



# **Cycling in bus lanes**

**Prepared for Charging and Local Transport Division,  
Department for Transport**

S Reid and N Guthrie

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## Executive Summary

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Cyclists in the UK are usually permitted to use with-flow bus lanes, and are often permitted to use other bus priority facilities, including contra-flow lanes. Bus lanes are endorsed in the National Cycling Strategy as a particularly useful facility for cyclists and it is recommended that they should be designed for both groups of users. The Government wishes to encourage cycling, and it appears that wide bus lanes offer a valuable facility to cyclists. This is possibly owing to the fact that they are usually direct, continuous and do not require cyclists to give way at junctions with minor roads and private accesses as cycle tracks often do.

This study, commissioned by the Charging and Local Transport Division of the Department for Transport, was undertaken with the following objectives.

- To provide guidance on the practical options for increasing safety and convenience of cyclists in bus priority schemes.
- To obtain a better understanding of cyclist and bus interaction in bus lanes.

Surveys were carried out at six sites in Edinburgh, Hull, Derby and London. Information was gathered through direct interviews with cyclists using bus lanes, and observation surveys, which included bus-based and stationary observers. Utility cyclists were particularly well represented amongst those interviewed. The most common journey purposes were commuting, shopping and trips to educational establishments.

The principal finding was that cycling in bus lanes was very popular with cyclists, compared with cycling in the typical traffic conditions of the area. The main benefits appeared to be increases in perceived levels of safety and reductions in journey times. Cyclists in all the bus lanes surveyed agreed that conditions were safer than they would be on a similar road without a bus lane. Furthermore, cyclists at some of the sites considered conditions to be safer than cycling in a cycle lane. Some conflict between cyclists and buses was found, although only a minority of cyclists experienced this frequently.

Generally speaking, the wider the bus lane, the better it appeared to be for cyclists, as long as it did not have a detrimental effect on the cycling conditions of the traffic lane in the opposite direction (i.e. reduce its width to 3.5m or less). It was also found that, where width permits, advisory cycle lanes should be provided inside bus lanes to further improve safety and journey times.

Contra-flow bus lanes were considered very useful to cyclists, although safety was a greater concern, but they were still considered safer than a similar road without a bus lane. Other factors influencing the perceived safety of lanes with different widths were bus flows, hours of operation, degree of enforcement and the condition of the bus lane.

On the negative side, bus drivers and cyclists appeared to have a generally low opinion of each other and it is recommended that efforts be made to address their mutual

concerns. This may be achieved by reducing the opportunity for conflict, which appeared to be directly related to the narrowness of the bus lane, and by educating both classes of users as to each other's needs.



# 1 Introduction

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## 1.1 Objectives

TRL was commissioned by the Charging and Local Transport Division of the Department for Transport (DfT) to carry out research into cyclists and bus priority. The main objectives were:

- To provide guidance on the practical options available for increasing the safety and convenience for cyclists in bus priority schemes.
- To obtain a better understanding of cyclist and bus interaction in bus lanes.

## 1.2 Background

Cyclists in the UK are normally permitted to use with-flow bus lanes (signs indicating that pedal cycles are excluded from bus lanes require special authorisation). They are also usually permitted to use other bus priority facilities, including contra-flow bus lanes, unless there are specific reasons why it would be unsafe.

There are two main reasons for allowing cycle-users to use bus priority measures:

- It would be less safe to force cyclists to cycle outside the bus lane (where cyclists would have moving motor traffic on both sides and would have to turn across the path of buses when making left-hand turns). Buses are not usually as fast as other motorised traffic, although at times, they exceed what cyclists might consider a desirable speed.
- Cycles are a sustainable mode of transport and are therefore being encouraged.

This latter point was emphasised in the Government's 1998 Transport White Paper, which called for redistribution of road space to buses, cycles and pedestrians by measures such as bus priority. Bus lanes were endorsed in the National Cycling Strategy as a particularly useful facility for cyclists and it was recommended that they should be designed for both groups of users.

During the 1990s, there was a substantial increase in investment in bus priority measures, such as the London Bus Priority Network. The concept of bus priority was also widened to include priority for a range of other users, such as cyclists, taxis, and sometimes goods vehicles and high occupancy vehicles. The users are determined by the relevant highway authority and regulated by a Traffic Regulation Order.

## 1.3 Current guidance

Current policy and practical guidance is briefly summarised below.

### 1.3.1 Local Transport Note 1/97: Keeping Buses Moving.

The DfT set out its policy and technical guidance on bus priority measures in Local Transport Note 1/97: Keeping Buses Moving (DETR, 1997).

### *With-flow bus lanes*

Pedal cyclists are allowed to use with-flow bus lanes because they are more likely to be involved in an accident if required to ride in the main traffic lane with buses passing on their nearside. The Government encourages authorities to make special provision for cyclists and the presumption is that cyclists will be allowed in the bus lane unless there is a very good reason for excluding them. Signs indicating that pedal cycles are excluded from bus lanes require special authorisation. Where roads are wide enough, the bus lane should be 4.25 metres wide, with a minimum preferred width of 4 metres. This allows buses to overtake cyclists safely and reduces the likelihood of interference from vehicles in the adjacent lane. The minimum recommended width is 3 metres. However, buses are unable to pass cyclists unless they pull out into the non-priority lane and, in some cases, it may not be possible to do this. With this in mind, bus lanes should be laid at the preferred width of 4 metres, or more wherever possible. The minimum width can cater for up to 120 buses an hour without obvious constraint, but the provision of a double width lane may ease bus flow at bus stops.

### *Contra-flow lanes*

Contra-flow bus lanes should be at least 3 metres wide and separated from the rest of the carriageway either by a solid white line, or physically by a continuous upstand, or series of long islands. Physical segregation is costly to install and may be impractical in an urban situation. Separation by white line supplemented by occasional traffic islands and/or solid white lines with hatching between them is usually preferable, therefore. As for with-flow bus lanes, the recommended width where cyclists are allowed to use the bus lane is 4.25 metres with a preferred minimum of 4 metres.

As the Local Transport Note 1/97 'Keeping Buses Moving' states: 'Research has shown that pedal cyclists using contraflow bus lanes can be at risk, mainly from conflicts with other traffic at the beginning and end of the lane. However, over lengths of bus lane between junctions, accident risk tends to be low. If at all possible, safe junctions should be provided at the entry and exit points so that cyclists can use the contraflow lane. This is especially relevant where alternative routes are considered to be more dangerous for cyclists, or where they involve a substantial detour' (DETR, 1997).

### *1.3.2 Cycle-Friendly Infrastructure - Guidelines for planning and design*

The main UK source of guidance on providing for cyclists is published by the Institution of Highways & Transportation: Cycle-Friendly Infrastructure - Guidelines for Planning and Design (IHT *et al.*, 1996). These guidelines state that bus/cycle lanes can improve safety and convenience for cyclists in town centres and on main urban roads. They should give access to areas closed to general traffic and physically distance cyclists from cars and lorries. It may be easier to justify a shared bus/cycle lane than a lane exclusively dedicated to either buses or cycles.

Three metres width (the minimum width for a bus lane) is insufficient to permit a bus to overtake a cyclist without leaving the lane. Where the carriageway is wide enough, a 4.25 to 4.60m lane should be provided. In such cases, an advisory cycle lane may be provided within the bus lane. The benefit of peak-hour-only lanes depends on the degree of parking and loading within the lane. Contra-flow bus lanes can be of greater value to cyclists and it is recommended that cyclists be permitted to use them wherever possible. A minimum lane width of 4m is needed (4.25m preferred) to enable buses to overtake cyclists without leaving the lane, although for short stretches of bus lane (or where bus and cycle flows are low) a 3m lane may be acceptable. On contra-flow links between junctions there is no specific accident risk to cyclists, but care must be taken in the design of the beginnings and ends of the bus/cycle lane because cyclists can be endangered by motorists who are not expecting to encounter them.

### 1.3.3 London Cycle Network Design Manual

The London Cycle Network Design Manual (LCN Steering Group, 1998) states that, whenever possible, cyclists should be allowed to use bus lanes, bus-only streets and other restricted routes which are open to buses. This is considered to add significantly to cyclists' safety and sense of security. The more widespread introduction of measures to help buses under the London Bus Priority Network programme is to be welcomed. Taxis are also allowed to use many bus lanes, but this makes the lanes less attractive to cyclists. Allowing motorcyclists to use bus lanes is not recommended in London because of the speed differentials.

A normal bus lane width of 3.0m is acceptable unless there is sufficient carriageway width to provide a 4.0m or wider lane. If the width is below 4m, the use of the lane by cyclists may force buses to follow the cyclists in the lane for short distances, or to move slightly out of the lane to overtake the cyclists. The increased safety to cyclists using the lane, however, outweighs this small disadvantage to bus passengers. Where possible the lane should be wide enough to accommodate overtaking, particularly where bus flows are heavy. If the bus lane is 4.0m or more, an advisory cycle lane can be marked within the bus lane (3.0m for the bus and 1.0m or more for the cycle lane).

The LCN Manual points to the fact that 'The London Bus Priority Network standards recommend a minimum width of 3.0m for the opposing flow lane'. This leaves no space for an HGV or bus to overtake a cycle, however. The LCN Manual therefore recommends 3.5m as the minimum width for the opposing flow lane, with 4.0m being the preferred width.

Cyclists should be able to use contra-flow bus lanes wherever possible. The main points for consideration are as follows:

- Whether cyclists can enter and leave the lane safely (special entry treatment or signals can reduce the possibility of conflict).

- The danger of a bus leaving the confines of a contra-flow lane to overtake a cyclist. Sufficient width (4.0m or more) should be allowed for safe overtaking. Nevertheless, for short stretches of contra-flow bus lane, or where the number of buses or cyclists is low, a 3.0m lane may be acceptable.

### 1.3.4 National Cycle Network Guidelines and Practical Details

The National Cycle Network guidelines (Ove Arup and Sustrans, 1997) state that the use of busy bus lanes as part of the National Cycle Network is not ideal for young or novice riders. The guidelines support cycling in part-time bus lanes where the exclusion is in force for 12 hours or more. A bus lane width of 4.25m to 4.6m is preferred, but where bus stops are not within the bus lane, or where bus flows are low, the width of the lane may be reduced to 3m for short lengths. An advisory cycle lane may be marked within the bus lane if this is thought appropriate. This may be particularly useful where the bus lane is more heavily trafficked or, for example, where other vehicle types have been permitted to use it.

### 1.3.5 TRL track trials of passing space (car to kerb)

TRL (Nicholson, 1978) carried out track trials of cars overtaking cyclists to establish a passing distance that was considered safe. It should be noted that the cars in this study were travelling quite slowly (20mph). The distances given are from the nearside edge of the car to the side of the road. The results were as follows:

- 0.95m was considered unsafe by 44%.
- 1.20m was considered unsafe by 20%.
- 1.45m was considered unsafe by 0%.

Joshi *et al.* (1993) showed that cyclists feel more threatened by buses than they do by cars, probably because of their greater size. Also, in reality, motor vehicles often pass cyclists at considerably more than 20 mph. The acceptable passing distance for overtaking buses on the highway is, therefore, likely to be greater than the acceptable distance of overtaking cars at 20 mph in a track trial. In our judgement, the passing distances described above would need to be increased by at least 0.25m to take account of the increased threat posed by a bus. It is probable that this would need to be further increased in situations where buses would be expected to travel at greater than 30mph, although calibrating the relationship between speed and necessary width lies outside the scope of this study. Further research would be necessary to allow reliable recommendations to be made in this respect.

If 0.25m is added to the figures obtained in the research by TRL (Nicholson 1978), and a further 2.50m is added to allow for the maximum width of a bus, the following figures for acceptability of bus lanes of varying widths are obtained:

- 4.20m might be considered safe by 100%.
- 3.95m might be considered safe by 80%.
- 3.70m might be considered safe by 56%.

## 1.4 Casualty record

To give context to this project it is appropriate to consider the casualty record of cyclists in bus lanes. Information regarding road casualties is collected by the Police using the STATS19 form and is consolidated into a database managed by TRL. The STATS19 database was interrogated for data on incidents resulting in pedal cyclist casualties that occurred between cyclists and buses and cyclists and cars. Recent changes to the STATS19 form made it possible to identify those crashes involving cyclists that have occurred within bus lanes, although at the time of writing, those data were only available for 1999. These figures are set out in Table 1. Table 2 contains similar information for pedal cyclist casualties sustained in crashes involving cars.

