

# Cycling in the city regions

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Delivering a step change

April 2011



## About Sustrans

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## About *pteg*

***pteg*** - the Passenger Transport Executive Group - brings together and promotes the interests of the six Passenger Transport Executives (PTEs) in England: Metro (West Yorkshire), SYPTE (South Yorkshire), Nexus (Tyne and Wear), GMPTE (Greater Manchester), Merseytravel (Merseyside) and Centro (West Midlands). Leicester City Council, Nottingham City Council, Strathclyde Partnership for Transport and Transport for London are associate members.

***pteg*** has two main tasks:

- promoting efficiencies and the exchange of knowledge and good practice within the PTE network, and
- raising awareness nationally about the key transport challenges which face the city regions, and the public transport solutions which PTEs are implementing.

***pteg*** strategy and policy is determined by the Directors General of the six PTEs, ***pteg*** also supports a number of task groups and committees bringing together professionals from across the PTE network to focus on specific policy areas, to share expertise and good practice and to work collaboratively and more efficiently.

## Authors

Andy Cope, Sam Nair, Jason Torrance, Allan Williams, Angela Wilson

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## Sustrans

2 Cathedral Square  
College Green  
Bristol  
BS1 5DD

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Registered Charity No. 326550 (England and Wales) SC039263 (Scotland)  
VAT Registration No. 416740656

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## Executive summary

Recent evidence has demonstrated that substantial changes in cycling levels can be achieved in the UK, with the potential for increasing cycling being greatest in the city regions. This report by Sustrans for *pteg* explores the potential impact of a step change in the delivery of interventions to support and promote cycling in the English city regions outside of London.

Our review of the existing evidence base suggests that:

- There is significant potential for a step change in levels of cycling in the city regions, particularly given that close to 50% of all journeys in the city regions are relatively local in nature.
- Increasing cycling can produce substantial economic benefits mainly by increasing physical activity through reduced congestion, lower carbon emissions, increasing physical activity and by improving access to employment, local facilities and public transport.
- Investment in cycling is highly cost-effective, delivering benefits at least three times higher than the costs.

Information gathered about existing PTE cycling initiatives shows that:

- Coordinated programmes of measures to increase cycling and change travel behaviour, targeted at key destinations, have achieved some increases in cycling in the city regions.
- However, investment levels and the overall priority given to increasing cycling levels have been relatively modest, in particular when set against recent national demonstration programmes.
- Existing best practice highlights the value of having a coherent strategy and shared objectives for increasing cycling in order to target resources where there is the greatest potential for change.

Modelling of area-wide and targeted interventions to increase cycling suggests that:

- A step change in the scale of sustainable travel programmes which include cycling as part of a wider package of behaviour change measures could more than double levels of cycling and deliver a beneficial impact on overall travel patterns within the PTE areas.
- Interventions aimed at increasing cycling for specific types of journey, such as access to public transport interchanges, schools and workplaces, can deliver a significant mode shift away from car use.
- Although measures to improve access by cycle to public transport could substantially reduce pressure on station parking and local road networks, there is as yet very limited evidence on the scope for improved station access on overall demand levels overall.

### A step change in cycling in the city regions is achievable

Although levels of cycling in UK cities are relatively low at around 0.8% of journeys compared to over 27% in the Netherlands, the potential to change this is substantial. Close to 50% of all metropolitan trips are of less than 5km and could therefore be made within 20 minutes by an average cyclist. Yet, at present, more than half of all such journeys are made by car. Lower average operating speeds for motorised traffic, chronic congestion levels, high population densities, high parking charges and the substantial cost of alternative interventions all mean that cycling measures could be both highly cost effective and deliver substantial change in travel behaviour across the city regions.

Evidence suggests that three in ten car journeys could potentially be shifted to cycling, walking and public transport without significant infrastructure changes or restrictions to car use. The greatest potential for changing travel behaviour lies in increasing cycling, providing a viable alternative to nearly one in three local car journeys. A wide range of practical interventions have been proven to increase cycling levels, and there is a growing body of evidence on the most effective approaches,

notably from the Sustainable Travel Towns (STT) and Cycling Demonstration Towns (CDT) programmes. In the STTs, car driver trips per resident fell by 9% between 2004 and 2008, whilst cycle trips increased by 26-30%. In the CDTs, cycling levels increased by 27% from 2005 to 2009. In Darlington, where the two approaches were combined, cycling levels more than doubled.

Already there are notable examples of where substantial increases in cycling have been achieved in the metropolitan areas. In some PTEs, the number of cycling trips into city centres is now double what it was ten years ago. Focussing specifically on city centre commuting, in some areas as much as 4% of all trips are now made by bicycle.

Our analysis suggests that the following set of measures form the cornerstones of successful cycling strategies:

- **Packages of behavioural and environmental measures** deliver high levels of change as part of a coordinated programme.
- High levels of change can be achieved by **focusing on key destinations and trip generators** such as schools, workplaces and public transport interchanges.
- **Coordinated investment in cycling and public transport** can increase both cycling levels and public transport use by promoting less car dependent life styles. Recent evidence from London and the *Bike n Ride* project also suggests that cycling can play a significant role in making rail travel more attractive and accessible.

## Investment in increasing cycling levels is good value for money

Evidence shows that measures to increase cycling contribute to a wide range of social, economic and environmental objectives at a relatively low cost. Appraisal shows high benefit-cost ratios (BCRs) for investments in cycling, largely through congestion and health improvements. For instance in the CDTs increases of 27% in cycling rates are estimated to have generated health benefits alone of around £2.50 for every £1 spent. Area wide investment in the London Cycle Network showed a return of approximately 4:1. An evidence review for Bristol City Council concluded that small scale and targeted interventions can deliver even higher BCRs, averaging 19:1 for walking and cycling interventions.

A review of the evidence base on cycling and walking schemes points to the following conclusions:

- Investment that leads to **increased cycling offers very good value for money**, delivering substantial economic and carbon-related benefits.
- **City-wide measures to increase cycling, such as those implemented in the CDTs, deliver substantially positive BCRs**, although it is difficult to assess the impact of measures individually.
- **Small scale and targeted investment**, focused where there is the greatest potential for change (e.g. key routes and access to schools) represents very high value for money, although it may only deliver relatively modest improvements in overall absolute cycling levels.

## Progress has been made on cycling in the city regions

Recent years have seen an increase in the number and scale of initiatives to increase cycling in the city regions. Evidence provided by the PTEs and some of the largest urban local authorities England suggests that:

- **Increases in cycling have been achieved across the city regions over the past few years.** A very wide range of measures and approaches have been adopted, ranging from information sheets to new bridges. There is much good practice already in place and evidence of successful programmes of interventions, in many cases through coordinated investment in infrastructure and behaviour change.
- **Small scale, targeted programmes have been most effective in relative terms.** Measures targeting workplaces and schools have been particularly successful, for instance more than

doubling cycling in *Bike It* schools. A number of programmes have targeted particular features of city region transport, for instance by providing secure cycle parking at light rail stations in South Yorkshire, university-based schemes in Tyne and Wear and Leeds, and cycle routes and bike schemes to improve access to employment in Merseyside and South Yorkshire.

- **Cycling investments are increasingly being coordinated at the city region level.** Although local authorities remain largely responsible for implementing highway improvements, there is increasing PTE-wide coordination of cycling as part of wider transport policies. A good example is the South Yorkshire Cycling Strategy. In general terms, cycling is emerging as a central theme of a number of third round Local Transport Plans and Local Sustainable Transport Fund bids.
- **Despite the success of targeted interventions, the PTEs have seen limited impact on the overall mode share of cycling.** Although cycling has increased among relatively small target populations and for specific journey types, in most cases there is little evidence of significant impacts on overall mode share, possibly because cycling is starting from a very small base. A related issue, which makes it difficult to measure the impact of specific interventions, is the absence of robust evidence on levels of cycling across large urban areas.
- **Levels of investment in cycling remain low compared, for example, to the CDTs.** In South Yorkshire, for example, its relatively ambitious local Cycling Strategy is based on an investment of 15p per head compared to the £10 per head spent on cycling in the CDTs.
- **Cross-sectoral partnerships can provide substantial opportunities for producing a step change in investment and cycling levels.** We have identified a number of examples of best practice in partnership working, and has highlighting the significant extent to which cycling funding and delivery has been through national programmes (e.g. Cycling England), non-transport budgets (e.g. health, regeneration) and the third sector (e.g. Sustrans Connect2).

## A step change in investment could change city region travel behaviour

Our analysis shows that substantial investments in cycling and wider sustainable transport measures - comparable to those delivered in the CDTs and STTs - could significantly increase the number of regular cyclists and cycling's mode share, reduce congestion levels, improve health and, more generally, deliver high value for money. We have estimated the potential impact of two scenarios:

- 1 Area-wide investment in the PTEs at the levels experienced in the Cycling Demonstration Towns.
- 2 Interventions focused on cycling for specific journeys (commuting to work, access to railway stations, and travel to school).

The results suggest that:

- **Area-wide cycling interventions similar to those implemented in the CDTs** result in up to 307,000 new cyclists across the PTE areas, making 96 million additional cycling trips per year. This would generate substantial health, decongestion and carbon benefits, amounting to £716 million over a ten year period for new cyclists alone and representing benefit cost ratios of over 3:1.
- **Delivery of large scale programmes similar to those implemented in the STTs** would also have a substantial impact on both cycling and wider travel patterns within the PTE areas. STT-type interventions could generate 16 million additional cycling trips per year across the six PTE areas. Up to 71.6 million car trips per year could be replaced, with an associated decongestion and carbon savings value of up to £181.4 million.
- **Interventions focused on specific types of journey, such as access to rail stations, schools and workplaces,** could substantially increase cycling mode share for these trips. For instance, interventions to overcome perceived barriers to cycling to school could result in some additional 2.5 million trips to school by cycle each year, with a benefit of up to £1.4 million.

