78
	Branksome Roundabout (intermediate point								NA (b)	68	70	47
	Boscombe Bus Station (intermediate point)								73	76	72	86
	Jumpers Common (intermediate point)								72	72	69	55
	Christchurch High Street (intermediate point)								83	88	76	60
	Somerford (intermediate point)								47	53	47	31**

Highlighted grey cells are for years of LSTF funding, including Key Component funding in 2011/12 where applicable. *BDRS:* Data are the percentage of buses running between -1 and +5 minutes from scheduled departure times along the targeted corridors. *Bournemouth:* Data are percentage of buses running between -1 and +5 minutes from scheduled departure times, for a series of timing points along the targeted corridor. An additional location was added in this year's Outcome Report. Note data is for calendar year so for example, 2012/13 data is data for 2012. *CENTRO:* Data are percentage of buses running on time (not defined further) across the whole CENTRO bus network. *Telford:* Data are the percentage of buses departing timing points between -1 and +5 minutes. Note data is based on annual survey so for example, 2012/13 data represents data from 2012. *WEST:* Data are percentage of buses starting or running on time (not defined further) across the whole area network. (a) Very few services currently start at Boscombe Bus Station so no data for last 2 years. (b) New location, monitoring started in 2013. *low figures due to small sample size; **low figures due to no shows.

The overall picture is mixed with CENTRO and WEST showing improvements in bus punctuality, Telford showing a decline from the baseline though an improvement over the last year, and BDRS and Bournemouth showing mixed results depending on the individual route/corridor. It is not clear to what extent changes in overall network punctuality may be attributable to LSTF interventions[30]. However, some LSTF interventions did deliver improvements on some routes. Specifically:

- BDRS showed an increase in bus punctuality in six out of twelve sub-corridors and a decrease in the remaining six. Officers commented that extensive road works and traffic management measures throughout the LSTF area, but especially in Sheffield as part of the 'Streets Ahead' programme (non-LSTF), had an adverse effect on bus punctuality. The 2014/15 Outcomes Report noted a number of improvements to bus journey times which can be attributed to specific interventions, including road improvements to the A638 in Doncaster which reduced average bus journey times by 21% for inbound buses to the town centre, and improvements to the A61 in Sheffield in 2014/15 which improved bus journey times by 32% in the outbound evening peak.
- Bournemouth showed no clear pattern in bus punctuality with an increase at four out of ten timing points along the 'Three Towns' corridor and a decrease at four points in 2014/15 compared to 2012/13. A number of significant projects were implemented towards the end of the delivery period and full impacts may not have materialised by 2015/16. However, some of the network improvement schemes including junction improvements and bus lanes which would be anticipated to provide bus punctuality benefits were completed in 2012/13.
- CENTRO showed a significant increase in network-wide bus punctuality in 2014/15 compared to 2012/13. This was accompanied by a 9% reduction in excess wait times for high frequency buses along LSTF corridors in the three years 2012 to 2014. The project team considered that this improvement could be attributed to new and more reliable buses, reassessment of journey times to improve punctuality and the use of Automatic Vehicle Location (AVL). There is now 100% AVL coverage on the major bus fleet. LSTF funding contributed toward 20% of AVL delivery on 80% of the buses. Thus the LSTF improvements were part of a wider range of bus infrastructure improvement schemes.
- Telford's bus punctuality fluctuated over the last five years but showed a decline compared to 2011/12. However, given that congestion relief was not a primary objective and the focus was on the transformation of the key town centre Box Road, it was not anticipated that network-wide bus journey times would be affected.
- WEST showed a significant and steady improvement over time of network-wide bus punctuality, though the 'start of route' times dropped back to 2012/13 levels in 2014/15. To put this in context, since 2005/06, 25% more buses are starting on time, 38% more buses are on time at intermediate timing points, and average excess wait times fell from almost three minutes in 2005/06 to just under 0.8 minutes in 2013/14[31]. This followed the implementation of some LSTF schemes aimed at improving bus punctuality at specific locations. As with CENTRO, it is not clear to what extent the improvements in punctuality may be related to a wider range of bus infrastructure improvement schemes of which the LSTF schemes formed one part.

30 Sample size (number of buses) is not given in any of the Outcomes Reports, so it is also not possible to test whether the improvements in punctuality are statistically significant.

31 No data on EWT is available for 2014/15 due to insufficient frequent services to produce a robust statistic.

5.6 Conclusions on outcomes related to congestion

Table 5.6 summarises the findings related to congestion. Although there is evidence at the level of individual interventions that some of these have had a good effect on congestion, there is little evidence that general congestion improved relative to what would have happened in the absence of LSTF, even for Large Projects where congestion-relief was an objective of the programme and specific congestion-relief measures were implemented.

At a *local authority-wide level*, rush-hour congestion became worse in most of the Large Projects over the LSTF funding period, both in absolute terms and relative to the national comparator group. This was despite the fact that traffic volumes (across all time periods, not only peak hours) declined, held constant or rose less than the national comparator group. This apparent inconsistency may be partly a result of the growth in employment since 2011, which is likely to have disproportionately affected peak period traffic levels and hence congestion.

At a *project level,* looking at areas that were the target of LSTF activity, rush-hour congestion also tended to worsen, although changes were small. This was due to a number of factors, some related to LSTF and some unrelated. The most common factor was major roadworks unrelated to LSTF schemes. This was identified by ten Large Projects as a contributory factor in worsening congestion. Roadworks for LSTF schemes were identified as a contributory factor by six Large Projects; reductions in junction capacity were identified as a factor by six Large Projects; and reductions in road capacity were identified as a factor by five Large Projects. However, there were examples where LSTF interventions, such as changes to traffic signals, resulted in rush-hour speeds increasing on individual roads, and two Large Projects (BDRS and Reading) showed a slight increase in rush-hour speeds on targeted corridors in the final year of the LSTF programme.

Although congestion for general traffic did not improve overall in most of the Large Projects, there was evidence of improvements in bus punctuality. In CENTRO and WEST, bus punctuality improvements occurred at a network-wide level, and measures funded through LSTF seem likely to have contributed to this. In BDRS and Bournemouth, bus journey times improved on some corridors (although they worsened on others), and the improvements on some corridors in BDRS could be attributed to specific road network modifications funded by LSTF.

Table 5.6: Overview of outcomes related to congestion

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
BDRS	■	Slight decrease in rush-hour speeds, likely to be temporary due to roadworks related to a large number of road/junction alterations.	-
	■	Small increase in bus punctuality in 6 out of 12 sub-corridors; likely to be attributable to LSTF, but decrease on other 6.	Some
Bournemouth	■	Slight decrease in rush-hour speeds, likely to be temporary due to roadworks related to a large number of road/junction alterations.	-
	■	No clear pattern in bus punctuality	-
CENTRO	☐	Slight decrease in rush-hour speeds	-
	■	Bus punctuality showing significant network-wide improvements: partly attributable to LSTF schemes	Some+
Hertfordshire	■	Small decrease in rush-hour speeds across whole LSTF area	-
	☐	No evidence on bus punctuality	-
Merseyside	☐	Slight decrease in rush-hour speeds	-
	☐	No evidence on bus punctuality	-
Nottingham	☐	Decrease in rush-hour speeds	-
	☐	No evidence on bus punctuality	-
Reading	■	Evidence of slight increase in rush-hour speeds	-
	☐	No evidence on bus punctuality	-
Solent	☐	Slight decrease in rush-hour speeds	-
	☐	No evidence on bus punctuality	-
Surrey	■	Little change in rush-hour speeds on roads in target area of Guildford and Woking	-
	☐	No evidence on bus punctuality	-
Telford	☐	Mixed evidence on rush-hour speeds in town centre	-
	☐	Fluctuating evidence on bus punctuality	-
TfGM	☐	Little change in rush-hour speeds across whole LSTF area	-
	☐	Bus journey times declined across the whole authority area	-
WEST	☐	Slight decrease in rush-hour speeds	-
	■	Bus punctuality showing steady trend in network-wide improvements: likely to be partly attributable to LSTF schemes	Some+

■ **decrease** in average vehicle speeds / bus punctuality; ■ **no change** in average vehicle speeds / bus punctuality; ■ **increase** in average vehicle speeds / bus punctuality; ■ **insufficient data** to assess average vehicle speeds / bus punctuality; ☐ **too few schemes completed** to be expected to affect congestion.

'Overview' only shows direction of change if significant schemes that might be expected to have an effect on congestion have been completed.

~ Different Large Projects treat different time periods as 'baseline'. Changes summarised here are since 2011/12 for Large Projects that received Key Component funding (BDRS, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST), and since 2012/13 for Large Projects that did not receive Key Component funding (Bournemouth, CENTRO, Reading, Solent).

+ Network-wide improvements in bus punctuality in CENTRO and WEST may in part be due to LSTF schemes at specific locations, but other (non-LSTF) interventions may also have contributed to the improvements in punctuality at the network level.

6 Bus patronage

Key points:

At area-wide level, there is statistically significant evidence that bus patronage in the Large Projects has outperformed the comparator group of other local authorities outside London. This finding is strongly influenced by exceptional rises in patronage in Reading and WEST, and to a lesser degree in Bournemouth and Solent.

It is not possible to assess how much of the observed area-wide patronage increases (or slowing of patronage decline) is due to LSTF funding. Better Bus Area funding, as well as LSTF, could have contributed to these patronage rises in Bournemouth, Solent and WEST, as could pre-LSTF investment in bus infrastructure in WEST. Reading has achieved this improvement without the aid of Better Bus Area funding, and also has a history of support for local bus operations, but its LSTF project was not particularly bus orientated.

Area-wide patronage in most of the other Large Projects tracks close to the comparator group, particularly when assessed in *per capita* terms. There are signs that some of the metropolitan areas have arrested or slowed the historic decline in bus use in their areas, although, over the LSTF time period, deviations above long-term trends could be attributed to the effects of economic rebound as well as to LSTF. Telford is the only Large Project that shows markedly worse patronage decline than the comparator group, but it did not implement measures aimed at increasing area-wide bus patronage, and suffered deep cuts to its subsidised bus network.

At the level of individual bus routes, it *is* possible to confidently attribute patronage increases to LSTF improvements to specific bus services. For 21 sets of routes that were new, or that were boosted to higher service levels (of a total of 32 enhanced services), a sharp rapid patronage increase can be attributed to the LSTF intervention *and* it appears the patronage benefit will be maintained, either because the new service level has reached commercial viability or because the social, environmental or economic value of the service merits ongoing support.

6.1 Overview of objectives and outputs intended to increase bus use

Eleven of the 12 Large Projects adopted objectives and targets to increase bus use, or had project strands directly concerning buses that implied this intention. Telford, a project based on turning part of its inner ring road into a shared-use space, was an exception, but did implement a new park and ride scheme. Table 6.1 summarises bus-related project objectives and interventions.

Table 6.1: Summary of bus patronage objectives and interventions

	Bus patronage objectives?	Summary of bus patronage objectives	Bus interventions?	Summary of bus-related interventions^
BDRS	Yes	Target to stop patronage decline for the whole area and targets to increase patronage on particular routes (S74, X19, A1 and ASOS 'Jobconnector' buses, route 52, Parkgate/Dearne corridor, and a bus mode share target for Doncaster 'waterfront'.)	Many	Higher service frequencies on X19, A1 and ASOS 'Jobconnector' buses. X20 Jobconnector bus introduced. S74 introduced then discontinued. Bus priority highway alterations or signalling introduced at 55 locations producing significant savings to bus journey times through congestion hotspots. Sheffield-Woodhouse key bus route (service 52) received priority measures, RTPI and new shelters late in the programme (2015). Parkgate/Dearne key bus route received only some of the bus priority measures (in 2015) and other planned improvements. Doncaster Waterfront links to town centre were delivered in 2013/14. 9,600 free one month taster tickets (valid on buses, trams and trains) given to car commuters via 'Busboost'.
Bournemouth	Yes	Project objectives are to increase bus punctuality/ reliability/attractiveness and bus patronage is listed as a core outcome indicator.	Many	Bus priority introduced or improved at two junctions. New bus lane on Poole Road (June 2014). New bus facility at the hospital and 63 bus stops upgraded (in 2013/14) including lower-step bus access. Bus shelter improvement programme. Parking re-allocation and enforcement measures to help bus flow. Some real time information improvements. Bus operators bought 51 new buses and increased Sunday bus services on routes M1/2 (and for a period also 1X), partly in expectation of LSTF improvements. Attempts to agree a coordinated all-operator timetable for the corridor failed due to operator opposition. Smart joint operator ticket introduced March 2016, too late to influence reported patronage data. Bournemouth travel interchange (early 2015) and Boscombe bus station improvements (still ongoing) also happened too late to influence available patronage data.
CENTRO	Yes	Objective to increase public transport patronage within the LSTF corridors.	Many	194 bus stops improved with build outs or real time information. Some bus priority measures. Some corridor-specific bus marketing. 'Swift' smart card pay-as-you-go scheme became active from May 2015, too late to influence available bus patronage data.
Hertfordshire	Yes	Objective to increase use of public transport.	Some	New bus routes ML1/2, with associated bus stop and interchange infrastructure. Watford route 10 improved, with new buses bought by operator. Inter-operator BUSnet ticket introduced in Watford September 2013. Mobile phone ticket app piloted, but not rolled out until after LSTF. Six RTPI screens installed (timing of installation unclear).

	Bus patronage objectives?	Summary of bus patronage objectives	Bus interventions?	Summary of bus-related interventions^
Merseyside	Yes	Improvement to bus services is a discrete project strand. Increase in patronage on targeted routes is listed as an indicator.	Some	11 'new or improved' bus services (not all identified). New bus control centre for Liverpool with real-time positional data operational since 2014. Plans for real time information at employment sites not implemented and unclear whether LSTF funded other RTPI improvements.
Nottingham	No	Overall target for 10% increase in mode share of sustainable travel; bus patronage not separated.	Some	Multi-operator 'Kangaroo' smart card day/season tickets (developed as a transport add-on product to Nottingham Citycards) but rolled out too late to influence available patronage data. Development work took place to upgrade Kangaroo to an Oyster-style e-purse ('Robin Hood' smart cards) but this did not launch until December 2015. 23 on-street vending machines installed between July 2014 and March 2015, too late to significantly change 2014/15 patronage (70 installed as at Feb 2016). LSTF part-funded transition of 'Locallink bus network' to electric vehicles by buying 19 electric vehicles and supporting some service improvements, mainly in 2014/15. Five 'Community Smarter Travel Hubs'.
Reading	Yes	Target to raise bus trips by 7200 per day.	Some	Fare discounts on selected routes for one year. Smart ticketing dropped, partly because main bus company saw it as commercially unattractive. Two park & ride (bus and rail) sites became active late in the project (August and October 2015).
Solent	Yes	Modelled forecasts expect the LSTF interventions to result in significant increase in public transport patronage.	Many	Bus station improvements, bus priority measures and new bus stops on some corridors. Over 300 real time information screens installed. Solent Go inter-operator smart ticket introduced late in the programme (August 2014).
Surrey	Yes	Increasing public transport use for trips to work is identified as a 'second order outcome'. Specific targets for 2.5% patronage increase along key LSTF corridors and for Onslow Park & Ride patronage levels.	Some	Bus stop improvements between Guildford and Woking. Bus priority in Woking, Redhill and Guildford. Upgrade to existing RTPI system. But traffic signal bus priority only put in place near or after the end of project and unclear whether the extent and timing of the RTPI upgrade was such that it might have impacted patronage during the LSTF period. Onslow P&R (west Guildford) opened November 2013.

	Bus patronage objectives?	Summary of bus patronage objectives	Bus interventions?	Summary of bus-related interventions^
Telford	No	A target for 10% shift to sustainable modes but no bus-specific objective or target.	Few	Pedestrian improvements at Telford Central rail-bus interchange. Ironbridge park and ride scheme and Gorge Connect service linking Ironbridge museums (Key Component bid, opened June 2012). Although it will come too late to influence data in this report, a new bus station will be built in 2017 with LEP funds, to improve interaction between the shopping centre, the bus station, and the new shared space environment that LSTF monies have created on the Coach Central portion of the Box Road.
TfGM	Yes	Target for 8% increase in bus travel. Project strand devoted to demand-responsive community transport for access to work.	Some	Four 'Local Link' demand-responsive bus services. Smart ticketing for buses and bus priority traffic management systems not yet implemented.
WEST	Yes	A general aim to encourage modal shift on important corridors. Bus patronage listed as an indicator for LSTF (and the joint local transport plan) and projected target levels shown.	Many	New and enhanced services on specific routes backed by marketing campaigns. Interventions to improve bus reliability. Bus stop improvements. Real time information improvements, on-board next-stop displays and WiFi jointly financed by LSTF and Better Bus Area funding.

^ Bus-specific schemes only: activities such as personal travel planning that promote multiple sustainable modes including bus are only listed if promoting bus use appears to have been emphasised.

Project activities divided into three broad categories, with different geographical scales and timescales and with differing likelihoods of creating rapidly discernible changes in bus patronage:

- **Service increases on bus specific routes** were achieved early in many projects and would be expected to show quick measurable rises in route-specific patronage, where the new services proved popular. BDRS, Bournemouth, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST all funded new or increased services.
- **Infrastructure for bus priority, better waiting facilities and real time passenger information** tended to require longer lead times and were installed at various times throughout the LSTF period. These measures would also be expected to take longer to show up as higher bus use. Quicker effects on patronage might be expected where multiple works were focused on key bus corridors (as was the case in BDRS, Bournemouth, CENTRO, Solent and WEST), or where such schemes immediately precipitated investment by commercial operators to provide new buses (as happened in Bournemouth), to lay on more services or to run faster services.
- **Network-level improvements** that might be expected to have a major long-term influence on bus use generally required long lead times and came to fruition too late to substantially influence patronage within the term of the projects. In particular, new smart card schemes for CENTRO, Nottingham and Solent only came into operation in 2014/15, and TfGM's smart card scheme is yet to be implemented (and Reading's smart card scheme was abandoned altogether due to the commercial concerns of the main bus operator).

6.2 Metrics used to monitor bus patronage

Bus operators' data from electronic ticket machines is the most reliable source of patronage data. Commercial confidentiality can cause this data to be withheld unless it covers many routes, although sensitivities vary significantly between operators and locations. All data for area-wide patronage across the Large Project areas appears to come from this source. Even this data may be subject to system errors on occasion, and this appears to have been an issue for the main operator in the WEST Large Project in 2012/13. If the bus operators working in an area change, this may also create year-on-year disparities in the dataset, a problem experienced by Hertfordshire in 2015/16.

The Department for Transport issues two sets of bus patronage data tables, as reported by bus operating companies (Table BUS0109a) and as reported by local authorities (Table BUS0109b). The obligation for local transport authorities to report bus patronage was removed after 2009/10, when operators began national reporting, although most Large Projects did continue reporting. Although the ultimate data source appears to be bus operators in both cases, the two datasets do not exactly correspond where overlap is available. Differences between the two data series are much greater than year-on-year variation within either series, and year-on-year changes may be in opposite directions (most notably for Merseyside, but also for TfGM and to a lesser degree for Nottingham).

For routes or areas for which operator data is unavailable, Large Projects have had to resort to other, less precise, methods to estimate bus use, such as surveys and cordon counts. These are less reliable, because they only cover limited time periods and it is not possible to replicate conditions for successive counts. This applies to the Reading town centre count of bus boardings and alightings.

At the route or corridor level, some Large Projects were able to provide a long time-series of data with close reporting intervals (e.g. daily, weekly or monthly patronage) enabling close analysis of whether patronage trends changed at the moment of LSTF intervention. In other cases only annual patronage figures pre- and post-intervention are available.

6.3 National trends in bus use compared with area-wide bus use in Large Projects

Two national datasets, the National Travel Survey and DfT bus data tables (BUS0109a/b), provide a view of national trends in bus use.

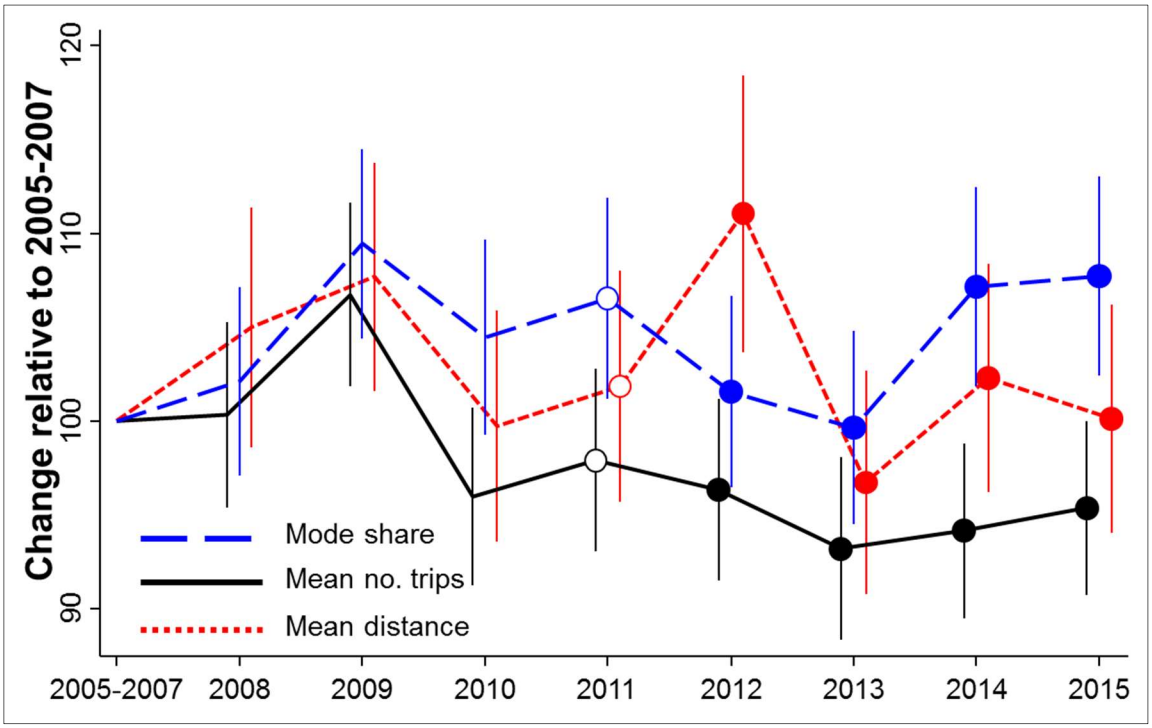
Figure 6.1 is based on National Travel Survey data for weekly bus use, showing national trends for ***per capita*** bus mileage, bus trips and bus mode share.

Another view of ***per capita*** bus use is given in Figure 6.2, based on bus operator data (BUS0109a) as the only complete national set of patronage data from 2009/10 onwards. This graph splits Large Project[32] data from a comparator group of other local authorities in England excluding London.

The black lines in both graphs show a national reduction in ***per capita*** bus trips since 2009. However, on a finer scale, most year-to-year trajectories are in opposite directions. The two datasets would align slightly better if the Large Project and comparator curves in Figure 6.2 were added together, but the year-to-year trend discrepancies would remain. The wide error bars on the National Travel Survey are sufficient to accommodate these discrepancies. Part of the difference may arise from the National Travel Survey graph covering urban areas only. However, the overall patronage decline since 2009 in the equivalent National Travel Survey dataset for rural areas is only slightly greater, with the two datasets arriving at end points that differ by much less than the error bars.

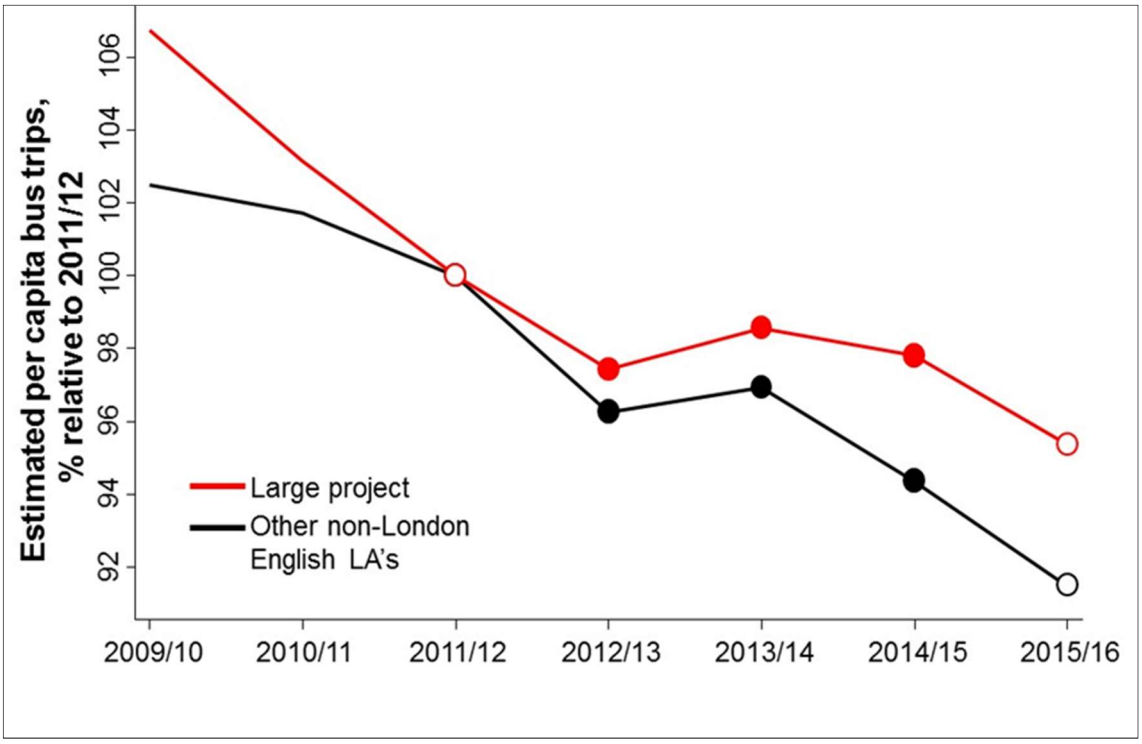
32 Surrey and Hertfordshire are not included in the Large Projects total curve because bus patronage data in BUS0109a relates to the entire counties, which are much larger than the project areas in these two cases.

Figure 6.1: Per capita bus travel in urban areas of England, excluding London, people of all ages (from National Travel Survey)



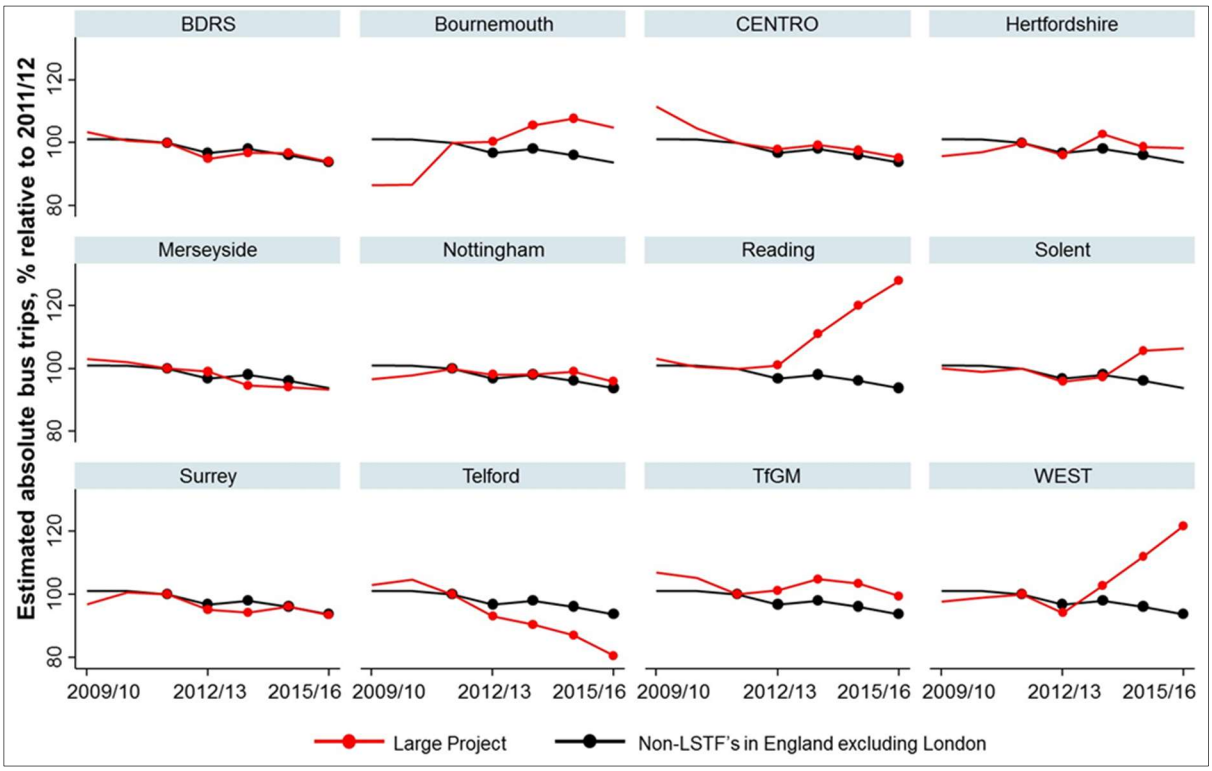
2015 confidence intervals are approximate, based on the assumption that uncertainty around the estimates in 2015 is the same as in 2014. Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

Figure 6.2: Per capita bus trips in all Large Projects, compared with other local authorities in England, excluding London (from bus operator data compiled in DfT Table BUS109a)



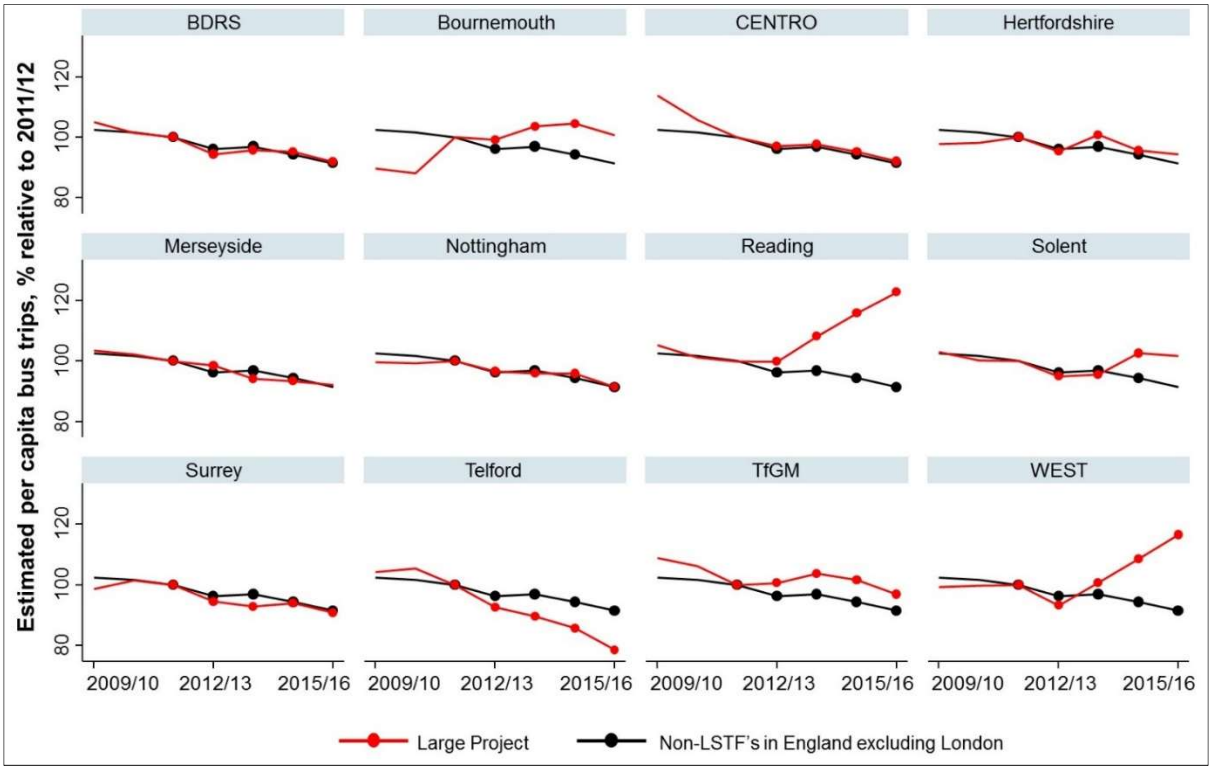
Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

Figure 6.3: Absolute bus travel in Large Projects, compared with other local authorities in England, excluding London (from bus operator data compiled in DfT Table BUS109a)



Filled circles show years when Large Projects were receiving funding.

Figure 6.4: Per capita bus patronage in Large Projects, compared with other local authorities in England, excluding London (from bus operator data compiled in DfT Table BUS109a)



Filled circles show years when Large Projects were receiving funding.

The bus operator data compiled in DfT Table BUS0109a provides a basis for analysis of bus patronage in both ***absolute*** terms and ***per capita***. Figures 6.3 and 6.4 present the data for both, from which it can be seen that the majority of Large Projects out-perform the comparator group by both metrics, generally by more in ***absolute*** terms than ***per capita***.

DfT Table BUS0109a only provides bus patronage data at the level of entire local transport authority areas. Its interpretation therefore requires consideration of the mismatch with the Large Project intervention areas. In particular:

- For Bournemouth Large Project we excluded Christchurch (because its bus use is reported as part of Hampshire).
- For Nottingham Large Project we only included City of Nottingham (because bus use in the other intervention areas is reported as parts of Nottinghamshire and Derbyshire).
- For Solent Large Project, we only included Portsmouth and Southampton (because bus use in the other intervention areas is reported as part of Hampshire).

In addition, when calculating aggregate bus patronage for the Large Projects as a whole (Figure 6.2), we have followed the practice in previous chapters of excluding Hertfordshire and Surrey, due to the extent of the mismatch between the Large Project intervention area and the local transport authority area[33]. For these reasons, a circumspect interpretation is required where graphs and figures are presented for these counties as a whole (Figures 6.3 and 6.4 and Table 6.2).

Table 6.2: Absolute and per capita bus travel in Large Projects, pre and post LSTF inception in 2011/12, compared with England, excluding London (from bus operator data compiled in DfT Table BUS109a)

	Pre LSTF inception: 2009/10-2011/12		Post-LSTF inception: 2011/12-2015/16	
	% change absolute bus journeys	% change per capita bus journeys	% change absolute bus journeys	% change per capita bus journeys
BDRS	3.3%	4.8%	-5.9%	-8.0%
Bournemouth	15.6%	11.5%	4.8%	0.7%
CENTRO	10.4%	12.2%	-4.7%	-7.9%
Hertfordshire	4.4%	2.2%	-1.7%	-5.6%
Merseyside	2.9%	3.6%	6.7%	-7.8%
Nottingham	3.4%	0.3%	-4.1%	8.6%
Reading	3.2%	5.1%	27.9%	22.8%
Solent	-0.1%	2.9%	6.3%	1.7%
Surrey	3.3%	1.3%	6.5%	9.2%
Telford	3.0%	4.1%	19.5%	21.5%
TfGM	6.5%	8.1%	-0.5%	-3.1%
WEST	2.3%	0.7%	21.8%	16.5%
Large Project average (excl Herts & Surrey)	4.4%	6.1%	0.3%	3.3%
Other LAs in England excl London	***-1.1%***	***-2.4%***	***-6.2%***	***-8.5%***

Red indicates worse performance than the national comparator.

33 In Hertfordshire the Large Project 'intervention local authorities' make up 3/10 of the local transport authority, and represented just 33.7% of the population in 2015. In Surrey, the Large Project 'intervention local authorities' make up 3/11 of the local transport authority, and represented just 33.3% of the population in 2015.

The aggregated data in Table 6.2 for all Large Projects (excluding Hertfordshire and Surrey) shows a pre-LSTF trend for bus use to decline ***faster*** in the Large Projects than in the national comparison group, whereas after the inception of LSTF, bus use declined ***more slowly*** in the Large Projects. Specifically:

- During the LSTF period (between a 2011/12 baseline and 2015/16), ***absolute*** bus journeys decreased by 6.2% in the national comparator group but decreased by just 0.3% in the 10 Large Projects (excluding Hertfordshire and Surrey). The difference between the Large Project local authorities and the national comparator local authorities was highly statistically significant (p=0.002 in a T-test).[34]
- During the LSTF period (between a 2011/12 baseline and 2015/16), ***per capita*** bus journeys decreased by 8.5% in the national comparator group, but decreased by just 3.3% in the 10 Large Projects (excluding Hertfordshire and Surrey). The difference between the Large Project local authorities and the national comparator local authorities was highly statistically significant (p=0.006 in a T-test).
- Prior to the LSTF period (between 2009/10 and 2011/12), ***absolute*** bus journeys decreased by 1.1% in the national comparator group, but decreased by 4.4% in the Large Projects. Over the same time period, ***per capita*** bus journeys decreased by 2.4% in the national comparator group, but decreased by 6.1% in the Large Projects. This difference may have been due to chance, as it was not statistically significant (p>0.2 for difference for both absolute and per capita changes). Nevertheless, at a minimum it highlights the fact that the more favourable trend in the Large Projects than in the comparator group is not simply a continuation of a pre-existing advantage.

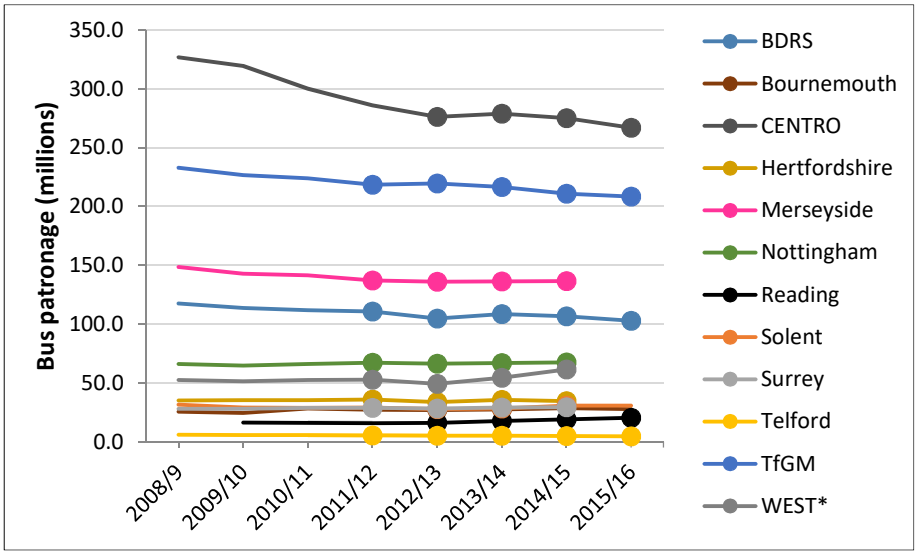
Area-wide ***absolute*** bus patronage data was also reported by Large Projects in their Outcomes Reports[35].

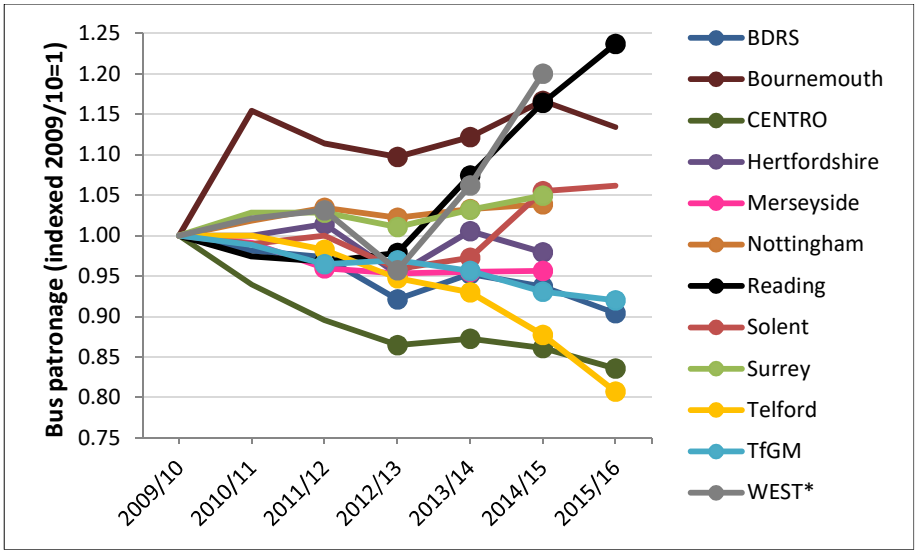
The following discussion considers data back to 2008/9, prior to which introduction of free travel for older people is liable to have been a significant influence.

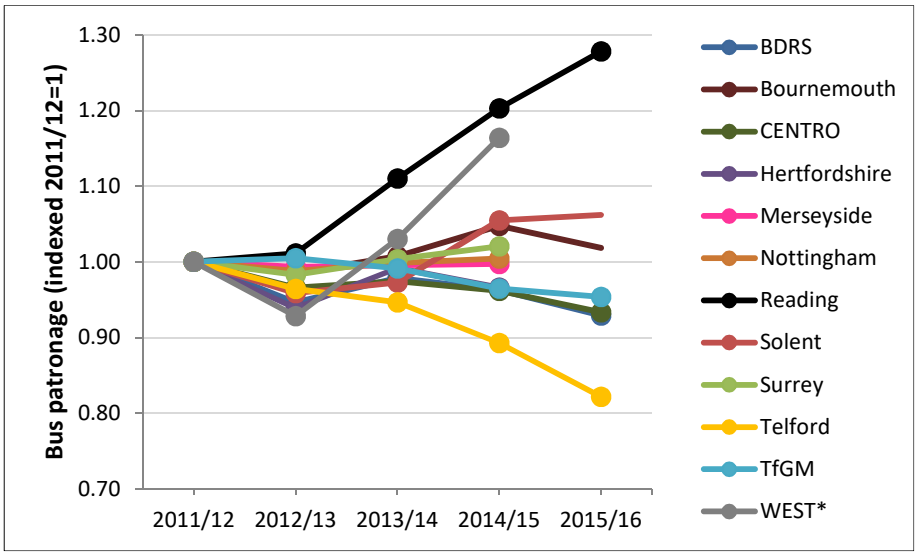
Area-wide annual patronage trends are shown graphically in Figure 6.5, in millions of trips per year, and indexed to financial years 2009/10 and 2011/12 (source data tabulated in Tables 6.3 and 6.4). Although some projects received some LSTF funding during 2011/12, the speed and scale of implementation was generally such that this year can be considered as pre-LSTF for all Large Projects.

34 This analysis and those in the following bullet points used a total of 16 local authorities, shires and Integrated Transport Authorities in the Large Projects and 68 in other parts of England excluding London.
35 The data reported was for the whole area of the local transport authority rather than the LSTF intervention area, with the exception of Nottingham, which provided data for bus patronage for the Greater Nottingham project area. Where the data was reported for the local transport authority area, in most cases it matched that reported to DfT and published in Table BUS0109b, with the exception of Solent, which matched BUS0109a, and Surrey, which matched neither data table. Where there was a matching DfT Table it was used to fill gaps in the reported bus patronage series. Merseyside data series was extended back one year to 2008/09. BDRS, Bournemouth, CENTRO, Solent and TfGM data series were extended forwards by one year to 2015/16. For Reading, which only reported patronage for a subset of bus routes branded 'Premier', DfT Table BUS0109a was used as the source of area-wide patronage data for all years.

Figure 6.5: Bus patronage trends in the Large Project areas







Filled circles show years when Large Projects were receiving funding. The trend lines in the top graph for Solent, Surrey and Bournemouth are close numerically and obscure one another.

*WEST patronage for 2012/13 may be significantly under-reported for its main bus operator.

Table 6.3: Area-wide bus patronage (millions of trips per year)

Millions	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Area considered	Notes
BDRS	117.6	113.9	111.8	110.9	104.9	108.5	106.7	103.0	All S. Yorkshire	
Bournemouth	25.8	24.6	28.4	27.4	27.0	27.6	28.7	27.9	Poole & Bournemouth	
CENTRO	326.7	319.5	300.2	286.1	276.3	278.8	275.1	267.0	All CENTRO area	excl.tram
Hertfordshire	35.1	35.4	35.4	35.9	33.7	35.6	34.7		All Hertfordshire**	
Merseyside	148.7	142.9	141.6	137.1	136.2	136.5	136.7		All Merseyside	
Nottingham	66.1	65.0	66.2	67.2	66.4	67.1	67.5		Greater Nottingham	excl.tram
Reading		16.5	16.1	16.0	16.1	17.7	19.1	20.4	Reading	
Solent	31.7^	29.1	28.8	29.1	27.9	28.3	30.7	30.9	Southampton & Portsmouth	
Surrey	28.2	28.2	29.0	29.0	28.5	29.1	29.6		All Surrey	
Telford	6.0	5.7	5.7	5.6	5.4	5.3	5.0	4.6	All Telford & Wrekin	
TfGM	233.0	226.6	224.0	218.6	219.7	216.7	210.9	208.5	Greater Manchester	excl.tram
WEST	52.6	51.4	52.5	53.0	49.2*	54.6	61.7		West of England sub-region	

Grey-shaded cells indicate years during which Large Projects received LSTF funding. Projects funded in 2011/12 were Key Component precursors to Large Projects.

^ This figure is higher than subsequent years due to a change in data collection methodology.

*This figure may be anomalously low since one of the bus operators in the WEST area suspects that its 2012/13 patronage was significantly under-reported.

** Hertfordshire provided data for 2015/16 but indicated that the set of bus routes covered may not be comparable to previous years. This data has therefore been omitted.

Table 6.4: Area-wide bus patronage indexed to 2009/10 and 2011/12

Indexed	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
BDRS	1	0.98	0.97	0.92	0.95	0.94	0.90
Bournemouth	1	1.15	1.11	1.10	1.12	1.17	1.13
CENTRO	1	0.94	0.90	0.86	0.87	0.86	0.84
Hertfordshire	1	1.00	1.01	0.95	1.01	0.98	
Merseyside	1	0.99	0.96	0.95	0.96	0.96	
Nottingham	1	1.02	1.03	1.02	1.03	1.04	
Reading	1	0.97	0.97	0.98	1.07	1.16	1.24
Solent	1	0.99	1.00	0.96	0.97	1.05	1.06
Surrey	1	1.03	1.03	1.01	1.03	1.05	
Telford	1	1.00	0.98	0.95	0.93	0.88	0.81
TfGM	1	0.99	0.96	0.97	0.96	0.93	0.92
WEST	1	1.02	1.03	0.96*	1.06	1.20	

2011/12	2012/13	2013/14	2014/15	2015/16
1	0.95	0.98	0.96	0.93
1	0.99	1.01	1.05	1.02
1	0.97	0.97	0.96	0.93
1	0.94	0.99	0.97	
1	0.99	1.00	1.00	
1	0.99	1.00	1.00	
1	1.01	1.11	1.20	1.28
1	0.96	0.97	1.05	1.06
1	0.98	1.00	1.02	
1	0.96	0.95	0.89	0.82
1	1.01	0.99	0.96	0.95
1	0.93*	1.03	1.16	

Grey-shaded cells indicate years during which Large Projects received LSTF funding. Projects funded in 2011/12 were Key Component precursors to Large Projects.

*This figure may be anomalously low since one of the bus operators in the WEST area suspects that its 2012/13 patronage was significantly under-reported.

** Hertfordshire provided data for 2015/16 but indicated that the set of bus routes covered may not be comparable to previous years. This data has therefore been omitted.

When bus use in all the Large Projects is charted together in millions of trips per year (Figure 6.5, top graph) bus use in the largest conurbations dwarfs the other areas. The long-term declining trends since 2008/9 for the metropolitan areas BDRS, CENTRO, Merseyside and TfGM are the most obvious feature of this graph. The most striking historical decline was in the CENTRO area, but this levelled off during the first years of LSTF funding, then resumed in 2014/15 and 2015/16. The other large metropolitan areas show a similar pattern. BDRS, like CENTRO, shows a levelling off then a slight continued decline from 2014/15. TfGM showed a small rise after the beginning of LSTF funding, but thereafter continued to decline at approximately the historic rate. Merseyside shows a complete levelling off that continued through 2014/15, the last year of data reported by the project. However, this trend may not be as different to the other metropolitan areas as it appears, since it is at variance with the dataset reported by bus operators to DfT (Table BUS0109a), which shows a continual year-on-year decline since 2009/10. Considered on an indexed basis relative to 2011/12 (Figure 6.5, bottom graph), patronage in BDRS, CENTRO and TfGM declines almost exactly the same degree to 2015/16. However, for CENTRO this level of decline represents a marked improvement on the previous trend.

The indexed graphs and data provide a basis to compare projects of different size. Indexed from 2011/12, a strong rise in patronage is evident for Reading and WEST[36], rising above year-on-year variability and departing from the previous trend.

Bournemouth and Solent show a smaller rise in patronage since 2011/12, weakening in 2015/16 but nevertheless representing a departure from previous trend (and also from the national comparator, whether measured in per capita terms or in absolute terms, as shown in the earlier Figures 6.3 and 6.4).

Hertfordshire, Merseyside, Nottingham and Surrey show little net change since 2011/12 (and in per capita terms remain close to the national comparator, as shown in Figure 6.4).

Compared on this indexed basis, Telford[37] shows a much steeper loss of patronage than BDRS, CENTRO and TfGM.

Two conflating factors specific to buses must be taken into account when interpreting the above trends:

- The positive influence of DfT funding for 'Better Bus Areas'.
- The negative influence of cuts in local authority funding for non-commercial bus services.

Table 6.5 summarises these conflating factors.

36 The erratic appearance of the WEST patronage trend may be due to a data collection problem experienced by its main bus operator, which suspects that its patronage for 2012/13 is significantly under-reported.
37 The loss of patronage in Telford is much less in terms of passenger numbers. It should also be noted that Telford was alone amongst the Large Projects in not implementing any measures intended to influence area-wide bus use.

Table 6.5 Conflating funding influences on bus patronage from Better Bus Area funding (2012 tranche) and local cuts to non-commercial services

	Ratio £BBA:£LSTF	Focus of BBA spend	Extent of cuts to non-commercial bus services during LSTF and assessment of probable impact
BDRS	44% : 56%	Smart ticketing, infrastructure, traffic management.	BDRS cuts in 2014/15 reduced patronage on its tendered services by 0.5 million trips per year, about one quarter of the total decline that year.
Bournemouth	34% : 66%	RTPI upgrade (also funded by LSTF), changes to prevent parking blocking bus stops, upgrading shelters/ stops, near-field communication tags at stops, on-board audio announcements, marketing.	Bournemouth consider that cuts to tendered services in Poole in 2014/15 did not significantly reduce overall patronage.
CENTRO	46% : 54%	Bus station, improved services, highway bus segregation, new bus stops, bus information, smart ticketing, smartcard roll-out, new buses.	CENTRO cut its tendered services but note that decline in patronage on those services has been proportionately less than decline on commercial services and therefore is not a major factor in the overall trend.
Hertfordshire	0% : 100%	No BBA	Hertfordshire only cut its tendered service budget after the latest patronage figures reported (but cuts in summer 2015 subsequently reduced patronage on tendered services by 32%).
Merseyside	68% : 32%	Bus stop improvements, bus priority, RTPI, mobile information.	Merseyside cuts to tendered bus services caused a loss of patronage of 1.2 million trips per year since 2011/12. This would account for all the 2011/12 – 2014/15 patronage loss reported by Merseyside (but not the 7.7 million patronage loss reported by Merseyside bus operators in DfT BUS0109a).
Nottingham	25% : 75%	Bus priority, RTPI, shelters, lighting at stops, CCTV, marketing.	Nottingham did not cut any tendered services during LSTF.
Reading	0% : 100%	No BBA	Reading made cuts to budgets but the services continued commercially.
Solent	28% : 72%	WiFi on buses, bus priority, on-board displays, new buses as operator match-funding (to BBA and LSTF).	Solent consider that its cuts to tendered services during the LSTF period did not have a significant impact on bus patronage.
Surrey	0% : 100%	No BBA	Surrey consider the small rise in patronage during LSTF a success in light of the 25% cut in the authority's bus service budget over the same period.
Telford	0% : 100%	No BBA	Telford note that they have experienced some of the deepest cuts to supported bus services of any local authority, 62% since 2010/11.
TfGM	83% : 17%	Bus priority, interchange improvements, bus stop clearways and kerb build-ups, bus services to employment sites, marketing.	TfGM cut its tendered bus budget 20% and mileage of tendered services also fell 20%. No patronage numbers on the tendered services available, but it appears possible these cuts could have influenced area-wide bus patronage.
WEST	45% : 55%	New/extended bus lanes, bus gates, traffic management/enforcement, parking controls, bus shelters, RTPI network-wide, WiFi in 230 buses.	WEST reported some cuts to tendered services, but consider that these were not sufficient to significantly influence area-wide patronage.

In summary, there is statistically significant evidence that area-wide bus patronage in the Large Projects has outperformed the comparator group of other local authorities outside London. This finding is strongly influenced by exceptional rises in patronage in Reading and WEST, and to a lesser degree in Bournemouth and Solent. Most of the other Large Projects track close to the comparator group, particularly when assessed in ***per capita*** terms, but there are signs that some of the metropolitan areas have arrested or slowed the historic decline in bus use in their areas. Over this time period, however, deviations above long-term trends could be attributed to the effects of economic rebound as well as to LSTF. Telford shows worse patronage decline than the comparator group, but did not implement measures aimed at increasing area-wide bus patronage, and suffered deep cuts to its subsidised bus network.

The strong patronage increase in WEST could partly represent the influence of WEST's LSTF programme, but its potential effect should be considered in conjunction with Bristol's earlier investment programme in bus priority measures and bus infrastructure over four years to 2012, and the more recent Better Bus Area project (and significant investment in new buses by commercial bus companies, partly due to the public investment programme).

Reading also has a history of working to support its bus network, but did not receive Better Bus Area funding, so in this case the strong patronage rises cannot be partly attributed to that programme. However, it is also difficult to attribute the patronage increase to LSTF, since the LSTF bus-specific measures implemented do not appear to have been of a scale or intensity likely to have caused area-wide patronage rises.

6.4 Corridor or sub-regional bus patronage data for Large Projects

A number of Large Projects focused their interventions on defined corridors or towns. This provides a higher likelihood of detecting and attributing uplift in bus patronage, if bus patronage data was collected at corridor level.

Bournemouth focused its whole project on a single corridor (Poole-Bournemouth-Christchurch). Patronage data is available for bus routes that represent about 80% of flows along the corridor, indexed to 2012/13 (Figure 6.6, source data in Table 6.6).

Figure 6.6: Bournemouth bus patronage changes for the intervention corridor (indexed 2012/13=1)

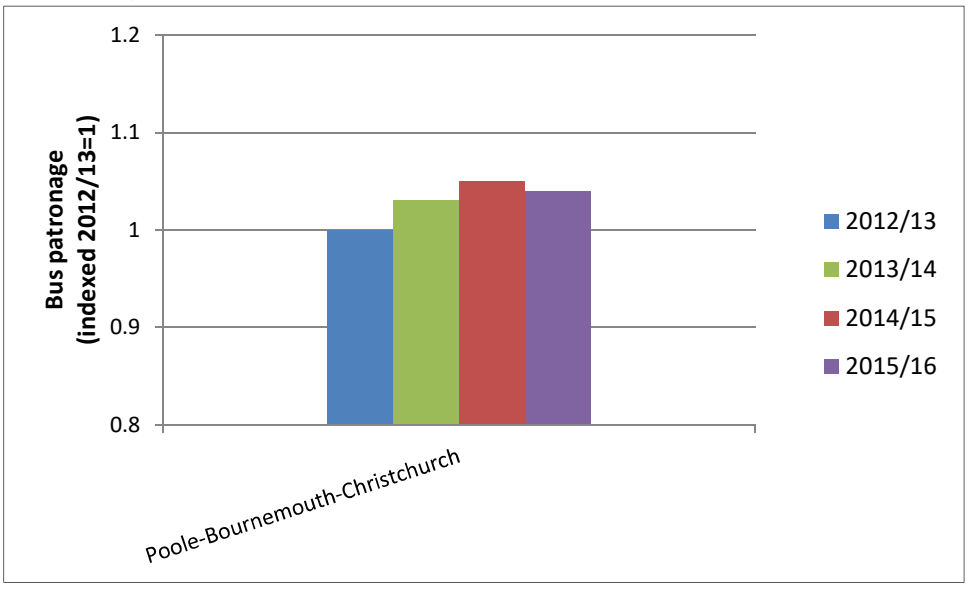


Table 6.6: Bournemouth bus patronage changes for the intervention corridor (indexed 2012/13=1)

Indexed 2012/13	**Intervention Corridor**	**All Bournemouth + all Poole**
2012/13	1.00	1.00
2013/14	1.03	1.02
2014/15	1.05	1.06
2015/16	1.04	not available

Bus patronage rose in the intervention corridor, but the LSTF interventions on the corridor have not yet led to patronage increase above the area-wide background increase. The rise is comparable to that across the whole of Bournemouth and Poole local authorities. However, the local authority note that lengthy roadworks to put the LSTF initiatives in place significantly affected the reliability of some of the services along the corridor in 2015. It is of the view that the figures to date do not give a true reflection of the potential impact, and that the benefits of the schemes will only be fully felt in future years.

CENTRO provided patronage data for its ten main intervention corridors, indexed to a 2012/13 baseline (Figure 6.7, source data in Table 6.7).

Figure 6.7: CENTRO bus patronage changes for each intervention corridor (indexed 2012/13=1)

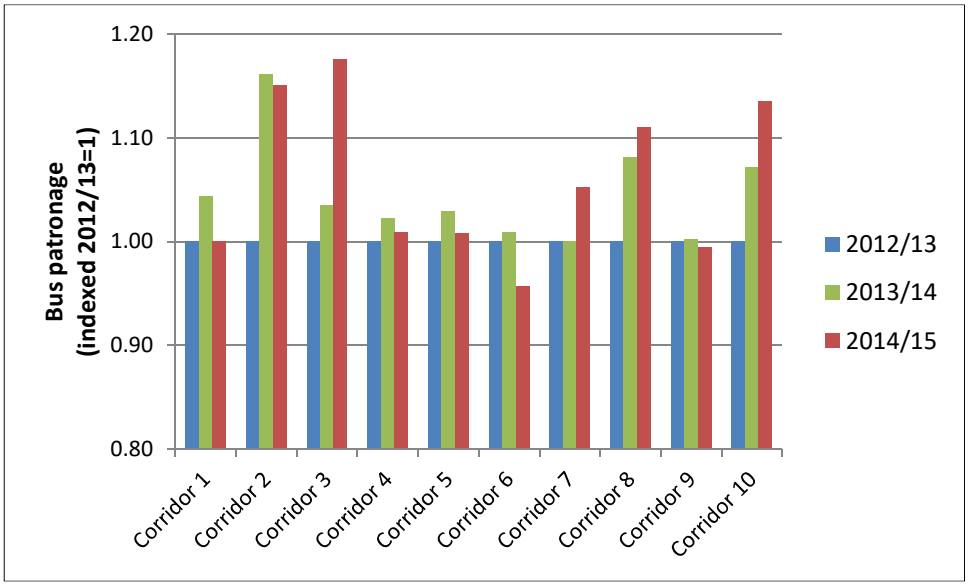


Table 6.7: CENTRO bus patronage changes by intervention corridor (indexed 2012/13=1)

Indexed 2012/13	**Cor. 1**	**Cor. 2**	**Cor. 3**	**Cor. 4**	**Cor. 5**	**Cor. 6**	**Cor. 7**	**Cor. 8**	**Cor. 9**	**Cor. 10**	**All corridors**	**All CENTRO**
2012/13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2013/14	1.04	1.16	1.04	1.02	1.03	1.01	1.00	1.08	1.00	1.07	1.03	1.01
2014/15	1.00	1.15	1.18	1.01	1.01	0.96	1.05	1.11	1.00	1.14	1.02	1.00

The corridors' combined total patronage and the CENTRO area as a whole showed a rise to 2013/14, then falling back in 2014/15, tending to indicate the influence of some shared exogenous factor unrelated to the LSTF. However, the corridors' combined patronage has outperformed that for the whole CENTRO area. This difference in performance may or may not be related to the LSTF programme.

In detail the picture varies across the corridors, with five showing noticeable rises, one showing a noticeable fall and the remainder showing little change. The sudden increase on corridor 3 is known

to be due to maintenance works on the parallel Metro service in 2014/15, rather than due to LSTF. The rise on corridor 7 appears to be related to the bus operator increasing services from three to four buses per hour late in 2013, a commercial decision that may have been influenced by LSTF improvements, but is not known to have resulted from them. CENTRO considers that the rises on corridors 8 and 10 may be related to LSTF residential PTP activity, but it is not clear that PTP should be regarded as a determining influence here as compared with corridors 1, 2, 5 and 6, which also received PTP but show widely varying trends of bus patronage. CENTRO pick out corridor 2 as a high frequency bus route which received significant bus priority measures. However the correlation with the sudden patronage rise in 2013/14 is not clear-cut: out of 12 locations, half did receive improvements in the latter part of the previous financial year; but four more received improvements during 2013/14 itself; and two received improvements during 2014/15.

Solent grouped its nine corridors into three geographical groups for the purposes of bus patronage analysis, corresponding to West Southampton, East Southampton, and Portsmouth-Gosport areas. The picture that emerges (Figure 6.8, source data in Table 6.8) reveals no consistent evidence of an influence from LSTF intervention, with three different trends in the three different corridors: falling, rising and approximately stable. Total patronage aggregated across all nine corridors shows little net change relative to the project's chosen baseline year of 2012/13, and is proportionately less than the rise of 10% recorded during the same period for all bus routes in Southampton and Portsmouth.