The numbers given are absolute casualty numbers. There was insufficient information available about the level of cycling activity taking place in bus lanes, as opposed to on the general carriageway, to establish the rates of cycle casualties in these locations. Therefore it is

**Table 1 Pedal cyclist casualties involving at least one PSV, 1999**

Link or junction	Bus lane or none	Cyclist casualties by severity			Cyclist casualties, all severities
		Fatal	Serious	Slight	
<b>2 vehicles: cyclist and PSV</b>					
Link	No bus lane	1	28	144	173
	Bus lane	0	0	7	7
Junction	No bus lane	1	35	241	277
	Bus lane	0	1	7	8
<b>&gt;2 vehicles: including cyclist and PSV</b>					
Link	No bus lane	0	4	15	19
	Bus lane	0	0	1	1
Junction	No bus lane	1	4	21	26
	Bus lane	0	3	0	3
Total		3	75	436	514

**Table 2 Pedal cyclist casualties involving at least one car, 1999**

Link or junction	Bus lane or none	Cyclist casualties by severity			Cyclist casualties, all severities
		Fatal	Serious	Slight	
<b>2 vehicles: cyclist and car</b>					
Link	No bus lane	40	615	3852	4507
	Bus lane	0	1	21	22
Junction	No bus lane	50	1559	12042	13651
	Bus lane	0	5	68	73
<b>&gt; 2 vehicles: including cyclist and car</b>					
Link	No bus lane	11	47	234	292
	Bus lane	0	0	1	1
Junction	No bus lane	6	70	322	398
	Bus Lane	0	2	2	4
Total		107	2299	16542	18948

impossible to comment reliably on the relative safety of cyclists using bus lanes, rather than the general carriageway. Furthermore, the lack of time-series data means that this ‘snapshot’ of the situation should be treated with caution.

Nevertheless, the data available imply that bus lanes lead to safer conditions for cyclists as far as conflict with PSVs is concerned. Figures are given separately for two-vehicle, and ‘more-than-two-vehicle’ collisions. The ‘more-than-two-vehicle’ collisions are difficult to interpret – for example, if a motorcycle hit a bus and then a cyclist, the cyclist casualty would appear in the data-set relating to >2 vehicles including cyclist and PSV. The two-vehicle data might be considered less ambiguous than the other set of data, and therefore, these comments focus on that data set.

It is clear from the figures that in 1999, the numbers of pedal cyclist casualties sustained in bus lanes in crashes involving PSVs were significantly lower than those sustained where bus lanes were not present. This applied to both casualties at links and junctions. In 1999, there were no fatal pedal cyclist casualties in bus lanes resulting from crashes with PSVs, on links or at junctions, and the majority of casualties were graded as slight.

Comparing the two tables indicates that more cyclists were injured in bus lanes, on both links and at junctions, by cars than by PSVs. However, as noted above, the lack of exposure data makes it impossible to establish the relative rates of involvement of cars and buses in pedal cyclist casualties in bus lanes.

It is reasonable to conclude that the available data do not indicate a particularly high level of cyclist casualties within bus lanes. This may have implications for the interpretation of words such as ‘danger’ and ‘risk’ in this context, particularly where they arise in comments by users. Whilst the high level of under-reporting of cyclist casualties is well known, the available casualty data suggest that where danger is considered a factor, it may reflect the intimidation and discomfort experienced by cycle users, rather than indicating a particular casualty problem at any given site. Nevertheless, such an effect should not be ignored since an intimidating environment is likely to render the facility unuseable for significant numbers of pedal cyclists, particularly those such as the young or inexperienced, who would most benefit from a safe facility.

## 2 Survey methods

A range of different observation survey approaches were used in order to provide a greater understanding of the interactions between bicycles and buses in bus lanes. Interview surveys were also carried out with cyclists using bus lanes at five different locations. The methods used at each location are explained in the following sections.

### 2.1 Static observation

Static observations were recorded at several locations (Westminster and Hull) to provide information about interaction between bicycles and buses. Two methods were adopted.

- Observation of buses and bicycles in the bus lane from the footway to assess the nature of interaction between buses and cyclists (i.e. any action taken by either vehicle, and any delay experienced as a result of the interaction).
- Observation of the outside line demarcating the bus lane to see whether, during an interaction between buses and bicycles, either vehicle was forced out of the bus lane into the main traffic lane.

In Hull, a stationary observer was positioned on a junction with a clear view of the outside of the bus lane, for a stretch of approximately 200m. From that point, the observer could note whether, during interaction between buses and bicycles, either vehicle strayed partially or completely into the all-traffic lane. Photographs were also taken at different sections of the bus lane to show the effect of different widths of bus lane on interaction between bicycles and buses or parked vehicles.

## 2.2 Fixed video camera surveys

With the co-operation of the London Traffic Control and Signals Unit (TCSU), Closed Circuit TV recordings were obtained of two sites in London where there were large numbers of cyclists and buses sharing a bus lane. The recordings were analysed to see how many interactions took place involving bicycles and buses, and to estimate the delay to buses during these interactions.

## 2.3 Bus lane enforcement cameras

Data were obtained from the bus lane enforcement cameras managed by the Traffic Director for London's Westminster office. The cameras were mounted on the front of selected buses and gave two views: a general view of the road ahead and another close-up view to permit the identification of car number plates. Although these views revealed some interactions between bikes and buses, the approach was not pursued, as the only information that could be effectively gleaned was the delay to buses, and more information on the width of each stretch of bus lane was needed to permit a meaningful analysis. London Transport produced an annual report listing all bus priority measures in London but, although this contained information on the length and direction of bus lanes, operational hours and vehicles permitted to use the lane, there was no information on lane width. Many local authorities do not provide this information either, so bus lane widths often need to be measured manually. This makes using bus lane enforcement cameras an inefficient means of assessing bus and bicycle interactions.

## 2.4 On-bus interaction surveys

### 2.4.1 Edinburgh

Bus-cyclist interactions were monitored on Edinburgh Greenways (a bus priority system using strictly-enforced bus lanes, priority signals, improved shelters and passenger information systems) and conventional bus lanes on a 9 km route in the city during May and June 1999. A TRL observer

travelled at the front of the top deck of the bus and recorded interactions between buses and cyclists. The objective was to achieve at least 100 interactions between buses and cyclists which, in practice, meant a 40-hour survey period. An 'interaction' was defined as any encounter between a bus and a cyclist. It did not, in itself, imply any conflict, danger, delay or other inconvenience. A typical interaction would be a bus overtaking a cyclist. Observers estimated the delay to vehicles during an interaction and estimated the 'satisfaction' level from the perspective of the bus driver and the cyclist (based on the observer's judgement).

The survey periods were organised to cover both the morning and evening peak traffic flows and some complete days. This gave both a daily distribution of interactions and enabled the required sample number to be achieved efficiently. Traffic counts were carried out during the morning and evening peaks to determine the traffic volumes and vehicle types.

The bus route surveyed was the Lothian Regional Transport route 65 between Heriot-Watt University, Riccarton, and Princes Street. The journey took approximately 25 minutes by bus. (This route was selected on the basis of the number of interactions recorded during a pilot study of potential survey routes.)

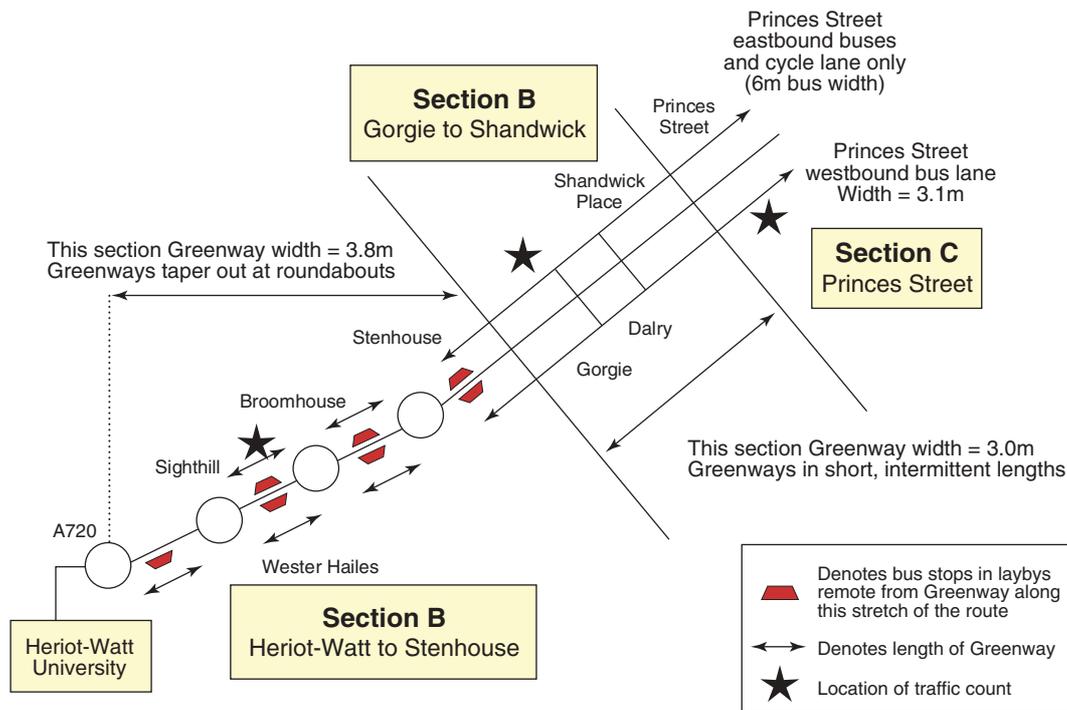
The route was approximately 9 km long and comprised three sections identified as A, B and C, according to Greenway/bus lane widths as shown in Figure 1. The Edinburgh Greenways provide priority routes for buses, taxis and cyclists by limiting access to other traffic at peak times. Greenways are coloured green and are marked by a double or single red line at the edge. In general, the Greenways and bus lanes were nearly continuous in the survey areas, except in section B, which had short intermittent lengths of Greenway. The three sections were as follows:

- *Section A:* 3.8m width Greenway in both directions between Heriot-Watt University and Stenhouse within a 7.3m wide, 2 lane dual carriageway, i.e. one general traffic lane in each direction (approximate length—4km).
- *Section B:* 3.1m width Greenway between Gorgie and Shandwick Place towards Edinburgh, and a 1m wide cycle lane outbound from Edinburgh City within a 7.3m 2 lane single carriageway, i.e. one general traffic lane in each direction (approximate length—4km).
- *Section C:* 3.1m width conventional bus lane plus 2 lanes for general traffic on the westbound carriageway of Princes Street. The eastbound direction was closed to traffic except for buses, taxis and cyclists (i.e. 6m wide bus lane with an additional 1m wide cycle lane - approximate length—0.8km).

The boundaries of these sections corresponded to changes in the surrounding environment. Section A was located in a suburban area, where traffic was generally freely flowing. Roundabouts were used at the main junctions and bus stop lay-bys were provided.

Sections B and C were located in urban areas containing signalised junctions where traffic frequently queued. Buses were required to stop in the main carriageway or Greenway.

The surveyed routes did not include any contra-flow lanes or one-way systems.



**Figure 1** Schematic diagram of the survey route showing the section division

#### 2.4.2 Hull

In Hull, the surveys were carried out in the Holderness Road/Witham bus lanes, which varied in width from 2.9m to 3.65m.

Surveys were carried out by two observers seated on board the bus, one at the front and one at the back of the bus. The observer at the front of the bus (usually seated on the top floor of a double-decker bus) had a clear view of the road ahead and could assess the following actions and/or delays:

- Delays to the bus (if any) as it approached the cyclist.
- Delays to the cyclist (if any) as the bus approached.
- Bus position whilst overtaking a cyclist (i.e. whether it stayed in the bus lane, partially entered the traffic lane, or moved completely into the traffic lane).
- Cyclist position as the bus approached (whether (s)he moved over to one side, or continued cycling as before).
- Traffic conditions in main traffic lane (free flow, fully congested or partially congested).

The observer at the back of the bus could see the actions of cyclists as they approached the bus (e.g. when the bus lane was congested) and record the following information:

- Delays to the cyclist if stopped behind the bus.
- Whether the cyclist overtook, undertook, or waited behind the bus.
- Whether cyclists stayed in the bus lane when undertaking or overtaking, or whether they entered the main traffic lane, or cycled on the footway.

#### 2.5 Interview surveys

A sample of 232 cyclists was asked to stop for interview at five bus lane sites with different conditions (i.e. with-flow/

contra-flow, different widths and with/without advisory cycle lanes). Respondents were asked for general journey information, their comments on the specific bus lane in which they were questioned, and their opinions on bus lanes in general.