- **Interventions to improve cycle access to rail** could substantially reduce the pressure on parking and local road networks at suburban and commuter stations. Improved facilities at suburban rail stations to encourage those who currently drive to the station but would like to cycle could replace up to 3,000 car access trips across the six PTE areas every day, with potential benefits of up to £959,000, and an estimated benefit to cost ratio in the region of 12:1. A number of on-going projects, most notably by ATOC, TfL and the PTEs may shed new light on this issue over the coming year.
- Improvements to **cycle routes, provision of cycling facilities in workplaces and financial incentives to cycle to work** can all substantially increase cycling's mode share. Across the six PTE areas, route improvements could increase cycling's mode share for work trips up to around 3.4% from its 2% average level, with annual benefits valued at up to £2.6 million. That represents almost a doubling of cycling trips. The provision of indoor parking and showers alone could increase the percentage cycling to work to 2.7%, and a £1 per day incentive to cycle to work could result in 2.9% cycling mode share, with annual benefits valued at around £1 million and £1.6 million, respectively. Estimated benefit to cost ratios are approximately 6:1 for improvements to cycle route, 5:1 for provision of cycling facilities at workplaces, and 1:1 for financial incentives for cycling to work.

## Recommendations

Our work supports the following recommendations:

- In the **short term, investment in high impact “quick wins”** offers high value for money, focusing on the potential for change that exists in relation to schools, workplaces, key corridors, and access to public transport interchanges.
- **Substantial long term area-wide investment** is needed to produce a visible mode shift from car, and deliver sizeable congestion, carbon reduction and health-related benefits in the city regions.
- Effective **coordination of interventions between key partners** – PTEs, local districts, health, education and third sector bodies – is critical in order to maximise the benefits of investment. One important area is to ensure that smarter choices and infrastructure interventions are jointly developed and targeted.
- New evidence on access to rail stations highlights the need to **invest in cycle access alongside public transport improvements**. Given the relatively high cost effectiveness of cycling interventions it is likely that this could often strengthen the business case for public transport schemes at a relatively low additional cost.
- Although there is a strong emerging body of evidence on the impact of recent cycling interventions there are a number of areas where it is still difficult to predict what a step change in investment could bring. We have identified the impact of cycle access on rail demand as one area for further work over the coming year. However, large changes in cycling over several decades in countries like Denmark and the Netherlands suggest that there may be a step change in travel behaviour, perceptions and social conventions once cycling levels reach a certain level. **Sustained monitoring and data collection programmes will therefore be critical in supporting the development of this policy area.**

# 1 Introduction

## 1.1 Background

Recent evidence from the Department for Transport (DfT)–funded Cycling Demonstration Towns (CDTs) and the Sustainable Travel Towns (STTs) programmes has helped demonstrate that substantial changes in cycling levels can be achieved in the UK and that cycling interventions can be more cost effective than many other forms of transport expenditure. Despite this, it is often difficult to extrapolate the findings from individual case studies to larger or very different areas. Only one of the programmes - Southport cycling town - operated in a PTE area. In addition, methodologies for comprehensively assessing the cost effectiveness of cycling interventions are still under development.

The PTEs have therefore identified the need to summarise and develop the existing evidence base and how it relates to experience in large metropolitan areas and specifically PTE areas, so as to provide a framework for prioritising local interventions aimed at increasing cycling levels. There is also a need to address the limited evidence base on the kind of impact that could be expected from a step change in the funding of cycling interventions in large urban areas in the UK. The Passenger Transport Executive Group (*pteg*) has therefore commissioned Sustrans to carry out a research project aimed at reviewing and developing the evidence base, as well as to make recommendations regarding how individual PTEs may wish to prioritise local cycling interventions. We expect that this work will inform Local Transport Plans (LTPs) as well as funding bids to the Local Sustainable Transport Fund (LSTF).

## 1.2 Objectives of the report

The objectives of this report as set out by *pteg* are as follows:

- To review the evidence base on what can be achieved by cycling measures in large urban areas
- To review existing methodological approaches aimed at estimating the cost effectiveness of cycling measures
- To summarise empirical estimates of the cost effectiveness of specific cycling measures
- To investigate existing experience of cycling interventions in the English PTE areas
- To develop the existing evidence base on the impact of cycling measures through targeted modelling exercises
- To provide a conceptual framework to allow improved prioritisation of cycling interventions in PTE areas and support their case for funding.

## 1.3 Structure of the report

The remainder of the report is structured as follows:

- Section 2 reviews the evidence on the impact and cost-effectiveness of measures to increase cycling.
- Section 3 presents the results of an initial investigation of recent and ongoing cycling interventions in the PTEs.
- Section 4 summarises new evidence on the potential impact of a step change in measures to increase cycling in the city regions.
- Section 5 identifies priorities and makes recommendations to assist the city regions in prioritising investment in cycling.

A full technical report on the economic modelling exercise is provided as a separate annex. References are provided at the end of the report, including hyperlinks to source material where possible.

## 2 Evidence review

This part of the report reviews the substantial body of evidence that exists on measures to increase cycling. Much of this relates to relatively small scale interventions, although the CDT and STT programmes have added a substantial body of new evidence, particularly on the effectiveness of area-wide programmes in a UK-specific context. The results of DfT programmes funded through Cycling England are also useful, and further relevant information will emerge shortly, particularly from the Bristol Cycling City project. Sustrans' research and monitoring of our own and others' programmes have contributed substantially to this evidence base, and to the development of methods for the evaluation of cycling and active travel which have been adopted by DfT and others.

This part of the report is structured as follows:

- Section 2.1 reviews the evidence on the potential scale of change in levels of cycling that could be achieved
- Section 2.2 provides an overview of approaches to estimating the cost effectiveness of cycling measures, and a summary of existing evidence
- Section 2.3 reviews the evidence on the effectiveness of various potential policies and measures to increase cycling

### 2.1 The potential for change

#### 2.1.1 The potential exists for a step change in city region cycling

Although UK levels of cycling are low at around 2% of all journeys (compared to over 27% in the Netherlands, for example), the potential to change this is substantial. The last few years have seen a growing awareness of cycling. There is a growing consensus around the need for a step change in cycling levels, and of the need for cycling to play a much bigger role in local transport. Making cycling convenient, safe and fun is increasingly recognised as a key element in the creation of thriving sustainable and liveable cities.<sup>1</sup>

As the recent Local Transport White Paper recognises, nationally more than half of all local journeys could be easily made by bike, while the Public Health White Paper suggests that '*Active travel and physical activity need to become the norm in communities ... learning from the ... sustainable travel towns and cycle towns*'.<sup>2</sup> The previous government's Active Travel Strategy aimed for '*cycling to be the preferred mode of local transport in England in the 21st Century*'<sup>3</sup> while the Chief Medical Officer's last annual report called for '*national targets ... to increase travel by bicycle eightfold*'.<sup>4</sup>

Congestion levels, high population densities, high parking charges and the substantial cost of alternative interventions mean that the potential for increasing cycling is arguably greatest in the city regions, where on average less than 1% of trips were made by bike in 2009.<sup>5</sup> Attempts have been made to calculate the specific cycling potential of particular cities, based on factors such as terrain, population density, demographics and travel patterns.<sup>6</sup> Although this approach is relatively simplistic – as it ignores variations in cycling between similar cities and assumes that existing levels are innate rather than the consequence of historic policies and levels of investment – the results nevertheless highlight the substantial underlying and unfulfilled potential which exists to increase cycling in the city regions.

Sustrans has called for a doubling of the number of journeys under five miles made by foot, bike and public transport to four out of five by 2020, a level of change which we believe is necessary and possible to achieve.<sup>7</sup> This would require a step change in investment, policies and political will over a number of years, but such levels of change have been achieved elsewhere: cycling as a share of all trips in Freiburg rose from 15% in 1982 to 27% in 2007.<sup>8</sup> The PTEs and their local authority partners are in a strong position to lead this level of change.

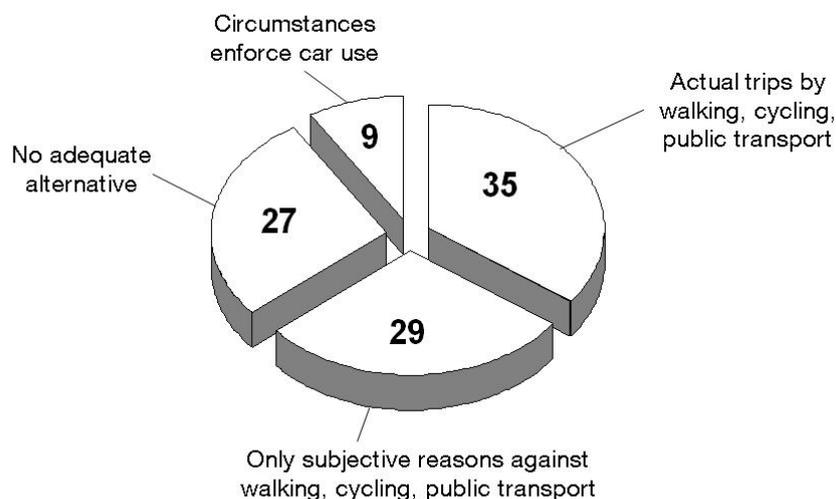
## 2.1.2 Local cycling journeys offer the biggest potential

Despite national trends towards increasing distances travelled, the majority of people's day-to-day trips are local in nature. There is substantial potential to change travel behaviour for journeys of under five miles, which comprise over two thirds of all journeys. In Britain more than half (55%) of all such journeys are made by car, compared with around a third (34%) on foot, seven per cent by bus and just two per cent by bike.<sup>9</sup> A quarter of journeys made by car are of less than two miles.

Previous Sustrans work in partnership with GMPTE demonstrated that the potential is even greater in PTE areas: in Greater Manchester over half of car trips were under 3km in 2007, creating the potential to achieve 10-16% reductions in peak car trips, and a tripling of cycling over 5 years, through a combination of behaviour change measures and investment in alternatives to the car, including cycling.<sup>10</sup> Certain types of journey have yet higher potential: for instance average trip lengths for the school journey are lowest in built-up metropolitan areas (1.2 miles for 5-10 year olds, 2.5 miles for 11-16s).<sup>11</sup>

Research undertaken by Sustrans in the three STTs showed the significant potential that exists for changing travel behaviour by addressing the subjective barriers that currently prevent people from making more trips on foot, by bike or by public transport. One of the most important overall findings was that on average nearly half of all car trips within the towns could be replaced by these modes using existing facilities. The research showed that people are swayed in their travel choice by severe misperceptions about the alternatives to the car (especially relating to relative travel times) and a lack of information.<sup>12</sup>

### Travel behaviour in the STTs (% trips per person)



Overall, the research showed that while 35% of all people's trips were already made by sustainable means, there was potential for a further 29% of trips to be shifted from car to walking, cycling or public transport without any infrastructure changes or restrictions on car use, by addressing the subjective barriers that exist to using alternative modes (e.g. by improving information about available cycle routes, bus routes and times). For the remaining 27% of trips, no adequate alternatives exist, for instance because of the lack of appropriate bus routes and/or connections. There are only 9% of journeys for which circumstances enforce car use, for instance because of a disability or where substantial loads are being carried.