Figure 6.8: Solent bus patronage changes by groups of intervention corridors (indexed 2012/13=1)

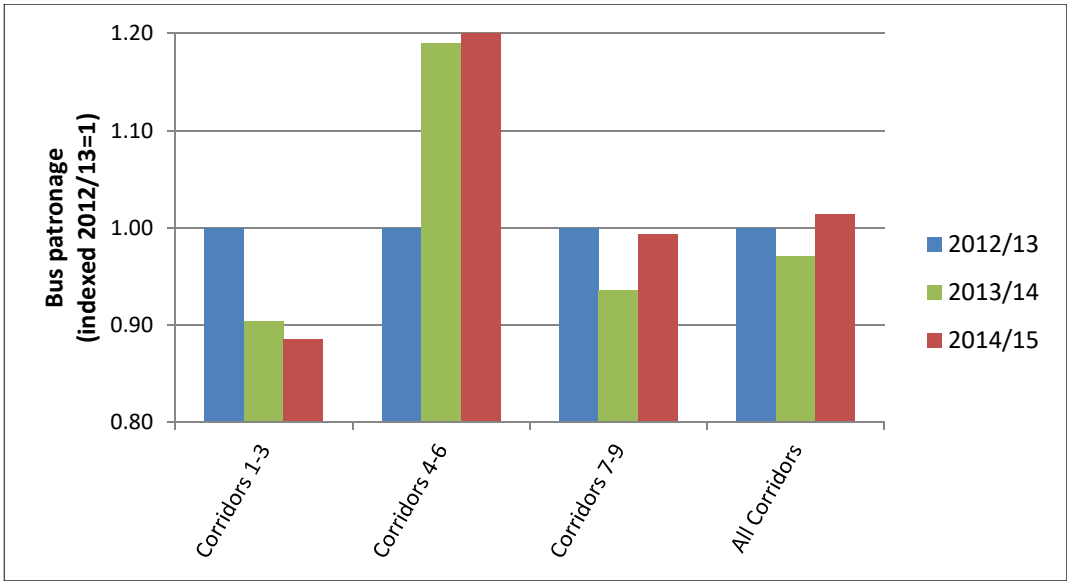


Table 6.8: Solent bus patronage changes by groups of intervention corridors (indexed 2012/13=1)

Indexed 2012/13	**Corridors 1-3**	**Corridors 4-6**	**Corridors 7-9**	**All Corridors**
2012/13	1.00	1.00	1.00	1.00
2013/14	0.90	1.19	0.94	0.97
2014/15	0.89	1.31	0.99	1.01

A corridor-level analysis of bus data is not possible for all projects that took a corridor approach to their interventions:

- **BDRS:** 'Corridors' are rather broad areas. Bus data is not presented at this level.
- **WEST:** Corridor-based approach, but data is not presented at this level.

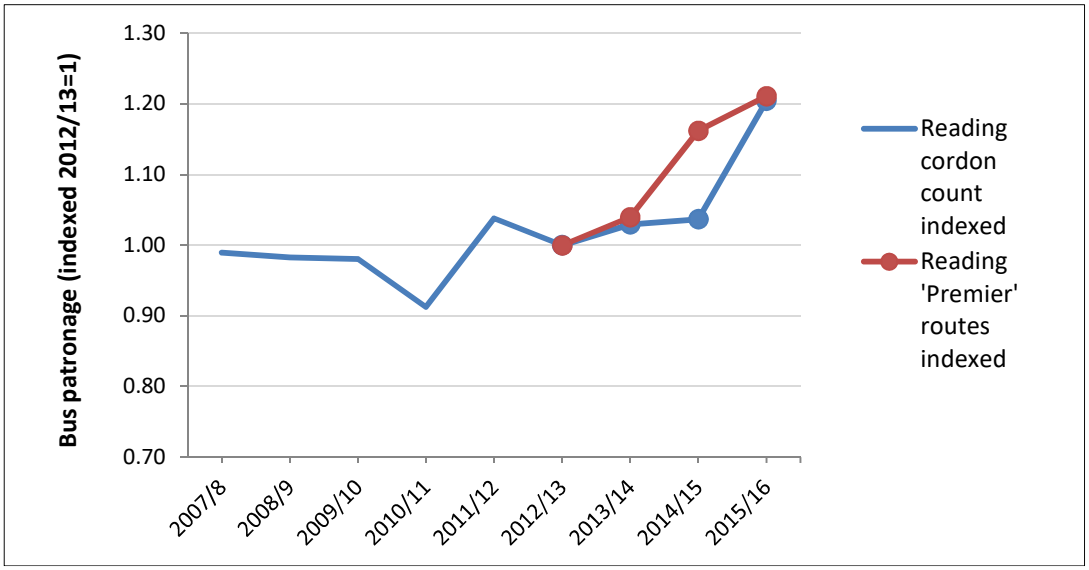
Three further Large Projects collected data with potential to show patronage trend changes at a sub-regional level.

Merseyside collected data for bus routes that were part of its Quality Bus Partnership. This data is not based on ticket numbers but comprises 'modelled figures based on weighted results from Merseytravel reimbursement surveys and route scheduled mileage'. Even so, data is only provided in an indexed form for reasons of commercial confidentiality. Just three years are presented, so it is not possible to say whether there is a deviation from the long-term trend on this set of routes. However, it can be seen that patronage on these routes (which account for 30% of patronage on commercial bus routes in Merseyside) has risen faster than that across Merseyside as a whole. The Quality Bus Partnership routes saw an increase in patronage of 9% over the two years from 2012/13 to 2014/15, whereas area-wide patronage rose just 0.4% in the same period. The Outcomes Reports indicate that personal travel planning was anticipated to have an impact on the Quality Bus Partnership routes. However, these routes have also been beneficiaries of Better Bus Area funding during the same period, so it is not possible to say how much of the rise might be attributable to LSTF interventions.

Reading runs an annual 12-hour count of bus use within a town-centre cordon, choosing a 'neutral week day' in May. A second measure of part of the network is provided by patronage data for Reading's network of 'Premier' bus routes, which account for about 60% of total bus patronage in Reading. In practice both these measures are likely to be closely related[38].

The data[39] plotted in Figure 6.9 (source data tabulated in Table 6.9) corroborate the patronage rise shown by the Reading-wide patronage data, but there is no evidence to relate these restricted patronage measurements more directly to LSTF interventions than the area-wide patronage data.

Figure 6.9: Reading town centre cordon count and Premier bus network patronage



Filled circles show years when Reading Large Project was receiving LSTF funding

38 For example, the town centre boardings and alightings count for a 12 hour weekday in 2013/14 was 50,061, for which year the average weekday patronage on 'Premier' routes was 39,240.

39 Some caution is required in interpreting the last year of cordon count data since Reading note that there was a methodological change in 2015, to count boardings and alightings using electronic ticket machine data rather than from manual observation as per previous years. The sudden 16% rise in the cordon count rise between 2014/15 and 2015/16 compared with the 4% rise on the 'Premier' route network may tend to indicate the new data collection methodology was more thorough than the previous years' data collection.

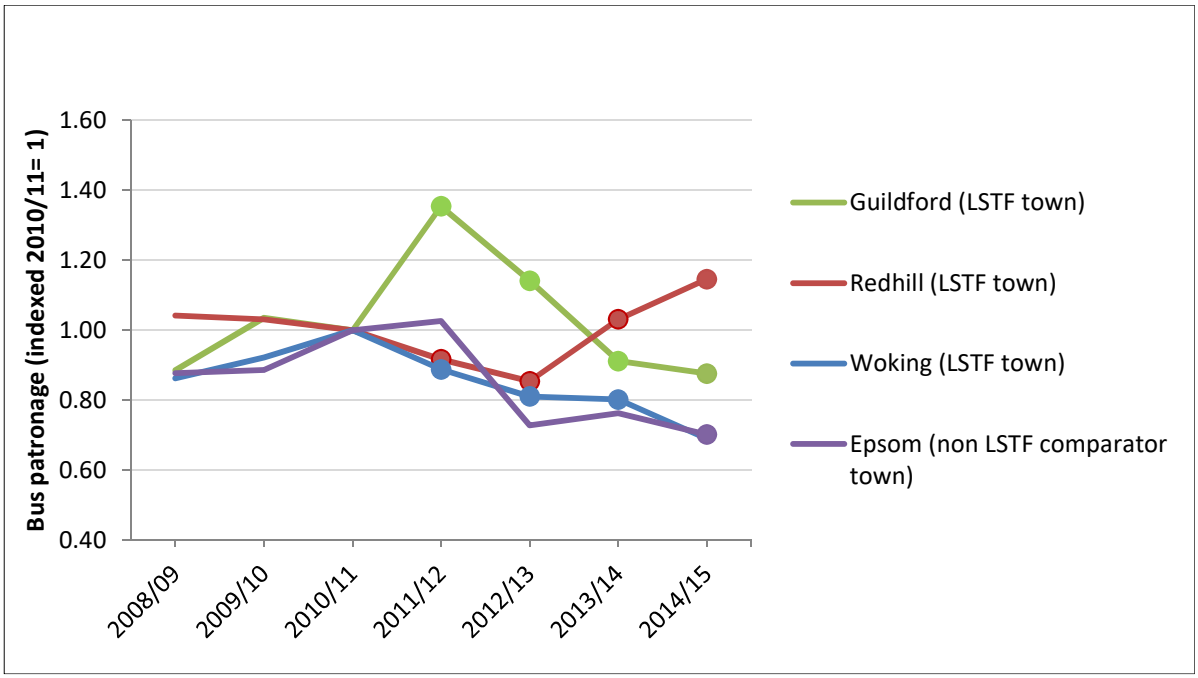
Table 6.9: Reading town centre bus boardings / alightings and Premier bus route patronage

	2007 /8	2008 /9	2009 /10	2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16
Count (1 day)	48,114	47,785	47,679	44,361	50,474	48,630	50,061	50,411	58,567
Indexed 2012/13	0.99	0.98	0.98	0.91	1.04	1.00	1.03	1.04	1.20
Premier routes patronage (m/yr)						9.8	10.2	11.4	11.9
Indexed 2012/13						1.00	1.04	1.16	1.21

Grey-shaded cells indicate years when Reading Large Project was receiving LSTF funding

Surrey collected bus patronage data for the three Large Project towns (Guildford, Redhill and Woking) and a comparator town (Epsom) that was not the subject of LSTF improvements. These data are tabulated in Table 6.10 and the trends are plotted in Figure 6.10. Although the data cover a consistent set of route numbers, the data are suspected to be problematic in several respects: bus route numbers and bus routes changed during the period in question; changes in bus operators are known to have resulted in large patronage changes; passenger numbers were recorded through a manual process susceptible to variable levels of bus driver diligence and the recording method changed in April 2014. The variability within the Guildford time series data tends to confirm these questions regarding the data collection methodology. The variations due to these non-LSTF factors appear likely to be much larger than the scale of any patronage changes that would be expected to result from LSTF. Thus, although the indexed patronage trend in the comparator town can be seen to be running below the LSTF towns (taken together), it is not possible to draw firm conclusions from this dataset about the effects of the LSTF programme.

Figure 6.10: Annual bus patronage in Surrey LSTF towns compared with a non-LSTF comparator town



Filled circles show years when Surrey was receiving LSTF funding for activities in Guildford, Redhill and Woking.

Table 6.10: Annual bus patronage in Surrey Large Project towns compared with a non-LSTF comparator town

indexed to 2010/11	**2008/9**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Guildford (LSTF town)	0.88	1.04	1.00	1.35	1.14	0.91	0.88
Redhill (LSTF town)	1.04	1.03	1.00	0.92	0.85	1.03	1.15
Woking (LSTF town)	0.86	0.92	1.00	0.89	0.81	0.80	0.69
All LSTF towns	0.95	1.01	1.00	1.06	0.93	0.94	0.96
Epsom (no LSTF)	0.88	0.89	1.00	1.03	0.73	0.76	0.70

Grey-shaded cells indicate years when the towns indicated were beneficiaries of LSTF funding

Telford reported bus passenger numbers at individual bus stations in the local authority. The data are tabulated in Table 6.11 and plotted in Figures 6.11 and 6.12, with bus patronage for the whole local authority area as a comparator. It would not be expected that Telford's LSTF activities, largely focused on remodelling its town centre Box Road, would have contributed to significant change in bus use, and the data tends to confirm this. On an indexed basis Telford town centre bus station, which arguably would be the most relevant to project activities, shows almost no difference in trend to the bus stations in the council's two other town centres (Wellington and Oakengates), and shows a similar overall decline to that across the whole Telford and Wrekin local authority area. The project attributes the decline in bus patronage to a 62% cut in budgets for local bus services since 2010/11. Bus trips to and from Telford railway station have bucked the declining trend, but the project attributes this to increases in rail patronage rather than activities related to LSTF. Although no change in bus patronage at Telford town centre is as yet attributable to the Box Road remodelling, the LSTF activity may contribute to future rises in bus use, since the improvements to date are the basis for rebuilding the bus station in 2017 in ways that the project anticipates may encourage more people to travel to the town centre by bus.

Figure 6.11: Telford bus passenger numbers

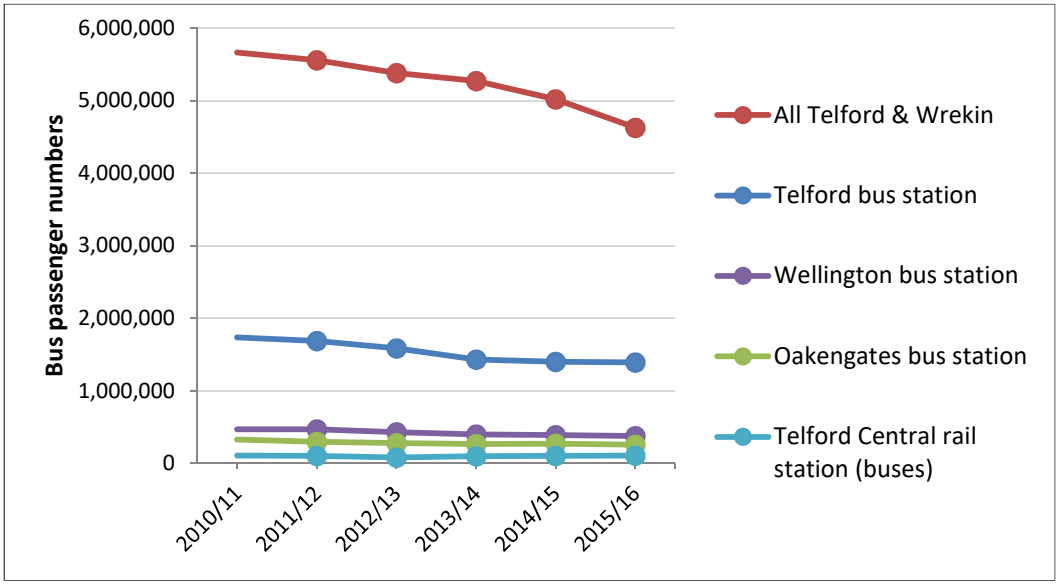
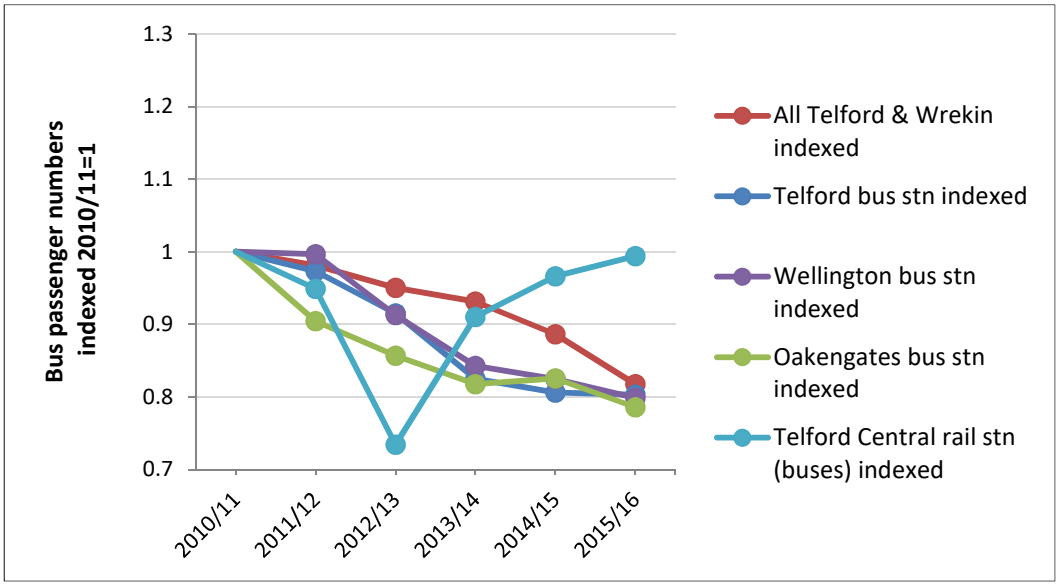


Figure 6.12: Telford bus passenger numbers indexed to 2010/11



Filled circles show years when Telford Large Project was receiving LSTF funding

Table 6.11: Telford bus passenger numbers

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
All Telford & Wrekin	5,659,361	5,553,786	5,377,623	5,271,013	5,016,353	4,626,641
indexed to 2010/11	1	0.98	0.95	0.93	0.88	0.81
Telford bus station	1,734,312	1,688,155	1,587,163	1,431,142	1,398,281	1,392,802
indexed to 2010/11	1	0.97	0.92	0.83	0.81	0.80
Wellington bus station	470,586	469,101	429,551	396,574	388,037	375,879
indexed to 2010/11	1	1.00	0.91	0.84	0.82	0.80
Oakengates bus station	328,554	297,214	281,507	268,573	271,236	258,141
indexed to 2010/11	1	0.90	0.86	0.82	0.83	0.79
Telford rail stn (buses)	107,614	102,132	78,989	97,952	103,985	106,986
indexed to 2010/11	1	0.95	0.73	0.91	0.97	0.99

* Telford and Wrekin local authority area. Grey cells are years Telford Large Project was receiving LSTF funding.

6.5 Route-specific bus patronage data for new or improved routes

A number of Large Projects used LSTF funding to create new bus services, to enhance service levels on existing routes, or to extend existing routes to serve new areas. These types of changes are the most likely to show quick, clear effects on patronage and offer the greatest potential for definite attribution to LSTF interventions.

Nine Large Projects provided data for new or improved routes that can be analysed to assess the relationship between patronage uplift and LSTF interventions. The data covers 28 sets of bus routes.

Patronage increase can most easily be attributed to LSTF activity for interventions that created completely new routes. These routes would not have existed without LSTF funding so all the new patronage can be attributed to the intervention with confidence (adjustment would be required for a new route that has caused significant abstraction from pre-existing parallel routes, but this does not appear to be the case for any of the LSTF-supported routes).

Assessment of patronage increase on bus routes where a previously existing service was upgraded is less straightforward, requiring information to assess the amount of patronage uplift and the degree

to which any uplift may be attributed to the LSTF intervention[40]. To estimate change above a 'do-nothing' situation it is necessary to obtain time-series data that shows the pre-existing trend on the route in question. If the pre-intervention trend is rising, patronage uplift can only be attributed to LSTF with confidence if it is significantly above the projected continuation of the pre-existing rising trend. It is also desirable to consider the trend on a comparator bus route or a set of comparator routes, and use of a comparator may be essential to confidently attribute changes to the LSTF intervention in cases where deviations from the previous trend are small.

Provision of these datasets and the necessary accompanying information is incomplete, but the extent of the route-specific uplift is so large and rapid in most cases that it is still possible to confidently associate the change with the LSTF intervention.

Table 6.12 lists bus routes that benefited from LSTF-funded enhancements to service levels. For each route the notes column indicates whether there was a subsequent patronage increase, whether that increase can be attributed to the intervention (with a summary of reasons), and whether the route is due to continue in future. For routes where operators insisted on commercial confidentiality, a percentage increase is shown, rather than an absolute value. The absolute patronage increases are known in these cases, and have been used in the meta-calculation that follows to estimate the total annual patronage uplift, car mileage and carbon savings likely to result in future years from the set of services that are anticipated to continue.

Some further bus routes in Hertfordshire (318, 622, S1/2/3, 46) appear to have received some service improvements but are excluded because no results were reported in Outcomes Reports and patronage data has not been obtainable subsequently.[41]

Table 6.12: Patronage uplift for routes for which LSTF funding has improved service levels

Project / Route	Annual uplift	Notes on attribution of patronage uplift to LSTF activity
BDRS		
ASOS Jobconnector	210,000	Attributable: service would not exist without LSTF. Running on a commercial basis since 01.04.2015.
A1 Jobconnector	135,000	Not attributable: funding was for a minor upgrade from Feb 2014 that could not have caused the patronage rise in 2013/14. This patronage rise precipitated wider changes in the commercial services covering the area from the following year, superseding the A1 Jobconnector.
S74 Jobconnector	2,400	Attributable: no service previously, but discontinued as unviable.
X19 Jobconnector	170,462	Attributable: patronage shows a clear sharp upward deviation from a previously flat trend when the service frequency was doubled. Commercially viable at the new service frequency.
X20 Jobconnector	193,426	Attributable: new service, but not on course to be commercially viable and likely to be discontinued in future.
Hertfordshire		
ML1/2	53,131	Attributable: new services (to Maylands business park). Commercially viable as a modified ML1 service, operated by Arriva since 29.03.2016.

40 i.e. the date of the intervention, the nature of the intervention, other unrelated changes to the service or its conditions of operation.

41 From dialogue with Hertfordshire it appears LSTF-funded service upgrades to 622 and S1/2/3 have been discontinued as unviable. The 318 service enhancements are partly continuing on a commercial basis (some of the extensions to Hemel Hempstead continue, Sunday services continue, but the evening service has been stopped).

Project / Route	Annual uplift	Notes on attribution of patronage uplift to LSTF activity
Watford route 10	38%	Attributable: patronage also rose in the year prior to the upgrade but only by 1%. Absolute figures commercially sensitive. Commercially viable at the new 10 minute service level.
Merseyside		
265	12,716	Attributable: a new service (to extend hours of the 265 Halewood to Whiston Hospital link). Ceased 31.03.2015 having not reached commercial viability as intended and not meeting criteria for local support to bus services.
249	8,099	Attributable: a new service (to Knowsley Leisure Park). Ceased 31.03.2015 having not reached commercial viability as intended and not meeting criteria for local support to bus services.
111	14,962	Attributable: a new service*. Ceased 31.03.2015 having not reached commercial viability as intended and not meeting criteria for local support to bus services.
Nottingham		
L2/L22/L23	Too early to assess	Attributable (although also supported by Green Bus Fund, Nottingham Workplace Parking Levy, Embankment Primary Care Centre): no upturn when route extended to new health centre in Sept 2014, but upturn from previously level patronage after Saturday services doubled and route enhanced to serve a shopping centre in Sept 2015.
L33	22,818	Attributable: a new service (although also supported by Green Bus Fund and Nottingham Workplace Parking Levy). Not commercial but supported on an ongoing basis as socially necessary.
L64	38,974	Attributable: a new service (although also supported by Green Bus Fund and Nottingham Workplace Parking Levy). Not commercial but supported on an ongoing basis as socially necessary.
Medilink	149,341	Attributable: no improvement to service levels was made by LSTF, but provision of new vehicles and a promotional campaign (also supported by Green Bus Fund and Nottingham Workplace Parking Levy) were followed by a sharp uptick from a previously flat patronage trend. Not commercial but continuing with support as socially necessary.
Reading		
Mereoak P&R	60,000	Attributable: new facility. Uplift figure reduced in line with local survey data showing the proportion that switched from other pre-existing P&R sites. Only open since Aug 2015 but level of use to date indicates service is likely to continue in operation.
Winnersh P&R	130,000	Attributable: new facility. Uplift figure reduced in line with local survey data showing proportion that switched from other pre-existing P&R sites. Only open since Oct 2015 but level of use indicates service likely to continue in operation.
Surrey		
Onslow P&R	70,000	Attributable: new facility. Uplift figure reduced in line with local survey data showing proportion that switched from other pre-existing P&R sites. On course to become self-sustaining. Patronage already sufficient to justify ongoing support as required.
Telford		
Gorge Connect	3,118	Attributable: new service. Annual patronage shown is an extrapolated figure representing the level that is anticipated to be sustained in future after funding reductions reduce the service to summer weekends only.

Project / Route	Annual uplift	Notes on attribution of patronage uplift to LSTF activity
Ironbridge P&R	5,154	Attributable: new facility. Annual patronage shown is an extrapolated figure representing the level that is anticipated to be sustained in future after funding reductions reduce the service to summer weekends only.
TfGM		
Local Link	25,308	Attributable: only annual averages pre- and post-intervention were provided but these show very substantial uplift, 39%. Combined total for four upgraded demand-responsive services. Annual uplift calculated from figures for average monthly patronage. Passenger numbers are not commercially viable, as expected for services of this nature. The local commitment to funding is continuing, subject to periodic review.
WEST		
X18	35,171	Attributable: new service (peak-hours-only peak-direction-only commuter service Kingswood to Aztec West). Support continued until August 2016 in anticipation it would become commercially viable.
C1-8	11,428	Attributable: new services (peak-hours-only peak-direction-only commuter services Weston to Bristol North Fringe). Anticipated to be commercially viable.
X1 upgrade	51%	Attributable: marked departure from previous patronage trend at point of service upgrade (from two to three buses per hour). A service with more stops (W1) was subsequently added and has been included in the data. Uplift calculated** relative to area-wide bus patronage as a comparator. Absolute figures commercially sensitive. Commercially viable.
X2/3 upgrades	53%	Attributable: marked departure from previous patronage trend at point of service upgrade (from two to four buses per hour). Uplift calculated** relative to area-wide bus patronage as a comparator. Absolute figures commercially sensitive. Commercially viable.
UWE 19	‡	Attributable: new service. The service is now running on a commercial basis.
UWE 13/13a (X74)	‡	Attributable: extension to existing route, with additional patronage on the extension reported separately. This part of the route subsequently split off and now operating commercially as the X74. Annual patronage uplift estimated from comparison of first seven months of X74 service level against patronage for previous year at the former service level.
Route 379	‡	Attributable: marked departure from previous patronage trend at point of service upgrade (from peak-only to hourly, with later route alterations). Anticipated to be commercially viable.
Bristol airport A2	‡	Attributable: new service. Annual patronage estimated from first eleven weeks of new timetable. Now running to a commercial schedule.

* Funding was initially provided to extend service times for the Jaguar plant bus service but the resulting take-up was too low to justify continuation, so funding was subsequently switched to route 111.

** Some of the data used draws on information provided to the meta-analysis research team for other research for DfT (Sloman et al. 2015 *Finding the Optimum: revenue / capital investment balance for sustainable travel*).

‡ For all these services uplift was substantial. Commercial sensitivities with the ongoing services prevent use of absolute figures, and since there were not closely equivalent preceding services, percentage uplift figures cannot be given either.

The following analysis uses the patronage uplift on the routes above to arrive at an estimate of ongoing carbon savings. The focus on carbon savings here should not, however, be taken to represent the only value created by the LSTF investment in these routes. Many of the routes were supported with the primary aim of enabling people to get to education, training or work, rather than achieving modal shift. Services tightly-targeted for employment purposes, such as TfGM's demand-responsive Local Link services, where 47% of users surveyed said they could not work where they do without the services, may generate relatively modest numbers of bus journeys, but should not be judged solely by the numbers of car journeys avoided. From a mode-shift perspective, some of the fully commercial services that were kick-boosted to even higher levels are the most significant, although commercial sensitivity prevents reporting in Table 6.12 of the absolute patronage numbers that would show this.

Table 6.12 indicates whether a service is due to be continued, either as a commercially viable service, or under another funding programme. The following calculations aim to estimate the annual car mileage and emissions reductions that will continue in future, and therefore only include the 19 services where operation was anticipated to continue after LSTF funding ended. Nearly 90% of the calculated car mileage savings and carbon savings result from routes that appeared fully commercial at the new level to which the LSTF funding had boosted the service. It is therefore reasonable to assume that the majority of the carbon and mode shift benefits from the LSTF interventions calculated below will continue indefinitely.

Estimation of mileage and emissions (carbon) benefits requires knowledge of journey lengths and the proportion of the LSTF-attributed patronage uplift that previously made the trip as car driver. Survey data indicating diversion rates from driving were collected for eight of the routes, and three of these surveys also indicate trip distances. For some of the commuter express routes and park and ride services the diversion rates are high (for example 64% and 68% of new peak-time passengers on the X1 and X2/3 previously drove to work by car[42], 45% of Onslow Park and Ride users previously drove to the town centre). For services designed to link specific residential areas with employment sites and for park and ride services the average trip lengths have been assumed to approximate to the distance between the key destinations. For services where one or both of these factors are unknown, the journey length is taken to be the average non-London local bus trip length, as reported by the National Travel Survey[43], and the diversion rate is taken as the average proportion of new bus users that used to travel by car as assessed by academic and professional studies (Mackie et al. 2002 and TAS 2002 found, respectively, that 32% and 33%[44] of new bus users had previously travelled by car). The ASOS Jobconnector service was a special case in that, although survey data was lacking, BDRS was able to supply information on the recruitment catchment and the history of recruitment, which in conjunction with consideration of the very isolated location of the site made it

42 Survey data for X1 and X2/3 is not from Outcome Reports or Outputs Surveys but draws on data provided for other research for DfT (Sloman et al. 2015 *Finding the Optimum: revenue / capital investment balance for sustainable travel*).

43 7.6km, National Travel Survey 2013 Tables NTS 0308/0309.

44 These figures equate to a 28% car driver diversion rate taking average car occupancy as 1.18 (National Travel Survey 2013 Table NTS0906) for commuter trips, which is appropriate because all the bus routes in question are primarily aimed at a commuter market. Mackie et al. (2002) *Achieving best value for public support of the bus industry Part 1: Summary report on the modelling and assessment of seven corridors*, in Commission for Integrated Transport / LEK (2002) Obtaining best value for public subsidy for the bus industry and TAS Partnership (2002) *Monitoring quality bus partnerships volume 1: the evidence*, quoted in Sloman (2003) *Less traffic where people live*.

clear that it was reasonable to assume a similarly high diversion factor from driving to the WEST X1/2/3 routes.

The resulting estimates of car mileage and emissions savings are shown in Table 6.13. These figures should be considered indicative rather than precise.

Table 6.13: Indicative estimates of car mileage and carbon savings due to improvements in service levels on 21 bus routes*

Total ongoing patronage uplift (millions of trips per year)	**Total annual car travel replaced** (millions of car km per year)	**Total annual emissions CO_2e avoided** (tonnes CO_2e per year)
2.5	12.0	2,300

*Routes included are those that are expected to continue in future: ASOS; X19; 10; ML1; Mereoak P&R; Winnersh P&R; Onslow P&R; Ironbridge P&R; Gorge Connect; L33; L64; Medilink; TfGM Local Link; X18; C1-8; X1; X2/3; UWE 19; UWE 13/13a; 379; A2.

Route-specific patronage data has been collected for two other types of route-specific intervention: a programme of infrastructure improvements and a fare reduction scheme.

BDRS made changes to the highway and upgraded the bus stop to provide a significantly improved interchange with the tram for a commercially run bus service feeding into the tram (route SL2 to the Supertram terminus at Malin Bridge). However, the works (completed October 2014) took place in the middle of an extended period of disruption to the tram for track replacement which reduced patronage. Patronage appeared to be recovering towards the end of 2015/16, but it is too early to assess whether the works will eventually lead to an increase above the original level of patronage. BDRS also provided time-series patronage data for two corridors that had received significant bus priority measures, route 52 and Parkgate/Dearne services, both of which showed marked increases in patronage (although with the overall rise partly eroded in 2014/15). However, the 'hotspot' congestion improvements along these routes came late in the programme and do not appear to have as yet impacted on bus timetables in a way that could have led to the observed patronage uplift. It is therefore not reasonable to attribute the uplift to LSTF.

Reading ran a fare discount scheme funded by LSTF for bus routes 5, 6, 72 and 82. The main single fare was dropped from £1.80 to £1.40 and 'short hop' central fares were held at £1 instead of increasing to £1.20 as on other bus routes. The reduced fares were advertised at bus stops and through fliers dropped door-to-door. The trial ran for 54 weeks. For the Reading Buses routes involved the patronage increase was nearly 10% above the network-wide average rise (3.5% in the same year). This was not sufficient to fully offset the price reduction, resulting in a 4% net loss of revenue on the urban services (more on the rural services). However, this increase in patronage was sufficient for Reading Buses to decide at the end of the trial that the ticket price should rise only to £1.50, rather than reverting to the previous level. At this time prices of other routes rose to £1.90, so the net effect of the trial appears to be an ongoing price reduction of 17% compared with the pre-trial price level and 21% against the post-trial standard price level. Reading Buses has also decided that the increased patronage merits investment in additional vehicles to increase the service frequency on the routes.

6.6 Conclusions on outcomes related to bus patronage

It is not possible to assess how much of the observed area-wide patronage increases (or slowing of patronage decline) was due to LSTF funding. The overall picture is, however, positive.

There is statistically significant evidence that area-wide bus patronage in the Large Projects outperformed the comparator group of other local authorities outside London. This finding is strongly influenced by exceptional rises in patronage in Reading and WEST, and to a lesser degree in Bournemouth and Solent. Better Bus Area funding, as well as LSTF, could have contributed to these patronage rises in Bournemouth, Solent and WEST, as could pre-LSTF investment in bus infrastructure in WEST. Reading achieved this improvement without the aid of Better Bus Area funding, and also has a history of support for local bus operations, but its LSTF project was not particularly bus orientated.

Most of the other Large Projects track close to the comparator group, particularly when assessed in ***per capita*** terms. There are signs that some of the metropolitan areas have arrested or slowed the historic decline in bus use in their areas, although deviations above previous trends could be attributed to the effects of economic rebound as well as to LSTF.

Telford stands out as showing worse patronage decline than the comparator group, but did not implement measures aimed at increasing area-wide bus patronage, and suffered deep cuts to its subsidised bus network.

At the finer-grained level of individual bus routes, it ***is*** possible to attribute patronage changes to LSTF activities. In a number of cases, where new bus routes were initiated or existing routes were enhanced, patronage increase was sufficiently large and clear over a short period of time for the change to be confidently attributed to the LSTF intervention. Although some of the services will not be sustainable beyond the end of the LSTF funding period, there are many routes that have been successfully 'kick-started' to a commercial level, or 'kick-boosted' from an existing commercial operation to a more frequent service that attracted sufficient additional patronage during the period of LSTF support to continue commercially. Some of these commercial operations are frequent services involving large numbers of travellers, and most are routes that provide important links to work or education.

Table 6.14 summarises the findings related to bus patronage.

Table 6.14: Overview of outcomes related to bus patronage

Large Project	Over-view	Summary of change 2011/12 – 2014/15~	Attributable to LSTF?[+]
BDRS	🟥	**Area-wide patronage** Fall, close to the ***per capita*** comparator group	**-**
	🟩	**Finer-grained patronage** Clear rise on three commuter routes	**Y**
Bournemouth	🟩	**Area-wide patronage** Rise over LSTF period, better than ***per capita*** comparator	**Y/N[%]**
	🟩	**Finer-grained patronage** Rise on LSTF corridor, but not above area-wide trend	**Y/N[%]**
CENTRO	🟥	**Area-wide patronage** Overall fall, close to the ***per capita*** comparator group but above the CENTRO historic trend	**-**
	🟩	**Finer-grained patronage** Slight overall rise on LSTF corridors, sharper rises on some	**Y/N***
Hertfordshire	🟧	**Area-wide patronage** Little change (slight fall), but above ***per capita*** comparator	**-**
	🟩	**Finer-grained patronage** Clear rise on two routes	**Y**
Merseyside	🟧	**Area-wide patronage** Level, close to ***per capita*** comparator group^	**-**
	🟩	**Finer-grained patronage** Rise on three improved services and QBP routes	**Y/N[^^]**
Nottingham	🟧	**Area-wide patronage** Level, close to ***per capita*** comparator trend^	**-**
	🟩	**Finer-grained patronage** Rises on four Locallink bus services	**Y**
Reading	🟩	**Area-wide patronage** Strong rise, well above ***per capita*** comparator group	**Y/N[$]**
	🟩	**Finer-grained patronage** Two park and ride schemes	**Y**
Solent	🟩	**Area-wide patronage** Rise over LSTF period, better than ***per capita*** comparator	**Y/N****
	🟧	**Finer-grained patronage** Patronage on intervention corridors level overall	**-**
Surrey	🟧	**Area-wide patronage** Little change (slight rise), in line with ***per capita*** comparator	**N[++]**
	🟩	**Finer-grained patronage** One park and ride scheme	**Y**
Telford	☐	**Area-wide patronage** No activities likely to have significantly increased bus use	**-**
	🟩	**Finer-grained patronage** One park and ride scheme	**Y**
TfGM	🟥	**Area-wide patronage** Fall, but above ***per capita*** comparator group^	**-**
	🟩	**Finer-grained patronage** Clear rise on a set of four demand-responsive services	**Y**
WEST	🟩	**Area-wide patronage** Strong rise, well above ***per capita*** comparator group	**Y/N[#]**
	🟩	**Finer-grained patronage** Clear rise on eight commuter routes.	**Y**

Notes to Table 6.14

■ **decrease** in patronage; ■ **little change** in patronage (within 97%-103% of baseline); ■ **increase** in patronage; ■ **insufficient data** to assess patronage changes; ☐ **too few schemes completed** to be expected to affect patronage. 'Overview' only shows positive or negative change if activities relevant to bus use have taken place.

~ '**Summary of change' column:** Different Large Projects treat different time periods as 'baseline'. For area-wide trends, baseline year has been standardised as 2011/12 because the choice of different baseline years for different projects would become a major factor in whether patronage appears to have risen or fallen. Although data is available for a further year (2015/16) for some projects, to provide a standardised approach this Table only considers patronage data up until 2014/15. The dataset used to assess area-wide decline or uplift is that provided by the Large Projects, presented in Tables 6.3 and 6.4. Comments on performance relative to the comparator group are also standardised to 2014/15, based on the ***per capita*** patronage plotted for that year in Figure 6.4. For finer-grained patronage changes related to upgrades of specific bus services the choice of baseline date is determined by the start date of the relevant upgrade.

+ '**Attributable to LSTF?' column:** Even where a patronage rise cannot be attributed to LSTF interventions, these activities nevertheless may be responsible for some or all of the improvement, but there is insufficient evidence to establish a causal link. Where attribution is shown, this is on the basis of marked departures from previous trends at the time of the intervention, as discussed further in the main texts.

%**Bournemouth:** patronage data is available for the main bus services on the intervention corridor, showing patronage rise over the project period. However, as discussed in the main texts, the rise is not above area-wide rises, the data series is too short to assess whether there has been an upward deviation from longer term trends during the LSTF period, and the project feels the benefits of its bus priority measures are most likely to show in future when disruption from installing them has ceased.

***CENTRO:** some patronage rises are known to result from enhancements or changes unrelated to LSTF. See discussion in main text.

^ Merseyside, Nottingham and TfGM: These projects display the most notable discrepancy between patronage data reported by the local authorities (generally matching DfT Table BUS0109b) and data reported to DfT by bus operators (BUS0109a). For Merseyside the bus operator data presents a distinctly more negative trend, for Nottingham the bus operator data presents a marginally more negative trend, and for TfGM the bus operator data presents a distinctly more positive trend.

^^ Merseyside: patronage on Quality Bus Partnership routes in Merseyside is rising significantly and is rising much faster than area-wide bus use. LSTF may be a contributing factor, but definite attribution is not possible because the time series data covers too few years to assess whether recent rises on QBP routes are above the historic trend and because these routes are presently benefitting from Better Bus Area funding. Patronage on three improved services is clearly due to LSTF intervention but these have not attained sufficient patronage to continue in future.

$ **Reading:** as discussed in the main texts, whilst LSTF activity may be a contributor, the scale and intensity of LSTF interventions directed at buses does not seem likely to have caused area-wide bus patronage rises to the extent observed. Area-wide patronage has risen strongly, and, from comparison with historic data (not supplied by the project but sourced elsewhere) appears to be rising somewhat more rapidly than the past trend. For the town centre cordon data, a marked rise is only seen in the last year, for which the data collection methodology became more thorough.

** **Solent:** LSTF activity may be a contributor, but if this were the case it would be expected that the intervention corridors would show consistent patronage increases, and increases above the average, which they do not.

++**Surrey:** LSTF activity has not lifted patronage above the rising long-term trend or the rising regional trend. This does not mean LSTF activity has not contributed to maintaining the rising trend, as discussed in the main text. However, if LSTF activity in the intervention towns was a decisive influence, it would be expected that these towns would show greater increases in patronage, but no such influence is evident, albeit with questionable data quality.

WEST: LSTF activity may be a significant contributor, but other major investments in the Greater Bristol Bus Network and Better Bus Area funding are liable to be large influences, as discussed in the main text.

7 Active travel: cycling

Key points:

Analyses of the Active People Survey provide some evidence that the proportion of adults who had cycled in the past month increased slightly in the Large Projects between 2010-12 and 2013-15 (from 14.1% to 14.5%, p=0.04 for difference). By contrast, the proportion in the comparison group decreased somewhat over this same time period, so the change in the Large Projects was more favourable than the background trend (p=0.02 for difference between the Large Projects and the comparison group). There was no evidence that the amount of cycling done by cyclists changed in the Large Projects, either in absolute terms or relative to the background trend. This provides an indirect suggestion that any increase in cycling in the Large Projects may have been driven by widening participation in cycling, rather than encouraging existing cyclists to do more.

Five Large Projects had signs of an overall increase in cycle traffic which, together with growth in cycling following specific LSTF interventions, seems likely to be attributed to the LSTF interventions. A further four Large Projects had evidence of increased cycling as a result of LSTF interventions, but no clear signs of an overall increase in cycling. Four further projects had weak, limited, or no evidence on the impact of individual LSTF interventions and no conclusive information on overall levels of cycling attributable to the LSTF.

For ten Large Projects, there were examples of particular initiatives leading to an increase in cycling: there were five projects with direct measures of cycling increases on specific improved routes and seven projects provided evidence from participants reporting an increase in cycling as a result of an LSTF initiative.

Three of the highlights from the Large Projects are:

- Nottingham: over 87,000 people were estimated to have changed their behaviour in favour of cycling, generating 1.4m cycle trips with an average annual increase of 144km cycled per person.
- Reading: the Large Project estimated that an additional 2,300 cycle trips were generated every day.
- BDRS: 2,430 people registered for cycle leasing, of whom between 70% and 77% previously used a car for commuting, and between 65% and 71% committed to cycling to work at least once a week.

7.1 Overview of objectives and outputs targeting cycling

Seven Large Projects explicitly identified either cycling or active travel as one of the objectives of their project. These are summarised in Table 7.1. The remaining five Large Projects had objectives which indirectly related to cycling, such as encouraging more use of sustainable modes, reducing carbon emissions and providing a transport system which keeps people healthy; these have been identified as 'indirect' cycling objectives in Table 7.1.

In the period covered by the most recent Outcomes Reports, seven Large Projects had delivered many interventions and the remainder had delivered some interventions which might have an effect on metrics related to cycling in the medium-term (see Table 7.1; the extent of the schemes implemented is listed in Table 7.2). Many schemes aimed at encouraging cycling involve on-going delivery of services such as cycle leasing, cycle training and cycling support; the number of participants in such schemes is listed in Table 7.2.

Table 7.1: Summary of cycling objectives and interventions

	Cycling objective?	Summary of cycling-related objectives^	Schemes implemented?	Cycling schemes implemented
BDRS	Indirect	Facilitating and encouraging sustainable commuting, enabling employers to reach a wider pool of potential employees, helping businesses through reducing congestion and encouraging more reliable journey times	Many	Cycle routes; cycle parking. Cycle maintenance and training; cycle leasing; cycle hubs.
Bournemouth	Yes	Improve the quality, attractiveness and user perception of the low carbon travel choices and increase levels of active travel	Some	Several junction improvements; cycle lanes and new links; cycle parking spaces; secure cycle storage at one station. Cycle vouchers for job-seekers; workplace cycle challenge.
CENTRO	Yes	Increase residents' cycling for short trips and increase levels of active travel at secondary schools, further education and workplaces in LSTF corridors	Many	Cycle routes; cycle parking spaces. Cycle maintenance; cycle training; led cycle rides; cycle leasing; cycle hubs; awards for 'top cycling locations'.
Hertfordshire	Indirect	Reduce carbon emissions from transport	Some	Cycle routes; cycle crossings; cycle parking spaces. Cycle challenge, led rides, events.
Merseyside	Indirect	Increase the proportion of journeys made using sustainable modes, enhance access to employment and essential services and broaden travel horizons	Many	Infrastructure improvements to support active travel including routes and speed reduction at key points; cycle parking. Cycle maintenance and training; cycle hire.
Nottingham	Yes	Support active travel. Increase competitiveness through sustainable transport for work journeys. Reduce carbon emissions by making low carbon travel a realistic and attractive option	Many	2 cycle routes; 580km of 20 mph limits on all residential roads in 9 areas; secure cycle storage at 14 sites; campus cycle parking; 500 cycle hire bikes available from 28 depots; 359 cycles for loan at 2 universities. Cycle training at 7 centres and at 61 schools; workplace challenge; events; community hubs.
Reading	Indirect	Encourage more use of sustainable modes	Many	Improved and new cycle routes and cycle parking at schools, at the rail station and in the town centre; cycle hire scheme; 'try out' cycle loans. Cycling officer providing cycle maintenance, cycle training, led rides, events and challenges.
Solent	Yes	Improve levels of physical activity, health and well-being through increased active travel. Improve sustainable access to jobs and key facilities	Some	Limited cycle routes on key corridors and cycle parking at public transport interchanges. Active travel events; cycle maintenance and training; 'try out' cycle loans.

	Cycling objective?	Summary of cycling-related objectives^	Schemes implemented?	Cycling schemes implemented
Surrey	Indirect	Provide a transport system that keeps people healthy and provides for lower carbon transport choices	Some	Cycle routes; cycle parking. Cycle maintenance and cycle training.
Telford	Yes	Make cycling more attractive to improve health	Some	1 new cycle route, improving 1 cycle route and 1 shared link and creating town centre shared space; cycle hire; cycle loan; few cycle parking spaces. Small scale cycle training.
TfGM	Yes	Connecting people with jobs, focusing on local walk and cycle access. Support businesses by promoting low carbon commuting	Many	Cycle routes; secure cycle parking. Cycle training, cycle maintenance, bikes for job-seekers, cycle maps.
WEST	Yes	Increased physical activity and improved health through greater use of walking/ cycling for local journeys, increased use of sustainable modes after 'life transition' points	Many	Several infrastructure projects: 17km of routes and crossings in the area with automatic cycle counters (outside Bristol), 16km of routes in Bristol (where automatic cycle count data not available); cycle parking, cycle hire, cycle loans. Community Active Travel Officers running initiatives with numerous employers, schools and people in transition between life stages; cycle maintenance; cycle training; led rides; business emergency cycle repair kits; cycle cafe.

^ Objectives drawn from Interim and Final Outcomes Reports

Table 7.2: Cycling schemes implemented in the 12 Large Projects (by July 2015) [A]

	Number of cycle parking spaces introduced or upgraded	New / improved cycle routes (km) [B]	Number of adults taking up bike maintenance services or classes	Number of adults taking up adult cycle training
BDRS [C]	798	37	5,181	3,678
Bournemouth	208	12	152	20
CENTRO [D]	68	55	2,553	2,408
Hertfordshire	419	13	0	0
Merseyside	456	104	594	1,633
Nottingham [E]	1,642	7	6,443	3,300
Reading	256	35	705	38
Solent	180	7	4,330 [F]	236
Surrey	1,367	20	420	734
Telford	10	13	3	19 [G]
TfGM	2,575	94	2,150	4,530
WEST	2,323	40	3,423	706
TOTAL	**10,302**	**437**	**21,624**	**17,302**

Notes:
A: Data are taken from the 2015 Outputs Surveys submitted by Large Projects, unless otherwise stated
B: Of the total 437km of new or improved cycle routes, 65% were new and 35% were improvements such as re-signing or re-surfacing of existing routes. These proportions vary between the Large Projects.
C: Source: 2014/15 Outcomes Report, Executive Summary
D: Source: 2014/15 Outcomes Report, tables 4.1 and 5.1
E: Source: Impact Evaluation Report Table B and LSTF in numbers (adult cycle training)
F: Source: 2014 Outputs Survey; but lower cumulative figure of 3,729 reported in 2015 Outputs Survey
G: Source: 2014 Outputs Survey

7.2 Metrics used to monitor cycling

The key outcomes are overall changes in cycling identified in monitoring programmes and household surveys, and in surveys of the impacts of specific interventions.

The following Large Projects monitored cycling levels at key intervention sites:

- Bournemouth
- CENTRO
- Hertfordshire
- Merseyside
- Surrey
- TfGM
- WEST (began monitoring cycling at key intervention sites in 2014)

The following Large Projects monitored cycling levels more broadly, either across the area as a whole or by monitoring flows across cordons around city centres:

- BDRS
- Merseyside (in addition to data on the LSTF sites specifically, data on LSTF sites was merged with that from other sites across the area)
- Nottingham
- Reading
- Telford
- TfGM
- WEST

In addition, Telford and Solent reported results from the Active People Survey for the area, while WEST and Solent reported results from area-wide surveys of residents.

At a Project level, the most robust metric used in the Outcomes Reports to monitor changes in cycling was average daily cycle flows derived from automatic cycle counts at key points – either area-wide or targeted at areas with LSTF interventions. Automatic cycle count data were reported by nine Large Projects (BDRS, Bournemouth, CENTRO, Hertfordshire, Merseyside, Nottingham, Reading, Surrey and WEST), although three of these (BDRS, CENTRO and Reading) only reported recent count data. Moreover only four of the Large Projects had count data for a large enough number of sites to provide robust results (CENTRO, Merseyside, Nottingham and WEST)[45]. (Table 7.3, which summarises the data from automatic counts, indicates the number of sites for which continuous data are available over the monitoring period.) Results from automatic cycle counts are reported in Section 7.5.

Surrey used limited automatic counts to monitor cycling levels. Twice yearly automatic cycle counts were carried out over 12 hour periods on weekdays in May and September. These results are reported in Section 7.6.

Another metric was also used in Surrey: the number of cycles parked at stations. The cycle parking surveys were carried out four times per year initially and then reduced to twice each year from 2012 onwards. The figures were compared with one comparator town: Epsom. The cycle parking metric was also used in TfGM where one-day counts of parked cycles were carried out in Manchester city

45 Experience in the Cycling Demonstration Towns suggested that at least 15 automatic count sites are needed in a medium-sized town in order to obtain a reasonable picture of changes in cycling.

centre and at district centres. In Reading, cycle parking counts were used to monitor the use of a cycle hub. These results are reported in Section 7.6.

Seven Large Projects reported data from manual counts, carried out once or twice each year (BDRS, Bournemouth, CENTRO, Merseyside, Reading, Telford and TfGM) which tended to be focused on specific LSTF sites; in the case of Telford and TfGM these were the only source of count data. Manual counts are highly susceptible to fluctuations in cycling due to weather, seasonal variations and other factors which are not related to the LSTF interventions. Results of manual cycle counts are reported in Section 7.6.

Just two of the Large Projects identified 'control' sites for comparison of cycling levels derived from automatic cycle counts with the areas targeted with LSTF interventions: Bournemouth and Hertfordshire.

- In Bournemouth, there was just one control site, on the A3049. This corridor was selected to be the control corridor because few schemes were planned, but because there is only one cycle count site it probably does not provide a robust comparator with the LSTF corridor for cycling.
- In Hertfordshire there were five automatic count sites in towns outside the LSTF area.

The other metric used by several Large Projects at an area-wide level was the reported frequency of cycling derived from various household surveys, panel surveys and the Active People Survey. However unless household survey data is focused on the areas affected by LSTF interventions, the results are of limited value for evaluating LSTF outcomes. There were some examples of such surveys and the results can provide evidence of the impact of specific LSTF interventions, but are not sufficiently comparable for meta-analysis. These results are summarised in Section 7.6.

Evaluation of specific schemes through surveys of users and participants focusing on attitudes and reported travel behaviour (thus not relying on counting cycle traffic) was reported by all but one of the Large Projects (Surrey). In some cases these were short term results (e.g. three months after participating in a scheme) but others monitored for a year, and longer term monitoring was planned in many cases. These results are summarised in Section 7.7.

A few Large Projects also presented data on more targeted metrics such as levels of cycle hire and subscriptions to cycle hire schemes. None of these measures were suitable for meta-analysis but the key points are summarised in Section 7.7.

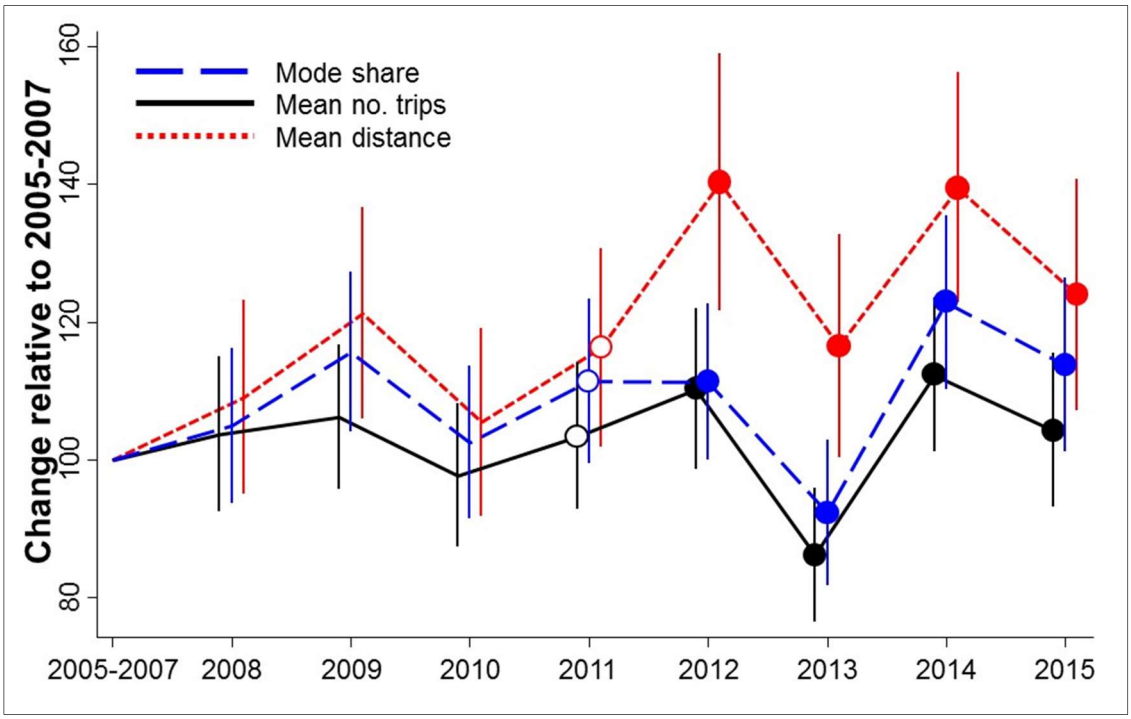
7.3 National trends in cycling

The National Travel Survey shows that the average weekly cycling distance by people living in urban areas of England (excluding London) has tended to increase in recent years, but with fluctuations in the overall trend since 2012 (Figure 7.1).

The Active People Survey provides a different measure of levels of cycling, capturing the number of days on which people cycled, for any purpose, in the past 28 days. The initial Survey waves asked about days containing a cycle trip 'of at least 30 minutes'; from 2010/11 onwards this question was modified to ask about the number of days with cycle trips of any duration[46].

46 This is probably a rather better measure of cycling levels, since many urban cycling trips cover distances that take less than 30 minutes to cycle.

Figure 7.1: Trends in cycling for transport – National Travel Survey



Data are for urban areas of England outside London. 2015 point estimates derived from data provided by the Department for Transport; 2015 confidence intervals are approximate, based on the assumption that uncertainty around the estimates in 2015 is the same as in 2014. Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

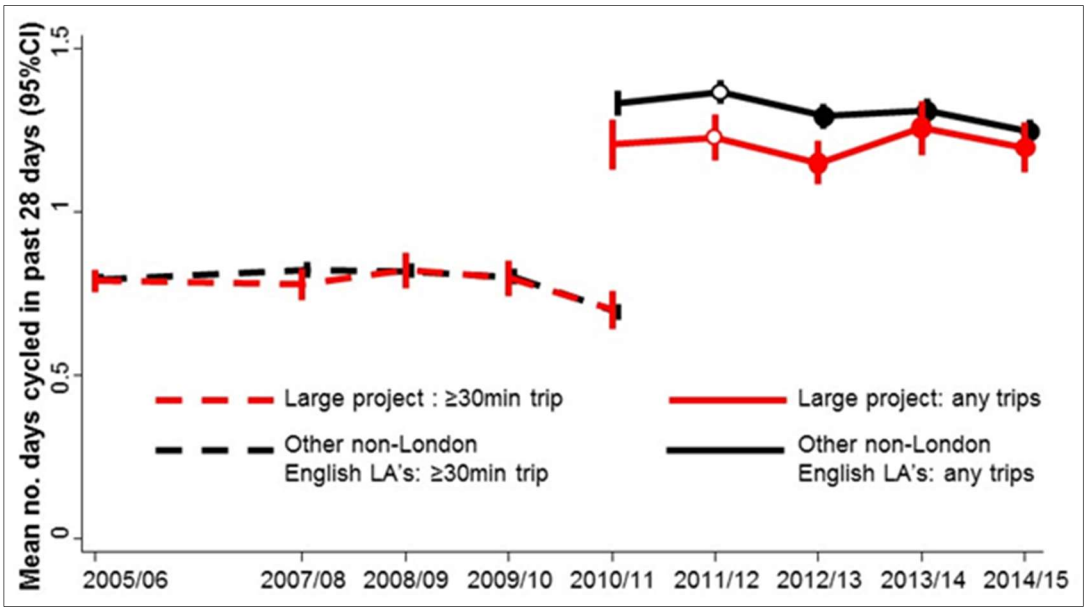
The Active People Survey does not show the same upward trend for cycling as the National Travel Survey[47] (Figure 7.2). Before the start of the LSTF programme, the average number of days with cycling trips of 30 minutes or more in the past 28 days changed very little from one year to the next between 2005/06 and 2009/10, and then fell slightly in 2010/11. This was the case both for the group of Large Project local authorities and also for the comparator group of other local authorities in England outside London.

From 2010/11 onwards, the mean number of days cycled continued to fall in the national sample, whereas in the Large Projects there was a modest increase. Statistical testing provided some evidence that the proportion of adults having cycled in the past 28 days increased slightly in the Large Projects from 14.1% in 2010-12 to 14.5% in 2013-15 (p=0.04), and that this change was significant relative to the modest decline from 16.0% to 15.4% in the comparator group (p=0.02 for

47 Note that one complication in using Active People Survey to compare groups of local authorities over time is variation in the sample size between local authorities between years. Specifically, although most local authorities have a sample size of around 500 per year, some local authorities have a considerably larger sample size in some years. For example, Liverpool (part of the Large Project group of local authorities) had a sample size of 2,505 in 2010/11, followed by a sample size of between 454 and 546 in the years 2011/12 to 2014/15. This could lead to changes in group averages over time simply because of changes in the geographical composition of the participants, without there having been any underlying behaviour change. We therefore calculated weights for each local authority in each year such that the population was weighted to have the equivalent of 500 participants (or 80 for the very small local authority of the Isles of Scilly), e.g. the weight for Liverpool in 2010/11 was 500/2505=0.20. We multiply this by the local authority-level weighting provided by the Active People Survey, which adjusts for differential response rates by demographic factors such as age and gender.

difference between the Large Projects and the comparator group).[48] By contrast, among participants who did any cycling, there was no evidence that the average number of days of cycling changed between 2010-12 and 2013-15 in the Large Projects (average 8.6 versus 8.5 days, p=0.48), or that it changed in the Large Projects relative to the comparator group (p=0.81). In other words, the proportion of the population who were 'cyclists' increased slightly in the Large Projects relative the comparator group, but there was no change in the amount of cycling done by cyclists.

Figure 7.2: Trends in the mean number of days on which cycle trips reported by adults – Active People Survey



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

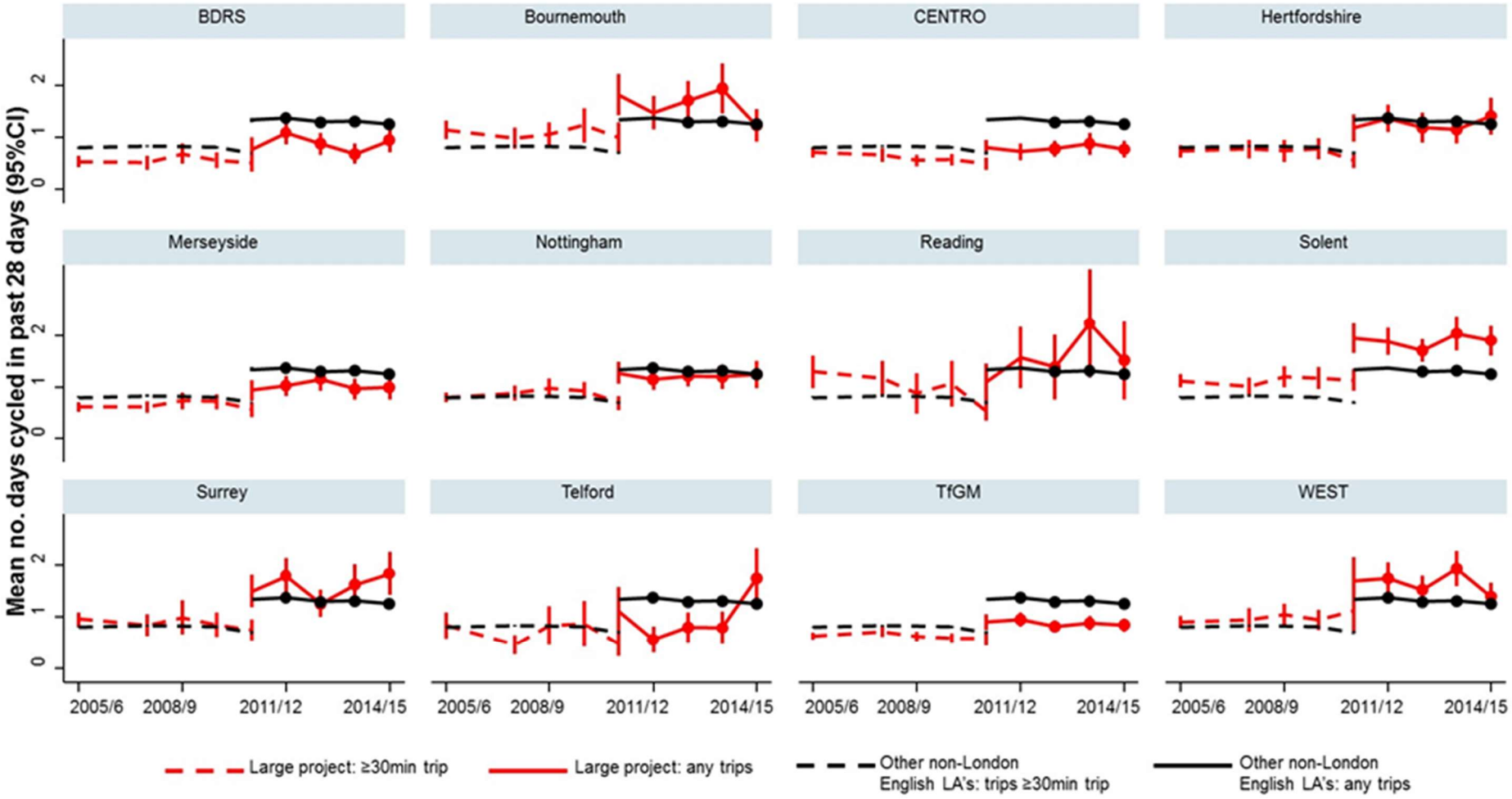
7.4 High-level outcomes of cycling interventions in the Large Projects

The trends in the mean number of days on which cycling trips were recorded by adults in the Active People Survey in each of the individual Large Projects are shown in Figure 7.3.