#### 2.6 Bus driver survey

To obtain a more detailed understanding of the relationship between cyclists and buses in bus lanes, a small survey of the views of bus drivers was also conducted. The participating drivers were based in Reading and their views were sought on general issues relating to sharing bus lanes with cyclists.

### 3 Results

#### 3.1 Edinburgh

##### 3.1.1 Interactions

An 'interaction' is defined here as any encounter between a bus and a cyclist. It does not necessarily imply any conflict, danger, delay or other inconvenience. A typical interaction would be a bus overtaking a cyclist.

Over the four days, 35 bus journeys were surveyed on the 9km route, amounting to 315 bus km. In total, 104 bus-cyclist interactions were recorded, giving an average of three interactions per bus journey, or 0.33 interactions per bus per km. Each bus journey took approximately 25 minutes, totalling 875 minutes of on-board survey, with an average interaction rate of approximately one interaction per bus every eight minutes. It should be noted that these rates are per bus and not per cyclist.

Sixty-one interactions were recorded in Edinburgh survey section A, and 43 in sections B and C combined.

### 3.1.2 Traffic flows

There were approximately 40 buses per peak hour one-way in section A, 70 in section B and 130 in section C, and approximately 10 cyclists per hour one-way in each section. Further details of peak hour traffic flows are shown in Table 3.

### 3.1.3 Daily distribution of interactions

Figure 2 shows the distribution of the 57 interactions observed over two entire-day surveys. Interactions were more frequent during the morning peak than during the evening peak and the rest of the day. This effect is probably attributable to fluctuations in cycle and bus traffic, particularly the University cycle traffic, whereby most students arrived on site by 0915 but left at different times, thus spreading their return trips over the course of the day.

Weather has a significant effect on daily cycle flows – they increase in warm weather and decrease when it rains (Emmerson *et al.*, 1998). The effect of the weather on bus-cycle interactions due to changes in cycle flows is clear from Figure 2. More interactions were recorded on the sunny day of the survey, and fewer on the day on which it rained.

### 3.1.4 Relationship between lane widths and delays

Figures 3 to 6 present the results of the first 43 interactions

in 3.1m and 3.8m wide bus lanes. In these figures, each interaction for a 3.1m lane is shown adjacent to an interaction for a 3.8m lane.

Taking both lane widths together, fewer than one in four interactions resulted in the buses being noticeably slowed. This amounted to approximately one slight delay per two buses, or one slight delay per 18 bus-km. Nearly all of these were in the 3.1m lanes.

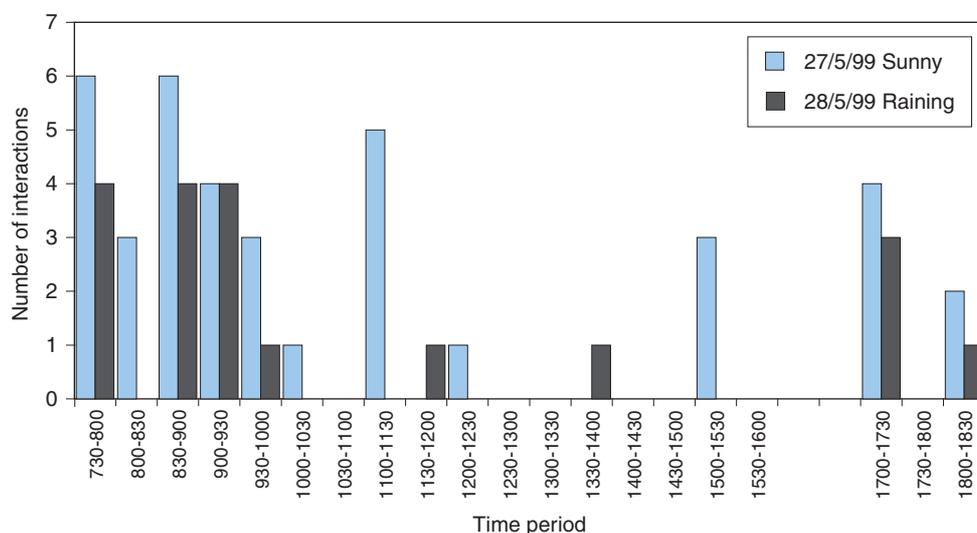
Figures 3 and 4 show the frequency of delays experienced by the bus due to interaction with cyclists, according to lane widths. In 3.8m wide lanes, buses were rarely delayed. Cyclists tended to pull to the kerb and buses overtook without entering the main traffic flow. Where delays occurred, they were due to buses waiting behind cyclists when approaching bus stops or roundabouts. In 3.1m wide lanes, however, delays were more common. In order to pass cyclists, buses had to enter the adjacent lane, causing delays if they had to wait for a gap in the general traffic flow.

A similar pattern is shown in Figure 4 where the speed adopted by the bus during the interaction is shown. Likewise, the reduction in speed was much greater in the 3.1m lanes.

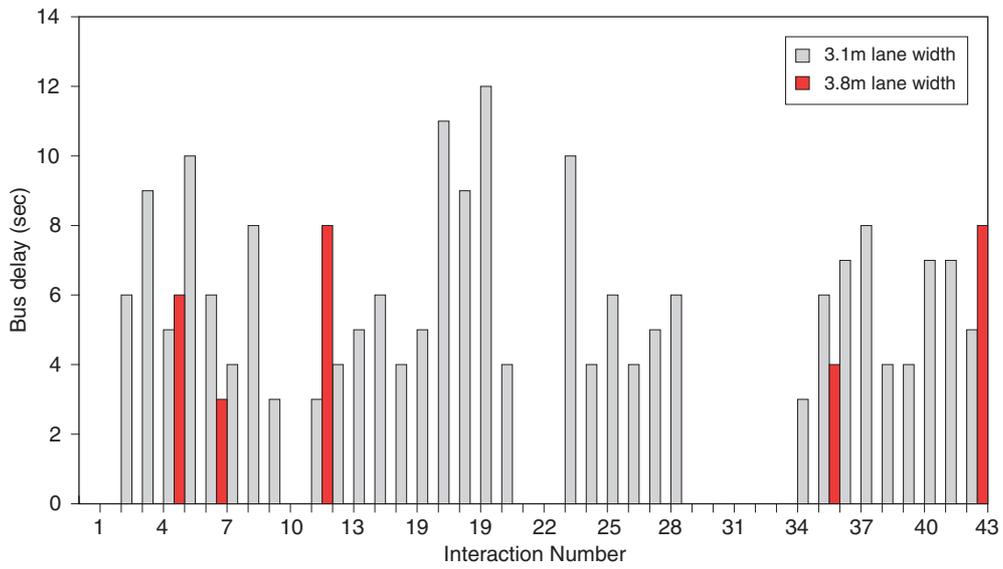
Figure 5 shows that generally, cyclists were not delayed by buses. Where delays were observed, these largely involved cyclists moving out of the path of buses by dismounting and pulling onto the footway, or waiting for a gap to join the main traffic flow to overtake a bus at a bus stop.

**Table 3 Directional traffic flows (vehicles/hour) at survey locations in Edinburgh**

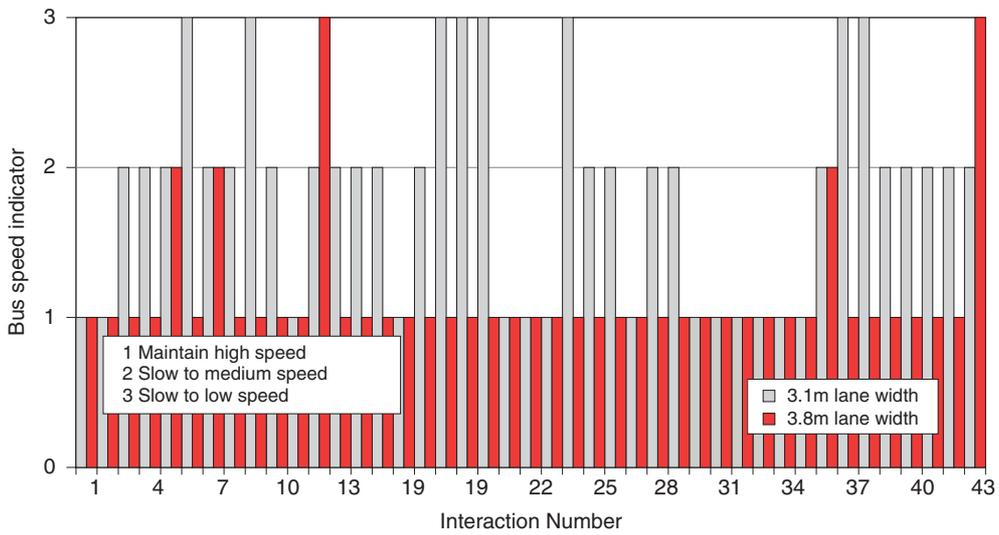
Peak period	Direction of travel	Section A: Sighthill			Section B: Gorgie			Section C: Princes St		
		Cars and LGV	Other GVs (OGV)	Bus	Cars and LGV	OGV	Bus	Cars and LGV	OGV	Bus
AM Wed.	Eastbound	788	16	40	456	0	72	468	0	124
	Westbound	892	24	48	492	0	84	0	0	112
PM Thurs.	Eastbound	1004	44	36	436	0	60	768	8	140
	Westbound	1208	32	36	608	0	68	0	0	128



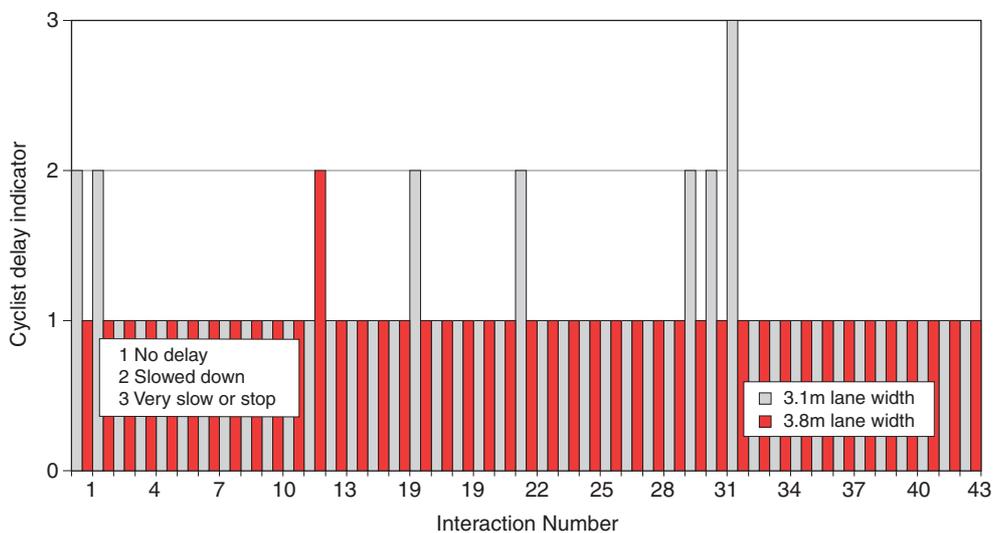
**Figure 2** Daily distribution of bus-cyclist interactions



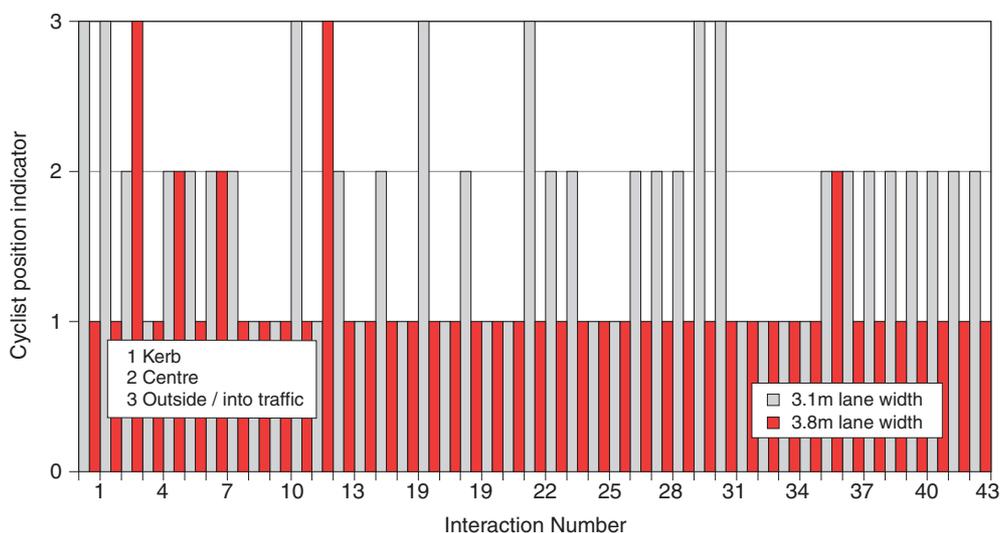
**Figure 3** Bus delay in seconds owing to interactions  
*(Where no value for an interaction number is shown, no delay was recorded.)*



**Figure 4** Reduction in bus speed owing to interactions



**Figure 5** Cyclist delay owing to interactions



**Figure 6** Position of cyclists on Greenway/bus lane during interactions

Of all the interactions observed, only three caused any delay to the main traffic flow. One was owing to a bus overtaking a cyclist and apparently pulling out without due care and attention, and two were owing to cars giving way to a bus manoeuvre. All took place in the 3.1m sections of the route.