As a result of the STT programme, car use fell substantially. Bus trips per person grew by 10% (to 22%) and the number of walking trips grew substantially, by 10%-13%, compared to a national decline in similar towns of 17%. The number of cycle trips grew substantially in all three towns, by 26%-30%. Despite this growth, the potential for change actually increased during the course of the programme, with the proportion of people who felt there were alternatives to car use rising from 47% to 54% from 2004 to 2008. This could be attributed to improvements in information about alternatives and the increased visibility and changed social norms surrounding their use.

Research also showed that the greatest potential for changing travel behaviour lay in increasing cycling, providing a viable alternative to nearly one in three local car journeys. In the STTs in 2008, of those 54% of journeys for which cars were used solely for subjective reasons and for which alternatives were available, people said 41% were in principle replaceable by cycling, 21% by public transport use, and 15% by walking. Through effective measures aimed at changing travel behaviour, use of sustainable modes could be easily doubled in the short term without substantial capital investment. In the longer-term targeted investment in providing viable alternatives to the car for trips that are currently impossible by other means could increase this further to nine out of ten journeys on foot, by bike or using public transport.

### **2.1.3 Cycling supports public transport use**

Integration between cycling and public transport offers many of the benefits of convenient door-to-door transport over longer distances that are associated with car use, and cycling can play a key role as a feeder and distributor service for public transport (see for example the results of our modelling work in section 4 below).<sup>13</sup> For operators, encouraging bicycle access to public transport offers increased passenger catchments compared to walking (typically up to four times the catchment area for the same journey time to the stop), as well as the potential to increase passenger numbers without some of the land-take and parking management issues associated with car travel (over ten cycles can be parked in the space required for one car parking space).<sup>14</sup>

The potential for competition between public transport and cycling should also not be overstated. For instance in the case of a bus corridor, cycling improvements could lead to direct substitution between cycling and bus use, as well as conflicts over road space between buses and cyclists in bus lanes. However, evidence from the STTs shows that coordinated area-wide packages of measures lead to parallel increases in all sustainable modes at the expense of car use, and that although individual users may switch modes, overall the trend towards increased usage far outweighs this effect. Evidence from elsewhere in Europe also demonstrates that, where measures to increase cycling form part of a coordinated programme of providing alternatives to car use, public transport mode share has grown alongside substantial increases in cycling levels. For instance, in Basle, Switzerland, active modes (walking and cycling) and public transport are each responsible for around 4 in 10 local journeys.<sup>15</sup>

An early study of cycling potential in European towns and cities noted that bicycles contribute to making public transport more appealing by guaranteeing better accessibility to boarding/ alighting points, and could also attract public transport users by reducing waiting times associated with multi-stage journeys to reach a rapid and/or long distance form of transport (e.g. railway station, metro, tram).<sup>16</sup> An analysis of the factors influencing transport mode choice in 40 EU cities concluded that there was a strong relationship between public transport network density and cycle use.<sup>17</sup> The majority (90%) of metropolitan households already live within 6 minutes walk of a bus stop, so the greatest potential for change is likely to be in improving access to rail, light rail and tram stops.<sup>18</sup>

Although half the nation owns a bicycle and 60% live within a 15-minute ride of a station, only 2% of passengers currently use their bike to access the rail network.<sup>19</sup> There are potentially enormous benefits to passengers, train operators and the wider rail industry through increasing access to stations for people who walk and cycle. As well as the wider social benefits of improved health, reduced greenhouse gas emissions and reduced traffic congestion associated with sustainable transport, there are many specific financial benefits for the railway industry from increasing access

for walkers and cyclists, not least relieving pressure on car parks. Sustrans has welcomed the inclusion of increased cycle parking in the specifications for recent rail franchises.<sup>20</sup>

A number of factors point to the value of improving access to railway stations by providing safe, direct routes for walking and cycling. A key one is parking: a new car park space costs £6-10,000 compared to a double-deck cycle rack at about £300; there is also a substantial opportunity cost attached in using valuable land adjacent to stations for car parking purposes. There is increasing interest from the rail industry in the “end to end journey”: in many cases the time spent on a train accounts for as little as 30% of journey time, so tackling localised peak-hour traffic congestion, the capacity of surrounding road systems and integration with other public transport are key to attracting passengers. There is a significant increase in cycle parking provision underway as the rail industry seeks to provide facilities for 5% of its passengers (the most notable example being the new Leeds Cycle Point).<sup>21</sup> Further information on related PTE initiatives can be found in Section 3.

As was noted in the Better Rail Stations report, *‘extra storage at stations is only the first step. The second step is to segregate cycle routes to busy stations, together with better signing and road traffic management.’* According to the National Stations Improvement Programme, nearly a third of rail users and nearly half (47%) of those who drove and parked at the station, would like to use an alternative means of travel to or from the station. Over 11% of rail users felt they would like to cycle from the station, whether they were to park the bicycle at the station or carry it onto the train. The main facilities/services potential cyclists wanted to see included the ability to take a bicycle on the train (over 60%) and bus/cycle lanes near the station (over 40%).

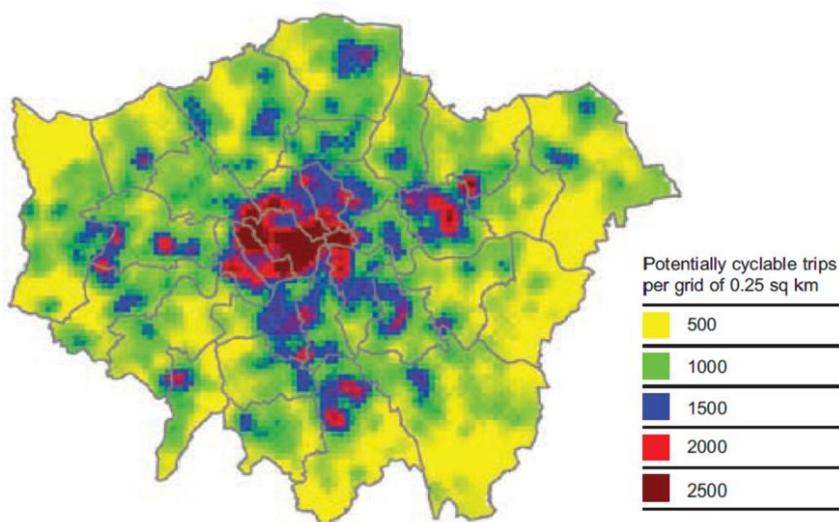
Research at stations without cycle facilities indicated that some people would be willing to change their travel behaviour if they were provided, and suggested that key factors were the amount and security of cycle parking facilities, protection from the weather, and cycle routes to and from the station.<sup>22</sup> Despite the enthusiasm of existing cyclists for taking bikes on trains and trams given current capacity constraints, improved cycle parking and station bike hire schemes are likely to be easier to implement and more effective than increasing the available space for bikes on trains and light rail vehicles. It is also important to note that the needs that existing cyclists identify are not necessarily those which would attract new users.

Bike N Ride was a Cycling England programme which aimed to increase cycling at 159 stations, mostly through more cycle parking but also through new cycle hire facilities, better information and signing, improved cycle access and the introduction of a cycle hub. The programme covered stations across five train franchises: Northern (99 stations), Merseyrail (18), Virgin (7) and South West (35). Across the 159 stations, 52% of people walked, 23% drove, 5% cycled, 5% arrived by train and 4% arrived by bus (other modes e.g. taxi 11%). The evaluation report showed that 79% of journeys to the stations were less than 5 miles, and that there was therefore potential for investments in cycle routes, safe facilities, signage and information to improve the experience for existing cyclists and attract new users. The report also showed that such investment delivers value for money and more rapid returns in comparison to investment in parking (e.g. 30 car spaces at Penrith cost £2.5m).<sup>23</sup>

### 2.1.4 Case study: the potential for cycling to replace short car trips in Outer London

A recent study of the potential for increasing cycling in London noted that more than half of all car trips made in Outer London are less than two miles in length (only 10 minutes on a bike). This suggests that the potential exists to reduce car use and congestion by encouraging a shift to cycling for around 2.4 million trips a day, most of which are currently made by car. The map above shows how this cycling potential varies across the urban area, with the highest density of potential shown in brown and red. The resulting strategy for addressing various physical, attitudinal and delivery barriers to cycling proposed that measures should be focused and targeted on those areas where there is the greatest potential for change.<sup>24</sup>

#### Potential for increasing cycling in London



## 2.2 The cost-effectiveness of investment in increasing cycling

### 2.2.1 Approaches to estimating the cost-effectiveness of cycling measures

The simplest way of expressing value for money is a benefit to cost ratio (BCR). BCRs for cycling schemes can be appraised using DfT's WebTAG guidance. As the interventions for which the tool was developed (e.g. cycle paths) tend to benefit both cyclists and pedestrians, it is usually impractical to consider walking and cycling separately. WebTAG can be used for schemes that are aimed primarily at improving conditions for pedestrians and cyclists. For schemes that are not aimed primarily at pedestrians and cyclists but which are expected to have a significant impact on cycling and walking a separate appraisal is not required - instead this is integrated into the main appraisal using the walking and cycling specific WebTAG unit as a guide.

As in the appraisal of wider transport schemes more generally the process of using this walking and cycling appraisal requires capturing a series of inputs which are added together in an Appraisal Summary Table. This draws together the findings of the appraisal and details the impacts of a scheme against five objectives, currently the environment, economy, safety, integration and accessibility. Within these objectives there are aspects which can be monetised, giving an expression of economic benefit as an output. Specifically, these are benefits from reduced absenteeism, reduced congestion, reduced accidents, increased amenity and journey ambience, the value of reduced carbon emissions and health benefits.

Health benefits are calculated using the World Health Organisation (WHO) Health Economic Assessment Tool (HEAT) tool which values the reduced mortality arising from increasing cycling levels. The WHO HEAT tool was designed to enable the economic appraisal of the health effects related to cycling, and to complement existing tools for economic valuations of transport interventions which focus on other aspects such as emissions or congestion. The tool estimates the mean annual benefit (per cyclist, per trip and total annual benefit) associated to reduced mortality as a result of cycling.<sup>25</sup> This necessary data has been collected as part of the monitoring process.