The trends were mixed across the Large Projects and the small sample sizes mean that it is difficult to draw any conclusions about individual Large Projects. Only in Telford was there any statistically significant evidence of a change, with weak evidence (p=0.03) of an increase in the proportion of adults who cycled in the past 28 days relative to the national comparison group. This finding should be treated with caution, however, in the context of multiple testing and given that this significant finding was driven by an unusually high level of cycling reported in Telford in 2014/15 (Figure 7.3).

48 P-values for difference between the Large Projects and the national comparison group come from tests for interaction between LSTF status (LSTF versus non-LSTF) and year (2013-15 versus 2010-12) in regression analyses adjusting for age and gender. We determined *a priori* to test for evidence of a change in cycling in two stages, first using logistic regression to examine changes in the proportion of adults doing any cycling, and second using linear regression to examine the number of cycling days among cyclists. We adopted this two-stage approach because for cycling (unlike walking) the number of days of cycling in the whole population is too skewed to be used as an outcome in linear regression because too many people give zero as an answer. We combined 2011/12 with 2010/11 to increase statistical power, given that the change in the survey question meant we could not draw data from 2009/10. To increase power, we likewise combined 2013/14 with 2014/15.

Figure 7.3: Trends in mean number of days on which cycling trips were reported by adult participants in the Active People Survey, 2005/06 – 2014/15, stratified by Large Project



Filled circles show years when Large Projects were receiving funding.

7.5 Project-level outcomes: automatic cycle counts

Data on levels of cycling from automatic cycle counters presented in the Outcomes Reports for six Large Projects[49] have been indexed to 2010/11 in Figure 7.4. The data on which these graphs are based are presented in Table 7.3; the footnotes to this Table state the basis of the data from each project.

Merseyside shows a gradual increase in cycling levels since 2008/9 and a more marked increase since the LSTF funding in 2011/12, but then levelling off by 2015/16. The change in cycling appears to have varied geographically. Across the Merseyside conurbation, automatic cycle count data showed a 13% increase between 2013 and 2015, while in Liverpool the increase over this period was 21%. Looking just at the LSTF-funded areas, manual counts show the increase was greater than for the conurbation as a whole (18% increase in manual peak hour counts at 13 LSTF sites over this period). However the data are presented at an aggregate level so it is not possible to assess whether the apparent difference between the uplift in the conurbation and the LSTF areas is significant.

In the case of Nottingham and WEST, there is some indication that there may have been an increase in cycling levels following the LSTF funding (2011/12 in both cases).

In Nottingham, the growth in cycling took place on the main cycling corridors in the city so cycling grew rather less in Greater Nottingham than in Nottingham itself; the growth took place in two separate periods, with only a small increase between 2015 and 2016. Nottingham City Council attribute the growth in cycling to a combination of factors which may include the LSTF, but also include the economic downturn, the large scale construction programme in the city and the increase in interest in cycling associated with the 2012 Olympic Games. However the evidence in Nottingham is not strong because data prior to 2010/11 was unavailable, so it is not clear whether cycling levels at the monitoring sites were already increasing prior to LSTF.

Data for WEST excluding Bristol[50] show a gradual increase in cycling levels over recent years, which was slightly greater after LSTF funding began in 2011/12 than before; a 23% growth in cycling in the authorities outside Bristol was recorded between 2010/11 and 2014/15 (equivalent data were not available for Bristol), compared with an 11% increase in the number of cyclists between 2008/09 and 2010/11.

Of these three Large Projects, Nottingham and WEST are identified in Table 7.1 as having direct cycling objectives and many schemes implemented while Merseyside had indirect cycling objectives but had also implemented many schemes.

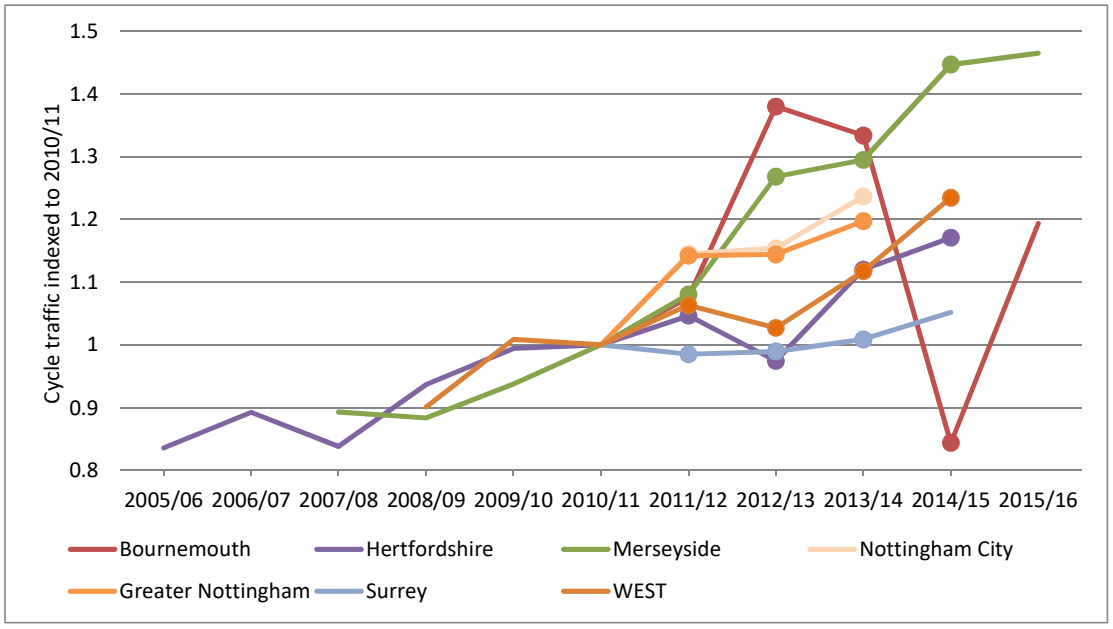
In the case of Bournemouth, there are indications of an overall growth in cycling between 2010/11 and 2012/13 but a decrease following the LSTF funding in 2012/13, and a partial recovery by 2015/16, although the evidence is weak due to the limited number of count sites and period of monitoring. However the level of decrease between 2012 and 2015 (14%) is less than at the one site on the comparator corridor (23%). Bournemouth is identified in Table 7.1 as having direct cycling objectives and having implemented some schemes.

49 For comparability, only the count sites for which data were presented for the entire time period covered are included.

50 The Outcomes Report for WEST notes that due to a breakdown in the management of the automatic cycle counters in Bristol, Bristol is excluded from the analysis of trends in levels of cycling in the WEST Large Project. Bristol City Council used the available data to estimate that a 9% increase in the number of cyclists counted has occurred since 2012/13.

One of the other Large Projects for which count data are available (Hertfordshire) shows gradual increases in cycling levels over recent years, and a greater increase since the LSTF funding began in 2011/12 than in the earlier years (average 20% increase between 2012 and 2015 for five sites with continuous data) although the increase is similar to that at a group of three control sites (21%). Hertfordshire plans to undertake analysis of travel survey data to provide a cross-check of the automatic cycle count data. Hertfordshire is identified in Table 7.1 as having indirect cycling objectives and having implemented some schemes. Surrey showed a modest increase in cycling and, like Hertfordshire, had indirect cycling objectives and implemented some schemes.

Figure 7.4: Trends in cycling levels in Large Projects – indexed to 2010/11



Filled circles show years when Large Projects were receiving funding.

In addition to these six Large Projects, three Large Projects presented recent data from automatic cycle counters which could not be indexed to 2010/11:

- BDRS – in 2015 cycle counters were installed at eight new sites and reinstated at a further four sites, but the historic data at the four sites was too patchy for comparisons to be made; the monthly count data provided does not yet indicate long term trends.
- CENTRO presented a summary of automatic cycle count data for LSTF corridors covering the 2012 - 2015 period[51]. Of the 50 sites with data for 2012 - 2015, 31 showed a year on year increase, 15 showed an increase in comparison with the baseline and just 4 sites showed a decrease.
- Reading installed automatic cycle counters in 2013 and collected data on average daily flows for May and October[52] 2013 – 2015. Three of the sites showed little change in the number of cyclists, while the remaining six showed an increase.

In addition, as mentioned above, Merseyside presented manual data for 2013 and 2015 for LSTF sites specifically which was not indexed to 2010/11.

51 Sites within 100m of LSTF corridors, counts cover 24 hours/ day throughout the year, both directions; more detailed analysis was not possible due to gaps in data at individual sites.
52 Tuesdays, Wednesdays and Thursdays in school term time.

Hertfordshire has installed additional automatic cycle counters within and outside the LSTF area, but the results were not available at the time of writing this report.

The following Large Projects did not present data from automatic cycle counters:

- Solent did not report data from its cycle counters in the LSTF monitoring programme.
- Telford – manual counts only.
- TfGM – manual counts and surveys only; automatic cycle count data not available in a suitable form for analysis.

In summary, the three Large Projects with longer term automatic cycle count data pre-dating the beginning of LSTF funding (Hertfordshire, Merseyside and WEST) show increases in cycling since the start of LSTF funding which are possibly at a greater level than before LSTF funding began and which could therefore be attributable to LSTF. Of the two Large Projects with cycle count data from about the beginning of the LSTF funding period (2010), Nottingham showed an increase by 2015/16 which might be attributable at least in part to LSTF; but Bournemouth, while possibly showing an increase by 2016, has shown fluctuations in cycling levels which are likely to be due to the small number of sites involved (five). In CENTRO and Reading, the two Large Projects with more recent automatic cycle count data (from 2012 or 2013), there was weak evidence of an increase in cycling, with around two-thirds of sites showing an uplift but little change at the remaining sites. Thus there are indications from automatic cycle count data that the LSTF contributed to increased cycling levels in at least four of the Large Projects, with less robust and mixed results from a further three Large Projects. No conclusions could be drawn on the basis of automatic cycle count data for the remaining five Large Projects.

Table 7.3: Automatic cycle counts indexed to 2009/10 and 2010/11

Large Project	*Indexed 2009/10*							*Indexed 2010/11*					
	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Bournemouth								1	1.08	1.38	1.33	0.84	1.19
Hertfordshire	1	1.01	1.05	0.98	1.13	1.18		1	1.05	0.97	1.12	1.17	
Merseyside	1	1.07	1.15	1.35	1.38	1.54	1.56	1	1.08	1.27	1.29	1.45	1.46
Nottingham city								1	1.15	1.15	1.24	1.33	1.34
Greater Nottingham								1	1.14	1.14	1.20	1.28	1.28
Surrey								1	0.98	0.99	1.01	1.05	
WEST	1	0.99	1.05	1.02	1.11	1.22		1	1.06	1.03	1.12	1.23	

Highlighted grey cells cover the period of LSTF funding. Some projects received Key Component funding in 2011/12; others did not receive funding until 2012/13. Nottingham and WEST received a further year of revenue funding in 2015/16.

Data are for individual years (rather than moving averages) unless specifically stated.

Bournemouth - index calculated from total of AADT at the 5 sites on LSTF corridor for which continuous data is available over the period (2 additional count sites did not start collecting data until after 2010 and 1 further site was affected by changes in the loops). Note that the one control site shows a 23% decrease in cycling (2015 compared with 2009-11 average)

Hertfordshire – index calculated from data for the 4 LSTF sites with continuous data over this period, spread across 3 towns on weekdays over 16 hour periods (2 additional sites started collecting data after 2010 and 1 site did not collect data in 2013). Note that 2 sites in the control area show an increase in cycling, averaging 9% more cyclists recorded between 2009/10 and 2012/13 (2 further count sites started collecting control data after 2010 and 1 site did not collect control data in 2013)

Merseyside – Automatic counts across Merseyside combined into an index based on the moving average for two most recent years

Nottingham – 19 sites across the city and Greater Nottingham, of which 14 have automatic counters and 5 sites have monthly one day counts. The index takes account of alterations to automatic cycle counter network over the period; two indices are available: City and Greater Nottingham

Surrey – Automatic counts in May and September over 12 hour periods on weekdays at eight sites in Woking and Guildford

WEST – index based on combined automatic counts at 33 sites in North Somerset, South Gloucestershire and Bath & North East Somerset, excluding Bristol City (for which no data collected in 2013/14 or 2014/15)

7.6 Project-level outcomes: manual counts and surveys

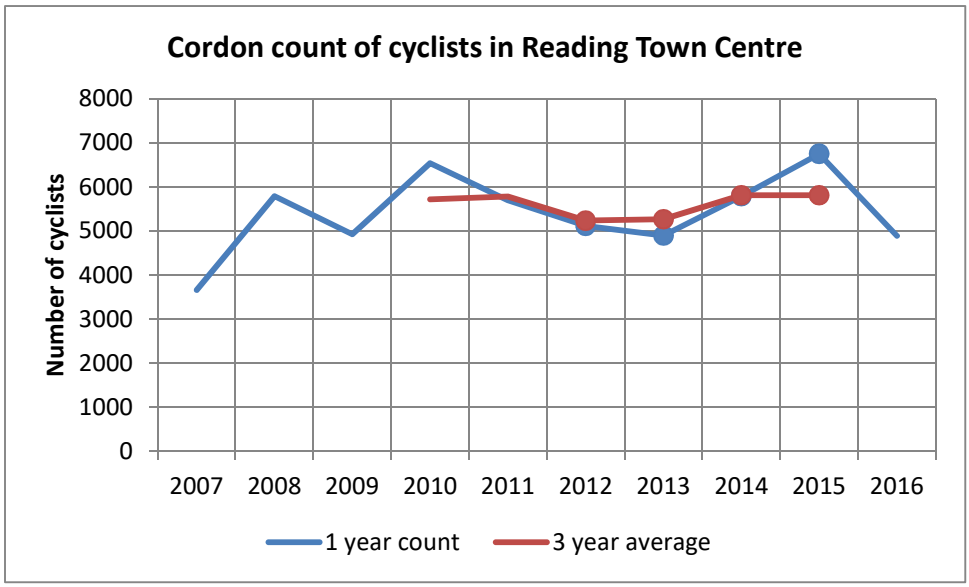
Manual count data are available for monitoring levels of cycling in BDRS, Bournemouth, CENTRO, Merseyside, Reading, Telford and TfGM (see Table 7.4). One day automatic count data for Surrey are also included in the table. Cordon counts in Reading and TfGM district centres and one of the CENTRO corridors show upward trends. Counts at two sites in Telford Park also show upward trends which have been attributed by the Large Project to LSTF funding, but the manual count data for Telford is not suitable for identifying trends over a short time period due to the variability from year to year. There is an indication of an upward trend in two of the four urban areas of BDRS but the variability from year to year also makes the data unsuitable for identifying trends. In Coventry city centre, CENTRO counts showed a fall after the baseline in 2012.

A small increase in cycling was recorded in two of the three urban areas in Surrey in the periodic automatic counts[53]; these are included here rather than in the previous section because, like manual counts, they represent a 'snapshot' from a limited time period.

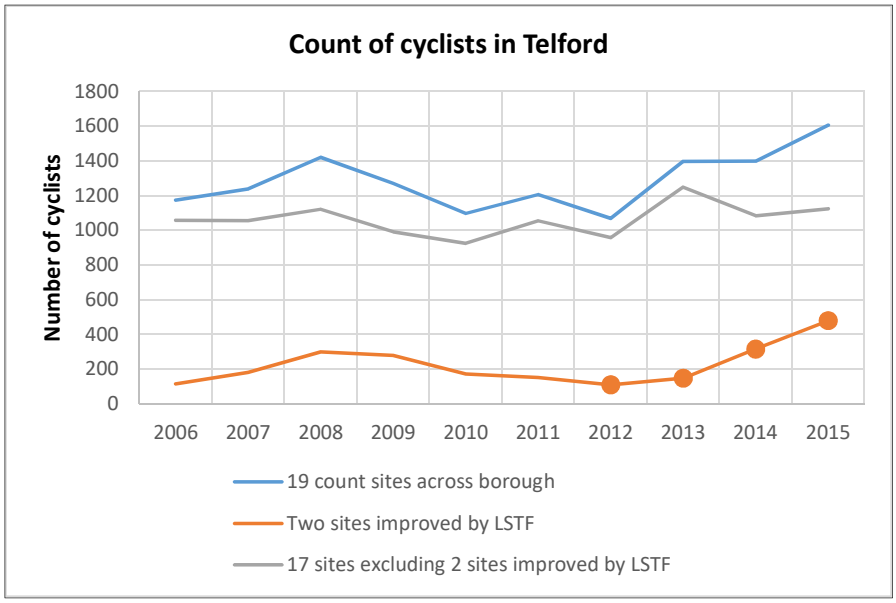
Table 7.4: Reported outcomes of cycling interventions based on manual cycle counts and periodic automatic counts

Large Project	Results from manual cycle counts and periodic automatic counts
BDRS	The cordon count data show that levels of cycling recorded are highly variable; there is no evidence that cycling levels have increased in Barnsley and Doncaster since 2010/11 but in Sheffield and Rotherham the count data show a year on year increase in all years except 2013; in 2015 the number of cycles counted was 5% higher in Sheffield and 34% higher in Rotherham than in 2010.
Bournemouth	Manual cycle counts at 20 sites on cordons around the three towns on the corridor on one day per year show high levels of variability in cycling levels with most sites showing a reduction between the 2009-11 average and 2015, and an overall decrease of 11%. Manual counts were also carried out at specific LSTF infrastructure improvement sites; these are reported in Table 7.5.
CENTRO	Manual cycle counts were carried out in two areas to assess the impacts of specific interventions. Improvements on the A452 North Solihull Network (18km of cycle route) showed on average a doubling in the number of cyclists (in 12 hour counts over 7 days), while in Coventry city centre cycling fell in 2013-15 compared with the 2012 baseline, but did not fall between 2014 and 2015. (Note the counts were carried out before completion of the cycling infrastructure in Coventry city centre.)
Merseyside	Manual cycle counts at 13 LSTF sites in the morning and evening peaks showed an 18% increase between 2013 and 2015, compared with a 13% increase over this period at all automatic cycle counter sites across the county (albeit over a full day).
Reading	Cycle counts across the town centre cordon have fluctuated since 2007 but there are weak indications of an underlying upward trend (see graph below). The average for the three years 2014-16 was 1.6% higher than the three years before LSTF (2009-11).

53 The third area did not have count data before 2012 and only one of the sites has continuous data since 2012.



Surrey	There was no change in cycling between 2010/11 and 2012/13 and then a 5% increase between 2012 and 2014 which was maintained in May 2015. (Based on automatic cycle counts on weekdays over a 12 hour period for two months each year in May and September in LSTF focus areas - 6 sites in Guildford and Woking with continuous data available.)
Telford	Manual cycle count data are available for one weekday in July for 2012 and 2013 and in June for 2014 and 2015 (12 hour manual counts, not always for the same weekday). The count sites for which data are available for many years show high levels of variability between years (as the blue line in the graph below indicates). This indicates that the data are of limited value for monitoring LSTF improvements over a short time period where significant changes to the urban environment would be expected to be reflected in changes in mode and route choice over a longer period of time. Across all 23 count sites, the level of cycling increased by 44% between 2012 and 2015; however the level of cycling fell by more than 20% at nine of these sites, including sites with significant improvements in the cycling environment. At eight sites the level of cycling increased by more than 10% between 2012 and 2015; of these, two sites were described by the Large Project as being attributable to the LSTF funding and are shown in orange in the graph below (changes in levels of employment and growth in travel demand were suggested as reasons for increases in cycling at other sites): • At one of the Silkin Way sites, resurfacing and improvements to a multi-user route was associated with a 219% increase in the number of cyclists between 2012 and 2015 • At Telford Town Park where there were route improvements, cycle parking, cycle hire, events and training, the level of cycling in 2015 was more than double that recorded in 2014, which in turn was much higher than earlier years (cycling levels were highly variable so quantitative comparisons between individual years could be misleading).



TfGM

Cordon count data for the daytime period (0730-1800) show year on year increases in cycling between 2010 and 2015, with an average 32% increase in the number counted between 2010 and 2015 and 9% between 2012 and 2015 across all of the 10 Greater Manchester district centres. Most of the increase is due to higher levels of cycling into Manchester, but some other district centres (Bolton, Bury, Salford, Stockport, Trafford) also show a fairly consistent upward trend).

Some route-specific counts found small scale increases in the number of cyclists:

- The Bolton East Cycleway (off-road and on quiet roads) was associated with an increase of 8% in overall levels of cycling in the three month period since the scheme was implemented; among the small proportion (93 people, 12%) surveyed, 7% said they had previously travelled by car (either as driver or passenger)
- At one of the sites on the Rochdale Canal off-road route, 4-day counts showed cycling doubling from 45 to 94 by the summer of 2015, four months after completion
- Counts at 12 routes to Salford Quays showed an increase in cycle flows of 33% between the 2012 baseline and in 2015 (two years after completion)

Other sites showed a decrease in cycling, but a shift from other modes:

- Two sites on the Peak Forest Canal showed decreases of 15% and 20% in the number of cyclists counted between the baseline in 2014 and the same month in 2015 (15 months after the route improvements and 3 months after the access ramps had been improved), but 3% of those interviewed had previously driven.

Overall survey results for the cycle routes programme found that 2% of users reported a shift from car since the routes opened and 5% of cyclists claimed to be new or re-starting cycling; however without time-series count data, it is not possible to establish whether there has been a net shift towards cycling.

More limited evidence on overall levels of cycling is available from household surveys in five of the Large Projects. Some of these indicate small increases in the reported frequency of cycling (Bournemouth – National Highways Transport Survey; Bristol in WEST - National Highways Transport Survey; CENTRO – residents' panel survey; and in one of the two towns in Hertfordshire the number of cycle trips per person per year increased initially between 2012 and 2013, although more recent data is not yet available). These are changes from one year to the next year or two; longer term results are needed before definitive conclusions can be drawn. In WEST a household survey (the Bristol Quality of Life Survey) has shown an increase in the proportion of people reporting that they cycle at least once a week.

- In Bournemouth, data from the National Highways Transport Survey for the relevant wards (around 1,500 respondents each year) showed a small increase in the percentage of people reporting that they cycled daily, weekly and monthly and a decrease in the percentage who cycled less frequently or never (from 73% to 68%) between 2012 and 2013. Statistical testing indicates that these results provide some evidence of a change, but the evidence is not strong. More recent data is expected to be available in 2017.
- In CENTRO, data from the National Travel Survey, the Active People Survey and DfT were analysed but these showed little change in levels of cycling in the West Midlands. The residents' panel survey in 2014/15 showed that compared with the 2012/13 baseline, on four of the 11 corridors respondents had substituted between 1% and 3% of car trips with cycling in the past year, but that on five of the corridors the percentage which had not substituted car trips increased; while certain individuals may have changed their behaviour, this may be influenced by factors beyond the LSTF programme, such as the reduction in fuel price. On average there was a 57% increase in the distance reported to be cycled by cyclists in the residents' panel survey from 7.5km per day in 2013 to 11.7km per day in 2015[54]. However the residents' panel survey also shows some evidence of a decline in the proportion of people who cycle; the proportion cycling less than an hour or not at all in a typical week rose from 93% to 94% in winter and 88% to 92% in summer between 2012/13 and 2014/15[55].
- In Hertfordshire between 2012 and 2013, the number of cycle trips per person per year increased from 28 to 39 in samples of about 800 people in St Albans, fell from 11 to 6 in samples of about 1000 in Hemel Hempstead, and did not change in the control town of Harpenden[56].
- In Solent, telephone surveys among residents were carried out at the end of 2015. The average number of days reported to be spent cycling was significantly[57] higher among residents stating that the 'My Journey' brand had influenced their behaviour than among those who were aware of the brand but did not claim to have been influenced by it (n=3,000).
- In WEST, the household survey in Bristol found an increase in the percentage of people reporting that they cycled at least once a week in 2014 (24.5%) compared with 2010 – 2013 when the proportion ranged from 18.4 to 20.0%; the National Highways Transport Survey data for Bristol also indicated an increase; the proportion who reported cycling daily increased from 8% in 2013 to 10% in 2015 but this survey also indicated a decline in daily cyclists in two areas (BANES and North Somerset) and no change in one (South Gloucestershire).

54 Source: CENTRO *Panel Survey Evaluation of Carbon and Health Benefits*

55 The Outcomes Report attributed this to shorter trips previously made by car being cycled, but because this group includes those who did not cycle at all this is not a valid conclusion.

56 Source: 2013/14 Outcomes Report

57 99% confidence level

In Solent, the Large Project used the Active People Survey to monitor changes in cycling, acknowledging the impact of small samples (~500) on the uncertainty associated with the results. In Portsmouth, the proportion who reported cycling at least once a month increased from 20% to 24% between 2010/11 and 2013/14, while in Southampton this increased from 14% to 17% over the same period but there was no evidence of a change in South Hampshire by 2013/14. Attitudinal and behavioural household telephone surveys were also carried out in 2012-13 and at the end of 2015.

In Telford, the Large Project also used the Active People Survey to monitor changes in cycling, although the most recent data available (2013/14) were not recent enough to reflect the impacts of LSTF schemes. The sample sizes were too small to ascertain whether or not there had been a significant change in either the proportion of people who had cycled in the past month or who had cycled for utility purposes; this source of data will be monitored in future years. Based on our own Active People Survey analyses, which use data up to 2014/15, it does seem possible that Telford has seen an increase in cycling, although further years of data collection will be needed to confirm this.

In Surrey, and TfGM, use of cycle parking was adopted as an indicator of overall cycling levels. In Surrey there were 16% increases in the average number of cycles parked at stations in two of the three LSTF towns between 2012 and 2015 and a 28% increase in Epsom over this period, a comparator town, continuing a trend which began before LSTF funding (the third LSTF town saw an increase between 2012 and 2014 and then a fall in 2015 to the 2012 level). In Manchester city centre, one-day counts indicated a steady growth in cycling: between 2013 and 2015 the numbers parked increased by 64%, and growth has continued even after the cycle hub membership levelled off. Three of the five Greater Manchester district centres with cycle parking counts spanning more than one year also indicated an increase in cycle parking.

7.7 Intervention-level outcomes for cycling from Outcomes Reports

Outcomes of cycling interventions were monitored through surveys and data collection targeted at the specific schemes. The key outcomes are summarised in Table 7.5. Although they show encouraging results in most cases, some of the indicators used tend to be indirect measures of the impact on cycling behaviour, for example: the percentage of people reporting that they cycle more often after receiving cycle training; numbers taking up a cycle lease who commit to cycling to work at least once a week; number of cycle hire subscriptions; or number of new cyclists.

Many direct impacts were reported, for example: the number of job-seekers who had found work and said that the cycle vouchers had been important in securing the job; reported increase in frequency of cycling; distance cycled in cycle challenges or by cycle hire users; increased level of use of cycle routes. However in only a few cases was there any indication of how these trips would otherwise have been made.

Some of the Large Projects concluded that combinations of measures aimed at encouraging mode shift were important in achieving behaviour changes, supporting infrastructure improvements with personal travel planning, training and other support. For example CENTRO concluded that their Corridor 2 infrastructure improvements combined with personal travel planning and initiatives at places of work and education achieved a small shift towards cycling from 1.1% to 2.5% of trips, while in Surrey the Large Project concluded that the cycle network improvements had made some impact on the level of cycling, but that people would expect further improvements in cycle routes and cycle storage before a greater impact could be achieved.

Table 7.5: Reported outcomes of individual cycling interventions

Large Project	Outcomes from individual schemes
BDRS	Several schemes showed promising results, with cycle training, leasing and maintenance sessions to encourage cycle use reaching over 11,000 individuals: • Across the whole LSTF funding period, 2,430 people registered for cycle leasing. Surveys in 2013/14 and 2014/15 found that of these, between 70% and 77% previously used a car for commuting and between 65% and 71% committed to cycling to work at least once a week. • 5,811 people took cycle training, of whom 69% cycled at least once a week as a result of the training. • 5,181 adults attended cycle maintenance classes, of whom more than 1,500 committed to cycling some or all of their journeys in future. • 2,430 adults took advantage of a free 'try out' loan of a bike and 60% said they continued to cycle after the end of the loan period. • A lasting effect was identified following 'Bike It' in Doncaster schools, with pupils cycling at least once a week increasing from 11% to 31% after 4 years and lasting increases were also recorded after three years in Sheffield and after two years in Rotherham, while the proportion cycling regularly was maintained in Barnsley. • 71% of those who benefitted from 'CycleBoost' (cycle parking, cycle maintenance, cycle leasing, cycle training and led rides) were car drivers. • 35,000 km ridden by Rotherham cycle hire users since the start of the scheme. Some cycle routes showed an increase in cycling: • Cycle counts on the Blackburn Meadows towpath route over a four month period showed a 157% increase in cyclists between 2012 and 2015 (to 3,672 cyclists in 2015). • On completion of the Doncaster Greenways cycle route, cycling increased by 77% compared with the baseline (anecdotal evidence, 55 journeys/ day compared with 31). • On the Wetmoor Lane walking and cycling route, before and after surveys more than a year apart found that daytime (0700-1900) cycling levels had more than doubled (+127%) from 133 to 302 cycling trips per day. Some workplace schemes (cycle parking and security, cycling support) were encouraging: • A threefold increase in cycling at one site in Barnsley was described as a culture change, with over 100 staff cycling three or more days per week. • 25 employees in a cluster of businesses in Barnsley took part in a cycling support scheme, cycling over 1,600 km.
Bournemouth	Two small scale schemes provided the basis for growth in cycling among specific groups: • Cycle vouchers were provided to 135 job-seekers (including 32 NEETs) and 25% of them had found work, 80% of whom said the scheme was extremely important in helping them to secure work. All of the remainder said they were using the bike to attend interviews and most had been able to access interviews which they would not otherwise have been able to reach. The scheme is set to continue beyond the LSTF period. • A cycle challenge at workplaces generated 210 new cyclists.

Large Project	Outcomes from individual schemes
	Short term traffic counts at six sites where infrastructure improvements were implemented did not show any increase in cycling in the short term, and at one site (where a footway under a bridge was widened), there appeared to be fewer cyclists; longer term monitoring will be needed to identify changes.
CENTRO	Almost 21,000 people took part in events, cycle training, maintenance, and led cycle rides and in 2015-16 almost 3,000 cycles were distributed to cycling participants in the Big Birmingham Bikes programme. However small scale results for three types of scheme provide only weak indications of the impact of LSTF activities: • Three months after receiving cycle training or taking part in cycle maintenance or led rides, 237 of the 3,000 people provided follow-up information and some of these reported cycling more for specific types of journey: 47% for leisure, 30% to education or work and just over 20% to the shops. In addition, a quarter had bought themselves a bicycle. • Cycle ownership increased significantly comparing before and after (2014/15) among students over 16 (43% to 47%, p=0.006) and showed a non-significant increase among staff (41% to 43%, p=0.16) but decreased among 11-16 year olds (68% to 65%, p<0.001); 10% of 11-16 pupils stated that they cycled more as a result of the travel planning and support for cycling at schools; these changes may not be related to cycle training or other LSTF initiatives and could be influenced by other factors. • Personalised travel planning on two corridors was aimed specifically at cycling. The average frequency of cycling recorded in one day travel diaries did not change but, in a follow up survey of 155 participants on one corridor, 20% of the car owners and 10% of the non-car owners reported that they had increased their frequency of cycling, while less than 2% reported cycling less; on the other corridor, 7% of 416 respondents reported cycling more and none cycled less. • Personalised travel planning on two corridors was aimed specifically at commuters and in this case the proportion of people who reported cycling at least once a week fell from 9% to 5% (samples of ~600).
Hertfordshire	Promising results were obtained from three small scale interventions: • The 2014 business cycle challenge was the best of the three which were run, with the number of lapsed and non-cyclists involved increasing from 130 in 2012 to 190 in 2013 and 271 in 2014. • Promoting the national cycle challenge via a local web site had registered 441 new riders. • A total of 82 additional covered cycle parking spaces were provided at rail stations, resulting in a modal shift of 84 journeys in the peak; use of the spaces at rail stations is growing, with one site at capacity and the other expected to reach capacity soon.
Merseyside	Encouraging results were achieved in the LSTF schemes for which results are given: • By the end of July 2014, the Citybike scheme had recorded over 7,000 cycle hires and 3,900 subscriptions. • There was an 85% rate of employment retention in the Workwise scheme which provided a bike and training.

Large Project	Outcomes from individual schemes
Nottingham	Information on the overall impacts on travel throughout the LSTF implementation period is available in most of the schemes aimed at encouraging active travel: • 500 bikes were provided at 28 cycle hire points and in 2014/15 some 5,600 hires took place comprising a total of 85,000 hire hours; over the LSTF period, users' estimates indicate that the scheme led to 50,000 additional hours of cycling and 13,000 additional hours of walking, resulting in over 1m fewer car km. • In the Ucycle initiatives at further and higher education sites, 1,100 people took up a bike loan and almost 1 million car trips were replaced with cycling or walking. • Cycle parking at further and higher education resulted in 460 new cyclists, making an additional 138,000 cycle trips (1.4m km) and 345,000 additional walk trips, reducing car use by 2.6m km. • 14 cycle hubs providing secure parking at interchanges were on average accessed over 900 times per month in 2014/15; surveys indicate that the cycle hubs encouraged 38,500 additional cycle trips and over 2,000 integrated cycle and public transport trips, with an estimated reduction in car use of 92,000km. • Bike It engaged with over 8,200 pupils, parents and staff over the LSTF programme and was reported to have generated an additional 550,000 cycle, scoot or skate trips, resulting in an increase in cycle mode share from 5.5% to 9.5%. • The Sustrans schools officer engaged with 6,300 pupils, as well as staff and parents, following which the proportion of children cycling to school at least once a week increased from 5% in 2013/14 to 12% in 2015/16. Also in 2015/16, 10% reported cycling to school at least 3 times a week. • After receiving cycle training, recipients reported cycling on average an additional 16 minutes per day, making 90,000 additional trips over 2.7m km. • Cycling promotion events were estimated to produce an additional 900,000 additional km cycled (80km per participant). • Inconclusive evidence is available on the 20mph zones. An increase in cycling in one 20mph zone was accompanied by a smaller increase at the control sites and a decrease where the 30mph limit was retained.
Reading	Some individual schemes indicate a potential for growth in cycling: • A new pedestrian and cycle bridge across the Thames with a link to the town centre has encouraged cycling into the centre, with one day counts at peak times showing a 14% increase (comparing 2016, 9 months after the bridge opened, with 2013). As noted in Table 8.4, surveys of bridge users identified a reported growth in active travel and reduced car use. • A 5% increase in the number of cycles parked in the vicinity of Reading station was observed following the opening of the cycle hub. • Over 17,000 people participated in workplace cycle challenges but only 350 were new cyclists; during the challenges 6,500 cycle journeys were made, covering 110,000 km. • After Bike It, the proportion of a small sample of pupils who never cycled to school fell from 66% to 40% in 2013/14. • 200 hire cycles have been provided at 29 docking stations across the area; by November 2015 after the scheme had been running for 18 months, there were almost 10,000 subscriptions with 45,000 rentals averaging 35 minutes, which was estimated to equate to around 340,000 km.

Large Project	Outcomes from individual schemes
Solent	Surveys of some 3,000 individuals carried out in 2013/14 and 2015 showed no conclusive evidence of a change in stated frequency of cycling. However reports from two interventions indicate a growth in cycling: • Active Steps, a 10-week programme for people with low levels of physical activity led to immediate increase in time spent cycling (2.4 hours per week) and a year after the programme the time continued to be higher than before. • In a small scale Commuter Challenge, cycling time increased (an extra 36 minutes per week in 2015). In addition, the average number of days reported to be spent cycling was significantly[58] higher among residents stating that the 'My Journey' brand had influenced their behaviour, than among those who were aware of the brand but did not claim to have been influenced by it. Those influenced by 'My Journey' cycled for 5% more of their journeys than those who were not aware of the brand. Around a third of those aware of the brand (9% of those surveyed) said it had encouraged them to walk, cycle or use public transport more often.
Telford	Over a period of 10 months to February 2016 the Telford Cycle Centre saw encouraging results, although the levels of cycling which resulted were not recorded: • Over 1,200 participants in the cycle hire scheme. • 100 participants in the cycle loan scheme. The change in levels of cycling was recorded following schemes in primary schools: • A combination of several programmes tackling different aspects of cycling (such as cycle training, road safety training, and cycle storage) appears to have been associated with an increase in levels of cycling, which the Large Project concluded may have contributed to reduced carbon emissions on journeys to primary schools. • DfT non-LSTF funded schemes (including Bikeability, Safer routes to school and cycle maintenance) appear to have had a bigger role in increasing cycling in primary schools than the LSTF schemes; LSTF coordination was described as an enabler contributing to the success of the non-LSTF schemes.
TfGM	Some participants in schemes to encourage cycling reported cycling more: • Of 389 people responding to a follow up to Learn to Ride training, 46% said they were cycling more and in a longer term follow-up, 57% of 396 respondents reported cycling more in a typical week, of whom 43% claimed to have driven this journey alone in the past. • On road cycle training participants were more likely to report cycling to work at least once a week after the training (69% of 186 compared with 51% before) and 70% said the training had affected their frequency of cycling to work. • Of 395 people receiving cycle maintenance training, who were interviewed three months after the course, 31% said they were making more cycle trips than 6 months previously. • In 2015 a survey of 82 cycle hub users found that only 32% said they would previously have made their most recent trip by cycling and parking elsewhere and 21% would previously have made that trip as a car driver. • Of 63 people who received a cycle in the 'Bike back to work' scheme, 84% reported that they were cycling more since they received the bike, 84% stated

58 99% confidence level

Large Project	Outcomes from individual schemes
	this is what they mostly use to travel around and 81% reported using it to cycle to work. Other schemes showed no evidence of an increase in cycling: • A 12-month follow up survey among over 600 people receiving residential travel planning showed no difference between the control group and the participants in the extent to which an increase in cycling was reported and early results of workplace travel planning evaluation also show no impact on the frequency of cycling to work among those surveyed. • Small scale data from surveys at cycle parks in Manchester city centre (179 in 2014 and 246 in 2015) found a significant[59] decline in those cycling at least 5 days a week (68% to 53%) and an increase in those cycling 3 – 4 days a week (18% to 27%). More encouragingly, scheme improvements appear to affect the reported likelihood of cycling among these cyclists: there were increases in the proportion citing improved cycle routes near home (4% to 11%) and improved cycle parking (3% to 9%) as reasons for cycling and a decrease in those reporting lack of safe cycle storage as a deterrent (59% to 48%). • A survey after improving an existing cycle route in Bury found that 50% of users had cycled the route before the improvements but only 1% said they had previously used a car for the journey. However other factors such as the low cost of cycling and the health benefits are also important influences: • 25% of cyclists crossing city centre cordons whose route was affected by interventions said that improved cycle routes to the city centre had influenced their decision to cycle, but 67% said the decision was influenced by other factors.
WEST	Over 3,000 people were reached through measures to encourage cycling including loan bikes, cycle maintenance, cycle training and led rides. Encouraging results are reported for some specific activities, but monitoring results for most of the activities are not yet available: • A small scale survey among 62 people receiving travel advice or cycling support reported increasing the amount of cycling (74%) initially.

7.8 Conclusions on outcomes related to cycling

Table 7.7 summarises the findings on cycling.

Data from the Active People Survey provides some evidence that the proportion of adults cycling in the past month increased slightly in the Large Projects over the course of the funded period, and this trend was more favourable than the background national trend. There was no evidence that the amount of cycling done by cyclists (number of days cycled in the past month) changed in the Large Projects over the funded period, either in absolute terms or relative to the national comparator group. This provides an indirect suggestion that any increase in cycling in the Large Projects may have been driven by widening participation in cycling, rather than encouraging existing cyclists to do more.

Sample sizes in the Active People Survey were not sufficient to permit meaningful examination of the trend in cycling in individual Large Projects: there was generally little or no evidence of any

59 Statistically significant at 95% confidence level

change, but this was not surprising in the context of limited statistical power. To assess changes in individual Projects, therefore, it is necessary to draw on the alternative data sources discussed below.

There are five Large Projects (Merseyside, Nottingham, Reading, TfGM and WEST) with signs of an overall increase in cycling from automatic and/or manual count data *and also* data showing a growth in cycling as a result of specific LSTF interventions.

There are a further four Large Projects (BDRS, Bournemouth, CENTRO and Telford) with some evidence of increased cycling associated with LSTF interventions but weaker or no signs of an overall increase in cycling.

Three Large Projects (Hertfordshire, Solent and Surrey) had weak or limited evidence on the impact of individual LSTF interventions and limited, mixed or no evidence on overall levels of cycling.

The Large Projects where individual schemes have been evaluated and show evidence that cycling has been encouraged are listed in Table 7.7 as having "some" improvement attributable to LSTF. It is important to note that even where no causal link has been identified, LSTF interventions nevertheless may be responsible for some or all of the increase in cycling

Three Large Projects with objectives aimed specifically at increasing cycling and which had implemented many cycling schemes (Nottingham, TfGM and WEST) had gathered sufficient data to indicate whether there had been an overall change in cycling levels following the LSTF funding[60]. However the evidence to enable attribution (i.e. to demonstrate a causal link) is not strong:

- In Nottingham a 34% growth in cycling was recorded between 2010/11 and 2013/14, focused on the main cycling corridors in the city. However, data from automatic cycle counts are not available prior to 2010, so it is not clear whether cycling levels at the monitoring sites were already increasing prior to LSTF.
- In TfGM, cycling grew by 32% between 2010 and 2015, based on manual cordon counts at district centres. This was mainly due to increases in cycling into Manchester, although some other district centres also showed growing cycling levels. Surveys found that improved cycle links were a contributory factor influencing the decision to cycle, but only for 25% of those surveyed.
- In WEST a 23% growth in cycling in the authorities outside Bristol was recorded over four years from 2010/11 to 2014/15 (equivalent data were not available for Bristol). However, this is a continuation of an existing trend: the rate of growth in cycling before the start of LSTF was 10% over the two years from 2008/09 to 2010/11.

Three of the Large Projects which implemented many cycling schemes but did not have objectives aimed at increasing cycling specifically, also showed evidence of increases in cycling, although not necessarily attributable to the LSTF:

- In BDRS, cordon counts in two of the four urban areas showed an increase in cycling but there was no evidence of change in the other two areas.
- In Merseyside the automatic cycle count data show an increase in cycling; the cycle count data at LSTF sites showed a greater increase than the overall average.

60 CENTRO also had objectives aimed at increasing cycling and had implemented many cycling schemes but numerous gaps in count data meant that levels of change in cycling could not be quantified reliably.

- In Reading increases in cycling were recorded at six of the nine automatic cycle count sites, while cordon counts showed an upward trend in cycling into the town centre.

Of the Large Projects which had implemented cycling schemes on a smaller scale, one showed a small increase in cycling levels, although this was not necessarily attributable to the LSTF, but the others had only limited data available so no conclusions could be drawn:

- In Bournemouth the few (five) sites with continuous data showed a high level of variation in cycling on the LSTF corridor.
- In Solent there was limited data but two small scale interventions led to a reported increase in cycling among participants.
- In Surrey, monitoring in two of the LSTF focus towns found cycling levels in 2015 to be 5% higher than in 2010.
- In Telford, manual cycle count data showed high levels of variability; some LSTF sites showed an increase in cycle traffic while others with significant improvements showed a decrease but as mentioned earlier, some specific schemes showed positive results. In addition there was weak evidence of an increase in cycling in the most recent year (2014/15) of the Active People Survey, although further years of data will be needed to establish whether this was a chance result or reflects a genuine uplift in cycling.

There are also encouraging results from indirect measures of the impact of many of the individual LSTF schemes (such as levels of cycle hire and numbers of people who commit to cycling more following participation in an LSTF scheme) in nine of the Large Projects (BDRS, Bournemouth, Hertfordshire, Merseyside, Nottingham, Reading, Telford, TfGM and WEST).

Table 7.7: Overview of outcomes related to cycling

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
BDRS	■ ■	Cordon counts indicate increases in overall levels of cycling in two of the four urban areas (5% higher in Sheffield and 34% higher in Rotherham in 2015 compared with 2010/11) but no evidence of change in the others.	?
	■	Monitoring on some improved cycle routes shows increases in use. Cycle hire schemes show good levels of use and cycle support schemes were followed by increases in cycling, some of which was by car drivers.	Some^
Bournemouth	■	Evidence on the overall level of cycling is limited and indicates an upward trend but fluctuations in levels of cycling since LSTF funding began.	-
	■	There is evidence of an increase in cycling from short term monitoring at six sites with infrastructure improvements. Small scale schemes have provided the basis for growth in cycling among job-seekers and employees.	Some^
CENTRO	■	Automatic counts on LSTF corridors show increases in levels of cycling at most sites and an overall increase in cycling compared with 2011/12.	?
	■	Panel survey results show an increase in the reported distance cycled among cyclists between 2013 and 2015 but a decrease in the proportion of people who cycle.	?
	■	Manual counts on specific routes showed a doubling in the number of cyclists on one route but inconclusive results on another. 21,000 people participated in events and schemes. Small scale results for some schemes provide only weak indications of the impact of LSTF activities, with a decrease in regular cyclists reported in one case.	Some^
Hertfordshire	■	Cycle counts show an increase in overall levels of cycling with a greater increase since LSTF began but a similar increase at 3 control sites.	-
	■	Business cycle challenge indicates signs of possible localised growth in cycling and cycle parking at stations has encouraged small scale modal shift.	Some^
Merseyside	■	Cycle counts at LSTF sites show a greater increase in cycling (18%) than at all sites across the county (13%) between 2013 and 2015.	?
	■	Encouraging results have been achieved in Citybike rentals.	Some^
Nottingham	■	Overall cycling levels have increased since 2010/11 but the evidence on the impact of the LSTF is not strong because it is not clear whether this represents a continuation of previous trends. However cycle hire, cycle parking, cycle training and cycling events are successful and have been shown to increase cycling; some of these schemes have also been shown to reduce car use.	Some^
Reading	■	Average daily flows increased at six sites out of 12 sites monitored between 2013 and 2015.	-
	■	There is an upward trend in cycling into the town centre.	?
	■	Some schemes indicate a potential for growth in cycling; cycle hire and a new cycle/ pedestrian bridge are successful.	Some^

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
Solent	■	Survey data shows no evidence of stated change in the frequency of cycling.	-
	■	Two small interventions led to a growth in cycling and the 'My Journey' brand is reported to have influenced levels of active travel (cycling for 5% more journeys than those who were not aware of the brand).	Some^
Surrey	■	Marginal increase in overall level of cycling (a 5% increase between 2012 and 2015 provided weak evidence of growth in two of the three LSTF towns). Cycle parking at stations did not increase more than in the comparator town.	-
Telford	■	Manual counts provide weak evidence of growth in cycling since the start of LSTF, in part due to growth at two sites where LSTF investment has been focused.	?
	■	There was weak evidence of an increase in the proportion of adults cycling in the Active People Survey between 2010-12 and 2013-15, but this was driven by an unusually high level of cycling reported in 2014/15 and it is not yet clear whether this will be sustained in the longer term.	-
	■	Levels of use of the cycle hire and cycle loan scheme were promising. Packages of measures in primary schools appear to have been associated with an increase in cycling, with non-LSTF funding contributing to their success.	Some^
TfGM	■	Annual one day manual cordon counts indicate increases in cycling into district centres (9% between 2012 and 2015). Several (but not all) LSTF-improved routes show small scale increases. Surveys of route users provide evidence of a small scale shift from car travel but there is no data to indicate the net effect on cycling on these routes.	Some^
	■	Some (but not all) LSTF schemes targeting individual behaviour have shown an increase in reported levels of cycling and one scheme showed evidence of a shift from driving, but there is evidence that the low cost of cycling and the health benefits are also important influences.	Some^
WEST	■	Overall levels of cycling have increased, by slightly more than before LSTF (24% 2010 /11 to 2014/15 compared with 11% 2008/9 – 2010/11).	?
	■	Some activities targeting individual behaviour have shown an increase in cycling but monitoring results for most of the activities are not yet available	Some^

■ **decrease** in cycling; ■ **no change** in cycling; ■ **increase** in cycling; ■ **insufficient data** to assess impact on cycling; ☐ **too few schemes completed** to be expected to affect cycling.

~ Different Large Projects treat different time periods as 'baseline'. Changes summarised here are since 2011/12 for Large Projects that received Key Component funding (BDRS, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST), and since 2012/13 for Large Projects that did not receive Key Component funding (Bournemouth, CENTRO, Reading, Solent).

^ Where 'some' of the observed uplift in cycling is attributed to LSTF, this is on the basis that monitoring data from individual schemes shows that these schemes have encouraged cycling.

8 Active travel: walking

Key points:

Nationally, since 2011, according to the National Travel Survey, walking levels have declined (whether looking at trips, distance walked or mode share) although the Active People Survey indicates that there may have been an increase in walk trips over 10 minutes in duration since then. In the Active People Survey, there was no evidence of any change walking in the Large Projects as a whole that differed from the background national trends.

Intervention-level monitoring data demonstrated that some schemes had resulted in increased levels of walking. Six Large Projects reported pre and post-scheme manual counts at locations where footways had been widened, new paths built, or (in one case) a new pedestrian / cycle bridge installed. In all, results were reported for 17 schemes: eight of these showed increasing pedestrian flows, six showed mixed results, and three showed a fall in pedestrian flows. There were also examples of reported increases in walking from post-intervention surveys of people who had participated in walking promotional programmes and personal travel planning.

Evidence of *overall* increases in walking in each Large Project area was relatively sparse, partly due to lack of available data and partly due to variability in data from year to year. For those Large Projects with data, four (Reading, Bournemouth, Nottingham and TfGM) showed evidence of an increase in walking, two of which (Reading and Nottingham) had implemented many schemes aimed at increasing active travel in general or walking in particular. There is some evidence that Nottingham as a whole has seen an increase in walking above the background national trend. Another project (CENTRO) found car trips that had been replaced by walking, but the project noted that this might not have been solely attributable to the LSTF. However, overall walking levels appear to have declined in two Large Projects (BDRS and Telford) as in the national data.

Three of the areas which appear to have been successful in increasing walking are:

- Reading: the number of pedestrians recorded in the town centre increased by 23% between 2007 and 2015, although in 2016 there were only 9% more pedestrians than in 2007. There were also increased pedestrian flows associated with building a new pedestrian bridge across the river, and 80% of participants in a 'Beat the Streets' initiative said that it had encouraged them to walk or cycle more.
- Nottingham: monitoring surveys for LSTF initiatives with discernible impacts on walking identified an additional 1.6m walk trips, while stated change surveys among participants in the workplace challenge and users of cycle facilities, led walks and 20mph zones identified an increase in walking of just over 58km per person per year.
- TfGM: the level of walking during the daytime in the ten urban areas increased by 2.5% between 2010 and 2015, continuing a previous trend. Of the participants in residential travel planning, 12% reported walking more after the initiative and attributed that to being involved; walking to work also increased at workplace travel plan survey sites.

8.1 Overview of objectives and outputs targeting walking

Eight Large Projects explicitly identified support for either walking or active travel as one of their objectives. These are summarised in Table 8.1. In the remaining four Large Projects, support for walking was implicit in the objectives, for example encouraging use of more sustainable modes, reducing carbon emissions or increasing transport connectivity.

Large Projects were loosely categorised into those which had delivered 'many', 'some' and 'few' interventions. Over the whole LSTF funding period, five Large Projects delivered many interventions and six delivered some interventions which might have an effect on metrics related to walking in the medium term (Table 8.1). Around 60km of new or improved pedestrian routes were completed, together with around 270km of new or improved off-road shared pedestrian / cycle routes[61]. Many services were delivered with the aim of increasing walking, such as active travel events, community travel hubs, walking maps and guided walks.

8.2 Metrics used to monitor walking

The key outcomes are overall changes in walking identified in manual counts and household surveys, and evaluation results of specific interventions. Walking interventions may also impact modal share; impacts on modal share are summarised in Chapter 10.

At a project level, the main metric used was the level of pedestrian activity obtained from manual counts at key points across the Large Project area, or across areas with interventions. In some cases the data were not yet available for a sufficiently long time period to provide robust monitoring results which isolate the impact of LSTF from other changes. Because the amount of walking varies with weather conditions, the annual monitoring for one 12 hour period which was carried out in some Large Projects is likely to fluctuate from year to year for reasons which are not related to the LSTF interventions. Indeed some projects have noted the likely impact of weather conditions on their count results for specific years. Results of the manual counts are summarised in Section 8.4.

- Area-wide manual pedestrian count data were reported for BDRS, Bournemouth and Telford.
- CENTRO reported baseline pedestrian counts at locations along their targeted corridors, but 'after' data proved to be insufficiently robust, so survey data were used to monitor trends.
- Merseyside, Reading and TfGM reported pedestrian count data for town centre cordons.
- Merseyside and TfGM reported pedestrian count data for LSTF areas/ sites specifically.
- Nottingham reported the combined change in walking and cycling in the area where 20mph zones had been implemented and compared this with the change at control sites.
- Telford reported pedestrian count data for 23 count sites across the local authority area and for the four town centre sites specifically to identify LSTF impacts.
- No pedestrian count data were reported for Hertfordshire, Solent, Surrey or WEST.

61 We have no break-down of what proportion of the new or improved shared routes benefitted pedestrians (e.g. because a previously unpaved route was surfaced) and what proportion mainly benefitted cyclists rather than pedestrians (e.g. where a pre-existing footway was converted to shared use).

Table 8.1: Summary of walking objectives and interventions

	Walking objective? [A]	Summary of walking-related objectives	Walking schemes implemented?	Walking schemes implemented (by July 2015)
BDRS	Indirect	Help businesses through reducing congestion and improving transport connectivity	Many	Around 44km of pedestrian route improvements of which there were 2km new pedestrian routes and 10km improved pedestrian routes, 22km new shared pedestrian and cycle routes and 9km improved shared pedestrian and cycle routes; improved crossings. 'Walkboost' programme to encourage walking for residents, commuters, and pupils including walking maps, street audits, led walks.
Bourne-mouth	Yes	Improve the quality, attractiveness and user perception of the low carbon travel choices and increase levels of active travel	Some	Several new or improved pedestrian crossings, some as part of junction improvements; around 9km of pedestrian route improvements with new footbridge and shared cycle-pedestrian path; urban realm improvements.
CENTRO	Yes	Increase walking for short trips made by residents and increase levels of active travel at schools, further education and workplaces in LSTF corridors.	Many	Around 30km of infrastructure improvements (mainly shared pedestrian / cycle routes); new crossings; led walks.
Hertford-shire	Indirect	Reduce carbon emissions from transport.	Some	Infrastructure improvements: 2 links completed, 2 routes and town centre redevelopment partially complete, totalling 8km.
Mersey-side	Indirect	Increase the proportion of journeys made using sustainable modes, enhance access to employment and essential services and broaden travel horizons.	Many	Around 70km of route improvements and speed reduction at key points; guided walks.
Notting-ham	Yes	Support active travel. Reduce carbon emissions by making low carbon travel a realistic and attractive option.	Many	Infrastructure schemes: 20 mph speed limits on all residential roads in the city (580 km); improved walking links at key sites (less than 5 km). Large programme of active travel events; over 4,200 residents took part in led walks, community travel hubs.
Reading	Indirect	Encourage more use of sustainable modes.	Many	Improved and new shared pedestrian / cycle routes and improved walking routes totalling just over 30km; additional pedestrian crossing points; shared space improvements. Events and challenges.

	Walking objective? [A]	Summary of walking-related objectives	Walking schemes implemented?	Walking schemes implemented (by July 2015)
Solent	Yes	Improve levels of physical activity, health and well-being through increased active travel.	Few	Limited route improvements (<2km), signs, maps and posters. Led walks; active travel events.
Surrey	Yes	Reduce carbon emissions, for example by bringing about an increase in the volume and proportion of journeys by low carbon, sustainable modes including walking and cycling	Some	Around 30km of shared pedestrian / cycle routes completed with improvements in signage for pedestrian routes. 700 adults took part in led walks.
Telford	Yes	Make walking more attractive to improve health.	Some	Around 5km of new shared pedestrian / cycle route improvements and 2km of new pedestrian routes; major town centre public realm enhancements. Walking maps.
TfGM	Yes	Connecting people with jobs, focusing on local walk and cycle access. Support businesses by promoting low carbon commuting.	Many	Over 40km of shared pedestrian and cycle route improvements; 1,500 adults took part in led walks.
WEST	Yes	Increased physical activity and improved health through greater use of walking/ cycling for local journeys, increased use of sustainable modes after transition points	Many	Infrastructure improvements: shared pedestrian and cycle routes, crossings, bridges, public realm totalling around 40km. Community Active Travel Officers ran initiatives with numerous employers, schools and people in transition between life stages; 1000 adults took part in led walks.

A: Objectives drawn from 2013/14 and 2014/15 Outcomes Reports

The other metric used by some Large Projects at an area-wide level was the reported frequency of walking derived from household surveys and panel surveys (see Section 8.4). However without filtering the results to focus on the areas affected by LSTF interventions, they are of limited value for evaluating LSTF outcomes:

- Bournemouth and Hertfordshire reported the results of household surveys, comparing reported frequency of walking with that reported by another sample in the previous year. Sample sizes were around 1,500 for Bournemouth and just under 2,000 for Hertfordshire; longer term results are needed before definitive conclusions can be drawn.
- CENTRO reported results of a panel survey, comparing just over 2,000 individuals between 2012/13 and 2014/15 and also reported National Travel Survey data.
- WEST reported results of NHTS surveys from 2013 – 2015.

Hertfordshire also presented a comparison with household survey results in the control area of Harpenden, without any LSTF interventions; the other Large Project to present control data for assessing the change in walking was TfGM, which compared the reported level of walking following residential Personal Travel Planning with that in a control area.

In Solent, Surrey and Telford, the results of the Active People Survey were used as an indicator of changes in levels of walking; however changes in the definition of walk trips in 2012 mean that this is not suitable for identifying changes in walking over the full period relevant to LSTF.

Evaluation of specific schemes by carrying out surveys of attitudes and behaviour was reported by five Large Projects – BDRS, CENTRO, Reading, Solent and TfGM. In addition, three projects (BDRS, Hertfordshire and Telford) used pedestrian counts to monitor specific sites with LSTF interventions, although in the case of BDRS these were not installed until after the schemes had been implemented. These results are summarised in Section 8.5.

8.3 National trends in walking

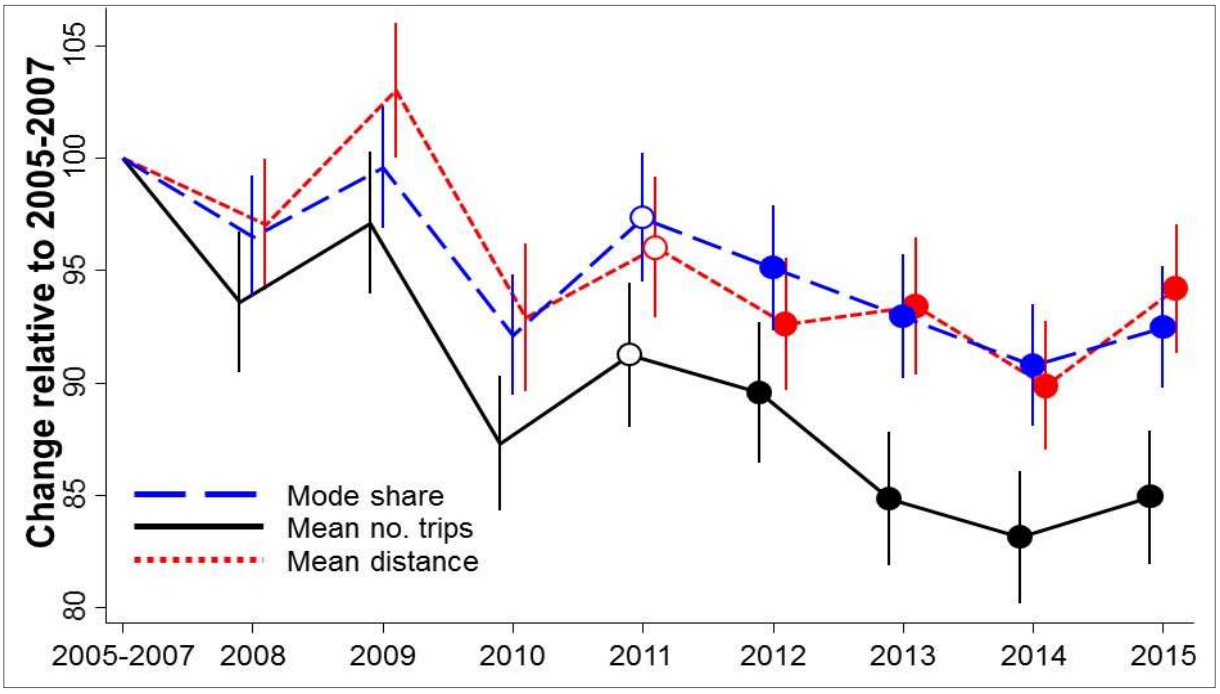
The National Travel Survey provides national data on long term trends in walking. Figure 8.1 shows that the average weekly distance walked by adults in urban areas of England (excluding London) has varied from year to year but with an overall tendency to decrease since 2005. This tendency to decrease is most marked for the mean number of walk trips, but there are also indications of a downward trend in the mean distance walked and walking mode share.

The Active People Survey provides another source of data on national trends in walking. Figure 8.2 shows the mean number of days that adult participants reported walk trips in the Large Projects, compared with other urban areas of England[62]. The results are somewhat different from those of the National Travel Survey, in that they generally provide little evidence of a change in walking since

62 One complication in using Active People Survey to compare groups of local authorities over time is variation in the sample size between local authorities between years. Although most local authorities have a sample size of around 500 per year, some have a considerably larger sample size in some years. For example, Liverpool (part of the Large Project group) had a sample size of 2505 in 2010/11, followed by between 454 and 546 in the years 2011/12 to 2014/15. This could lead to changes in group averages over time simply because of changes in the geographical composition of the participants, without there having been any underlying behaviour change. We therefore calculated weights for each local authority in each year such that the population was weighted to have the equivalent of 500 participants (or 80 for the very small local authority of the Isles of Scilly), e.g. the weight for Liverpool in 2010/11 was 500/2505=0.20. We multiply this by the local authority-level weighting provided by the Active People Survey, which adjusts for differential response rates by demographic factors such as age and gender.

2005 and, in the case of days containing walks with a duration of ≥10 minutes, suggest an increase in 2014/15 compared to previous years. This reported increase in the number of days on which people made walking trips of ≥10 minutes in 2014/15 is somewhat surprising since no comparable increase was seen in days with ≥30 minutes walking across the day. The reason for the change is unclear and it seems possible that it reflects changing methodology even though no methodological changes are reported in the Active People Survey documentation. Whatever the explanation, there was no evidence that the change in the amount of walking differed between the Large Projects as a whole and the national comparison group (p=0.44 for 'number of days with at least 30 minutes of walking', p=0.16 for 'number of days with a walk of at least 10 minutes')[63]. In other words, the Active People Survey suggests that trends in walking in the Large Projects between 2012 and 2014/15 were no different to the background trends observed nationally.