### 3.1.5 Lane width and cyclist position on Greenway/bus lanes

Figure 6 shows that in the wider lanes, when interacting with a bus, cyclists tended to adopt a position close to the kerb. By contrast, in the narrower bus lanes, many cyclists adopted a more central lane position (perhaps to prevent unsafe overtaking, or to force the bus into the adjacent lane when overtaking and give the cyclist more space). The areas with narrow bus lanes also appeared more congested with street furniture and proximity of buildings to the carriageway. The cyclists might have perceived that more space between their path and the kerb was required.

### 3.1.6 Satisfaction of parties concerned

The estimated satisfaction ratings for all parties were averaged over the interactions occurring in each lane width and the average values are shown in Table 4. Satisfaction level 1 is the highest and 3, the lowest.

Generally the arrangement appeared reasonably satisfactory for all parties, although the bus manoeuvres needed to be restricted in the narrow sections of the route, where it might be necessary to wait to overtake cyclists or join the main traffic flow. Bus drivers generally appeared

**Table 4** Average satisfaction of road users during interactions

Lane width	Cyclist	Bus	Other road users
3.1m	1	2	1
3.8m	1	1	1

to treat cyclists with due consideration and cyclists were not observed being forced into making any hazardous manoeuvres. From observations alone, however, it was not possible to know whether the cyclists were really satisfied with the situation, either in the narrow bus lanes where buses could not overtake, or in the wider lanes where buses were able to overtake.

### 3.1.7 Edinburgh summary

- 104 bus-cyclist interactions were observed on Greenways and bus lanes in Edinburgh, on 35 bus journeys, over 15 hours of bus travel.
- The width of Greenways and conventional bus lanes appeared to have an effect on the extent of delays to buses. Buses were delayed much less in the 3.8m lanes, than in the 3.1m lanes.
- A small number of delays to cyclists were observed, and all but one occurred in the 3.1m bus lanes.

## 3.2 Hull

### 3.2.1 Mobile observations - rear

Fifteen interactions between buses and cyclists were recorded during a single midweek morning and evening peak hour survey. Of the total, one involved a cyclist undertaking, four involved cyclists overtaking (in the traffic lane) and ten involved cyclists waiting behind the bus until it started moving again. The longest observed delay to a cyclist was 12 seconds and this occurred in a bus lane with a width of 3.6m. Most delays were experienced in the 3.5m wide lane, although they also occurred in the 2.9m and the 3.65m stretches. These results indicate that in all lane widths observed (i.e. up to 3.65m), stationary buses can delay cyclists. With the exception of one cyclist (who undertook a bus), those observed were apparently unable to pass the buses without leaving the bus lane and entering the main traffic lane.

### 3.2.2 Front of bus observer results

Observers surveying at the front of the bus recorded 25 interactions between buses and cyclists. Eight of these interactions caused the buses to be delayed for a period of between 3 and 30 seconds in bus lanes with widths of 3.65m, 3.6m and 2.9m. The traffic flow in the main lane was congested in only four of the interactions, so for most of the time, the bus was able to pass without delay. In each of the four instances when the main traffic lane was congested, the bus was delayed by the cyclist and could not, therefore, overtake in the bus lane (2.9m to 3.65m).

### 3.2.3 Stationary observers

A stationary observer was placed at the end of the Witham bus lane, which was 3.6m wide. Fifteen interactions between buses and bicycles were recorded from this position. All involved a bus overtaking a bicycle, but six interactions involved the bus moving partially into the traffic lane, while in the other nine, the bus remained in the bus lane.

### 3.2.4 Other observations

Cyclists were observed in different sections of the Hull bus lane. Photography was used to record the effect of various widths on bus-bicycle interactions and those between bicycles and other vehicles parked in the bus lane. Two indicative examples are included below (see Plates 1 and 2).

The lanes surveyed using this method were divided into two categories: wide (3.5m-3.65m) and narrow (2.85m-2.9m). The following observations were made.

In the narrow lanes:

- Two cyclists were observed travelling into Hull in the morning peak period in Holderness Road, where the bus lane was 2.9m wide. Riding in the bus lane, the cyclists were apparently benefiting from a clear route into the city centre, which compared favourably with the congestion faced by motorists in the adjacent all-traffic lane.
- In the same road closer to Hull, where the bus lane width was also 2.9m, cyclists were observed behind two stationary buses (Plate 1), where there did not appear to be enough width to pass.
- The limited width of this section forced cyclists into the main traffic lane as they overtook a parked lorry outside operational hours
- One cyclist overtaking a parked van in the narrow section managed to stay within the confines of the bus lane.

In the wider lanes:

- In a section that was 3.65m wide, a cyclist overtook a parked lorry whilst staying in the bus lane.
- In a 3.6m wide stretch, where a cyclist was overtaken by a bus, the bus entered the free flowing all-traffic lane to give the cyclist ample clearance (Plate 2).
- In a 3.5m wide section including a parked bus there appeared to be enough space for a cyclist to overtake within the bus lane, although if the bus had been moving and overtaking the cyclist, it seemed unlikely that it would have been able to remain entirely within the lane.



Plate 1 Cyclists wait behind a bus in Holderness Road, Hull



Plate 2 A bus gives good clearance to a cyclist, Hull

- In the same 3.5m bus lane outside operational hours, cyclists still enjoyed the benefit of the bus lane owing to a lack of parked vehicles in the bus lane, and moving vehicles keeping to the main traffic lane.

These observations revealed the practical implications of different lane widths on cycling in bus lanes. The other survey methods showed that the widest bus lane in Hull (3.65m) was not sufficiently wide to enable buses to overtake cyclists comfortably within the lane. The other observations indicated that the intermediate widths between 3.65m and 2.9m had safety implications for cyclists, particularly regarding the overtaking of parked vehicles during non-operational hours.

Plate 2 also shows an experimental scheme in Hull that allowed motorcycles to use bus lanes. The extent to which users and their perceptions of safety embrace the presence of motorcycles in such schemes is explored further in Section 4.

### 3.2.5 Hull summary

Comprehensively surveying bus and bicycle interaction required a substantial flow of buses and cyclists and a congested main traffic lane, so that buses could be observed attempting to overtake within the confines of the bus lane. There were heavy flows of bicycles and buses in Hull, but

the majority of observed interactions took place when the main traffic lane was free flowing, so there were fewer examples of buses having to overtake cyclists within the bus lane. However, the results from the three surveys detailed above showed that even the widest lane (3.65m) was not sufficiently wide for buses to overtake cyclists comfortably.

### 3.3 London TCSU video footage

With the co-operation of the London Traffic Control and Signals Unit, it was possible to examine closed circuit television (CCTV) recordings of two sites in London where cyclists made use of bus lanes. These were in Wandsworth on the A3 travelling downhill towards Putney, and also at the Elephant and Castle roundabout in Southwark.

As shown in Table 5, however, even where relatively high flows of both cyclists and buses used the same facility, the opportunities to observe incidents over a 100 metre section of bus lane were few. In cases where buses and cyclists use the same route over an extended distance, however, overtaking manoeuvres will be more likely.

**Table 5 Frequency of interaction between bus and bicycle**

Location	Total bus flow (morning peak 2 hour period)	Total cyclist flow	Number of times a bus was delayed by a cyclist	Number of times a bus overtook a bicycle
	Wandsworth	78	70	0
Elephant & Castle	186	190	20	2

In the CCTV recordings studied, only 20 out of 264 buses (about 7.5%) experienced any delays at those locations as a result of cyclists using the lane.

It was impossible, as noted above, to calculate the width of the lanes from the video films supplied. It would be instructive to compare the widths at the point of delays in Elephant and Castle with those in Wandsworth, where no delays were experienced. It seems highly likely that there is an inverse relationship between bus lane widths and delays caused by cyclists. If that is the case, wider bus lanes may well provide a solution at sites where cycle-use seems to result in unacceptable delays to bus traffic.

Finally, no estimate was made in this project of the relative frequency of delays caused by cyclists as opposed to those caused by illegal parking by other road users, or other causes. Anecdotal evidence suggests that illegal parking may be a far more frequent and serious source of disruption to bus services than cyclists, but further work would be necessary to establish whether this is, in fact, the case.

## 4 Interview surveys – detailed results by site

As described in Section 2.5, the study sites were selected to represent a range of widths and to include one contra-flow bus lane (Derby). In addition to the investigations

described in Section 3, an interview survey of users was also conducted at each of the sites. This chapter describes the results in detail for each survey site, and then compares the results between sites. A summary of the results of these interview surveys is presented in Table 6 and discussed further in Section 5. The survey questionnaire is reproduced in Appendix A.

Approximately one third of cyclists passing the interviewers agreed to take part in the survey, which resulted in a total of two hundred and thirty two cyclists being interviewed at the five sites. The most heavily represented age group was 25-39, which accounted for forty seven per cent of all respondents. Twenty per cent were under 25 and thirty three per cent were 40 or over. Seventy nine per cent of respondents were male and twenty one per cent were female.

### *Journey details*

Most cyclists were travelling to, or from work, or education on journeys that they made several times a week. A majority said they would follow this route regardless of whether it had a bus lane or not, although nearly a quarter gave the bus lane as one of the reasons for their route selection.

### *The bus lane*

Almost all respondents considered the bus lane easy to use and a small majority said that it was because it kept the traffic well away. Nevertheless, about half thought the bus lane was still too narrow. Despite that, over three quarters of respondents thought that conditions in the bus lane were quite safe, and nearly all thought that cycling in the bus lane was safer than similar roads without bus lanes. A majority thought that cycling in the bus lane was quicker, too.

### *Buses in the bus lane*

About three-quarters of respondents thought the buses in the bus lane travelled at about the right speed and a majority disagreed that the presence of cyclists delayed the buses. Opinions were divided on whether bus drivers were sufficiently courteous or considerate to cyclists.

### *Cars and motorbikes*

Most respondents agreed that cars parked in the bus lane were a problem, and over half agreed that they would be concerned if motorbikes were allowed to use the bus lane.

## Site results

### 4.1 London Westminster Bridge (4m)

Seventy seven interviews (see plate 3) took place on the Westminster Bridge southbound with-flow bus lane, which was 4m wide with a 1m wide advisory cycle lane marked within it.