There are a number of drawbacks to the current approach:

- Schemes cannot be evaluated unless appropriate types of data (e.g. numbers of new cyclists, not just total cyclists) are collected to provide the required inputs
- A number of the benefits of cycling and walking schemes are not captured, and the approach cannot easily be applied to all types of schemes.
- Health benefits to young people cannot be evaluated using HEAT, presenting difficulties in appraising interventions focussed on young people such as Bike It and Bikeability.
- It is not possible to value more extensive health and well-being benefits amongst children and adults from increased physical activity as well as wider non-monetised benefits

A further barrier to a more complete understanding of the value for money delivered by schemes encouraging cycling and walking is the limited guidance available on appraising Smarter Choices initiatives – examples of which have been shown to have a substantial impact on travel behaviour. DfT guidance on appraising such measures is expected shortly.

### 2.2.2 Examples of value for money of cycling interventions

The approach described above has been used to estimate benefit cost ratios for town wide initiatives, such as the CDT programme, and infrastructure delivery, such as individual Links to Schools schemes. Typically a large proportion of the benefits of schemes to support walking and cycling are the health benefits to people using the facilities, with other benefits including amenity, accident reduction, environmental, absenteeism and decongestion generally less significant. The combination of these inputs - especially mortality benefits, decongestion benefits and carbon benefits - with the relatively low investment costs of individual schemes means that very high BCR values are often generated, regardless of the exclusion of any non-monetised benefits from the BCR calculation.

The examples below show the cost effectiveness of different types of cycling and walking schemes, ranging from interventions at town level to household level, as well as infrastructure for schools. The benefit cost ratio values for these schemes are all classified as high using the DfT's methodology.

- A study for Bristol City Council and NHS Bristol reviewed a selection of cycling and walking infrastructure projects, such as crossings and paths across the UK and calculated an average benefit cost ratio of 19:1 based on these examples.<sup>26</sup>
- The DfT uses three Sustrans schemes as case studies in their guidance for appraising walking and cycling interventions. These have BCR values, ranging from 18.4:1 to 37.6:1.<sup>27</sup>
- Green Alliance gives the example of improvements to 6 kilometres of the Union Canal towpath in Brent. Sustrans monitoring of increases in cycling and walking shows a BCR of 38.4:1.<sup>28</sup>
- A 2008 study of a range of soft measures to reduce car use by enabling behaviour change through Smarter Choices such as workplace travel plans, travel marketing, car sharing and teleworking shows a BCR of over 10:1.<sup>29</sup>
- Analysis of the CDT programme demonstrates that for every £1 invested in cycling schemes only, the value of decreased mortality is £2.59.<sup>30</sup> When including all forms of benefit in the appraisal the BCR ranges from 2.6:1 to 3.5:1.<sup>31</sup>

- Appraisal of Sustrans personal travel planning programme shows high economic benefits from reduced congestion, reduced absenteeism and increased physical activity. The resulting BCR is nearly 8:1.
- Sustrans has also calculated BCRs for various Links to Schools projects for DfT using WebTAG, producing BCRs of 29.3, 32.5 and 14.9 for various small scale infrastructure improvements.<sup>32</sup>
- More recent calculation by Sustrans of value for money of infrastructure schemes linking schools and communities, using a conservative interpretation of the WebTAG guidance, still shows an average BCR of almost 4:1.<sup>33</sup>
- Benefit cost analysis of small scale adult cycle training schemes suggest that returns are of the order of 7:1. Investment in the London Cycle Network showed a return of approximately 4:1, largely from health, congestion and air quality benefits.<sup>34</sup>

It should also be noted that, in general terms, BCRs tend to be substantially higher for smaller and localised interventions (which can be targeted at the highest potential for change and monitored more easily) than for area-wide schemes (where impacts are more widespread and harder to assess), although the overall scale of benefits is of course greater for larger area-wide interventions.

There is also evidence that the inclusion of cycling in wider packages of investment can boost overall scheme BCRs. For example, a recently approved major scheme in the East of England, *Ipswich Fit for the 21<sup>st</sup> century*, includes approximately £10m of cycling, walking and behaviour change measures as part of a £25m package of public transport and public realm improvements. With a BCR of approximately 6, these substantially contribute to the BCR of 3 for the combined package.<sup>35</sup>

Both these conclusions are supported by the results from our PTE modelling work and can be found in annex 1.

### 2.2.3 Evidence of value for money in the CDTs and STTs

Although not all benefits can be expressed in monetary terms, the CDT programmes delivered high BCRs, largely through congestion and health improvements.<sup>36</sup> The DfT estimated a BCR for the programme at the end of the first phase, based on monitoring data collected from the beginning of the programme in 2005 until the end of March 2009.<sup>37</sup> The methodology applied was largely in line with that described in the DfT's WebTAG unit on appraising walking and cycling interventions within the limitations of the data available and given that the monitoring programme was not designed primarily to collect data for use in such a calculation (see 2.2.1 above).<sup>38</sup> Health, decongestion, accident, absenteeism and amenity benefits were all included in the calculation:

- Health benefits were calculated using the World Health Organisation's HEAT for cycling model.<sup>39</sup>
- Decongestion benefit was valued based on an estimate of car kilometres abstracted from the road network as a result of the programme. A value was applied to these based on the relevant WebTAG guidance and including the value of reduced congestion, reduced infrastructure costs, fewer accidents, improved air quality, reduced noise levels and reductions in indirect taxes.
- The impact of the programme on accidents was valued using an average cost per cycling casualty. Changes in numbers of casualties were examined under three scenarios – the first using a fixed assumption of changes in accident rates with changes in numbers of cyclists, the second comparing accident rates in the towns with accident rates in matched towns, and the third comparing accident rates before and after the implementation of the programme.
- Absenteeism benefit, valued based on salary and other on-costs, was calculated for the proportion of cyclists in work and meeting the minimum level of activity required to obtain an absenteeism benefit.
- Amenity values were estimated based on assumptions on the proportions of new and existing cyclists using new cycling facilities, and applying standard values for the amenity benefit to

these users, as published in the WebTAG guidance unit concerning the appraisal of walking and cycling interventions.

A summary of the resulting values for the CDT programme is included below:

Impact	Benefits and costs over 10 years (£m, 2007 prices)
Reduced mortality	Benefit of £45 million
Decongestion	Benefit of £7 million
Reduced absenteeism	Benefit of £1-3 million
Amenity	Benefit of £9 million
Accidents	Disbenefit of £0-£15 million
TOTAL BENEFITS	£47-64 million
Costs	£18 million
Benefit-Cost Ratio	2.6 – 3.5

As an outcome of the STT programme, car driver trips in the towns taken together fell by 9% between 2004 and 2008, reducing congestion and improving journey reliability. The Cabinet Office values excess delays to journeys caused by congestion at £10.9 billion per year.<sup>40</sup> Targeting schools and workplaces because of their effect on peak hour trips was effective: car use for the journey to school fell by between 9%-17% and car driver distance for commuting also fell. In the STTs, the benefit-cost ratio was in the order of 4.5 for congestion-only effects.<sup>41</sup>

#### 2.2.4 Evidence that cycling supports wider local economic objectives

There is a substantial body of evidence on the wider economic benefits of increasing cycling. Evaluation of the STT and CDT programmes demonstrated the contribution that cycling makes to a wide range of social, economic and environmental objectives at low cost.<sup>42</sup> Cycling England have estimated the economic benefit of £382 per year for each additional urban cyclist, although the method used does not correspond with existing transport appraisal methods (see above).<sup>43</sup>

**Employer benefits.** Transport for London has estimated that removing one car parking space could save up to £2,000 per year in high-density urban areas. GlaxoSmithKline (GSK) chose to support those who were willing to give up their cars and cycle to work at the cost of £400 per annum instead. As a result, the number of staff cycling to work increased sevenfold to over 10% of employees.<sup>44</sup> Employers involved in the Bikes for Business scheme estimated the average savings to the organisation at £25-80 per month per bike.<sup>45</sup> There are also significant benefits to employers from promoting active travel, including reduced absenteeism, lower turnover rates, improved productivity and employee morale, and lower health care costs.<sup>46</sup> A 1% increase in regular commuting by bicycle would result in savings of approximately €27 million (£24m) per annum for employers.<sup>47</sup>

**Improving access to employment and services.** In Darlington the CDT and STT programmes made it easier to reach workplaces without a car, widening access to work for people on low incomes, as well as enabling employment and/or housing growth without creating unacceptable levels of congestion. Car use fell but access to services and travel choice improved through better information about the travel options, and by improving the travel options that were on offer.<sup>48</sup> DfT has noted that coordinated improvements to cycling, walking and public transport are effective in improving accessibility.<sup>49</sup> Examples of how cycling has improved access to opportunities in the PTEs are provided in section 3 below.