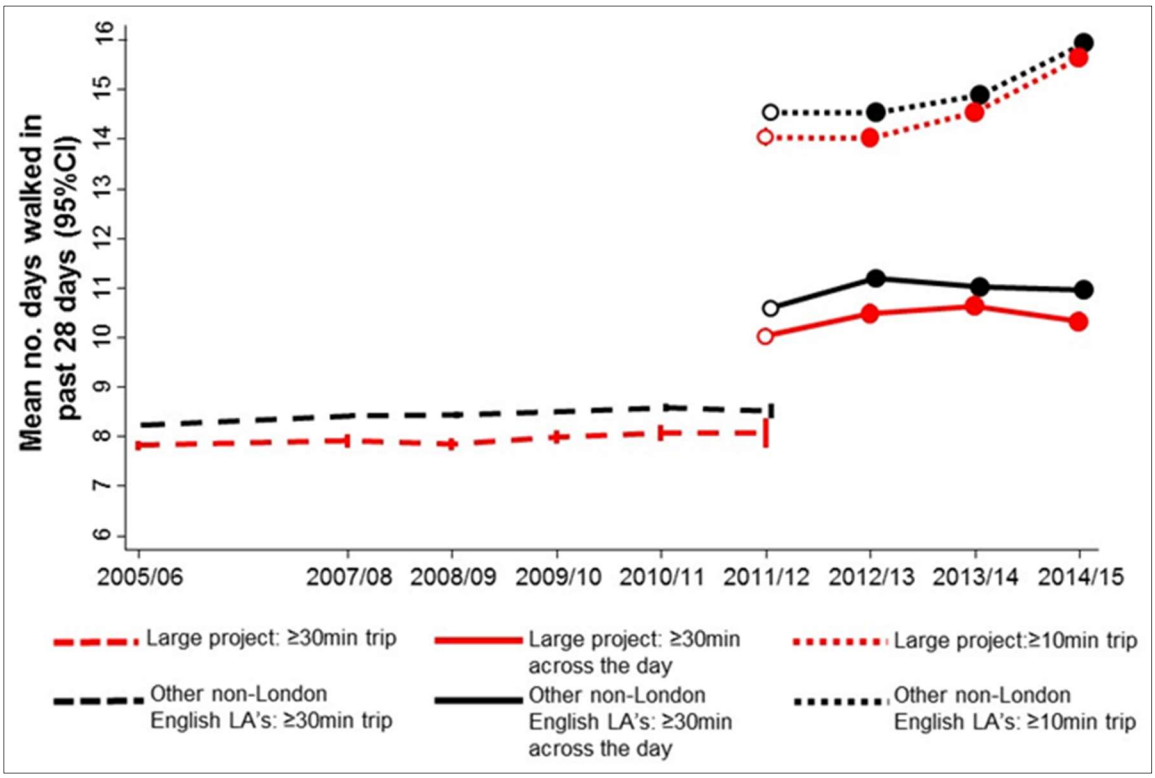
Figure 8.1: Trends in walking for transport – National Travel Survey



2015 point estimates derived from data provided by the Department for Transport; 2015 confidence intervals are approximate, based on the assumption that uncertainty around the estimates in 2015 is the same as in 2014. Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

63 Tests for interaction tested whether the change in the Large Projects between baseline (first 3 quarters of 2012) and follow-up (2013/14 and 2014/15 combined) differed from the change in the national comparison group of 'all non-London LA's in England' using linear regression, adjusted for age band and sex. This is broadly equivalent to a change-on-change analysis.

Figure 8.2: Mean number of days on which walk trips were reported by adult participants in the Active People Survey 2005/6 – 2014/15 (all Large Projects combined)



Note that the confidence intervals for walking in non-London local authorities are so narrow that they are not clearly visible in the graph.

8.4 High-level outcomes of walking interventions in Large Projects

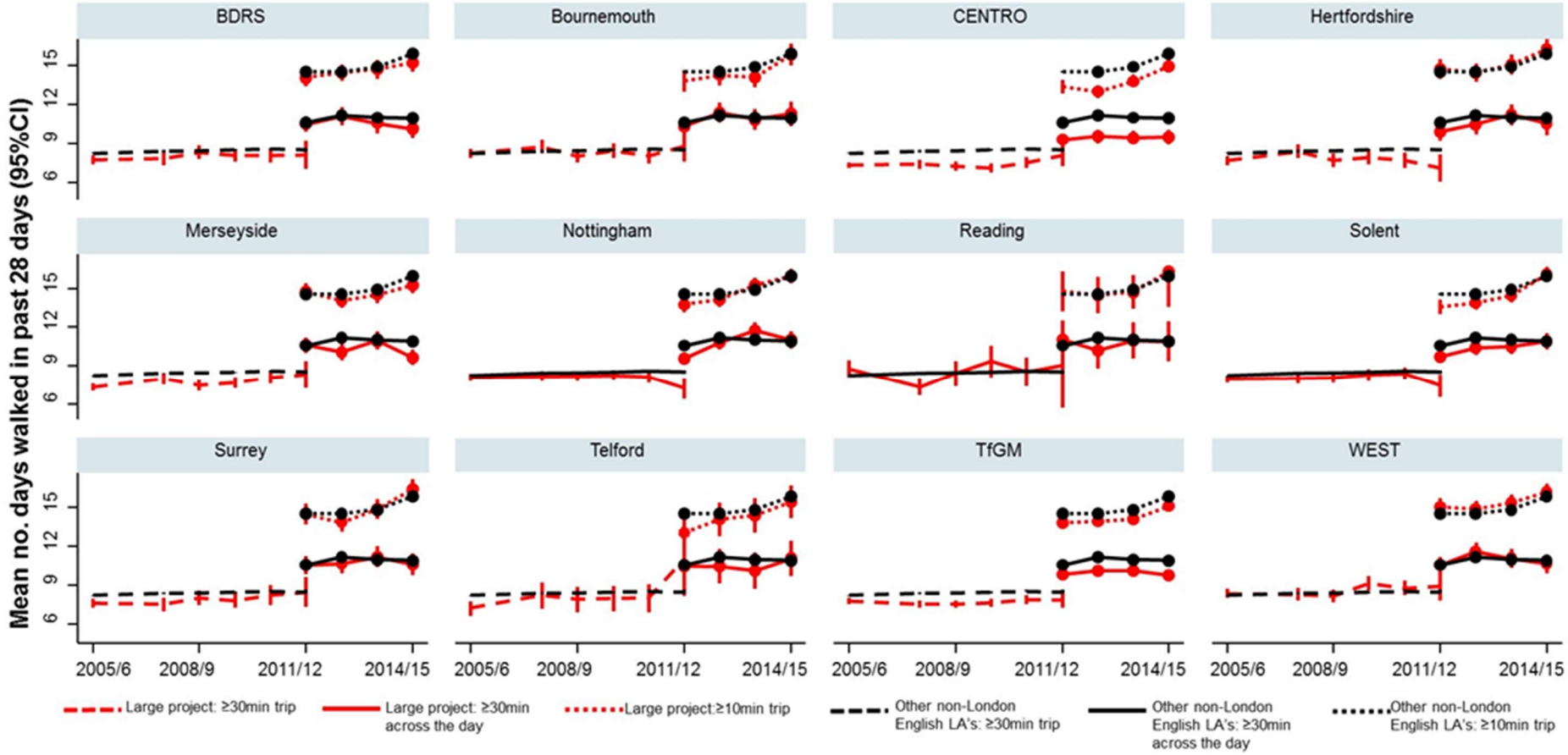
The trends in walking trips recorded by adults in the Active People Survey in each of the individual Large Projects are shown in Figure 8.3.

For ten of the Large Projects there was no evidence at the 5% significance level of any difference between that individual Large Project and the national comparison group. There was, however, strong evidence that in Nottingham walking had increased between 2012 and 2014/15 relative to the background trend ($p<0.001$ for 'number of days with at least 30 minutes of walking', $p=0.004$ for 'number of days with a walk of at least 10 minutes')[64]. There was also weak evidence that the number of days with at least 30 minutes of walking had increased relative to the background trend in Solent ($p=0.02$). This result for Solent should be interpreted with more caution, however, since it was not replicated for 'number of days with a walk of at least 10 minutes' ($p=0.13$).

This indicates that there is evidence that Nottingham has seen an increase in walking above the background trend and possible also in Solent. However some caution should be applied in interpreting these results as they may be chance findings: visual inspection of Figure 8.3 suggest that in both these local authorities the baseline year 2012 may have measured an anomalously low level of walking.

64 Test for interaction tested whether the change in the Large Project between baseline (first 3 quarters of 2012) and follow-up (2013/14 and 2014/15 combined) differed from the change in the national comparison group of 'all non-London LA's in England' using linear regression, adjusted for age band and sex, which is broadly equivalent to a change-on-change analysis.

Figure 8.3: Mean number of days on which walk trips were reported by adult participants in the Active People Survey 2005/6-2014/15, stratified by Large Project



8.5 Project-level outcomes of walking interventions

Data on levels of walking from manual counts presented in the Outcomes Reports are summarised in Table 8.2. This shows limited evidence for an increase in walking into one of the BDRS centres (Doncaster), Reading town centre, at some of the LSTF sites in Telford, on the LSTF corridor in Bournemouth and into the urban centres in both TfGM and Merseyside.

However the pedestrian counts indicate a decrease in levels of walking in two of the BDRS towns (Barnsley and Sheffield) and an inconclusive result in Rotherham, the fourth BDRS town. Pedestrian counts also show a decrease in levels of walking at LSTF sites in Merseyside and in Telford overall, as in the National Travel Survey.

Two of the Large Projects showing an increase in pedestrian activity in urban centres (Reading and Merseyside) are two of the four Large Projects with many walking schemes implemented and monitoring results available.

Only one of the Large Projects which showed a decrease in walking had implemented 'some' (as opposed to 'many') schemes (Telford), although Telford does have specific objectives for increasing active travel. The other Large Projects which showed evidence of a decrease in walking had implemented many schemes (BDRS and LSTF sites in Merseyside).

Table 8.2: Monitoring results from pedestrian counts

Large Project	Summary
BDRS	Cordon count data for the four urban centres showed an overall 8% decrease in pedestrians between 2011 and 2014, with variations between the four centres: a 3% increase in Doncaster, no change in Rotherham, and decreases of 12% and 14% in Barnsley and Sheffield.
Bournemouth	The manual counts made on one day each year at 18 sites on the LSTF corridor show an average increase of 7%, comparing 2015 with the 2009-11 average, but with variations between -27% and +90% at individual sites. Short term traffic counts at six sites where infrastructure improvements were implemented were also carried out; see Table 8.4.
Merseyside	Opposing trends were recorded at urban centres and LSTF sites. Manual counts of the people walking at LSTF sites during the morning peak and evening peaks at weekdays and weekends show a 7% reduction in the level of walking between 2013 and 2015; this compared with a 12% reduction in people walking into urban centres in the morning peak in the same period but a 4% increase in walking into urban centres between 2013 and 2016.
Reading	Pedestrian counts across the town centre cordon have fluctuated since 2007 but there are indications of an upward trend (depending on which year is taken as the baseline). In 2015 there were 23% more pedestrians than in 2007 and the figure was also higher than in 2013 and 2014. However in 2016, 9% more pedestrians were recorded than in 2007; the Large Project concluded that the reduction compared with 2015 was influenced by wet weather on the 2016 survey day.
Telford	Pedestrian count data are available for one weekday (12 hours, note day of the week varies) in July in 2012 and 2013 and in June in 2014 and 2015. The count sites for which data are available for many years have high levels of variability

Large Project	Summary
	between years; variations in monitoring period indicate that the data are of limited value for monitoring LSTF improvements over a short time period, particularly where significant non-LSTF developments have affected travel patterns. The number of people counted fell by 12% between 2012 and 2015 at the 22 sites where data were available; but numbers were higher in 2014 than in 2015. There were eight sites where the number of pedestrians counted increased between 2012 and 2015, with the increases ranging from 4% to 259% (discounting one site with an unusually low count in 2012), but 14 sites where the number of pedestrians counted fell over this period (by between 2% and 47%). However five of the sites with a large decrease over this period had recorded unusually high counts in 2012 and three of the sites with a large increase had recorded unusually low counts in 2012.
TfGM	Cordon count data for the ten urban areas show an increase in pedestrian activity between 2010 and 2015 of 2.5% between 0730 and 1900, continuing the trend of the previous four years. There was a year-on-year increase in numbers in 2012, 2013 and 2014 but a 3% fall between 2014 and 2015. Monitoring results from counts at specific sites are reported in Table 8.3.

The project-level trends in levels of walking in six Large Projects have been calculated from manual counts as three-year rolling averages and indexed to 2009-11; these are summarised in Figure 8.4. The trends in levels of walking in five Large Projects are shown as three-year rolling averages indexed to 2007-09 in Figure 8.5. The data on which these graphs are based are summarised in Table 8.3. Note that as three-year averages, the results differ from the individual year-on-year comparisons summarised in Table 8.2 and Table 8.5.

Figure 8.4: Trends in walking in Large Projects – three year rolling averages indexed to 2009-11

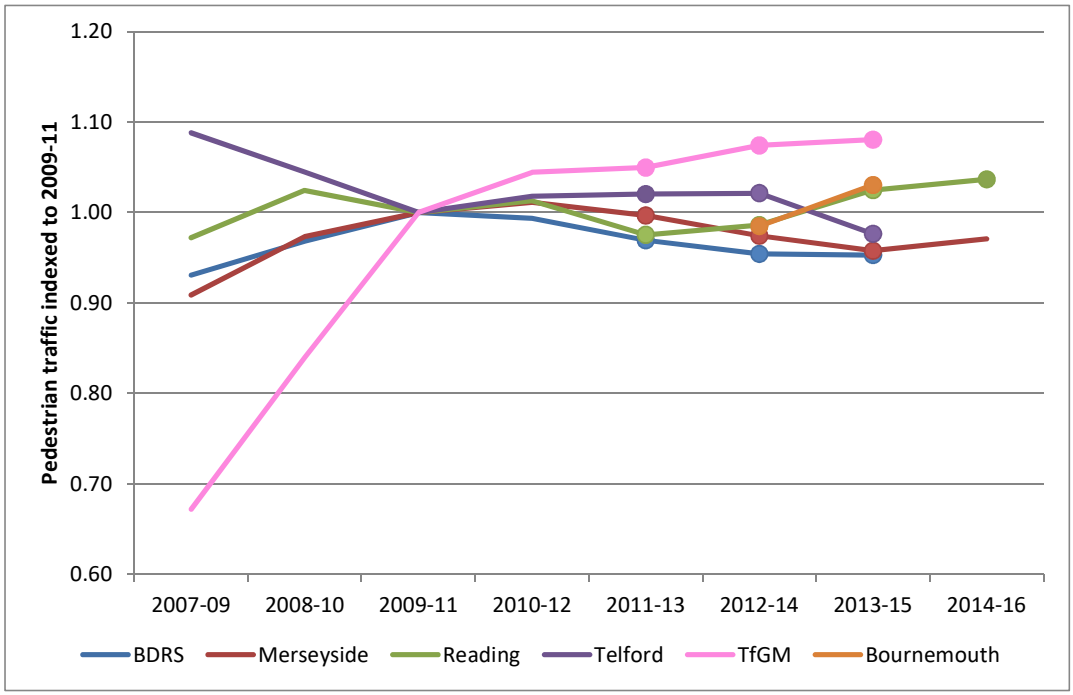


Figure 8.5: Trends in walking in Large Projects – three year rolling averages indexed to 2007-09

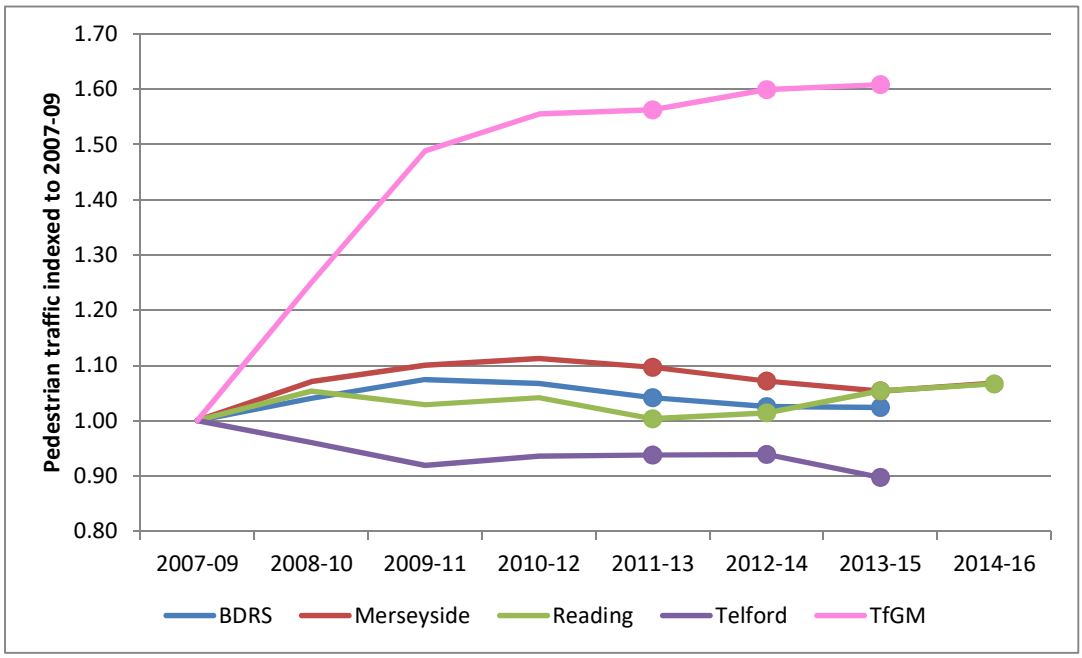


Table 8.3: Pedestrian counts indexed to 2007-09 and 2009-11

	Indexed 2007-09								*Indexed 2009-11*							
	2007-09	2008-10	2009-11	2010-12	2011-13	2012-14	2013-15	2014-16	2007-09	2008-10	2009-11	2010-12	2011-13	2012-14	2013-15	2014-16
BDRS	1	1.04	1.07	1.07	1.04	1.03	1.02		0.93	0.97	1	0.99	0.97	0.95	0.95	
Bournemouth	1										1			0.99	1.03	
Merseyside	1	1.07	1.10	1.11	1.10	1.07	1.05	1.07	0.91	0.97	1	1.01	1.00	0.97	0.96	0.97
Reading	1	1.05	1.03	1.04	1.00	1.01	1.05	1.07	0.97	1.02	1	1.01	0.98	0.99	1.02	1.04
Telford	1	0.96	0.92	0.94	0.94	0.94	0.90		1.09	1.05	1	1.02	1.02	1.02	0.98	
TfGM	1	1.25	1.49	1.55	1.56	1.60	1.61		0.67	0.84	1	1.04	1.05	1.07	1.08	

Highlighted grey cells cover the period of LSTF funding: either Key Component funding in 2011/12 or Large Project funding in 2012/13.
Data are for three year rolling averages.
BDRS – cordon counts for 4 towns 0700 - 1900 on 1 day/ year
Bournemouth – counts at 18 sites with complete data on 1 day/ year
Merseyside – walking levels in mode share surveys (sample sizes 9,000 – 10,000)
Reading – cordon counts in town centre for 12 hours on 1 day/ year
Telford – counts at 19 sites with complete data 0730 – 1800 on 1 day/ year
TfGM – cordon counts in town centres 0730 – 1800

The following Large Projects did not present data from pedestrian counts:

- CENTRO – count data proved to be insufficiently robust for monitoring trends in walking so results were not reported.
- Hertfordshire, Nottingham, Solent, Surrey and WEST.

In summary, the limited data available on the changes in overall levels of walking following LSTF interventions do not provide conclusive evidence of an increase in the level of walking that could be attributable to LSTF interventions; some evidence of an increase was shown in two Large Projects (Reading and TfGM) but three showed an overall decrease and variations in results within Large Projects between towns and individual sites.

In addition to these overall results from pedestrian counts, six Large Projects used area-wide survey data to identify changes in levels of walking. Two Large Projects reported encouraging results (Bournemouth and Nottingham): Bournemouth showed an increase which reflected the count data results while Nottingham identified a significant increase in reported levels of walking. In one case (WEST) there was a decrease in reported level of walking, in one case (Solent) there was no change, and in another (Hertfordshire) there was a small increase which was similar to the increase in the control area. In CENTRO there were mixed results with two national surveys showing a reduction in walking but in the more robust panel survey (albeit a sample of only 900 people), car trips were reported as being substituted for walking on three of the ten corridors and fell on seven corridors, which the Project noted may not have been solely attributable to the LSTF.

- In Bournemouth, data from the National Highways Transport Survey for the relevant wards (around 1,500 respondents each year) show that between 2012 and 2013 there was an increase in the percentage of people reporting that they walk daily (from 53% to 58%), a small decrease walking weekly and monthly and a decrease in the percentage who walk less frequently or never (from 8% to 5%)[65]. These results are of limited value given that they cover only one year after LSTF funding began.
- In CENTRO the residents' panel survey of over 2,000 people carried out in 2014/15 showed that compared with their responses in the 2012/13 baseline, the proportion who reported substituting any car-based trips with walking increased on three of the corridors (from 11% to 18%, 12% to 17% and 14% to 23%) but fell on 7 of the corridors, although it was noted that this may be influenced by factors beyond the LSTF programme; the panel survey showed that overall a smaller proportion of the sample was walking more than 5 days per week (21% in 2013 fell to 17% in 2015) and the average distance travelled per day by each walker fell by 9% from 4km to 3.7km between 2013 and 2015. A downward trend was also found in DfT data showing that the proportion of residents across the West Midlands reporting that they walk at least once a month fell slightly from 83.1% to 82.3% between 2012/13 and 2013/14, while the average number of walk trips recorded in the NTS for West Midlands residents fell by 3% between 2009-2012 and 2012-2014.
- In Hertfordshire, household surveys showed an increase in the reported level of walking between 2012 and 2013 in St Albans (5%) and Hemel Hempstead (4%); this was similar to the proportion in Harpenden, the control town (4%) and indicates that the increases reported may not be attributable to the LSTF interventions.

65 Chi^2 test for association $p=0.005$ for difference 2012 and 2013 and $p<0.001$ for trend

- In Nottingham, monitoring surveys for LSTF initiatives with discernible impacts on walking identified an additional 1.6m walk trips covering an additional 2.3m km; over 63,000 people[66] reported changes in their walking behaviour with 'the majority' indicating more activity.
- In Solent, residents' surveys (n=3,000 – 3,500) carried out in 2012-13 and at the end of 2015 found a significant increase in the proportion of people reporting that they walked on 5 or more days each week (from 45% to 60%) on one group of corridors, but no change overall and no change in the proportion who said they intended to walk more often.
- In WEST, data from the National Highways Transport Survey showed that the reported frequency of walking decreased between 2013 and 2015; the proportion who said they walked at least 2-3 times per week fell from 79% to 75% and the proportion saying they walked less than once a month or never increased slightly from 9% to 10%.
- In WEST there is inconclusive evidence on the impact on walking to work from the Bristol Quality of Life Survey; the proportion walking to work increased from 17% in 2010, 2011 and 2012 to 20% in 2014 but the figures for 2014 are not considered to be comparable with those for previous years and the level fell to 15% in the intervening year (2013).

In Nottingham, 'stated change' surveys among participants in the workplace challenge and users of cycle facilities, led walks and 20mph zones identified an increase in walking of just over 58km per person per year.

8.6 Intervention-level outcomes for walking from Outcomes Reports

Evaluation of specific interventions aimed at encouraging walking was reported in ten of the Large Projects. Seven of these Large Projects carried out surveys of users and participants, while in BDRS, Bournemouth, Hertfordshire, Nottingham, Telford and TfGM, pedestrian count results for sites affected by the LSTF interventions were analysed. The key outcomes identified in this way are summarised in Table 8.4.

The surveys tend to be small scale – with between a few hundred and 2,000 participants – but show encouraging results in most cases. However, the indicators used tend to be indirect measures of the impact of interventions on the amount of walking as a mode of transport. Examples of the measures used include: the number of people taking part in organised walks; a change in the proportion who report that they never walk or walk more frequently after an intervention; and the number of people who report that a new route has encouraged them to walk more.

A few examples of direct impacts were reported, for example: the increase in footfall on a new pedestrian link or shared pedestrian and cycle path; and an increase in the number of journeys by walk or cycle after implementing 20mph speed limits over and above the increase in a control area.

The interventions for which targeted evaluations did not show any evidence of an increase in walking were the town centre improvements in Telford, where pedestrian numbers fell. This may be attributed to a shift in pedestrian movements and other developments in the town centre. In addition, there was only weak evidence (due to a limited sample) of an increase in walking associated with 20mph speed limits in Nottingham.

66 The sample size and response rate were not given

Table 8.4: Reported outcomes of specific walking interventions

Large Project	Outcomes from individual schemes
BDRS	• The number of pedestrians counted using the Blackburn Meadows towpath over a four month period almost doubled between 2012 and 2015 (from 3,390 to 6,623). • 5,000 people per day benefitted from footpath improvements at Wetmoor Lane in Rotherham. • 4,013 adults took part in led walks. • A pedometer challenge at 35 workplaces in Rotherham recorded 11.5m steps over a month. • Three months after participating in Sheffield 'WalkBoost' initiatives, 62% of the 567 respondents^ reported walking more than when they first joined the programme, with an average increase of 81 minutes per person per week, while 14% reported driving less.
Bournemouth	• Short term (1-3 day) manual traffic counts at LSTF sites where infrastructure improvements were made appear to show an increase in pedestrian flows at two sites (a footway widening and upgrading a pedestrian route to a shared cycle path), but inconclusive results at three sites.
CENTRO	• Following personalised travel planning initiatives, on two corridors focused on commuters the proportion of people (n=~600) who said they walked more than once a week increased from 81% to 83%, while on two corridors focused on cycling, there was an increase in the average number of walk trips from 2.37 to 2.77 per day, with overall 39% reporting an increase in walking, with higher proportions among car owners (64%) and non-drivers (50%). • On the corridor between Walsall and Merry Hill, where infrastructure schemes were focused to support the switch to sustainable travel, there was a mode shift towards walk from 2.7% to 5.1% of all trips. The proportion of people walking to education and work increased to a greater extent than on other corridors (2% points compared with a 1% point increase at workplaces; and 4% points compared with 3% points at education establishments). The proportion who reported replacing car-based trips with walking in the previous year increased from 11% in 2013 to 18% in 2015. • Monitoring of education travel plans identified 69% of 11-16 pupils reporting that they walked more; an increase in walking was also reported among older pupils from 4% to 7% of trips.
Hertfordshire	• One new footway was completed in September 2014, providing a link to a new market; video surveys identified an initial increase in footfall compared with 2012 of 15% on weekdays and 3% on Saturdays.
Merseyside	• Surveys of over 700 people using traffic free routes at 21 sites were carried out in 2014 and 2015; they showed that the routes are used for a combination of work and leisure, and are used as part of the regular weekly routines, with over half using the route for over 18 months. Almost half said the route had encouraged them to walk or cycle more and just over half said the route had encouraged them to increase their level of physical activity.

^ 35% of the people who registered to join the scheme

Large Project	Outcomes from individual schemes
Nottingham	• Inconclusive evidence is available on the 20mph zones due to small samples (one day before and one after in one of the areas treated); in one area a 17.5% increase in walking and cycling (mainly walking) exceeded the increase recorded at control sites (11.2%) without the 20mph limit. • Personal journey planning with almost 12,000 beneficiaries recorded an additional 580,000 walk trips. • Jobseeker personal journey planning recorded an additional 314,000 walk trips.
Reading	• A new pedestrian and cycle bridge across the Thames with a link to the town centre encouraged walking into the centre at peak times and at weekends. One day counts of pedestrians using the bridges 9 months after the opening of the new bridge found a 24% increase in the morning peak (8 – 9 am) and a 13% increase in the evening peak (6 – 7 pm), compared with 2013. Over half of bridge users said the new bridge had encouraged them to walk or cycle and 11% said they had previously made their trip by car. • The 'Beat the Streets' scheme, which was piloted through LSTF, found that four fifths of participants said it helped them to walk or cycle more and the percentage of people meeting Department of Health targets for physical activity increased from 40% to 48% by the end of the monitoring period.
Solent	• After 15 months of a 10-week active travel programme aimed at encouraging walking and cycling, 126 people had registered; 64 had completed follow up surveys, which showed the number of hours spent in physical activity more than doubled during the programme (4.6 to 9.7 per week) and time spent on car travel fell from 5.8 to 2.7 hours per week; and 49% reported less distance travelled by car after the programme ~. • 2,000 people signed up for a Commuter Challenge and around 200 provided follow-up data; 15% began walking; 41% said their level of walking had increased to some degree; and walking was done on more days of the week, with an extra 8 minutes walked per week ~. • The average number of days reported to be spent walking was significantly * higher among residents stating that the 'My Journey' brand had influenced their behaviour than among those who were aware of the brand but did not claim to have been influenced by it (n=3,000 – 3,500) in surveys at the end of 2015; those influenced by 'My Journey' reported walking for 7% more of their journeys than those who were not aware of the brand and around a third of those aware of 'My Journey' (equivalent to 9% of all those surveyed) said it had encouraged them to walk, cycle or use public transport more often.

~ These results are from the 2013/14 Outcomes Report

* 99% confidence level

Large Project	Outcomes from individual schemes
Telford	One day count data were analysed for sites affected by LSTF interventions: • Silkin Way results showed a lower count in 2012 than in preceding or subsequent years and a higher count in 2015 than in any year since counts started in 2001; thus, although this increase in walking may be attributable to the improved multi-user route, the scale of the increase is difficult to quantify as it depends on which year is used as the baseline. • Another site at Newport showed a 58% increase in pedestrians (from 40 in 2012 to 63 in 2015, which was a reduction from 77 in 2014); the increase is attributed to LSTF funding for a shared path; and crossings and signs encouraging walking between Newport and Telford. The subsequent addition of further signage is expected to lead to a further increase. • Combined results for four town centre count sites, where much of the LSTF investment was focused, showed a 26% decrease in walking between 2012 and 2015 which is attributed partly to shifts in pedestrian movements associated with the interventions and other developments affecting overall levels of demand. Walking tends to have increased in primary schools with several walking programmes in place: • Peer promotion and other activities to promote walking in primary schools resulted in between 30% and 66% of schools seeing an increase in walking, with the proportion varying between different initiatives. The highest proportions were associated with interventions providing additional scooter storage (63%) and peer promotion (66%) while the lowest increases in walking (30%) were seen both at schools with up-to-date travel plans ('Mode Shift Stars') and at schools participating in the Telford Travel to School Network which provided access to activities and assemblies.

Large Project	Outcomes from individual schemes
TfGM	Count data collected at specific sites showed: • A decrease in pedestrians on the Bolton East off-road cycleway of 15% between July 2014 and September 2015, which may be attributable to the change in survey month. • On the Rochdale Canal off-road cycle route, the pedestrian count increased by 42% (925 to 1318 in four-day counts) by summer 2015, four months after the route was completed. • Pedestrian counts at a key junction improvement near Oldham Town Centre that was expected to improved pedestrian access found that, comparing 2013 and 2014 (three-day counts), pedestrian flows reduced overall, although there was an increase in pedestrian movements at one arm of the junction. The Large Project concluded that changes at nearby sites and the poorer weather during the 2014 counts affected the pedestrian count data gathered at this junction. • Pedestrian counts at Salford Quays where cycle and pedestrian routes for commuters were improved showed a slight fall (1%) over the seven routes between 2012 and 2015, while Port Salford Greenway showed a 4% reduction in pedestrians between September 2014 (before improvements) and September 2015 but a 34% increase in pedestrians at another access point to the route. • Pedestrian counts on the Peak Forest Canal saw a 19% increase in pedestrians at one site between July 2014 and July 2015, but an 8% reduction over this period at a second site. • Annual cordon counts at Stockport centre show no change in pedestrian flows over the term of the LSTF investment. Increases in walking were reported following residential travel planning: • 12 months after personalised travel planning, among just under 700 people surveyed, 16% reported walking more and 7% reported walking less (compared with 10% in the control group of almost 250 who reported walking more and 9% in the control group walking less (statistically significant difference, p=0.02 in a chi-squared test for trend)); 12% of the 106 people walking more in the PTP group said this was due to personal travel planning to some extent. Surveys of some 1,750 people at sites where routes had been improved for walking and cycling showed evidence that the improvements were influencing choice of route and in a few cases, choice of mode; the results combine pedestrians and cyclists and about half of the users surveyed were walking: • An increase in active travel was observed, with 22% of users saying they had not made that journey before the route was opened and 70% saying the presence of the route had increased their level of physical activity. • There was evidence of small scale reduction in car use: 2% reported shifting from car for that journey.

Large Project	Outcomes from individual schemes
WEST	• A small scale survey among 62 people receiving travel advice or cycling support reported increasing the amount of walking (21%) ^. • Surveys before and after the introduction of 20mph zones in one area found that the proportion of residents reporting that they walked for 10 minutes or more in their local area increased significantly (p=0.003) from 78% to 88% (n=250) ^ (note that results for other areas will be available in the final evaluation report).

^ These results are from the 2013/14 Outcomes Report

8.7 Conclusions on outcomes related to walking

Nationally, as outlined in Section 8.3, different data sources show somewhat different patterns with respect to trends in the amount of walking. The National Travel Survey indicates that walking levels have declined nationally since 2005 and perhaps since 2011, particularly with respect to the number of walking trips. On the other hand, the Active People Survey indicates little change in the number of days in the past month on which people report having made walking trips, and in 2014/15 shows an increase in the number of days on which people made trips of ≥10 minutes. In the Active People Survey, there was no evidence of any change in walking in the Large Projects as a whole that differed from the background trends in the national comparison group.

An overview of the walking data from the Large Projects is presented in Table 8.5.

There is evidence that Nottingham and perhaps Solent have seen an increase in walking above the background trend, although the results should be treated with caution since they may reflect chance findings (visual inspection of the data provides some suggestion that the 2012 baseline year was below average for walking in both of these Large Projects).

A few individual schemes have produced encouraging results in several of the Large Projects (BDRS, Bournemouth, CENTRO, Hertfordshire, Reading, Solent, Telford, TfGM and WEST) although these are small in scale. In some cases these were through indirect measures such as people reporting that they have been walking more frequently following participation in a scheme. Examples included: 62% of 'WalkBoost' participants in Sheffield reported walking more three months later; 64% of car owners and 50% of non-drivers reported walking more after personal travel planning on two CENTRO corridors; four-fifths of participants in the 'Beat the Streets' scheme in Reading said it helped them to walk more; after a commuter challenge in Solent participants recorded an extra 8 minutes walked per week; in a 20mph zone in WEST there was a significant increase in people walking for 10 minutes or more in their local area (from 78% to 88%). In five cases there were direct measures of increased levels of walking: higher flows at two improved routes in Bournemouth; higher flows on a new footway in Hertfordshire; increased flows after a new bridge was built in Reading of 24% in the morning peak and 13% in the afternoon peak; a 42% increase in pedestrians on a canal side route in Rochdale; and a 58% increase in pedestrians on a shared path in Telford.

The limited data on changes in overall levels of walking which can be attributed to LSTF interventions do not point to a clear conclusion, in some cases because there is insufficient data and in others because the data available shows variations from year to year and from one town or area to another. On an area-wide basis there are external influences which may affect the level of walking so it is not yet possible to ascertain whether the changes are attributable to the LSTF. However, attribution can be established for new interventions which have received LSTF funding and have been evaluated directly, as in the examples above.

Four Large Projects showed evidence of an increase in walking, two of which (Reading and Nottingham) had implemented many schemes aimed at increasing active travel in general or walking in particular.

- In Bournemouth there was an overall increase in walking recorded in counts on the LSTF corridor and in reported levels of walking in the household survey (3% between 2009-11 and 2013-15).
- There is limited evidence for an increase in walking into Reading town centre with 23% more pedestrians in 2015 than in 2007, although the trend between these years shows substantial fluctuation and the following year the increase was just 9%, which is attributed to wet weather on the survey day.
- In Nottingham, monitoring surveys for LSTF initiatives with discernible impacts on walking identified an additional 1.6m walk trips, averaging just over 58km per person per year; this supports the evidence from the Active People Survey of an overall increase in walking since 2012.
- Between 2010 and 2015 the level of walking during the daytime in the ten urban areas in TfGM increased by 2.5%, continuing the increase observed in the previous four years.

Another project (CENTRO) found car trips had been replaced by walking in some areas, but the project noted that this may not have been solely attributable to the LSTF.

However, as in the national data on walking, walking levels appear to have declined in three Large Projects (BDRS, Merseyside and Telford), although one of the BDRS towns showed a modest increase in walking and some of the LSTF sites in Telford showed an increase which may reflect other factors not related to the LSTF interventions. Contradictory results in Merseyside showed a 4% increase in walking to urban centres between 2013 and 2016 (after a decline between 2013 and 2015) but a 7% reduction in walking at LSTF sites between 2013 and 2015. Survey data also indicate a decline in reported frequency of walking in a fourth Large Project: WEST.

Table 8.5: Overview of outcomes related to walking

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
BDRS	🟥	Cordon counts show decrease in level of walking in Barnsley and Sheffield (12% and 14%) since 2011; inconclusive in Rotherham and a small increase in Doncaster (3%).	-
	🟩	In Sheffield the community events and walking schemes based around businesses and employers encouraged 62% of participants to walk more, with an average increase of 81 minutes per person per week.	Yes
	⬜	Led walks and route improvements showed promising levels of participation but impacts on overall levels of walking are unclear.	-
Bournemouth	🟩	Annual one day counts on the LSTF corridor show an average increase of 7%, comparing 2015 with the 2009-11 average, but with variations between -27% and +90% at individual sites.	-
	⬜	Short term manual traffic counts at LSTF sites where improvements were made show an increase in pedestrian flows at two sites, but inconclusive results at three sites.	
	🟩	Household surveys show a small short term increase in people saying they walk every day, every week and every month	-
CENTRO	🟥	Area-wide data generally show a decline in walking.	-
	🟩	Results for some schemes provide indications of an increase in walking where efforts were concentrated to improve infrastructure to support other LSTF activities; after personal travel planning on two corridors, 64% of car owners and 50% of non-drivers reported walking more.	?
Hertfordshire	⬜	Area-wide count data are not available.	-
	🟩	Area-wide household surveys show a small increase in the reported level of walking which was similar in the control area.	
Merseyside	🟥	Counts show a 7% reduction in the level of walking at LSTF sites between 2013 and 2015. This compared with a larger (12%) reduction in people walking into urban centres in the morning peak which was reversed in 2016, when 4% more people were recorded walking into urban centres than in 2013.	-
	🟩		
Nottingham	🟩	The Active People Survey provides strong evidence of an increase in walking compared with the background trend.	?
	🟩	Monitoring surveys for LSTF initiatives with discernible impacts on walking identified an additional 1.6m walk trips, averaging just over 58km per person per year.	Yes
Reading	🟩	Possible increase in pedestrians going into the town centre (23% more in 2015 and 9% more in 2016 than in 2007, but trend is variable).	?
	🟩	Increase in pedestrians crossing the Thames following construction of a new pedestrian/ cycle bridge.	Yes

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
Solent	■	No overall monitoring data available.	-
	■	Active People Survey data indicates that there may have been an increase in walking compared with the background trend.	?
	■	After a commuter challenge, 41% reported an increase in walking of 8 minutes per week, while the 'My Journey' brand is reported to have had a positive influence on active travel.	Yes
Surrey	☐	No evidence on walking provided	-
Telford	■	The limited count data available show a decrease in overall levels of walking.	-
	■	Some specific sites and schemes are claimed to have seen LSTF-related increases in walking.	Yes
TfGM	■	Upward trend in walking in the ten urban areas between 2010 and 2015 (2.5% in the daytime) continuing a previous trend.	-
	■	16% of participants in residential travel planning schemes reported walking more and some of these attributed it to the travel planning, while walking to work increased following workplace travel plans.	Yes
WEST	■	No overall data available on walking levels yet but survey data shows a decline in reported levels of walking. Early results from one 20mph zone indicate positive results on the reported frequency of walking with the proportion walking for 10 minutes or more increasing from 78% to 88%.	-

■ decrease in walking; ■ no change in walking; ■ increase in walking; ■ insufficient data to assess impact on walking; ☐ too few schemes completed to be expected to affect walking.
'Overview' only shows direction of change if significant schemes that might be expected to have an effect on walking have been completed.
~ Different Large Projects treat different time periods as 'baseline'. Changes summarised here are since 2011/12 for Large Projects that received Key Component funding (BDRS, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST), and since 2012/13 for Large Projects that did not receive Key Component funding (Bournemouth, CENTRO, Reading, Solent).

9 Economy: support for job-seekers

Key points:

Many Large Projects developed innovative ways to target job-seekers, especially hard to reach groups, and support new starters. Survey evidence suggests that the programmes helped significant numbers of job-seekers make trips to interviews, training or work that would have been difficult otherwise. Many of the job-seekers supported have subsequently secured and maintained paid employment. This has produced significant economic benefits in the Large Projects where these are estimated.

BDRS, Merseyside, Nottingham and TfGM in particular developed large-scale support programmes for job-seekers, reaching a substantial proportion (>10%) of unemployed people and offering a comprehensive range of services. CENTRO, Solent and WEST also offered substantial support and reached a smaller but still significant proportion (>5%) of job-seekers in their areas.

Across all 12 Large Projects, the total number of job-seekers helped across the whole funding period was approximately 91,000.

9.1 Overview of objectives and outputs targeting job-seekers

Eight of the 12 Large Projects had objectives relating to job-seekers, mostly around improving access to jobs rather than reducing unemployment *per se*. Seven Large Projects included significant activity aimed at making it easier for unemployed people to gain access to interviews, training or employment. The main activities were:

- **Free or discounted public transport travel:** free one-day / one-week tickets to enable travel to interviews or short-term training; discounted public transport travel for job-seekers; and free travel for job-seekers in the first 1-4 months after starting a new job.
- **Personalised travel planning and 'travel training':** travel training workshops at Work Clubs or Job Clubs to help people to plan journeys; one-to-one personalised journey planning at job centres and via travel hubs, travel 'surgeries' and information stalls; and training for employment advisers at job centres, Work Programme providers, etc, to enable them to offer travel support to job-seekers and training to help people travel independently to job interviews.
- **Moped or bike loan:** short-term loan or hire-purchase of a moped, bike or electric bike for people who had been offered a job or training but were unable to get there by any other means of transport.
- **Cycle services:** free or low-cost refurbished bicycles and cycle safety equipment for job-seekers or people who had been offered a job; sometimes accompanied by cycle training and bike maintenance training.
- **Direct job creation:** some Large Projects sought to recruit previously unemployed people to transport-related jobs, either related to the delivery of the LSTF programme or more generally.

Some Large Projects also funded new bus services or bookable community transport services to hard-to-reach major employment sites, which in certain cases enabled unemployed people to take jobs that would not otherwise be accessible to them.

Table 9.1 summarises relevant project objectives and provides an overview of main activities.

Table 9.1: Summary of objectives and interventions supporting job-seekers

	Objective to support job-seekers?	Summary of objective related to job-seekers	Job-seeker support delivered?	Interventions supporting job-seekers delivered so far
BDRS	Yes	Key Component addresses 'the local urgent challenges faced by our communities, and focuses upon people entering employment or acquiring work skills'	Substantial	Travel training workshops at Work Clubs / job clubs; free public transport tickets for travel to interviews / work placements; Wheels 2 Work moped loans; travel training for independent travel; provision of travel buddies
Bournemouth	No	-	Minor	Provision of vouchers for bike and cycle equipment
CENTRO	Yes	Increase the number of people finding employment through WorkWise initiatives and support	Substantial	Personalised information, advice and journey planning for travelling to interviews, training and new jobs by bus, train, Midland Metro, car sharing, on foot or by bike; free day tickets to attend interviews; and free monthly travel passes for the first two months of a new job.
Hertfordshire	Yes	To maximise contribution to…economic growth by ensuring that…unemployed people can gain work	Minor, continuing	Provision of mopeds on hire-purchase to job-seekers
Merseyside	Yes	Deliver real benefits to Merseyside through measures that…enhance access to employment and broaden travel horizons	Substantial	Free public transport tickets for travel to new jobs; personalised journey plans; free bicycles; cycle training and bike maintenance training; moped hire-purchase; transport-related jobs for young job-seekers
Nottingham	Yes	Link people to jobs by reducing barriers to accessing services and opportunities, particularly in terms of affordability and low travel horizons	Substantial	Half-price public transport travel for job-seekers; free multi-operator tickets for new job starters, trainees and apprentices; personalised travel information; bike loans for job-seekers and new starters, free refurbished bicycles; transport-related jobs for job-seekers
Reading	No	-	Minor	Personalised travel information at job centres
Solent	Yes	Reduce unemployment in areas of deprivation through improved sustainable access to employment centres	Substantial	3 months' free public transport travel to help job-seekers with finding a job; travel advisers in job centres
Surrey	No	-	Minor	Cycle hubs helped NEETs gain bike refurbishment skills
Telford	No	Investment in low carbon, low cost transport will help improve travel horizons and opportunities especially for groups such as the young and unemployed	Minor	Bike, moped or electric bike loans; travel advice or travel plans, car health checks or car repair grants for job-seekers to help gain access to work

	Objective to support job-seekers?	Summary of objective related to job-seekers	Job-seeker support delivered?	Interventions supporting job-seekers delivered so far
TfGM	Yes	Supporting areas with high deprivation and unemployment, by removing problems of access to adjacent employment opportunities or into the wider public transport network	Substantial	Free and discounted public transport tickets for travel to interviews and new jobs; journey planning advice; free refurbished bicycles and cycle training; community transport services to major employment sites; training for long term unemployed people to secure jobs with commercial and community bus operators
WEST	Yes	Improve access to employment, training and education.	Substantial	Free public transport tickets for travel to interviews, training and new jobs; scooter and bicycle loans

9.2 Scale of activity

Table 9.2 summarises the scale of job-seeker support programmes. Detail on the scale of job-seeker support in each Large Project is based on information in the Annual Outcomes Reports and Annual Outputs Surveys adjusted or supplemented where necessary following scrutiny.

The 2014/15 Outputs Surveys asked all LSTF projects to report a single headline figure for the number of job-seekers who had received individual support to gain access to work since the start of LSTF funding. Based on the headline figures in the 2014/15 Outputs Surveys the total number of job-seekers helped by the 12 Large Projects would be approximately 91,000. The reported headline figures are not directly comparable to those given in Table 9.2, because the reporting period is slightly different[67] and some Large Projects may have interpreted the question in the 2014/15 Outputs Survey in different ways, and hence under- or over-reported. The individual Large Project figures were therefore adjusted (sometimes upwards and sometimes downwards) following scrutiny of the detailed figures in the Outcomes Reports.

A final estimate, summarised in Table 9.2, confirms that about 91,000 job-seekers have been helped by the 12 Large Projects over the LSTF period. While figures should be considered approximate, these adjusted estimates suggest that some Large Projects appeared to have reached significant numbers of job-seekers and those in training with around one quarter of these in TfGM, over a fifth in BDRS, and over a tenth each in Merseyside, CENTRO and Nottingham. Figure 9.1 shows the total number of job-seekers supported (including those given advice or information only) as well as a lower figure which represents the number of job-seekers helped in more substantive ways through provision of free or discounted public transport, moped loans, recycled bikes etc. Some of the Large Projects significantly increased the numbers of job-seekers reached in the last year of the LSTF programme. In the case of TfGM this appeared to be due to development of highly effective methods of engagement, training employment advisors in Job Centres. In the case of BDRS, realignment of delivery of the scheme and budget to coincide with another LSTF project (BusBoost) enabled many more job-seekers to be reached.

The number of job-seekers supported by each Large Project can also be related to overall levels of unemployment in the area over the programme lifetime. Figure 9.2 illustrates the scale of activity and shows the proportion of job-seekers helped, including and excluding the numbers who were given personal journey advice or information only. Note these figures should be viewed as conservative as combining two years of unemployment data may overestimate the 'pool' of unemployed people who were potentially eligible for help since some of the same people will have been out of work in both years.

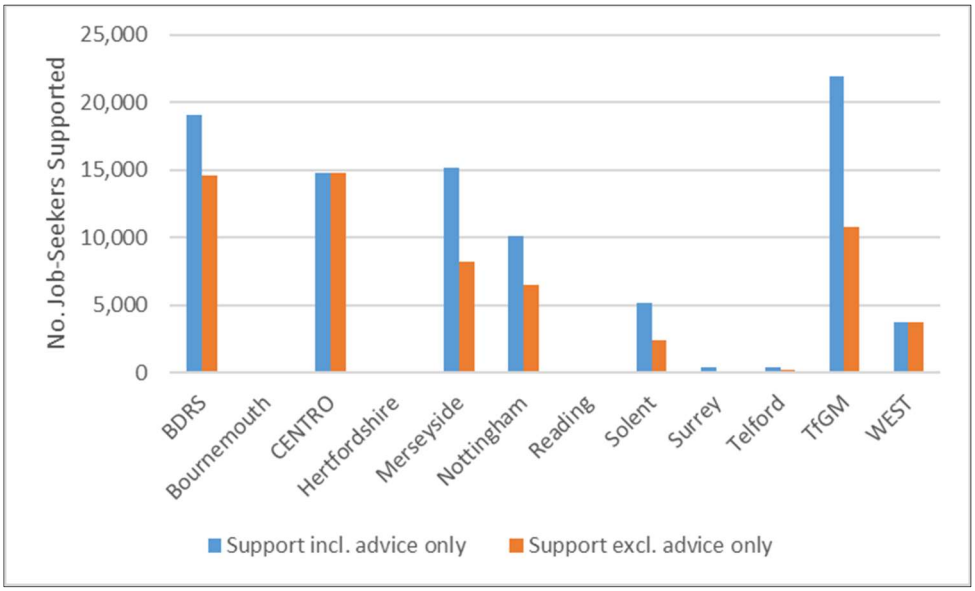
Across all 12 Large Projects combined, the total number of job-seekers helped during the whole funding period is approximately 10%[68] (on average) of the number of 16-64 year-olds who were unemployed in these 12 areas during 2013/14 and 2014/15 combined. The total number of job-seekers helped in more substantive ways is approximately 7% on average of the number of 16-64 year olds unemployed in the 12 areas during 2013/14 and 2014/15.

67 To March 2015 for the Outputs Surveys while some of the Outcomes Reports report up to September 2015 or January 2016.

68 The figure is based on the adjusted estimates of the total number of job-seekers supported over the LSFT period, using evidence from the 2014/15 Outcomes Reports and Outputs Surveys up to 2014/15, as a proportion of unemployed in the years July 2013 to June 2014 and July 2014 to June 2015 combined.

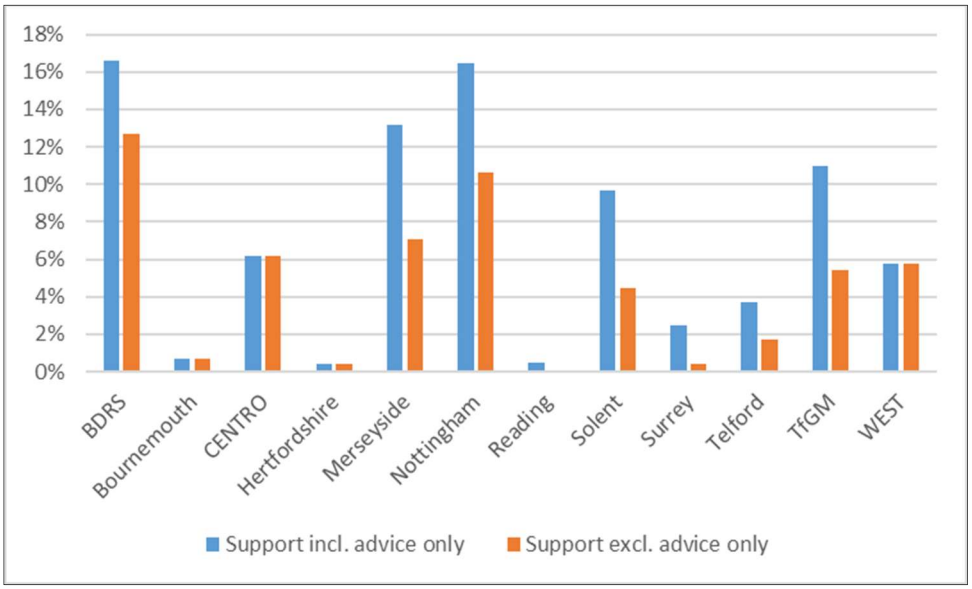
Figure 9.2 shows that BDRS, Merseyside, Nottingham and TfGM supported significant numbers of job-seekers equivalent to 10-17% of unemployed 16-60 year olds in their areas. CENTRO, Solent and WEST also supported significant numbers of job-seekers though less than 10% of unemployed 16-64 year olds in these areas.

Figure 9.1 Numbers of job-seekers supported over the LSTF period, including and excluding those given advice or information only, in each of the 12 Large Projects.



Note: Figures are our best estimates based on detailed scrutiny of Outcomes Reports, Outputs Surveys and other information, and in some cases differ from headline figures provided by Large Projects in 2014/15 Outputs Surveys.

Figure 9.2: Supported job-seekers (including and excluding those given advice only) over the LSTF period as a proportion of number of unemployed 16-64 year-olds, July 2013-June 2015 combined.



Figures for number of job-seekers supported are derived from Large Project 2014/15 Outcomes Reports, 2014/15 Output Reports, adjusted where necessary, and adjusted figures from the 2013/14 Interim Meta-Analysis. For Large Projects where major amendments have been made, these have been checked with the programme manager. Differences mainly arise because of double counting or different reporting periods. Number of unemployed 16-64 year-olds in 2013/14 and 2014/15 are from Table LI01 on the ONS Nomis website for relevant local authorities in the 12 Large Project areas. Thanks to Bob Watson of ONS for help sourcing unemployment data.

Table 9.2: Scale of activity to support job-seekers, over the LSTF funding period

	Free / discounted public transport travel	Travel training / personalised journey planning	Moped loan	Cycle services	Other
BDRS	13,181 job-seekers received free tickets to attend interviews, work placements or training; an additional 935 free tickets were issued to job-seekers to support independent travel.	4,500 job-seekers received journey advice. 307 people with learning difficulties/disabilities received travel training over 3 years to help them travel independently.	948 people loaned moped to access work, education or training (1,101 by June 2015)		
Bournemouth				135 job-seekers offered vouchers for bike and equipment	
CENTRO	14,722 job-seekers received free tickets: 10,858 received a travel pass for first one/two months of new employment; 7,799 received one day travel passes to attend job interviews (note some double counting).				
Hertfordshire		82 students with special needs helped with independent travel training	76 people offered hire purchase moped		
Merseyside	6,705 job-seekers offered free travel passes for the first month of new employment	5,377 job-seekers offered personalised journey plans In addition, 1,642 NEETs offered Personalised Journey Plans or travel training.	61 young people offered moped loan	1,281 job-seekers offered free bicycle to get to work; 154 offered cycle training; 163 offered bike maintenance training	'Employment in the Transport Sector' programme created 107 jobs filled by young job-seekers

	Free / discounted public transport travel	Travel training / personalised journey planning	Moped loan	Cycle services	Other
Nottingham	4,377 people received Jobseekers' Citycard (discounted Kangaroo tickets) funded by LSTF^ 1,967 new starters received one month's free travel to a new job. An additional 9,250 young people from low income households received free 16-19 Kangaroos to help access employment and education (not included in total).	5,422 job-seekers offered travel information via travel surgeries at Job Centres, Job Fairs and Job Clubs or via phone/email.		122 job-seekers offered free refurbished bike and accessories Cycle training, bike maintenance and other cycle activities also provided.	37 people gained employment in sustainable transport
Reading		48 job-seekers received personalised journey advice via road shows at job centres			
Solent	2,350 job-seekers offered 3 months free public transport to help with job searches	2,787 job seekers received travel advice			
Surrey		324 job-seekers received journey planning advice	15 job-seekers received moped loans-	45 job-seekers received free bikes	2 volunteer cycle hubs develop skills in bike refurbishing by NEETs Funding provided to community based projects aiming to improve access to jobs and skills

^ Up to March 2014 the Jobseekers' Citycard was funded by the City Deal, not LSTF. It was funded by LSTF from March 2014. A further 5,061 people received Jobseeker Citycards in 2013/14 but data presented in this report refers only to the LSTF-funded tickets.

	Free / discounted public transport travel	Travel training / personalised journey planning	Moped loan	Cycle services	Other
Telford (to March 2016)	1 person received discounted public transport ticket through Wheels to Work	203 people received travel plan or advice to help access training, employment or education	43 people offered moped loan of which 14 received moped training to help access training, employment or education.	125 people received bike or electric bike loans to help access training, employment or education	3 people received car health check, 1 of which received car repair grant to help access training, employment or education
TfGM	10,437 job-seekers~ received 27,137 free public transport tickets to attend interviews or for first 1 month of employment up to January 2016 (14,878 free 1-day tickets and 12,259 28-day tickets)	11,100 job-seekers received journey planning advice via travel surgeries; 420 employment advisers trained to offer travel support; and an additional 1,200 job-seekers reached through training and promotion events		308 job-seekers offered free refurbished bike and accessories of which 150 received bike training	4 Local Link community transport services to major employment sites
WEST	3,679 free public transport tickets distributed to people to attend interviews or training, or for first month of new employment		10 job-seekers offered 'loan to buy' a moped	25 job-seekers offered free loan of a bicycle for 2-6 months	

Figures are taken from 2014/15 Outcomes Reports and 2011/12, 2012/13, 2013/14 and 2014/15 Outputs Surveys. Note that some numbers may relate to the period covered in the Annual Outputs Survey (i.e. to March 2015), while others may relate to the period covered in the Annual Outcomes Report (i.e. to September 2015) or later. Some outputs arising from funding from other sources (local contribution and/or other DfT sources such as City Deal) are included. There is likely to be some 'double counting' in that some job-seekers may have received more than one service, though the travel training/personalised journey planning figures generally represent those who received advice only and no other service.

~ Our estimate based on correction factor applied to ticket numbers, derived from survey results of job-seekers indicating what percentage had received more than one ticket.

9.3 Metrics used to monitor job-seeker support programmes

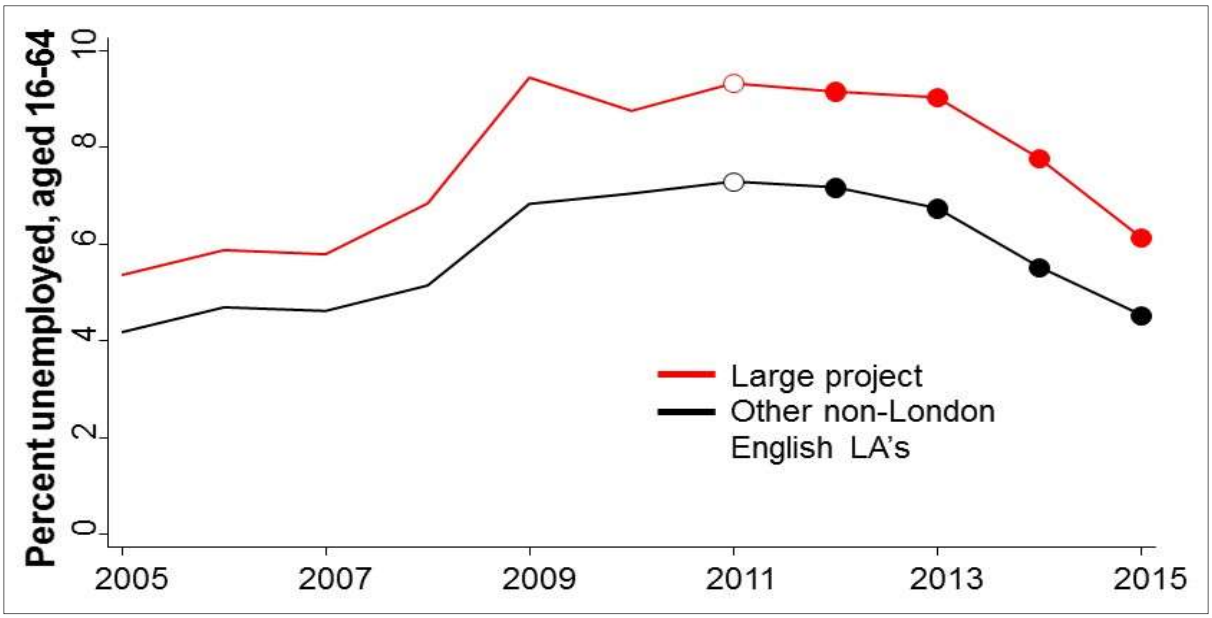
Identification of a single, simple metric is challenging because of the very wide range of types of support being offered, to people at different stages in their job search, and by a number of different agencies. Further, as many of the objectives and activities were around improving access to jobs, particularly for hard-to-reach groups, rather than direct job creation, the activities were more likely to affect 'who the jobs went to' rather than net levels of employment.

Nevertheless, in the absence of a more appropriate metric, unemployment rate was chosen at the outset of the meta-analysis as a crude high-level indicator of the effect of job-seeker support programmes. In the event, the scale of delivery of job-seeker support programmes was insufficient for any impacts to be detectable using this metric; however, evidence using this metric is reported in section 9.4. Other scheme-specific evidence of the effect of job-seeker support programmes is included in Outcomes Reports, commonly based on surveys, and this is reported in section 9.5.

9.4 High-level outcomes of job-seeker support programmes

There is no clear indication that the various forms of travel support offered to job-seekers resulted in lower levels of unemployment in the Local Authority areas overall than would otherwise be the case. Figure 9.3 shows how the proportion of unemployed people changed over time (from 2005 to 2015) across all Large Projects combined. Since 2011, unemployment has fallen across the 12 Large Projects, but the change is parallel to that seen in other non-London English local authorities.

Figure 9.3: Proportion of 16-64 year-olds unemployed, 2005 – 2015 (all Large Projects combined)



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

This null result is unsurprising, given the relatively small proportion of job-seekers who secured employment as a direct result of the programmes and the wider macroeconomic factors that affect unemployment levels. As noted above, the objective of the job-seekers programmes was generally to remove barriers such as travel cost or lack of transport options to employment sites, rather than job creation itself. A few Large Projects also provided training for jobs in the transport sector, or independent travel training for people with learning difficulties or disabilities. The effect of all of these programmes is to widen opportunities for job-seekers and enable them to access jobs or training they would not otherwise have been able to interview for, accept or maintain.