#### 4.1.1 Journey details

Two thirds of the cyclists interviewed (65%) were on their way to or from work. The next largest group (10%) was

**Table 6 Interview surveys – overview of results**

Question	Survey location				
	London West -minster Bridge	Edinburgh Gorgie Road	Edinburgh Calder Road	London Hammer -smith Road	Derby
<b>Width of bus lane</b>	4m	3.1m	3.8m	4.2m	3.8m
<b>No of interviewees</b>	77	29	35	72	19
<b>Journey purpose</b>					
Commuting	65%	55%	60%	68%	32%
Leisure	10%	–	–	7%	–
Education	9%	24%	40%	6%	–
Shopping	7%	17%	–	8%	32%
Business	7%	–	–	4%	–
Other	–	–	–	–	36%
<b>Journey distance</b>					
< 5 miles	37.3%	44.8%	28.6%	46.4%	57.9%
5-<10 miles	41.4%	48.3%	54.3%	31.9%	26.3%
10 miles and over	21.3%	6.9%	17.1%	21.7%	15.8%
<b>Journey frequency</b>					
> once a week	81.8%	89.7%	97.1%	90.3%	89.5%
Once a week or less	18.2%	10.3%	2.9%	9.7%	10.5%
<b>Has lane affected route choice</b>					
Yes, main reason	4%	14%	11%	1%	21%
Yes, part reason	20%	24%	43%	13%	42%
No	76%	62%	46%	86%	37%
<b>Is lane easy to use</b>					
Yes	81%	97%	97%	86%	90%
No	19%	3%	3%	14%	10%
<b>Lane width</b>					
Too wide	3%	3%	3%	9%	–
Right width	87%	45%	77%	76%	47%
Little too narrow	10%	41%	17%	17%	47%
Much too narrow	–	10%	3%	3%	5%
<b>Bus speed</b>					
Much too fast	8%	7%	3%	4%	11%
Little too fast	31%	21%	14%	33%	15%
Right speed	59%	72%	83%	62%	68%
Little too slow	1%	–	–	2%	5%
<b>Safety of conditions for cyclists</b>					
Very safe	5%	3%	11%	7%	5%
Quite safe	55%	80%	60%	50%	42%
Neither	22%	10%	20%	26%	42%
Quite dangerous	17%	7%	9%	17%	11%
Very dangerous	1%	–	–	–	–

Continued ....

cycling for leisure or exercise purposes, 9% were cycling to or from school/college, 7% were on shopping trips, and a further 7% were on business trips. Thirty seven per cent of respondents were cycling a distance of less than 5 miles, with 21% cycling 10 miles and over. Most respondents were regular cyclists, with 81.8% cycling more than once a week. Only 18.2% of cyclists cycled once a week or less. When respondents were asked whether the bus lane had affected their choice of route, 4% said that it was the main reason for their route selection and 16% said it was one of the reasons. However, 81% said they would have gone that way whether

**Table 6 (Continued) Interview surveys – overview of results**

Question	Survey location				
	London West -minster Bridge	Edinburgh Gorgie Road	Edinburgh Calder Road	London Hammer -smith Road	Derby
<b>Speed of use compared to similar roads without bus lanes</b>					
Much quicker	34%	41%	43%	40%	32%
Little quicker	40%	41%	23%	46%	32%
The same	26%	17%	29%	14%	37%
Little slower	–	–	6%	–	–
Much slower	–	–	–	–	–
<b>Cycling in bus lane is safer than cycling in roads with cycle lanes</b>					
Strongly agree	5%	14%	17%	16%	–
Agree	36%	10%	23%	21%	16%
Neither	32%	38%	37%	26%	58%
Disagree	17%	28%	17%	–	16%
Strongly disagree	11%	10%	6%	19%	11%
<b>Bus lane is wide enough to be used safely by cyclists and buses</b>					
Strongly agree	36%	14%	20%	28%	26%
Agree	34%	24%	37%	38%	5%
Neither	18%	10%	23%	15%	26%
Disagree	4%	38%	20%	18%	32%
Strongly disagree	8%	14%	–	1%	11%
<b>Cyclists in the bus lane cause delays to buses</b>					
Strongly agree	3%	3%	3%	1%	5%
Agree	21%	21%	20%	12%	11%
Neither	10%	10%	26%	7%	5%
Disagree	28%	28%	14%	33%	16%
Strongly disagree	38%	38%	37%	46%	63%
<b>Bus drivers are considerate to cyclists</b>					
Strongly agree	12%	14%	–	4%	5%
Agree	26%	35%	11%	40%	16%
Neither	27%	28%	54%	28%	32%
Disagree	16%	14%	29%	13%	11%
Strongly disagree	19%	10%	6%	15%	37%
<b>Cars parked in this bus lane are a problem</b>					
Strongly agree	72%	69%	22%	47%	61%
Agree	8%	10%	6%	17%	6%
Neither	11%	7%	–	10%	–
Disagree	3%	14%	19%	11%	–
Strongly disagree	7%	–	53%	16%	33%
<b>Would be concerned if motorbikes were allowed to use this lane</b>					
Strongly agree	55%	41%	51%	35%	58%
Agree	19%	14%	20%	17%	11%
Neither	4%	14%	3%	19%	16%
Disagree	16%	17%	20%	21%	11%
Strongly disagree	7%	14%	6%	8%	5%

there was a bus lane or not (perhaps not surprisingly because the bus lane was on a bridge over the Thames, and therefore, route selection was relatively constrained.)

#### 4.1.2 The bus lane

Eighty one per cent considered the bus lane to be easy to use. Respondents were asked why they found the bus lane easy (or otherwise) to use and 39 comments were recorded; of which, 72% were positive and 28% were negative. About a quarter (26%) said it was easy to use

because it was free from congestion and gave them a clear run through, while 18% said it was because it kept cars well away from them, 15% said because it was big and wide, 8% because it was clearly marked, and one person said it was easy to use because it had a cycle lane inside it. The most frequent complaint (21% of comments) was about parked vehicles (cars on a Sunday and ice cream vans and coaches on all days). Other complaints mentioned the behaviour of bus and taxi drivers.

When asked about the lane width, 87% thought it was about right, 10% found it a little too narrow, and 3% found it a little too wide. Conditions in the bus lane were considered quite safe by more than half of respondents (55%) and very safe by a further 5%. However, 16% said they were quite dangerous and 1%, very dangerous (perhaps owing to parked vehicles or the bus stop at the end of the bridge).

When respondents were asked for comments regarding safety in the bus lane, 59 comments were received, of which, 73% were positive and 27% negative. Nearly half (47%) said that the bus lane was fairly safe or better than nothing, while 15% said that it was excellent/fine/offered double protection etc. However, 10% said that it didn't help, 8% said that parked vehicles affected safety and 7% said they were scared of buses. Others commented that it was unsafe at the entry point, there was a pedestrian danger, and the cycle lane should be segregated.

The majority of respondents (86%) found cycling in the bus lane to be safer than cycling on similar roads without bus lanes – 51% said it was a lot safer, while only 3% said it was more dangerous. Almost three quarters (74%) considered cycling in the bus lane to be quicker (34% said a lot quicker) than cycling on a similar road without a bus lane, while 26% said it was about the same, and no one thought it slower.

Forty one per cent of respondents agreed (5% strongly) that cycling in the bus lane was safer than cycling on a similar road with just a cycle lane, but 28% disagreed (32% neither agreed nor disagreed).

A majority (70%) agreed that the bus lane was wide enough to be used safely by buses and bikes together, and only 12% disagreed.

#### **4.1.3 Buses in the bus lane**

Nearly a third (31%) thought that buses travelled a little too fast, although 57% said they travelled at about the right speed. Some cyclists (11%) agreed that cyclists caused delays to buses, but 88% disagreed (63% strongly). When respondents were asked whether they thought bus drivers were considerate towards cyclists, 27% expressed no feelings either way and the remainder were fairly evenly split between agreement (38%) and disagreement (35%).

#### **4.1.4 Cars and motorbikes**

A majority of respondents strongly agreed that parked cars were a problem (72%), with only 3% disagreeing. A similar proportion (73%) also agreed that they would be concerned if motorbikes were allowed to use the bus lane, but 23% disagreed.

#### **4.1.5 Advisory cycle lane inside the bus lane**

Respondents at the Westminster Bridge bus lane were asked specific questions about the advisory cycle lane inside the bus lane. Most (84%) thought the cycle lane inside the bus lane made cycling safer (including 47% who thought it made it a lot safer) while 16% said safety remained about the same, and no-one said it made cycling more dangerous. Nearly two thirds (61%) said that it made cycling journeys quicker (including 21% who said a lot quicker) while 39% said it had no effect on the speed of journeys, but no-one said it made journeys slower.

When respondents were asked for their views on putting cycle lanes inside bus lanes, 45 comments were recorded, of which, 44% were generally positive e.g., 'Prefer them to bus lanes on their own', 'Should be more of them', 'Good idea', 'Improvement' 'The more the better/merrier'. Eighteen per cent mentioned the problems encountered at bus stops ('Dodgy at bus stops', 'Always a problem with bus stops', 'Bus stops in cycle lanes are dangerous for cyclists' etc.) and 7% said they were either unsafe or not a good idea. Other comments included, 'They should use coloured tarmac', 'They are confusing to cyclists', 'They raise motorist awareness' and 'Don't know whether bus/cycle is allowed in the other lane'.

### **4.2 Edinburgh Gorgie Road (3.1m)**

Twenty nine cyclists were interviewed at the Gorgie Road bus lane in Edinburgh.

#### **4.2.1 Journey details**

Over half of the respondents (55%) were making a commuter journey, with education (24%) the next most frequent journey purpose. Nearly two thirds (62%) were making a trip of less than five miles.

#### **4.2.2 The bus lane**

Nearly all respondents found the lane easy to use (97%) although opinions of its width were divided with 45% believing it was about the right width and 41% believing it was a little too narrow. While 80% believed the bus lane to be 'quite safe', only 28% agreed or strongly agreed that cycling in bus lanes was safer than cycling on roads with cycle lanes. Thirty eight per cent of respondents believed that neither alternative was safer than the other, but a majority agreed that using bus lanes was quicker than on similar roads without lanes.

#### **4.2.3 Buses in the bus lanes**

Nearly three quarters (72%) believed that buses travelled at about the right speed, although 21% thought they travelled a little too fast. The majority of respondents did not agree that cyclists caused delays to buses, but just under a quarter (23%) thought that they did. Approximately half (49%) agreed that bus drivers were considerate to cyclists.

#### **4.2.4 Cars and motorbikes**

More than two thirds (69%) of respondents strongly agreed that cars parked in the bus lane were a problem,

with only 14% disagreeing. Forty one per cent strongly agreed and 14% agreed that they would be concerned if motorbikes were allowed to use the bus lane, but almost a third (31%) disagreed.

### **4.3 Edinburgh Calder Road (3.8m)**

Thirty-five cyclists were interviewed at this site.

#### **4.3.1 Journey details**

The respondents were making regular journeys to or from places of work or education and most journeys were shorter than ten miles. About half gave the bus lane as one of the reasons for their choice of route, although a similar proportion would have travelled that way in any case.

#### **4.3.2 The bus lane**

Almost all respondents thought the bus lane was easy to use. About half attributed this to the exclusion of most traffic and the other main reasons were increased space and an absence of parked cars. Nearly all respondents thought that cycling in the bus lane was safer than cycling on similar roads without bus lanes, and two thirds thought it was quicker.

About three-quarters thought the bus lane was about the right width and that cycling conditions within it were safe. Other comments indicated that some cyclists thought safety could be improved by complete segregation, by better enforcement and by re-designing the beginning and end of the lane, which could be difficult for cyclists.

#### **4.3.3 Buses in the bus lane**

Most respondents agreed that buses in the bus lane travelled at about the right speed, although nearly a quarter agreed that buses were delayed by cyclists. Two thirds thought that bus drivers were considerate towards cyclists.

#### **4.3.4 Cars and motorbikes**

Over a quarter of respondents considered parked cars in the bus lane to be a problem, and about three-quarters said that they would be concerned if motorbikes were allowed to use the bus lane.

### **4.4 London Hammersmith Road (4.2m)**

Seventy-two cyclists were interviewed at the Hammersmith Road bus lane.

#### **4.4.1 Journey details**

The respondents were questioned during the morning peak in late October. Most were travelling to, or from, work and were cycling a distance of five miles or less.

#### **4.4.2 The bus lane**

Most respondents found the bus lane easy to use, mainly because it was about the right width and kept traffic well away. Over half thought cycling conditions were safer than cycling on similar roads without bus lanes and a majority thought it was quicker, too.

#### **4.4.3 Buses in the bus lane**

Over a third of respondents said that buses travelled too fast, and over a quarter found bus drivers inconsiderate towards cyclists. Most cyclists did not think that they delayed the buses.

#### **4.4.4 Cars and motorbikes**

Nearly two thirds of respondents agreed that cars parked in that bus lane were a problem. About half agreed (most of them strongly) that they would be concerned if motorbikes were allowed to use the bus lane.

### **4.5 Derby, Wardwick Road contra-flow bus lane (3.8m)**

Despite Wardwick Road being a main road leading into the city centre, cycle flows were lower than expected and only 19 cyclists were interviewed in the 3.8m contra-flow bus lane.

#### **4.5.1 Journey details**

About a third (32%) of cyclists interviewed were shopping and a further third (32%) were travelling to or from work. The remainder were on 'personal business', leisure trips or meeting friends. More than half (58%) were cycling a distance of up to 5 miles with 16% cycling 10 miles and over. Most of respondents (90%) cycled more than once a week, while 42% said that the bus lane was a reason for the route they had taken.

#### **4.5.2 The bus lane**

Most respondents (90%) thought the bus lane was easy to use. The main reason given was that there was less traffic (64% of comments) e.g., 'Hassle free from cars', 'Less congestion'. Other positive comments included, 'Not many buses' and 'More direct route'. The only negative comment received was 'There are problems joining and leaving the lane'.

Nearly half (47%) thought that it was about the right width, but another 47% found it a little too narrow and the remaining 5% said it was much too narrow. Conditions in the bus lane were considered to be at least quite safe by nearly half (47%), and most of the remainder (42%) thought they were neither safe nor dangerous, with just 11% considering them to be quite dangerous.