**Attracting and retaining inward investment.** There is strong evidence that improvements to walking, cycling and the local environment are effective in making attractive places in which to live, work and shop.<sup>50</sup> The Local Transport White Paper notes that ‘pedestrians, cyclists and public transport users provide as much if not more spending power than car users’, and research shows that retailers tend to greatly overestimate the importance of car users and parking to their businesses.<sup>51</sup> A survey for TfL in Kingston found that those who arrived on foot or by bike spent

more per week than those who arrived by car.<sup>52</sup> Sustrans cycle routes in South Wales generated an annual £75m expenditure and £9.9m pa net income to Wales, generating or securing 1399 jobs, 183 in tourism.<sup>53</sup>

**Climate benefits.** In 2009, the potential carbon saving from the 407 million journeys on the National Cycle Network alone was worth £32 million (SPC = £52 per tonne CO<sub>2</sub> equivalent).<sup>54</sup> Sustrans estimates that over 60 million trips every year will be made on Connect2 networks, potentially saving the equivalent of 79,000 people's annual emissions from car travel.<sup>55</sup>

### 2.2.5 Evidence that cycling increases demand for public transport

Noting the parallel growth of bus travel and cycling in cities such as London over the last decade, the International Association of Public Transport (UITP) recently recognised that cycling provision is among the factors which 'influence mobility behaviour - in the short and the long term - and increases the demand for public transport'.<sup>56</sup>

Other evidence suggests that intermodality is a key factor in the attractiveness of public transport. 35% of all train clients use the bike to get to the station in the Netherlands, compared with 25% in Denmark, 9% in Sweden (35% in the south Swedish region of Malmö). In the Netherlands, all main train stations have guarded facilities for storing bikes, and offer additional services like maintenance and repair, a model that was adapted for the new Cycle Hub at Leeds Station. At smaller stations in the Netherlands, lockers are provided for safe storage, an approach that has also been implemented at 43 rail and tram stops in South Yorkshire (see section 3 below). In the West Midlands, cycling promotion and provision of covered cycle parking and lockers has increased "bike and ride" at local rail and metro stations.<sup>57</sup>

### 2.2.6 Case study: OV-fiets (public transport bicycle)

In the Netherlands the OV-fiets cycle hire scheme is operated throughout the country and owned by Dutch Railways. There are now over 160 rental points, mainly at train stations throughout the Netherlands but also at some other city centre locations. The scheme has been designed for frequent users, mainly commuters, to encourage cycle use over motorised transport for the first/last leg of their journeys between the station and their homes or places of work. Currently half of the nation's rail passengers have access to the scheme. Because of OV-fiets, 35% of subscribers travel more frequently by train and 12% sometimes or regularly leave their cars at home. The goal is to exceed a million journeys in 2011. In addition, OV-fiets aims to become a city rental bicycle and will increasingly be available for rent outside stations, for example at big bus stations, as well as town centres, business parks and ferry quays.<sup>58</sup>

## 2.3 Effective approaches to increasing cycling

There is a substantial body of evidence, experience and best practice on measures to increase cycling. Despite this, cycling advocates and experts have adopted a wide range of positions on how best to increase cycling, most notably on the merits of dedicated cycling infrastructure versus highway-based measures. As with other types of transport interventions, there are many examples of programmes that are not evidence-based or effectively monitored, and that fall far short of best practice in terms of delivery and impact. Nevertheless given the small scale, low cost and targeted nature of historic interventions to increase cycling, and the significant benefits accruing in relation to each additional cyclist, it is clear that a wide variety of approaches have achieved increases in cycling levels, and that the task is largely about finding "what works best in the local circumstances" rather than "what works".

Some of the highest quality evidence comes from public health rather than transport. A recent systematic review published in the British Medical Journal only identified 25 high quality controlled studies, concluding that 'community-wide promotional activities and improving infrastructure for cycling have the potential to increase cycling by modest amounts' and that 'studies of individualised

marketing report consistent positive effects of interventions on cycling behaviour', while also identifying a need for 'more robust study designs'.<sup>59</sup>

Although a number of more promising approaches can be identified, some of which are evaluated in more detail in section 4 below, there are no "silver bullets" or single measures that work in isolation or regardless of context. Indeed all of the evidence suggests that sustained and coordinated packages of locally-appropriate and targeted behavioural and environmental measures, incorporated into transport and other local strategies, exceed and multiply the effectiveness of any individual interventions.

### **2.3.1 Building on existing best practice, evidence and expertise**

A wide range of practical interventions exist with a proven potential to increase levels of cycling quickly and cost-effectively, and there is a substantial body of evidence on the most effective approaches.<sup>60</sup> Sustrans own approach is based on this evidence, and has shown that it is possible to overcome many of the barriers to active travel, for example through targeted environmental improvements and promoting these options to specific audiences such as school children, older people, employees and families at home. In order to optimise the benefits of individual measures, both hard and soft interventions are implemented as part of an integrated package, for example, promoting new infrastructure and locking in behaviour change through traffic and speed restraint by reallocating road space from private motorised transport to walking and cycling.<sup>61</sup>

### **2.3.2 Developing packages of behavioural and environmental measures**

Demonstration programmes have shown the effectiveness of integrated low cost travel behaviour change programmes, including both behavioural measures and environmental improvements, in increasing cycling. In the STTs, car driver trips per resident fell by 9% between 2004 and 2008, whilst cycle trips increased by 26-30% and walking by 10-13%. In the CDTs, cycling levels increased by 27% from 2005 to 2009. In Darlington, where the two approaches were combined, cycling levels increased by 117%, albeit from a very low base.

The evidence shows that measures to promote walking and cycling are also more effective when they are integrated as part of a wider programme to change travel behaviour, particularly for journeys of under five miles, and with public transport use for longer journeys. It appears likely that, once targeted behaviour change programmes have encouraged people to consider alternatives to the car, people are then more likely to use the most appropriate alternative mode for their journey. Environmental measures such as traffic restraint and road space reallocation are also effective in locking in the benefits of travel behaviour change.

### **2.3.3 Focusing on key destinations and trip generators**

Facilities such as schools, workplaces and public transport interchanges are key to both individual journeys and wider travel habits, and the evidence suggests that focusing on journeys to and from such destinations is the most effective and efficient approach to changing travel behaviour and increasing levels of cycling. In the STTs, car use for the journey to school fell by between 9%-17% and car driver distance for commuting also fell by targeting schools and workplaces. Sustrans' own projects in schools and workplaces demonstrate the impact of this approach: for instance Bike It has consistently doubled levels of regular cycling in over 800 schools across the UK, including in 5 of the 6 PTEs. There is also some evidence of the long term benefits in terms of children's levels of physical activity and lifelong travel habits.<sup>62</sup>

### **2.3.4 Using high profile projects as catalysts for change**

Several cycle hire schemes are now in operation in the UK. The London cycle hire scheme is by far the largest, with 6,000 bikes available from 400 docking stations across London. Northern Rail's provision of new cycling facilities at over 100 rail stations on all the routes into Leeds will be completed in full by June 2011. While evidence from UK programmes is still limited, findings from elsewhere in Europe suggest that high profile schemes (such as Velib in Paris) may play a role in

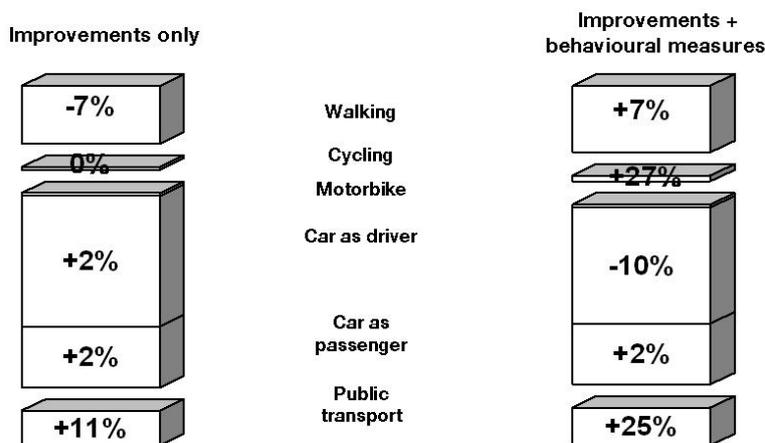
raising the profile of and changing attitudes to cycling, but their ability to deliver modal shift is limited to small areas, and may impact more on public transport than car use. In London a survey of bike scheme users found that 35% have switched from using the tube, 29% used to walk and 23% have switched from bus rides, so only 13% have shifted from car use.<sup>63</sup>

Sustrans' high profile projects, including Connect 2 and the National Cycle Network, act as catalysts for communities and individuals to start cycling again and enable people to make local journeys to local facilities using alternatives to the car. A number of the schemes focus on improving traffic-free access to public transport links. Appraisal of these schemes shows high benefit-cost ratios, as discussed above. Although other high-profile events such as Sky Rides may also perform this catalyst role, there is little evidence of a sustained impact on levels of cycling.

### 2.3.5 Case study: increasing cycling and public transport use through smarter choices

There is some evidence to suggest that coordinated initiatives including infrastructure improvements and smarter choices measures can increase both cycling levels and public transport usage. In Bristol in 2004 the implementation of a Sustrans' personalised travel planning programme coincided with the development of a showcase bus corridor. A 12% growth in bus patronage that resulted from the bus corridor improvements was further increased to 25% as a result of the implementation of measures to encourage wider travel behaviour change, which also led to increases in cycling of 27%.<sup>64</sup>

#### Effect of bus corridor improvements & behavioural measures in Bristol



### 3 Interventions to increase cycling in the city regions

This section of the report summarises the information gathered concerning some of the existing cycling interventions in PTE areas. It shows some of the work that PTEs are investing in to increase cycling levels. We have focussed on recent and ongoing cycling initiatives, their type, cost and impact, as well as on the likely inclusion of cycling measures in LTP3 implementation plans and LSTF bids.

There are many examples of good practice and successful outcomes in the PTEs, and although it provides a broad indication of the types and scale of existing measures to promote cycling it is in no way a complete picture. Levels of investment in interventions seeking to increase cycling are at present a small part of wider plans and strategies, but the successes detailed point the way towards the potential benefits of increased investment.

The remainder of this section is structured as follows:

- Section 3.1 covers measures to improve access to public transport.
- Section 3.1 summarises other interventions to increase cycling in the PTEs.
- Section 3.3 deals with measures focused where there is the greatest potential for change
- Section 3.4 deals with the issue of the integration of cycling into wider strategy
- Section 3.5 identifies partnership approaches to increase cycling.
- Section 3.6 draws some initial conclusions from the information gathered

#### 3.1 Improving cycle access to public transport.

All PTE areas have put in place measures that have improved the integration of cycling and public transport, in many cases through improvements to cycle parking.