Figure 9.4: Proportion of 16-64 year olds unemployed, 2005-2015

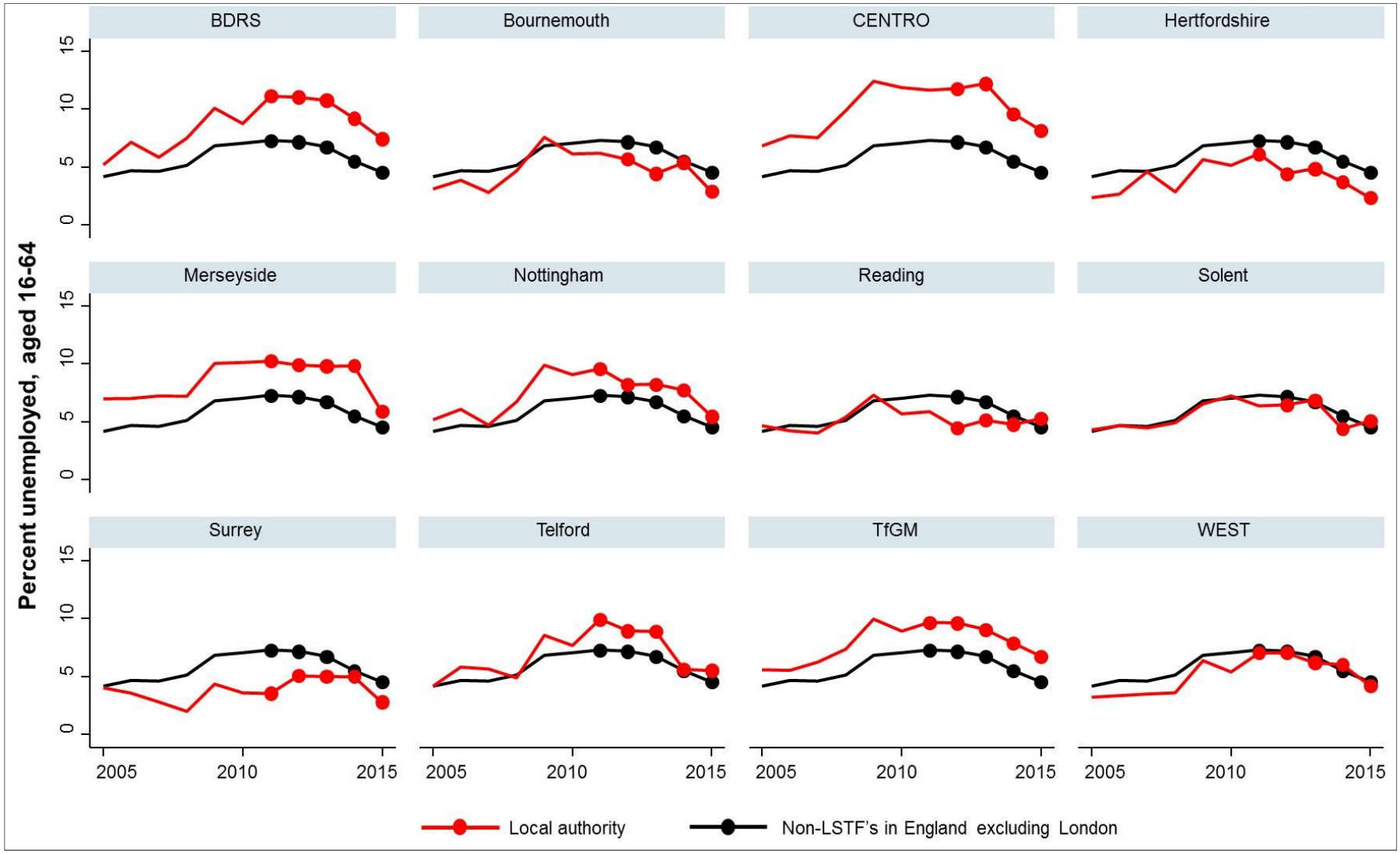


Figure 9.4 shows the change in the proportion of unemployed 16-64 year-olds for each Large Project, and for non-LSTF local authorities excluding London in calendar years 2005 to 2015. Since 2011, all but one of the Large Projects, Reading, show a fall in unemployment, as do non-LSTF local authorities outside London. There is no clear difference in unemployment trends between some of the Large Projects with a more substantial job-seeker support programme (BDRS, CENTRO and TfGM) and those with a smaller job-seeker support programme, suggesting that other local factors are more important determinants of unemployment levels. Merseyside which had a substantial job-seeker support programme, appears to show fairly significant falls in unemployment levels between 2014 and 2015. However, the Outcomes Report for Merseyside notes this is more likely to be related to changes in claimant rules introduced by DWP resulting in more job-seekers becoming ineligible or having their benefits stopped, since the employment level fell over the same period. This is likely to have contributed to at least some of the fall in unemployment in other Large Projects between 2014 and 2015.

9.5 Intervention-level outcomes of job-seeker support programmes

While results are hard to see at a local authority level, positive results are evident at a project or programme level. Various survey results reported in 2014/15 Outcomes Reports suggest that support programmes for job-seekers have been helpful in enabling people to gain access to jobs. These are summarised in Table 9.3. The main results are:

Evidence that LSTF programmes helped people find and maintain jobs through travel support

- **Free or discounted public transport tickets**: 20% of job-seekers in BDRS and 21% of job-seekers in Nottingham who were offered free or discounted public transport tickets in order to help in their job search subsequently succeeded in gaining work. The results are likely to have been attributable in large part to the intervention, with 83% of job-seekers in Nottingham who received half fare (Kangaroo) passes saying it would not have been possible to access an interview / employment due to the cost of public transport, indicating the initiative expanded the job search area and opportunities. In WEST surveys of job-seekers who had received 3,000 free bus tickets to access work and training found that 49% claimed to be unable to make the journey without the ticket.
- **Support for new starters:** Amongst people who were offered free bus travel for the initial period in a new job, there is evidence that this support was valuable. In CENTRO, 74% of respondents to a survey were still in employment six months after starting their new job, and most of these people (81%) were still travelling to work by bus. The one-month free travel offered by a number of Large Projects also helped to support new starters until they received their first salary, as this quote from a job-seeker in Nottingham indicates:

  > *"Without it I wouldn't have been able to go. There's no way I could have walked there, especially not at that time of the morning. As I'd got a job the Social stopped my money and I was paying full council tax and rent. I started my job at the end of June but didn't get paid until August. I just didn't have the money for bus fare! It was a big help, a really big help*!"

- **Moped or bike loan**: Amongst job-seekers from Bournemouth who received cycle vouchers and equipment to help in their job search 25% subsequently succeeded in gaining work. This is likely to have been attributable in large part to the intervention as 80% of those agreed it was extremely important in helping them find work. Evidence from BDRS and Hertfordshire suggests that loan of a moped may have enabled people to take up a job offer or training, or to remain in work. Evidence from BDRS suggests 60% of a small sample of respondents to a survey remained in employment after participating in the scheme, while in Hertfordshire 27% gained

employment, 46% were able to stay in employment and 26% were able to access education or training as a result of a moped loan. The majority of recipients of scooter loans in the various Wheels to Work programmes were young people, helping to build confidence and independence. In BDRS 56% of those helped were located in some of the most deprived areas of England, thus also helping to reduce social exclusion. In Telford all the 114 people who received support through Wheels to Work in the form of bike and scooter loans, moped training and car health checks either had a job offer or were at risk of losing it due to transport barriers so were helped into a new job or helped to retain existing employment. Similarly, in TfGM all the 308 people who applied for a free refurbished bike to work were required to have a job offer. Although there are no figures on how many job-seekers secured employment from a Bike Back 2 Work scheme in TfGM, 90% claimed it was important for them to get to work. In Nottingham a job-seeker who received a free bike from a community hub said:

> *"I now have a different job that is quite far away. It has helped me a lot having a bike. I would not have been able to accept this job without a bike. Buses in the area are pretty much non-existent so I am very grateful for a bike*."

- **Community transport**: Evidence from TfGM suggests that nearly half (47%) of workers using community transport services to get to/from major employment sites would not be able to get to work without the service and three-quarters can now look for work in more places. This suggests it has helped job-seekers apply for and secure employment at locations that would not have been feasible otherwise.
- **Supporting hard to reach groups**: A programme in Merseyside to provide NEETs with a travel ticket, bike or scooter resulted in 21% securing employment as a result. A programme in BDRS to support individuals who struggled to travel on their own with free tickets to interviews, work placements or training helped 4% into permanent job positions. Other Large Projects had programmes to support NEETs or young people from low income households travel to training or education but did not report outcomes.

Evidence that LTSF programmes supported job-seekers through skills training for employment or travel training for independent travel

- **Skills training**: A scheme in TfGM to help long term unemployed people to gain professional transport qualifications and a job in community transport supported 74% of people into paid employment. A scheme in Merseyside resulted in 107 individuals gaining jobs in the transport sector. As part of the BDRS travel training initiative and ticket pilot to help individuals travel independently, 229 clients completed basic skills assessments and training courses to improve employability.
- **Travel training**: Training to help young people and adults with learning difficulties and disabilities to travel independently to job interviews, work placements or training in BDRS and Hertfordshire improved their independence and confidence: 61% of the people supported in BDRS were trained so they could travel without the need for an escort, and the remainder travelled with limited support; and 53% in Hertfordshire gained full or some independence. Of those who received travel training in the BDRS programme, 83% rated it as good or excellent and reported that they felt more confident in planning journeys as a result.

Evidence of economic benefits from LSTF programmes job-seeker programmes

- **Benefits of reduced unemployment:** Nottingham calculated that the programme of half-fare tickets for job-seekers generated £3.74 million of Gross Value Added (GVA) job and employment benefits, as well as £0.45 million for public transport operators through increased public transport patronage. Similarly, BDRS calculated that the Wheels to Work scheme saved over £1

million a year in benefits payments. TfGM calculated that training to provide jobs for long term unemployed people in the community transport sector had delivered a total public value benefit of over £1 million which represents a public value benefit-cost ratio of nearly 3:1.

- **Benefits of direct job creation:** The LSTF programme contributed to economic growth in other more direct ways. For example, 14.5 FTE posts created by the LSTF programme in Nottingham were estimated to generate £1.3m GVA[69], while volunteer contributions via community travel hubs in Nottingham were estimated to have generated over £1 million of wider economic benefits (based on value of labour replacement and well-being benefits).

Table 9.3: Reported primary and secondary outcomes of job-seeker support programmes

	Primary outcome: employment secured	Secondary outcomes
Intervention type: free or discounted public transport travel		
BDRS	In 2014/15, 6,286 free 1-day tickets and 1,379 free 7-day tickets were distributed to 6,592 people. Of these, 78% accessed training using these tickets with the remaining individuals using tickets for work experience, job interviews or other activities. 20% (1,318) went on to gain employment on a contract greater than 6 months in length, or place on a training course, with 65% (4,285) gaining a qualification (*Online survey, autumn/winter 2014/15, 2769 respondents, 42% response rate).*	
	In a programme to support individuals who struggled to travel on their own, 935 people (295 in pilot and 640 in 2014/15) received free tickets to attend interviews, work placements or training. Of these, 104 people used the day ticket to attend an interview, and 39 people gained employment or were offered permanent positions as a result of work placements accessed using the tickets. (*No survey details given).* A further seven people were helped into jobs and volunteer roles with a Doncaster-based company.	The 39 people who gained employment represented savings in benefits of almost £122,000 a year (assuming all of these people were eligible for and claiming JSA of £60 per week). Of the 935 people in the travel training programme, 229 completed basic skills assessments and training courses in Maths & English to enable them to start looking for employment (completing CVs and job applications).
CENTRO	LSTF funding enabled a significant expansion of a pre-existing 'Workwise' programme of free tickets for travel to interviews /new jobs. Over 14,000 people received support during the LSTF programme. A follow-up survey of those who received support found that 74% were still in employment 6 months after receiving it. (*Postal survey 6-9 months after receiving free travel pass. 2013/14 survey: 389 respondents, 13% response rate; 2014/15 survey: 630 respondents, 7% response rate*). This estimate should be treated with some caution given that the response rate is low, and the sample may not be representative. Yet even if we	The proportion of WorkWise clients using the bus increased from 76% in 2012/13 to 81% in 2014/15 while those using the car (as driver) decreased from 11% to 7% over the same period.

69 GVA was estimated as part of an independent impact evaluation of the Nottingham programme undertaken by ITP, and was based on the total number of jobs created, net of leakage and displacement, multiplied by years in post and annual GVA from ONS sub-regional productivity data.

	Primary outcome: employment secured	Secondary outcomes
	assume those in work were (say) three times more likely to participate in the survey than those not in work, this would imply a 6-month employment rate of 50% among those who received support. As such, although this survey does not allow precise quantification of the impacts of the job-seeker programme, it does suggest that a substantial proportion of beneficiaries - plausibly more than half - were still in employment 6 months later.	
Notting-ham	Of over 4,000 job-seekers in receipt of a Jobseeker Kangaroo half fare pass, who would not otherwise have been able to get to work, an estimated 13% (569) found full time employment during the LSTF-funded part of the programme (excluding DWP funded part prior to March 2014), and an estimated 8% (350) found part-time employment. *(Telephone surveys of 268 people conducted in 2014/15).*	This is calculated to have generated £3.74m of Gross Value Added job and employment benefits through local income increases, estimated savings in Jobseeker Allowance payments, and additional Income Tax receipts. The net increase in public transport patronage resulting from this initiative is estimated to be worth £0.45m to local public transport operators in ticket revenues. 83% of the Jobseeker Kangaroo pass holders stated they would not have been able to access their interview or place of employment due to the cost of using public transport.
Solent	Of 1,850 job-seekers who were offered 3 months' free public transport to help with job searches during 2013/14, more than 43% found employment during the period that they had the free transport. *(No details given of data collection method but presumed to be Job Centre statistics).*	
TfGM	70% of job-seekers receiving free 28-day tickets reported that the support they received had helped them to get to an interview or employment; 37% use public transport more (*Survey of 2,096 job seekers, 12% response rate*).	Of those who received a 28-day ticket, the vast majority (98%) perceived it as useful, and most had continued to buy a bus ticket (63% bus operator season ticket, 13% System One season ticket).
WEST	3,679 free bus tickets were distributed to people up to September 2015 to help access work and training. Qualitative comments from a survey indicated that this was an enabling factor to finding and maintaining employment. 49% claimed to be unable to make the journey without the ticket. (*Survey of bus ticket applicants who received free bus tickets up to September 2015, N = 2,393*).	The main journey purposes supported by free tickets were: to attend a training course (40%); start a new job (24%); or attend an interview (17%) with the remaining used for work placements, open days or other uses.
Intervention type: travel training / personalised journey planning		
BDRS		Amongst people who received travel training via work clubs, job club meetings and other training establishments, 83% rated the training as 'good' or 'excellent', stating that

	Primary outcome: employment secured	Secondary outcomes
		they felt more confident in planning their journeys and learning different ways to travel. 307 young people and adults with learning difficulties/disabilities were trained to travel independently on public transport over 3 years. Latest figures show that 186 (61%) are now able to travel on their own, exceeding the target of 100 people over three years.
Hertford-shire		Of 82 students with special educational needs and disabilities who undertook independent travel training, 26 students gained full independence, 18 gained some independence and 38 were continuing in training (*No survey details provided*).
Intervention type: moped loan		
BDRS	Of the 1,101 people who received a moped loan over 4 years, 75% of survey respondents retained full time employment after participating in the scheme and 79% said that as a result of Wheels to Work (W2W) they had found a transport solution that they could personally sustain after leaving the scheme. (*No details of survey*). The majority of riders were young people.	Enabling people to get into work via the W2W scheme saved £21,962 in benefits payments per week, or £1,142,024 per year. 55.9% of 590 riders surveyed were located in the 20% most deprived neighbourhoods in England. As the major focus of the scheme was to support individuals from deprived areas, the W2W programme contributed to reducing social exclusion. There was also an increased level of confidence and independence amongst beneficiaries.
Hertford-shire	Of the 76 people who received a moped loan over the LSTF period, 27% gained employment; 46% were able to stay in employment; and 26% were able to access education or training. 10% were young fathers able to enhance the lives of their families with employment (*No survey details provided).*	
Intervention type: cycle services		
Bourne-mouth	Amongst 135 job-seekers who signed up to a cycle voucher scheme to improve access to employment and training, 25% subsequently found work; of these 80% agreed that the bike and equipment were extremely important in helping them find work. 32 NEETs were helped through the scheme *(No survey details provided).*	Amongst job-seekers who had signed up to a cycle voucher scheme but not yet found work, all were using the bike and equipment to attend interviews; 73% said the scheme had enabled them to access interviews that they previously would not have been able to access *(No survey details provided).*
TfGM		Amongst job-seekers who received Bike Back to Work support, 90% claimed it was important for them to get to work, and 68% reported that they could not work where they did without it; 59% who received a bike

	Primary outcome: employment secured	Secondary outcomes
		are now cycling whereas previously they were not (feedback from 68 recipients). (*Telephone surveys 3 months after receipt of the bike, interviews to September 2015, 92 respondents, 30% response rate.*)
Intervention type: other		
Mersey-side	The introduction of Employment in the Transport Sector and the Sustainable Transport apprentice scheme resulted in significant numbers of individuals trained for jobs in the transport sector and 107 (a high percentage of those trained) gaining employment.	
Mersey-side	Of 375 individuals who received support from a programme to provide NEETs with a travel ticket, bike or scooter, 78 accessed and retained employment (figures from 2013/14. It has not been possible to update to 2014/15 but a total of 1,642 NEETs were helped through the programme).	
Notting-ham	Qualitative post-service surveys of job-seekers who received travel support (free ticket or bike) from a community travel hub found that 87.5% were still in employment and all had felt that it benefitted them.	(*Paper or phone surveys in January-March 2016. Survey numbers low but no details given*).
TfGM	Amongst users of 'Local Link' community transport services to four major employment sites, the majority (125 of 159, 79%) claimed the service was 'very important' and the vast majority (150 of 159, 94%) claimed that the service was 'important' or 'very important' in them getting to or from work. Three quarters (84 of 159) reported that they could now look for work in more places and just under half (75 of 159, 47%) stated that they could not work where they currently did without this service. If the service was not available for the work trip, respondents were most likely to report that they would have used a taxi instead (86 of 200, 43%), and 9% (18 of 200) would not have been able to make the trip at all. *(All results are from 2015 survey; respondent numbers varied between questions.)*	*(Telephone survey of users in 2015: 200 interviews, 36% response rate; similar survey in 2013/14: 125 respondents, 47% response rate. 25 face to face interviews also held in 2013/14.*)
TfGM	A 'Train Learn Drive and Earn' (TLDE) course to enable people who had been unemployed over 6 months to gain qualifications and secure jobs with Community and Commercial bus operators. Initial findings suggest it supported 74% of 58 people completing the project into paid employment.	TLDE increased capacity in the Community Transport sector. It generated a return on investment of £1.95 for every £1 invested in the project and delivered a total public value benefit of over £1m, which represented a public value benefit-cost ratio of nearly 3:1.

9.6 Conclusions on outcomes related to job-seeker support

Table 9.4 summarises the findings related to job-seeker support.

Evidence collected by the Large Projects suggests that many job-seeker support programmes achieved their objectives in helping job-seekers gain access to employment, for example by enabling travel to work placements which subsequently resulted in a job offer, or by enabling travel to interviews or training that would not otherwise have been feasible. There is some evidence that support programmes broadened people's travel horizons, and hence widened the number of jobs that were within scope. Finally, there is evidence that support programmes that provided access to hard-to-reach employment sites (e.g. through community transport services, free public transport travel in the early days of a new job, or loan of a moped) may have led people to take up job offers that they would not otherwise have considered.

The many successful quantitative and qualitative outcomes of the programmes need to be set in context against the challenges of reaching job-seekers generally, with many Large Projects targeting hard-to-reach groups (e.g. NEETs, long-term unemployed, young people and adults with learning difficulties) and deprived areas, and the relatively short programme period (in some cases only a couple of years).

Despite evidence at a programme level that a significant percentage of those helped had gone on to secure paid employment, there was no clear indication that this resulted in lower unemployment levels in the local authorities overall than would otherwise be the case. This was not altogether surprising in view of the nature and scale of the activities. Firstly travel barriers are just one, albeit an important one, of the barriers facing unemployed people and the objectives of the programmes were aimed at widening opportunities rather than creating jobs directly. Therefore while the support may have helped certain target groups or job-seekers in specific areas to find jobs, this would not necessarily have changed net levels of employment. Secondly, even in the Large Projects which implemented job-seeker support programmes on a large scale, the number of people gaining work was still small relative to the total number of unemployed people. For example, while Nottingham's programmes helped 13% of those receiving half-price tickets to secure employment, overall this number finding work represents less than 1% of the total unemployed in the area over two years. Similarly, while BDRS's programme helped 20% of job-seekers receiving free tickets to gain employment or a place on a training course, this would still only represent less than 2% of the total unemployed over two years.

Therefore, although the unemployment rate in all but one of the Large Projects has fallen since the start of the LSTF programme, and it is likely that the job-seekers programmes have contributed towards this fall, the activities have been on too small a scale relative to total levels of unemployment to detect the impact or suggest a causal link even in the Large Projects with significant job-seeker programmes.

The significant economic benefits estimated by a few of the Large Projects in terms of savings in benefit payments, local income increases and additional income tax receipts, suggest that the successful job-seeker programmes have been highly cost-effective.

Table 9.4: Overview of outcomes related to job-seeker support

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
BDRS	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case. Evidence that 20% of over 13,000 job-seekers in receipt of free public transport tickets went on to gain employment or a training place.	Some
Bournemouth	☐	Unemployment rate has fallen, but unlikely to be attributable to LSTF as scale of intervention too small	-
CENTRO	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case. Evidence that around three-quarters of over 14,000 job-seekers who received free travel tickets to interviews or new jobs still in employment 6 months later.	Some
Hertfordshire	☐	Unemployment rate has fallen, but unlikely to be attributable to LSTF as scale of intervention too small	-
Merseyside	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case. 107 young people have gained jobs in the transport sector following training.	Some
Nottingham	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case. Evidence that 13% of over 4,000 job-seekers in receipt of half-price travel tickets have found full time employment and 8% part-time employment.	Some
Reading	☐	Slight increase in unemployment rate	-
Solent	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case	Some
Surrey	☐	Unemployment rate has fallen, but unlikely to be attributable to LSTF as scale of intervention too small	-
Telford	☐	Unemployment rate has fallen, but unlikely to be attributable to LSTF as scale of intervention too small	-
TfGM	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case. 70% job-seekers in receipt of free travel tickets report this has helped them get to an interview or employment.	Some
WEST	■	Unemployment rate has fallen; could in part be attributable to LSTF as programme is large scale, but no direct evidence that this is the case	Some

■ increase in unemployment; ■ no change in unemployment; ■ decrease in unemployment; ■ insufficient data to assess change in unemployment; ☐ too few schemes completed to be expected to affect unemployment.

~ Different Large Projects treat different time periods as 'baseline'. Changes summarised here are all since 2011/12 for Large Projects that received Key Component funding (BDRS, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST), and since 2012/13 for Large Projects that did not receive Key Component funding (Bournemouth, CENTRO, Reading, Solent).

10 Modal shift from behaviour change initiatives

Key points:

All Large Projects undertook behaviour change initiatives to encourage a shift from single occupancy car driving to more sustainable modes. Activities included delivery of personal travel advice through workplaces, schools, community events, rail stations and households, as well as improvements to non-car modes of travel at workplaces and schools.

Meta-analysis of data from workplace initiatives provides evidence that, on average, there was a real reduction in car mode share between baseline and follow-up in the 93 workplace surveys conducted across eight of the Large Projects. The pooled effect size was a percentage point reduction of 2.7%-points (a relative decrease of 4.1%). This effect was very variable between different workplaces. The relatively small change relative to previous analyses of workplace travel planning initiatives may indicate fewer site-specific 'push' factors in the companies now becoming involved in travel planning or a reduced application of 'push' initiatives by the local authorities now promoting travel planning.

There is evidence from other surveys that car travel reduced following workplace personalised travel planning in BDRS, TfGM and WEST. Other interventions also showed positive results. School travel data in BDRS, Bournemouth and CENTRO suggests LSTF-funded initiatives encouraged a reduction in car mode share and a corresponding increase in more active modes. There were also positive results from large scale household PTP programmes in CENTRO, Hertfordshire and TfGM, which reported reductions in car usage and increase in active and sustainable travel modes.

10.1 Overview of objectives related to modal shift

Encouraging modal shift may be seen as an important aim by local authorities for three reasons:

- In the context of changes in population, jobs and travel habits, it may be more meaningful to look at relative shares of different modes (rather than absolute travel by any particular means).
- Some authorities are reluctant to set targets on traffic reduction, for the political reason of not wishing to seem anti-car, and for the practical reason that they may be happy to see an increase in travel by all means to locations where they are trying to encourage employment growth.
- Some travel initiatives (as discussed in section 10.2) are inherently multi-modal in their approach, and are intended to achieve general behavioural shift, rather than favouring any particular form of travel.

Table 10.1 summarises the objectives listed in Annual Outcomes Reports that related to modal shift. Five authorities had objectives that directly referenced modal shift, of whom two (Reading and WEST) repeated one of the objectives set out for the national LSTF programme as a whole. However, the remaining seven authorities all made reference to modal shift, to encouraging or enabling use of more 'sustainable modes' or to increasing access by a range of means, either directly, or as part of the way in which they intended to achieve primary objectives. Many authorities linked these goals with particular trip purposes, specifically travel for work/business (BDRS, Bournemouth, CENTRO, Hertfordshire, Nottingham, Solent, TfGM), and travel for school (Bournemouth, CENTRO).

Table 10.1: Objectives relating to modal shift in the 12 Large Projects

	Modal shift objective?	Summary of modal shift objectives
BDRS	No	No direct objective, although 'facilitating and encouraging sustainable commuting' potentially implies encouraging modal shift.
Bournemouth	Yes	• **Deliver modal shift** to low carbon alternatives to the car, particularly for shorter distance commuting and school car trips. • **Create more integrated, multi-modal sustainable travel opportunities** on the corridor. • Enhanced, and more equal, opportunities to access jobs and services, for all sections of the community, particularly by public transport, walking and cycling.
CENTRO	No	No direct objective, although objectives to 'maintain sustainable travel to work' and 'increase levels of active travel' for workplaces, secondary schools and further education establishments within the 10 corridors.
Hertfordshire	No	No direct objective, although a focus on encouraging business access by sustainable means.
Merseyside	No	No direct objective, although mode shift discussed in relation to a number of the stated objectives.
Nottingham	Yes	• Increasing economic competitiveness and creating capacity for growth by **bringing staff into the workplace using an integrated multi-modal sustainable transport network** and attracting inward investment. Associated target: Increase sustainable travel modal share by 10% from 2011/12 levels by 2014/15.
Reading	Yes	• Reduce carbon emissions by bringing about **an increase in the** volume and **proportion of journeys made by lower carbon, more sustainable means of travel** including walking and cycling. Separate objectives for PTP include: 'mode shift as a result of PTP will mean more people walking, cycling, and using public transport and less people using cars, especially for short to medium length journeys.'
Solent	No	No direct objective, but one of the three main strands of work is defined as 'behaviour change measures encouraging people to make trips by sustainable modes'
Surrey	No	No direct objective, although mode shift discussed in relation to a number of the stated objectives.
Telford	Yes	• [To achieve] a reduction in carbon emissions through **a 10% modal shift to sustainable modes**.
TfGM	No	No direct objective, although a focus on promoting 'low carbon commuting options'
WEST	Yes	• Reduce carbon emissions, for example by bringing about **an increase in the** volume and **proportion of journeys made by low carbon, sustainable modes** including walking and cycling.

10.2 Measures implemented to achieve modal shift

Some of the key strands of work in the Large Projects related to behavioural change programmes, which were not aimed at promoting a particular mode, but were generally trying to achieve a shift away from single occupancy car use, to more use of public transport, walking and cycling (and, in some cases, greater car sharing, more use of local facilities, more efficient journey planning and the reduction of unnecessary journeys).

The nature of such programmes included:

- Workplace travel planning (where travel solutions were developed for particular workplaces).

- School travel planning (where travel solutions were developed for particular schools) and active and sustainable travel initiatives for school students such as Bike It, walking promotions and active challenges. Some of the results of these initiatives are also reported in other chapters.
- Personalised travel planning (where individuals receive travel advice and offers, through contact at home, workplaces, stations or other locations).
- Other initiatives – such as community smarter travel hubs, 'transitions programmes' (for people moving to university, or into a new residential development) etc.

Personalised travel planning for job-seekers is reported separately in the job-seekers chapter.

Tables 10.2 and 10.3 summarise the scale of the behavioural change programmes in the Large Projects.

As indicated in Table 10.2, workplace engagement was a significant activity for nine Large Projects. More than 2,400 businesses received initiatives and/or support, and workplace travel activities often formed a major strand of work, albeit that the focus was different in different locations (compare, for example, the BDRS focus on bus service provision with Reading's focus on providing personalised travel advice to employees).

Eight Large Projects had significant programmes of engagement with schools. In some cases, this involved just a couple of types of initiative (e.g. cycle training and Bike It); others, such as BDRS, CENTRO, Solent, Telford and WEST, employed a wider range of interventions. Overall the Large Projects engaged with over 750 schools and, at a conservative estimate, nearly 200,000 students.[70]

Seven Large Projects undertook household personalised travel planning on a significant scale. More than 100,000 households (and an even greater number of individuals) received personalised travel planning information, incentives and/or advice. Typically, the number of households targeted with material or a visit (i.e. where contact was attempted, but no information, incentives or advice were given) was three to five times higher than this figure.

All of the Large Projects also offered some form of personalised travel advice and/or incentives to people in non-household contexts (e.g. via workplaces, stations, or events). Nearly 100,000 adults received advice. Major initiatives include the distribution of free bus tickets (by BDRS) and the provision of advice through events and workplaces (CENTRO, Nottingham, Reading, Solent, Surrey and WEST).

Other behavioural change initiatives include work at railway stations (CENTRO); development of community smarter travel hubs (Nottingham); work in FE colleges (Nottingham) and work focused on transition points, such as the move from primary to secondary school, or to university, or moving house (WEST).

70 Based on 765 schools supported and an estimated 250 students per school based on the average primary school. As many Large Projects also engaged with secondary schools the figure can be considered conservative.

Table 10.2: Scale and nature of engagement with employment sites

	Number of workplaces helped to reduce single occupancy car use*	Activity to date	Intensity of activity
BDRS	738	Enhanced bus services to major employment sites and a range of services to businesses to support take-up of sustainable travel by employees (Busboost, Cycleboost, Walkboost)	High
Bournemouth	65	Largely preparatory: consultant appointed to implement a Business Travel Network; employer travel grant scheme launched in March 2014; travel plan commissioned for Bournemouth Borough Council	Low
CENTRO	82	Substantial business support programme, working with many businesses along the target corridors: employer travel grant scheme; implementation of sustainable transport improvements; ticketing initiatives; cycle training and promotion etc.	High
Hertfordshire	8	Enhanced bus services to Maylands Business Park and area travel plan for Maylands businesses	High
Merseyside	176	Distributing sustainable travel information to employees; employer travel grant scheme; supporting employers to develop travel plans	High
Nottingham	100	Support for businesses to develop travel plans, including travel survey, bespoke advice, and implementation of sustainable transport improvements.	High
Reading	230	Workplace PTP service offered to businesses	High
Solent	250	Workplace challenge; establishment of 4 business travel plan networks	High
Surrey	165	Five business travel forums established, each with a devolved budget for local transport improvements	Medium
Telford	1	Limited promotion of sustainable travel offer to businesses. Outreach events at two businesses and one business park. 15 businesses funded to improve cycle parking. Business Travel Network established, but apparently right at the end of the project	Low
TfGM	450	Business travel network established; action plans developed with businesses (50 of which completed them); employer travel grant scheme; various services including cycle training and promotion, workplace PTP	High
WEST	156	New commuter bus services; employer travel grant scheme; various services including sustainable travel roadshows; cycle maintenance sessions	High

* Aggregate figures for whole programme period, as estimated by Large Projects in 2014/15 Annual Outputs Surveys, except where subsequently advised otherwise by Large Projects. Note that the basis for estimation is likely to have varied between projects. Answers were in response to question seeking 'number of workplaces, including sites for further or higher education, where significant new walking, cycling, public transport or car-sharing services or facilities have been provided to reduce single occupancy car use'. This was a more restrictive definition than for the equivalent question in the 2013/14 Outputs Survey, and so numbers for some Large Projects reported here are lower than in interim meta-analysis.

Table 10.3: Scale and nature of other behaviour change initiatives (schools, residential PTP, non-residential PTP)

	Schools supported*	Intensity of activity	Households receiving PTP*	Intensity of activity	Adults receiving PTP at non-home locations*	Intensity of activity	Other significant initiatives
BDRS	135	high	1,741 (includes 1,207 individuals who received free one-month bus tickets)	low	14,120	medium	
	Child pedestrian training, road safety workshops, Bike It, Walkboost, active challenge and Big Pedal				BusBoost free one-month trial tickets or information for drivers at workplaces		
Bourne-mouth	5	low	0	-	397	low	
CENTRO	56 sites, 25,600 students	medium	17,326	high	14,705‡	medium	Activities and campaigns on walking, cycling and car-share at 18 stations; leaflet delivery to 180,000 households near stations and adverts on trains
	Bike training, Dr Bike, sustainable travel grants, personalised journey information for students, student-led sustainable travel campaigns		6 projects on different target corridors, each ~3000 -5,000 households		Journey planning advice via events / roadshows, at various locations including workplaces		
Hertford-shire	2	low	23,936	high	887	low	Sustainable marketing campaigns at 2 stations
			2 projects: Hemel Hempstead (13,790 households) & St Albans (10,146 households)				
Merseyside	16	low	7,311	medium	3,842 **	medium	
			A mix of 'conventional' household PTP, town-centre drop-in, employer roadshows, public events and marketing to businesses and households along Quality Bus route				
Notting-ham	88	medium	10,847	high	13,952	medium	5 community smarter travel hubs; journey planning advice during major disruption at station; LSTF funded expansion of existing UCycle project to promote cycling to 3 Further Education Colleges
	Bike It, cycle training, road safety awareness programme		PTP with residents via 5 community smarter travel hubs		Journey planning advice at events and workplaces		
Reading	63	medium	13,770	high	7,867	medium	Over 23,000 people took part in Beat the Street game using electronic scanners to encourage walking and cycling; workplace cycle challenge; 1,980 participants in Cycle UK Behaviour Change programme
	Bike It, Bike Club and Beat the Street challenge		Rolling programme of household PTP, delivered in most residential areas over successive years		Journey planning advice conversations at 120 workplaces		

Solent	**139** Bike It, Park and Stride, Parking Promise, Back to School promotion, Walk to School week, Modeshift Stars	**high**	**3,918** Separate projects in Eastleigh, Gosport, and residential and tourist areas of Portsmouth	**medium**	**9,330** Journey planning advice at events and workplaces	**medium**	
Surrey	87 Bike It, cycle training	medium	0	-	3,622 Journey planning advice at events and workplaces	medium	
Telford	54 Many active travel initiatives including bike training, park and stride, junior safety, Modeshift Stars etc.	medium	0	-	187	low	
TfGM	11 Bike training for staff, pool bikes for staff and students	low	19,810 Projects covering 7 districts in areas targeted for economic activity, car ownership and potential for modal shift	high	8,688 Workplace-based PTP Additional 1,000 at stations	medium	
WEST	95 schools, 129,020 children, 7543 staff and 9802 parents Large Active Travel to School programme: cycle training, bike maintenance sessions, 'transition rides' for pupils moving to secondary school etc; walk to school, travel advice to parents, many Safer Routes to School infrastructure schemes	high	1,825	low	18,669 ^ Major programme of sustainable travel roadshows, at workplaces and other locations together with a range of other business engagement work	high	'Transitions' programme, working with universities and in new residential developments

* Aggregate figures for whole programme period, as estimated by Large Projects in 2014/15 Outputs Surveys and 2014/15 Outcomes Reports, with some adjustments to reflect detailed responses. Note that although figures have been adjusted for consistency as far as possible, the basis for estimation is likely to have varied between projects.

‡ From examination of data in 2013/14 and 2014/15 Outputs Surveys, this is the most likely figure, but it is possible that the total was substantially less, at around 7,500.

** Merseyside's 2014/15 Output Survey noted a further 40,425 people received PTP or a public transport journey ticket at a workplace but no details or supporting evidence were available. We took this to be the number of people approached rather than engaged, so figure is not included here.

^ The Outputs Survey provides a much higher figure but we have subtracted the number of people who received shallow exposure only at workplace and other roadshows.

10.3 Metrics used to monitor modal shift

Nine Large Projects reported cordon count data for inbound travel to significant urban centres (sometimes reported as vehicle mode share, and sometimes as person mode share). This provides a high-level measure of changes in modal share, and is reported in Chapter 4.

At the project or intervention level, various types of travel survey were used to monitor changes in modal share associated with specific initiatives. In some cases, a comparison was made between baseline and follow-up surveys; in others, a post-intervention survey was used to gather data on previous and current travel patterns.

Annual Outcomes Reports often did not give details of sample sizes, response rates, timing of survey(s) relative to the initiative, or precise questions asked (e.g. usual mode of travel versus actual mode on day of survey). In cases where the comparison was between a baseline and a follow-up survey, it was not always clear that results were comparable (for example, because reported results may be aggregated across a number of businesses in a business park, but with different businesses taking part in different years). There were also some problems monitoring school travel initiatives because of the removal of a question on travel to school from the School Census in 2011.

Section 10.6 summarises the main evidence collected through non-workplace surveys.

Because many of the Large Projects had particularly focused on travel to work, we obtained detailed workplace-level data from baseline and follow-up travel surveys from all Large Projects that had this, and carried out our own analysis. This is reported in Section 10.5. The Large Projects were asked to supply workplace travel survey data for all employment sites with at least two sets of survey results (one 'baseline' and one 'follow-up'). Information was also sought on the approximate number of employees at each employment site, the survey response rate in each year, whether, and to what degree, there had been LSTF-funded interventions affecting the employment site in the period between the two surveys, and the wording of the survey question on mode share.

Eight Large Projects were able to supply pre- and post-intervention workplace-specific travel survey data. Table 10.4 summarises the extent of the usable workplace survey data, after filtering out surveys with fewer than 20 respondents, surveys of sites with multiple businesses, and surveys of sites not subject to LSTF interventions.

To give potential for a larger dataset and for comparison purposes we also requested workplace survey data from Small Projects that were known to have undertaken significant amounts of LSTF work with employers. Seven Small Projects were able to supply pre- and post-intervention workplace-specific travel survey data.

Table 10.4: Evidence of outcomes of workplace engagement available for the Large Projects

	Number of employment sites with baseline and follow-up travel surveys	Other evidence
BDRS	-	Post-intervention survey of employees receiving free one-month bus pass via Busboost
Bournemouth	1	
CENTRO	54	
Hertfordshire	-	
Merseyside	12	
Nottingham	-	
Reading	-	Post-intervention survey of employees receiving workplace PTP
Solent	1	
Surrey	3	
Telford	1	
TfGM	5	Post-intervention survey of employees receiving workplace PTP
WEST	16	Post-intervention survey of roadshow participants

10.4 National data for mode share

Table 10.5 shows National Travel Survey data for changes in trip mode share for all trip purposes in all urban areas of England outside London. This provides some context for the results in the Large Projects, although it should be noted that patterns may vary slightly for different trip purposes. The broad picture is of rather little systematic change between 2009-2011 and 2015: mode shares vary somewhat between years, but absolute differences are small (<1%).

Table 10.5: Trip mode share of different modes in 2015, relative to 2005-07 and 2009-2011 (National Travel Survey: all urban areas outside London)

	Average mode share, 2005-2007	Average mode share, 2009-2011	Mode share, 2015	Percentage point change 2015 versus 2009-2011
Walking	20.5%	19.8%	19.0%	-0.80%
Cycling	1.6%	1.7%	1.8%	+0.06%
Car – driver	37.0%	36.4%	36.4%	+0.02%
Car – passenger	27.8%	28.1%	28.4%	+0.30%
Rail	1.5%	1.7%	1.8%	+0.07%
Local bus	7.6%	8.3%	8.4%	+0.11%
Other	3.9%	4.0%	4.3%	+0.27%

Source: National Travel Survey, for all urban areas of England outside London. Calculation of confidence intervals is not possible because 2015 data was derived from population level data provided by the Department for Transport rather than individual-level data. Individual-level data from NTS in 2015 will not be published until mid-2017.

10.5 Project level outcomes for workplace initiatives

Methods

Sample of workplaces

We assembled data from workplaces that participated in workplace travel planning initiatives under the auspices of the LSTF programme, and that undertook both baseline and follow-up surveys which included information on the proportion of employees driving to work.[71] Of the surveys obtained, we excluded 31 workplaces (21 in Large Projects, 10 in Small Projects) that covered multiple firms at a single site; that received no LSTF interventions; or where the number of survey responses was less than 20. This left a total of 93 workplaces in the Large Projects, of which 54 were in CENTRO, 16 in WEST, 12 in Merseyside, 5 in TfGM, 3 in Surrey, and 1 each in Bournemouth, Solent and Telford. No workplace travel survey data was available from BDRS, Hertfordshire, Nottingham or Reading.

To give potential for a larger dataset and for comparison purposes we also requested workplace survey data from Small Projects that were known to have undertaken significant amounts of LSTF work with employers. Small Projects provided data for 547 workplaces, of which 487 were in West Yorkshire, 40 in Tyne & Wear, 9 in Derby, 9 in Swindon, 6 in Staffordshire, and 3 each in Lincolnshire and East Riding of Yorkshire.

Meta-analysis to synthesise effects across workplaces

To statistically test the significance of the recorded changes in car commuting, we compared the baseline and follow-up travel surveys for each workplace in terms of the percentage of people travelling to work by car. Our primary outcome was absolute change (percentage-point difference), calculated for each workplace as the car mode share in the follow-up survey minus the car mode share in the baseline survey[72].

We then synthesised the data from the individual workplaces using random effects meta-analysis, and thereby generated an overall pooled effect size for changing car mode share.[73] This was initially done for all the 93 Large Project travel surveys together and then repeated for the 8 Large Projects individually. We used meta-regression to test whether there was evidence that the changing car mode share differed between the 8 Large Projects. We then conducted random effects meta-analysis for the 547 Small Project workplaces, and used meta-regression to test whether the change

71 Survey questions varied in their definition of car modes. The outcome metrics used were “Drive a car alone + car share as a driver" for 593 sites (63 in Large Projects), "Drive a car alone + 0.5* car share (driver/passenger not distinguished)" for 29 sites (17 in Large Projects), “Any car use (i.e. combining car driver and passenger)” for 12 sites (all in Large Projects), and “Drive a car alone” for 6 sites (1 in a Large Project). Survey questions about travel frequency were also not consistent between projects or across sites and had variable sensitivity to modes used occasionally (e.g. some surveys asked about ‘usual’ mode of travel and so were insensitive to changes in subsidiary modes of travel, others asked about the mode used ‘today’). Data from different forms of this question was included in the analysis, but workplaces were excluded if the ‘before’ and ‘after’ survey questions were not the same.

72 We defined confidence intervals for single proportions using the Wilson score method (Newcombe, R.G. (1998b) *Two-sided confidence intervals for the single proportion: comparison of seven methods.* Stat Med, 17, 857-872), and defined confidence intervals for the difference between two proportions using the Newcombe-Wilson score method (Newcombe, R.G. (1998a) *Interval estimation for the difference between independent proportions: comparison of eleven methods.* Stat Med, 17, 873-890).

73 Higgins, J.P., & Thompson, S.G. (2002). *Quantifying heterogeneity in a meta-analysis. Stat Med, 21, 1539-1558.*

in car mode share in the Small Projects differed from the Large Projects. We used forest plots to present estimates from individual workplaces and the pooled effect sizes[74].

After calculating pooled effect sizes for the absolute change in car mode share, we also calculated a measure of relative change. This was calculated as the pooled estimate for absolute change divided by the pooled estimate for car mode share at baseline.

Sensitivity analysis, and meta-regression analyses to test for predictors of effect size

Low response rates can introduce bias and low sample sizes can introduce random error. We therefore conducted a sensitivity analysis restricted to workplaces that had a response rate ≥30% and a sample size ≥50 in both surveys. We did this for both the Large Projects and the Small Projects, using meta-regression to test whether there was significant difference between the workplaces that were included in the sensitivity analysis and those that were not.

Finally, we used meta-regression to examine whether the magnitude of the change was predicted by three variables:

- The total number of staff in the workplace (available for 529/640 workplaces in total, and 75/93 in the Large Projects).
- The response rate at follow-up.
- The change in response rate between baseline and follow-up.

We examined the last two factors to test whether there was any evidence that a lower response rate at follow-up, or falling response rate between baseline and follow-up, was associated with better outcomes. This is what might be expected if a positive effect were due to response bias, such that people using sustainable travel modes were over-represented in surveys with lower response rates.

In addition, we tried to collect data giving indications of intervention intensity. Only a minority of Projects were, however, able to provide any such information (covering 66/640 workplaces). Moreover, even where this information was provided, it did not prove possible to reduce it to a single measure of intervention intensity that appeared consistent or reliable.

Results

Pooled effect size across Large Projects, and heterogeneity between Large Projects

Among the Large Projects there was significant evidence that the car mode share decreased on average in absolute terms, with a pooled effect size of -2.7 percentage points (95%CI -4.4%, -1.0%), p=0.001 (Table 10.6, Figure 10.1). [75] Given that the pooled estimate of car mode share at baseline was 65.9%, this change of 2.7 percentage points corresponds to a 4.1% relative decrease.

74 We also calculated an I^2 value representing between-workplace heterogeneity (i.e. variation between workplaces in the extent of change). In meta-analyses, I^2 is a standard measure of heterogeneity in the results across the different observation units. In this case, this corresponds to measuring how far there is heterogeneity across different workplaces in the change in car modal share. Specifically, I^2 values capture the percentage of total variation across workplaces that is due to genuine underlying differences in the effectiveness of the workplace scheme in generating modal shift ('heterogeneity') as opposed to chance ('homogeneity'). I^2 values can vary between 0% and 100%, with a value of 0% indicating no underlying heterogeneity between workplaces, and larger values indicating increasing heterogeneity (Higgins & Thompson op. cit.).

75 It should be noted that the method used weights results according to the size of the surveys available, so that larger surveys 'count' more than smaller surveys. The unweighted mean generated by averaging across the surveys was relatively similar.

Although the average effect was a modest decrease in car mode share, there was strong evidence that the extent of the change varied across the 93 Large Project workplaces[76].

Looking at the changes for each Large Project individually, all achieved an average reduction in the car (driver) mode share. However, for the 5 Large Projects with more than one survey, the pooled effect size was only significant for Merseyside.

Comparison with Small Projects, and sensitivity analysis

Table 10.6 presents the estimated absolute and relative change in both the 93 Large Projects and the 547 Small Projects. The pooled effect size for absolute change was of -0.9 percentage points in the Small Projects (p=0.04), corresponding to a 1.47% relative decrease. This is therefore smaller than the estimate observed in the Large Projects, although the confidence intervals overlap and the difference is not significant (p=0.12).

Table 10.6 also presents the results of our sensitivity analyses. Unfortunately, response rates and/or sample sizes were low in many of the workplace travel surveys. Of the 93 workplaces in Large Projects, only 8 (9%) met our criteria of having a response rate ≥30% and a sample size ≥50 in both the baseline and the follow-up survey. In these 8 workplaces, the estimate for the change in car mode share was larger (Table 10.6), but the very small sample size meant that the uncertainty around this estimate was high, and the difference was not statistically significant (p= 0.17). As such, the sensitivity analysis in the Large Projects indicated a trend towards higher-quality surveys having a larger effect size, but this may be due to chance. The same was true in the Small Projects – again the estimate was slightly larger in the sensitivity analysis, but the difference was not significant (p=0.62).

Table 10.6: Pooled effect-estimates for absolute percentage-point change, and estimated relative change, in car mode share in the LSTF Large Projects and Small Projects

		Number of workplaces	Absolute percentage-point change (follow-up minus baseline)	Corresponding relative change (absolute change/ baseline mode share)
Large Projects	**Main analysis**	93	-2.70% (-4.36%, -1.04%)	-4.10%
	Sensitivity analysis	8	-6.58% (-13.05%, -0.10%)	-9.58%
Small Projects	**Main analysis**	547	-0.87% (-1.71%, -0.02%)	-1.47%
	Sensitivity analysis	131	-1.10% (-2.49%, 0.30%)	-1.96%

Meta-regression analyses examining possible predictors of modal shift

In meta-regression analyses predicting the absolute percentage-point change, there was no evidence of heterogeneity according to the total number of employees in the company, or according to the intensity of the intervention[77]. There was also no convincing evidence of heterogeneity

76 I^2 value 47%, p<0.001 for heterogeneity. This did not primarily reflect differences between the 8 Large Projects: in meta-regression analyses, there was no evidence that schemes were, on average, more effective in some Large Projects than in others (p=0.70). Instead it was driven by heterogeneity in modal shift within Large Projects, in particular within CENTRO and to a lesser extent within Merseyside, Surrey and TfGM (I^2 value 49-69%, p≤0.06).

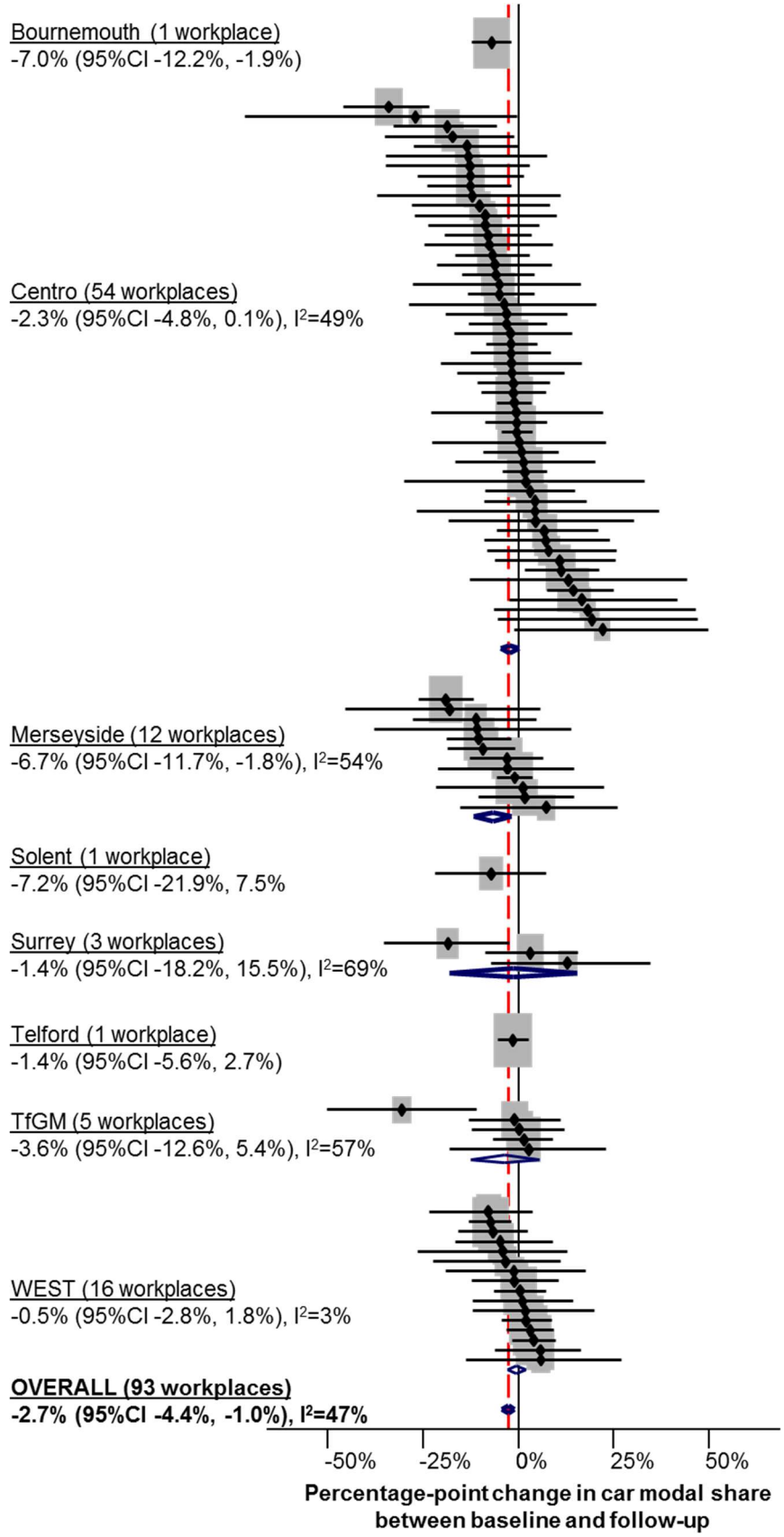
77 p=0.31 for total employees; p=0.37 for intervention intensity when including all 93 workplaces, or p=0.17 when restricting the analysis to the 37 Large Project workplaces where we had complete information about intervention intensity.

according to the response rate at follow-up (p=0.24), or according to the change in response rate between baseline and follow-up (p=0.13).[78]

In the Small Projects, there was no evidence of heterogeneity according to intervention intensity, the response rate at follow-up or the change in response rate between baseline and follow-up (all p>0.2). There was weak evidence of a larger effect in companies with larger reported staff sizes (p=0.02), but this effect was entirely driven by 15 very large companies with staff size greater than 5000. Excluding these outlier companies, there was no evidence of an effect of staff size (p=0.51).

78 This latter analysis excluded one outlier workplace that recorded the single largest decrease in car use of any workplace (a decrease of 34%). If one included that outlier workplace, there was marginally significant evidence that a larger decrease in car modal share was seen in companies with a larger increase in response between baseline and follow-up, p=0.04) – i.e. an effect in the opposite direction to what one could expect if falling response rates led to increased positive response bias.

Figure 10.1: Forest plot from random-effects meta-analysis, examining the percentage-point change in car modal share in Large Projects between baseline and follow-up (N= 93 workplaces)



10.6 Intervention-level outcomes for workplace initiatives

Four Large Projects had carried out other types of survey to assess the effect of workplace-based interventions. These are reported in Table 10.7.

Table 10.7: Reported outcomes of individual workplace interventions

Large Project	Outcomes from individual schemes
BDRS	'Busboost' offered a free one-month travel pass to employees who usually commuted to work by car (as driver or passenger) at workplaces in the four targeted corridors. • In an 'experience feedback' survey at the end of the one-month trial in 2013, 77% of respondents said that they would continue to choose public transport for some of their journeys to work (N=3,073, response rate not given). Results were similar for employees working at Meadowhall shopping centre (*79%, N=217, response rate 55%*) and Sheffield Hallam University (*85%, N=205, response rate 79%*). • In a survey 6-18 months later, 37% of respondents (at all workplaces) said they typically travelled to work by bus, with a further 18% saying that they typically travelled by tram or train and only 29% typically driving (*N=665, response rate not given*). Results were similar for employees working at Sheffield Hallam University (bus 44%; tram or train 15%; car as driver 22%; *N=120, response rate not given*). In a final wave of surveys carried out in 2014, 73% of respondents said they had changed their behaviour by continuing to use public transport to work more often as a result of Busboost (*N=539, 42% response rate*). Outcomes from 'Walkboost' activities at workplaces in Rotherham and Sheffield are reported in Chapter 8 on Walking.
Reading	Personalised travel planning was provided to 7,867 employees across 120 businesses during the LSTF period. In a quality control survey in April 2014, with 195 respondents (*response rate not given*), 31% said that they had made a change towards sustainable travel after meeting a travel adviser.
TfGM	Personalised travel planning was provided to 8,688 employees across 141 organisations in two phases between March 2014 and Oct 2015. 3-month-after follow up surveys were conducted with those who had indicated an interest. In the first phase, 15% of solo car drivers (63 out of 421) reported that they had made a change to a more sustainable mode (*N=983, 27% response rate*). This was estimated to result in a reduction in weekly car mileage of 2,996 miles. In the second phase, 16% of solo drivers (13 out of 79) showed a shift to a more sustainable mode, which was estimated to result in a reduction in weekly car mileage of 1,917 miles. An evaluation of the whole workplace-based PTP intervention estimated that it reduced car travel by 5.4 car trips per participant and 39.7 miles per participant per annum. However, the results were highly variable between the different phases of PTP.
WEST	In 2013/14 Sustainable Travel Roadshows took place at 178 employment sites (and 179 other locations). The events engaged 3,233 participants (1,783 from business). 'Engagement' involved leaving contact details, requesting a service, or taking up a service. There was shallower contact in the form of a conversation without follow-up with another 5,398 people (2,428 from business). A follow-up survey of participants found that 26-27% of respondents had changed how they travel (*N=460, response rate not given*). In 2014/15 Sustainable Travel Roadshows took place at 159 employment sites (and 256 other locations). The events engaged 1,973 participants (951 from business) and a further 12,188 (4,303 from business) 'exposed' to shallower contact. A follow-up survey of all road-show participants found that 35% of respondents had changed how they travel (*N=482, response rate not given*)

10.7 Project and intervention-level outcomes for non-workplace initiatives

Aside from data on workplace initiatives, various Large Projects reported results from other initiatives, as summarised in Table 10.8. Some positive results were reported in relation to school and college travel work in BDRS, Bournemouth, CENTRO and Nottingham and from household personalised travel planning in CENTRO, Hertfordshire and TfGM.

Although only quantitative evidence on modal shift for projects is presented here there was also much qualitative evidence from the Large Projects that indicated the positive impacts and wider benefits for individuals participating in the various interventions. These include stories of individuals giving up a second car, learning to ride a bike or taking the bus for the first time, with benefits for their health or community. For example "*The PTP programme has enhanced my life; it made me fitter and more aware of local amenities*." (CENTRO household PTP) or "*We have seen a definite decrease in traffic outside of school gates with a far greater number of children cycling or scooting to school*." (BDRS Bike It)

Table 10.8: Other evidence reported on modal shift

Large Project	Outcomes from individual schemes
Schools and other educational establishments	
BDRS	Results of hands-up surveys at schools following the Bike It initiative showed a reduction in children regularly driven to school (once or more a week) in all four local authorities. Reductions in car mode share were as follows: 49% to 46% at 4 schools in Rotherham (*2012-2014, N=645 at baseline, 938 at follow up*); 54% to 46% at 4 schools in Sheffield (*2012-2014, N=714 at baseline, 1055 at follow up*); 49% to 46% at 19 schools in Doncaster (*2010-2014, N=1738 at baseline in 2010, 823 at follow up*); 43% to 41% at 6 schools in Barnsley (*2012-2014, N=880 at baseline, 626 at follow up*). In all four areas the proportion of active travel (including scooting and skating) increased. Outcomes from the schools Bike It initiative are also reported in Chapter 7.
Bourne-mouth	School travel data showed a reduction in car mode share, from 43% to 36%, and an increase in walking from 44% to 53% between 2010-11 and 2014-15 for four schools in the corridor (*N=1,375 at baseline; 1,434 at follow-up*). (Figures for schools in Poole were not available due to changes in School Census data collection and data for the other 26 schools in the corridor was not available for the full four years.)
CENTRO	Surveys of mode of travel to educational establishments (including 11-16 year olds, 16+ students and staff) showed car driver mode share falling from 11% (2011/12) to 8% (2014/15) and car passenger mode share (passengers dropped off) falling by a half percentage point from 22%. 15% of 11-16 pupils, 19% of 16+ pupils and 12% of staff indicated that the initiatives/improvements delivered throughout the LSTF programme had encouraged them to change the way they travel. (Results are for same group of educational establishments in each survey, *N=17,669 at baseline; 24,343 at follow-up*).
Nottingham	Single occupancy car use decreased at two FE establishments following the Ucycle initiative (follow up survey data was not available at a third college). Between 2013 and 2014 at one college single occupancy car use decreased amongst staff from 44% to 37% and amongst students from 9% to 5% (*N=277 at baseline; 158 at follow up*). At a second college between 2013 and 2014 single occupancy car use decreased amongst staff from 63% to 62% and amongst students from 17% to 15% (*N=883 at baseline, 455 at follow up*). There was a corresponding increase in cycling rates at both colleges, as reported in Chapter 7. Outcomes from the schools Bike It initiative are also reported in Chapter 7.
Telford	Travel to school data for primary and secondary schools in the borough showed an increase in car mode share from 44% in 2010/11 to 46% in 2015/16 for primary schools (*N= 11,640 at baseline; 13,922 at follow up*); and from 28% in 2010/11 to 33% in 2015/16 in secondary schools (*N=10,528 at baseline, 9,494 at follow up*). Cycling modal share in both primary and

Large Project	Outcomes from individual schemes
	secondary schools increased over the LSTF period while walking modal share fell overall. Those primary schools with several LSTF programmes in place achieved the greatest increase in active travel mode.
Household personalised travel planning	
CENTRO	Households along six of the 10 targeted corridors were offered personalised travel planning in three tranches reported separately. Each programme was tailored e.g. bus-, commuter- or cycle-specific and before and after surveys including a one-day travel diary were undertaken in all PTP areas. **Tranche 1**: In the two bus-specific corridors (A4123/A459 and A34) there was a fall in car driver mode from 58% to 54% and a corresponding increase in bus use from 18% to 23%. Of the 21% of respondents who had changed their travel habits or were intending to do so, 48% were planning to decrease car use; 42% to increase bus usage and 40% to increase walking *(2013, N = 2,946 at baseline, 686 at follow up, response rate 23%).* **Tranche 2:** In the two commuter-specific corridors (A41 South and A45) there was a decrease in car driver mode 7 days a week from 47% to 38% though there was a marked difference between the 2 corridors. However, there was an increase in car driver mode 5 days a week from 20% to 32%. Regular bus and train use also appeared to go down. However there were positive changes in attitude with 39% respondents likely to use public transport, cycle or walk more. *(2013/2014, N= 6,062 at baseline, 601 at follow up, response rate 10%]* **Tranche 3:** In the two cycling-specific corridors (route 4 and North Coventry) there was a reduction in car driver mode from 38% to 33% and increases in bus mode from 18% to 20% and walking from 24% to 27%. Amongst people who travelled to work there was a reduction in car driver mode from 68% to 58%, and increased in bus mode from 13% to 22%, cycling from 3% to 6% and walking 13% to 21%. However, there was a widespread increase in the number of trips between the surveys *(2014, N = 8318 at baseline, 1062 at follow up, response rate 13%).*
Hertford-shire	Baseline (2012) and follow-up surveys (2013) were carried out in two areas where there was a household PTP project (St Albans and Hemel Hempstead), and in one control area (Harpenden). In the control area, car driver mode share remained constant, and the number of car driver trips per person increased slightly. In the LSTF areas, car driver mode share and trips reduced. In St Albans there was a 12% reduction in car-as-driver trips, a 31% increase in public transport trips and a 20% increase in active travel modes relative to the control (*N=844 before and 809 after, ca. 60% response rate*) while in Hemel Hempstead there was a 2% reduction in car as driver trips, a 12% increase in public transport trips and a 4% increase in walking relative to the control (*N=1150 before, 1020 after, ca. 60% response rate*). *(Control area in both cases: N=603 before and 554 after, ca. 60% response rate*.)
TfGM	Residential PTP was delivered in 6 phases with baseline and 3-month surveys carried out for all phases and 1 or 2 year follow-up surveys for the earlier phases. Findings from the follow-up 3-month surveys for the first 4 phases included: Respondents making car trips to work or for peak journeys who reported reducing the number of days they made those trips by car ranged from 9% (*N=492*) for Phase 1, 1% (*N=578*) for Phase 2A, 3% (*N=759*) for phase 2B and 4% (*N= 695*) for phase 2C. The proportion of respondents making car trips over all 4 phases who reported making positive changes (including reducing car trips, car sharing or travelling at off peak times) to work or peak trips following PTP was 5.6% compared to 3.3% for a control group (*N=2,523 representing people who were willing to be followed-up and still making a matched journey*). Over the first 4 phases the frequency of making that work or peak journey by car reduced from an average of 4.22 days/week to 4.15 days per week. The proportion of car users who reported reducing their car mileage after receiving PTP ranged from 9% (*N=1,113*) for phase 1, 9% (*N=1,196*) for phase 2A; 10% (*N=1,178*) for phase

Large Project	Outcomes from individual schemes
	2B and 10% (*N=1,134*) for phase 2C. In all phases less than 2% car users reported increasing their car mileage. For those in Phase 1 who reduced their mileage, 64% estimated their reduction to be between 6% and 20%, and 14% estimated their reduction to be more than 50% (*N=80*). In Phase 2A 77% of respondents reduced mileage by over 10 miles and 37% by more than 30 miles (*N=82*). In Phase 2B, 80% respondents reduced their mileage by over 10 miles and 45% by over 30 miles (*N=113*) while in Phase 2C 58% reduced by more than 10 miles and 21% by more than 30 miles (*N=104*). Follow-up surveys conducted 12 months after the first three phases of PTP, showed 4% respondents overall continuing to make some change to the peak journeys on which the PTP was based (*N=403 excluding those no longer making the journey*).
Other	
CENTRO	Data from Station Travel Plan Surveys showed an increase in car driver mode share from 24% (2012/13) to 30% (2014/15) and a small fall in car passenger mode share from 17% to 16%. Bus mode share increased from 9% to 10% and cycling mode share increased from 1% to 2% though walking mode share fell from 41% to 39% over the same period (*N=12,164 at baseline; N=2,127 at follow up.*) Improved or new Park and Ride facilities providing free car parking for rail passengers at 3 of the 12 stations was thought to be a contributory factor to the increase in car use.
Nottingham	Matched survey data tracing the behaviour of each of 66 participants actively engaged by two of the five community hubs in Nottingham found positive change in mode share with car mode share decreasing from 25% to 18%, and walking and cycling mode share increasing from 52% to 65% for those participants between 2013 and 2015 (*original baseline N=672 though figures refer only to matched data for 66 respondents*).
Reading	The Beat the Street programme, a 6-week competition involving touching smart cards on electronic scanners positioned around the intervention area, directly reached around 24,000 players (children and adults), of whom 3,216 were followed up with surveys. 37% of respondents said that it helped them travel less by car, while 73% said it helped them walk more and 32% said it helped them cycle more (*N=570, 18% response rate*). Walking results are also reported in Chapter 8.