Comments on safety were mainly that it was a little safer than without a bus lane. Other more specific comments included 'Fine apart from the way buses pull away from stops' and 'Clearer marking required'.

All the cyclists interviewed considered cycling in the bus lane to be safer than cycling in similar roads without bus lanes (58% a lot safer and 42% a little safer). Nearly two thirds (63%) thought that cycling was quicker in the bus lane than on normal roads (32% a little quicker, 32% much quicker), while the remaining 37% thought it took about the same time. More people disagreed than agreed (26% to 16%) that cycling in that bus lane was safer than cycling in a similar road with just a cycle lane, but more than half of the respondents (58%) had no strong opinion.

When asked whether the bus lane was wide enough to be used by buses and cyclists, more respondents disagreed (42%) than agreed (32%), while 26% had no strong opinion.

#### **4.5.3 Buses in the bus lane**

About two thirds of the respondents (68%) thought that buses travelled at about the right speed in the bus lane, although 26% thought they travelled too fast. Over three quarters of respondents (79%) disagreed that cycling in the bus lane caused delays to buses, while just 16% of respondents agreed and 5% had no strong opinion. Nearly half of the cyclists (47%) disagreed (mostly strongly) that bus drivers were considerate towards cyclists in that bus lane, while 21% agreed and 32% neither agreed nor disagreed.

#### **4.5.4 Cars and motorbikes**

Two thirds of respondents (67%) agreed, most of them strongly, that parked cars were a problem in that bus lane, but the remaining third strongly disagreed. About two thirds (68%) also agreed, mostly strongly, that they would be concerned if motorbikes were allowed to use the bus lane, while the remainder were equally divided between disagreement and no strong opinion.

#### **4.5.5 Contra-flow bus lanes**

Respondents were asked three open ended questions specifically about cycling in contra-flow bus lanes. Firstly, how did it compare to a with-flow bus lane? Seventeen comments were received, of which, only eight clearly stated which they preferred. Six said they preferred the contra-flow bus lane e.g., 'Feel safer', 'A lot better', while others said 'More dangerous', 'Similar if others take care' and 'Safer but danger of pedestrians not looking for you'.

Respondents were also asked whether there were any problems where the contra-flow lane started and finished. Over half the respondents said that there were. Five people specifically mentioned the entry points and three mentioned the exits, while a further comment was that, 'It would help to have a green block at the Curzon Street Right Turn'.

## **5 Interview surveys – summary of overall results**

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### **5.1 Comparisons between sites**

The sites were selected to give a broad range of bus lanes in terms of width, direction of flow and the inclusion of an advisory cycle lane. The different sites are now compared to consider how the respondents rated them in different categories. The sample sizes at Edinburgh were twenty nine for the narrow lane and thirty five for the wide lane. Seventy two people were interviewed in Hammersmith and seventy seven in Westminster. In Derby, however, only nineteen people were interviewed (owing to rainy weather and fairly low levels of cycling).

### **5.2 Influence on choice of route**

Cyclists were asked whether the bus lane had influenced their choice of route. The responses varied from site to site, with the lowest percentage (13%) saying that it had at Hammersmith and the highest (43%) in the wide Edinburgh

bus lane. The percentages of respondents for whom the bus lane had been the main reason for route selection were lower (from 1% at Hammersmith to 21% at Derby).

### **5.3 Ease of use**

The majority of cyclists at all sites agreed that the lanes were 'easy to use', although the percentages ranged from 81% on Westminster Bridge to 97% at both Edinburgh sites. Most of the complaints about the Westminster Bridge bus lane were about vehicles parked in the bus lane (ice cream vans and coaches in particular). The positive comments in the Edinburgh bus lanes included, 'Bus drivers are trained in defensive driving' and that the lanes were, 'Clear of traffic and clearly marked'. It was also mentioned that cars were not parked in those bus lanes.

### **5.4 Width of bus lane**

When the respondents were asked whether the bus lanes were the right width, responses from site to site varied from less than half (45%) of those interviewed agreeing at Gorgie Road, Edinburgh to 87% on Westminster Bridge. These ratings reflected the widths of the lanes, as Edinburgh had the narrowest bus lane (3.1m) and Westminster Bridge the second widest (4m) and included an advisory cycle lane. Similarly, only 10% thought the Westminster Lane was too narrow, but 51% thought the Gorgie Road lane too narrow. A similar percentage of respondents (52%) thought the Derby contra-flow lane (3.8 metres wide) was too narrow which emphasised the importance of lane width at contra-flow sites. Generally, very few people thought the bus lanes were too wide although this ranged from none in Derby to 9% in Hammersmith, which, at 4.2m, was the widest lane.

Cyclists were also asked if they agreed that the bus lanes were wide enough to be shared safely with buses. Those agreeing ranged from 70% in the Westminster bus lane to 31% in the Derby contra-flow. The respondents in the two Edinburgh bus lanes showed differences with 57% agreeing in the wide lane and 38% agreeing in the narrow lane. Only in the narrow Edinburgh lane did a majority of respondents (52%) disagree that the lane was wide enough to be shared safely (compared with 20% in the wider Edinburgh lane).

### **5.5 Behaviour of bus drivers**

The majority of respondents (60% to 83%) at all sites agreed that buses travelled at 'About the right speed', although this response was most frequent at the wide Edinburgh site and lowest on Westminster Bridge. Between 21% (Derby) and 66% (Edinburgh wide) of respondents agreed that buses were considerate towards cyclists, but those who disagreed were a minority (from 6% Edinburgh wide to 48% Derby) at all sites.

The majority of cyclists (51% to 88%) across the sites disagreed that they caused delays to buses in the bus lane. Fewest agreed in Westminster (8%) and most agreed in the Edinburgh sites (23% and 24%). The width and the presence of an advisory cycle lane on Westminster Bridge were likely to reduce delays to buses caused by cyclists. It

was surprising, though, that in Edinburgh, the percentages of cyclists agreeing were comparable in both lanes, despite the differences in width. This was compounded by the lower bus flows in the wider of the two lanes.

### 5.6 Safety of cycling in the bus lane

With the exception of Derby (47%), a majority of all respondents considered conditions to be safe for cyclists in the bus lane, from 57% at Hammersmith to 83% in Edinburgh (narrow). It was surprising that the narrower bus lane in Edinburgh was considered safer than the wide one (71%) although more cyclists in the wide lane thought it was very safe (11%) than in the narrow lane (3%).

The great majority of all respondents considered cycling in the bus lane to be safer than cycling in a similar road without a bus lane: percentages ranged from 85% (Hammersmith and Westminster) to 100% in Derby. The wider bus lane in Edinburgh received a slightly better rating than the narrow one in this category (97% to 93%). The majority of all respondents (51% to 72%) also considered the bus lanes to be 'a lot safer' than similar roads.

Cyclists were asked if they considered the bus lane to be safer than a similar road with a cycle lane. The Westminster site was slightly misleading in this context because it already contained an advisory cycle lane. However, in the three wider bus lanes, more people agreed that a bus lane was safer than a cycle lane, than disagreed (Westminster 41% to 28%, Hammersmith 37% to 19%, and Edinburgh wide 40% to 23%). At the remaining sites, more people disagreed than agreed (Edinburgh narrow 38% to 24%, Derby contra-flow 27% to 16%). This suggested that cyclists preferred a wide bus lane to a cycle lane, but preferred a cycle lane to a narrow bus lane.

Comments on the safety afforded to cyclists by bus lanes included the following: 'Bus lane fairly safe, better without taxis', 'OK until cars start coming in early before the end of the bus lane', 'Safety is OK due to less traffic in bus lane and bus drivers are considerate'. Negative comments included, 'Because it is called a bus lane some people don't think we should use it', 'If you get hit by a bus you're dead, if you get hit by a car you might survive'.

### 5.7 Other vehicles in the bus lane

Cars parked in the bus lane were considered a problem by most respondents (67% to 80%) at all sites except Edinburgh Calder Road, where only 28% agreed and 72% disagreed that parked cars caused problems. At all sites, most people, ranging from 74% at Westminster to 52% at Hammersmith, agreed that they would be concerned if motorbikes were allowed to use the bus lane.

### 5.8 Bus and bicycle interaction

Respondents were asked a series of questions about their feelings and behaviour when they interacted with a bus. These questions examined the cycle users' general reactions and behaviour in bus lanes, but it was not possible to relate their responses directly to the facility type in which they responded to the questionnaire. Therefore, the percentages given below relate to

proportions of the total sample of 232 cyclists and do not necessarily include all responses.

The majority of those questioned (60%) said that they at least 'occasionally' felt intimidated by buses behind them. Seventeen per cent said they were often intimidated but over a fifth said that they never were.

Respondents were asked specifically what they did when they were being followed closely by a bus. Forty four per cent said they moved over to let the bus pass, 6% said they slowed down, 40% said they increased their speed and 1% said they tried to prevent the bus from passing.

In addition to the standard questionnaire, some additional questions were asked at the Westminster and Derby sites to examine views specifically relating to the cycle lane within the bus lane and the contra-flow bus lane respectively.

### 5.9 Cycle lanes inside bus lanes

Respondents in Westminster were asked what they thought about the advisory cycle lane (Plate 3). The responses were overwhelmingly favourable. Eighty four per cent of those interviewed considered the lane to be safer (including 47% a lot safer) and 60% considered them to be quicker (including 21% a lot quicker). No one considered that the lane made journeys less safe or slower. Favourable comments included, 'This is the best layout', 'Let's have more of them', 'Should be more of them and more continuous', 'Any cycle route makes motorists more aware of us', 'If roomy, very good', 'Prefer them than to just using bus lanes-safer' and 'Good idea for buses too-speeds it up for buses and cyclists'.



**Plate 3** The advisory cycle lane, Westminster Bridge, London

Some comments were more ambivalent such as, 'Painted lines make hardly any difference but in general are a good idea' and 'Not clear whether we can go in bus lane-can they come in this lane?' Most negative comments focused on problems at the bus stops e.g., 'Bus stops in cycle lanes are dangerous for cyclists', 'They're fine except buses pulling into stops' and 'Dodgy at bus stops'. Other negative comments included, 'They're very unsafe as buses are inconsiderate and don't heed cyclists', 'They are dangerous-a contest between cyclist and bus driver'.

Respondents at other sites (without an advisory cycle lane) were asked if they thought it would be better if bus lanes had cycle lanes marked inside them. A large majority of respondents (71%) said, 'Yes'.

Respondents were questioned to explore why they thought this was a good idea. One hundred and forty three comments were received, and the category with the largest response (22%) contained comments that related to advisory cycle lanes giving cyclists dedicated space e.g., 'A definite demarcation between me and the bus', 'Inexperienced cyclists tend to wander, this would help keep them on track, so to speak', 'It would make it more obvious that cyclists have a right to use the bus lane' and 'You'd know which part of the lane to ride on'. Other comments included those that related to raising awareness of cyclists, 'Makes it easier on cyclists so everyone can see they're allowed to use the bus lane', 'Make cyclists' rights clearer- it gives a safe boundary', 'Good visual reminder to bus drivers that cyclists have a right to exist', 'Not seen as a hindrance, you have a right to be on the road and are not slowing everyone down' and 'I don't think buses realise bikes should be in the bus lane; a green cycle lane would make everyone aware'. Other comments included, 'Saves buses and cyclists time, stops leapfrogging' and 'There's not enough buses on most routes to cause a problem'.

Negative comments included the worry that cyclists would be ignored by cars and buses e.g., 'Cars would ignore the cycle lane as they do bus lanes at present', 'Buses aren't going to recognise them', 'Cars park and drive in cycle lanes'. Several respondents were concerned about the effect on bus stops e.g., 'Not logistically possible, would need to go round bus stops', 'Cycle lane should be on offside due to buses dropping off'. Other comments included, 'It would cause extra problems', 'Need a kerb between buses and bikes', 'Wouldn't feel under greater pressure to go faster if buses were behind'.

### 5.10 Contra-flow bus lane

Views were sought from respondents about the contra-flow lane (Plate 4) to assess whether there were differences from with-flow lanes. The contra-flow lane in Derby was 3.8 metres wide at the point where the interviews took place. Contra-flow bus lanes can provide cyclists with a car-free route into town and city centres which is often shorter and more direct than the main traffic route. This fact may be the reason that nearly a quarter of all respondents in Derby said the bus lane was the main reason for them choosing that particular route (a higher proportion than at any other location).