- Between 2007 and 2011, Cycling England, Northern Rail, **Barnsley MBC** and **SYLTE** provided secure parking for an extra 300 bicycles at public transport hubs. In 2009, this translated into 21,700 intermodal journeys per year on cycles and public transport. SYLTE reported a 29% increase in cycles parked at Sheffield station and a 44% increase in cycles parked at all stations.
- 150 secure bike lockers were provided at suburban stations in the **GMPTE** area. No evidence was available on the impact on levels of cycling or rail use, but GMPTE's view is that *'it encourages healthy and sustainable transport, yet at the same time supports use of the Greater Manchester public transport network, reduces pressure for the provision of car parking spaces, and widens the catchment area of public transport nodes – particularly those not well connected by other transport services'*.<sup>65</sup> Cycle parking is also incorporated into ongoing Metrolink extension and refurbishment works.
- In **South Yorkshire**, the Bikes on Buses scheme was trialled in rural areas. Although the scheme was popular with cycle advocates, there is limited evidence of wider impacts.
- The **Leeds Cycle Point** scheme, opened in 2010, provides a secure facility for storing 300 bikes for a fee of up to £1 per day, and also offers cycle repair, retail, rental and information. It has greatly increased level of cycle storage provided at the station, based on a well established model from the Netherlands. Given the recent opening of this facility no evidence of the impact of the scheme on rail use or cycling levels is yet available. A number of other PTE areas and trains operating companies are considering similar schemes.
- **Nexus** has audited all Metro stations and major bus stations/interchanges, to record existing cycling facilities and make proposals for additional facilities and minor infrastructure in the immediate locality. The PTE is considering other potential promotion of cycling, such as the setting up of a discount for folding bike purchase for annual Metro ticket users.
- **Centro** has a dedicated strategy for increasing walking and cycling to public transport, with the aim of making such journeys commonplace within five years.<sup>66</sup> Improvements to station

cycle parking and security in the West Midlands and campaigns to promote cycling to stations are ongoing.<sup>67</sup>

## 3.2 Behavioural change and infrastructure measures

A very wide range of interventions to increase cycling have been implemented by the PTEs. After measures relating to access to public transport the most common interventions appear to be child and adult cycle training, programmes in schools, the development of infrastructure and signage, and various types of behavioural pledge or challenge-based marketing campaigns. A number of key types of interventions have been successfully used:

- **Cycle training.** This has been central to cycling interventions in most PTEs, both as an individual intervention and as part of wider packages of measures. For instance, as a result of the Sheffield Bikeboost programme, 73% of recipients of cycle training and other workplace measures intend to become regular cyclists.<sup>68</sup>
- **Infrastructure and signage.** The priority and resources given to capital cycling projects varies between PTE areas. In Barnsley for instance, a substantial programme of route development and signage work includes the Trans-Pennine trail (1m users/year), five Sustrans Links to Schools schemes connected to new education sites, and routes in the Dearne Valley linking housing areas to employment sites. Many PTEs are delivering Sustrans Connect2 infrastructure projects, including four in Greater Manchester. Greater Manchester local authorities identified key sites to focus investment for cycle infrastructure e.g. routes or areas important for employment, linking residential areas etc. Initial results from automatic cycle counts have shown an overall increase of 12% usage of routes and up to 60% increases at specific sites.
- **Marketing and information.** Measures in the PTEs include websites, journey planners and maps of each district that include cycle routes and parking. In Merseyside, the New Year New Bike campaign included fitness messages as well as the 'how to' for those who'd bought/received new bikes for Christmas, plus the offer of free cycle training.
- **Mass participation events.** There are many examples of high profile awareness-raising events across the PTEs. As well as many local programmes, there have been Sky Rides in Manchester, Bradford and Birmingham (plus Leicester). These events are popular and successful in increasing attendance year on year.
- **Challenges.** In Greater Manchester, cycle and workplace challenge events were delivered in partnership with PCTs and the 3<sup>rd</sup> sector, resulting in 44 "new" cyclists and increased frequency of cycling among existing cyclists. In Merseyside a five week cycling challenge including, targeted information, organised rides, Dr Bike maintenance sessions at schools, marketing activity and grants achieved some increase in frequency of cycling but many participants were already cyclists<sup>69</sup>. Commuter challenges' in Sheffield showed cycling to be the quickest way of getting to the city centre in the morning peak period for journeys of 5 miles and under and that cycle journey times are more reliable than motorised travel.
- **Packages of measures.** Many cycling initiatives in the PTEs involve coordinated packages of many of the hard and soft measures listed above. For instance The Sheffield Cycling Action Plan 2006-11 covers a broad package including radial routes and routes to all major destinations, secure cycle parking at Public Transport interchanges, cycle training to a third of Year 6 schoolchildren, cycle marketing, cycle audits of all transport schemes over £50,000 and measures to encourage family and leisure cycling. The result was a 66% increase in cycling overall since 2001, with cycling more than doubling in Sustrans Bike It schools.<sup>70</sup>

## 3.3 Targeting the greatest potential for increasing cycling

Many PTE initiatives have focussed on specific types of trip, user groups or destinations where there is the greatest potential for change:

- **Workplaces.** Initiatives to increase cycling to work such as route planning tools and maps, bike buddy schemes and employer challenges were widely implemented in the PTE areas. Based on a small programme, SYPTE concluded that modest investment in workplace cycle training can increase cycling to work by 25%.
- **Schools.** Many PTE areas have cycling programmes in schools, most commonly Bikeability Cycle Training and Bike It. For example Bike It schools in Doncaster saw a fourfold average increase in levels of cycling to school and a 4.6% reduction in the mode share of car journeys. Increases in pupil and parent confidence relative to cycling were reported as a result of Bikeability training. In Merseyside this led to an increase in cycling for utility/transport (up 27%) and leisure (up 63%).
- **Universities.** Leeds and Nottingham are among those areas that have implemented university-based cycling schemes, including cycle hire, routes and behaviour change measures, to tackle problems of parking on campus and in student areas, focusing on a key transitional time when adult travel habits are being established. Nexus is considering extending the existing low cost University-based "ScratchBike" cycle scheme link with Metro stations. Centro has also just completed a feasibility study for a Birmingham University Cycle Hire Scheme
- **Public transport corridors.** A number of PTE areas had identified key corridors around which investment and programmes were being coordinated. In the West Midlands, a recent proposal included measures to increase walking and cycling to and along the corridor, particularly for short distance trips to key destinations including public transport interchanges, improvements to rail station facilities and access and smarter choices measures.<sup>71</sup> An interesting package of interventions, including cycle parking, traffic calming and bus priority measures focused on suburban high streets where there are clusters of services and bus stops is being considered by Merseytravel.
- **Access to employment.** There were many examples of schemes targeted at tackling social exclusion through promoting cycling as a low-cost means of transport. Evaluation of the Freewheeling scheme, which provides bikes in some of the most deprived wards of Liverpool, demonstrated evidence of improved health and access to opportunities.<sup>72</sup> Also in Liverpool, the Workwise Wheels improved access to employment and removed transport barriers through providing free bikes, achieving this outcome at less than half of the cost of providing travel passes or scooters.<sup>73</sup> In the West Midlands, Workwise staff provide advice, maps and leaflets on cycling and walking to unemployed people attending interviews and starting new jobs.

### 3.4 Strategic cycling measures

There are many good examples of strategic programmes to increase cycling across PTEs, through coordinating investment between cycling and wider transport measures, and with smarter choices initiatives:

- A number of PTE areas have specific monitoring reports focused on cycling. Annual **Greater Manchester** cycling progress report describes trends in the indicators used to assess changes in pedal cycle usage and reports progress on wide range of scheme implementation. The most recent reported an increase of 17% in annual average cycle flows between 2005 and 2009 and a continuing increase in cycle usage within Greater Manchester.<sup>74</sup>
- The **South Yorkshire Cycle Strategy**, developed in 2010, describes increasing cycling as one of the main means through which the LTP will deliver more sustainable and active modes of travel, tackle congestion and reduce CO<sub>2</sub> emissions. By coordinating district cycle plans it is intended to promote partnership working, improve coordination, maximise funding opportunities and ensure the efficiency of schemes. Three potential levels of investment are set out, the ideal level being £8.5m or just over £0.15 per head of population per annum in South Yorkshire.<sup>75</sup>

- Councils in **Greater Manchester** developed the Concise Pedestrian and Cycle Audit Tool (COPECAT) for local authorities to use to audit of highway and public transport schemes and ensure that pedestrian and cycle facilities are considered as part of these schemes.<sup>76</sup>
- In the **West Midlands**, cycling and walking considerations have been incorporated into the Gateway process. This is intended to create a more holistic approach, giving greater prominence of the modes within new projects and aiding integration.
- A number of PTEs have included substantial investment in cycling in previous funding bids, including the Sustainable Travel Cities (STC) and Transport Innovation Fund (TIF) programmes. Some have also indicated that cycling is likely to form a substantial element of LTP delivery plans and LSTF bids that are currently under development.

### 3.5 Partnership working

- **Partnerships with the community.** The Cycle Speke project includes community based infrastructure (e.g. parking and access improvements) and behavioural measures (e.g. rides, training), both revenue and capital, and is part funded through regeneration funding from the ERDF. Cycle counts found increases in cycling numbers.
- **Working with health bodies.** A number of cycling projects in the PTE areas are jointly delivered and/or funded by health bodies. For instance In Barnsley an NHS funded officer post is funded to develop active travel and strengthen the links between transport, planning and health. There is also evidence of the health benefits of cycling being used to attract contributions from public health bodies: for instance in the Centro Low Carbon Corridors proposal identified annual benefits of £4.3m from better personal health (via increased walking and cycling).
- **Partnership with the 3<sup>rd</sup> sector.** This exercise illustrated that many cycling interventions in PTE areas are delivered in partnership with 3<sup>rd</sup> sector bodies including Sustrans and CTC. A number of strategies refer Sustrans as a potential funder, highlighting the key role that the 3<sup>rd</sup> sector role has played in securing funding for cycling schemes from DfT and other sources such as the Lottery.

### 3.6 Conclusions on existing measures to increase cycling

Information gathered from PTE cycling programmes points to the following conclusions:

- **Increases in cycling have been achieved across the city regions over the past few years.** A very wide range of measures and approaches have been adopted, ranging from information sheets to new bridges. There is much good practice already in place and evidence of successful programmes of interventions, in many cases through coordinated investment in infrastructure and behaviour change.
- **Small scale, targeted programmes have been most effective in relative terms.** Measures targeting workplaces and schools have been particularly successful, for instance more than doubling cycling in Bike It schools. A number of programmes have targeted particular features of city region transport, for instance by providing secure cycle parking at light rail stations in South Yorkshire, university-based schemes in Tyne and Wear and Leeds, and cycle routes and bike schemes to improve access to employment in Merseyside and South Yorkshire.
- **Cycling investments are increasingly being coordinated at the city region level.** Although local authorities remain largely responsible for implementing highway improvements, there is increasing PTE-wide coordination of cycling as part of a wider transport strategy. A good example is the South Yorkshire Cycling Strategy. In general terms, cycling is emerging as a central theme of a number of third round Local Transport Plans and Local Sustainable Transport Fund bids.
- Given the success of targeted interventions in PTE areas and the positive trend in cycle use over the past 10 years, it is clear that a step change in investment levels could produce a significant boost in terms of cycling's mode share. **However, levels of investment in cycling**

**remain relatively low especially when compared with the very ambitious CDT programme.** In South Yorkshire, for example, its relatively ambitious local Cycling Strategy is based on an investment of 15p per head compared to the £10 per head spent on cycling in the CDTs.