10.8 Conclusions on modal shift

Data from travel surveys in 93 workplaces which Large Projects targeted with LSTF initiatives provides evidence that, on average, the car modal share decreased between baseline and follow-up. The meta-analysis suggests that the observed reduction was not simply due to chance, but the effect was variable across workplaces. The pooled effect size of the average reduction in car use achieved at the workplaces was -2.7%-points (with a 95% confidence interval of -4.4% to -1.0%, p=0.001).

This reduction in car use was small compared to previous evidence of the effects of workplace engagement programmes (e.g. 15%-point median reduction amongst twenty workplaces undertaking travel planning reviewed in Cairns et al. 2004[79]). This may be because the intensity of interventions was low at some workplaces: the information in Outputs Surveys and Outcomes Reports tends to suggest that Large Projects focused on relatively easy 'pull' initiatives, such as providing encouragement and information to employees, rather than more challenging, but more effective, 'push' initiatives such as reducing or restraining parking. It also seems likely that the 'first mover' companies considered in earlier analyses of workplace travel planning were at the forefront of workplace travel planning as a result of local or company-specific push factors around parking and

79 Cairns et al. (2004) *Smarter Choices Changing the Way We Travel*

planning, which may be less prevalent in the companies now being more reactively drawn into workplace travel planning.

Positive results were reported from relatively large-scale workplace initiatives in BDRS (free bus travel), TfGM (PTP) and WEST (sustainable travel roadshows). Although these were self-reported changes from respondents, the sample size was sufficient to suggest that there has been some positive modal shift as a result of the interventions.

Initiatives within schools and educational establishments were often focused on promoting active travel (reported in other chapters) and other outcomes such as road safety, rather than mode shift from driving *per se*. Nevertheless, school surveys in BDRS, Bournemouth and CENTRO suggest LSTF-funded initiatives encouraged a reduction in car mode share and a corresponding increase in more active modes.

Large scale household PTP programmes in CENTRO, Hertfordshire and TfGM all reported positive results for reduction in car usage and increase in active and sustainable travel modes. The results were variable, however, probably reflecting the differences in the targeted areas, approaches and options available.

While many of the mode shift changes are relatively small, particularly for reduction in single occupancy car use, some of the interventions appear to have produced quite significant changes over a relatively short period of time. It is unclear over what period the benefits are likely to be sustained, particularly for very short term interventions. There is some evidence[80] from TfGM that without continued input there may be regression. On the other hand where a longer term programme of interventions will continue, evidence from other studies indicates that even modest initial improvements in sustainable travel mode are likely to be sustained or increase over a longer time period.[81] For example, Census data shows that London experienced a modest increase in the prevalence of cycling to work between 1991 and 2001 (0.4%), followed - in the context of multiple ongoing initiatives - by a much larger increase between 2001 and 2011 (1.7%).[82] Likewise public transport commuting in London increased more, and car commuting decreased more, between 2001 and 2011 than between 1991 and 2001.

80 The 12-month follow up surveys for residential PTP conducted by TfGM showed significant decay rates in miles reduced by car drivers compared to 3 months. However, it is suggested by TfGM based on research elsewhere that PTP encourages trial of alternatives and after a relatively short period participants either adopt the new behaviour or revert to previous behaviour. Of more importance than time since engagement is the project location including demographics and availability of good quality travel options. External evaluation of their PTP programme suggested that long term success depends on 'push' factors, the target area, complementary activities, incentives, and external factors.

81 Cairns, S. et al. (forthcoming) *Sustainable travel towns: an evaluation of the longer term impacts*. Main report and appendices. TRL report for DfT, PPR 776 and 776a.

82. Goodman, A. et al. (2013) Effectiveness and equity impacts of town-wide cycling initiatives in England: A longitudinal, controlled natural experimental study. *Social Science & Medicine*, 97, pp. 228-237.

Table 10.9: Overview of outcomes related to modal shift

Large Project	Over-view	Summary of change	Attributable to LSTF?+
BDRS	■	No post-intervention workplace survey data.	-
	■	Results from the Busboost project suggested that modal shift towards public transport use occurred amongst car commuters offered taster bus tickets.	Yes
Bournemouth	■	Reduction in car mode share at one targeted workplace (beyond statistical margin of error).	Yes
	■	Reduction in car mode share for school travel.	Yes
CENTRO	■	Reduction in car driver mode share at targeted workplaces but pooled effect size not statistically significant.	-
	■	Some reductions in reported car use following household PTP; reductions in car driver mode share to educational establishments; variable results for workplace PTP	Yes
Hertfordshire	■	No post-intervention workplace survey data.	-
	■	Reductions in car driver mode share in areas receiving household PTP; not seen in control area.	Yes
Merseyside	■	Statistically significant reductions in car driver mode share at targeted workplaces: pooled effect size across 12 workplaces -6.7%-points.	Yes
Nottingham	■	No post-intervention workplace survey data.	-
	■	Reductions in car use for residents using community hubs.	Yes
Reading	■	No post-intervention workplace survey data.	-
	■	Some reductions in reported car use following workplace PTP.	Yes
Solent	■	Reduction in car mode share at one workplace, but within statistical margin of error.	-
	■	No post-intervention survey data.	
Surrey	■	No statistically significant pooled effect for changes in car mode share across three workplaces.	-
Telford	■	Small reduction in car mode share at one workplace, but within statistical margin of error.	-
	■	Increase in car mode share for travel to school	-
TfGM	■	No statistically significant pooled effect for changes in car mode share across five workplaces.	-
	■	Reductions in car use following workplace PTP. Some reductions in reported car use following household PTP.	Yes
WEST	■	No statistically significant pooled effect for changes in car mode share across five workplaces.	-
	■	Positive impacts on modal shift reported from surveys of people engaged via Sustainable Travel Roadshows.	Yes

■ Some evidence of a decrease in car mode share; ■ no change in car mode share; ■ increase in car mode share; ■ insufficient data to assess overall impacts on modal shift.

+ It should be noted that even where a modal shift cannot be attributed to LSTF interventions these activities nevertheless may be responsible for some or all of the improvement.

PART III: EVIDENCE ON IMPACTS AND COST-BENEFIT ANALYSIS

11 Carbon emissions

Key points:

According to our analysis of DECC[83] data, for both absolute and per capita emissions of carbon dioxide (under the scope of local authority influence), all Large Projects showed a decrease in 2014, relative to a 2009-2011 baseline. The overall change in absolute emissions of CO_2 for the Large Projects was a reduction of 4.1%, compared to a reduction in comparator authorities (other English local authorities excluding London) of 2.3%. Per capita emissions of CO_2 in the Large Projects showed a reduction of 6.9%, compared to a reduction in the comparator authorities of 4.7%. For both absolute and per capita emissions, the difference between the average value for the Large Projects, and the average value for the comparator authorities, was statistically significant ($p<0.001$). Moreover, individually, all twelve of the Large Project areas experienced a higher reduction in per capita emissions (between a 2009-11 baseline and 2014) than the average for the comparator authorities.

Three Large Projects provided project-level calculations of CO_2 emissions during the LSTF period. For Reading, the data broadly corroborated the DECC data. For Merseyside and Greater Nottingham, this was not the case, as the Large Project calculations suggested that absolute emissions were not reducing. As well as differences in methodology, the main reason is likely to be differences in which emissions were included (i.e. inclusion of all transport emissions, not just those within the scope of local authority influence).

Eight Large Projects provided bottom-up estimates of savings from some, or all, of their interventions. There were also estimates of savings from parts of TfGM's and Solent's programmes in the Carbon Impacts and Congestion Relief case study. The scale of savings achieved by work with commercial vehicles (ECO Stars fleet management and driver efficiency schemes and freight consolidation) was notable. The reported CO_2 reductions achieved via BDRS work on BusBoost, Merseytravel's work with employers, and Telford's car sharing scheme were also substantial.

11.1 Overview of carbon reduction objectives

The LSTF programme had two primary objectives, one of which related to reducing carbon emissions. Specifically, this objective was to "Reduce carbon emissions, for example by bringing about an increase in the volume and proportion of journeys made by lower carbon, more sustainable means of travelling including walking and cycling."

Many Large Projects referenced this when outlining their own objectives. Reading adopted it as an explicit objective of its own programme, whilst its 2014/15 Outcomes Report also included a more specific quantitative objective for reducing CO_2. Other authorities adopted variations of this objective, including objectives to make lower-carbon means of travel more attractive; to achieve modal shift to lower-carbon means of travel; and to achieve carbon emissions reductions. BDRS did not have a primary objective of reducing carbon emissions, however, it chose to focus on three short

83 Department of Energy and Climate Change, now part of the Department for Business, Energy and Industrial Strategy.

aims, with carbon reduction receiving considerable attention when expanding on those aims. Three authorities (Bournemouth, TfGM and WEST) mentioned encouraging lower-carbon travel choices for commuting. CENTRO linked their aim to reduce carbon dioxide emissions with the parallel intention to reduce emissions of local air pollutants. Nottingham and Surrey linked their aim of reducing emissions with a parallel aim of adapting to climate change.

Table 11.1 summarises the objectives listed in Outcomes Reports that related to carbon emissions.

Table 11.1: Summary of objectives relating to carbon

BDRS	No primary objective, but many mentions of reducing carbon emissions, and the overarching objectives of the LSTF fund quoted in the preface.
Bournemouth	• Deliver a step change in the quality, attractiveness and user perception of low carbon travel choices along the corridor, which makes them more competitive with the car. • Deliver modal shift to low carbon alternatives to the car, particularly for shorter distance commuting and school car trips.
CENTRO	• Improve the urban realm and local environment along all transport corridors, including reductions in both CO_2 and NO_2 emissions, so as to support the regeneration of local centres.
Hertfordshire	• To ensure the area is an exemplar in reducing carbon emissions from transport.
Merseyside	• Achieve an overall reduction in carbon emissions.
Nottingham	• Continuing downward trend in carbon emissions from transport and adapting to climate change by making low carbon travel options a realistic and attractive choice and preparing for changing weather patterns. Linked target - No increase in traffic levels contributing to a reduction in carbon emissions from transport by 10% over three years by 2014/15.
Reading	Previous reports phrased the objective as: • Reduce carbon emissions by bringing about an increase in the volume and proportion of journeys made by lower carbon, more sustainable means of travelling including walking and cycling. The most recent report defines the objective as: • To achieve a 29,000 tonne reduction in CO_2 against an estimated 2026 forecast.
Solent	• Reduce emissions (particularly carbon) from the transport sector by reducing highway vehicle kilometres.
Surrey	• To reduce the emissions from transport in Surrey, especially carbon dioxide and other greenhouse gases, and manage risks posed to the transport network arising from climate change. • To provide an integrated transport system that protects the environment, keeps people healthy and provides for lower carbon transport choices.
Telford	Overarching objectives of the LSTF fund quoted. Key component and Large Project objectives did not explicitly mention carbon, although expected outcomes included 'carbon savings of 40,816 tonnes'.
TfGM	• Connecting people with jobs… with a particular focus on local walk and cycle access to embed low-carbon travel from the outset. • Supporting concentrations of business activity…with a focus on promoting low carbon commuting options. • Targeting congestion for carbon and business efficiency… addressing areas where local transport congestion undermines… network carbon performance.
WEST	• Widened lower carbon access to employment and improved economic growth through reduced congestion. • Reduced carbon emissions *per capita* for journeys to work.

11.2 Metrics used to monitor carbon emissions

DECC publishes estimates of carbon dioxide emissions for local authority areas. Emissions are divided into a number of categories, of which one is transport. There is a time lag in statistics production, such that the most recent data available for this analysis was for 2014. Data are provided both in total and on a per capita basis.

There are two versions of the dataset for local authority emissions. One includes total emissions from transport for each local authority (although aviation and shipping are excluded). The other represents a subset of this information, and is focused on carbon dioxide emissions deemed to be within the scope of influence of local authorities. In relation to transport, carbon emissions on A roads, minor roads, and 'other' transport carbon emissions are considered within the scope of influence of local authorities. Emissions on motorways and from diesel railways are considered outside the scope of influence of local authorities. Our analyses focus on those emissions within the scope of influence of local authorities, as it is these types of emissions that the LSTF programme targeted. These 'within scope' transport carbon emissions accounted for 28% of all emissions deemed to be within the scope of influence of local authorities in England in 2014.

Five Large Projects (BDRS, Bournemouth, Hertfordshire, Nottingham and WEST) quoted absolute and/or per capita emissions from the DECC data in their 2014/15 Outcomes Reports. Telford and Surrey did so in their 2013/14 Outcomes Reports, but removed this analysis in favour of an alternative approach in their latest reports. The figures from the local authority reports are discussed in section 11.4.

A second way of calculating carbon emissions from transport is by use of the Department for Transport's Basic Local Authority Carbon Tool[84]. Hertfordshire, Surrey and Telford initially intended to use this tool to generate an estimation of carbon dioxide emission reductions for their final Outcomes Reports, although Hertfordshire subsequently decided not to do so.

Some Large Projects (Merseyside, Nottingham and Reading) had their own method for calculating carbon dioxide emissions from transport. This usually involved input information on traffic volumes (from ATC data); traffic speeds; vehicle types; and WebTAG guidance values on fuel consumption and associated emissions.

Solent and TfGM were both part of the 'Carbon Impacts and Congestion Relief' LSTF case study, which assessed changes in carbon emissions by a variety of methods including a comparison of postal surveys undertaken in 2013 and 2014 on travel behaviour.

Finally, in the 2014/15 Outcomes Reports, a larger number of authorities (8) chose to undertake 'bottom-up' calculations of carbon savings from particular initiatives. These are discussed further in section 11.5.

It is not always clear whether authorities have been consistent in whether they are quoting CO_2 or CO_2e values and/or whether they used the same value for converting from car miles to carbon dioxide emissions. We have used the figures and reporting conventions given in the Outcomes Reports, together with any subsequent clarification information received.

84 See https://www.gov.uk/government/publications/local-authority-basic-carbon-tool.

11.3 National data and high level outcomes for carbon

For our analysis of national trends, we used the DECC estimates of *emissions that are deemed to be within the scope of local authority influence*.

Data for changes in absolute emissions are given in Table 11.2. Meanwhile, Table 11.3, Figure 11.1 and Figure 11.2 provide information about changes in per capita emissions.

In general, there has been a significant fall in carbon dioxide emissions from transport (both in absolute and per capita terms) since 2005-2007, which was particularly steep in 2008 and 2009.

Overall, absolute transport carbon emissions decreased by 4.1% percent in the 12 Large Projects between 2009-2011 and 2014, a larger decrease than the national average decline of 2.3% and a difference of 1.9%. This difference between the Large Projects and the comparator group of local authorities was highly statistically significant ($p<0.001$), as judged by a t-test analysis of 292 local authorities and non-metropolitan counties (53 in Large Projects, 239[85] in other local authorities excluding London).

Meanwhile, overall, per capita transport carbon emissions decreased by 6.9% percent in the 12 Large Projects between 2009-2011 and 2014, again a larger decrease than the national average decline of 4.7% – a difference of 2.2%. This difference between the Large Projects and the comparator group of local authorities was also highly statistically significant ($p<0.001$), as judged by a t-test analysis of 292 LAs and non-metropolitan counties (53 in large projects, 239 in other local authorities excluding London).

In other words, transport carbon emissions (within the scope of local authority influence) decreased in the Large Projects over the time period, and the data suggest that this decrease was statistically significantly larger than that experienced by local authorities elsewhere in England, excluding London.

When the individual district values are ranked for per capita emissions, Nottingham City, Bournemouth, Coventry, Salford, Manchester and Watford are in the top 5% of authorities, in terms of reductions in per capita carbon emissions.

Moreover, as shown in Table 11.3, all twelve Large Projects experienced a higher reduction in per capita emissions (between a 2009-11 baseline and 2014) than the average for other English local authorities (excluding London). Looking at the trends in Figure 11.2, Hertfordshire, Reading, Surrey and TfGM are notable, in that their trends appear to still be diverging from the national trend.

Comparison of average data for 2009-11 with that for 2005-2007 indicates that eight Large Projects experienced larger reductions in per capita emissions than the average for the comparator group over this pre-LSTF period. This may imply that pre-LSTF activity contributed to the trends observed during the LSTF period. However, it should also be noted that the differences between the Large Projects and the comparator group were generally smaller during this time (an average reduction of 10.9% compared with 10.2%).

85 Isles of Scilly were excluded, as this is such a small local authority that values may not be reliable.

Table 11.2: Carbon data on traffic in Large Project areas, for emissions with the scope of local authority influence – changes in absolute values

Large Project	Carbon emissions 2005-2007 (kt CO_2 per year)	Carbon emissions 2009-2011 (kt CO_2 per year)	% change between 2005-2007 and 2009-2011	Greater carbon reduction than national trend?	Carbon emissions 2014 (kt CO_2)	% change between 2009-2011 baseline, and 2014	Greater carbon reduction than national trend?	Average percentile of change (range)*, relative to all non-London local authorities
BDRS	1884.0	1745.7	-7.3%	No	1674.1	-4.1%	Yes	24 (9 - 32)
Bournemouth	523.5	481.1	-8.1%	Yes	459.6	-4.5%	Yes	17 (9 - 22)
CENTRO	3706.7	3393.6	-8.4%	Yes	3263.0	-3.8%	Yes	31 (13 - 53)
Hertfordshire	582.1	534.7	-8.1%	Yes	515.2	-3.6%	Yes	34 (11 - 54)
Merseyside	1772.0	1615.3	-8.8%	Yes	1540.8	-4.6%	Yes	24 (5 - 47)
Nottingham	1316.6	1219.9	-7.3%	No	1168.5	-4.2%	Yes	32 (3 - 80)
Reading	131.3	119.0	-9.4%	Yes	113.6	-4.6%	Yes	14
Solent	1000.4	906.5	-9.4%	Yes	877.8	-3.2%	Yes	38 (23 - 47)
Surrey	755.0	682.0	-9.7%	Yes	668.9	-1.9%	No	51 (33 - 84)
Telford	301.0	270.4	-10.2%	Yes	261.3	-3.4%	Yes	33
TfGM	3316.8	3026.0	-8.8%	Yes	2862.9	-5.4%	Yes	8 (3 - 15)
WEST	1542.8	1441.3	-6.6%	No	1408.0	-2.3%	Same	59 (40 - 74)
Large Project average			8.3%	Yes		4.1%	Yes	Not applicable
Other LAs in England excl London	***61631.2***	***56813.7***	***-7.8%***	***n/a***	***55520.4***	***-2.3%***	***n/a***	***Not applicable***

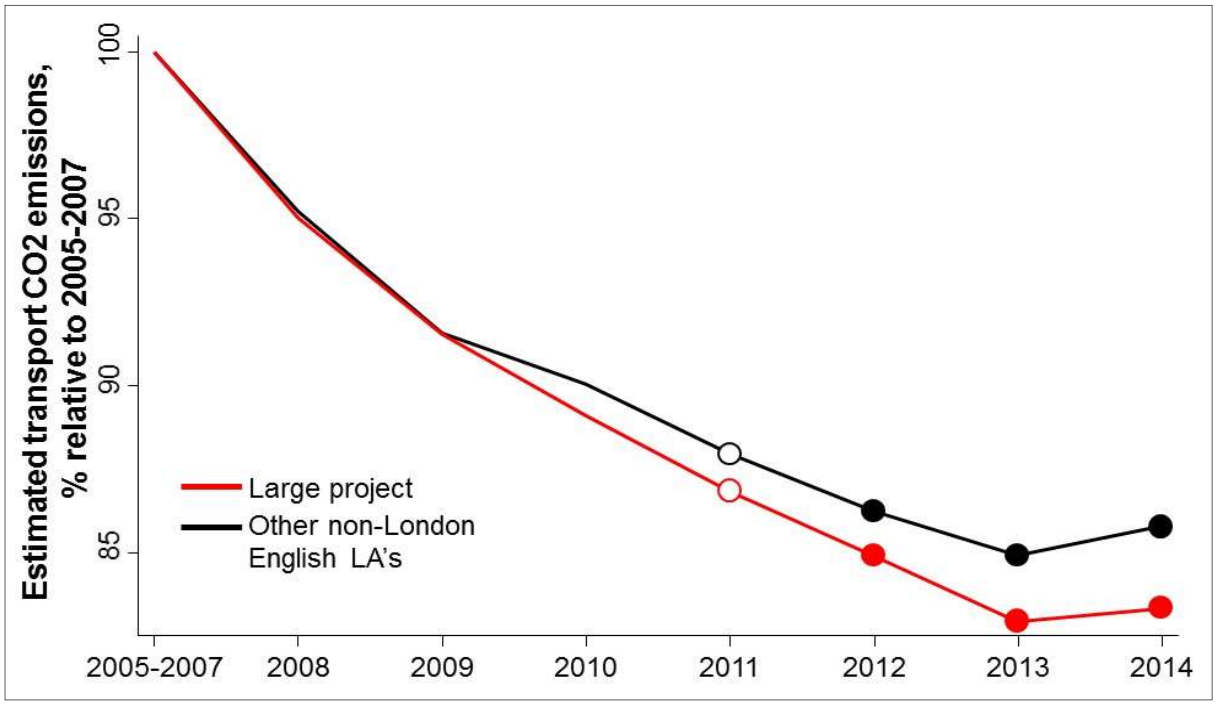
* Range only presented if there was more than one local authority included in the Large Project area. Authorities were ranked, with rankings converted to percentiles, such that the lowest percentile authority experienced the greatest decrease in carbon, whilst the highest percentile authority experienced the greatest increase. Definitions of the local authorities included for each Large Project are given in Chapter 1, Appendix 1.1.

Table 11.3: Carbon data on traffic in Large Project areas, for emissions within the scope of local authority influence – changes in per capita values

Large Project	Carbon emissions 2005-2007 (kt CO_2 per 1000 people per year)	Carbon emissions 2009-2011 (kt CO_2 per 1000 people per year)	% change between 2005-2007 and 2009-2011	Greater carbon reduction than national trend?~	Carbon emissions 2014 (kt CO_2 per 1000 people)	% change between 2009-2011 baseline, and 2014	Greater carbon reduction than national trend?~	Average percentile of change (range)*, relative to all non-London local authorities
BDRS	1.45	1.31	-9.7%	No	1.23	-6.4%	Yes	36 (9 - 58)
Bournemouth	1.47	1.29	-12.6%	Yes	1.18	-8.7%	Yes	15 (3 - 27)
CENTRO	1.41	1.25	-11.4%	Yes	1.16	-7.1%	Yes	33 (2 - 54)
Hertfordshire	1.64	1.44	-12.4%	Yes	1.32	-8.2%	Yes	12 (3 - 26)
Merseyside	1.30	1.17	-9.4%	No	1.11	-5.6%	Yes	54 (8 - 76)
Nottingham	1.56	1.41	-9.7%	No	1.31	-7.1%	Yes	35 (4 - 72)
Reading	0.89	0.77	-12.7%	Yes	0.71	-8.6%	Yes	7
Solent	1.18	1.04	-12.0%	Yes	0.97	-6.5%	Yes	32 (12 - 45)
Surrey	2.14	1.84	-14.0%	Yes	1.74	-5.8%	Yes	33 (14 - 55)
Telford	1.85	1.63	-11.9%	Yes	1.54	-5.5%	Yes	41
TfGM	1.28	1.14	-11.5%	Yes	1.05	-7.8%	Yes	18 (2 - 44)
WEST	1.49	1.36	-9.2%	No	1.28	-6.1%	Yes	36 (16 - 46)
Large Project average	1.41	1.25	10.9%	Yes	1.17	6.9%	Yes	Not applicable
Other LAs in England excl London	***1.96***	***1.76***	***-10.2%***	***n/a***	***1.68***	***-4.7%***	***n/a***	***Not applicable***

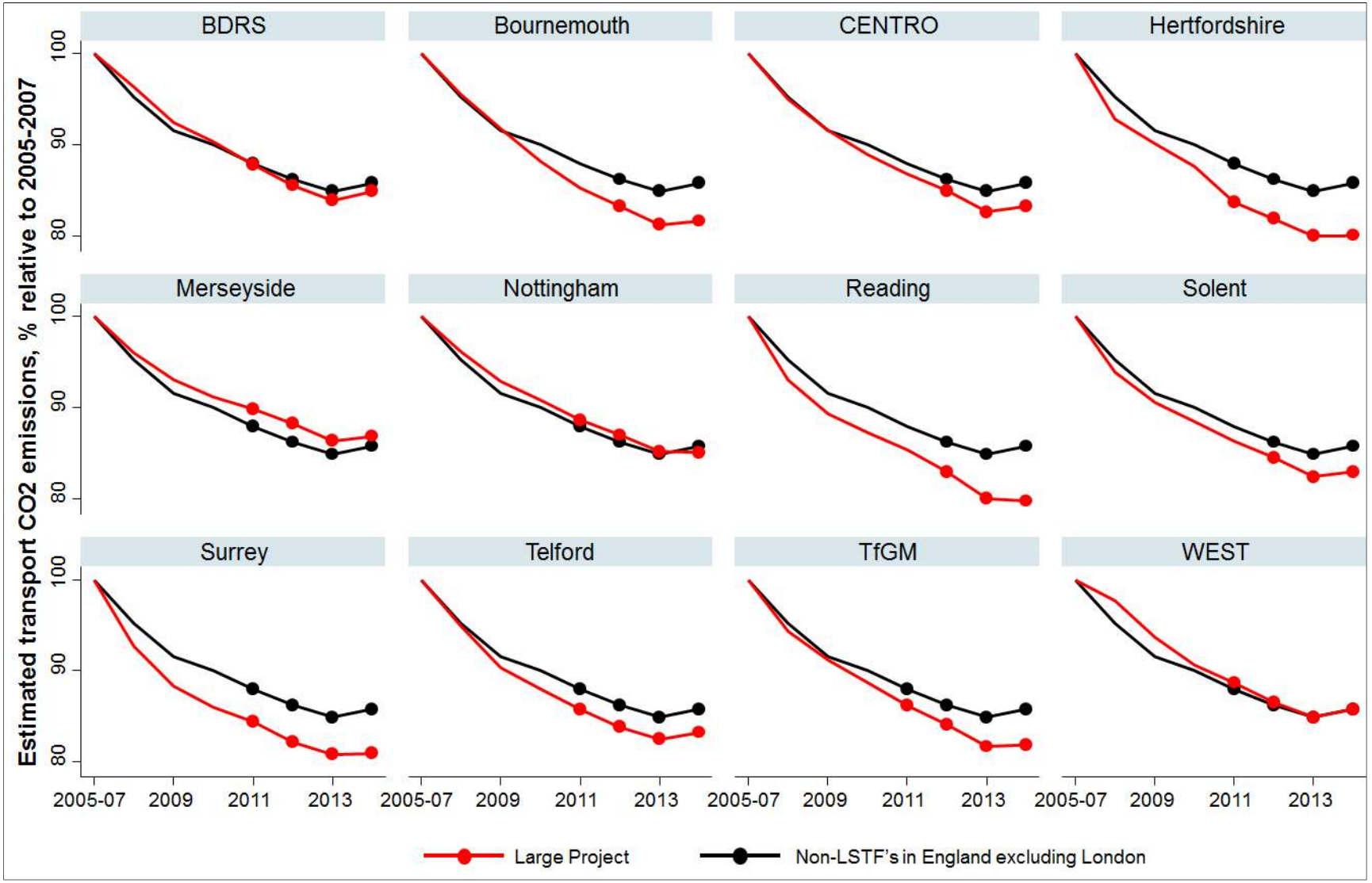
* Range only presented if there was more than one local authority included in the Large Project area. Authorities were ranked, with rankings converted to percentiles, such that the lowest percentile authority experienced the greatest decrease in carbon, whilst the highest percentile authority experienced the greatest increase. Definitions of the local authorities included for each Large Project are given in Chapter 1, Appendix 1.1.

Figure 11.1: Estimated *per capita* carbon emissions from transport within the scope of local authority influence at the grouped local authority level



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding.

Figure 11.2: Estimated *per capita* carbon emissions from transport within the scope of local authority influence, relative to 2005-2007, by Large Project



Filled circles show years when Large Projects were receiving funding.

11.4 Project level outcomes for carbon

Table 11.4 describes the data given in Outcomes Reports (and follow-up correspondence) about area-wide changes in total carbon dioxide in the Large Project areas. Meanwhile, Table 11.5 gives the data, where it did not essentially repeat the DECC figures described in Section 11.3.

Specifically, BDRS, Bournemouth, Hertfordshire, Nottingham and WEST quoted DECC data. There were some differences compared with the figures reported here, depending on whether the authorities reported on all transport emissions, or emissions within the scope of local authority influence. BDRS, Bournemouth and Nottingham also provided updated DECC data after publication of their Outcomes Reports, when revised figures from DECC became available, which included changes to historical figures due to changes in methodology.

Merseyside, Nottingham, Reading and Surrey presented data from their own models. Nottingham City and Reading both showed a long-term downwards trend. Data for Merseyside and Greater Nottingham did not show a reduction, which is somewhat at odds with the DECC data.

In correspondence, Merseyside stated that their model uses emission factors from the Defra Emission Factor Toolkit, which change by year, by vehicle type and by vehicle speed, which are applied to each road link in Merseyside. Their model also takes into account differences in, and emissions relating to: major roads; minor roads; cold starts, hot soaks and diurnal evaporation; rail traffic; bus stations; airports and shipping ports. In brief, then, both the sources of emissions considered are different, and the methodology for generating estimates of emissions are different to those used for the DECC calculations.

Equally, Nottingham uses its own methodology, and was reporting on all emissions from transport.

The Surrey calculations were done in two ways, using the DfT's Local Authority Carbon tool, where the second run assumed no change in year. In correspondence, the local authority argued that the difference between the results indicated the large effect that assumptions about improvements in vehicle engines made to the figures, and that the DECC data should therefore be treated as the more reliable data source.

Table 11.4: Notes on carbon data

Large Project	Notes
BDRS	The DECC estimates for total kT CO_2 emissions from transport were presented in total (in Table 11.5 [86]), and *per capita*, together with a local estimate of savings, given in Table 11.6.
Bournemouth	The 2014/15 Outcomes Report quoted DECC data for the three authorities for total transport-related CO_2 emissions. Bournemouth had previously used a different methodology for estimating carbon emissions for the major routes on the corridor, based on a model using ATC data, information on vehicle speeds and vehicle types, and WebTAG guidance on fuel consumption and associated emissions. This showed a reduction from 89kTp.a. in 2012 to 88.5kTp.a. in 2013[87].
Hertfordshire	Local Transport Plan indicator data on transport CO_2 emissions (annual tonnes *per capita*), derived from DECC estimates, "supplemented by local data", were

86 These figures are understood to be for all carbon emissions, not just those within the scope of local authority influence.

87 Bournemouth's Outcomes Report stated that they were considering alternative methods of calculation, although, in response to a clarification question, it was reported that that budgetary constraints mean this is unlikely to occur.

Large Project	Notes
	given in the Outcomes Report (1.7 at Local Transport Plan baseline; 2.3 in 2012, 2013 and 2014). The 1.7 figure is potentially erroneous, given the sequence shown in the DECC data. In addition, these figures are for the whole of Hertfordshire, rather than the LSTF areas. They have therefore not been included in the table. The decision was made not to use the Basic Local Authority Carbon Tool to generate carbon estimates in the 2014/15 Outcomes Report.
Merseyside	Data given were 'CO_2 equivalent' emissions in tonnes per year from vehicles, generated from a complex modelling procedure undertaken by the Merseyside Atmospheric Emissions Inventory. Separate analysis of the impacts of individual initiatives is given in Table 11.6.
Nottingham	Nottingham has its own method for generating estimates of carbon emissions across Greater Nottingham and for the City, which are given in Table 11.5 and relate to kT CO_2 emissions from transport per year. The Outcomes Report also quoted data on 'total carbon emissions' from DECC, and per capita emissions for the City (which were updated during the course of this project, given new data from DECC).
Reading	CO_2 emissions were estimated using Reading's own model, which is calibrated using ATC data for vehicle flows, and procedures from WebTAG guidance for estimating fuel consumption and associated emissions. Data given in Table 11.5 are for 12 hour CO_2 emissions from vehicles. The area covered by the model includes Reading borough and parts of Oxfordshire, Wokingham Borough and West Berkshire (i.e. it is wider than just Reading itself).
Surrey	As the main measure of the carbon impacts of the LSTF work, a project-specific calculation was undertaken using the DfT's Basic Local Authority Carbon Tool, providing data for 2009 and 2014 based on traffic flows in the area. In light of changes to the traffic data, these calculations were subsequently revised. In addition, in order to reconcile differences with the DECC figures, calculations were undertaken twice, where the second run assumed no change in year. The dramatic difference between the two sets of calculations implied that the savings from the first run were mainly resulting from assumptions about improvements in vehicle engines, making the second run more meaningful in relation to evaluating LSTF effects. Figures given are for kT CO_2. (Previous estimates from DECC were removed from the 2014/15 Outcomes Report.)
WEST	In the Outcomes Report, DECC data on CO_2 emissions from road transport were given for the four local authorities, and for the West of England sub-region. Data were given both for *per capita* emissions, and total kT of emissions.

Table 11.5: CO_2 emissions from transport (kilotonnes)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005-2007 average	2009-2011 average	% change	Pre-LSTF change
Merseyside						1746.8	1582.2	1539.1	1552.7	1772.4			1665	+6.5%	
Nottingham City	70	70	69	67	68	68	67	66	65	65		70	68	-3.9%	-2.9%
Greater Nottingham	247	248	248	239	238	239	236	237	239	240		248	238	+1.0%	-4.0%
Reading			425	414	409	402	403	397	408	382	392	425	405	-3.1%	-4.8%
Surrey LSTF areas															
Guildford					6.77					6.09				-10.0%	
Redhill					9.39					8.26				-12.0%	
Woking					6.13					5.44				-11.3%	
Surrey LSTF areas – treating 2009 as 2014															
Guildford					5.98					6.09				+1.8%	
Redhill					8.30					8.26				-0.5%	
Woking					5.42					5.44				+0.4%	

% change refers to the change between the 2009-11 average and latest available data. Pre-LSTF change refers to the change between the 2009-11 average and a 2005-2007 average.

11.5 'Bottom-up' estimates of carbon emissions

Eight Large Projects provided estimates of carbon impacts from individual schemes. These are summarised in Table 11.6.

The savings given in the Table are largely quoted from the Outcomes Reports. In some cases (notably the figures for BDRS) some further investigation was carried out, although none of the figures were subject to full independent audit. The types of schemes for which estimates were made include:

- Public transport replacing car journeys (BDRS).
- Car sharing (Telford).
- Modal shift for commuting (Merseytravel, TfGM) and school travel (Nottingham).
- Modal shift from PTP and cycle initiatives (Nottingham, TfGM).
- ECO Stars schemes and eco-driver training, to encourage more efficient driving (Nottingham, Surrey, BDRS).
- Promotion of ultra-low emission vehicles and associated infrastructure (BDRS, Nottingham, WEST).
- Road redesign (Telford).
- Freight consolidation (WEST).

The magnitude of the carbon savings reported from the strands involving freight vehicles (in particular, the ECO Stars scheme and the freight consolidation centre) are notable. Other impressive savings are reported from BDRS's Busboost work, Merseyside's work with employers and Telford's car sharing scheme.

The other source of 'bottom-up' estimations of the carbon impacts of LSTF projects was the Carbon Impacts and Congestion Relief case study report[88], which included examination of two treatment areas in Greater Manchester (Rochdale and Tameside), two treatment areas in Solent (Eastleigh and Gosport), and a control area from each (Wigan and West Fareham), using travel diaries administered in November 2013 and 2014. Rochdale, Tameside and Gosport all achieved a reduction in carbon dioxide emissions (comparing both before and after data, and their performance relative to the change in their respective control area). However, Eastleigh was reported to experience an increase in carbon dioxide emissions, both relative to before data, and relative to changes in the control area. (This is surprising, since the data on car mileage from the same survey suggested that Eastleigh had experienced a lower increase in car driver miles between before and after surveys than that which occurred in the control area, although calculations of carbon emissions also included consideration of speeds, vehicle type and fuel type.)

Table 11.6: Summary of changes in carbon from individual schemes

Large Project	Summary
BDRS	The 2014/15 Outcomes Report estimated that benefits achieved in 2014/15 equated to 3.923kTCO_2. Through further correspondence and discussion, these benefits were broken down, and refined to give the following commentary. First, estimates of CO_2 reductions from individual public transport schemes were as follows: • 80% of patrons using the ASOS Jobconnector bus service would otherwise have travelled by private car, suggesting an estimated annual saving of **414 tonnes CO_2e**, which should continue into the future.

88 Preston J, Wong A, Hickford A, Ghali K and contributors (2016) *Local Sustainable Transport Fund Evaluation: A case study evaluation of carbon impacts and congestion relief. Final report. Executive report*.

Large Project	Summary
	• 25% of extra commuters using the X19 Jobconnector bus following increased service frequency (from October 2012) would otherwise have travelled by private car, which, together with estimates of journey length and annual patronage totals, suggested an estimated annual saving of **111 tonnes CO_2e** in 2014/15, which should continue in the future. • Similar calculations for the X20 service (launched January 2015) suggested a saving of **78 tonnes CO_2e in 2015/16 only.** • A park-and-ride station at Elsecar (opened in November 2013) was estimated to be used by 45 cars per day in 2014/15, for rail journeys that would otherwise have generated 100 miles of car travel per week, equivalent to a saving of **65.52 tonnes CO_2 p.a**.. Savings in 2013/14 were estimated to be 27.32 tonnes CO_2. • Park-and-ride facilities at Adwick station were estimated to be used by 138 people per day in 2014/15, equivalent to 64,780 miles per month and **240 tonnes CO_2 p.a.**. • Surveys were conducted of the BusBoost free public transport trial (which ran for 2.5 years from October 2012). In 2014/15, 4,689 trips per day were estimated to permanently shift from car to bus. Assuming 228 work days per year, and 8km two-way trip lengths, this was assumed to save 8.552m km of car travel p.a. and **1,636 tonnes CO_2 p.a.**. BDRS also had a strand of work promoting lower carbon vehicles and driving. Schemes included: • Young Persons travel planning, which was reported to save **4 tonnes CO_2** in 2014/15. • CycleBoost schemes, which were estimated to save **31 tonnes CO_2** in 2014/15. • Barnsley Digital Media Centre Bike Ride was estimated to save **0.4 tonnes CO_2** in 2014/15, involving 25 people, who made cycle journeys replacing 1,160 car miles. • Electric Vehicles Inmotion – 18 companies had worked with Inmotion! to incorporate electric vehicles into their fleets, between June 2014 and March 2016. In total, they had been used to travel over **56,000 miles** by the time of the Outputs Report, representing **27.5 tonnes of CO_2.** • ECO Stars – at the time of the Outputs Report, there were 120 South Yorkshire members, with a total of 5,634 HGVs, 2,377 vans and 759 buses that had received a star rating. Assuming a 5% fuel saving on typical annual mileages for each vehicle type implied a potential saving of **36.481kT CO_2** in 2014/15. • Eco-driving during 2014/15 – via the 'Transport Academy', by June 2015, 1638 drivers from 74 organisations, and 95 driving instructors, had received driver training (to reduce fuel consumption, improve safety and cut costs). On average, fuel consumption had reduced by 12.12%. Assuming an average annual mileage of 24,000 miles p.a., this was calculated as suggesting potential carbon savings of **916 tonnes CO_2 p.a.**. In total, this implies carbon savings may have been as much as 40kT p.a. in 2014/15, with most of the saving coming from the ECO Stars scheme. The magnitude of savings from the BusBoost scheme was also notable.
CENTRO	Data was collected as part of the Residents Panel Baseline survey in 2012/13 and 2014/15. Car driver miles per person showed a 17% reduction over the time period. Meanwhile, area-specific NTS data for residents showed a 4% reduction in car driver miles between 2013 and 2015. Assuming that 15% of the West Midland population (i.e. those living along the LSTF corridors) experienced a 13% reduction in car driver miles over the two year period, additional to what would have happened anyway,

Large Project	Summary
	this was equivalent to a saving (comparing 2015 with 2013 data) of 306.664 million car driver kilometres, and **52,440 tonnes of CO_2** or **14,266 tonnes of carbon** (assuming CO_2 emissions of 171g/km). There would have been smaller savings in previous years, and further savings after 2015.
Merseyside	The Outcomes Report provided estimates of mileage savings from LSTF activity at 22 workplaces, from travel surveys in 2012/13 and 2014/15. Using information about the mode shift away from 'car', together with data about numbers of car journeys, journey distance, and assumptions about number of working days and average CO_2 emissions, this suggested savings of 54,909 car journeys p.a., 527,887 miles p.a. and 161 tonnes of CO_2e p.a.. In clarification questions, Merseyside reported on data for all workplaces, suggesting that 91,961 employees had been affected, achieving a 3-5% reduction in car use, with an average journey length of 14.33km. In the previous calculations, assumptions made were that employees would travel two journeys a day, 231 days a year. Indicator O1 suggested a 69% car mode share for the journey to work (average 2010 and 2013 data). This implies between 1904 and 3173 employees stopped driving to work, giving a total saving of between 12.6 and 21 million car miles p.a.. Using the assumption from the Outcomes Report of 305g CO_2e per mile therefore implies savings of **3,845 – 6,407 tonnes of CO_2e p.a..**
Nottingham	An impact evaluation of the whole LSTF programme was undertaken for Nottingham by ITP. This estimated that the programme overall resulted in a reduction of **28.4 million car kilometres**, and **23,528 fewer tonnes of CO_2e.** The biggest contributors were: • The ECO Stars scheme (17,700 tonnes CO_2 e) – achieved via a 3% fuel saving, through engagement with 69 organisations and 4869 fleet vehicles. • The Community Smarter Travel Hubs (>4,000 tonnes CO_2e) – achieved through modal shift, via PTP to residents and job seekers, and adult cycle training. • Bike It (891 tonnes CO_2e) – achieved through mode shift on the school journey. • U-Cycle (720 tonnes CO_2e) – achieved through modal shift for the journey to further and higher education colleges. • Electric bus trial – with LSTF support for 6.3 of the 45 electric buses introduced, saving 109.2 tonnes CO_2e during the LSTF period, with total savings over 10 years estimated to be 611 tonnes CO_2e. Carbon savings from 20mph zones and other cycle and walking initiatives were not captured in the figures.
Surrey	One strand of project work involved Eco Driver training sessions on a simulator. In total, between October 2013 and March 2015, 129 participants from 14 businesses took part. If the decreases in fuel consumption observed during the simulator training were realised in employee's actual driving, and maintained over time, the Large Project estimated that this training would lead to a 15% reduction in fuel consumption, and annual savings of **68.026 tonnes CO_2 p.a.**.
Telford	Telford reported on carbon savings from two sources: • The Box Road scheme was estimated to have reduced carbon dioxide emissions from either 26.37KT (2009) or 28.13kT (2012) to 19.00kT in 2015, implying a

Large Project	Summary
	reduction of **7.3-9.1 kT CO_2**, through a combination of more efficient journeys and changes in speed[89]. • By 2016, the car share scheme had attracted 1661 members, with reductions in car driving estimated to save **1.78kT CO_2 between 2013 and 2016**. This is a cumulative total, based on estimates for 2013, 14, 15 and 16, generated by assuming members in groups travelled together, and comparing their mileage to the equivalent mileages if they travelled separately. In addition, increased walking and cycling to primary schools, as a result of Low Carbon Life Skills, were also thought to have contributed to carbon emission reductions, although no estimates were given.
TfGM	Survey data on outcomes from Components 1 (cycle/pedestrian schemes), 2a (residential PTP), 2b (workplace PTP), 2c (workplace travel planning) and 'Key Component' (cycle hubs) was used to estimate mileage savings and consequent carbon reductions. Further savings were expected from Component 3 (traffic management technology) once it was fully implemented, but this information was not available for this analysis. In total, 2.6 million vehicle kilometres p.a. were reported to have been removed, estimated to represent **925 tonnes CO_2** in 2015, with two estimates of savings over a 20 year period made. Workplace PTP was calculated as the biggest contributor to these savings. Separately, the TfGM results from the carbon and congestion case study were reported. Between 2013 and 2014, comparing treatment areas with control areas, treatment areas were reported to show a 7% reduction in car driving, (equivalent to 416 miles per person per annum) albeit that this difference was not statistically significant, and a 5% reduction in the level of land-transport related carbon emissions, equivalent to **70kgCO_2e per person per annum**.
WEST	Working with Co-Wheels, WEST was involved in various projects to encourage the take-up of low emission vehicles. LSTF funding was also used to enhance a freight consolidation centre near Junction 18 of the M5, which was in operation since the start of the LSTF programme. In 2014/15, this centre was estimated to have saved over 2,074 delivery trips into Bristol and Bath, saving **23,657 tonnes CO_2**. Figures for the two preceding years appeared to be similar (but slightly higher). There will also have been carbon savings from other strands of the LSTF work – such as the modal shift achieved through work with businesses.

11.6 Conclusions on outcomes related to carbon

Table 11.6 provides an overview of reported outcomes relating to carbon emissions.

According to our analysis of DECC data, for both absolute and per capita emissions of carbon dioxide emissions (under the scope of local authority influence), all Large Projects showed a decrease in 2014, relative to a 2009-2011 baseline. The overall change in absolute emissions of CO_2 for the Large Projects was a reduction of 4.1% compared to a reduction in the comparator group of local authorities of 2.3%. Per capita emissions of CO_2 in the Large Projects showed a reduction of 6.9%, compared to a reduction in the comparator group of 4.7%. For both absolute and per capita

89 However, there were some issues with the data which make it difficult to be confident about the derivation of these figures. Also, Surrey's experience with using the Local Authority Carbon Tool suggests that savings may be overestimated due to assumptions about improvements in vehicle efficiency.

emissions, the difference between the average value for the Large Projects, and the average value for the comparator authorities, was statistically significant ($p<0.001$). Moreover, individually, all twelve of the Large Project areas experienced a higher reduction in per capita emissions (between a 2009-11 baseline and 2014) than the average for the comparator authorities.

Three authorities provided project-level calculations of carbon dioxide emissions during the LSTF period. (Although Hertfordshire and Surrey provided data, there were problems in both cases.) For Reading, the data broadly corroborated the DECC data. For Merseyside and Greater Nottingham, this was not the case, as the Large Project calculations suggested that absolute emissions were not reducing. As well as differences in methodology, the main reason for the inconsistent findings for these cities is likely to be differences in which emissions were included (i.e. inclusion of all transport emissions, not just those within the scope of local authority influence).

Eight authorities provided bottom-up estimates of savings from some, or all, of their work, whilst bottom-up calculations were undertaken for parts of TfGM and Solent as part of the Carbon Impacts and Congestion Relief case study. The suggested scale of savings achieved by working with commercial vehicles (via ECO Stars or work on freight consolidation) was notable. The carbon dioxide reductions achieved via BDRS work on BusBoost, Merseytravel's work with employers, and Telford's car sharing scheme were also substantial.

Table 11.6: Overview of outcomes related to carbon emissions

Large Project	Over-view	Summary of change since start of LSTF project	Attributable to LSTF?
BDRS	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 71.6kT of CO_2 lower than compared with 2009-11. Bottom-up estimation of CO_2 savings from different elements of the LSTF programme suggested potential reductions of 38.5kT CO_2 from the ECO Stars scheme, and a further 3.5kT CO_2 from other initiatives.	Some
Bournemouth	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities.	Some*
CENTRO	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 130.6kT of CO_2 lower than compared with 2009-11. Centro's own calculations suggested potential savings of 52.4kT CO_2 in 2015, compared with 2013, from reductions in car driving.	Some
Hertfordshire	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities.	Unknown
Merseyside	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities.	Some

Large Project	Over-view	Summary of change since start of LSTF project	Attributable to LSTF?
		However, Merseyside's own data, which included data on emissions from all forms of transport (including motorways, ports and airports) suggested that emissions had increased by 6.5%. A bottom-up calculation of Merseyside's workplace travel programme suggested that it could be resulting in savings of 3.8-6.4kT CO_2e p.a..	
Nottingham		Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 51.4kT of CO_2 lower than compared with 2009-11. Nottingham's own data (for all transport emissions) suggested that, over the same period, emissions in Nottingham City had fallen by an annual average of 3kT CO_2 but had increased by 2kT CO_2 in Greater Nottingham. A bottom-up evaluation of Nottingham's LSTF programme suggested the cumulative savings for the programme as a whole were 23.5kT of CO_2e, with a significant contribution from the ECO Stars scheme.	Some
Reading		Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 5.4kT of CO_2 lower than compared with 2009-11. Reading's own data, for a somewhat wider area, suggested that the annual total had reduced by 13kT CO_2 between 2009-11 and 2015.	Some*
Solent		Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In the Carbon Impacts and Congestion Relief case study, Gosport showed reductions in emissions between 2013 and 2014, and relative to performance in the control area. However, Eastleigh did not.	Some
Surrey		Between 2009-11 and 2014, data from DECC showed a reduction in per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. The absolute change, however, was slightly smaller (-1.9% compared with -2.3%), presumably due to the above average growth in both population and employment. Surrey reported on one bottom-up calculation, for their eco-driver training work, which was potentially saving 0.068kT CO_2 p.a.	Some
Telford		Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 9.1kT of CO_2 lower than compared with 2009-11. In bottom-up calculations, Telford estimated that the Box Road scheme had potentially reduced annual carbon emissions by 7.3-	Some

Large Project	Over-view	Summary of change since start of LSTF project	Attributable to LSTF?
		9.1kT CO_2, that the car share scheme had saved 1.8kT CO_2, and that there were several other strands of work that could also have contributed. (However, estimates for the Box Road scheme may be somewhat high.)	
TfGM	■	Between 2009-11 and 2014, data from DECC showed a reduction in both absolute and per capita emissions from transport (within the scope of local authority influence) which was greater than that which occurred in the comparator group of local authorities. In 2014, absolute emissions were 163.1kT of CO_2 lower than compared with 2009-11. In a bottom-up calculation, TfGM estimated that, in 2015, various strands of their LSTF work were saving 0.925kT CO_2. The two areas from TfGM in the Carbon Impacts and Congestion Relief case study both showed a reduction in emissions between 2013 and 2014, and relative to performance in a control area.	Some
WEST	■	Between 2009-11 and 2014, data from DECC showed a reduction in emissions from transport (within the scope of local authority influence) which, when compared with the comparator group of local authorities, was similar in magnitude, whilst the reduction in emissions per capita was greater. WEST experienced higher than average growth in population. In 2014, absolute emissions were 33.3kT of CO_2 lower than compared with 2009-11. In a bottom-up calculation, WEST estimated that a freight consolidation centre was potentially saving 23.7kT CO_2 in 2014/15, and that there would also have been other strands of work generating carbon savings.	Some

■ decrease in carbon dioxide emissions; ■ ambiguous or conflicting data, making it difficult to confidently assess changes in carbon dioxide emissions.

In the 'Attributable to LSTF' column, 'some' indicates that there was evidence of at least some reduction in carbon dioxide emissions occurring as a result of individual LSTF schemes. 'Some*' indicates that there was no direct evidence on carbon dioxide emissions, but that there was evidence of reductions in traffic occurring as a result of LSTF initiatives, as discussed in the traffic chapter, which would suggest this.

However, note that for Merseyside, Nottingham and Solent, the overall change in emissions in the areas was difficult to assess.

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12 Road safety

Key points:

Although there are some positive trends in road safety in the Large Projects in the period of LSTF funding, we cannot conclude that these are attributable to LSTF.

Nationally, across all modes, records on road casualties collected by police forces show that killed and seriously injured (KSI) casualties per head of population fell from 2005-7 onwards but showed a slight increase between 2012-13 and 2014-15.

Taken as a group, these casualty records show that the Large Project areas have seen a reduction in KSI casualties per capita since 2009/2011, a reduction that continues an ongoing downward trend since at least 2005/07. This decrease in overall KSI since 2009/11 was slightly bigger in the Large Projects than the decrease seen in other areas of England outside London (5.9% relative decrease in the Large Projects, 4.8% relative decrease in the national comparison group), although statistical testing suggests that this difference in the overall trend may reflect a chance finding. Statistical testing did, however, provide strong evidence that since 2009/11 the rate of cycling KSI has increased less in the Large Projects than in the national comparison group (6% relative increase in the Large Projects, 25% relative increase in the national comparison group). Although individual LSTF-funded road safety interventions in some Large Projects may have played a modest part in this reduction in casualties, the limited scale of LSTF-funded road safety interventions means it is unlikely that they provide the main reason for the observed downward trend in total KSI, or for the slower rate of increase (relative to the national comparison group) in cycling KSI.

Five of the Large Projects have recorded safety improvements since the start of LSTF funding and four showed a decrease in the number of people who were killed or seriously injured.

Evidence on individual road safety interventions is sparse but a few (20mph zones and infrastructure improvements) were followed by a decline in casualties which may be attributable to LSTF.

Walking and cycling KSI casualties per capita showed a downward trend in the Large Projects relative to nationally, and this was significant for cycling KSI casualties. On the other hand, car/motorbike KSI casualties per capita showed an upward trend in the Large Projects. There are indications of an increase in cycle casualties associated with an increase in cycling in Bournemouth, the one Large Project which provided LSTF-specific data on both casualties among vulnerable road users and automatic cycle counts.

12.1 Overview of road safety objectives

Five Large Projects explicitly identified road safety as one of their objectives. In one case (Nottingham) this was indirectly through improving health and reducing transport impacts, while in Surrey and WEST, improving road safety was identified as a secondary objective. Telford and CENTRO had specific objectives related to the safety of vulnerable road users in the LSTF areas. These objectives are summarised in Table 12.1.

Table 12.1: Summary of road safety objectives and activities

	Road safety objective?	Summary of road safety objectives	Road safety schemes implemented (by July 2015)
BDRS	No		3,519 pupils received child pedestrian training, 270 children received scooter training
Bournemouth	No		Junction modifications to improve safety for pedestrians and cyclists; 500 children received scooter training
CENTRO	Yes	Reduce the accident rate for vulnerable road users within all LSTF corridors	None
Hertfordshire	No		None
Merseyside	No		20mph speed limits on residential and local roads
Nottingham	Indirect	The 'health' objective is to create the social, cultural and physical environment to support active travel options and reduce transport impacts; a reduction in road casualties (number and severity) is one of the outcomes monitored under this objective	20mph speed limits on 580km of roads in 9 areas, covering all residential roads
Reading	No		None
Solent	No		180 children received scooter training
Surrey	Yes	Improving road safety is a secondary objective	None
Telford	Yes	The Shared Space design on Coach Central was intended to provide a public realm which is safer and more pleasant for pedestrians and cyclists. One of the key aims was to improve safety particularly for pedestrians and other vulnerable road users on the Box Road around the town centre	Shared space and infrastructure improvements in town centre; 222 children received pedestrian training
TfGM	No		None
WEST	Yes	Improving safety is one of the secondary objectives	20mph speed limits on residential and local roads across Bristol 4,463 children received pedestrian training, 1,769 children received scooter training

12.2 Metrics used to monitor road safety

The metrics used to monitor road safety are all based on the records of collisions involving injuries which have been reported to the police (in STATS19). However the data used were not the same across the Large Projects:

- Some were based on killed and seriously injured (KSI) casualties (Bournemouth, CENTRO Hertfordshire, Nottingham, Surrey, Telford and WEST) and others were based on KSI collisions (BDRS and Solent).
- In Merseyside, an index based on the change in injury collisions in the LSTF low speed zones compared with the baseline was reported.

- Some provided rolling averages (5 years in BDRS and Nottingham).
- In Bournemouth, CENTRO and Solent the data were for LSTF-specific zones or corridors while in BDRS, Hertfordshire, Nottingham, Telford and WEST the figures were for a wider area. Telford also provided time-series data for one of the LSTF areas.
- Bournemouth, CENTRO and Surrey provided data by mode of travel, while Telford included figures for pedestrians and children.

No data were provided for TfGM and Reading (two of the Large Projects without road safety objectives and interventions), while in Merseyside no 'before' data were provided.

Some Large Projects provided local data for specific schemes: the junctions that were improved in Bournemouth and the Box Road area of Telford where urban realm improvements were introduced; in each case these were small areas with few casualties but it is nevertheless important to monitor casualty trends.

12.3 National trends in road safety

Figure 12.1 is drawn from the records on road casualties collected by police forces (in STATS19) which are compiled into national data by DfT. It shows the indexed change in the number of people killed and seriously injured in road collisions since 2005-2007, per head of population, in the Large Projects and in other areas of England (outside London).[90]

Looking at all modes, in the national comparison group of local authorities, casualties per capita fell from 2005-2007 onwards but showed a slight increase between 2012-2013 and 2014-2015. Across the period of LSTF funding, the overall KSI rate per 1,000 in the population fell from 0.456 in 2009/11 to 0.437 in 2015, a 4.2% relative decrease. In the Large Projects, casualty rates per capita for all modes fell more slowly, but then continued to fall by a modest amount in the most recent years. The overall KSI rate per 1,000 people fell from 0.355 in 2009/11 to 0.334 in 2015, a 5.9% relative decrease. The Large Projects thus showed a slightly larger relative decrease across the LSTF funding period, but tests for interaction indicated that this difference was not statistically significant ($p=0.47$)[91]. In summary, the Large Projects had markedly lower absolute per capita casualty rates than the national comparison group, but a similar relative decline across the LSTF funding period.

Pedestrian casualties in the national comparison group fell between 2005-2007 and 2010-2011 but this trend slowed in 2012-2013, and then continued to fall in the Large Projects but not elsewhere. Between 2009/11 and 2015, pedestrian casualties in the national comparison group fell from 0.084 to 0.080 per 1,000 in the population, a 4.8% relative decline. Over the same period, pedestrian casualties in the Large Projects fell from 0.112 to 0.100 per 1,000 people, a 10.7% relative decrease. Tests for interaction, however, indicated that this difference was only borderline statistically significant ($p=0.09$), meaning one would require additional years of data to assess whether the difference persists.