Over half the respondents in Derby thought the contra-flow lane was too narrow (the highest proportion of all sites). Nearly half (47%) of respondents thought that the lane was the right width, but this contrasted with 80% at the Calder Road site, which was a with-flow lane of the same width. Bus drivers in Derby were also considered to be the least considerate towards cyclists. This could be because overtaking cyclists forced them into the oncoming traffic lane, and therefore they had less opportunity to give cyclists a comfortable overtaking distance. Derby was also the only site where fewer than half of all respondents



Plate 4 The contra-flow lane, Derby

considered conditions to be safe for cyclists in the bus lane. However, uniquely amongst the sites, 100% of cyclists in Derby considered the bus lane to be safer than cycling on a similar road without a bus lane, although that was not surprising if respondents were comparing cycling against the traffic flow without any protection.

Respondents in Derby also felt that a cycle lane would be safer than the contra-flow bus lane. Generally therefore, the survey in Derby confirmed the belief that, although contra-flow bus lanes can be of greater use to cyclists, they can also present them with greater sense of danger. The preference for a bicycle lane rather than a bus lane helps locate the source of perceived danger on the buses, rather than oncoming traffic. This implies that it is not the principle of contra-flow that is problematic, but the willingness or ability of buses to allow adequate passing distances to cyclists when constrained by oncoming motor traffic.

### 5.11 Likes and dislikes (open questions)

Respondents were asked generally what they liked and disliked about cycling in bus lanes. The most frequently mentioned factor was that they were safer (37%) e.g., 'You feel safer because of red tarmac', 'Get the feeling of safety, no traffic except buses', 'I feel safer, you can also keep going if the traffic is clogged up' and 'It is safer than when you are weaving in and out of normal traffic'. The second most frequent response (22%) was that they made journeys quicker e.g., 'Speed is improved for cyclists', 'It gets you from A to B quicker', 'Traffic does not slow me down', and 'Speed at rush hour passing cars'. Other comments generally fell into the categories of bus lanes being more convenient, away from unpredictable cars, allowing more space, containing less traffic and being congestion free, and allowing the cyclist a clear path. For example, typical comments were: 'A bit more room to manoeuvre', 'Less traffic, surface is better, more space', 'More friction, less slippery, surface is better than normal roads', 'Less stressful', 'Only deal with buses and taxis rather than all the other nutters in cars', and 'Quieter, less stressful and less likely to be knocked off'.

One hundred and forty five comments were made about what cyclists disliked about cycling in the bus lane. The

category that included the most comments (42%) focussed on aggressive or inconsiderate bus drivers. Comments included, 'Bus drivers are not always aware they have to share and they are not used to the idea yet', 'Bus drivers cut us up and sit on our back wheel'.

Other traffic (particularly cars) in the bus lane was mentioned by 12% of respondents. Comments included; 'Cars that use bus lanes, you're not expecting them so it's more dangerous', 'Unpredictability of a car appearing' and 'Cars cutting into the bus lane in front of you-happens towards the end of the bus lane'.

The categories of 'parked cars in the bus lane', 'bus stops', 'bus fumes', and inconsiderate taxis' were mentioned by 8% of respondents. Comments included, 'If narrow with traffic backed up, fumes are terrible', 'People at bus stops tend to wander into road, not aware of cyclists', 'It's dangerous negotiating your way round a parked bus as they pull in and out' and 'Taxis passing at speed due to lack of traffic in the bus lane'.

Other comments included, 'I don't like holding buses up, don't like feeling buses behind me' and 'I don't like it when motorcyclists use it'.

### 5.12 How to improve bus lanes

Respondents were also asked what could be done to improve things for cyclists in bus lanes. The most frequent single response (36% of all comments) was to add a cycle lane inside the bus lane. However, some of these comments included suggestions to put the cycle lane on the outside of the bus lane e.g., 'Cycle lane on outside as bikes don't need to stop like buses', 'Have cycle lane on outside so buses don't pull across and hold you up'. Other categories included improved marking and layout, better enforcement of the bus lane and increasing the bus lane width. Individual comments included, 'Make them wider, police them more', 'Passengers should be more aware of cyclists who could be overtaking on the inside', 'Stronger penalties for motorists who park in them', 'Put a sign on buses to remind people who are stepping off to look out for cyclists', 'More education of cyclists and bus drivers to stop conflict', 'Drivers of Routemaster buses are generally better-they are just driving, not taking money'.

### 5.13 Bus drivers' views

In order to understand the interactions between cyclists and buses better, the views of bus drivers were also sought. A small sample of bus drivers in Reading completed a questionnaire about the specific issue of cyclists in bus lanes. It should be noted that, unlike the survey of cyclists' attitudes that took place within bus lanes and asked questions relating to that bus lane in particular, this survey considered general attitudes and views. Only 17 responses were received to the questionnaire, which is reproduced at Appendix C. This small sample size did not permit reliable statistical analysis, nor inferences to be drawn as to the general views of bus drivers, nevertheless, there were some strongly suggestive patterns that arose in the responses.

Some conflict with cyclists was indicated in bus drivers' responses, however, concerns about cyclists appeared less prominent than concerns about other users in drivers' responses, despite the fact that the questionnaire explicitly sought views on cycling. A summary is given below.

*Question: When not using a bus lane, which other road users cause you the most concern about delays?*

**Table 7 Bus drivers' concerns about other road users and delays**

	Number of mentions	%*
Cars	9	43
Taxis	4	19
Cyclists	5	24
Other	3	14
Total	21	

\* Percentages are rounded.

*Question: When not using a bus lane, which other road users cause you the most concern about accidents?*

**Table 8 Bus drivers' concerns about other road users and accidents**

	Number of mentions	%*
Cars	8	38
Taxis	2	10
Cyclists	2	10
Pedestrians	9	43
Total	21	

\* Percentages are rounded.

There was a distinct impression that bus drivers thought cyclists did not understand the difficulties faced by bus drivers. Ten of the 17 respondents disagreed with the statement that cyclists understood their needs, and 8 of those disagreed strongly. Only one respondent agreed strongly that cyclists understood bus drivers' difficulties.

The overwhelming majority of bus drivers thought that the standard bus lane (3m) was too narrow for sharing with cyclists, with 12 out of the 17 disagreeing strongly that the lanes were adequately wide. That seemed to reflect a general sense that the lanes were not wide enough for buses – 14 of the drivers believed that bus lanes generally were either a little or much too narrow. Of the suggested improvements, only road widening was seen as a possible solution, although some favoured making cyclists use the footway instead of the bus lane.

The bus drivers tended towards the impression that cyclists were somewhat cavalier in their approach to road traffic regulations. The contrast between the fear of losing a Public Service Vehicle licence (and hence a livelihood) and the unlicensed freedom of a cyclist appeared to be a particular source of resentment. Bus drivers also considered

that they should be top of the 'road user hierarchy'. Not surprisingly, they did not view their own behaviour as problematic – 13 of the 17 believed that bus drivers generally travelled at about the right speed in bus lanes and 12 agreed that bus drivers were generally courteous to cyclists. Only one of the sample disagreed (strongly) that bus drivers were generally courteous to cyclists.

## **6 Conclusions and recommendations**

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### **6.1 Conclusions**

This project considered the use of bus lanes by cyclists. It assessed the effect of cyclists on buses and the physical interaction between the two modes in bus lanes that varied according to a number of key parameters, specifically:

- Width.
- Provision of an advisory cycle lane.
- With flow versus contra-flow.

The project also considered those parameters in relation to the views of cycle users, with particular reference to their assessments of the utility and safety of specific facilities.

Finally, the study investigated the views of bus drivers in order to understand the interaction and behaviour of cyclists and bus drivers in bus lanes more completely.

The results from these three elements of the study allowed a number of conclusions to be drawn. These fall into a number of discrete categories, as described below.

#### *Benefits of bus lanes to cyclists*

- The interviews showed that bus lanes were generally very popular with cyclists, compared with cycling in the typical traffic conditions of the area. In each of the five sites where interviews took place, a large majority of respondents said that cycling in the bus lane was safer than cycling on a similar road without a bus lane. The popularity of cycling in bus lanes was indicated by nearly a quarter of all respondents citing the lanes as a reason for selecting that particular route.
- The aspects of bus lanes most appreciated by cyclists were the perceived safety benefits, followed by the journey time improvements. Cyclists most disliked aggressive, or inconsiderate behaviour by bus drivers, followed by the misuse of the bus lane by other vehicles.
- Cyclists considered the contra-flow bus lane to be the least safe, but still safer than similar roads with no bus lane.
- The contra-flow bus lane influenced the cyclists' route choice more than any of the with-flow bus lanes investigated.

#### *Lane widths*

- Cyclists clearly preferred bus lanes with generous widths. The widest bus lanes, at 4m and 4.2m, were considered 'about the right width' by nearly all respondents, whereas the narrowest, at 3.15m, was considered the right width by fewer than half.

- Even narrow bus lanes were beneficial to cyclists. Although cyclists preferred wider bus lanes, they still preferred cycling in the (narrow) bus lane to cycling on a similar road with no bus lane.
- It is sometimes suggested that, where a wide bus lane cannot be provided, a narrow bus lane is preferable in order to prevent bus drivers attempting to overtake cyclists with inadequate clearance. This idea was not supported by the results of this research. Basically, 'wider is better' as long as widening the bus lane does not adversely affect the cycling conditions in the oncoming traffic lane.

#### *Compared with cycle lanes*

- In bus lanes over 3.8m wide, most cyclists (who expressed an opinion) thought that bus lanes afforded them greater safety than a cycle lane. However, in the narrower bus lanes, most cyclists (who expressed an opinion) thought a cycle lane would be safer than a bus lane.
- A clear majority of respondents expressed a preference for having a cycle lane inside a bus lane. The principle advantage was considered to be safety. Most respondents also thought cycle lanes inside bus lanes enabled journeys to be made a little, or much quicker.

#### *Delays to buses*

- In bus lanes of less than approximately 3.5 m, buses might be delayed by cyclists, but that is only a significant problem if cycle flows are high. Wider bus lanes are, therefore, in the interests of bus users.
- Cyclists did not generally believe that they caused delays to buses in the bus lane. Cyclists in the bus lane with the advisory cycle lane thought that they caused buses the least delays (possibly because they were separated from the bus lane).
- At the sites studied, delays to buses as a result of cyclists using bus lanes were minimal.

#### *Bus driver/cyclists relations*

- Most cyclists considered bus speeds to be 'about right'. Views on whether bus drivers were considerate towards cyclists varied considerably from site to site. Bus drivers were rated the least considerate at the contra-flow site. This might have been because overtaking a cyclist in a contra-flow lane could involve the bus entering the oncoming traffic lane, which might prevent buses from overtaking cyclists with the usual safety margin.
- Most bus drivers held a generally poor opinion of cyclists and thought that the standard bus lane width (3m) was too narrow for sharing with them.

#### *Other bus lane users*

- Cars parked in the bus lane were considered a problem by most respondents at four of the five sites.
- The majority of respondents at all sites said they would be concerned if motorbikes were allowed to use the bus lane.

## 6.2 Recommendations

### Planning

- The value of bus lanes to cyclists should be recognised and incorporated into any economic appraisal of the implications of reallocating general purpose road space to buses.
- The use of bus lanes by cyclists should be anticipated and planned for.
- Transport planners should, where possible, take an integrated approach towards assisting buses and cyclists so that cyclists are seen as equal users of ‘bus’ lanes, as implied by the Edinburgh term ‘Greenway’.
- Proposed changes to bus priority measures should be subject to Cycle Audit procedures.

### Design

- Bus lanes (with-flow and contra-flow) and other bus priority schemes should be designed for use by cyclists, wherever this can be safely achieved.
- Where possible, bus lanes should be made wider wherever cyclists are expected to use them – that is, in the great majority of cases. The ‘standard’ width for a bus lane should, therefore, be revised to 4m, although it might not always be possible to achieve this width.
- Where width permits (4m and over), advisory cycle lanes should be provided inside bus lanes. The cycle lane should be located at the kerb-side of the bus lane.
- Bus lanes should not deliberately be made narrow in order to prevent buses overtaking cyclists.
- Contra-flow bus lanes should be wider than the equivalent with-flow lane.
- Where bus lanes of less than 4m are provided, consideration should be given to upgrading drain gullies to kerb-face inlets.

- More research is necessary into the optimum methods of resolving conflicts and delays to cyclists at bus stops.

**Table 9** was assembled from the results of this research, from earlier TRL research (Nicholson, 1978) and from guidance published in LTN 1/97 and Cycle Friendly Infrastructure (IHT, 1996). These recommended widths are based on ‘typical’ urban conditions. The likelihood of conflict between cyclists and buses probably increases where bus speeds are higher than 30mph, or where flows of either class of user are unusually high. Where these unusual conditions pertain, greater widths may be necessary.