- **Cross-sectoral partnerships can provide substantial opportunities for producing a step change in investment and cycling levels.** We identified a number of examples of best practice in partnership working, which have highlighted the extent to which cycling funding and delivery has been through national programmes (e.g. Cycling England), non-transport budgets (e.g. health, regeneration) and the third sector (e.g. Sustrans Connect2).

## 4 Modelling the potential impact of a step change in cycling in the city regions

This section of the report summarises the results of a series of modelling exercises intended to explore the potential impact of step changes in the delivery of interventions to support and promote cycling in the PTE areas. The rationale for this is to give an indication of the potential outcomes and value for money of measures to increase cycling, in order to support investment decision-making in the PTE areas. The full technical report on this exercise is included as annex 1.

### 4.1 Background

Earlier sections of this report suggest that substantial investments in cycling and wider sustainable transport measures - comparable to those delivered in the CDTs and STTs - could significantly increase the number of regular cyclists, cycling's mode share, reduce congestion levels, improve health and, more generally, deliver high value for money. From this work, we identified two approaches for further investigation: area-wide investment in the PTEs at the levels experienced in the CDTs and STTs; and interventions focused on cycling for specific journeys (commuting to work, access to railway stations, and travel to school).

In order to undertake this exercise, Sustrans conducted a review of evidence to identify data sets, both from intervention evaluation projects and relevant academic literature that could form the basis of modelling exercises.

- The first part of this study draws on evidence from the CDT and STT programmes. The results of these two studies are used to generate investment scenarios for PTE areas and estimate their value for money. We assume a level of investment of a similar order of magnitude on a per capita basis and a similar ratio of revenue to capital expenditure on a comparable suite of interventions to those implemented in the CDTs and STTs. This evidence exists only at the town-wide level, and does not disaggregate down to specific trip or destination scenarios.
- The second part of the study uses published evidence on the impact of interventions focused on specific journey types (commuting to work by bicycle, rail travel where the bicycle may be used as an access mode, and travel to school). We draw on a range of data sources to generate scenarios and to estimate the value for money associated with each scenario.

There are a number of difficulties in undertaking this type of modelling exercise, but we have made clear in the full technical report the underlying assumptions which form the basis for the modelling, any potential limitations, and the robustness and relative applicability of the results. The conclusions from each stage are indicative, and PTEs and individual local authorities will want to review them in the context of their particular setting. Sustrans would welcome the opportunity to support such exercises.

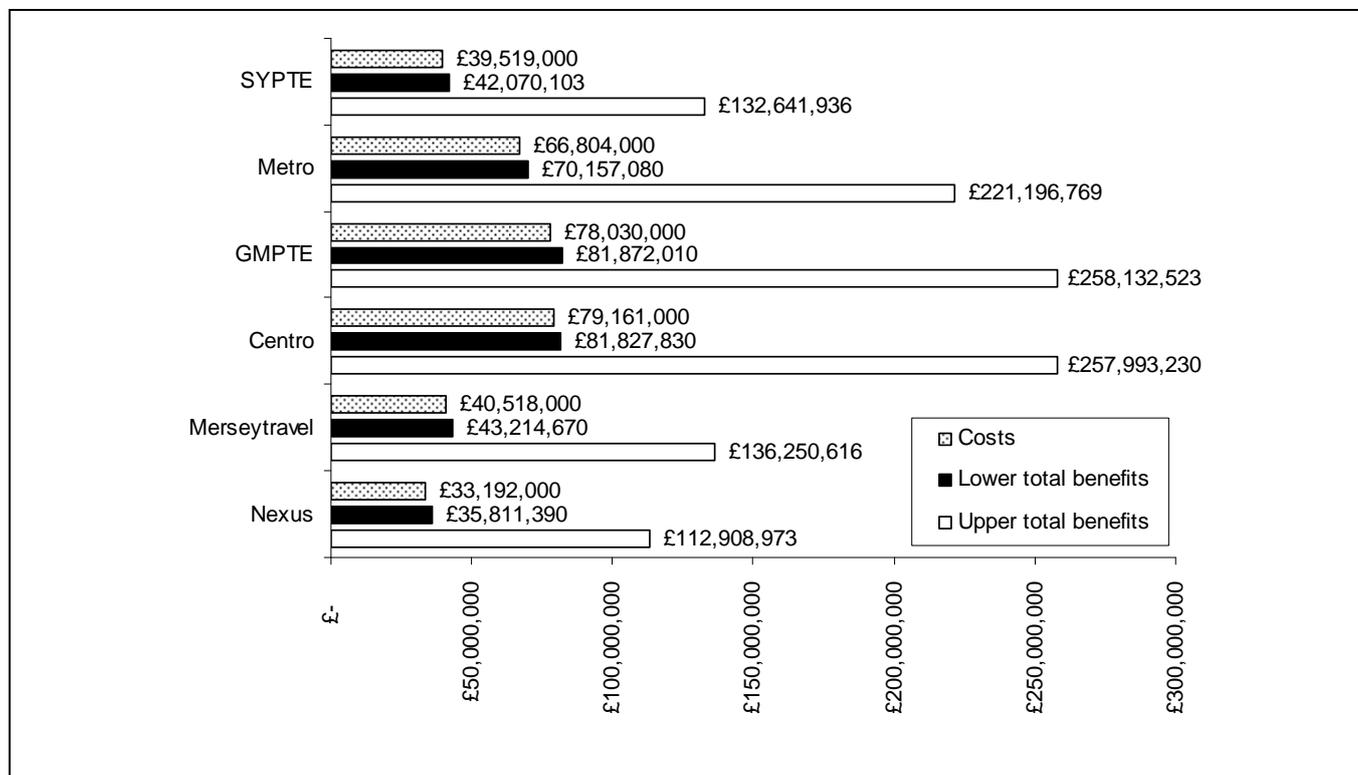
### 4.2 Area-wide interventions

The first part of this modelling study attempts to estimate the potential impact of substantial investment in area-wide cycling interventions (CDT scenario), or in sustainable transport modes more generally (STT model). Impacts are expressed as potential changes in numbers of cyclists, changes in numbers of trips and decongestion, carbon and health benefits.

The underlying assumption is that the same level of impact observed in CDTs and STTs can be achieved in PTE areas. Full descriptions of the CDT and STT interventions are provided in the annex, but it is assumed that both of these programmes represent sound investment, without discussion or exploration of either the counterfactual, or of other investment possibilities. The transferability of the likely impact of the intervention is considered by comparing CDT and STT areas with PTEs, using a range of socio-economic, demographic and transport variables.

## 4.2.1 CDT-type interventions

Our analysis suggests that the delivery of CDT type interventions in the PTE areas would generate substantial benefits in terms of numbers of new cyclists, decreased mortality, decongestion and carbon savings. Benefits to health as well as decongestion and carbon were valued over a ten year period for a lower, upper and best estimate of impact in the PTE areas.



Our best estimates of BCR values for the PTE areas reach up to 2.6:1, whilst calculations based on the 75<sup>th</sup> percentile of impacts in the CDTs indicate BCR values of up to 3.4:1. It should be noted that:

- Although the health benefit represents the majority of the benefit value in the scenarios generated, the carbon and congestion benefits calculated are substantial
- Secondly, this exercise is conducted using a pragmatic interpretation of the WebTAG guidance, which may underestimate some of the values that contribute to the benefit to cost ratios.

<b>Costs</b>	Assumed £30 per head of population over three years invested in similar packages of measures with similar ratios of infrastructure to soft measures as delivered in the CDTs
<b>Outcomes</b>	2.6%-4.2% of the adult population become 'new cyclists' Estimated increase in cycling mode share to 2.4% Annual benefits across PTE areas of reduced congestion of up to £18.3 million, reduced carbon emissions of up to £695,300 and annual health benefits of up to £62.1 million Potential to reduce NHS costs by £196 million over ten years
<b>Value for money</b>	Benefit to cost ratio of up to 3.2:1
<b>Strength of evidence</b>	●●●●●

## 4.2.2 STT-type interventions

Although the STTs did not have a specific focus on cycling, there were substantial increases in cycling trips over the course of the programme. Other outcomes included reductions in car driver trips and distance, decongestion, carbon savings, additional bus trips and modal shift. Without information on the proportion of the additional cycle trips observed in the STT areas being undertaken by those who are new to cycling, it is not possible to estimate health benefits, but published information on the STTs notes a benefit to cost ratio based on decongestion benefits alone of 4.5:1.

<b>Costs</b>	Assumed investment of the order of £11 per head of population per year over five years invested in similar packages of measures as delivered in the STTs
<b>Outcomes</b>	<p>Up to 16 million additional cycle trips per year</p> <p>Estimated increase of cycling mode share to 1.9%</p> <p>Reduction in car km of up to 617.6 million</p> <p>Decongestion benefit valued at up to £174.8 million</p> <p>Annual benefits of reduced carbon emissions savings of up to £6.6 million</p> <p>Up to 375,000 additional bus trips per year, with additional operating cost of up to £393,700 and additional revenue value of £450,00</p>
<b>Value for money</b>	Benefit to cost ratios not calculated due to more limited information on the potential impacts on health than available for the CDT model. Published estimates of value for money for the Sustainable Travel Towns based on decongestion benefits only are 4.5:1
<b>Strength of evidence</b>	●●●●●

## 4.3 Impact of interventions targeted at specific journey types

Whilst the evidence base is strong for the impact of area-wide interventions as a whole, it is not possible from the existing evidence to readily establish the individual impact of specific interventions when delivered as part of a wider package. This second part of the modelling exercise estimates the impact of investment in specific types of interventions.

### 4.3.1 Cycling to rail stations

We developed two types of scenarios, based on existing evidence of willingness to cycle if specific barriers are dealt with. As a benchmark, estimates were also made of the potential impact should levels of cycling to rail stations in PTE areas reach levels currently seen in the Netherlands. Our analysis identified a wide range of beneficial impacts arising from improving access and parking at railways stations and encouraging modal shift away from car use. It was not possible to calculate value for money for all types of interventions, but illustrative examples made using high level assumptions suggest positive BCRs.