Cyclist casualties have been rising, but rose less in LSTF areas than nationally in recent years. Between 2009-11 and 2015, cycling casualties in the national comparison group rose from 0.048 to 0.060 per 1,000 population, a 25% relative increase. Over the same period, cycling casualties in the

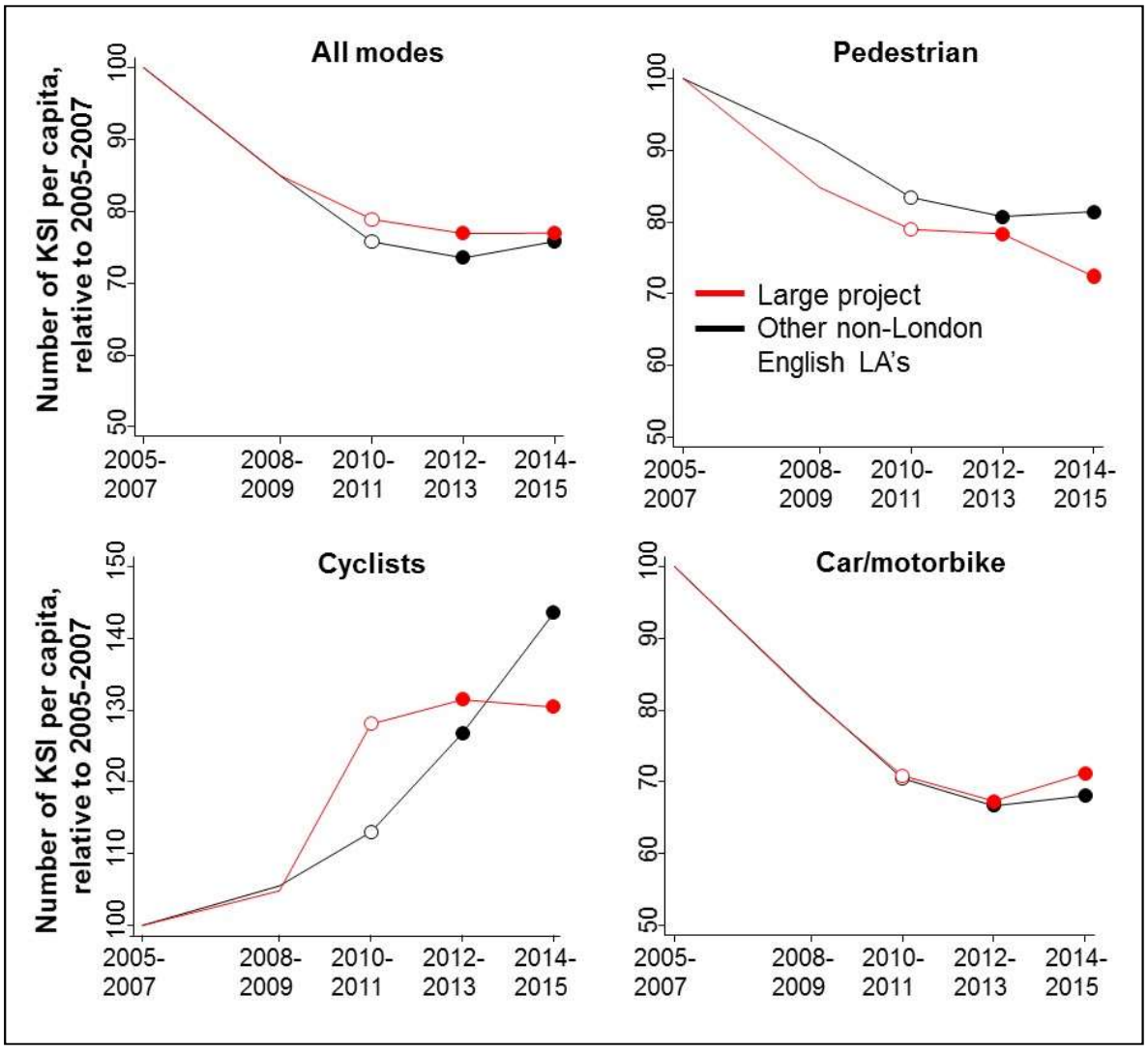
90 Note that casualties per capita is the only comparable outcome available across modes because data on distance travelled by each mode (that would make it possible to calculate exposure to risk) are not collected in a robust and comparable way for each mode across Large Projects.

91 P values calculated in a Poisson regression model looking for an interaction between year (2015 vs 2009/11) and LSTF status in predicting the number of KSI. The number of KSI in 2015 was divided by the relevant population increase between 2009/11 and 2015.

Large Projects rose from 0.050 to 0.053 per 1,000 population, a 6% relative increase. Tests for interaction indicated that this difference was highly statistically significant (p=0.001). In other words, there is strong evidence of a smaller per capita increase in cycling injuries in the Large Projects than in the national comparison group.

The trends for car and motorcycle casualties (combined) in the Large Projects were the same as the trend in the comparison group until 2012-13 but car and motorcycle casualties then showed a greater increase in the Large Projects in the most recent period than elsewhere. Between 2009/11 and 2015, car and motorcycle casualties in the national comparison group fell from 0.310 to 0.284 per 1,000 population, an 8.4% relative decline. Over the same period, car and motorcycle casualties in the Large Projects fell from 0.183 to 0.173 per 1000 population, a 5.5% relative decrease. Tests for interaction indicated that this difference was not statistically significant (p=0.20), i.e. the smaller relative decrease in car and motorcycle casualties in the Large Projects may be due to chance.

Figure 12.1: Trends in casualties (killed and seriously injured) by mode relative to 2005-2007 – DfT statistics



Open circles show years when some Large Projects were receiving funding; filled circles show years when all Large Projects were receiving funding. Note that trends for 'car' and 'motorbike' individually may not be the same as the trend for 'car/motorbike', as the risk profile for these modes is quite different.

12.4 Project-level road safety outcomes

Figure 12.2 summarises the trends in the road safety indicators for the Large Projects which have provided data for more than one year and have included data from 2011 onwards. The basis for comparison is not the same in each area, with different metrics reported by different Large Projects as noted in section 12.2 above. Figures have been indexed to 1 in 2011. The first graph shows the trends for Large Projects which provided data on KSI casualties and the second shows trends for KSI collisions. The data underlying these graphs are shown in Tables 12.2 and 12.3.

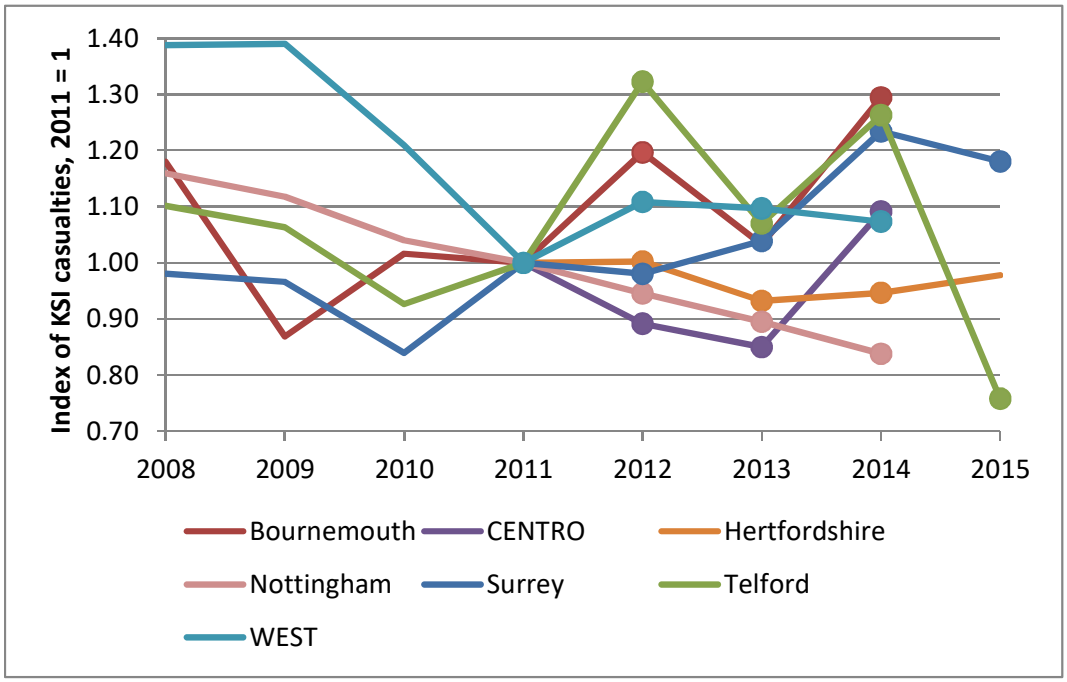
The general picture is of considerable fluctuation from year to year, with no clear evidence of a downward trend. The two Large Projects providing five year rolling averages (Nottingham and BDRS) do show indications of a downward trend, reflecting the national picture shown in Figure 12.1. However in the case of BDRS no figures are provided for the period before LSTF funding and in Nottingham the decrease was a continuation of the trend prior to the LSTF, so it is not possible to attribute the improvement in road safety to LSTF.

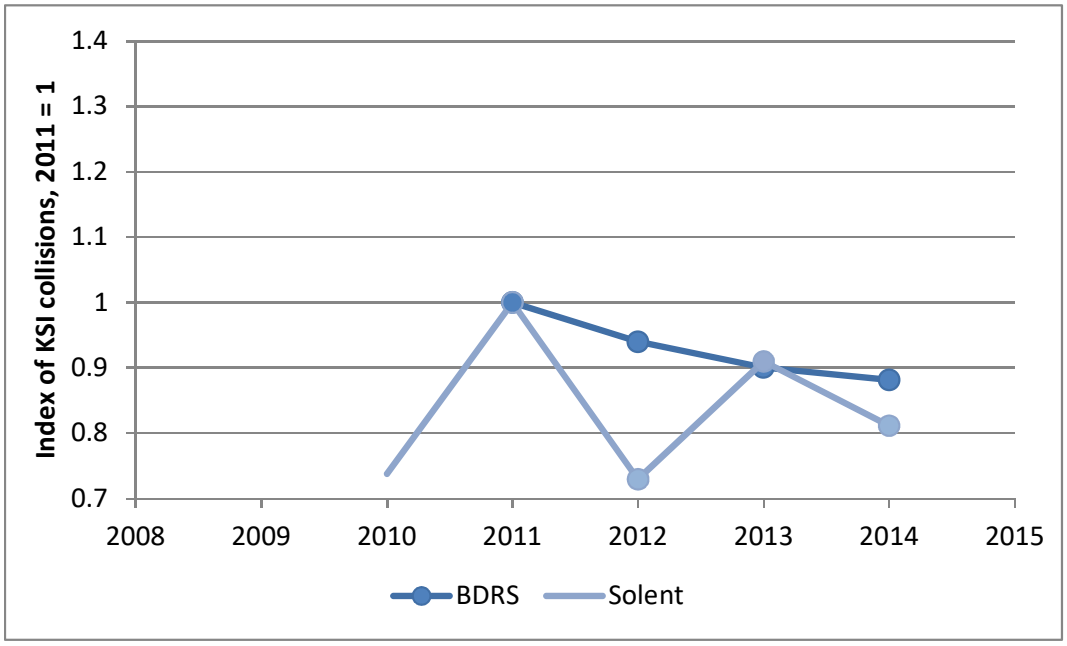
In addition to the data shown in the graphs, Merseyside provided data for the 20mph zones in Liverpool, showing a 16% reduction in the total number of collisions between 2013 and 2014.

It is important to note that where LSTF interventions encourage a growth in cycling or walking, this could result in an increase in casualties among these vulnerable road users. Two projects provided data on casualties among vulnerable road users on LSTF corridors (Bournemouth and CENTRO), with indications of an increase in cycling being associated with an increase in cycle casualties in Bournemouth:

- In Bournemouth, where automatic cycle counts showed higher levels of cycling in four of the five years since LSTF, cyclist casualties on the LSTF corridor increased more since LSTF funding than in the previous few years, while pedestrian casualties showed a decrease in 2013 and returned to the 2012 level in 2014 (see Figure 12.3).
- In CENTRO, pedestrian KSI casualties fell on the LSTF corridors but there was no change in cycle casualties (see Figure 12.4).

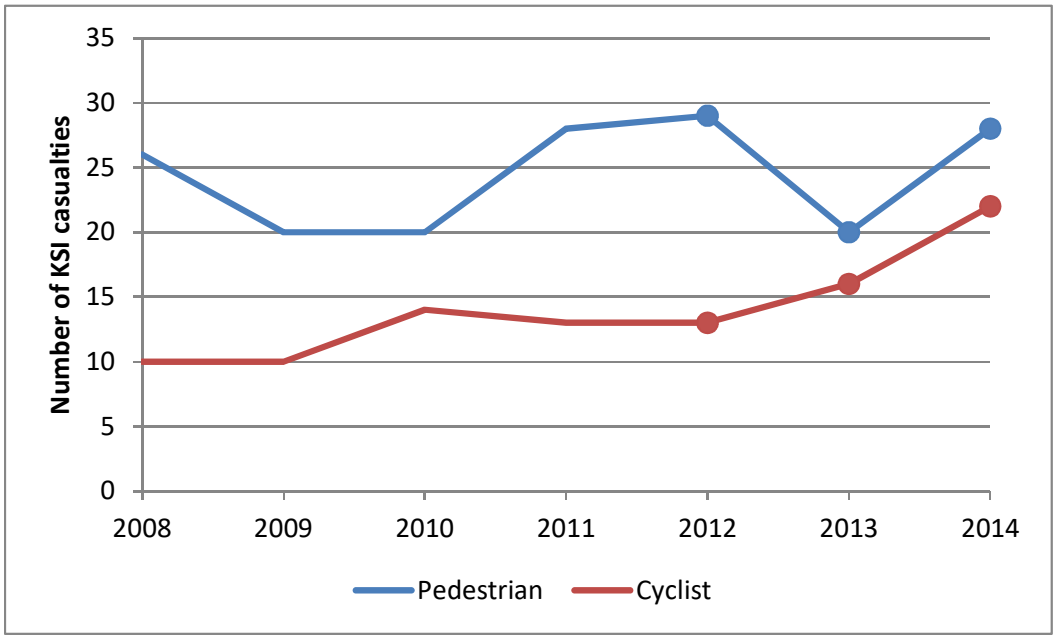
Figure 12.2: Road safety trends in nine Large Projects





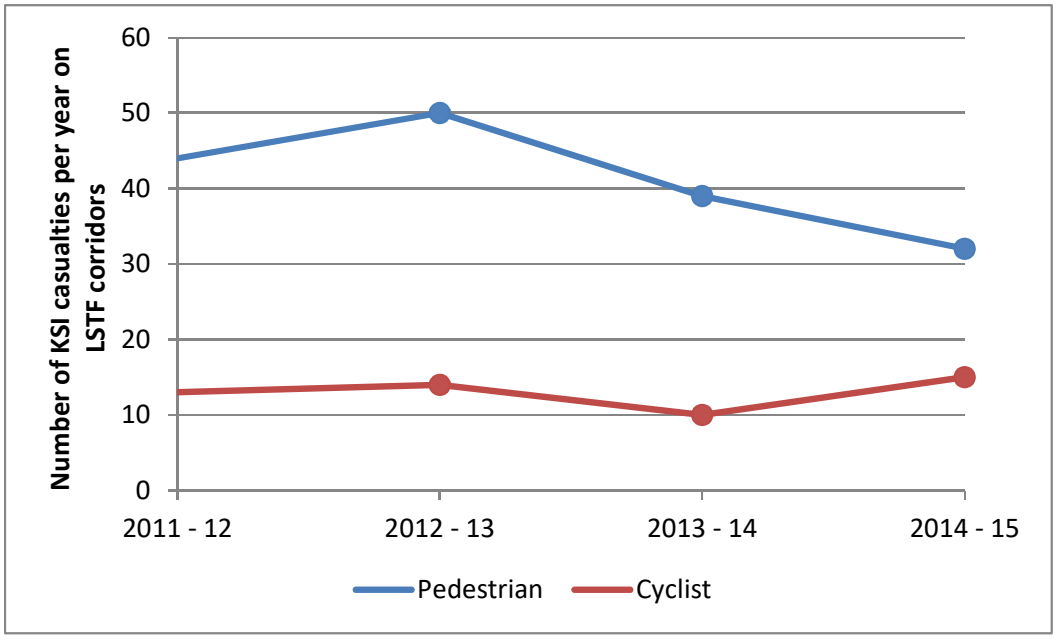
Filled circles show years when Large Projects were receiving funding

Figure 12.3: Pedestrian and cyclist KSI casualties on LSTF corridor in Bournemouth



Filled circles show years when Large Project was receiving funding

Figure 12.4: Pedestrian and cyclist KSI casualties on CENTRO LSTF corridors



Filled circles show years when Large Project was receiving funding

Table 12.2: Road safety statistics indexed to 2011: Large Projects providing data since 2011

	2008	2009	2010	2011	2012	2013	2014	2015	*Notes*
BDRS				1	0.93	0.90	0.88		Area-wide KSI collisions 5 year averages
Bournemouth	1.18	0.87	1.02	1	1.20	1.03	1.30		LSTF corridor KSI casualties
CENTRO				1	0.89	0.85	1.09		LSTF corridors KSI casualties
Hertfordshire				1	1.00	0.93	0.95	0.98	Area-wide KSI casualties
Nottingham	1.16	1.12	1.04	1	0.95	0.90	0.84		Area-wide KSI casualties 5 year averages
Solent			0.74	1	0.73	0.91	0.81		LSTF corridors KSI collisions
Surrey	0.98	0.97	0.84	1	0.98	1.04	1.23	1.18	Area-wide KSI casualties in LSTF towns
Telford	1.10	1.06	0.93	1	1.32	1.07	1.26	0.76	Area-wide KSI casualties
WEST	1.39*	1.39*	1.21	1	1.11	1.10	1.07		Area-wide KSI casualties

Highlighted grey cells are from the first year of LSTF funding onwards: either Key Component funding in 2011/12 or Large Project funding in 2012/13.

* Average for 2005 – 2009

Table 12.3: Road safety statistics

	2008	2009	2010	2011	2012	2013	2014	2015	*Notes*
BDRS				532	500	479	469		Area-wide KSI collisions, 5 year averages
Bournemouth	72	53	62	61	73	63	79		LSTF corridor KSI casualties
CENTRO				120	107	102	131		LSTF corridors KSI casualties
Hertfordshire				413	414	385	391	404	Area-wide KSI casualties ^
Nottingham	179	173	161	154	146	138	129		Area-wide KSI casualties, 5 year averages
Solent			90	122	89	111	99		LSTF corridors KSI collisions
Surrey	201	198	172	205	201	213	253	242	Area-wide KSI casualties in LSTF towns
Telford	314	303	264	285	377	305	360	216	Area-wide KSI casualties
WEST	358*	358*	312	258	286	283	277		Area-wide KSI casualties

Highlighted grey cells are from the first year of LSTF funding onwards: either Key Component funding in 2011/12 or Large Project funding in 2012/13.

* Average for 2005 – 2009

^ Source: 2014/15 Outcomes Report, Hertfordshire Road Casualty Facts 2016 and clarification from Large Project

12.5 Safety outcomes of individual interventions within projects

Five of the Large Projects reported on the safety impacts of specific safety interventions. There were encouraging results in Merseyside, Nottingham and Telford, inconclusive results in Bournemouth and mixed results in CENTRO.

Merseyside and Nottingham monitored casualty data for 20mph zones:

- Merseyside reported data on collisions in the Liverpool and Sefton 20mph zones. Compared with the baseline, the number of collisions fell by 16% in 2014; no data were available for 2015 within the timescale of the project.
- Nottingham reported an estimated reduction of 28 fewer serious casualties and an increase of four slight casualties over 26 months between 2012/13 and 2014/15 across the 20mph zones; these figures were factored up from the initial monitoring of one 20mph zone.

Bournemouth, CENTRO and Telford monitored statistics for reported casualties or collisions at sites where LSTF funding had been used to improve safety at junctions, crossings or on specific routes:

- Bournemouth reported collision data for six junction improvements covering the period 2008 to May 2015, providing data for between 1 and 2 years after the schemes were completed. The number of injury collisions at each site (including collisions resulting in slight, serious or fatal injury) ranged from 0 to 11 per year before the improvements and from 0 to 4 per year at each site after the improvements. Longer term monitoring is needed before conclusions can be drawn on the impact of the LSTF interventions on the number of collisions at these junctions.
- CENTRO reported data on the number of corridors which had seen a change in KSIs, with five corridors showing an increase and five showing a decrease. The types of incident were analysed by the Large Project to provide an indication of how these related to the LSTF interventions. The overall conclusion drawn by CENTRO was that increased commuting by car, cycle and walk may have affected casualty numbers, but that the decrease in KSIs on five corridors could be attributed in some measure to the LSTF investment.
- CENTRO also reported data on the Walsall to Merryhill corridor (Corridor 2) which focused on infrastructure investment to encourage sustainable travel. The total number of casualties (fatal, serious and slight) increased by 14 between 2012/13 and 2014/15 (from 64 to 81), of which six were pedestrians and one was a fatality. The Large Project concluded that the objective to reduce casualties among vulnerable road users had not been achieved. However the travel to work data indicate that car use, cycling and walking had all increased over this time period, thus increasing the exposure to traffic among vulnerable road users.
- Telford analysed the change in casualties in the Box Road area, which had been the focus of efforts to improve safety particularly for vulnerable road users. The number of slight casualties fell from an average of 12 per year in the five years before LSTF funding to an average of 4 per year in 2013-2015, and there was a reduction in pedestrian casualties, but there was no change in the number of serious casualties.

Monitoring of child pedestrian training took place in BDRS and Telford, but this focused on the travel impacts rather than the safety impacts:

- In BDRS, 3,519 children were involved in pedestrian training and postcard surveys were used to identify change in mode use.
- In Telford child pedestrian training impacts on the change in walking to school were monitored at a high level: the training was followed by an increase in walking at between 42% and 56% of the schools involved (walking increased for 42% of those involved in training for basic pedestrian

skills, 50% of schools providing Year 1&2 pedestrian courses and 56% of schools with workshops on pedestrian visibility).

12.6 Conclusions on road safety outcomes

Although there are some positive trends in road safety in the Large Projects in the period of LSTF funding, we cannot conclude that these are attributable to LSTF.

Nationally, across all modes, records on road casualties collected by police forces show that killed and seriously injured (KSI) casualties per capita fell from 2005-7 onwards but showed a slight increase between 2012-13 and 2014-15.

Taken as a group, the Large Project areas have seen a reduction in KSI casualties per capita since 2009/2011, a reduction that continues an ongoing downward trend since at least 2005/07. This decrease in overall KSI since 2009/11 was slightly bigger in the Large Projects than the decrease seen in other areas of England outside London (5.9% relative decrease in the Large Projects, 4.8% relative decrease in the national comparison group), although statistical testing suggests that this difference in the overall trend may reflect a chance finding. Statistical testing did, however, provide strong evidence that since 2009/11 the rate of cycling KSI has increased less in the Large Projects than in the national comparison group (6% relative increase in the Large Projects, 25% relative increase in the national comparison group). (Note that the number of casualties per capita is the only comparator available because data on exposure to risk arising from distance travelled are not available.) Although individual LSTF-funded road safety interventions in some Large Projects may have played a modest part in this reduction in casualties, the limited scale of LSTF-funded road safety interventions means it is unlikely that they provide the main reason for the observed downward trends in total KSI, or for the slower rate of increase (relative to the national comparison group) in cycling KSI.

Table 12.4 summarises the findings on road safety in the individual Large Projects. Five of the Large Projects have recorded safety improvements since the start of LSTF funding and four showed a decrease in KSIs.

There were a few interventions which were followed by a decline in casualties (20mph speed limit zones in Merseyside and Nottingham, some of the corridors in CENTRO and the Box Road area of Telford), which may be attributed to the LSTF.

Overall, walking and cycling KSI casualties showed a downward trend in the Large Projects relative to nationally, and this is significant for cycling KSI. On the other hand, car/motorbike KSI showed an upward trend. There are indications of an increase in cycle casualties associated with an increase in cycling on the LSTF corridor in Bournemouth, the one Large Project which provided data on casualties among vulnerable road users and automatic cycle count data specific to the LSTF interventions.

Few Large Projects have provided data for the LSTF areas specifically and only one of these provided data on longer term trends before the LSTF. There were three Large Projects showing a consistent downward trend (BDRS, Hertfordshire and Nottingham); in Nottingham this continued a previous trend while in BDRS and Hertfordshire, data on previous trends were not provided. The remaining projects providing casualty data showed considerable fluctuations in KSI casualties, from which no conclusions could be drawn.

There was no clear association between road safety objectives and improving road safety after LSTF funding.

Table 12.4: Overview of outcomes related to road safety

Large Project	Over-view	Summary of change since start of LSTF project~	Attributable to LSTF?
BDRS	■	No specific figures are provided for the LSTF areas. Comparing 5 year averages, KSI collisions across the four local authorities fell from 532 in 2007-11 to 500 in 2008-12 and 469 in 2010-14: a reduction of 12%	-
Bournemouth	■	Data on KSI casualties on the LSTF corridor for individual years show variations between years, but no consistent trend	-
	■	Results were inconclusive at sites where junctions were improved	-
CENTRO	■	On the LSTF corridors, KSI casualties fluctuated, falling by 15% between 2011-12 and 2013-14 but then increasing in 2014-15 to 9% above the 2011-12 level.	-
	■ ■	On 5 corridors there was a decrease in casualties but there were 5 where casualties increased, which may be associated with growth in travel by car, cycle and walk.	-
Hertfordshire	■	No specific figures are provided for the LSTF areas. Comparisons of KSI casualties in the Hertfordshire area show no change between 2011 and 2012, but a slight reduction of 7% in 2013, and then smaller reductions of 5% in 2014 and 3% by 2015	-
Merseyside	■	The number of collisions involving injury on the roads in the LSTF 20mph zones fell between 2013 and 2014 by 16%	?
Nottingham	■	No specific figures are provided for LSTF areas but the 20mph zones have seen the number of serious casualties fall by 28.	?
	■	The 5 year rolling average of KSI casualties in Nottingham City fell by 16% between 2011 and 2014; the decrease since LSTF funding continued the previous trend	?
Reading	■	No information provided	-
Solent	■	KSI collisions for the major roads in three groups of LSTF corridors show fluctuations since 2010, with the levels on 2013 and 2014 being lower than in 2011 but higher than in 2010	-
Surrey	■	KSI casualties in the LSTF towns increased after 2012	-
Telford	■	KSI casualties in the area fluctuated, but were lower in 2015 than in the previous 7 years	-
TfGM	■	No information provided	-
WEST	■	In the West of England sub-region the number of KSI casualties fell by 23% between 2005-09 and 2014, but did not decrease after LSTF funding	-

■ decline in safety; ■ no change in safety ■ improvement in safety; ■ insufficient data to assess changes in safety.

~ Different Large Projects treat different time periods as 'baseline'. Changes summarised here are all since 2011/12 for Large Projects that received Key Component funding (BDRS, Hertfordshire, Merseyside, Nottingham, Surrey, Telford, TfGM and WEST), and since 2012/13 for Large Projects that did not receive Key Component funding (Bournemouth, CENTRO, Reading, Solent).

13 Value for money of the LSTF programme

Key points:

For 11 Large Projects for which ex-post cost-benefit assessment was possible on a consistent basis (excluding Telford), the best-estimate programme-level benefit-cost ratio (BCR) was in the range 5.2 – 6.1. This suggests that the programme was very high value for money.

'Best estimate' BCRs for most individual Large Projects were in the range 2.4 – 6.5 (with one Large Project having a higher BCR than this, and one lower).

Journey quality benefits arising from interventions such as simplified (smartcard) ticketing, real-time passenger information, and new cycle infrastructure, formed a significant proportion of the overall benefits, as did benefits arising from lower traffic levels.

13.1 Overall approach

All the Large Projects had assessed the value for money of their programmes as part of the development of their business case, during the LSTF application stage. The benefit-cost ratios (BCRs) estimated by the 12 Large Projects at that stage ranged from 4.1 (Telford) to 19.3 (Bournemouth), resulting in an overall BCR for all 12 Large Projects of 7.4. The Department for Transport (DfT) scrutinised the assumptions and models used to generate the BCRs, and where assumptions were considered optimistic, or the model was not consistent with WebTAG, adjustments were made. The DfT-adjusted ex-ante BCRs ranged from 1.9 (Telford) to 7.8 (Nottingham), with an overall ex-ante BCR for the whole programme of 5.1[92]. The DfT-adjusted ex-ante BCRs for each Large Project are shown in Table 13.5. These were considered by DfT to be 'lower bounds' rather than 'best estimates'.

It would not have been feasible or cost-effective to replicate the process that had been undertaken by each Large Project at the business case stage in order to calculate an ex-post BCR, as the meta-analysis research team did not have access to the local transport models that had been used by most Large Projects. However, a simple spreadsheet model, broadly compliant with WebTAG, was developed in order to estimate ex-post BCRs in a consistent way for each Large Project. The approach used the WebTAG Databook Spring 2016 release version 1.5, and 2010 price and value years, for most of the analysis where possible. It attempted to monetise the following benefits:

- Benefits arising from reductions in car traffic, using the marginal external costs (MEC) approach, as set out in WebTAG Unit A5.4[93]:
  - Reduced congestion
  - Reduced infrastructure wear and tear
  - Fewer accidents
  - Improvements in local air quality

92 Department for Transport (2014) *Value for money assessment for the Local Sustainable Transport Fund*

93 In WebTAG, these are referred to as 'decongestion benefits'. They relate to congestion-relief that would have occurred if nothing except traffic levels had changed. However, the benefit might be taken in other ways: e.g. by reallocating road capacity to longer pedestrian phases at traffic signals. If this happened, 'on the ground' congestion (as measured by average traffic speeds) might stay the same but there would still be a decongestion benefit.

  - Reductions in noise pollution
  - Reductions in greenhouse gases
  - Changes to indirect taxation (a net loss to Government through reduced fuel duty revenues).

- Bus user benefits:
  - Journey time savings for all bus users as a result of bus priority measures
  - Journey quality benefits for all bus users due to improvements such as real-time passenger information, simplified smartcard ticketing, new bus interchanges etc.
  - Health benefits due to mode shift from car to bus (reflecting the benefit of walking to / from bus stops), for new ex-car bus users only.

- Cyclist benefits:
  - Journey quality benefits for all cyclists due to new cycle facilities (on-road and off-road routes, secure high quality cycle parking)
  - Health benefits due to increased physical activity, for new cyclists only
  - Offset by disbenefits due to assumed increases in cyclist casualties.

This captured most, but not all, of the benefits that arose as a result of the interventions delivered by the Large Projects[94]. Benefits that were not captured included public realm enhancements; health benefits from increased walking (other than that associated with bus travel); and benefits associated with rail and station enhancements. For most Large Projects, these are likely to have contributed a small proportion of the total benefit, if calculated using WebTAG assumptions. We also considered, but did not include, the social benefits of additional bus travel by people who would not otherwise have travelled[95]. We discussed with DfT whether such benefits could be considered additional to the benefits already included; by (conservatively) excluding them, we may be under-estimating the magnitude of the benefits associated with bus improvements.

No allowance was made for wider economic benefits of the projects (i.e. the benefits beyond the transport system). However, an attempt was made to estimate the possible benefits of job-seeker support programmes (not included in WebTAG, but a significant intervention in some Large Project areas). The short-term economic benefits of the programme were also estimated, in terms of gross value added (GVA) as a result of additional jobs (both those directly arising from the LSTF programme, and indirect and induced jobs in the wider economy). This approach was informed by guidance from DfT.

There was one Large Project for which it was not possible to estimate a BCR on an equivalent basis to the others: this was Telford, where the main focus of the project was on transformation of the town centre Box Road to improve the quality of the public realm, rather than on measures to achieve decongestion, bus user and cyclist benefits. We concluded that the cost-benefit model we

94 It is worth noting that WebTAG was not developed to estimate the benefits of sustainable transport programmes. The large monetary values of savings in drivers' time due to decongestion can 'swamp' the smaller values due to reductions in carbon emissions, improvements in air quality, and improvements in health as a result of increased active travel, all of which are objectively important, and are normally the core policy aims of typical sustainable travel programmes. While the question of whether the ex-ante BCRs had been broadly correct is perhaps appropriately answered using WebTAG methodologies to estimate ex-post BCRs, the question of whether the schemes achieved their wider policy aims is perhaps best answered using a different tool.

95 Mott MacDonald (2013) *Valuing the social impacts of public transport* Report for Department for Transport

had developed for the other 11 Large Projects would not provide a fair assessment of the benefits of the Telford scheme.

13.2 Input assumptions

Ex-post assessment of the BCRs of the Large Projects should – in theory – be straightforward, since outturn costs and outcomes are known. However, in practice, ex-post assessment of BCRs is complicated by a number of factors. Our approach to dealing with each of these factors is described below, and our key input assumptions are summarised in Table 13.2.

Estimation of the counterfactual

The counterfactual (i.e. what would have happened 'without LSTF') was calculated as the change that would have occurred in each Large Project if *per capita* change had been the same as our national comparator group of local authorities in England excluding London. Population changes in Large Project areas were factored in. We termed this the 'top-line' change.

Many of the local authorities in our comparator group also invested in sustainable transport over the same time period (including, in a number of cases, through LSTF-supported programmes). This means that our comparator group was, strictly speaking, a 'lower level of intervention' group, rather than a 'non-intervention' group. Consequently, our estimates of top-line change ('with LSTF' versus 'without LSTF') in the Large Projects are likely to be underestimates.

Attribution

While pre- and post-LSTF levels of traffic and bus use were generally known, and 'with' versus 'without' LSTF change could be inferred from comparison with the counterfactual, the proportion of any change that was *directly attributable to LSTF interventions* (as opposed to non-LSTF interventions) was not known. We tried to reduce the uncertainty about attribution by asking all Large Projects (following the interim meta-analysis) to undertake an assessment of the scale and effect size of their main interventions; this would have provided a cross-check of the extent to which the main interventions could plausibly have accounted for the observed changes in car and bus use etc. However, only one Large Project (Nottingham) carried out a full ex-post assessment of scale and effect size; evidence presented by other Large Projects typically covered only some of their interventions.

We dealt with this limitation in the quality of the evidence by applying a series of sensitivity tests, in which the change ('with LSTF' versus 'without LSTF') calculated by comparison with our national comparator group was adjusted downwards. Adjustments were based on evidence about the effect size of similar interventions, where this was known from other Large Projects; our knowledge of the extent to which the LSTF programme in question had represented simply one of many sustainable transport initiatives, or was 'the main show in town'; and/or our own judgments about the plausible scale and effect size of interventions, based on knowledge of similar programmes in other places and at other times.

It is worth noting that attribution is only an issue for those benefits that are proportional to the magnitude of reductions in traffic, or increases in bus patronage or cycle use. It is not an issue for bus journey time savings and bus / cycle journey quality benefits, since the extent of physical improvements funded by LSTF (e.g. bus lanes, real time information, cycle paths, cycle parking) is known. Since this latter group of benefits formed a significant proportion of the overall benefits of the programme, the degree of uncertainty about total benefits is less than the degree of uncertainty about decongestion and health benefits.

Quality of evidence on changes in levels of cycling and walking

Evidence on pre/post-LSTF change in levels of cycling and walking was weak for most Large Projects, due to the lack of monitoring of these modes (for example, few Large Projects had a comprehensive network of automatic cycle counters to enable area-wide changes in cycling to be reliably estimated). This meant that it was not possible to include benefits due to increased physical activity from cycling and walking for some Large Projects. The full benefits of their programmes are, consequently, likely to be underestimated.

Decay rates

Revenue-type interventions accounted for a significant proportion of expenditure for most Large Projects (between 12% and 56%). The longevity of change in travel patterns due to these interventions is uncertain. Some revenue-funded interventions are *not* likely to have diminishing effects over time: in particular, this applies to kick-start revenue support for new bus services that enables patronage to grow to the point where a service becomes commercially viable. However, other revenue-funded interventions, such as personalised travel planning and some workplace and school interventions, are likely to have a diminishing effect over time, and so a decay rate is applicable.

Selection of an appropriate decay rate is particularly challenging when outcomes (less car use, more bike use etc.) follow implementation of a package of interventions, including both revenue and capital schemes. The recent update of the Sustainable Travel Towns research[96] suggests that a decay rate of 33-40%, as considered in our original STT evaluation, was overly pessimistic for typical sustainable transport programmes in real-world circumstances[97]. A range of decay rates is appropriate, not just to reflect uncertainty, but to reflect different possible futures depending on subsequent transport policy decisions. On this basis, and on the assumption that encouraging more accessible and less polluting forms of transport is likely to continue as a key policy objective, 'programme-level' decay rates somewhere between zero and 15% are likely to be more realistic estimates of real-world effects.

We therefore explored the effects of three scenarios for the benefit 'decay rate', summarised in Table 13.1.

96 Cairns, S. and Jones, M. (forthcoming) *Sustainable travel towns: an evaluation of the longer term impacts*. TRL report for DfT, PPR 776.

97 This is partly because sustainable transport programmes implemented by local authorities typically include infrastructure and service improvements, as well as information / marketing measures. Infrastructure and service improvements implemented as part of a package would be expected to have at least the longevity of effect of such measures if implemented in isolation. The STT update work also highlights the importance of long-term consistency of policy: where a sustainable transport programme is followed by further supportive measures, behavioural change may be augmented; but where a sustainable transport programme is followed by 'negative' interventions, such as service cuts or fare increases, the beneficial effects of the original programme may rapidly be eroded.

Table 13.1: Decay rate scenarios

Scenario / decay rates	Description	Likely applicability
A Zero	No decay of any benefits: all benefits sustained at the 2014/15 level for 30 years	Appropriate to a highly supportive policy environment for sustainable transport, consistent over extended time periods.
B 5%	All benefits decay from 2014/15 levels at **5%** per year. This means that: Decay rates for some schemes and types of benefit are pessimistic (e.g. journey quality benefits due to improvements in bus or cycle infrastructure) Decay rates for other schemes and types of benefit are optimistic (e.g. mode shift benefits due to behaviour change programmes).	Appropriate in the current policy environment for sustainable transport, with some supportive trends and factors, and some unsupportive trends and factors, at both local and national levels.
C 0 – 30%	Variable decay rates (**0%, 15% and 30%**) for different types of benefits, tailored to the interventions in each Large Project. **Decongestion benefits:** decay rate **0%** for Large Projects whose programmes were largely capital; **15%** for Large Projects whose programmes were a balance of revenue and capital schemes^ **Bus quality and infrastructure improvements:** decay rate **0%** **Cycle journey ambience improvements:** decay rate **0%** **Health benefits due to mode shift from car to bus / bike:** decay rate varied depending on whether the relevant interventions were largely infrastructure / commercially-viable service improvements (**0%**); or largely 'smarter choice' interventions (**30%**), or a balance of both (**15%**).	Appropriate in the current policy environment for sustainable transport, if there is detailed knowledge of the interventions being assessed.

^ A decay rate of 30% could be used for programmes that were largely revenue; this did not apply to any Large Projects.

Build-up of effects

Several Large Projects implemented major interventions in the final year of LSTF funding, including, for example, public transport smart cards or major cycle infrastructure (e.g. a new cycle bridge). The effects of these interventions are very unlikely to have been fully realised by 2014/15 and are likely to continue to grow over several years. Since we had no evidence regarding the future rate of growth, we used sensitivity tests (discussed further below) to make some allowance for this, with a pessimistic ('Low') sensitivity test assuming no growth in the effects of recent interventions on patronage or cycling levels beyond 2014/15, and a realistic ('Mid') assumption incorporating some allowance for future growth in effects of recent interventions. This means that the full 'active travel' health benefits of these elements of the programme (in relation to uplift in cycling and in walking to/from bus stops) are underestimated under our 'Low' sensitivity test. However, the journey quality benefits of these late-stage major interventions for *existing* users are fully included.

Table 13.2: Main assumptions for cost-benefit analysis

Input parameter	Assumption	Rationale / method
Appraisal period	30 years	Ex-ante value for money assessments by the LSTF Large Projects used varying appraisal periods, ranging between 10 and 60 years, with an average across all 12 Large Projects of 38 years. For ex-post BCR calculations, we used a consistent appraisal period of 30 years for all Large Projects. Note that there would be a case for using a longer appraisal period of 60 years (as with road schemes and some public transport schemes), since maintenance costs are factored in.
COSTS		
Costs	Includes DfT grant and local contribution; capital and revenue.	
Upkeep costs of capital items	1%	Upkeep costs of 1% of infrastructure expenditure per year were applied from the date of capital expenditure.
BENEFITS: GENERAL		
Build-up of effects during LSTF	Effects assumed to ramp up in linear fashion between start and end of LSTF period.	
Build-up of effects after LSTF period	Zero	Effects of interventions in the final year of LSTF may not yet have reached their final level; however, no growth beyond 2014/15 was assumed.
Decay rates	Three decay rate scenarios for revenue-led projects: **Scenario A:** no decay of any benefits (i.e. all benefits sustained at the 2014/15 level for 30 years) **Scenario B:** benefit decays from the 2014/15 level at 5% per year (across all modes, and all types of benefit) **Scenario C:** differential decay of benefits from the 2014/15 level for different Large Projects / modes / types of benefit.	See text (section 14.2) for explanation. Note that inclusions of upkeep costs for capital items means that a zero decay rate for change arising from capital-funded infrastructure is justifiable.

Input parameter	Assumption	Rationale / method
BENEFITS: ROAD TRAFFIC		
Reduced marginal external costs (MEC)	Figures for total MEC based on WebTAG Table A5.4.2, 2010 prices and values, including reduced congestion, reduced infrastructure wear and tear, fewer accidents, improvements in local air quality, reductions in noise pollution and greenhouse gases, and changes to indirect taxation. Total value varies from 33.7 p/car-km-removed (A-roads in inner and outer conurbations) to 10.1 p/car-km-removed (other roads in other urban areas).	Area type: BDRS, CENTRO, Merseyside and TfGM: applied MEC for 'inner and outer conurbations'; other Large Projects: applied MEC for 'other urban'. Road type: In most cases, MEC for 'other roads' was used, except Bournemouth, CENTRO and Solent, for which MEC for 'A-roads' was used because these Large Projects were focused on A-road corridors.
BENEFITS: BUS		
Journey time benefit	Only applied for Large Projects where bus priority measures influenced a significant proportion of services. Assumed to be 0.25 or 0.5 minutes per trip. Proportion of bus trips benefitting from journey time savings assumed to be 0%, 10% or 20%, depending on scale of bus priority measures implemented. Rule of half used for new trips (i.e. average benefit to all new users = half of benefit per existing user).	Time saving per trip based on evidence from BDRS: 0.5 minute average peak time saving recorded from real time information systems for 17 intervention locations covering 15 bus services. Same time-saving assumed in other Large Project areas, except Bournemouth where evidence suggested a smaller time-saving was appropriate. Examples of scale of bus priority measures: BDRS: tackled 55 locations focused on congestion hot spots: assumed benefit would apply to 20% of bus trips. CENTRO: tackled 21 locations assumed to be on key corridors: assumed benefit would apply to 10% of bus trips.
Journey quality benefit	Benefits in generalised minutes per trip, based on WebTAG Table M3.2.1, ranging from 0.84 for simplified (smartcard) ticketing to 1.90 for electronic display screens. Wifi on buses assumed to offer benefit equivalent to 1.00 minutes per trip, as no figure available from WebTAG. Rule of half used for new trips.	For each Large Project, proportion of bus trips benefiting from various quality upgrades (real-time passenger information, electronic display screens, simplified (smartcard) ticketing, new/improved bus shelters, new bus interchange facility, wifi on buses) was estimated, based on evidence in Outputs Surveys / Outcomes Reports. The assumed benefit of Wifi on buses was commensurate with evidence from studies of willingness to pay for Wifi on rail, after making allowance for average bus trip lengths and the lower suitability of bus environments for computer work. Benefit of smartcard ticketing was applied to 50% of existing passengers. Introduction of smartcards would be expected to benefit all passengers (since non-smartcard users benefit from faster boarding times), but in light of

Input parameter	Assumption	Rationale / method
		discussion with DfT we decided that it was implausible for this benefit to be included for the full 30-year appraisal period, since it might be expected that smartcards would be introduced at some future date even without government funding. The benefit was therefore applied to 50% of passengers for 30 years, as a proxy for applying it to 100% of passengers for a shorter time period.
Health benefit from walking to / from bus stops	Only applied to new bus trips that would otherwise have been made by car or would not have been made. Proportion 'ex-car' = 32%; proportion 'not otherwise made' = 21%. Walking distance to and from bus stops assumed to be 2x200m, giving walking time at 4.8km/h of 5.0 minutes; using the Health Economic Assessment Tool (HEAT) this is equivalent to a reduction in risk of all-cause mortality of 0.023. Health benefits ramp up over five years (i.e. 20% of benefit in 2014/15, rising to 100% of benefit in 2018/19 and thereafter).	Mackie et al. (2002)[98] and TAS (2002)[99] found, respectively, that 32% and 33% of new bus users had previously travelled by car. Mott MacDonald (2013)[100] found that 21% of new bus trips would not otherwise have been made. The normal rule of thumb for a bus stop 'catchment' is 300-400m[101].
BENEFITS: CYCLING		
Cycling distance at baseline	*Number of people in the workforce cycling to work* in 2011 in local authorities covered by each Large Project taken from 2011 Census data. *Cycle commuting distance* at baseline based on average cycle commute distance of 4.83 km (one-way); assumes each cycle commuter makes 10 cycle trips to/from work per week, for 48 weeks per year. *Total cycling distance:* cycle commuting distance at baseline factored up by 2.6 (1/0.38) to allow for non-commuter cycling.	Average cycle commute distance: from NTS national data, corroborated by national data from 2011 Census. Factor for non-commuter cycling: special tabulation from National Travel Survey data (2011 NTS Table 0410) shows 38% of all cycle distance in areas classified as 'urban cities and towns' is for commuting. Most of the remainder is for leisure.

98 Mackie, P.J., Bristow, A.L., Shires, J., Whelan, G., Preston, J., Huang, B. (2002) *Achieving best value for public support of the bus industry Part 1: Summary report on the modelling and assessment of seven corridors*, in Commission for Integrated Transport / LEK (2002) Obtaining best value for public subsidy for the bus industry.
99 TAS Partnership (2002) *Monitoring quality bus partnerships volume 1: the evidence*, in Sloman (2003) Less traffic where people live.
100 Mott MacDonald (2013) *Valuing the social impacts of transport* Report to DfT.
101 See, for example, discussion in Daniels R and Mulley C (2013) *Explaining walking distance to public transport: the dominance of public transport supply* The Journal of Transport and Land Use 6:2 pp 5-20.

Input parameter	Assumption	Rationale / method
Cycling distance / time 'without LSTF'	Total cycling distance in 2014/15 'without LSTF' estimated by factoring up cycling distance at baseline in proportion to population growth. Total cycling time calculated using average cycling speed of 15.5km/h.	Population growth calculated from ONS mid-year population estimates.
Cycling distance / time 'with LSTF'	Total cycling distance in 2014/15 'with LSTF' estimated by factoring up cycling distance at baseline using evidence from automatic and manual counts in each Large Project area. Total cycling time calculated using average cycling speed of 15.5km/h.	Adequate automatic and manual count data to estimate area-wide change in cycling levels between baseline and 2014/15 is available for 8 Large Projects. Copenhagen Bicycle Account (2014) reports average cycling speeds of between 15.3 and 16.4 km/h between 2004 and 2014.
Journey quality benefit	Users assumed to spend 5% of cycling time on new cycle tracks / lanes. Benefits based on WebTAG Table A4.1.6: 7.03p/min for off-road segregated cycle track and 2.99p/min for on-road cycle lane. Rule of half used for new trips. (i.e. average benefit to all new users = half of benefit per existing user).	Quality benefit was weighted according to proportion of cycle infrastructure by length that was off-road cycle track versus on-road cycle lane, based on evidence in Outputs Surveys.
Secure cycle parking benefit	Benefit based on WebTAG Table A4.1.6: 98.14p/use.	Number of uses of new secure cycle parking facilities based on evidence in Outputs Surveys / Outcomes Reports, but not reported systematically so likely to be underestimated.
Health benefit from cycling	Only applied to 'new' cyclists ('with LSTF' minus 'without LSTF'), using HEAT to estimate reduction in risk of all-cause mortality of 0.17 for 'cycling time' of 172 minutes per week. Health benefits ramp up over five years (i.e. 20% of benefit in 2014/15, rising to 100% of benefit in 2018/19 and thereafter).	172 minutes per week derived from average cycle commute distance and average cycling speed. Additional cycling assumed not to be offset by a reduction in other forms of physical activity (in line with evidence from Sahlqvist et al. 2013, and recent analysis of Active People Survey data undertaken by Goodman reported in Cycle City Ambition Programme: Baseline and Interim Report (2017 – forthcoming)).
Road safety disbenefit	Casualty rate assumed to increase by (distance cycled)^0.4.	Power relationship between distance cycled and number of casualties based on Jacobsen (2003), as used in WebTAG Table Unit A4.1.
BENEFITS: JOB-SEEKER SUPPORT*		
Number of job-seekers receiving support		Figures extracted from Outputs Surveys and Outcomes Reports for all Large Projects, for different types of support (free public transport travel, moped loan etc.). Adjusted following quality checks.

Input parameter	Assumption	Rationale / method
Proportion of job-seekers gaining work	27% of those receiving free /reduced fare public transport travel for extended period whilst unemployed; 34% of those receiving free one/two months' travel to enable start in new job; 20% of those receiving free public transport to attend interviews or training; 74% of those offered moped / bike loan; 44% of those offered free / low-cost bike; Other job-seeker support services for which evidence of 'effect size' was lacking were assumed to have 'effect size' of nominal 1%.	'Effect size' i.e. proportion of job-seekers gaining work *as a result of* LSTF intervention based on survey evidence from multiple Large Projects.
Benefit of job-seeker gaining work	Programme assumed to reduce the time period for which job-seekers were unemployed by 25%.	Data for proportion of claimants finding work, according to duration of unemployment, used to estimate number of weeks of Job-Seekers Allowance 'saved' by job-seekers gaining work. No benefit assumed to employers, although in practice, some posts may have been filled earlier due to LSTF and some short-term drop-out and re-recruitment may have been avoided.
BENEFITS: JOBS CREATED / GROSS VALUE ADDED*		
Jobs created by LSTF	For each 'direct' LSTF job created, assume 0.7 'indirect' jobs and 1 'induced' job, for duration of LSTF only.	Figures for number of people, Full-Time Equivalents (FTE), directly employed to deliver the LSTF programme in Large Projects taken from Outputs Surveys. Estimates for indirect and induced jobs from Scottish Government Input Output tables.
GVA	Assume GVA = jobs created x regional GVA per head for each Large Project area.	

* Benefits related to job-seeker support and jobs created / GVA are not standard to WebTAG, but were estimated as part of sensitivity tests.

13.3 Attribution and use of sensitivity tests

As discussed in section 13.2, a series of sensitivity tests were applied to the top-line changes in traffic, bus use and cycling ('with' versus 'without' LSTF). The sensitivity tests varied very substantially between Large Projects, depending on the magnitude of the top-line changes and the available evidence on the scale and effect size of LSTF interventions. For example, where the scale and/or effect size of LSTF interventions to increase bus patronage were small relative to the top-line change in bus patronage, a sensitivity test closer to 0% was used. In contrast, where the scale and effect size of LSTF interventions to increase bus patronage were larger, and the expected uplift in bus use was comparable to the top-line change in bus patronage, a higher sensitivity test (closer to 100%) was used.

We assessed the effects of two values for the sensitivity test, a 'Low' value that we judged to be highly conservative and a 'Mid' value that we judged to be realistic. In some cases, the 'Low' and 'Mid' values were the same, because we had good information to enable an assessment of the

proportion of the top-line change that was attributable to LSTF; in other cases, where there was greater uncertainty, the 'Low' and 'Mid' values differed substantially. For job-seeker support programmes, benefits were based on intervention-level data on the number of job-seekers assisted (the 'scale') and the proportion who subsequently found work (the 'effect size'), rather than on top-line changes in employment; the 'Mid' value was therefore always set at 100%, but the 'Low' value was always set at 0% reflecting the fact that benefits of job-seeker support are not standard to WebTAG.

Sensitivity tests for each Large Project are summarised in Table 13.3. Our reasoning for arriving at the percentage figures in Table 13.3 is described for three example Large Projects, Bournemouth, Nottingham and TfGM, in Table 13.4.

Table 13.3: Sensitivity tests for Large Projects

	Sensitivity test	Traffic	Bus	Cycling	Job-seeker support
BDRS	Mid	40%	100%	100%	100%
	Low	20%	80%	100%	0%
Bournemouth	Mid	100%	100%	10%	100%
	Low	100%	20%	10%	0%
CENTRO	Mid	100%	*	*	100%
	Low	20%			0%
Hertfordshire	Mid	40%	100%	10%	100%
	Low	10%	100%	10%	0%
Merseyside	Mid	60%	5%	30%	100%
	Low	35%	1%	10%	0%
Nottingham	Mid	40%	80%	30%	100%
	Low	10%	30%	30%	0%
Reading	Mid	100%	80%	*	-
	Low	100%	20%		
Solent	Mid	100%	80%	*	100%
	Low	100%	20%		0%
Surrey	Mid	75%	20%	*	-
	Low	30%	5%		
TfGM	Mid	3%	5%	30%	100%
	Low	1%	2%	10%	0%
WEST	Mid	40%	80%	30%	100%
	Low	20%	20%	10%	0%

Percentages represent the approximate proportion of top-line change in traffic, bus patronage or cycle trips ('with' versus 'without' LSTF) that might be considered to be attributable to LSTF under 'realistic' (Mid) and 'pessimistic' (Low) assumptions. Where there is no evidence of change (either 'top-line' or 'scheme-specific'), an asterisk is shown.

Table 13.4: Assumptions behind sensitivity tests for three example Large Projects

Large Project	Sensitivity tests	Rationale for sensitivity test settings
Bourne-mouth	**Traffic:** Mid 100% Low 100%	Project focused on tightly-defined corridor, in which there was little expenditure (<10%) on sustainable travel apart from the LSTF grant and local contribution. Large Project able to report pre / post LSTF vehicle km on corridor and, once adjusted relative to the counterfactual, it is plausible that this change is entirely attributable to the LSTF scheme.
	Bus: Mid 100% Low 20%	Modest increase in bus use relative to counterfactual. No intervention-level evidence to support attribution of this change to LSTF, but fairly extensive measures to improve bus services which might plausibly have delivered the uplift relative to the counterfactual. However, most of the bus-related benefits are due to quality and journey time improvements for existing passengers, and so downward adjustment of sensitivity test has very small effect on BCR.
	Cycling: Mid 10% Low 10%	Automatic cycle counts on corridor show 19% increase between 2010/11 and 2015/16, but manual count data shows high variability. Relatively little activity in support of cycling as part of LSTF. Therefore 19% uplift judged implausible, and sensitivity test of 10% applied to physical activity benefit associated with cycling uplift.
Notting-ham	**Traffic:** Mid 40% Low 10%	Project spread across urban area, and accompanied by significant spend on other sustainable transport measures (in addition to LSTF programme). Thorough reporting of the scale and estimated effect size of *all* interventions. This suggests it is implausible that LSTF project alone could account for the change in traffic relative to the counterfactual; on a pessimistic view the LSTF interventions would only have delivered 10% of the change in traffic; on a more realistic view the contribution from LSTF could have been around 40%.
	Bus: Mid 80% Low 30%	Modest increase in bus use relative to the counterfactual. Evidence on scale and effect size for bus-related interventions suggests that these could have accounted for 30% of the change in bus trips relative to the counterfactual. This takes no account of likely uplift in bus use in future due to introduction of smartcard at end of LSTF period and it is plausible that this will result in substantial additional uplift in patronage in future years; on a realistic view this could deliver around 80% of the change in bus use relative to the counterfactual.
	Cycling: Mid 30% Low 30%	Automatic cycle counts show 28% increase between 2010/11 and 2015/16. Evidence on scale and effect size for cycling interventions suggests that these could have accounted for 30% of the overall uplift in cycling trips.
TfGM	**Traffic:** Mid 3% Low 1%	Project spread across whole conurbation. Large conurbation-wide fall in traffic relative to the counterfactual is believed by TfGM to be primarily due to economic factors, rather than to LSTF schemes. Somewhat restrictive analysis of scale and effect size of main interventions suggests that these could account for only around 1% of the change in traffic. Assuming not all effects of all interventions have been captured (because some interventions had not taken effect by 2014/15), proportion of change in traffic attributable to LSTF might be up to about 3%.
	Bus: Mid 5% Low 2%	Modest conurbation-wide uplift in bus patronage. However, LSTF-supported bus travel (Local Link) only represents 2% of this. Somewhat higher 'Mid' figure of 5% to allow for expected patronage effects of bus priority measures and smartcard in future (not yet realised).
	Cycling: Mid 30% Low 10%	Cordon manual counts suggest a conurbation-wide increase in cycling averaging 32% across all 10 Greater Manchester district centres. TfGM implemented a significant number of cycling schemes, but there is insufficient evidence from route-specific cycle counts to attribute the whole of the conurbation-wide uplift to LSTF measures. 'Mid' sensitivity test of 30% to allow for this, but 'Low' sensitivity test of 10% reflects greater uncertainty than for other Large Projects such as Nottingham.

13.4 Results of cost-benefit analysis

The benefit-cost ratios for the Large Projects are summarised in Figure 13.1.

At the **programme level** (i.e. including all costs and benefits for all 11 Large Projects apart from Telford), the 'best estimate' BCR is **5.2 – 6.1**. This assumes either a fixed decay rate of 5% or a variable decay rate, and the 'Mid' sensitivity test. At its most pessimistic, the programme level BCR could be 4.1; and at the most optimistic it could be 14.3. This means that even with extremely stringent assumptions about what proportion of top-line changes in traffic, bus patronage and cycling are attributable to LSTF, the programme level BCR represents very high value for money[102].

This 'best estimate' programme level ex-post BCR is similar to the DfT-adjusted ex-ante BCR (5.1, or 5.2 if Telford is not included), suggesting that the programme was successful in achieving its expected outcome, so far as value-for-money was concerned.

Most Large Projects have **individual BCRs** in the range of 2.4 – 6.5 (with either a fixed decay rate of 5% or a variable decay rate, and the 'Mid' sensitivity test). This range is similar to the range of the ex-ante individual BCRs as adjusted by DfT (2.1 – 7.8 excluding Telford).

One Large Project, CENTRO, has BCRs that lie substantially higher than this range (16.2 – 19.7). These extremely high BCRs are partly due to the journey quality benefits of simplified (smartcard) ticketing, and partly because the marginal external cost for CENTRO's Large Project were higher than for other Large Projects (because the Project was focussed on 'A' roads in a conurbation). If the benefit of smartcards is excluded, the BCRs fall to 10.8 – 14.3[103].

One Large Project, Reading, has a BCR that is lower than the typical range. This is at least in part because some important benefits of the Reading programme were not captured by the simplified cost-benefit approach we used. In particular, our approach did not capture the benefits of Reading's two new park and ride schemes, and nor did it capture the benefits of a new pedestrian / cycle bridge across the Thames that was installed late in the LSTF programme. The latter might be anticipated to provide substantial journey quality benefits to existing cyclists, not readily monetised in WebTAG[104]. From initial cycle flow data, the new bridge also seems likely to encourage significant cycling growth.

Tables 13.5 and 13.6 show how the benefits break down by type, first for Scenario B (5% decay) and the 'Mid' sensitivity test, and then for Scenario B and the 'Low' sensitivity test. The breakdown of benefits is also illustrated in Figure 13.2 (for Scenario B and the 'Mid' sensitivity test). The biggest benefits are from bus journey quality improvements and lower traffic levels, although there is substantial variation between Large Projects. Some benefits, notably those arising from secure cycle parking and job-seeker support programmes, delivered a small fraction of the total benefit, but these types of intervention also accounted for a small proportion of total expenditure, and so may still represent good value for money if assessed individually.

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102 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/255126/value-for-money-external.pdf

103 However, there is no prima facie argument to remove the smartcard benefit. Those LSTF projects that invested in smartcards did so because they perceived that simplified ticketing offered substantial benefits to local people and therefore merited the substantial time commitment required to achieve them within the deregulated bus system.

104 WebTAG journey quality benefits for new cycle infrastructure are proportional to the distance of new cycle lanes. A new bridge may only be a few tens of metres wide, but provide disproportionate benefit if it enables cyclists to avoid lengthy distances on busy main roads.

Figure 13.1: Ex-post BCRs for Large Projects, under different decay rate assumptions and sensitivity tests, compared to ex-ante BCRs

BDRS			
6.8	A: no decay	B: 5% decay	C: variable decay
-	16.8	11.7	7.8
Mid	8.6	6.5	4.9
Low	5.7	4.7	3.9

Bournemouth			
2.1	A: no decay	B: 5% decay	C: variable decay
-	6.6	5.7	6.6
Mid	5.7	4.8	5.7
Low	5.4	4.6	5.4

CENTRO			
3.5	A: no decay	B: 5% decay	C: variable decay
-	24.3	19.7	16.2
Mid	24.3	19.7	16.2
Low	14.3	13.4	12.7

Hertfordshire*			
6.9	A: no decay	B: 5% decay	C: variable decay
-	15.4	9.9	5.8
Mid	6.3	4.1	2.5
Low	1.8	1.2	0.8

Merseyside			
4.2	A: no decay	B: 5% decay	C: variable decay
-	7.3	6.0	5.0
Mid	3.6	2.9	2.4
Low	2.2	1.7	1.4

Nottingham			
7.8	A: no decay	B: 5% decay	C: variable decay
-	11.0	8.1	5.9
Mid	5.5	4.3	3.4
Low	3.1	2.8	2.5

Reading			
3.7	A: no decay	B: 5% decay	C: variable decay
-	1.9	1.3	0.9
Mid	1.8	1.3	0.9
Low	1.6	1.1	0.7

Solent			
7.3	A: no decay	B: 5% decay	C: variable decay
-	4.8	4.1	4.7
Mid	4.8	4.1	4.7
Low	4.6	3.9	4.6

Surrey			
3.8	A: no decay	B: 5% decay	C: variable decay
-	7.4	5.7	4.5
Mid	6.2	5.0	4.1
Low	4.1	3.6	3.2

Telford			
1.9	A: no decay	B: 5% decay	C: variable decay
-			
Mid			
Low			

TfGM			
3.8	A: no decay	B: 5% decay	C: variable decay
-	44.1	29.7	18.7
Mid	3.8	3.3	3.0
Low	2.1	1.9	1.7

WEST			
6.6	A: no decay	B: 5% decay	C: variable decay
-	11.7	9.1	7.2
Mid	6.8	5.6	4.7
Low	4.9	4.3	3.9

OVERALL: 11 LARGE PROJECTS			
5.2^	A: no decay	B: 5% decay	C: variable decay
-	14.3	10.6	7.9
Mid	7.7	6.1	5.2
Low	5.0	4.3	4.1

^ Ex-ante BCR for 11 Large Projects (i.e. excluding Telford)

X	*Ex-ante BCR, as adjusted by DfT*
X	*Ex-post BCRs*

* Hertfordshire's traffic data was revised after the cost-benefit analysis had been completed. The BCR quoted here uses more conservative figures for the overall change in traffic than the latest data as reported in Tables 4.4 and 4.5 and hence may represent an underestimate.