### Maintenance

- Bus lanes, particularly those with higher flows, can be subject to more rapid deterioration of the surface than the general carriageway owing to the greater weight of buses than most vehicles. Damage to the surface can cause discomfort and increase risk to cyclists, including causing them to swerve or adopt a position towards the centre of the lane, between the wheel-tracks. It is recommended, therefore, that bus lanes should be subject to more frequent inspection than the general highway network, and should be prioritised for repair where damage is identified.

### Education and enforcement

- Efforts should be made to encourage bus drivers and cyclists to appreciate their mutual concerns.
- Bus lane regulations should be better enforced, particularly regarding illegal parking and loading.
- There is considerable interest in allowing motorcycles to use bus lanes. This research has revealed concern among cycle users about this prospect. Sign approval from the Department for Transport (DfT) is required for such

**Table 9 Relationship between bus lane widths and cycle/bus interactions**

<i>Effective lane width (metres)</i>	<i>Overtaking a cyclist</i>
<b><i>With-flow bus lanes</i></b>	
3m (minimum recommended width for a bus lane) -3.2m	Insufficient space for a bus (2.5m maximum width) to overtake a cyclist (0.7m average width) without entering the adjacent lane.
3.3m-3.6m	Overtaking within bus lane possible but considered unsafe by a majority of cyclists. Cyclists able to stay in bus lane when overtaking parked cars during non-operational hours.
3.7m-4.0m	Overtaking within bus lane considered safe by a majority of cyclists. Cyclists able to overtake large vehicles parked in the bus lane during non-operational hours.
Over 4m	The minimum preferred width for a bus lane is 4m (allowing buses to overtake cyclists safely and reducing the likelihood of interference from general traffic in the adjacent lane).Where bus lanes are over 4m wide, an advisory cycle lane can be marked out (3.0m for the bus and 1.0m or more for the cyclist). This research has shown this to be a popular facility with cyclists.Where roads are wide enough, the bus lane should be at least 4.25m wide.
<b><i>Contra-flow bus lanes</i></b>	
3-3.6m	Buses unable to pass cyclists safely without leaving the confines of the bus lane.
3.7m-4.0m	Overtaking within bus lane considered safe by a majority of cyclists.
Over 4.0m	The minimum preferred width for a bus lane is 4m (allowing buses to overtake cyclists safely and reducing the likelihood of interference from general traffic in the adjacent lane).Where roads are wide enough, the bus lane should be at least 4.25m wide

schemes. The DfT is concerned that the wider use of bus lanes by motorcycles should only be encouraged following controlled pilot schemes that are fully monitored. Bristol was the first highway authority to allow this in 1995 and a number of other authorities, including Bath, Birmingham, Colchester, Hull, Reading, Sheffield, South Gloucester and Swindon have followed suit. Two trials of motorcycles in bus lanes are currently being evaluated. Transport for London (TfL) is conducting pilot schemes on three corridors (A13 East India Dock Road, A23 Brixton Road and A41 Finchley Road) in the capital and TRL is monitoring three sites on Queens Drive in Swindon. Before and after monitoring surveys have been carried out for both trials and data analysis is underway. A greater understanding of the interactions between, and impacts on, buses, cyclists, motorcyclists and pedestrians with motorcycle use of bus lanes is needed and it is recommended that the findings of the two pilot schemes are considered alongside the need for further work.

### Information

- Bus lanes should be shown on urban cycle route maps.
- The current edition of the Highway Code advises cyclists that they may only use a bus lane if the cycle symbol is present. This is at odds with the convention that cyclists are permitted to use bus lanes unless specifically excluded. It is recommended therefore that cyclists should check whether they are permitted to use the lane, rather than assume that they will be able to do so.

## 7 Acknowledgements

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## Appendix A: Cyclist questionnaire – with-flow bus lanes

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Location.....

Ref Number □□□

**Good morning/afternoon. I'm from the Transport Research Laboratory, and I would like to ask you a few questions about shared bus and cycle lanes**

1. **What is the main purpose of this cycle journey today?**  
***DO NOT READ OUT***  
***Ring one code only***

- To/ from work 1
- In the course of business 2
- To/ from school/college/university 3
- To/from shopping 4
- Personal business 5
- To/from socialising/meeting friends 6
- Leisure/exercise 7

Other (write in).....

2. **(a) About how far is this cycle journey today?**  
***Write in***

.....miles

- (b) How often do you make this journey by bicycle?**  
***READ OUT***  
***Ring one code only***

- More than once a day 1
- About once a day 2
- Several times a week 3
- About once a week 4
- About once a fortnight 5
- About once a month 6
- Less than once a month 7

***READ OUT:*** The next few questions are about this particular bus lane

3. **Has this bus lane affected your choice of route?**  
***READ OUT***  
***Ring one code only***

- Yes, it's the main reason why I come this way 1
- Yes, it's one of the reasons why I come this way 2
- No, I would come this way whether there's a bus lane or not 3

4. (a) As a cyclist, do you think this bus lane is easy to use?

Yes 1

No 2

(b) Why do you say that?

*Probe and record all reasons*

5. As a cyclist, what do you think about this bus lane regarding safety?

*Probe and record all reasons*

6. As buses and cyclists share this bus lane, do you think the lane at the point where you were stopped is.....?

**READ OUT**

*Ring one code only*

A lot too wide 1

A little too wide 2

About the right width 3

A little too narrow 4

A lot too narrow 5

7. Would you say that buses in this bus lane at the point where you were stopped generally travel.....?

**READ OUT**

*Ring one code only*

A lot too fast 1

A little too fast 2

About the right speed 3

A little too slowly 4

A lot too slowly 5

8. **Would you say that conditions for you as a cyclist in this bus lane at the point where you were stopped are.....?**

**READ OUT**

**Ring one code only**

- Very safe 1
- Quite safe 2
- Neither safe nor dangerous 3
- Quite dangerous 4
- Very dangerous 5

9. **How safe do you find cycling in this bus lane compared to cycling on similar roads without bus lanes? Would you say it is.....?**

**READ OUT**

**Ring one code only**

- A lot safer 1
- A little safer 2
- About the same 3
- A little more dangerous 4
- A lot more dangerous 5

10. **How quick do you find cycling in this bus lane compared to cycling on similar roads without bus lanes? Would you say it is.....?**

**READ OUT**

**Ring one code only**

- A lot quicker 1
- A little quicker 2
- About the same 3
- A little slower 4
- A lot slower 5

11. How much do you agree with each of the following statements?

**SHOW CARD A**

*Ring one code only on each row*

	Strongly agree				Strongly disagree
(a) Cycling in this bus lane is safer than cycling on similar roads <u>without</u> bus lanes	1	2	3	4	5
(b) Cycling in this bus lane is safer than cycling on similar roads <u>with</u> cycle lanes	1	2	3	4	5
(c) This bus lane is wide enough to be used safely by cyclists and buses together	1	2	3	4	5
(d) Cyclists in this bus lane cause delay to buses	1	2	3	4	5
(e) Bus drivers are considerate towards cyclists in this bus lane	1	2	3	4	5
(f) Cars parked in this bus lane are a problem	1	2	3	4	5
(g) I would be concerned if motorbikes were allowed to use this lane	1	2	3	4	5

**READ OUT:** The next few questions are about cycling in bus lanes in general

12. (a) Do you think it would be better if bus lanes had cycle lanes marked inside them?

Yes 1  
No 2

(b) Why do you say that?

*Probe and write in*

13. What do you like best about cycling in bus lanes?  
*Write in*

14. What do you dislike most about cycling in bus lanes?  
*Write in*

15. (a) Have you ever been involved in an incident when cycling in a bus lane which could have, or did result in someone being injured?

Yes 1  
No 2

*If YES*

(b) Was it.....?

**READ OUT**

*Ring one code only*

An injury accident 1  
A damage only accident 2  
A near miss 3

**Please describe the incident, giving its location**

16. What do you think could be done to improve things for cyclists in bus lanes?  
*Write in*

17. (a) When you are cycling in a bus lane, do you ever feel threatened or intimidated by buses behind you?

**READ OUT**

*Ring one code only*

Yes, often 1  
Yes, occasionally 2  
No 3

(b) When you are in a bus lane being followed closely by a bus do you....?

**READ OUT**

**Ring all that apply**

- Continue as normal 1
- Speed up 1
- Slow Down 1
- Move over to let the bus pass 1
- Try to stop the bus from passing you 1
- Other (write in).....

18. Have you any other comments about cyclists and buses?

**Write in**

**ABOUT YOURSELF**

19. (a) Do you have access to a car you drive yourself?

- Yes 1
- No 2

(b) Do you hold a current driving licence?

- Yes 1
- No 2

20. How much do you agree with each of the following statements?

**SHOW CARD A**

**Ring one code only in each row**

	strongly agree				Strongly disagree
(a) For me personally, cycling is a convenient form of transport	1	2	3	4	5
(b) Cyclists should be given more priority in towns and cities, even if this makes things more difficult for car drivers	1	2	3	4	5

21. **What is the occupation of the chief wage earner in your household (or if retired the occupation before retirement)?**

*Interviewer to code*

- A. Senior managerial, administrative or professional 1
- B. Junior managerial, administrative or professional/supervisory and clerical 2
- C. Skilled manual 3
- D Semi-skilled or unskilled manual 4
- E Student, housewife/husband 5
- Unemployed 6
- Don't know/can't say 7

22. **Age:**

- Under 18 1
- 18 to 24 2
- 25 to 39 3
- 40 to 59 4
- 60 or over 5

23. **Sex:**

- Male 1
- Female 2

**THANK RESPONDENT AND CLOSE**

Interviewer signed.....

Time.....

Date.....

## **Appendix B: Additional questions for cyclists in contra-flow bus lane**

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READ OUT: You are currently in a contra-flow bus lane (where cyclists and buses travel in the opposite direction to traffic in the adjacent lane)

**11.1 How do you think cycling in contra-flow bus lanes compares with normal bus lanes?**

.....  
.....

**11.2 Where, if anywhere, do you feel most vulnerable in this contra-flow bus lane?**

.....  
.....

**11.3 Do you find any particular problems at the points where the contra-flow bus lane starts and finishes?**

## Appendix C: Additional questions for cyclists in bus lane with advisory cycle lane

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### Additional questions for cyclists in bus lane with advisory cycle lane.

READ OUT: When there is sufficient width, bus lanes sometimes have cycle lanes marked inside them, like here on Westminster Bridge.

#### 12. Do you think cycle lanes inside bus lanes make journeys

- A lot safer than cycling in normal bus lanes?
- A little safer than cycling in normal bus lanes?
- About the same as cycling in normal bus lanes?
- A little safer than cycling in normal bus lanes?
- A lot safer than cycling in normal bus lanes?

#### 13. Do you think cycle lanes inside bus lanes make journeys

- A lot quicker than cycling in normal bus lanes?
- A little quicker than cycling in normal bus lanes?
- About the same as cycling in normal bus lanes?
- A little slower than cycling in normal bus lanes?
- A lot slower than cycling in normal bus lanes?

#### 14. Do you have any other thoughts on having cycle lanes inside bus lanes?

.....  
.....

## Abstract

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Cyclists in the UK are normally permitted to use with-flow bus lanes and other bus priority facilities because sustainable modes of transport are being encouraged and because cycling in bus lanes is usually safer than riding outside them between moving buses and general traffic. TRL was commissioned by the Department for Transport to examine the issues surrounding cyclists and bus priority in order to:

- Obtain a better understanding of cyclist and bus interaction in bus lanes.
- Provide guidance on the practical options available for increasing the safety and convenience for cyclists in bus priority schemes.

Surveys and interviews carried out in Edinburgh, Hull, Derby and London found that riding in bus lanes (including contra-flows) was generally very popular with cyclists because it appeared safer and more direct than cycling in general traffic. Wider bus lanes were preferred, and an advisory cycle lane within the bus lane was suggested where space allowed. Few instances of actual conflict or delay were observed, but bus drivers and cyclists appeared to have a generally low opinion of each other, which might be addressed by ensuring sufficient bus lane width and greater mutual awareness.

## Related publications

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TRL549 *Drivers' perceptions of cyclists* by L Basford, S Reid, T Lester, J Thompson and A Tolmie. 2002 (price £40, code HX)

TRL490 *Cyclists' assessments of road and traffic conditions: the development of a cyclability index* by N Guthrie, D G Davies and G Gardner. 2001 (price £35, code H)

CT15.2 *Planning for pedestrians and cyclists update (1999-2001). Current Topics in Transport: selected abstracts from TRL Library's database* (price £20)

Prices current at August 2004

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