<b>Costs</b>	Assumed costs of £200 per indoor cycle parking racks, annual maintenance costs of £10 per parking rack and replacement of 10% of parking racks after five year
<b>Outcomes</b>	<p>Up to 3,000 additional cycle accesses to stations of each day</p> <p>Cycle mode share to journeys to access train stations of up to 2.9%</p> <p>Decongestion benefits valued at up to £924,000 per year</p> <p>Carbon emission savings values at up to £35,000 per year</p>

<b>Value for money</b>	Based on cost assumptions described above, and decongestion and carbon emissions savings benefits discounted over ten years, the estimated benefit to cost ratios is 8.8:1. When health benefits are included then the BCR goes up to 12:1.
<b>Strength of evidence</b>	●●○○○

### 4.3.2 Cycling to school

Our analysis identified substantial benefits arising from targeted interventions to encourage modal shift for school journeys, which are summarised below.

<b>Costs</b>	Delivery of cycle training to school children costs approximately £45 per pupil Infrastructure interventions may cost from £50,000 - £300,000
<b>Outcomes</b>	Up to 2.5 million additional cycle accesses to school each year Cycle mode share to journeys to access schools of up to 1.6% Decongestion benefits valued at up to £1.3 million Carbon emission savings values at up to £51,000
<b>Value for money</b>	Uncertain for cited examples; estimated benefit cost ratios for infrastructure interventions to improve cycle access to school are in the region of 4:1
<b>Strength of evidence</b>	●●○○○

### 4.3.3 Cycling to work

This series of scenarios looks at the potential for mode shift for the commute to work based on distance from the work place and current mode of travel. We modelled three scenarios: improvements to routes; improved facilities at work (e.g. showers); and financial incentives.

<b>Costs</b>	£150,000 per mile of traffic free cycling route £200 per indoor cycle parking space
<b>Outcomes</b>	Over 37,000 additional commuters cycling to work following improvements to route infrastructure, increasing cycle mode share to on average 3.4% with decongestion benefits of up to £2.5 million and carbon emission savings of up to £96,000 Over 15,000 additional commuters cycling to work following improvements to workplace cycling facilities, increasing cycle mode share to on average 2.7% with decongestion benefits of up to £1 million and carbon emission savings of up to £39,000 Up to 259,000 additional commuters cycling to work following financial incentives to cycle to work, increasing cycle mode share to on average 10.7% with decongestion benefits of up to £17.5 million and carbon emission savings of up to £665,000
<b>Value for money</b>	Based on calculations including high level assumptions, we estimate the BCR to be 6:1 for cycle parking facilities, 5:1 for cycle route improvements and 1:1 for financial incentives to cycle to work.
<b>Strength of evidence</b>	●●○○○

## 4.4 Key findings from the modelling

Our analysis supports the following high level conclusions:

**Area-wide cycling interventions similar to those implemented in the Cycling Demonstration Towns could deliver substantial health, decongestion and carbon benefits, with benefit cost ratios as high as 3.2:1.** Delivery of CDT-type interventions could result in up to 307,000 new cyclists across the PTE areas, making 96 million additional cycling trips per year. Benefits accrued in relation to these new cyclists alone could total in the region of £716 million over a ten year period.

**Delivery of large scale programmes similar to those implemented in the Sustainable Travel Towns would also have a substantial impact on both cycling and wider travel patterns within the PTE areas.** STT-type interventions could generate 16 million additional cycling trips per year across the six PTE areas. Up to 71.6 million car trips per year could be replaced, with an associated decongestion and carbon savings value of up to £181.4 million.

**Interventions focused on specific types of journey, such as access to rail stations, schools and workplaces, could substantially increase cycling mode share for these trips.** For instance, interventions to overcome perceived barriers to cycling to school could result in some additional 2.5 million trips to school by cycle each year, with a benefit of up to £1.4 million.

**Interventions to improve cycle access could substantially reduce the pressure on parking and local road networks at suburban and commuter stations.** Interventions to encourage those who currently drive to the station but would like to cycle to do so by investing in improved facilities at suburban rail stations could replace up to 3,000 park and ride trips across the six PTE areas every day, with potential benefits of up to £959,000. A number of on-going projects, most notably by ATOC, TfL and the PTEs may shed new light on this issue over the coming year.

**Improvements to cycle routes, provision of cycling facilities in workplaces and financial incentives to cycle to work can all substantially increase cycling's mode share.** Across the six PTE areas, route improvements could increase cycling's mode share for work trips up to around 3.4% from its 2% average level, with annual benefits valued at up to £2.6 million. That represents almost a doubling of cycling trips. The provision of indoor parking and showers alone could increase the percentage cycling to work to 2.7%, and a £1 per day incentive to cycle to work could result in 2.9% cycling mode share, with annual benefits valued at around £1 million and £1.6 million, respectively

Further work is needed to investigate the impact of packages of measures aimed at key public transport and commuting corridors.

## 5 Recommendations on cycling interventions in PTE areas

### 5.1 Building on the evidence

The evidence contained in this report shows that some of the substantial potential benefits of a step change in cycling levels that could be achieved in the PTE areas have yet to be realised.

Our review of the existing evidence base suggests that:

- There is significant **potential for a step change in levels of cycling** in the city regions, particularly given that close to 50% of all journeys in the city regions are relatively local in nature.
- Increasing cycling can produce **substantial economic benefits** mainly through reduced congestion, lower carbon emissions, increasing physical activity and by improving access to employment, local facilities and public transport.
- Investment in **cycling can be highly cost-effective**, delivering benefits at least three times higher than the costs for a number of typical packages of interventions.

An initial investigation of PTE cycling initiatives shows that:

- Coordinated **programmes of measures** to increase cycling and change travel behaviour, targeted at key destinations, have achieved an increase in cycling in the city regions.
- However, **investment levels and the overall priority** given to increasing cycling levels have been relatively modest, in particular when set against recent DfT-funded national demonstration programmes.
- Existing best practice highlights the value of having a **coherent strategy and shared objectives** for increasing cycling in order to target resources where there is the greatest potential for change.

Modelling of area-wide and targeted interventions to increase cycling suggests that:

- A **step change in the scale of sustainable travel** programmes which include cycling as part of a wider package of behaviour change measures would have a substantial and beneficial impact on overall travel patterns within the PTE areas.
- Interventions aimed at **increasing cycling for specific types of journey**, such as access to public transport interchanges, schools and workplaces, can deliver a significant mode shift away from car use.
- Although measures to **improve access by cycle to public transport** could substantially reduce pressure on station parking and local road networks, there is as yet very limited evidence on the scope for improved station access on overall demand levels.

Sustrans' conclusion is that sustained investment in increasing cycling, as part of a wider package of smarter choices and other measures (e.g. integration with public transport and re-allocation of road space) could transform transport – particularly for local journeys – in the city regions. Our view is that the PTEs should set out now to achieve a step change in levels of cycling over the next decade by building on the positive trend observed in recent years.

In order to achieve this, cycling needs to be considered as an integral part of long term strategic and investment planning. Substantial increases in both investment levels and in the priority given to cycling will be needed. Evidence from elsewhere also shows that high levels of change require significant political leadership and commitment.

## 5.2 Prioritising investments in increasing cycling

Prioritising which interventions to use in a local area will ensure that expenditure is focused on schemes and interventions that achieve the highest levels of change and value for money. Although there are many interventions that can increase cycling levels, there are no “silver bullets”, and all the evidence points to the need for sustained and coordinated packages that include a wide range of measures.

Nevertheless, evidence from past initiatives can help to identify some priorities:

- Interventions must be based on the **local context, priorities and opportunities** to be successful.
- **Integrating interventions** will increase success. This is most often a mixture of infrastructure and ‘smarter choices’ projects. Individual projects that are not connected to wider plans have often only a limited or short lived success.
- Identifying which groups of people might be most likely to start cycling enables interventions to be **targeted where there is the greatest potential for change** and build on an existing appetite for change.
- **Targeting investment on local transport corridors** to schools, workplaces and rail stations can improve cycling levels and public transport use.

The evidence contained in this report suggests that substantial change could be achieved through investment in both targeted and area-wide measures. Although different circumstances in the PTEs mean that it is difficult to generalise, broadly indicative examples of what might be delivered and achieved in a PTE area over 5 years at three levels of investment are summarised below.

- **Step change (£10m/year)**. This would enable delivery of a comprehensive area-wide programme of hard and soft measures to increase cycling and promote behaviour change. This could deliver a measureable modal shift away from car use towards cycling, walking and public transport use, and substantial economic, carbon and health benefits.
- **Boost (£2m/year)**. This would enable a substantial programme of cycling measures targeted at major transport corridors and key destinations in town/city centres. This could achieve substantial increases in cycling levels in these priority areas, improving access to public transport, employment and essential services.
- **Maintain (£0.5 million/year)**. This would enable continued investment in programmes targeted on increasing cycling where there is the greatest potential for change. This could for example double levels of cycling to schools and workplaces, delivering substantial peak time decongestion benefits

## 5.3 Summary of recommendations for PTEs

Our work supports the following recommendations:

The city regions should **continue to invest in high impact “quick wins”**, focusing on the high potential for change that exists in relation to schools, workplaces, key corridors, and access to public transport. The evidence in this report shows that such small scale, low cost, high impact measures already deliver very high levels of change and excellent value for money.

**Substantial long term area-wide investment** is needed to produce a visible mode shift away from the car, and deliver sizeable congestion, carbon reduction and health-related benefits in the city regions. This would have a significant beneficial impact on overall travel patterns in the city regions increasing cycling, walking and use of public transport.

Effective **coordination of interventions between key partners** – PTEs, Districts, health, education and third sector bodies – is critical in order to maximise the benefits of investment. One important area is to ensure that smarter choices and infrastructure interventions are jointly developed and targeted. As PCTs public health duties are passed to local authorities, and given the substantial

health benefits of cycling measures, the benefits of coordinating programmes and investment with public health are substantial.

New evidence on access to rail stations highlights the need to **invest in cycle access alongside public transport improvements**. Given the relatively high cost effectiveness of cycling interventions it is likely that this could strengthen the business case for public transport schemes at a relatively low additional cost.

Although there is a strong emerging body of evidence on the impact of recent cycling interventions there are a number of areas where it is still difficult to predict what a step change in investment could bring. We have identified the impact of cycle access on rail demand as one area for further work over the coming year. However, large changes in cycling over several decades in countries like Denmark and the Netherlands suggest that there may be a step change in travel behaviour, perceptions and social conventions once cycling levels reach a certain level. **Sustained monitoring and data collection programmes will therefore be critical in supporting the development of this policy area.**

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