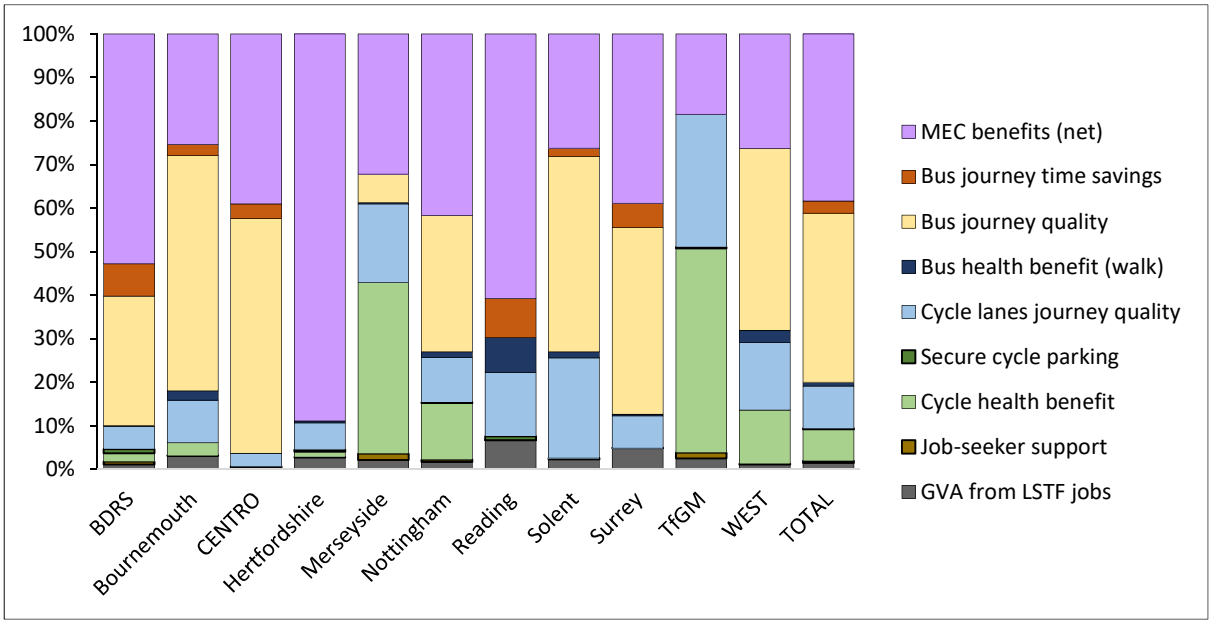
Table 13.5: Breakdown of benefits by type, under Scenario B (5% decay rate for all benefits), sensitivity test 'Mid'

	BDRS	Bourne mouth	CENTRO	Herts	Mersey-side	Notting-ham	Reading	Solent	Surrey	TfGM	WEST	11 Large Projects
MEC benefits:												
Decongestion	55%	26%	40%	95%	38%	46%	65%	27%	42%	22%	29%	41%
Infrastructure	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Accident	7%	6%	3%	27%	5%	13%	18%	6%	12%	3%	8%	7%
Local air quality	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Noise	0%	0%	0%	2%	0%	1%	1%	0%	1%	0%	1%	0%
Greenhouse gases	2%	2%	1%	8%	2%	4%	5%	2%	3%	1%	2%	2%
Indirect taxation	-12%	-9%	-6%	-44%	-8%	-22%	-30%	-9%	-19%	-5%	-14%	-11%
Bus benefits:												
Journey time savings	7%	3%	3%	0%	0%	0%	9%	2%	6%	0%	0%	3%
Journey quality benefit	30%	55%	54%	0%	7%	33%	0%	45%	43%	0%	43%	40%
Health benefit	0%	2%	0%	0%	0%	1%	8%	1%	0%	0%	3%	1%
Cycle benefits:												
Journey quality (cycle lanes)	5%	10%	3%	6%	21%	11%	15%	23%	7%	36%	16%	10%
Journey quality (secure parking)	1%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Health benefit	2%	3%	0%	1%	45%	14%	0%	0%	0%	55%	13%	8%
Road safety disbenefit	-1%	-1%	0%	0%	-13%	-4%	0%	0%	0%	-17%	-4%	-2%
Job benefits:												
GVA from LSTF jobs	1%	3%	0%	3%	2%	2%	7%	2%	5%	3%	1%	2%
Job-seeker benefits	1%	0%	0%	0%	2%	1%	0%	0%	0%	2%	0%	0%
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Table 13.6: Breakdown of benefits by type, under Scenario B (5% decay rate for all benefits), sensitivity test 'Low'

	BDRS	Bourne mouth	CENTRO	Herts	Mersey-side	Notting-ham	Reading	Solent	Surrey	TfGM	WEST	11 Large Projects
MEC benefits:												
Decongestion	39%	28%	12%	79%	37%	18%	75%	28%	23%	13%	19%	23%
Infrastructure	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Accident	5%	6%	1%	22%	5%	5%	21%	6%	6%	2%	5%	4%
Local air quality	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Noise	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
Greenhouse gases	2%	2%	0%	7%	2%	2%	6%	2%	2%	1%	2%	1%
Indirect taxation	-9%	-9%	-2%	-36%	-8%	-8%	-35%	-9%	-11%	-3%	-9%	-7%
Bus benefits:												
Journey time savings	10%	3%	5%	0%	0%	0%	10%	2%	8%	0%	0%	4%
Journey quality benefit	42%	57%	79%	0%	12%	51%	0%	47%	60%	0%	56%	56%
Health benefit	0%	0%	0%	2%	0%	1%	2%	0%	0%	0%	1%	0%
Cycle benefits:												
Journey quality (cycle lanes)	7%	10%	4%	20%	34%	17%	17%	24%	10%	64%	21%	14%
Journey quality (secure parking)	1%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
Health benefit	3%	3%	0%	4%	25%	21%	0%	0%	0%	33%	6%	5%
Road safety disbenefit	-1%	-1%	0%	-1%	-7%	-7%	0%	0%	0%	-10%	-2%	-2%
Job benefits:	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Figure 13.2: Split of benefits by type



Note: 'MEC benefits (net)' includes decongestion, infrastructure, accidents, local air quality, noise and greenhouse gases, offset by indirect taxation losses. Split of benefits is for Scenario B (5% decay rate) and 'Mid' sensitivity test.

13.5 Cost per vehicle km removed

Previous studies of the effects of sustainable investment programmes (Sloman et al. 2010 and Cairns et al. 2004) reported the value of those programmes in terms of 'cost per vehicle km removed from the road network'. Cairns et al. (2004) suggested that 'smarter choice' (revenue-type) sustainable transport measures might typically cost an average of 1.5p per car km removed (2003 prices), equivalent to 1.9p per car km removed in 2015 prices. Sloman et al. (2010) suggested that the cost of the smarter choice revenue investment programmes in the three Sustainable Travel Towns was around 3.3p per car km removed (2006 prices), equivalent to 3.9p per car km removed in 2015 prices.

Using a similar method, but with different underlying assumptions reflecting differences in the programme, we estimate that Large Projects taken together cost approximately 4.8p per car km removed (2015 prices). This figure is based on a thirty year appraisal period, a decay rate of 5% (i.e. Scenario B) and the 'Mid' sensitivity test.

13.6 Conclusions

The ex-post cost-benefit analysis suggests that the 11 LSTF Large Projects for which assessment was possible on a consistent basis had a combined BCR that represented very high value for money. The best estimate programme-level BCR for the 11 Large Projects (excluding Telford, which could not be assessed on an equivalent basis) is between 5.2 and 6.1.

Even under the most stringent (i.e. pessimistic) assumptions about what proportion of change was attributable to LSTF investment, and about the rate of decay of any benefits due to modal change, the programme-level BCR was above 4, and with optimistic assumptions it was potentially more than 14.

Journey quality benefits arising from interventions such as simplified (smartcard) ticketing, real-time passenger information, and new cycle infrastructure, formed a significant proportion of the overall

benefits (around 49% of the total benefit at the programme level in the most likely scenario for decay of benefits and attribution of change to LSTF). Benefits arising from lower traffic levels were the next most-significant benefit (around 38% of the total benefit at the programme level, mainly comprising decongestion benefits, fewer accidents and lower greenhouse gas emissions, offset by drops in indirect taxation). Health benefits due to increased cycling and increased walking as part of bus trips represented around 8% of the total benefit at the programme level.

14 Key findings and lessons

14.1 Introduction

This chapter provides a summary and discussion of key findings, relating these back to our original research questions[105] and, where possible, relating reported outputs (activities) to observed outcomes. Findings from the interim report are reiterated where they remain relevant.

The chapter then sets out some lessons for the design, monitoring and evaluation of future sustainable transport programmes, updated where appropriate from the recommendations that were made in the interim meta-analysis.

14.2 Main strands of activity

Research Question 1:

What were the main strands of each Large Project's approach, and how did they relate to the objectives of the Fund? How did the Large Projects try to intervene to achieve these objectives, in terms of expenditure and outputs? How similar or different are the Large Projects in their approaches and outputs?

Inputs

There was substantial expenditure in the final year (2014/15) of the programme, and this meant that by March 2015 all but one Large Project had spent their full DfT grant, or very nearly so.

This was in contrast to the situation a year earlier, when most projects were about 50% complete, in terms of expenditure.

This 'back-end loading' of expenditure to the final year of the programme was mainly due to large capital schemes, which required a lengthy planning phase incurring relatively little expenditure, with the main 'spend' occurring near the end.

This spend profile had implications for the evaluation, because infrastructure schemes delivered at a late stage in the programme were unlikely to have had their full effect at the point when the 12 Large Projects were collecting final monitoring data. Where possible, the evaluation team obtained more recent data (covering the period beyond March 2015) to allow for this, although the amount of data available after this period was limited.

The split of expenditure between capital and revenue varied markedly between Large Projects, but in most cases revenue-type schemes accounted for a significant proportion of the total expenditure. The proportion of scheme expenditure that was revenue ranged from 12% (Telford) to 56% (Nottingham).

Approaches and outputs

Although the main strands of each Large Project's approach differed in terms of the detail, and in terms of the proportion of funding allocated to different types of intervention, there were some common themes:

- Several of the Large Projects adopted a **'corridor' approach**, in which infrastructure, such as bus priority measures and cycle paths, and behaviour change activities, such as household-based

105 Findings are reported in the same order as the chapters of the report. Research questions as originally defined followed a slightly different order, and hence appear here out of strict numerical sequence.

personalised travel planning or workplace travel planning, were concentrated along a limited number of main routes.

- A number of Large Projects adopted **innovative approaches to travel behaviour change** that went beyond the activities that are now quite well established as part of workplace travel planning, school travel planning and household personalised travel planning. For example, Large Projects experimented with workplace-based personalised travel planning and workplace-based free bus ticket offers; marketing along public transport corridors (including distribution of free bus tickets to households); neighbourhood-based approaches such as virtual 'community smarter travel hubs'; and engagement with people at times of transition (e.g. from school to college or the workplace). While none of these types of activity are entirely new, the scale on which they were delivered was larger than in the past. However, it was also notable that the LSTF behaviour change interventions relied on 'pull-factors' (carrots) and did not attempt to create a supportive environment through intervening with 'push-factors' (sticks). Nottingham's workplace parking levy did provide a supportive 'push' context, but was not implemented as part of LSTF.

- Reflecting the Fund's core focus on supporting the local economy while reducing carbon, several Large Projects expended considerable effort in improving access by sustainable modes to **'hard-to-reach' car-dependent employment sites106** – with the dual aims of improving access to jobs and widening the workforce pool available to employers. While some of these initiatives were successful (for example, the support for new bus services to ASOS in the BDRS Large Project), others proved very challenging because of the difficult location (peripheral and close to major roads) of the sites in question. In a sense, the LSTF investment was having to 'work uphill' to try to ameliorate the effects of past land-use planning decisions that undermined the viability of sustainable modes of transport.

- Also reflecting the Fund's core focus on the local economy and carbon reduction, a number of Large Projects developed a **suite of workplace travel behaviour change services**. These tended to feel quite different to workplace travel planning programmes in the past, in that the emphasis was on the local authority providing services directly to employees (e.g. travel information, cycle training, discounted bus tickets), with the employer apparently playing a less active role. This approach resulted in smaller reductions in car use than have been observed from more comprehensive site-based approaches in the past, some of which implemented 'push' measures and many of which were precipitated by particular employers experiencing local difficulties with parking or congestion that created a supportive 'push' environment at their sites.

- A number of Large Projects focussed considerable effort on **supporting job-seekers and those who had been offered a job**, through a suite of services that were tailored to the needs of the individual. These included free one month travel passes, free bicycles and cycle training, and personalised travel information or 'travel training'. This was clearly pertinent to the Fund's focus of supporting the local economy. It is also interesting because the time of transition from being out of work to being in work may be a particularly opportune moment to influence future travel patterns towards lower-carbon choices – that is, this group might be expected to be easier to

106 For example, ASOS and Sheffield Advanced Technology Park (BDRS); Maylands Business Park (Hertfordshire); Surrey Research Park (Surrey); Bristol North Fringe (WEST).

engage and possibly also more receptive than existing employees, although we do not have clear evidence of this.

- Turning to the secondary objectives of the Fund, all the Large Projects **promoted active travel** (cycling and walking) to some degree, with seven projects doing so quite intensively. While Large Projects varied in their approach, those for which this was a major focus tended to implement a wide range of measures to address all the barriers to active travel, ranging from infrastructure (cycle paths, cycle parking) to new services (e.g. free adult cycle training, loans of bicycles, cycle 'hubs' with secure parking and storage lockers) and promotion (e.g. led walks and cycle rides, cycle challenges, 'Beat the Streets' walking challenges).
- The Fund's secondary objective of delivering wider **accessibility and inclusion benefits for the community** figured less prominently in the outputs and activities described by the Large Projects. However, this objective was a major focus for Merseyside, which had a 'grass roots' approach in which voluntary organisations worked with communities that had been identified as having narrow travel horizons. It was also evident in TfGM's 'Local Link' community transport services to employment sites; Nottingham's free travel passes for young people from low-income households; one-to-one travel training funded by a few Large Projects; and the support offered to job-seekers by a number of the Large Projects.
- The Fund's secondary objective of **improving safety** also featured less prominently. However, it was a significant focus for Nottingham and WEST Large Projects, who designated area-wide 20mph zones across many roads in the cities of Nottingham and Bristol. Cycle training for adults and children, child pedestrian training and road safety education, and safe routes to schools schemes, also figured in some Large Projects although these probably represented a small proportion of total expenditure and effort.
- Finally, the Fund's secondary objective of **improving air quality and reducing noise** was not a significant focus of activity, except in so far as schemes to reduce traffic might be expected to lead to lower emissions and noise. Examples of activity relevant to this objective are the BDRS work to promote eco-driving and ECO Stars fleet management and driver efficiency scheme, and WEST's support for a freight consolidation centre.

14.3 Traffic and car use

Research Question 2:

In each Large Project separately, and across the 12 Large Projects as a whole, did traffic volume / levels of car use improve (pre-post comparison)? Can any changes in traffic volume be attributed to LSTF interventions?

Outputs

The Large Projects undertook a wide range of interventions that might be expected to influence overall traffic volumes, including measures to improve public transport services and walking and cycling facilities, and behaviour change programmes designed to encourage modal shift towards sustainable travel choices. There was relatively little evidence, however, of restraint measures designed to discourage car use (with Nottingham being a notable exception where a workplace parking levy, although not directly related to the LSTF programme, was an important part of the overall transport strategy).

Outcomes

Using NRTE data at the local authority level[107], the group of 10 Large Projects for which data were available showed a fall in car traffic between a 2009-11 baseline and 2013, followed by an increase over the period to 2015. A broadly similar 'U'-shaped trend was also seen in a comparator group of local authorities (all other English local authorities excluding London), reflecting wider economic trends of recession followed by economic recovery. However, the rate of decrease from 2009-11 to 2013 was greater for the Large Projects as a group than for the comparator group, and the rate of increase after 2013 was lower.

This meant that between 2009-11 and 2015, total volumes of car traffic in the comparator group increased by 2.9%, whereas car traffic in the group of 10 Large Projects only increased by 1.2% (a statistically significant difference of -1.7 percentage points).

This difference between the Large Projects trend and the comparator group trend was more marked *after* 2009-11 than it was *before* 2009-11: in the period before LSTF from 2005-07 to 2009-11, car traffic in the Large Projects fell by 0.7%, while in the comparator group it fell by 0.2% (a difference of -0.5 percentage points, i.e. three times smaller than the -1.7 percentage point difference observed after 2009-2011).

Looking at the 10 Large Projects individually, all of them showed either a decrease in car traffic, or a smaller increase in car traffic than the comparator group, over the LSTF period of 2009-11 to 2015.

The better performance (i.e. smaller increase in traffic than in the comparator group) in the Large Project local authority areas occurred despite a more rapid rise in population in the Large Project areas than in the comparator group (Large Project population increase between 2009-11 and 2015 of 3.9%, compared to +3.3% in the comparator group). Employment growth in the Large Project areas was marginally less than in the comparator group (Large Projects +4.8%; comparator group +5.1%).

Adjusting for population growth, the 10 Large Projects as a group, and all of them individually, showed a fall in *per capita* car traffic between 2009-11 and 2015 which was greater than the fall in the comparator group (Large Project average -2.6%; comparator group -0.3%: a statistically significant difference of -2.3 percentage points). Again, the difference between the Large Projects' trend and the comparator group trend was more marked *after* 2009-11 than it was *before* 2009-11: in the period from 2005-07 to 2009-11, *per capita* car traffic in the Large Projects as a group fell by 2.6%, while in the comparator group it fell by 2.2%, a difference of -0.4 percentage points.

Thus the general picture in the Large Project local authority areas is one of **absolute traffic volumes and *per capita* traffic volumes declining relative to a comparator group (and, for *per capita* traffic, also declining in absolute terms), with an increasing difference during the post-LSTF period as compared to the pre-LSTF period.**

Most Large Project Outcomes Reports included traffic data for the specific areas where LSTF activities had been focussed, and in some cases also for a local comparator (non-intervention) area. In a number of cases, this data was messy, with concerns about the validity of some of the

107 Local authority-level data covers a fairly similar area to the area that was the focus of LSTF activity for five Large Projects (Nottingham, Reading, Telford, TfGM and WEST), and a rather larger area for five Large Projects (BDRS, Bournemouth, CENTRO, Merseyside and Solent). Hertfordshire and Surrey were not included in this analysis because NRTE data is only available at the much larger 'county' level, as opposed to the 'district' level and the LSTF schemes were only implemented in parts of each county.

comparator information. At this level, six Large Projects had stable or falling traffic levels between the 2009-11 baseline and the most recent year (either 2014 or 2015); of these, one performed better than the comparator, one performed less well, and four did not report comparator data. Three other Large Projects showed traffic growth in the LSTF areas, but with a lower rate of traffic growth compared with either the wider local authority area or a local comparator (but in one case with the local comparator and the wider local authority area showing inconsistent evidence). The remaining three Large Projects showed mixed evidence of traffic growth or decline, depending on which metrics and locations were used.

The changes in traffic in the Large Projects were likely to have been the consequence of multiple factors, of which LSTF investment was just one. This makes it difficult to assess the extent to which the changes in traffic volume relative to the comparator group are attributable to LSTF interventions. Other factors that might have contributed include:

- Other (non-LSTF-funded) improvements to public transport and cycling and walking infrastructure over the same time period.
- Earlier improvements to public transport and cycling and walking infrastructure (pre-LSTF) that took time to take full effect.
- Demographic or socioeconomic changes (e.g. if the age profile or income profile of the population changed in a different way in the Large Project areas and the comparator group over the LSTF period, such that car licence-holding, ownership and use also changed differentially i.e. different 'peak car' effects in different areas).
- Land use changes (e.g. if the growing population in the Large Project areas was accommodated to a greater degree through densification of residential areas, or in housing with lower car parking allocations, or in areas with higher public transport accessibility, compared to the growing population in the comparator areas).

We asked the Large Projects to make an assessment of the scale and 'effect size' of their LSTF interventions, as a basis for estimating what proportion of the change in traffic might be attributable to LSTF. Eight Large Projects did this to some degree, although in general they did not find it feasible to undertake such an assessment for all (or even most) of their interventions. Their estimates suggested that the magnitude of change that could have occurred as a result of LSTF schemes was non-trivial and would probably constitute a discernible proportion of the overall changes in traffic. However, for most Large Projects, it was implausible that the LSTF programme alone could account for the entirety of the change in traffic.

We therefore conclude that it is plausible that an ongoing programme of sustainable transport interventions, taking place over a number of years, and of which the LSTF programme formed one of the most recent manifestations, was a primary cause of the observed traffic reductions. However, other factors are also likely to have played a significant role. In particular, the declining trend in per capita car use ('peak car'), evident nationally and internationally, may have had a bigger effect in the Large Project areas than elsewhere, as they included large urban areas which tend to have a younger 'trend-leading' population profile. Changing patterns of land use may also have had a bigger effect in the Large Project areas than elsewhere, as the Large Project local authorities may have been more committed to sustainable transport and therefore more concerned to ensure that land use planning strategies were supportive of sustainable transport patterns.

14.4 Economy: congestion

Research Question 6:

In each Large Project separately, and across the 12 Large Projects as a whole, what were the economic impacts, particularly in relation to congestion relief [and support for job-seekers]? Can any economic effects be attributed to LSTF interventions?

Outputs

Three Large Projects undertook many congestion-relief interventions, and two undertook some interventions. The main interventions were traffic signal upgrades; upgrade of traffic monitoring and control technology; changes in road and junction layouts; and park and ride schemes.

Outcomes

At the end of the programme, rush-hour congestion had not improved at the local authority level across the Large Projects as a whole.

DfT congestion data for the comparator group showed a slight increase in rush-hour speeds (average vehicle speeds in the morning peak on locally-managed 'A' roads) from 2010 to 2012, followed by a fall in rush-hour speeds from 2012 to 2015. The group of 10 Large Projects for which data were available showed broadly the same pattern, but with a larger relative worsening of congestion. That is, rush-hour speeds fell by 5.2% in the group of 10 Large Projects between 2009-11 and 2015, compared to a fall of 3.6% in the comparator group. The difference between the group of 10 Large Projects and the comparator group was statistically significant.

Looking individually at the six Large Projects where congestion worsened relative to the comparator group, and comparing data on rush-hour speeds with data on population and employment levels, it appears plausible that most of the changes in rush-hour speeds can be attributed, at least in part, to improvements in the local economy coupled with population growth in these Large Project areas.

However, there is an apparent mismatch between the evidence on rush-hour speeds and the evidence on 24-hour traffic volumes. While rush-hour speeds for the group of 10 Large Projects worsened relative to the comparator group between 2009-11 and 2015, 24-hour traffic volumes increased by less than in the comparator group (+1.2% compared to +2.9%). There are two possible reasons for this: either the fall in 24-hour traffic volumes is due to a rise in peak-hour traffic volumes coupled with a larger fall in off-peak traffic volumes; or the fall in rush-hour speeds occurred despite a simultaneous fall in traffic volumes, and is due to a temporary or permanent reduction in road capacity.

Discussion with the Large Projects indicates that in 11 Large Projects there were local factors at play that could have significantly worsened rush-hour congestion over the LSTF period. These included both factors *unrelated* to LSTF (e.g. disruptions due to utility roadworks, or disruptions due to major transport schemes involving roadworks at motorway junctions or highway maintenance programmes); and factors *related* to LSTF (temporary roadworks due to LSTF schemes; permanent reallocation of road or junction capacity; speed limit reductions). There were also cases where new development (housing or employment uses) had been expected to cause localised increases in traffic and worsen congestion, and where the Large Project officers judged that LSTF interventions had lessened the adverse impact.

Although rush-hour congestion for general traffic did not improve, there was **evidence of improvements in bus punctuality.** Five Large Projects reported data on bus punctuality in their Annual Outcomes Reports. In two Large Projects (CENTRO and WEST), bus punctuality improved at a network-wide level, and measures funded through LSTF seem likely to have contributed to this. In another two Large Projects (BDRS and Bournemouth), bus journey times improved on some corridors (although they worsened on others), and the improvements on some corridors in BDRS could be attributed to specific road network modifications funded by LSTF. In one Large Project (Telford) bus punctuality worsened somewhat, but this did not appear to be directly due to the LSTF programme.

14.5 Bus use

Research Question 4:

In each Large Project separately, and across the 12 Large Projects as a whole, did public transport use increase (pre-post comparison)? Can any changes in public transport use be attributed to LSTF interventions?

Outputs

Five Large Projects undertook many interventions intended to increase bus use, and six undertook some interventions. Interventions included increased bus services, often aimed at commuters; bus priority measures; improvements to bus waiting facilities; and real-time passenger information. Some Large Projects offered free 'taster' bus tickets to encourage residents or employees to try bus travel, or offered reduced fares on selected routes or to job-seekers. Some introduced smart card schemes, in all cases near or after the end of the LSTF funding period.

Increased bus services might be expected to show near-immediate effects on patronage on the routes concerned. Effects due to bus priority measures, better waiting facilities and real-time passenger information might be expected to take longer to show up in patronage data, although possibly yielding quicker effects where multiple works were focussed on key bus corridors. Network-wide interventions such as smart card schemes came to fruition too late to influence patronage within the period of the evaluation.

Outcomes

Data on bus trips showed a general decline in bus use since before the start of the LSTF programme, both when measured in absolute terms and when measured per capita, for the group of 10 Large Projects for which data are available. This downward trend was also shown by the comparator group.

However, the *pre-LSTF trend* was for bus use to decline faster in the group of 10 Large Projects than in the comparator group, whereas the trend *after the start of LSTF* was for bus use to decline more slowly in the group of 10 Large Projects than in the comparator group. (Pre-LSTF period from 2009/10 to 2011/12[108]: per capita change in Large Projects = -6.1% and per capita change in comparator group = -2.4%. Period after start of LSTF, from 2011/12 to 2015/16: per capita change in Large Projects = -3.3% and per capita change in comparator group = -8.5%; statistically significant).

108 For bus patronage data, the baseline year was *a priori* chosen to be slightly later than the years used for other analyses, and a shorter period was used to compare pre-intervention trends, because the data series in question is only available from 2009/10 onwards.

The more favourable trend in the Large Projects than in the comparator group since the start of LSTF (both in per capita terms and, even more strongly, in absolute terms) was statistically significant. The difference in pre-LSTF trends between the Large Projects and the comparator group may have been due to chance, as it was not statistically significant. However, it indicates that the more favourable trend in the Large Projects since the start of LSTF was not simply a continuation of a pre-existing advantage.

The better performance of the group of 10 Large Projects was strongly influenced by exceptional rises in patronage in Reading and WEST, and to a lesser extent in Bournemouth and Solent. Most other Large Projects tracked close to the comparator group, although there were signs that some of the metropolitan areas had arrested or slowed the historic decline of bus use in their areas.

It is improbable that the strong performance in Reading is primarily attributable to LSTF schemes, since the LSTF bus measures in Reading were not of a scale or intensity likely to have caused area-wide patronage increases. Other factors, perhaps related to other work by the local authority and the main (municipal) bus company in Reading, are likely to have been more important. The strong patronage increase in WEST could partly represent the influence of LSTF schemes, of which there were many. However, it may also be partly attributable to Bristol's earlier investment in bus priority measures and bus infrastructure and its recent Better Bus Areas project (and significant investment in new buses by commercial bus companies, partly due to the public investment programme). Better Bus Areas funding, as well as LSTF, could have contributed to the patronage rises in Bournemouth and Solent.

Some projects noted that their bus budgets had come under significant pressure from austerity cuts, so that LSTF service improvements may have been in the context of reductions to tendered bus services. In this context some projects considered that level bus use, or slower decline, should be considered a positive achievement.

For those Large Projects that had concentrated their activity on a limited number of corridors, data at the corridor level might be expected to provide a greater chance of detecting any uplift in patronage as a result of interventions. Examination of patronage data at this level showed a mixture of positive, null, and negative results, such that it was hard to draw over-arching conclusions about the effectiveness of corridor-focussed interventions.

Nine Large Projects provided route-specific patronage data for new or improved bus routes. This covered 28 sets of bus routes. Detailed scrutiny of all 28 routes was undertaken to assess the amount of patronage uplift and the extent to which any uplift could be attributed to LSTF intervention. In all but one case, it was clear that patronage uplifts could be attributed to the interventions, based on an assessment of timing and nature of the intervention, the timing of the change in patronage trend, comparison with pre-existing patronage and comparison with other routes where no investment had taken place. Of these routes, 21 were likely to continue beyond the end of LSTF funding, either because they had reached commercial viability or because they were part of a longer term strategy for the local authority concerned. **These 21 routes had together resulted in an estimated annual patronage uplift of 2.5 million trips, replacing an estimated 12.0 million car kilometres per year, and avoiding an estimated 2,300 tonnes CO_2e per year**. Some 90% of these car mileage and carbon savings were due to routes that appeared fully commercial at the new level and hence likely to continue indefinitely.

14.6 Active travel: cycling

Research Question 5:

In each Large Project separately, and across the 12 Large Projects as a whole, did active travel increase (pre-post comparison)? Can any changes in active travel be attributed to LSTF interventions?

Outputs

Seven Large Projects delivered many interventions intended to increase cycling, and five delivered some interventions. Interventions included cycle routes; secure cycle parking; cycle training for adults and children; cycle maintenance courses and services; and cycle hire (both short-term on-street hire schemes and longer term loan schemes). Cycling was also promoted by means of events, led rides, cycle challenges and other activities. Across all 12 Large Projects, nearly 440km of cycle routes were built or improved; over 10,300 cycle parking spaces were introduced or upgraded; and over 17,300 adults received cycle training.

Outcomes

The general picture is of a significant amount of activity to encourage cycling, but rather limited collection of evidence to assess the effect of this activity on overall cycling levels (inadequate deployment and maintenance of automatic cycle counters, particularly). Nevertheless, accepting the limitations of the data, **all seven Large Projects that had implemented many cycling interventions showed some indications of increases in cycling since the start of the LSTF programme**, measured either by automatic counts or manual cordon counts.

The indications of upward cycling trends from automatic and manual counts received some corroboration from data on cycling participation from the Active People Survey at the local authority level. Among participants in this Survey, the proportion of adults who had cycled in the past month increased slightly in the Large Projects between 2010-12 and 2013-15 (from 14.1% to 14.5%, p=0.04 for difference). By contrast, the proportion of cyclists in the national comparator group decreased somewhat over this same time period from 16.0% to 15.4%, meaning that the change in the Large Projects was more favourable than the background national trend (p=0.02 for difference between the Large Projects and the national comparison group). There was no evidence that the amount of cycling done by cyclists changed in the Large Projects, either in absolute terms or relative to the background trend. This provides an indirect suggestion that any increase in cycling in the Large Projects may have been driven by widening participation in cycling, rather than encouraging existing cyclists to do more.

Cycling uplift as recorded by data from multiple automatic counter sites was +46% in Merseyside and +28% in Greater Nottingham (pre / post comparison, both between 2010/11 and 2015/16), and +23% in WEST excluding the City of Bristol (pre / post comparison between 2010/11 and 2014/15). These figures do not necessarily imply an *overall* cycling uplift of 20-50% in these cities, as cycle counters are likely to have been preferentially located in places where improvements to cycle infrastructure had been made, but they are nevertheless suggestive of some increase in cycling activity. For CENTRO, data from 50 automatic counters close to LSTF intervention corridors also showed signs of increased cycling between 2012 and 2015: 31 sites showed a year on year increase, 15 showed an increase in comparison with the baseline and just 4 sites showed a decrease. Area-wide cycling uplift as recorded by manual cordon counts was +2% in Reading (between 2009-11 and 2014-16) and +9% in TfGM across all 10 district centres (between 2012 and 2015). In BDRS, manual

cordon counts suggested cycling had increased for trips into two out of four urban centres, Sheffield and Rotherham (pre / post comparison between 2010 and 2015, +5% and +34% respectively).

In some cases, area-wide increases in cycling were a continuation of a pre-LSTF trend, suggesting that although LSTF schemes may have contributed to the uplift in cycling, other factors, including cycling investment prior to LSTF, were also likely to have played a part.

There was a large amount of evidence of specific interventions leading to increases in cycling (and also some evidence of specific interventions having unsuccessful outcomes). This evidence came from pre- and post-scheme counts at sites where cycle lanes had been built or secure cycle parking installed; from post-intervention surveys of people who had received cycle training, a bicycle loan, or cycle maintenance classes; and from pre- and post-intervention surveys at sites such as schools and colleges which had participated in cycling promotional programmes.

Examples of intervention-specific evidence included:

- BDRS: 2,430 people registered to lease a bicycle; surveys suggested that 70-77% had previously used a car to commute, and 65-71% committed to cycling to work at least once a week.
- Nottingham: 14 secure cycle parking hubs were accessed over 900 times per month in 2014/15, and survey evidence indicated that the hubs had encouraged 38,500 additional cycle trips.
- Reading: following provision of a secure cycle parking hub at the station, cycle parking counts showed an increase of 5% in the number of parked cycles in the area of the station.
- TfGM: 25% of cyclists crossing city centre cordons whose route was affected by LSTF interventions said that improved cycle routes to the city centre had influenced their decision to cycle.

14.7 Active travel: walking

Research Question 5:

In each Large Project separately, and across the 12 Large Projects as a whole, did active travel increase (pre-post comparison)? Can any changes in active travel be attributed to LSTF interventions?

Outputs

Seven Large Projects delivered many interventions intended to increase walking, and four delivered some interventions. A few Large Projects made significant public realm improvements – for example, Telford's redesign of part of the town centre Box Road as a shared space. Other interventions included 20mph zones, pedestrian route improvements, and behaviour change measures such as led walks.

Outcomes

At the local authority level, data from the Active People Survey on the average number of days when adults had done any walking in the previous four weeks showed similar trends in the group of 12 Large Projects and in the comparator group, both before and during the course of the LSTF programme. However, one Large Project, Nottingham, showed an increase in walking relative to the comparator group between 2012 and 2014/15 that was statistically significant.

Data from area-wide manual counts (and in one case a large-scale mode share survey) in six Large Projects showed mixed evidence. Using a three-year rolling average, three Large Projects showed an increase in walking between 2009-11 and the most recent period (either 2013-15 or 2014-16), while three showed a decrease.

Intervention-level evidence was of variable quality. Some of the stronger evidence included:

- BDRS: Three months after participating in 'WalkBoost' initiatives, 62% of the 567 respondents reported walking more than when they first joined the programme, with an average increase of 81 minutes per week, while 14% reported driving less.
- CENTRO: 64% of car owners and 50% of non-drivers reported walking more after personal travel planning on two corridors.
- Merseyside: surveys of over 700 people using traffic-free routes found that almost half of respondents said the route had encouraged them to walk or cycle more.
- Reading: a 'Beat the Streets' scheme found that four-fifths of participants said that it helped them to walk or cycle more.
- TfGM: surveys of 1,750 people at sites where routes had been improved for walking or cycling found that 70% said the presence of the route had increased their level of physical activity.

Six Large Projects reported pre and post-scheme manual counts at locations where footways had been widened, new paths built, or (in one case) a new pedestrian / cycle bridge installed. In all, results were reported for 17 schemes: eight of these showed increasing pedestrian flows, six showed mixed results, and three showed a fall in pedestrian flows.

The general picture is therefore of **some activity to encourage walking, but with a less strong focus than for cycling.** Some intervention-level monitoring data demonstrates that specific schemes have resulted in increased levels of walking (or reported increases), although these are small in scale.

14.8 Economy: support for job-seekers

Research Question 6:
In each Large Project separately, and across the 12 Large Projects as a whole, what were the economic impacts, particularly in relation to [congestion relief and] support for job-seekers? Can any economic effects be attributed to LSTF interventions?

Outputs

Across all 12 Large Projects, **the total number of job-seekers helped across the whole funding period was approximately 91,000.** This was equivalent to 10% of the number of unemployed adults of working age in the 12 Large Project local authority areas during 2013/14 and 2014/15 combined. Seven Large Projects had substantial job-seeker support programmes. Activities included providing free or discounted tickets for travel by public transport to interviews and training, and for the first 1-4 months after starting a new job; personalised journey planning at job centres and other locations; provision of a moped or bicycle to enable access to a new job; free or low-cost refurbished bicycles for job-seekers and people who had been offered a job; provision of bus or community transport services to hard-to-reach employment sites; independent travel training for people with special educational needs and disabilities; and recruitment and training of unemployed people to take up jobs in the transport sector.

Outcomes

Across all 12 Large Project local authority areas, the change in levels of unemployment both before and since the start of the LSTF programme closely tracked the change in the comparator group. There was thus no indication that the various forms of travel support offered to job-seekers had reduced overall unemployment levels.

However, surveys suggested that the various support services were **helpful in enabling people to secure employment.** Evidence from BDRS, Bournemouth, Merseyside, Nottingham and Solent showed that between 20% and 43% of people who were offered free or discounted public transport tickets or cycle vouchers to assist their job search subsequently succeeded in gaining work. Survey evidence from two Large Projects (Bournemouth and Nottingham) suggested that around 80% of these people felt that the public transport tickets or cycle vouchers had been important in enabling them to get a job, suggesting that people's success in securing employment was at least in part attributable to the intervention.

Some forms of support helped to **broaden travel horizons**. Amongst people who received travel training via work clubs, job club meetings and other training schemes, 83% in BDRS stated that they felt more confident in planning their journeys and learning different ways to travel. In Hertfordshire, more than half of young people with special educational needs and disabilities who undertook independent travel training were reported to have gained full or partial independence.

From BDRS, Hertfordshire and elsewhere, there was evidence that Wheels to Work schemes offering the loan of a moped or bicycle had **enabled people to accept job offers that they would not otherwise have been able to take up.** Similarly, from TfGM, there was evidence that nearly half (47%) of workers using community transport services to get to major employment sites would not have been able to get to work without the service.

There was evidence that interventions had **long-term benefits**. For example, CENTRO found that nearly three-quarters of people who were offered free bus travel for the initial period in a new job were likely to still be in work six months later.

There were interesting indications that the offer of support at the point when people were experiencing change in their lives (i.e. being out of work, or starting a new job) **may have led to more sustainable travel patterns in the future**. For example, from CENTRO, there was evidence that 76% - 81% (in different survey waves) of those who had received bus travel for the initial period in a new job were still travelling to work by bus after six months. There was similar evidence from TfGM, where 37% of job-seekers who had received a 28-day ticket subsequently reported that they used public transport more, and 76% had continued to buy a public transport season ticket. A survey of job-seekers who had received a bike from the TfGM Bike Back to Work programme found that 59% were now cycling, whereas previously they were not.

Three Large Projects calculated the economic value of their job-seeker support programmes, and concluded that this was high relative to the cost of their programmes.

Thus the overall picture was that job-seeker support programmes helped people in their job search, for example by enabling travel to work placements that subsequently resulted in a job offer, or by enabling travel to interviews or training that would not otherwise have been feasible. There is some evidence that support programmes broadened people's travel horizons, and hence widened the number of possible jobs that were within scope. Support programmes that provided access to hard-to-reach employment sites (e.g. through community transport services, free public transport travel in the early days of a new job, or loan of a moped) resulted in people taking up job offers that they would not otherwise have considered. And finally, having accepted a job offer, these services enabled people to stay in work and encouraged sustainable travel patterns in future.

14.9 Mode shift

Relevant to several Research Questions:

Research Question 2:

In each Large Project separately, and across the 12 Large Projects as a whole, did traffic volume / levels of car use improve (pre-post comparison)? Can any changes in traffic volume be attributed to LSTF interventions?

Research Question 4:

In each Large Project separately, and across the 12 Large Projects as a whole, did public transport use increase (pre-post comparison)? Can any changes in public transport use be attributed to LSTF interventions?

Research Question 5:

In each Large Project separately, and across the 12 Large Projects as a whole, did active travel increase (pre-post comparison)? Can any changes in active travel be attributed to LSTF interventions?

Outputs

All the Large Projects delivered a range of behavioural change programmes designed to encourage mode shift away from single occupancy car use to more use of public transport, walking and cycling. There was a strong focus on engagement with workplaces, which were a significant focus for nine Large Projects, with more than 2,400 businesses receiving some form of support.

Household personalised travel planning projects were implemented on a fairly large scale by five Large Projects, and on a medium scale by two, with more than 100,000 households overall receiving personalised travel planning information, incentives or advice. Nine Large Projects also delivered large- or medium-scale projects to provide personalised travel information or incentives to individuals in other contexts (at workplaces and other locations), with nearly 100,000 adults receiving this.

Eight Large Projects had significant programmes of engagement with schools, including cycle training and a wide range of activities to encourage sustainable travel. Overall, more than 750 schools became involved.

There were also a range of initiatives with universities, at railway stations, through community hubs, and in new residential developments.

Outcomes

Across eight Large Projects, 93 workplaces had useable data from baseline and follow-up employee surveys before and after involvement in workplace travel initiatives, suitable for assessment of the change in car commuting. Workplace travel survey data from a further 547 workplaces was also obtained from Small Projects, for comparison purposes.

Across the Large Projects, random effects meta-analysis found significant evidence that car driver mode share for travel to work decreased on average in absolute terms by 2.7 percentage points (95%CI -4.4% -1.0%), p=0.001. The pooled estimate of car driver mode share at baseline was 65.9%, so this absolute change of -2.7 percentage points corresponded to a 4.1% reduction in car driver commuting.

The change in car mode share was smaller for the workplace data from Small Projects (average change in absolute terms of -0.9 percentage points, or a 1.5% relative decrease), although the

difference between the result in the Large Projects and that in the Small Projects was not statistically significant.

This reduction in car use was small compared to previous evidence of the effects of workplace engagement programmes (e.g. 15 percentage point median reduction amongst twenty workplaces undertaking travel planning reviewed in Cairns et al. 2004[109]). This may be because the intensity of interventions was low at some workplaces: the information in Outputs Surveys and Outcomes Reports tended to suggest that Large Projects focussed on relatively easy 'pull' initiatives, such as providing encouragement and information, rather than more challenging, but more effective, 'push' initiatives such as reducing or restraining parking. It also seems likely that the 'first mover' companies considered in earlier analyses were at the forefront of workplace travel planning as a result of local or company-specific push factors around parking and planning, which may be less prevalent in the companies now being more reactively drawn into workplace travel planning.

Four Large Projects cited evidence of outcomes of individual workplace initiatives. The BDRS Busboost project appeared to have resulted in a significant modal shift from car to bus; surveys by WEST of employees engaged via roadshows at various locations suggested that these services had influenced between a quarter and a third of participants to change how they travelled.

Five Large Projects cited evidence of outcomes of schemes with schools and colleges. Survey data from schools in the four local authority areas in BDRS (i.e. Barnsley, Doncaster, Rotherham and Sheffield) and in Bournemouth showed a fall in car mode share, although data from schools in Telford showed a rise in car mode share. In CENTRO and Nottingham, surveys of colleges showed a fall in car use amongst staff and students.

Large scale household PTP programmes in CENTRO, Hertfordshire and TfGM reported positive results for reduction in car use and increase in active and sustainable travel modes. The results were variable, probably reflecting differences in the targeted areas, approaches and options available.

While many of the mode shift changes were relatively small, particularly for reduction in single occupancy car use, some interventions had produced quite significant changes over a relatively short period of time. It is unclear over what period the benefits are likely to be sustained, particularly for very short term interventions. There was some evidence from TfGM that without continued input there may be reversion to previous travel behaviour. On the other hand where a longer term programme of interventions will continue, evidence from other studies indicates that even modest initial improvements in sustainable travel mode may be sustained or increase over a longer time period.[110]

14.10 Longer-term impacts

Relevant to two Research Questions:

Research Question 3:

In each Large Project separately, and across the 12 Large Projects as a whole, did carbon emissions reduce (pre-post comparison)? Can any changes in carbon emissions be attributed to LSTF interventions?

109 Cairns et al. (2004) *Smarter Choices Changing the Way We Travel*

110 Cairns, S. et al. (forthcoming) *Sustainable travel towns: an evaluation of the longer term impacts*. Main report and appendices. TRL reports for DfT, PPR 776 and 776a.

Research Question 7:
In each Large Project separately, and across the 12 Large Projects as a whole, did road traffic casualties (KSIs) go down (pre-post comparison)? Can any changes in the number of casualties be attributed to LSTF interventions?

Carbon emissions

Carbon dioxide emissions from transport fell in all 12 Large Projects, and some but not all of this reduction in emissions was attributable to LSTF schemes.

Carbon dioxide emissions from transport fell in both absolute terms and per capita, between a 2009-11 baseline and 2014, according to DECC estimates for transport emissions under the scope of local authority influence. The overall change in absolute emissions of CO_2 for the Large Projects was a reduction of 4.1% compared to a reduction in the comparator group of 2.3%. Per capita transport emissions of CO_2 in the Large Projects fell by 6.9%, compared to a reduction in the comparator group of 4.7%. For both absolute and per capita emissions, the difference between the Large Projects and the comparator authorities was statistically significant. Moreover, individually, all twelve of the Large Projects experienced a higher reduction in per capita emissions (between a 2009-11 baseline and 2014) than the comparator group.

Eight Large Projects made estimates of the carbon impacts of individual schemes including car sharing; public transport substituting for car journeys; promotion of cycling; workplace travel planning; personalised travel planning; ECO Stars schemes; eco-driver training; promotion of ultra-low emission vehicles; and the development of a freight consolidation centre. These used a range of assumptions, not always fully described, and unlikely to be consistent with one another. However, for those Large Projects that estimated the carbon savings attributable to multiple initiatives, quoted annual emissions savings were in the order of 1,000 – 50,000 tonnes CO_2 per Large Project, equivalent to between 0.03% and 1.6% of total carbon emissions from transport in the respective local authorities. The schemes for which estimates of carbon impacts had been made represented an incomplete and unknown proportion of total LSTF investment, and it would therefore be expected that overall carbon savings would be greater than these figures.

In addition, the study team carried out its own estimations of carbon savings from bus service enhancements. To a first order of magnitude, these were consistent with the estimates made by the Large Projects. For 21 bus routes in eight Large Project areas that had received funding to boost them to the point where they were likely to continue indefinitely (because patronage growth had made them commercially viable or justified continued revenue support) the annual saving in emissions was 2300 tonnes CO_2e.

Road safety

The Large Projects carried out a range of interventions that might be expected to offer road safety benefits, such as 20 mph speed limits, cycle infrastructure, cycle training, child pedestrian training and road safety training. However, in most Large Projects the scale of road safety interventions was modest.

Road casualty data (STATS19) showed that the trend in KSI casualties per capita[111] in the group of Large Projects closely tracked the trend in the comparator group, both before and during the LSTF

111 It was not possible to assess changes in KSI casualties relative to exposure (e.g. relative to distance walked / cycled).

period. This was also generally true when KSI was split up according to the victim's mode of travel, although there was some evidence of more favourable trends with respect to cycling KSI in the Large Projects than in the comparator group.

At the intervention level, two Large Projects reported evidence on road safety in 20 mph zones. In Merseyside, the number of collisions fell by 16% between baseline and 2014 in the Liverpool and Sefton 20mph zones. In Nottingham, it was estimated that widespread 20mph zones had resulted in 28 fewer serious casualties and four more slight casualties over a period of just over two years (based on monitoring of the initial 20 mph zone).

Telford reported changes in casualties in the Box Road area around its town centre, where a key aim had been to improve safety for pedestrians and cyclists. There was no change in the number of serious casualties, but the number of slight casualties fell from an average of 12 per year in the five years before LSTF funding to an average of 4 per year in 2013-15; there was also a reduction in pedestrian casualties.

Elsewhere, evidence of road safety effects was inconclusive or mixed, with some areas within Large Projects showing rises in casualties while other areas showed drops, and it was not possible to draw conclusions about overall effects.

14.11 Lessons for the design and monitoring of future programmes

Research Question 8:

What lessons can be learnt for the design and monitoring of future programmes?

Value for money of the programme

Ex-post assessment of the value-for-money of the LSTF programme delivered by the Large Projects suggested that it had been very high value for money. For the group of 11 Large Projects for which assessment was possible on a consistent basis, the best estimate benefit-cost ratio (BCR) was 5.2 – 6.1.

Sensitivity tests, varying the rate at which changes in traffic, bus use and cycling were assumed to decay after the end of the programme, and varying the assumptions about what proportion of change was attributable to the LSTF programme, suggested a lower-bound programme-level BCR of more than 4, and an upper-bound programme-level BCR of more than 14.

These BCRs did not include all benefits of the LSTF programme. Benefits that it was not possible to capture, due to lack of adequate data, included public realm enhancements; health benefits from increased walking (other than that associated with bus travel); and benefits associated with rail and station enhancements.

The best estimate programme-level ex-post BCR was similar to the DfT-adjusted ex-ante BCR (5.1 for the equivalent group of 11 Large Projects), suggesting that the programme was successful in achieving its expected outcome, so far as value-for-money was concerned.

Journey quality benefits arising from interventions such as simplified (smartcard) ticketing, real-time passenger information, and new cycle infrastructure, formed a significant proportion of the overall benefits (around 49% of the total benefit at the programme level). Benefits arising from lower traffic levels were the next most-significant benefit (around 38% of the total benefit at the programme

level, mainly comprising decongestion benefits[112], fewer accidents and lower greenhouse gas emissions, offset by drops in indirect taxation). Health benefits due to increased cycling and increased walking as part of bus trips represented around 8% of the total benefit at the programme level.

The cost of the programme per car km removed from the network was estimated to be 4.8p per car km. This was broadly comparable with estimates from previous sustainable transport investment programmes.

Recommendations for the design of future programmes

The LSTF programme was successful in encouraging innovation. In some cases the innovation was to expand tried-and-tested activities to a much larger scale than attempted previously. Some new approaches that were tried appear to merit consideration for future programmes. These included:

- **Comprehensive travel support programmes for job-seekers.**
- **Corridor treatment programmes** (combining infrastructure changes, better bus services and behaviour change activities on a single route).
- **City-wide 20mph areas.**
- Neighbourhood approaches such as **community smarter travel hubs** or **community active travel officers**.

Although not new, it was also clear that **pump-priming of new commuter bus services** was a significant success for several Large Projects.

Some generic lessons about the design of the LSTF programme that may be valuable to consider are set out here for debate:

- The objectives of the Fund were very wide-ranging. As a result of this, some of the secondary objectives were given little attention when Large Projects designed their programmes – and indeed, it would have been almost impossible to address all of them. The high-level nature of the objectives also meant that in practice, almost any transport project could be included (including some that are likely to have had negative consequences in relation to the Fund's core objective of reducing carbon). A more focussed approach would make it easier to share experience and to evaluate, and learn from, outcomes. This could still be structured in a way that offered local authorities options to design projects to suit their local circumstances. Thus, **future funding programmes could ask local authorities to concentrate their efforts by choosing a few more tightly-defined activities from a list of options** that might be either modal e.g. 'increasing cycling', 'increasing bus use'; or related to just one objective e.g. 'reducing carbon', 'improving air quality'; or related to a particular journey purpose e.g. 'increasing sustainable commuting'; or related to a target audience of special interest e.g. 'getting job-seekers to work'.

112 These benefits relate to congestion-relief that would have occurred if nothing except traffic levels had changed. However, the benefit might be taken in other ways: e.g. by reallocating road capacity to longer pedestrian phases at traffic signals. If this happened, 'on the ground' congestion (as measured by average traffic speeds) might stay the same but there would still be a 'decongestion benefit'.

- The short-term nature of the programme meant that a significant proportion of time was spent in the 'start up' and 'wind down' phases, reducing the period during which Large Projects were operating at full capacity and with a fully experienced delivery team. This was evident from our analysis of both Outputs Reports and Outcomes Reports[113]. This inevitably introduced substantial inefficiencies. Some Large Projects had less than three years of funding (July 2012 – March 2015). For projects of this scale and complexity, involving many partners, multiple local authorities within each Large Project, and many different schemes, a **longer funding period (possibly with the same amount of grant spread over more years)** would lead to more effective implementation and better value for money.
- It is a significant difficulty for programmes of this nature if they are implemented within a wider context of retrenchment in terms of the funding available to local authorities to invest in transport. In some Large Projects, cuts to tendered bus services were being made at the same time as, or shortly after, LSTF funding was being used to support new services. In general, competitive funding programmes may make more sense as the 'icing on the cake', being used in a selective way to encourage innovation and take good practice to the next level up; they appear less useful where there is little cake available to be iced. That is, short-term competitive grant programmes should not be seen as an alternative to maintenance of core funding for sustainable transport.
- It was a major strength of the programme that it included **both revenue and capital funding.** It is evident that the combination enabled Large Projects to develop complementary schemes: for example, combining construction of cycle lanes in a particular neighbourhood with cycle training and led cycle rides aimed at encouraging residents to take advantage of the new infrastructure.

Recommendations for monitoring of future programmes

During the course of this meta-analysis of the Large Projects' various monitoring reports, the research team identified some weaknesses of the approach to monitoring, as well as some important strengths.

Key lessons are that it would have been fruitful to:

- Design an **approach to data collection and reporting in which outputs and outcomes were much more closely linked**. An evaluation of whether change can be attributed to a specific set of interventions requires a detailed understanding of the nature, timing and scale of those interventions. The separation of outputs reporting (in Annual Outputs Surveys) from outcomes reporting (in Annual Outcomes Reports), with no consistent linkage between the two, made it difficult to draw conclusions about the extent to which positive trends in, for example, bus patronage or levels of cycling were attributable to the activities that were undertaken.
- Further **standardise reporting of scheme elements** within Annual Outputs Surveys. Large Projects adopted different approaches to defining scheme elements: in some cases they related to the type of intervention, in some cases to the modes of transport affected, and in other cases to geographical location. This made it difficult to disaggregate overall expenditure in a consistent way across the 12 Large Projects, and hence introduced significant uncertainties about the relative emphases of the different Large Projects.

113 For example, significantly less activity was reported in the first year of each Large Project than in subsequent years.

- Provide **a stronger lead at the start of the programme, and on an ongoing basis, to ensure comparability of data collection and reporting**. In practice, Large Projects adopted widely varied approaches to their Outcomes Reports, and in some cases expended considerable effort in collecting and reporting data that was of limited value. Large Projects were helpful in making a number of changes to their Outcomes Reports in response to recommendations from the meta-analysis research team at the end of the scoping phase of the research in 2014, but there were limits to the extent to which this was feasible as many decisions about how the programme would be monitored had already been made. The nature and content of Outcomes Reports was consequently such that a very large amount of checking and clarification was required (amounting to over 100 individual clarification queries for the interim report and almost 400 individual clarification queries for this final report, and therefore representing a very significant additional burden of work for the Large Projects as well as for the evaluation team). A more coordinated approach from the outset would have saved time and enabled more comparison and aggregation of results[114].

- Provide **more detailed guidance to Large Projects specifying the data characteristics required to ensure reported outcomes are attributable to the LSTF interventions**. Guidance should, *inter alia*, emphasise the importance of sufficient time-series information to assess changes against prior trends; careful definition of comparator (non-intervention) locations, and collection of sufficient comparator data to enable meaningful comparison; and supportive descriptive material that shows the relationship between the timing and nature of the activity and the putative associated outcome. A greater understanding of the 'height' at which the DfT sets the evidential 'bar' could also help both in-house and outsourced evaluation personnel protect the requirements of dispassionate evaluation from the inherent pressures from project managers to present the upside of project achievements.

- Require that **all unsuccessful initiatives are reported in Outcomes Reports**. Some initiatives were discontinued for very good reasons and monies diverted to other measures where more could be achieved. These initiatives naturally then fell out of Outputs Reports for subsequent years and also tended to get lost from Outcomes Reports. They may however, provide significant learning power.

- **Focus data collection on metrics that would be expected to show observable change** as a result of the schemes being implemented. Some Large Projects reported very high-level metrics such as Gross Value Added, employment levels, life expectancy, child obesity, town centre vitality (e.g. retail vacancy rates), air quality data (including for sites unaffected by LSTF, but with no distinction made), aggregated traffic flows over a large area such as the whole local authority (including substantial areas unaffected by LSTF), and travel behaviour as reported in county-wide

114 The approach to monitoring and evaluation of LSTF was established in the context of a view that DfT's involvement should be 'light touch', with the corollary that 'local authorities know best'. The LSTF Monitoring and Evaluation Framework sought to encourage consistency in the approach to data collection and reporting by the Large Projects, but in practice this proved to be difficult to achieve. In order to enable strong statements to be made by meta-analyses of multi-local authority programmes in future, some additional monitoring and evaluation support for local authorities may be required, especially given the local constraints on analytical capacity. For example, in addition to providing initial guidance and identifying key monitoring parameters, this might include engaging with Large Projects individually on a regular basis to check monitoring is proceeding as planned, and providing structured and regular information-sharing meetings to enable Large Projects to share good practice.

travel surveys (including probably insufficient sample sizes in the areas affected by LSTF). While it is accepted that some of these metrics may provide useful context, they were, on their own, insufficient, since it was highly unlikely that the magnitude of effect from LSTF schemes would be such as to be observable against the 'noise' of many other influences.

- Ensure at the outset of the programme that Large Projects with a significant focus on cycling have a **comprehensive network of automatic cycle counters, all fully functional,** and specifically allocate funds in the programme to ensure that these are maintained for the duration of the programme and several years afterwards. Similarly, ensure at the outset that Large Projects with a significant focus on walking consider how changes can be monitored effectively, since this is an area where the evidence base is weak.
- Require all bus operators in receipt of public money via LSTF to share with the relevant Large Project **detailed patronage data, disaggregated by route**.
- **Standardise attitudinal and travel surveys.** A number of Large Projects carried out surveys of attitudes, perceptions and behaviour, or household or workplace travel surveys. In future, it would be worth developing sets of standard questions, from which local authorities would be able to select questions relevant to them. This would reduce duplication of effort, and would also increase the potential for comparison and aggregation of results.
- **Avoid artificial boundaries in evaluation based on the funding source**. All the Large Projects undertook many activities to encourage sustainable travel, of which those funded by LSTF were just a part. For the purposes of evaluation and attribution of change, it would be valuable for future outputs monitoring to gather information on *all* activities of a particular type (e.g. those intended to increase cycling, or to support job-seekers), regardless of funding source, rather than only to gather information on those activities funded by one specific grant programme.
- **Extend the evaluation period for a longer time after the end of the project**. This would allow time for the full effects of the overall programme to be realised (including the effects of major schemes implemented in the final year of LSTF), and would ensure that secondary datasets for the full period up to and somewhat beyond the end of the programme were available for analysis. Against this, there is also a need to begin the evaluation while project officers are in post and can provide output and outcome data and help clarify points of uncertainty. For the LSTF Large Projects, one option worthy of consideration would be to re-assess the evidence from secondary datasets in two to three years' time.

It was a strength that:

- Large Projects sought where possible to provide **long time-series data** (going back around eight years) for key metrics, taking on board the recommendations made at the scoping phase of this meta-analysis. The approach initially adopted by some Large Projects of simply reporting high-level outcome data for a 'baseline' year against which figures for subsequent years were compared did not provide sufficient evidence to be able to make judgments about attribution.
- Large Projects sought where possible to identify **comparator areas** that did not benefit from LSTF investment. During the course of the meta-analysis we have sometimes questioned whether the particular areas chosen as comparators were sufficiently similar to intervention areas in terms of socio-demographics, traffic flow, and number of monitoring sites etc. to provide robust non-intervention controls. However, in principle, the careful identification of

suitable local comparator areas has the potential to strengthen the conclusions that can be drawn in a programme of this nature.

- All Large Projects were extremely helpful in providing **additional data and clarifications** to the meta-analysis team in a timely way.

14.12 Conclusions

The 12 Large Projects delivered a very wide range of schemes to encourage sustainable transport. As would be expected in any large and complex programme of this nature, some individual schemes were highly successful and some less so, and it is challenging for monitoring and evaluation to capture and distil the full range of this endeavour. This is particularly so given that the outcomes of some schemes completed late in the LSTF period were not yet evident within the timescale of the evaluation process.

However, focussing on the Fund's high-level policy objectives of reducing carbon and supporting the economy, there is evidence that the Large Projects made some worthwhile progress.

Carbon reduction

With regard to **carbon**, we can say that the Large Projects performed better than a comparator group in terms of improvements (i.e. reductions) in per capita traffic volumes during the LSTF period, and that this superior performance was more evident during the LSTF period than it had been before the LSTF period. While it is implausible that this improvement in traffic was solely due to LSTF interventions, examination of the scale and effect size of individual LSTF schemes points towards these schemes having played a discernible role in the observed changes in traffic.

It seems likely that earlier (pre-LSTF) schemes to improve public transport and walking and cycling infrastructure may have also contributed to the improvements in per capita traffic levels during the LSTF period. It is also possible that demographic or socioeconomic changes in the Large Project areas may have played a part, as may land use changes.

We therefore conclude that the programme of sustainable transport interventions that has taken place over a number of years, of which LSTF has been one of the most recent manifestations, has probably been one cause of the observed per capita traffic reductions, and hence carbon savings.

Support for the local economy

With regard to **support for the local economy**, this meta-analysis focussed on two main dimensions on which a reasonable amount of information was available from multiple Large Projects: congestion relief and support for job-seekers.

The Large Projects performed slightly worse than the comparator group in terms of rush-hour congestion: that is, rush-hour speeds fell further in the Large Projects than in the comparator group over the course of the LSTF programme. This appeared to be largely attributable to growth in the population and local economy in the Large Project areas. However, there was also evidence that temporary and permanent reductions in road capacity may have contributed to the worsening congestion. These reductions in road capacity were related both to non-LSTF schemes (utility roadworks, major highway schemes) and LSTF schemes (temporary roadworks and permanent reallocation of road or junction capacity). In some local areas, it seems likely that congestion would have been worse if it had not been for the beneficial effect of LSTF interventions in reducing traffic. Although rush-hour congestion for general traffic did not improve, there was evidence of improvements in bus punctuality in a number of Large Projects.

Substantial numbers of job-seekers received assistance with travel (91,000 over the course of the programme), and survey evidence pointed to the conclusion that this support was helpful in enabling job-seekers to intensify their job search, accept job offers that they would not otherwise have been able to take up, and stay in work.

Other findings

Interventions to improve public transport and cycling options, and to encourage a mode shift from driving to walking, cycling, public transport and car-sharing, were implemented on a significant scale. Our analysis suggested that new or improved bus routes achieved a substantial uplift in patronage, clearly attributable to the investment, and likely to result in ongoing benefits in about three-quarters of the examples examined (because the new routes were commercially viable or likely to continue beyond the end of funding for other reasons). There was somewhat less positive evidence from workplaces engaged in travel initiatives: although 2,400 businesses received some form of support, evidence from the limited sample of 93 workplaces where there were good quality 'before' and 'after' travel surveys suggested that the reduction in car use was small, compared to previous workplace engagement programmes, possibly because of an emphasis on easy but less effective measures within the tight time-frame of the programme. Cycling increased during the course of the LSTF programme in some Large Projects. It was clear from inspection of data related to individual interventions that some of this overall uplift was attributable to LSTF schemes.

Value for money

Taken together, the schemes delivered by the Large Projects represented very high value for money. Ex-post cost-benefit analysis produced a 'best estimate' BCR of 5.2 – 6.1 (depending on which assumptions were applied). Sensitivity tests, varying the rate at which changes in traffic, bus use and cycling were assumed to decay after the end of the programme, and varying the assumptions about what proportion of change was attributable to the LSTF programme, suggested a lower-bound programme-level BCR of more than 4, and an upper-bound programme-level BCR of more than 14. Journey quality benefits arising from interventions such as simplified (smartcard) ticketing, real-time passenger information, and new cycle infrastructure, formed a significant proportion of the overall benefits (around 49% of the total benefit at the programme level). Benefits arising from lower traffic levels were the next most-significant benefit (around 38% of the total benefit at the programme level, mainly comprising decongestion benefits, fewer accidents and lower greenhouse gas emissions, offset by drops in indirect taxation). Health benefits due to increased cycling and increased walking as part of bus trips represented around 8% of the total benefit at the programme level. The cost of the programme per car km removed from the network was estimated to be 4.8p per car km, broadly comparable with estimates from previous sustainable transport investment programmes.